

ANALYSIS OF THE NUMBER OF FACILITIES REGULATED BY EPA'S SPCC PROGRAM

1. EXECUTIVE SUMMARY

This analysis provides a national estimate of the number of facilities potentially regulated by EPA's SPCC Program.¹ To develop this estimate, EPA used the results from EPA's 1995 Survey of Oil Storage Facilities (1995 SPCC Survey) and extrapolated them to the nation using standard statistical techniques. EPA then compared the results of the 1995 SPCC Survey to previous government and industry studies and calculated a 1996 Adjusted National Estimate, which represents EPA's best approximation of the number of facilities regulated by the SPCC Program. The analysis indicates that approximately 438,000 facilities are potentially regulated under the SPCC regulation. The industries that make up the greatest proportion of potentially-regulated facilities are farms (37 percent) and oil production facilities (33 percent).

2. APPROACH

To develop a national estimate of SPCC-regulated facilities, EPA applied standard statistical techniques to the results from the 1995 SPCC Survey. The 1995 SPCC Survey was designed to ensure that data on the sampled facilities could be statistically extrapolated to the nation as a whole for all facilities regulated by EPA's SPCC regulation. To accomplish this, EPA randomly selected facilities in industries likely to include regulated facilities. Using several national databases, facilities were randomly selected to ensure that the sample facilities reflect the actual universe of facilities that produce, use, or store oil products. EPA's approach for calculating the sample allows EPA to make statements about surveyed industries to within 10 percent of their true value and within the 90-percent confidence interval.²

EPA used a two-stage cluster sampling methodology in which EPA clustered counties into sampling units according to the total estimated storage capacity for that county, and then randomly selected facilities within each of the counties. For the 1995 SPCC Survey, EPA sampled facilities in 215 of the 3,111 counties in the 48 contiguous states. Of the 215 counties, 20 stored large volumes of oil and, thus, were considered to be "self-representing" in the sample design; that is, the results obtained from those counties were only extrapolated to the population of those counties. Because of the significant difference in total oil storage capacities in those 20 counties, including them with the other 195 as part of the overall extrapolation would have generated significantly lower confidence in the resulting estimates. For this reason, in the sample design the counties were divided into two distinct strata:

¹ The Spill Prevention, Control, and Countermeasures regulation is found at 40 CFR Part 112.

² Statistical error is defined by two measures: the percent error and the percent confidence. The percent error is the amount (plus or minus) that the true value could vary from the point estimate. The percent confidence indicates the probability that the true error will fall between the upper and lower values. For example, in this analysis a 10-percent error bound indicates that we are 90 percent confident that the true value is within 10 percent of the point estimate.

- Stratum One consists of 20 counties that have a large estimated overall oil storage capacity; and
- Stratum Two consists of the remaining 195 counties.

EPA used standard statistical techniques to extrapolate the 1995 SPCC Survey results to the nation and to develop confidence intervals around those estimates.³ EPA then summed the point estimates and confidence intervals based on the two strata to give an overall estimate of the national number of facilities in each industry sector that meet the SPCC oil storage criteria. Because the sample design is self-weighting and the number of facilities meeting the SPCC oil storage criteria is estimated by Standard Industrial Classification (SIC) code (the estimate does not cut across industry strata), EPA used a simple inflation estimator for two-stage cluster sampling⁴ to calculate the total number of facilities meeting the oil storage criteria within each industry stratum.

EPA compared the results of the 1995 SPCC Survey to previous government and industry studies and calculated the 1996 Adjusted National Estimate. To develop this estimate, EPA used the number of facilities from the study providing the best estimate for a particular industry sector. For example, EPA used the estimate provided by the 1995 SPCC Survey where the industry population size could be calculated with 90-percent confidence. Where the 1995 SPCC Survey could not provide a reliable estimate, EPA either used the estimate calculated in the 1991 Facilities Study, which provided the federal government's previous best estimate of the size of the SPCC regulated community, or calculated the mid-point between the 1995 SPCC Survey and the 1991 Facilities Study. The 1996 Adjusted National Estimate also reflects EPA's estimate of the number of SPCC-regulated facilities in Alaska and Hawaii.

3. 1995 SPCC SURVEY RESULTS

EPA's analysis of the 1995 SPCC Survey data indicates that between 350,000 and 425,000 facilities may be regulated under the SPCC regulation. Furthermore, the five industries that comprise the greatest proportion of SPCC-regulated facilities are farms (42 percent), oil production facilities (37 percent), manufacturing facilities (6 percent), transportation facilities (4 percent), and gasoline service stations/vehicle rental (3 percent). For each of the 16 industries surveyed, **Exhibit 1** provides the estimated number of SPCC-regulated facilities. **Exhibits 2** and **3** graphically present the nationally extrapolated point estimate of the number of regulated facilities for each of the 16 industry sectors surveyed. On each of the graphs, the shaded bars

³ The statistical equations used by EPA are presented in Appendix A.

⁴ A first stage of a two-stage cluster sample, such as that used in this analysis, involves randomly selecting primary sampling units (PSUs) that are representative of the entire study population (e.g., selecting contiguous groups of counties that are representative of all counties in the U.S.). The second stage involves randomly sampling individual enumeration units (in this case facilities) from each PSU that are representative of all of the other enumeration units within that PSU. Enumeration units can then be extrapolated to the PSU, or county level, and PSU-level estimates can be extrapolated to the nation as a whole.

**Exhibit 1:
1995 SPCC Survey National Estimate of SPCC-Regulated Facilities**

Industry	SIC Code(s)	Estimated Number of Facilities Meeting the Storage Criteria	Total Population ^a	Estimated Percent of Industry Strata Meeting Criteria ^b	Percentage Estimate of Facilities Meeting Storage Criteria Within the 90% Confidence Interval	Estimated Number of Facilities Meeting Criteria Within the 90% Confidence Interval
Farms	01	163,157	1,925,300	8%	7.82% - 9.13%	150,509 - 175,805
Coal Mining/Nonmetallic Mining	12/14	1,849	7,959	23%	18.23% - 28.23%	1,451 - 2,247
Oil Production ^c	131	144,349	210,223	69%	61.21% - 76.12%	128,676 - 160,022
Contract Construction	16	7,167	34,332	21%	19.03% - 22.72%	6,533 - 7,801
Manufacturing	20-39	24,612	370,401	7%	5.85% - 7.45%	21,682 - 27,592
Food and Kindred Products	20	4,314	21,049	20%	18.02% - 22.97%	3,793 - 4,835
Chemicals and Allied Products	28	3,281	12,371	27%	16.22% - 36.82%	2,007 - 4,555
Petroleum Refining and Related Industries	29	827	2,117	39%	13.56% - 64.57%	287 - 1,367
Primary Metals Industries	33	664	6,726	10%	5.08% - 14.66%	342 - 986
Other Manufacturing	21-27/30-32/ 34-39	15,526	328,138	5%	4.65% - 4.83%	15,253 - 15,849
Transportation	401/411/413/414/ 417/42/449/458	16,492	133,262	12%	11.49% - 13.14%	15,309 - 17,513
Electric Utility Plants	491	2,638	5,523	48%	38.53% - 53.49%	2,128 - 2,954
Petroleum Bulk Stations and Terminals	5171	6,845	11,200	61%	55.67% - 66.56%	6,235 - 7,455
Gasoline Service Stations/Vehicle Rental	554/751	12,996	111,697	12%	10.89% - 12.37%	12,166 - 13,818
Fuel Oil Dealers	5983	2,160	4,924	44%	29.43% - 58.31%	1,449 - 2,871
Hospitals/Colleges/Other Education	806/821/822	3,408	27,570	12%	10.85% - 13.87%	2,991 - 3,823
Military Installations	97	988	5,472	18%	15.00% - 21.11%	821 - 1,155
Total	--	386,661	2,847,863	14%	12.29% - 14.86%	349,950 - 423,056

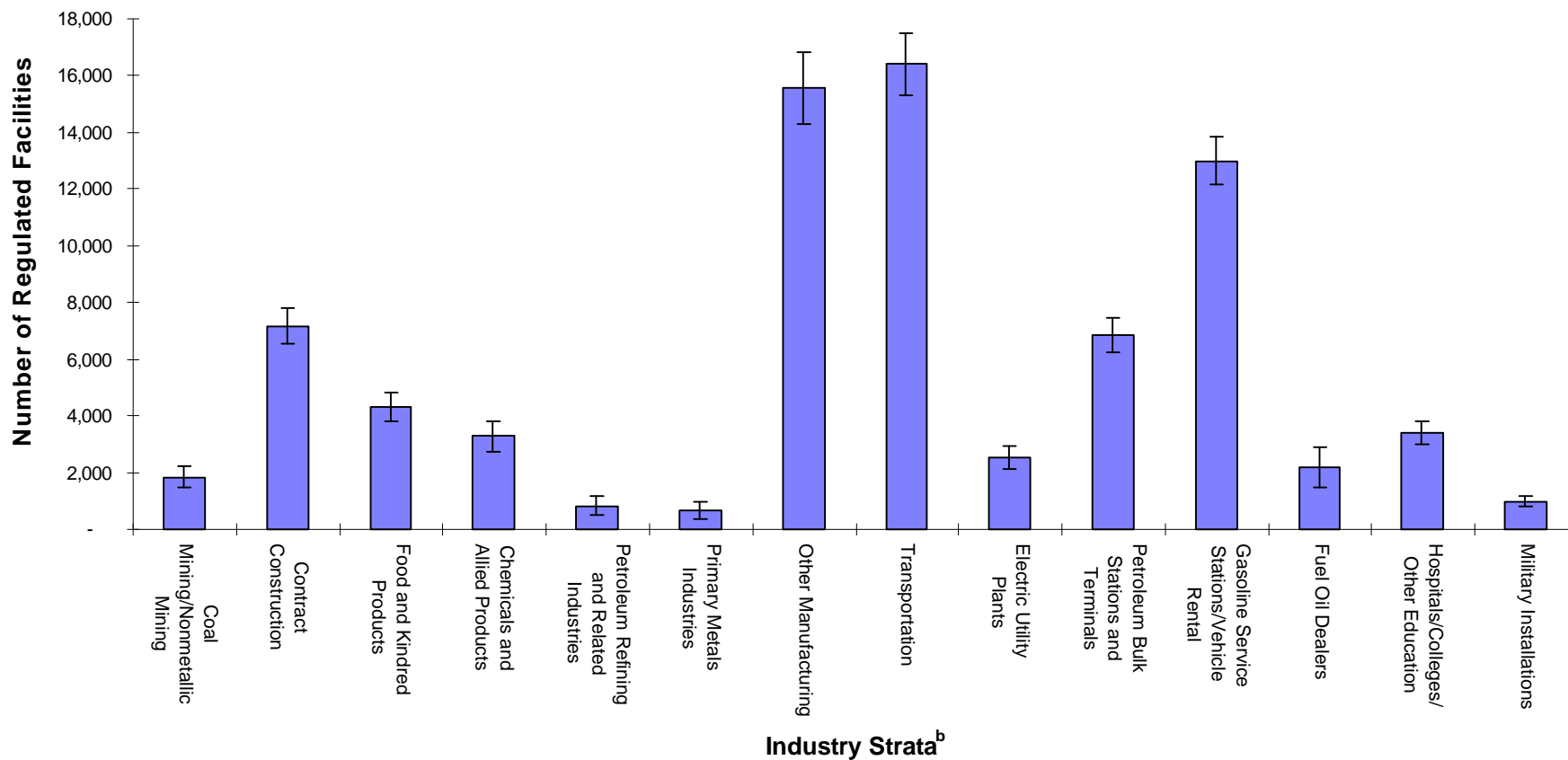
^a Data in this column are taken from 1993 County Business Patterns, Bureau of Census, except for data on Farms which are taken from 1992 Census of Agriculture and Oil Production which were treated differently (see footnote c below).

^b These percentages include all facilities in the specified SIC code in the specified county. In some cases, the facility operated only headquarters operations in the particular county being surveyed. For this reason, some industry sector percentages may be somewhat lower than expected (e.g., oil production, petroleum bulk stations and terminals).

^c For purposes of the 1995 SPCC Survey, the estimated number of oil production facilities meeting the SPCC oil storage criteria is determined by number of **leases** in the industry stratum versus the number of U.S. Census establishments in the industry stratum. This definition ensures that the facility count comports with the SPCC regulatory definition of an "oil production facility." Active crude oil data were obtained from Petroleum Information, Inc.

Exhibit 2:

**Estimated Number of Facilities Meeting the SPCC Storage Criteria
(Excluding Farms and Oil Production)^a**

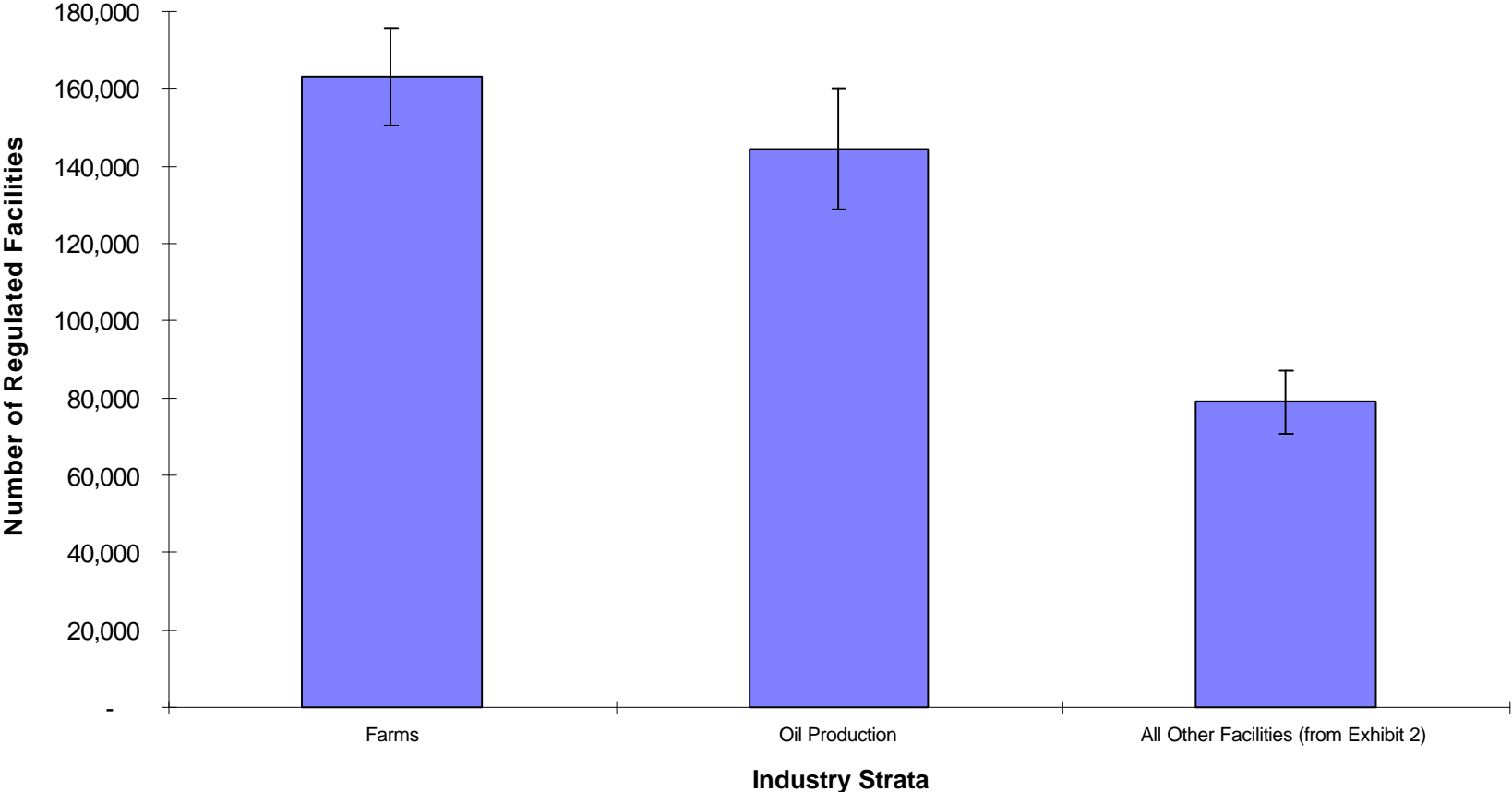


^a Farms and Oil Production are presented on a separate exhibit because their estimates are an order of magnitude greater than the other industry sectors.

^b The five industries that comprise the "Manufacturing" industry stratum, as presented in Exhibit 1, are presented separately on this exhibit.

Exhibit 3:

**Estimated Number of Facilities Meeting the SPCC Storage Criteria
(Farms and Oil Production)^a**



^a Farms and Oil Production are presented separately on this exhibit because their estimates are an order of magnitude greater than the other industry sectors.

represent the point estimate for that industry sector. The thin vertical line indicates the 90-percent confidence interval around the point estimate for that industry group. As discussed in Section 4 of this analysis, the point estimates generated using the 1995 SPCC Survey data generally are comparable to those of earlier government and industry studies.

EPA's analysis found that the percentage of facilities that are potentially regulated under the SPCC regulation varies significantly across industry sectors. For example, while only 8 percent of all farms in the U.S. store enough oil to meet the SPCC regulatory thresholds, almost 70 percent of facilities in the U.S. oil production industry do so. Thus, even though farms and oil production facilities both constitute a large proportion of the SPCC-regulated universe, they also differ from each other. **Exhibit 4** presents the estimated percentage of regulated facilities within each industry.

The results of this analysis may overestimate the number of regulated facilities for several reasons. First, the estimates of potentially-regulated facilities in this analysis are based only on whether a facility meets the SPCC storage capacity thresholds.⁵ However, under the SPCC regulation, facilities are regulated if they store oil in quantities greater than the established thresholds and have the potential to release oil into navigable waters or adjoining shorelines. Nonetheless, validation of the 1995 SPCC Survey results with previous government and industry studies indicates that the Survey results are consistent with earlier estimates and appear to be reliable. Section 4 of this analysis provides greater detail on this validation.

Second, the statistical error bounds for some industry groups are fairly large. This is because the sample was designed to produce estimates for the total regulated community and not for individual industry sectors. As a result, the number of facilities sampled in certain industry sectors is quite small. For example, there were only 33 facilities in the coal mining/nonmetallic mining industry sector represented in the 1995 SPCC Survey. Likewise, there were only 28 facilities in the petroleum-refining and related industries stratum in the sample. Even with these limitations, the error bounds for most industry sectors are less than 30 percent.

4. VALIDATION OF RESULTS AND CALCULATION OF 1996 ADJUSTED NATIONAL ESTIMATE

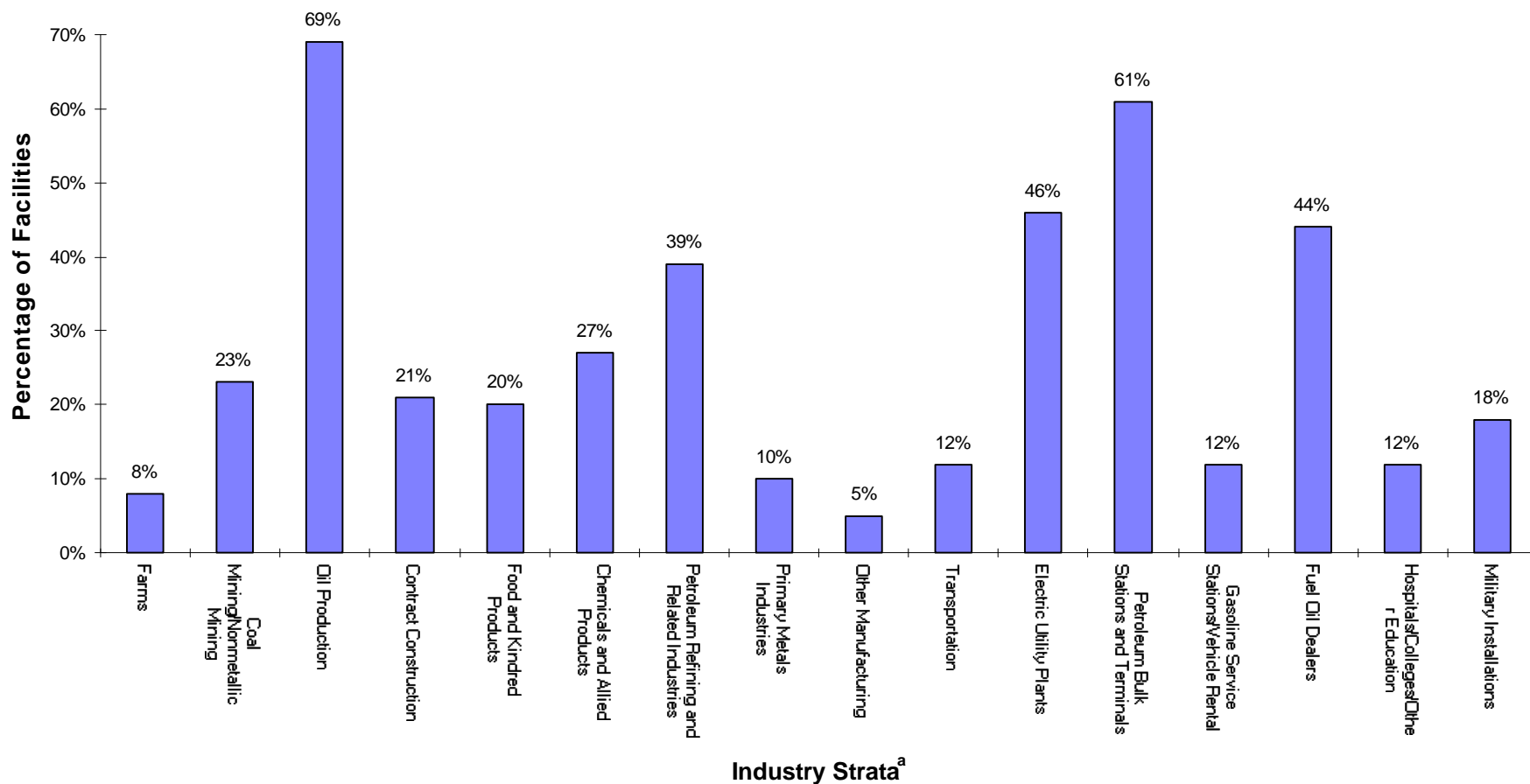
This section compares the results of the 1995 EPA SPCC Survey to other government and industry studies that provide national estimates for certain industry categories. EPA compared the results from this Survey to EPA's 1991 SPCC Facilities Study, which provided the federal government's previous best estimate of the size of the SPCC-regulated community. Where appropriate, EPA also compared the 1995 SPCC Survey results to the American Petroleum Institute's 1989 Aboveground Storage Tank Survey (the 1989 API Survey), which provides estimates for certain industry categories.⁶ **Exhibit 5** compares the estimates derived from the 1995 SPCC Survey, the 1991 SPCC Facilities Study and, for certain industries, the

⁵ The regulatory thresholds are for facilities that have more than 660 gallons of storage capacity in a single aboveground tank, more than 1,320 gallons of aboveground storage capacity for the entire facility, or more than 42,000 gallons of underground storage capacity.

⁶ The 1989 "Aboveground Storage Tank Survey," was prepared for API by Entropy, Limited. API has completed a more recent survey, "A Survey of API Members' Aboveground Storage Tank Facilities" (July 1994), which focuses on groundwater contamination and AST facility improvements at member facilities in the refining, transportation, and marketing sectors. Because the 1994 API Survey does not provide estimates of the facility populations as a whole, EPA did not include it in this analysis.

Exhibit 4:

**Estimated Percentage of Facilities Meeting the SPCC Storage Criteria
by Industry Sector**



^a The five industries that comprise the "Manufacturing" industry stratum, as presented in Exhibit 1, are presented separately on this exhibit.

**Exhibit 5:
Comparison of the Estimated Number of Facilities
Regulated by the SPCC Program**

Industry	SIC Code(s) ^a	1995 SPCC Survey Estimate	1991 Facilities Study Estimate	1989 API Survey Estimate ^b
Farms	01	163,157	138,400	--
Coal Mining/Nonmetallic Mining	12/14	1,849	4,300	--
Oil Production	131	144,349	237,000	143,000 - 383,000 ^c
Contract Construction	16	7,167	3,500	--
Manufacturing	20-39	24,612	26,500	--
Food and Kindred Products	20	4,314	4,000	--
Chemicals and Allied Products	28	3,281	5,150	--
Petroleum Refining and Related Industries	29	827	2,300	207 ^d
Primary Metals Industries	33	664	2,000	--
Other Manufacturing	21-27/30-32/34-39	15,526	13,050	--
Transportation	401/411/413/414/ 417/42/449/458	16,492	7,050	--
Pipelines	46	NA ^e	600	2,132
Electric Utility Plants	491	2,638	4,800	--
Petroleum Bulk Stations and Terminals	5171	6,845	12,400	11,305 ^f
Gasoline Service Stations/Vehicle Rental	554/751	12,996	7,850	--
Fuel Oil Dealers	5983	2,160	5,600	--
Hospitals/Colleges/Other Education	806/821/822	3,408	6,400	--
Military Installations	97	988	600	--
Other Health Care	NA	NA ^g	1,800	--
Other Commercial Facilities	NA	NA ^g	48,200	--
Total	--	386,661	505,000	156,644 - 396,644

^a The SIC codes used by the 1995 SPCC Survey and the 1991 Facilities Study are generally consistent; however, the 1991 Facilities Study gathered data on farms, oil production, and military installations from other sources (not strictly by SIC code), and contract construction data came from SIC codes 15, 16, and 17. The 1989 API Survey did not base its analysis on SIC codes.

^b The 1989 API Survey estimated the number of facilities with aboveground storage tanks by industry sector. For comparative purposes, this estimate is treated as an estimate of the number of facilities within industry sectors that meet SPCC capacity thresholds.

^c The 1989 API Survey estimate for this category assumes an average of 1.5 to 4 tanks per tank battery and one tank battery per facility.

^d The 1989 API Survey estimate for this category includes only petroleum refineries, not other facilities involved in related industries.

^e Facilities in the pipeline industry did not respond to the 1995 SPCC Survey in adequate numbers to develop a national estimate or this industry sector.

^f Defined as "Marketing" in the 1989 API Survey.

^g The 1995 SPCC Survey did not sample from these industries because the information collection burden and costs for surveying them would be significant. See Footnote 11 on page 15, which addresses this issue for the other health care industry.

1989 API Survey. The purpose of this section is to refine the population estimates from the 1995 SPCC Survey by adjusting the estimates if the examination of other data reveals such adjustments are appropriate. (Exhibit 7 presents the 1996 Adjusted National Estimate this validation analysis calculated.)

4.1 OVERVIEW OF STUDIES COMPARED

4.1.1 1991 EPA SPCC Facilities Study

EPA developed the 1991 SPCC Facilities Study to estimate the number of non-transportation-related facilities regulated under the SPCC regulation, as part of an effort to determine the potential economic effects of proposed amendments to the regulation. In this study, EPA estimated that over 500,000 facilities met the SPCC oil storage capacity thresholds, and that the majority of facilities were in just a few industries -- nearly one-half were oil production facilities, over 25 percent were farms, and over 10 percent were education, health care, and other commercial and institutional facilities.

In order to calculate the number of facilities meeting the SPCC storage capacity thresholds, EPA examined existing state and industry census data for over 20 industry categories of facilities that store oil. EPA classified facilities into three storage capacity size tiers:

- Small (42,000 gallons or less of aboveground storage capacity);
- Medium (42,001 to one million gallons of storage capacity); and
- Large (greater than one million gallons of storage capacity).

For most facility categories, EPA estimated the number of facilities in the medium and large capacity tiers by extrapolating information contained in state databases from California, Illinois, Maryland, and New York. The state databases provided estimates of the number of facilities in the medium and large tiers of each category. EPA multiplied the fraction of regulated facilities in a given state for a given category by the total number of U.S. facilities in the category to approximate the number of regulated facilities in the nation. For example, if 10 percent of the bus stations in Maryland had more than 42,000 gallons of oil storage capacity, EPA estimated that 10 percent of the bus stations in the nation met this threshold. The Agency obtained the data for the total number of facilities in most facility categories from County Business Patterns 1986, which is organized by SIC code.⁷

EPA did not use the state databases to estimate the small capacity tier because the databases likely excluded or underrepresented facilities with low-volume storage capacities. The Agency estimated the number of facilities in the small capacity tier by multiplying the estimated number of U.S. facilities in the medium tier by a factor developed from the New York Bulk Storage Tank database. There were approximately four small facilities for each medium facility storing diesel fuel and five small facilities for each medium facility storing fuel oil. Therefore, to estimate the number of U.S. facilities in the small capacity tier, EPA multiplied the

⁷ U.S. Department of Commerce, County Business Patterns 1986, Washington, D.C., 1988.

number of U.S. facilities in the medium tier by a factor of four or five, depending on whether the facilities in the category store primarily diesel fuel or fuel oil.

For certain facility categories, the state databases and County Business Patterns did not provide the best information. EPA used different, but much more complete data sources for oil production wells, electric utility plants, and petroleum bulk stations and terminals. For farms and commercial and institutional buildings, EPA did not have to base the small capacity tier estimates on the medium capacity tier estimates because the Agency obtained better data on the total number of facilities with oil. Finally, for certain categories (e.g., petroleum refining and related industries, pipelines, and fuel oil dealers), EPA assumed that all facilities not in the medium and large tiers were in the small tier, and for other categories (e.g., gasoline service stations, vehicle rental, railroad fueling, and air transportation), the Agency assumed that no facilities were in the small tier. As shown in Exhibit 5, in the 1991 SPCC Facilities Study, EPA estimated that over 500,000 facilities met the SPCC oil storage capacity thresholds.

4.1.2 1989 API Aboveground Storage Tank Survey

The 1989 API Survey looked at certain characteristics of tanks located at API member facilities in the production, refining, transportation, and marketing segments of the petroleum industry. These characteristics included shell capacity, size, age, contents, construction type, and distance from navigable waters. The API Survey did not include tanks at user locations because this segment was believed to be a small part of the total tank population.⁸ API estimated the total number of tanks for each industry segment by stratifying the segment and then extrapolating the results to the national level. Although the API Survey focused on characteristics of individual aboveground storage tanks (ASTs) rather than facilities, the report also provides estimates of the number of facilities in each industry sector, as shown in Exhibit 5. Most facilities are related to production wells, and fewer than 10 percent are in marketing (i.e., petroleum bulk stations and terminals).

4.2 COMPARISON OF THE ESTIMATED NUMBER OF REGULATED FACILITIES

EPA compared the estimated size of the regulated community between the 1995 SPCC Survey and the two previous studies. This comparison focused primarily on the 1995 SPCC Survey and the 1991 SPCC Facilities Study, because the 1989 API Survey does not provide a complete estimate of the population of facilities regulated under the SPCC program.

Overall, the estimated number of regulated facilities in the 1995 SPCC Survey is smaller than in the 1991 SPCC Facilities Study, by 23 percent or 118,339 facilities. The greatest difference is in the oil production industry category, where the 1995 SPCC Survey estimated 92,000 fewer regulated facilities than the 1991 SPCC Facilities Study. Another factor contributing to the difference is that the 1995 SPCC Survey did not include certain categories included in the 1991 SPCC Facilities Study, such as other commercial facilities, other health care, and pipelines. Finally, the difference between the two estimates can be

⁸ In contrast, the 1991 EPA Facilities Study estimated that nearly half of all facilities were oil users. Later API estimates include 100,000 to 200,000 tanks in industries that use bulk fuel. Carter, Will J., "How API Viewed the Needs for Aboveground Storage Tanks," Tank Talk, 7(5), July/August 1992, and Epstein, Lois N., "LAST But Not Least: Threats, Costs, and Answers," Environmental Defense Fund, Washington, D.C., February 1993.

attributed to some degree to the scope of each study; in particular, the 1995 SPCC Survey calculated estimates for the 48 contiguous states whereas the 1991 Facilities Study estimated the number of facilities for all 50 states.

In certain industry categories, however, the estimated number of facilities meeting the SPCC thresholds is actually larger in the 1995 SPCC Survey than in the 1991 SPCC Facilities Study. The largest increase was for farms, which may reflect a trend toward larger, commercial farms with more average acreage and oil storage needs. If two or more small farms merge, the new large farm may meet the SPCC storage capacity thresholds even if the small farms did not do so individually. Increases for categories such as gasoline service stations, contract construction, and facilities associated with trucking or bus transportation, may reflect industry trends towards switching tankage from underground to aboveground storage. For example, if a gas station storing 42,000 gallons of oil switches from underground to aboveground tankage, that facility then becomes an SPCC-regulated facility.

Exhibit 6 provides the results of this comparison between the 1995 SPCC Survey and the 1991 SPCC Facilities Study, and lists the differences in estimates for each industry category in order of magnitude of difference. The exhibit presents both the change in the number of facilities and the percent change between the 1995 SPCC Survey and the 1991 SPCC Facilities Study. Section 4.3 below provides greater detail on some of the reasons for the differences between the two estimates for particular industry categories.

When comparing the estimates for a particular industry category, EPA considered the overall size of the category together with the difference in estimates. A very small percentage difference in one of the larger categories can affect the overall estimate more than a large percentage difference in a small category. For example, a 10-percent difference in the number of oil production facilities as estimated by the 1995 SPCC Survey, or 14,435 facilities, would be much more significant than a 100-percent difference in the number of military installations, or 988 facilities. Nevertheless, the validation analysis indicates small percentage differences for several different categories examined by both studies; in other words, both studies generated similar estimates, even though they used two different sampling and extrapolation methodologies.

4.3 EXPLANATION OF DIFFERENCES

Several general factors may have contributed to the lower overall estimate in the 1995 SPCC Survey when compared to the 1991 SPCC Facilities Study. First, the 1995 SPCC Survey included only the 48 contiguous states and the District of Columbia, while the 1991 SPCC Facilities Study covered all 50 states. Second, the 1995 SPCC Survey and the 1991 SPCC Facilities Study used different definitions of the term "facility." For purposes of the 1995 SPCC Survey, "Facility means any mobile or fixed onshore building, structure, installation, equipment, pipe, or pipeline used for exploring, drilling, producing, storing, handling, transferring, processing, or transporting oil....[T]he entire area within a county where the company's operations occur is considered a single facility." EPA's 1991 SPCC Facilities

**Exhibit 6:
Comparison of the Estimated Number of Facilities Regulated by the SPCC Program**

Industry	SIC Code(s)^a	SPCC SURVEY Estimate	FACILITIES STUDY Estimate	Difference (%)
Oil Production	131	144,349	237,000	-92,651 (-39%)
Other Commercial Facilities	NA	NA ^b	48,200	-48,200 (-100%)
Petroleum Bulk Stations and Terminals	5171	6,845	12,400	-5,555 (-45%)
Fuel Oil Dealers	5983	2,160	5,600	-3,440 (-61%)
Hospitals/Colleges/ Other Education	806/821/822	3,408	6,400	-2,992 (-47%)
Coal Mining/ Nonmetallic Mining	12/14	1,849	4,300	-2,451 (-57%)
Electric Utility Plants	491	2,638	4,800	-2,162 (-45%)
Manufacturing	20-39	24,612	26,500	-1,888 (-7%)
Food and Kindred Products	20	4,314	4,000	314 (8%)
Chemicals and Allied Products	28	3,281	5,150	-1,869 (-36%)
Petroleum Refining and Related Industries	29	827	2,300	-1,473 (-64%)
Primary Metals Industries	33	664	2,000	-1,336 (-67%)
Other Manufacturing	21-27/30-32/ 34-39	15,526	13,050	2,476 (19%)
Other Health Care	NA	NA ^b	1,800	-1,800 (-100%)
Pipelines	46	NA ^c	600	-600 (-100%)
Military Installations	97	988	600	388 (65%)
Contract Construction	16	7,167	3,500	3,667 (105%)
Gasoline Service Stations/Vehicle Rental	554/751	12,996	7,850	5,146 (66%)
Transportation	401/411/413/414/ 417/42/449/458	16,492	7,050	9,442 (134%)
Farms	01	163,157	138,400	24,757 (18%)
Total		386,661	505,000	-118,339 (-23%)

^a The SIC codes used by the 1995 SPCC Survey and the 1991 Facilities Study generally are consistent; however, the 1991 Facilities Study gathered data on farms, oil production, and military installations from other sources (not strictly by SIC code), and contract construction data came from SIC codes 15, 16, and 17.

^b The 1995 SPCC Survey did not sample from these industries because the information collection burden and costs for surveying them would be significant.

^c Facilities in the pipeline industry did not respond to the 1995 SPCC Survey in adequate numbers to develop a national estimate for this industry sector.

Study, however, considered each separate place of operation as a single facility. In those instances where companies surveyed maintained several places of operation within a single county, the 1995 SPCC Survey estimate would be lower than the 1991 SPCC Facilities Study estimate. For example, in the electric utilities industry, the 1995 SPCC Survey estimated the number of regulated facilities based on a sample of primary electrical generating stations within the county, and not from substations or other separate places of operation that may have been treated as a separate facility in the 1991 Facilities Study.

The remainder of this section discusses other factors that may account for industry-specific differences between the 1995 SPCC Survey results and the results of other studies.

4.3.1 Oil Production

EPA's 1995 SPCC Survey estimated that about 144,000 oil production facilities would meet the SPCC storage capacity thresholds. This sizable decrease from previous estimates calculated in 1991 by EPA and in 1992 by API is primarily attributable to the fact that the 1995 SPCC Survey definition of "oil production facility" more closely tracks the SPCC regulatory definition.

The 1995 SPCC Survey defined oil production facilities as "leases." This definition tracks the definition of "production facility" found in the SPCC regulation at 40 CFR 112.7(e)(5):

Definition. An onshore production facility may include all wells, flowlines, separation equipment, storage facilities, gathering lines, and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

In the oil industry, an oil lease is generally regarded as a single oil field operated by a single operator.

EPA's 1991 SPCC Facilities Study utilized existing data sources for the number of oil wells to derive its estimate of the number of production facilities associated with those wells. In this study, EPA assumed that a production facility was a tank battery serving an average of two to four wells and, therefore, that the number of production facilities in the nation would correspond to between one-fourth and one-half the number of wells. Using the midpoint of the range of estimates, EPA found that about 237,000 production facilities would meet the SPCC storage capacity thresholds. API's 1992 comments on EPA's draft Liner Study⁹ concurred with EPA's 1991 assumptions, and in so doing calculated an estimate of 246,000 production facilities.

Because it seems reasonable to assume that a single oil field operated by a single operator may include more than one tank battery, the 1995 SPCC Survey estimate of the number of production facilities is not inconsistent with previous estimates. The most significant

⁹ American Petroleum Institute, Comments on the OPA Liner Study, Washington, D.C., April 2, 1992.

contributor to the difference in estimates appears to be the difference in the definition of "production facility."

4.3.2 Farms

EPA's 1995 SPCC Survey estimated that more than 160,000 farms meet the storage capacity thresholds of the SPCC regulations, whereas the estimate in the 1991 SPCC Facilities Study was 138,400. In summary, the 1995 SPCC Survey provides a better estimate because it utilizes an improved methodology, which more accurately reflects changes in industry characteristics since the earlier study.

One reason for the difference between the two estimates of regulated farms is the methodologies used in the studies. The 1995 SPCC Survey collected new data, utilized the data to calculate the fraction of sampled farms that met the SPCC storage capacity thresholds, and then used this fraction to extrapolate to all farms. The 1991 SPCC Facilities Study, on the other hand, relied on existing Census data for the number of farms with oil storage capacity, and estimated the fraction of these farms with aboveground storage capacity. Because the 1995 SPCC Survey estimate was derived through statistical extrapolation, the Survey estimate may be more reliable.

Another reason the 1995 SPCC Survey more accurately estimates the actual number of regulated farms is that the 1991 SPCC Facilities Study used only the data provided for diesel fuel storage in its calculations. Therefore, farms meeting the storage capacity thresholds for another fuel or for a combination of fuels, but not for diesel fuel alone, would have been excluded.

The difference between the estimates of the 1995 SPCC Survey and the 1991 SPCC Facilities Study can also be traced to the sources and years of data involved. While both studies used Census of Agriculture data, the 1991 SPCC Facilities Study used 1982 information on the number of farms with oil, while the 1995 SPCC Survey used 1992 data on the total population of farms. Although the total number of farms covered in the Census of Agriculture dropped during this ten-year period, the average acreage per farm increased from 440 to 491 acres. If small farms that were not previously regulated under SPCC gained significant acreage, thereby using more oil, the number of farms meeting the storage capacity thresholds would likely increase. This factor would further support the higher 1995 SPCC Survey estimate of farms meeting the SPCC thresholds.

It may also be that the percentage of farm facilities with ASTs has increased in recent years following the development of EPA's underground storage tank (UST) program. The 1995 SPCC Survey does point to this trend for the relatively small number of facilities with USTs that are covered by the SPCC regulation.¹⁰

¹⁰ See EPA's analysis entitled, "Analysis of Trends in the Replacement of Underground Storage Tanks at SPCC-Regulated Facilities."

4.3.3 Pipelines, Other Health Care, and Other Commercial Facilities

Overall, the 1995 SPCC Survey estimate of the number of facilities regulated by the SPCC program was lower than the 1991 SPCC Facilities Study. In part, this difference results from the fact that the latter included an additional 50,600 facilities from the "pipelines," "other health care," and "other commercial facilities" industry sectors in its estimate of regulated facilities. The 1995 SPCC Survey did not calculate estimates for these industry sectors for several reasons.

With respect to pipelines, the 1995 SPCC Survey was unable to estimate accurately the number of pipeline facilities because the response rate for the pipeline industry was too low to allow extrapolation to the nation with acceptable confidence. Although EPA did not include pipeline facilities in the 1995 SPCC Survey estimate, both the 1991 SPCC Facilities Study and the 1989 API Survey calculated national estimates for this category. The 1991 SPCC Facilities Study assumed that the number of establishments in SIC code 46 (establishments primarily engaged in the pipeline transportation of petroleum and other commodities, except natural gas) approximated the number of pipeline facilities that met the SPCC capacity thresholds. This number has increased from 600 facilities in 1986 to 811 facilities in 1993, according to U.S. Census data on the number of establishments in this industry. The estimate in the 1989 API Survey (795 of 2,132 facilities were covered by SPCC regulations) was based on a survey of 38 companies with 1,107 facilities, and totals for the U.S. were extrapolated on the basis of pipeline mileage. These findings suggest good agreement between API and EPA estimates of the number of regulated facilities in a relatively small category.

EPA did not sample from the population of "other health care facilities" in the 1995 SPCC Survey because the 1994 Pilot Survey indicated that an extremely small percentage of facilities are regulated within this industry sector.¹¹ As a result, EPA determined that an exorbitant amount of resources would be needed to sample from this industry that ultimately accounts for a small proportion of regulated facilities, so the Agency decided to utilize its 1991 Facilities Study data to calculate the 1996 Adjusted National Estimate.

Similarly, EPA did not sample from facilities in the "other commercial facilities" industry because an excessive number of surveys would need to be distributed in order to obtain the target sample size for that industry.¹² EPA did, however, calculate an estimate of other commercial facilities in the 1991 SPCC Facilities Study. To estimate the number of facilities in this category in the medium and large oil storage capacity tiers (i.e., above 42,000 gallons), the

¹¹ EPA conducted a pilot survey of 3,000 facilities in 1994, which surveyed facilities in the "other health care" industry among others. Based on the results of the pilot survey, EPA estimated that the proportion of facilities regulated in the "other health care" industry was extremely small (0.006). If EPA had included the "other health care" industry in the 1995 SPCC Survey, it would have been necessary to distribute an additional 5,700 surveys in order to obtain the target sample size for that industry. This would have increased the information collection burden for the survey to unacceptably high levels.

¹² Other commercial facilities include such facilities as assembly buildings (e.g., convention halls, auditoriums, stadiums, etc.), lodging facilities (e.g., hotels, motels), office buildings, and apartment buildings.

Agency extrapolated information from state databases and concluded that about 1,500 of these facilities had medium or large capacity. To determine the number of small capacity facilities, EPA used data on buildings with fuel oil from the Department of Energy's (DOE's) 1983 Residential Buildings Energy Survey to estimate the total number of facilities, and subtracted the estimated number of facilities in the medium and large capacity tiers. The DOE survey found that over 600,000 of the 4,000,000 commercial buildings in the U.S. use fuel oil as an energy source. Although EPA estimated that most of these buildings likely have underground storage capacity less than 42,000 gallons, the Agency estimated that approximately 46,700 small capacity facilities in this industry sector meet the SPCC storage criteria. In all, the 1991 SPCC Facilities Study estimated that about 48,200 "other commercial facilities" (not including health care and primary education facilities) would meet the SPCC storage capacity thresholds.

4.3.4 Petroleum Bulk Stations and Terminals, Electric Utility Plants, Fuel Oil Dealers, and Petroleum Refining and Related Industries

For these industries, the 1995 SPCC Survey found that anywhere from 40 to 60 percent of the facilities sampled in these categories indicated that they did not meet the SPCC storage capacity thresholds. In contrast, the 1991 SPCC Facilities Study assumed that 100 percent of such facilities would store oil in excess of the SPCC regulatory thresholds. For example, EPA assumed that all petroleum industry facilities and electric utility plants have at least 1,320 gallons of oil storage capacity in aboveground tanks or electric transformers. For the reasons described below, EPA believes that the actual number of facilities in these industries is likely to fall within the range provided by these two analyses (e.g., between 12,500 and 25,000). Nonetheless, the difference between the estimates represents only a small fraction of the total number of facilities that meet the SPCC storage capacity thresholds.

The 1995 SPCC Survey estimates were lower than the 1991 SPCC Facilities Study estimates for this group for several reasons. First, the 1995 SPCC Survey used the Dun & Bradstreet business directory, which provided mailing addresses for the sample population, to assign SIC codes based on line of business and not actual business activity at a given location; consequently, EPA sent some surveys to facilities whose primary business involves oil storage, but whose activity within the specified county does not involve oil storage (e.g., a company headquarters). In EPA's 1991 SPCC Facilities Study, the Agency assumed that 100 percent of all facilities in the petroleum refining and related industries and petroleum bulk stations and terminals would meet the SPCC storage capacity thresholds. Similarly, EPA assumed in 1991 that all electric utility plants, whether or not they use petroleum as a source of energy, would meet the thresholds, because all such facilities were presumed to store at least 1,320 gallons of oil aboveground in transformers and other equipment.

In addition, for the electric utility industry specifically, the 1995 SPCC Survey data only applied to a company's primary electric generating station in a county. Respondents in this industry were asked to provide aggregate estimates of the number of transformers and substations in the county.¹³ In the 1991 SPCC Facilities Study, EPA considered the storage

¹³ See EPA's analysis entitled, "Analysis of the Applicability of EPA's SPCC Program to the Electric Utility Industry."

capacity of aboveground oil storage in transformers and other equipment in its estimate of regulated facilities.

For fuel oil dealers, the 1995 SPCC Survey results may be more accurate than the 1991 Facilities Study. Specifically, in the 1991 SPCC Facilities Study, EPA assumed that all fuel oil dealer facilities met SPCC storage capacity thresholds. Responses from the 1995 SPCC Survey suggest, however, that some fuel oil dealers may not operate oil storage facilities at all. Specifically, the results show that several fuel oil dealers do not store oil at their facilities, and follow-up telephone calls indicate that some use trucks that obtain their oil directly from petroleum bulk stations or terminals. To the extent that this situation occurs, it would contribute to the lower estimate by the 1995 SPCC Survey for the number of facilities in this SIC code. EPA does not have information on the percentage of fuel oil dealers who generally use or do not use their own fuel oil tanks. Additionally, a comparison between 1986 and 1993 County Business Patterns data shows a 62 percent decrease in the population of facilities in the fuel oil dealer and petroleum refining and related industries.

A comparison of the results for the petroleum refining and petroleum bulk stations and terminals industries indicates that the 1995 SPCC Survey national estimate is significantly less than that provided in both the 1991 SPCC Facilities Study and the 1989 API Survey. Both the 1991 SPCC Facilities Study and the 1989 API Survey based estimates for petroleum bulk stations and terminals on 1982 Census of Manufacturers data, so that the final estimates were similar. It is unclear, however, whether the 1995 SPCC Survey estimate is more accurate than the other studies. Although the Census of Manufacturing data may provide a reliable national estimate of oil storage facilities in this category, the data are over 14 years old. The 1995 SPCC Survey results may also reflect, to some degree, a change in the demographics of this industry. The lower estimate in the 1995 SPCC Survey may also result from surveys mailed to office locations where oil is not stored.

For the petroleum refining industry and related industries, the 1995 SPCC Survey estimated that there are 827 facilities regulated under the SPCC regulations. Because the 1989 API Survey counted only petroleum refineries, and not other facility types, API's estimate of the number of regulated facilities is lower (207 facilities). EPA assumed in the 1991 Facilities Study that all related establishments in SIC code 29, including petroleum refining, manufacture of paving and roofing materials, and compounding of lubricating oils and greases, would store oil. To the extent that the SPCC regulations cover related manufacturing establishments, and not just refineries, the 1995 SPCC Survey provides a better estimate than the API Survey.

4.3.5 Transportation, Contract Construction, Manufacturing, and Coal Mining

The 1995 SPCC Survey and the 1991 SPCC Facilities Study provide different estimates for the transportation, contract construction, manufacturing, and coal mining industries. The cause for these differences can be attributed primarily to the different methodologies used in the two studies. Specifically, the 1991 SPCC Facilities Study estimated the number of large facilities (i.e., greater than 42,000 gallons of storage capacity) for the nation by extrapolating information contained in several state data bases. The number of remaining facilities was estimated by calculating a ratio of small to large facilities and applying this ratio to the nation.

Results of 1995 Survey of Oil Storage Facilities (July 1996)
United States Environmental Protection Agency

In contrast, the 1995 SPCC Survey utilized a statistical methodology that resulted in a national estimate of facilities in these industries within specified confidence levels. In general, this statistical approach can be considered a more reliable methodology than the extrapolation of state data to the nation. In addition, trends in the number of facilities operating in these industries as reported in Census data are consistent with the findings of the 1995 SPCC Survey. For these reasons, EPA believes that the 1995 SPCC Survey provides the better estimate for the number of facilities that meet the SPCC storage capacity thresholds in these four industry categories.

4.3.6 Gasoline Service Stations and Vehicle Rental

Gasoline service stations and vehicle rental facilities were grouped together in the 1995 SPCC Survey results. The 1995 SPCC Survey estimated over 60 percent more regulated facilities in these industries than does the 1991 SPCC Facilities Study. When we examine current trends in the industry, it appears that the 1995 SPCC Survey better describes the actual population for this group of facilities. First of all, the estimated number of gas stations meeting the SPCC thresholds in the 1991 SPCC Facilities Study may be underestimated because of its assumption that gas stations do not have aboveground storage tanks. Following recent advances in AST technology and safety, such as for vaulted or double-walled tanks, there has been a trend toward increasing use of ASTs, even in the gasoline service station industry. In addition, as new large gasoline service stations are built, there may be an increase in facilities with more than 42,000 gallons of underground storage.

4.4 CALCULATION OF 1996 ADJUSTED NATIONAL ESTIMATE

With EPA's review and comparison between the 1995 SPCC Survey data and previous analyses complete, EPA calculated an adjusted national estimate of the number of facilities subject to EPA's SPCC regulations. **Exhibit 7** provides EPA's 1996 Adjusted National Estimate of the total number of facilities, by industry sector, subject to EPA's SPCC regulations. To calculate the 1996 Adjusted National Estimate for each industry category, EPA determined which study provided the best data and utilized that study's estimate of the number of regulated facilities. As a rule, EPA used the estimate provided by the 1995 SPCC Survey where the population size for an industry sector could be calculated with 90-percent confidence. Consequently, EPA used the 1995 SPCC Survey estimate for most industry sectors. However, where the 1995 SPCC Survey could not provide a reliable estimate, EPA either used the estimate calculated in the 1991 SPCC Facilities Study, or calculated the mid-point between the 1995 SPCC Survey and the 1991 SPCC Facilities Study estimates.

In one instance, EPA chose to utilize the 1991 SPCC Facilities Study estimate, but determined that further adjustment was necessary. Because the 1995 SPCC Survey did not gather data on "other commercial facilities," EPA relied on the 1991 SPCC Facilities Study estimate for the other commercial facilities industry sector. However, because the 1995 SPCC Survey estimated the number of facilities in several industry sectors that also may be included in the other commercial facilities sector, EPA adjusted the original estimate provided in the 1991 SPCC Facilities Study. Specifically, EPA estimated the number of facilities that are captured in other industry sectors and subtracted these estimates from the original estimate for

**Exhibit 7:
1996 EPA Adjusted National Estimate of SPCC-Regulated Facilities**

Industry	SIC Code(s)	1995 SPCC Survey Estimate	1991 SPCC Facilities Study Estimate	1996 Adjusted National Estimate ^a	Basis for Adjusted National Estimate
Farms	01	163,157	138,400	163,200	1995 SPCC Survey
Coal Mining/Nonmetallic Mining	12/14	1,849	4,300	1,800	1995 SPCC Survey
Oil Production	131	144,349	237,000	144,300	1995 SPCC Survey
Contract Construction	16	7,167	3,500	7,200	1995 SPCC Survey
Manufacturing	20-39	24,612	26,500	25,400	1995 SPCC Survey/1991 SPCC Facilities Study
Food and Kindred Products	20	4,314	4,000	4,300	1995 SPCC Survey
Chemicals and Allied Products	28	3,281	5,150	3,300	1995 SPCC Survey
Petroleum Refining and Related Industries	29	827	2,300	1,600	Mid-point Estimate: 1995 SPCC Survey/1991 SPCC Facilities Study
Primary Metals Industries	33	664	2,000	700	1995 SPCC Survey
Other Manufacturing	21-27/30-32/34-39	15,526	13,050	15,500	1995 SPCC Survey
Transportation	401/411/413/414/417/42/449/458	16,492	7,050	16,500	1995 SPCC Survey
Pipelines	46	NA	600	600	1991 SPCC Facilities Study
Electric Utility Plants	491	2,638	4,800	3,700	Mid-point Estimate: 1995 SPCC Survey/1991 SPCC Facilities Study
Petroleum Bulk Stations and Terminals	5171	6,845	12,400	9,600	Mid-point Estimate: 1995 SPCC Survey/1991 SPCC Facilities Study
Gasoline Service Stations/Vehicle Rental	554/751	12,996	7,850	13,000	1995 SPCC Survey
Fuel Oil Dealers	5983	2,160	5,600	3,900	Mid-point Estimate: 1995 SPCC Survey/1991 SPCC Facilities Study
Hospitals/Colleges/Other Education	806/821/822	3,408	6,400	3,400	1995 SPCC Survey
Other Health Care	NA	NA	1,800	1,800	1991 SPCC Facilities Study
Military Installations	97	988	600	1,000	1995 SPCC Survey
Other Commercial Facilities	NA	NA	48,200	40,000	1991 SPCC Facilities Study (adjusted)
Subtotal	--	386,661	505,000	435,400	--
Est. No. of Regulated Facilities: Alaska	All of the above	--	--	2,000	Alaska Department of Environmental Conservation
Est. No. of Regulated Facilities: Hawaii	All of the above	--	--	300	Extrapolation of 1995 SPCC Survey Data
Total				437,700	--

^a Estimates for each industry sector are rounded to the nearest hundred.

the other commercial facilities sector provided in the 1991 SPCC Facilities Study. These adjustments are as follows:

- For the warehouse and storage sector, EPA estimated that approximately 6,800 facilities are already accounted for in the transportation industry sector under SIC 42; and
- For the education sector, EPA estimated that approximately 1,400 facilities are already accounted for in the colleges industry sector under SIC 821.¹⁴

In addition to these adjustments for individual industry sectors, EPA also addressed issues relating to the Survey design. For administrative reasons, in calculating the Adjusted National Estimate, the survey sample was drawn only from counties within the contiguous 48 states. As a result, EPA was compelled to estimate the number of facilities subject to the SPCC regulation for Hawaii and Alaska. Because comprehensive data on SPCC-regulated facilities in Hawaii are not available, EPA used information obtained in the 1995 SPCC Survey. Specifically, for each industry sector, EPA applied the proportion of regulated facilities calculated for the contiguous 48 states to the total number of facilities in Hawaii.¹⁵ Based on this analysis, EPA estimated that there are approximately 300 facilities in Hawaii that are regulated under EPA's SPCC program.

EPA applied the same approach used for Hawaii to estimate the number of SPCC-regulated facilities in Alaska. However, because of certain industry and geographic characteristics associated with Alaska, this approach yielded far fewer facilities than other information sources indicate.¹⁶ Alaska's Department of Environmental Conservation (DEC) has conducted numerous surveys of their state's facilities that store oil and has estimated that there are 2,000 facilities that store oil in tanks with storage capacities exceeding 660 gallons. Although the Alaska state data may provide a conservative estimate of the number of SPCC-regulated facilities, this estimate is the most reliable figure available to EPA for purposes of developing the 1996 Adjusted National Estimate.¹⁷

¹⁴ Although the 1991 SPCC Facilities Study estimated the number of facilities in the colleges sector, secondary buildings commonly found at colleges and universities (e.g., dormitories, auditoriums, etc.) were included in the estimate of other commercial facilities. To account for the possible overlap between these industry sectors, and to address the possible overcounting resulting from the use of individual buildings rather than entire facilities, EPA calculated the estimated number of education-based facilities based on the average number of secondary buildings at college campuses, and subtracted this estimate from the other commercial facilities sector.

¹⁵ EPA used data from the 1993 County Business Patterns (U.S. Census) and Dun & Bradstreet Business Directory to derive estimates of the total number of facilities by industry sector in Hawaii.

¹⁶ Unlike Hawaii, Alaska has an extensive oil production industry and, because of its climate, many facilities use heating oil.

¹⁷ EPA recognizes that the Alaska DEC estimate may not include all facilities subject to the SPCC regulations because some facilities may store more than 1,320 gallons of oil in several small tanks with individual storage capacities less than 660 gallons.

APPENDIX A

STATISTICAL EQUATIONS USED TO DERIVE NATIONAL ESTIMATES

EPA used the following equation to estimate the total number of SPCC-regulated facilities:

$$x'_{clu} = \left(\frac{M}{m} \right) \sum_{i=1}^m \left(\frac{N_i}{n_i} \right) \sum_{j=1}^{n_i} x_{ij}$$

where,

- x'_{clu} = Estimated total number of facilities in the lower 48 states that meet the SPCC oil storage criteria within a given industry stratum
- M = Total number of clusters in the population (i.e., 702 PSUs from Stratum 2 consisting of 3,091 counties and 20 PSUs from Stratum 1 consisting of 20 counties)
- m = Total number of clusters in the sample (i.e., 43 PSUs from Stratum 2 consisting of 195 counties and 20 PSUs from Stratum 1 consisting of 20 counties)
- N_i = Total number of facilities within PSU i
- n_i = Total number of facilities included in the sample from PSU i (i.e., returning either a Part A or Part B survey form)
- x_{ij} = A binary value indicating whether facility j in county i meets the SPCC oil storage criteria (a value of 1 indicates that the criteria are met, a value of 0 indicates that they are not)

EPA then calculated a 90-percent confidence interval around the estimates using the following equation:

$$x'_{clu} \pm 1.64 \times \left[\left(\frac{M}{\sqrt{m} f_2} \right) \left[\frac{\sum_{i=1}^m (x_{ij} - \bar{x})^2}{m-1} \right]^{1/2} \left(\frac{N-n}{N} \right)^{1/2} \right]$$

where,

- x'_{clu} = Estimated total number of facilities in the lower 48 states that meet the SPCC oil storage criteria

- M = Total number of clusters in the population (i.e., 702 PSUs from Stratum 2 consisting of 3,091 counties and 20 PSUs from Stratum 1 consisting of 0 counties)
- m = Total number of clusters in the sample (i.e., 43 PSUs from Stratum 2 consisting of 195 counties and 20 PSUs from Stratum 1 consisting of 20 counties)
- f2 = Sampling fraction within each county
- x_{ij} = A binary value indicating whether or not respondent j within cluster i meets the SPCC oil storage criteria (i.e., 1 if yes, 0 if no)
- x = Average number of facilities meeting the SPCC oil storage criteria within each PSU/SIC code in the sample
- N = Total number of facilities in the SIC code nationwide
- n = Total number of facilities returning either a Part A or Part B survey in the particular SIC code