Committee on Science, Space, & Technology
Environment Subcommittee
United States House of Representatives
"The State of the Environment: Evaluating Progress and Priorities"
Testimony of Richard Trzupek
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WRITTEN

Introduction

Thank you Chairman Harris, Ranking Member Bonamici and other members of the Subcommittee for the opportunity to testify on this important topic. I am Richard Trzupek, a chemist and environmental consultant, currently employed as a Principal Consultant with Trinity Consultants, Inc. I have been employed in the environmental industry for thirty years, initially as a stack tester (measuring air pollution emitted by industrial processes) and then as a consultant to industry. The vast majority of my clients are now, and always have been, small to mid-sized companies that do not have full-time environmental professionals on staff.

I appreciate the opportunity to submit testimony on this important topic, one that is – I believe – vital to the continuing health, welfare and prosperity of our nation. Having made enormous strides in restoring our environment, we have arrived at a crossroads. If we follow one path, the obsessive-compulsive flight toward environmental puritanism (as opposed to prudent conservation) that characterizes today's environmental movement will affect more and more of the nation. Activists will continue to search for new and necessarily increasingly insignificant risks to protect the populace from, and we will spend increasing amounts of time and energy to mitigate these tiny risks, for less and less return. If we choose the other path, we can balance the need to maintain a healthy, vibrant environment with our equally important obligation to eliminate unfounded fear, fight poverty and to spread prosperity.

Many of those invested in the environmental industry agree that we are at a crossroads, but they view the available paths somewhat differently. They would have us believe that we can only choose between two extremes. If you don't support new environmental initiatives and every EPA program, then – according to these prophets of doom – you therefore support a return to the bad old days of unlimited, unrestrained ecological damage. Or, to put in terms of the Neil Simon's famous play "The Odd Couple", they would have us believe that choosing not to be Felix Unger requires one to be Oscar Madison. There is no middle ground.

This message emanates from all parts of today's massive environmental industry. This includes not only well-funded, hyper-active environmental organizations like the Sierra Club and National Resources Defense Council, but a host of people in academia and industry who have a vested

interest in maintaining what the late Michael Crichton so accurately described as our national "State of Fear". It includes academic types whose research funding and relevance depends on them discovering, quantifying and publicizing sources of risk. In the blinkered world of academia, the relative magnitude of these risks rarely matters and the idea that risk analysis should necessarily encompasses rewards, penalties and unintended consequences that go well beyond the limits of their research seems to be an alien concept.

There is a significant portion of the commercial sector whose profits depend on perpetuating this climate of fear as well. For example, the tap water in the vast majority of American homes is among the cleanest in the world. Our drinking water standards are very stringent, monitoring extremely diligent and the technology that is employed to remove contaminants and to test for them is, with few exceptions, state of the art. None the less, water-purification products have become ubiquitous in the marketplace, taking advantage of the perception – however false – that tap water is dangerous to our health. Claims that this product or that removes 99% of harmful contaminants may or may not be true, but it hardly matters when the concentration of contaminants one starts with are so tiny as to be barely measurable. 99% of nothing is still nothing.

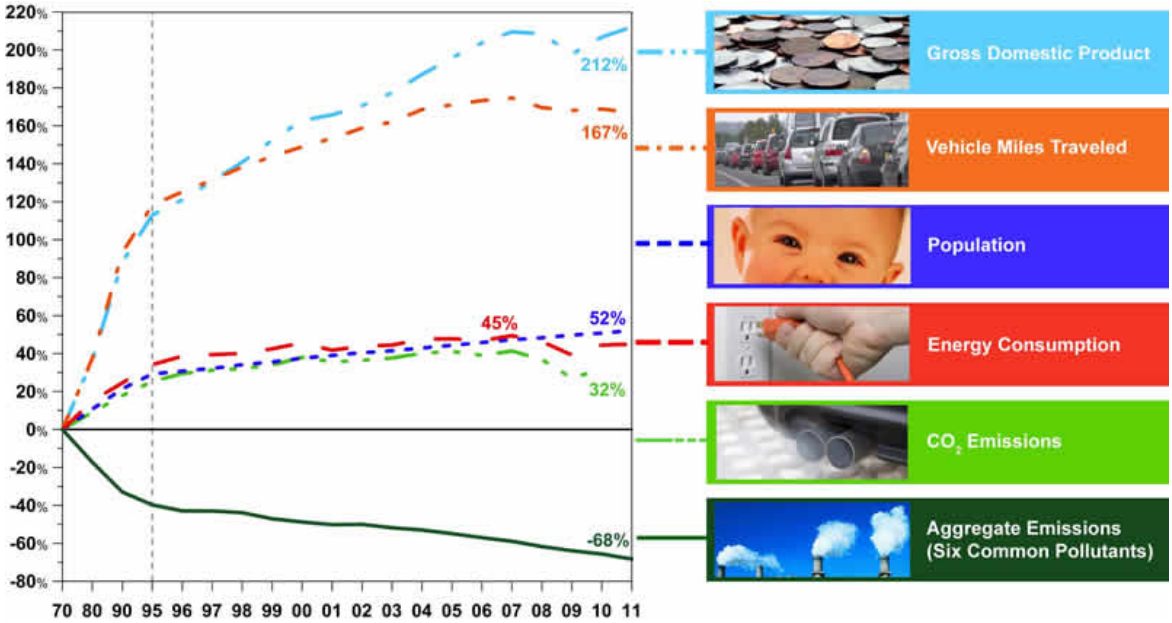
Other companies sell indoor air purifiers in order to prey on the mistaken, but all too common, misconception that America's air is getting more and more polluted every year. Some of these air purifiers generate ozone, which they promise will remove all sorts of air pollutants. To be sure, ozone does react with a variety of compounds that may or may not be present in the air. The irony of such products however, is that billions upon billions of dollars have been spend over the last forty years in an effort to reduce ozone concentrations in the ambient air of our large cities, only to find that – in the name of "clean air" – we have developed devices that introduce the compound directly into peoples' homes instead.

The chasm between environmental perception and environmental reality, in other words, is huge and it's growing larger every day. My testimony primarily focuses on two aspects of environmental policy: 1) the progress America has made in improving and protecting our environment, and 2) an analysis of selected, current environmental issues and initiatives, focusing on societal and economic costs, and ever-diminishing returns for increasingly puritanical and intrusive policies.

Because my career has primarily involved air quality issues, I will examine that portion of the environmental picture in the most depth, in terms of both conventional air pollutants, toxic air pollutants and greenhouse gases. In addition, I will also discuss water quality, wetlands preservation and hydraulic fracturing of shale gas formations as well.

Conventional Air Pollutants

The progress we have made in reducing emissions of the six most common "criteria" air pollutants is both remarkable and undeniable. The following graphic, published by USEPA, illustrates that progress:



A more detailed examination of the underlying data, also published by USEPA, shows that this reduction trend has been consistent in terms of both emissions of the individual air pollutants reduced and the time frame in which the reductions took place. The latter point is important, because a popular misconception is that America has had "pro-environment" and "anti-environment" administrations in power over the last forty years. Clearly, in terms of air pollution at least, this is not the case. Every administration since 1970 has been pro-active in protecting the environment.

Percent Change in Emissions

	1980 vs 2010	1990 vs 2010	2000 vs 2010
Carbon Monoxide (CO)	-71	-60	-44
Lead (Pb)	-97	-60	-33
Nitrogen Oxides (NO_X)	-52	-48	-41
Volatile Organic Compounds (VOC)	-63	-52	-35
Direct PM_{10}	-83	-67	-50
Direct $PM_{2.5}$	---	-55	-55
Sulfur Dioxide (SO_2)	-69	-65	-50

Notes:
1. --- Trend data not available
2. Direct PM10 emissions for 1980 are based on data since 1985
3. Negative numbers indicate reductions in emissions

These emissions reductions have primarily been accomplished by the industrial sector in two ways: 1) by reducing the amount of air pollutants emitted in the industrial sector through the use of add-on controls, changes in work practices, raw material substitutions and other measures, and 2) by designing and producing increasingly cleaner engines and fuels used in the transportation sector of our economy.

These reductions are reflected in the steady improvement in ambient air quality across the nation, as recorded by America's extensive air quality monitoring network:

Percent Change in Air Quality

	1980 vs 2010	1990 vs 2010	2000 vs 2010
Carbon Monoxide (CO)	-82	-73	-54
Ozone (O_3) (8-hr)	-28	-17	-11
Lead (Pb)	-90	-83	-62
Nitrogen Dioxide (NO_2) (annual)	-52	-45	-38
PM_{10} (24-hr)	---	-38	-29
$PM_{2.5}$ (annual)	---	---	-27
$PM_{2.5}$ (24-hr)	---	---	-29
Sulfur Dioxide (SO_2) (24-hr)	-76	-68	-48

Notes:
1. --- Trend data not available
2. Negative numbers indicate improvements in air quality

Given this spectacular record of success, I am constantly amazed by the number of Americans who are unaware of the progress we have made in cleaning up the air. As I have interacted with everyday citizens in the course of public hearings for new projects and during speaking engagements, a surprising number of people – a large majority in fact – seem genuinely surprised to learn of these facts. In some cases, more stubborn individuals flatly refuse to believe them.

Clearly, no one expects the average American to be an expert in finding and evaluating air quality data. This all-too-common impression that the United States is a dangerously polluted nation and is becoming more so must, therefore, be attributable to some other source or source(s). It is my impression that these false-impressions are primarily created by what I think of as America's large and ever-growing risk industry, and these messages are then further perpetuated by individuals in the media and bloggers who have only the vaguest understanding of the underlying principals and issues. Unfortunately, the USEPA has become part of this disinformation machine, especially in the course of the last four years.

By way of example, consider USEPA's recently finalized "Boiler MACT" rule. This regulation primarily affects larger industrial (as opposed to utility) boilers that burn solid and/or liquid fuels. One of the positive aspects of this rule trumpeted by the Agency, environmental groups and media outlets is a reduction in "fine particulate" emissions (also known as PM-2.5

emissions) of 18,000 tons per year. Fine particulate matter has been linked to respiratory illnesses such as asthma.

If research data shows that fine particulate matter contributes to respiratory illnesses, it follows that that a reduction in fine particulate matter emissions will result in a decrease in respiratory illnesses. Taking this another step further, the EPA then puts a price tag on avoided respiratory illnesses (and other illnesses) that will result from Boiler MACT implementation, claiming that while achieving these emissions reductions will cost industry $2.2 to $2.4 billion, the net national monetary benefit will come in somewhere around $13 to $29 per dollar invested.

We'll touch on this rather dubious accounting in a moment, but let's first focus on the real magnitude of this emissions reduction. To the untutored, a reduction of 18,000 tons of anything per year seems significant, but what does that number really mean in terms of the real world? To find the answer, we again turn to EPA data, which summarizes the amount of fine particulate emissions from various types of sources.

Source Type	Emissions (tons/year)	Percentage of All Emissions
Electric Utility Fuel Combustion.	308,738	5.04%
Industrial Fuel Combustion	147,494	2.41%
Other Fuel Combustion	369,590	6.04%
Chemical & allied product mfg	20,678	0.34%
Metals processing	63,484	1.04%
Petroleum & related industries	23,126	0.38%
Other industrial processes	350,472	5.72%
Solvent utilization	3,551	0.06%
Storage & transport	22,067	0.36%
Waste disposal & recycling	205,004	3.35%
Highway vehicles	295,373	4.82%
Off-highway	301,179	4.92%
Miscellaneous	4,012,455	65.53%
TOTAL:	**6,123,211**	**100.00%**

Looking at this table, it's clear that today's industrial sources are relatively small contributors to fine particulate emissions. Miscellaneous – a catch-all for all non-industrial, non-transportation sources (e.g.: consumer products, natural sources, etc). is the largest contributor by far. This is largely due to the fact that industrial and transportation sources have – as we have seen – made such massive reductions in emissions over the past four decades.

The 18,000 ton per year reduction in fine particulate emissions from industrial boilers represents a 0.3% reduction in overall national fine particulate emissions of over 6 million tons per year. Is this a significant reduction? In my view it's not, but whether or not one agrees, doesn't a supposedly disinterested agency in the public service like the USEPA have an obligation to

present this part of the picture as well, rather than steering us toward numbers with lots of zeros that mean nothing in a vacuum from a scientific point-of-view? Should not the Agency help put to rest the tired, old myth that it is industry – and industry alone – that is responsible for whatever contaminants find their way into the environment?

Let's return to those monetary benefit claims. Using the low end of the numbers presented by USEPA, a $2.2 billion investment will result in a $28.6 billion return. What a terrific result. But why stop there? If controlling a mere 18,000 tons per year of fine particulate matter can result in the generation of $26.4 billion in net income, what would happen if we controlled all 6.1 million tons per year of fine particulate matter? Using USEPA's minimum cost effectiveness approach, we find that applying the same rate of return would generate $8.9 trillion per year in net revenue. We have thus solved America's debt crisis. All we need to do is build a dome over the nation to keep every bit of fine particulate out and we'll clear the national debt in two years.

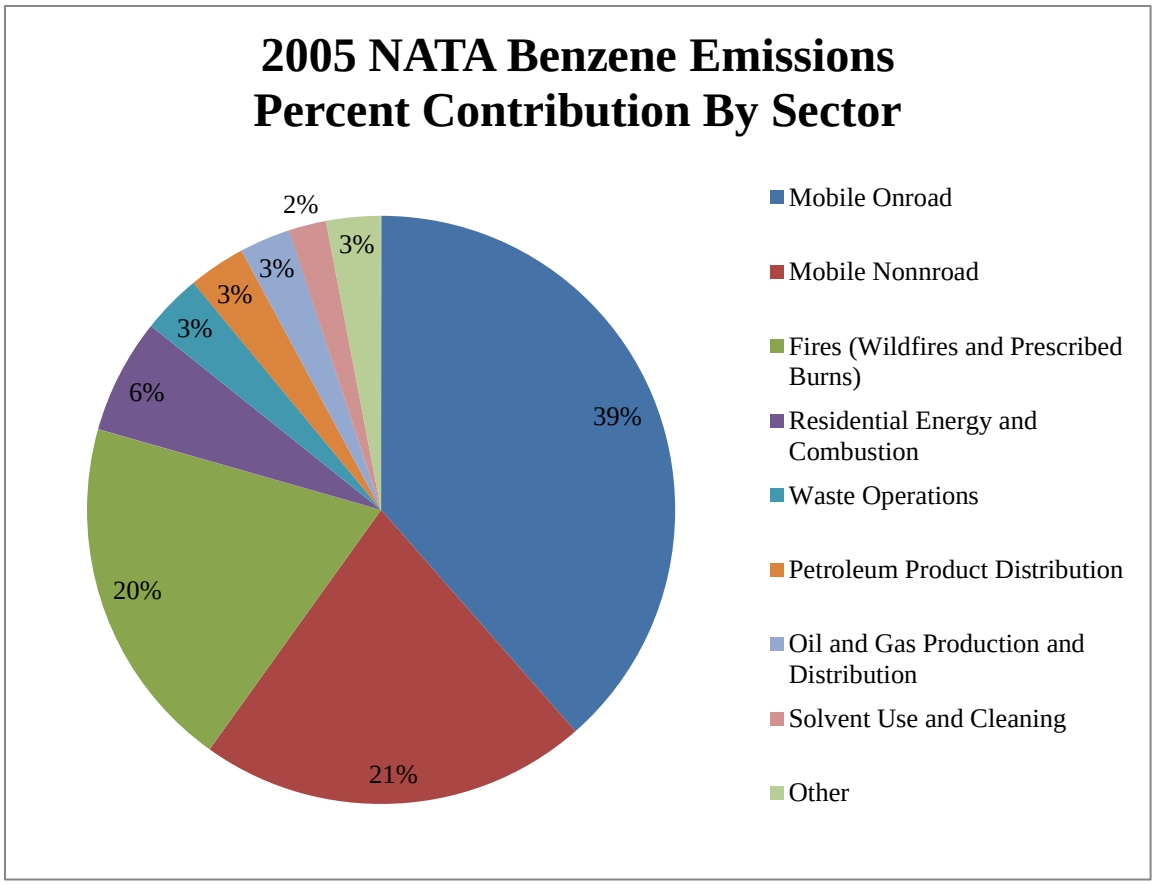
USEPA also claims that Boiler MACT implementation will result in the avoidance of 8,100 premature deaths per year. If we extend that peculiar logic, we find that control of all 6.1 million tons of fine particulate will avoid over 27 million premature deaths per year. The road to immortality apparently awaits.

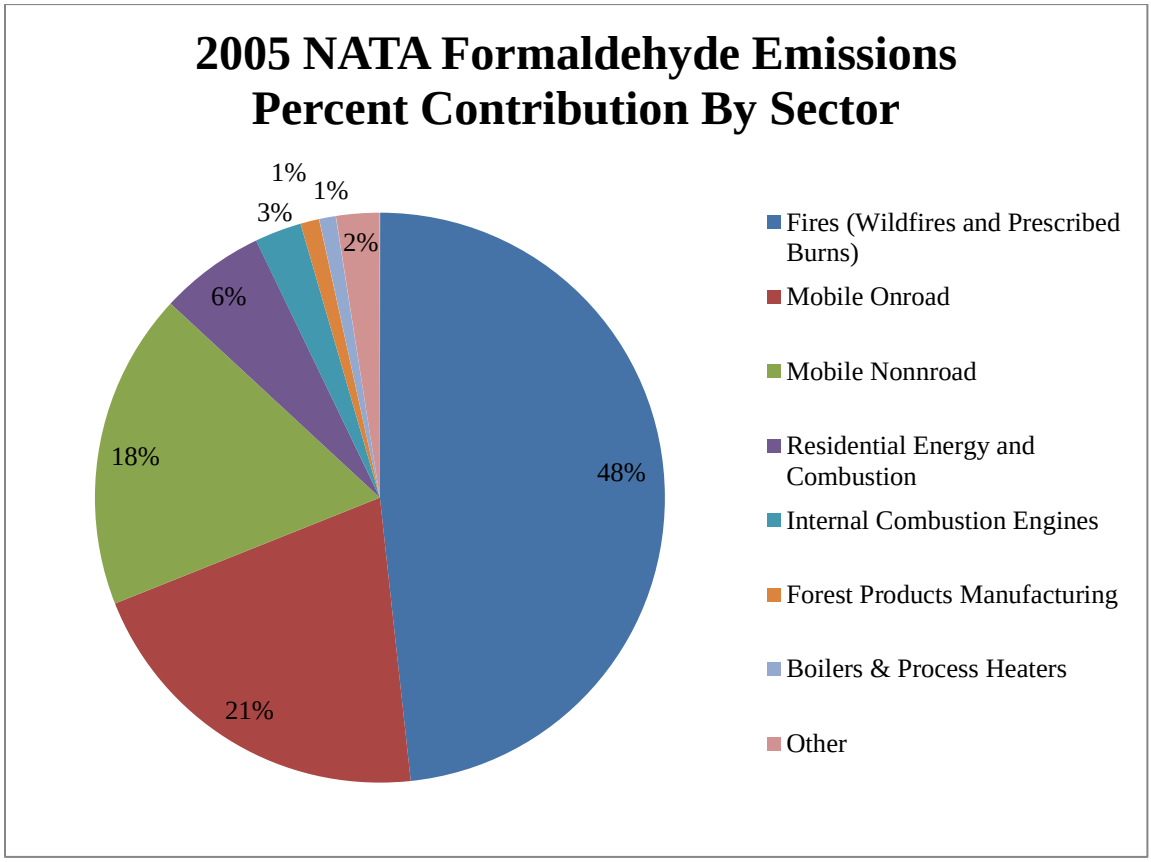
Obviously, these absurd conclusions cannot hold up to any scientific scrutiny. They are presented as one way to illustrate the way in which EPA's regulatory analyses and justifications don't make sense in any real world context. Absurd assumptions must necessarily result in absurd conclusions.

The fact is that industrial sources of air pollution have been so successful in cleaning up their act that they represent less than half – and in some cases much less than half – of United States emissions of all of the criteria air pollutants, except for sulfur dioxide. Sources of criteria air pollutant sources, based on the latest USEPA National Emissions Inventory, are summarized in Appendix A, attached.

The same themes hold true with respect to emissions of so-called "toxic air pollutants" (also known as "Hazardous Air Pollutants" or "HAPs". The industrial contribution to the very, very small concentrations of HAPs present in the nation's ambient air is not very significant in most cases, yet industrial sources are those most often vilified and targeted when toxic air pollutants are mentioned. Consider, for example, USEPA data identifying the sources of two readily recognizable air toxics: formaldehyde and benzene, both of which are on the USEPA's list of regulated HAPs.

The following two pie charts, showing the sources that contribute to ambient concentrations of formaldehyde and HAPs are taken from USEPA's 2005 National Air Toxics Assessment. Released in 2011, this is the most recent National Air Toxic Assessment available. The data shows that the vast majority of emissions of these two pollutants emanates from natural sources (fires) and from transportation sources.


2005 NATA Benzene Emissions
Percent Contribution By Sector
39%
21%
20%
6%
3%
3%
3%
2%
3%
Mobile Onroad
Mobile Nonnroad
Fires (Wildfires and Prescribed Burns)
Residential Energy and Combustion
Waste Operations
Petroleum Product Distribution
Oil and Gas Production and Distribution
Solvent Use and Cleaning
Other


2005 NATA Formaldehyde Emissions
Percent Contribution By Sector
48%
21%
18%
6%
3%
1%
1%
2%
Fires (Wildfires and Prescribed Burns)
Mobile Onroad
Mobile Nonnroad
Residential Energy and Combustion
Internal Combustion Engines
Forest Products Manufacturing
Boilers & Process Heaters
Other

America has spent a great deal of money and effort to reduce air toxics emissions, even though the average American is not exposed to dangerous concentrations of these compounds. The two examples referenced above are representative of the relative contributions of different sources for a great many air toxics. We simply do not have an air toxics problem in the United States today and, to the extent that anyone is unduly concerned by the small amounts of air toxics that exist in the atmosphere, industry should not continue to be the primary target of USEPA and environmental advocacy groups.

Greenhouse Gases

I would describe myself as a "global warming skeptic", although I find those three words a gross oversimplification of a complex position. Like many other scientists, I believe that planet Earth has been going through a moderate warming cycle over the past few decades, one that appears to be leveling off. I also believe that human activities have made a contribution to that warming cycle, but I do not believe that the magnitude of that contribution is especially significant nor does it justify the imposition of expensive mitigation measures that would certainly have the most negative effects on the poorest segments of our global society.

Having said that, I must admit that those who believe that both the recent warming trend and mankind's contribution to it – sometimes designated "global warming alarmists" – have won the day, in the United States at least. We have made and will continue to make massive reductions in greenhouse gas emissions rates in the United States. I marvel that nobody in the EPA or in the employ of the big environmental advocacy groups will acknowledge – much lest celebrate – that simple truth. Instead prominent alarmists like former Vice President Al Gore continue to call for action as if completely unaware of all of the changes that have taken place and will continue to take place.

According to USEPA data, emissions of GHG's in 2010 (the last year for which a complete GHG inventory has been published) were down to levels that have not been seen since 1997. While America's recent economic woes are surely in part responsible for this decrease, so has the continued implementation of Renewable Portfolio Standards (RPS) programs in over thirty individual states. When RPS implementation is combined with mass retirement of older, less-efficient coal-fired power plants and their replacement by less-carbon intensive natural gas fired power plants, it is clear that GHG emission rates in the United States will continue to drop.

Water Quality

Assessing the magnitude of the improvements in water quality that have been realized over the last forty years is a more difficult task than quantifying improvements in air quality. This is primarily because there are so many metrics for assessing water quality and the way that a particular water resource is used will factor into the evaluation as well. "Stream A", used for recreational purposes, may be deemed to be healthy even though it contains the same amount of the same contaminants as "Stream B", which supplies drinking water to neighboring communities.

I do not mean to criticize this aspect of EPA's water quality assessment effort. It seems reasonable and proper to factor in type(s) of usage when applying water quality standards. Doing so, however, makes it very difficult to clearly define the magnitude of improvement in United States water quality since the passage of the Clean Water Act. This is further complicated by the fact that water quality standards – just like air quality standards – have been repeatedly tightened over the years.

However, there is little doubt that America has made great strides in improving the nation's water quality. Rivers no longer catch on fire. Lakes once thought dead are sportsman's paradises. The water quality "problems" we worry about today are issues that Americans in 1970 would have traded a limb to have, instead of dealing with the real ecological disasters of the time.

Wetlands Preservation

Since 1988, when the policy was first introduced by President George H.W. Bush, every administration has followed a "no net loss of wetlands" policy. This policy has been a huge success. With the exception of Gulf Coast tidal wetlands (as special case) wetlands in the United States have increased in acreage and improved in terms of quality.

Many people, including myself, believe that wetlands program could stand with some improvements. At times, those who administer the program at the Army Corps of Engineers and in the EPA make petty determinations that are almost laughable. I have seen a pair of tires declared a wetland, for example and it several months of effort to get that ruling reversed. Arbitrary wetlands determinations have come into conflict with individual property rights as well.

Yet, for all its flaws, the wetland policy articulated by the first President Bush remains another American, environmental success story.

Hydraulic Fracturing

Hydraulic fracturing of deep shale formations in order to collect natural gas, natural gas liquids and crude oil is not, as critics would have it, new, poorly understood technology. Hydraulic fracturing, also known by its slang name of "fracking", has been around for over fifty years. The increased use of fracking in recent years is the result of two technological advances: 1) development of horizontal drilling techniques that allow for the economical recover of hydrocarbons in relatively shallow deep shale formations, and 2) new sensing techniques that allow energy companies to vastly improve their success rates when searching for energy deposits. Critics of the technique claim that the chemicals used in fracking are dangerous and could lead to contamination of aquifers. These are false, scientifically unsound conclusions.

When a hole is drilled deep underground, for <u>any</u> purpose, it necessarily must pass through shallow aquifers, if such aquifers are present. The depth of aquifers used for drinking water vary, but 50 to 200 feet is typical in the United States. When the hole passes through the aquifer, an impermeable casing must be used to ensure that the materials used in drilling do not contaminate

the aquifer. Again, this is the case whenever one drills deep, for any purpose. This would be the case, for example, if Carbon Storage and Sequestration ever becomes a viable way of controlling carbon dioxide emissions.

Drilling also requires the use of very small concentrations of certain chemicals, such as corrosion inhibitors (to prevent metal oxidation) and anti-bacterials (to prevent biological growth and fouling). This has and will continue to be the case of any kind of deep well drilling. So, if a casing is poorly constructed, there is a chance that a small amount of certain, well-understood chemicals could seep out into an aquifer. That risk – tiny as it may be – will always exist as long as man uses drills to explore the earth and extract its resources. However, if the casing is properly installed, there is no way for any material used to extract shale gas lying a mile below the surface to seep into aquifers lying a couple of hundred feet down.

The shale gas revolution is an American success story. A decade ago we were listening to dire predictions of natural gas shortages and the need to build LNG import terminals. Today, natural gas is abundant and cheap. Rather than talking about imports, American energy companies are preparing to export this valuable commodity overseas. This revolution has taken place safely and responsibly. It's a revolution of which we should all be proud.

Summary

In my opinion, we have reached a point of diminishing returns such that we need to reassess the wisdom of continuing investment in environmental programs and regulation at the same rate that we have over the last forty-some years. In addition to the fact that America is now effectively controlling, minimizing and otherwise reducing the majority of pollutant emissions into the air, water and soil that had been largely uncontrolled in the run-up to modern environmental regulatory activity, the cost to further control, minimize and otherwise reduce the residual emissions that remain is disproportionately high.

For example, all large industrial sources of particulate emissions in the United States are controlled. The days of smokestacks belching black soot are well behind us (which leads media outlets and environmental groups to publish pictures of smokestacks emitting steam as a way of visualizing "air pollution"). The vast majority of these large industrial sources use one of two well-established, reliable technologies to control particulate emissions: fabric filters (aka: baghouses) and electrostatic precipitators (ESP). Each of these technologies typically removes 99% + of particulate matter introduced into it. Controlling more than we control now would require either adding more ESPs and/or baghouses, or replacing these units with more exotic and expensive technologies. However, by definition, that additional expenditure would be much less cost effective. Generally speaking, if controlling the first 99% costs "X dollars/ton", then controlling 99% of the remaining 1% will cost 10X dollars/ton, and controlling 99% of that residual will cost 100X dollars/ton, etc.

If the EPA is going to remain relevant and most importantly – from its point of view - fully-funded, then it has felt the need to continually redefine its mission as environmental progress has

accumulated. In the past, under administrations of both parties, this redefinition has consisted primarily of adopting increasingly more stringent standards for the air and the water. As long as the EPA has the ability and the authority to decide what the word “clean” means, it can ensure that the air and our waterways are eternally, officially “dirty”, no matter how much pollution is removed from each.

A portion of the public and our elected representatives have caught on to the continual rolling back of the goal posts that is so central to current environmental policy-making. While it’s unlikely that enough people have become aware of this practice so as to endanger EPA funding, or that of the big environmental groups, any type of increased scrutiny is troubling to those invested in the risk industry. A new tactic was needed to justify ever more environmental purity in a pristine nation.

The answer – the coming trend – is the equivalent of searching for needles in the midst of otherwise inoffensive haystacks. The EPA is moving from looking at the environment in the macroscopic sense to a new paradigm in which they put every single bit of the environment under a microscope. Doing so will accomplish a couple of things that will make both the Agency and environmental groups quite happy. It will certainly create a bevy of work in its own right. When you move from a model where the EPA uses representative sampling to assess environmental quality to one in which you search for individual hot spots, you create a massive amount of work. It’s the difference between conducting an opinion poll utilizing a statistically significant portion of the population and soliciting the opinion of every single citizen.

In addition to the work that the search itself creates, it’s inevitable that this kind of intensive examination will yield fruitful results. When one puts anything under a microscope, one necessarily will find something ugly to gawk at. A magnifying device not only makes things look bigger, it also makes them seem more important than they really are.

How will this new mission play out in practical terms over the next four years? Let’s consider one example. At a recent meeting of the Air and Waste Management Association, the new Director for Air and Radiation in EPA Region V, George Czerniak, proudly announced some new initiatives that would begin in 2013. One of these involve a new term: occult emissions. It’s an apt name, since finding them will involve many a witch hunt.

According to the EPA, occult emissions are air pollution emissions that may (or may not) leak out of building from something other than the traditional smokestack. Let’s say that you operate a printing plant, for example. The solvents in the printing ink will be collected in a dryer, directed to a control device and destroyed very efficiently, thus preventing the solvents from contributing to smog formation. All of this happens according to applicable regulations and will be documented in the plant’s permit.

But, even though well over 99 per cent of the solvents will be collected and destroyed, might there be a little bit that escapes? Perhaps through a window? Perhaps through a vent on a wall? It's surely possible, even if that kind of tiny, incidental emission isn't going to endanger anyone's health or hurt mother earth in any way. But that's exactly the sort of "occult emissions" that EPA will start searching for in 2013.

Czerniak said that EPA inspectors would be looking for occult emissions with the aid of infrared cameras. These cameras identify sources of heat, not actual air pollution, and it will be easy to find heat escaping here and there is practically any building. No matter. These points will be viewed as potential sources of undocumented emissions and will therefore prompt further investigation.

When the EPA identifies occult emissions that it perceives to be a problem, it will use its Clean Air Act enforcement authority and its general power to prevent "endangerment" of any sort to go after offenders. This too has become a bigger part of the EPA's playbook in recent years. The threat of enforcement is enough to force action (justified or not), particularly when small to mid-sized companies that don't have the resources to conduct protracted fights are involved. If that sounds an awful lot like environmental racketeering to you, well let's just say that you wouldn't be the first one to make that particular observation.

There is, in summary, a big difference between solving problems and searching for problems to solve. As a nation, we have largely solved the environmental crisis that we faced half a century ago. It is time that we acknowledged that remarkable accomplishment and set ourselves upon a new course: one which will prevent us from ever returning to those dirty old days, but which also reflects the simple fact that any slight residual environmental and health risks to be addressed do not deserve the same level of time, attention or treasure as the big problems of yesteryear.

Thank you again for the opportunity to testify before the committee.

Richard Trzupek

Appendix A

Sources of United States Criteria Air Pollutant Emissions

NATIONAL EMISSIONS SUMMARY: CARBON MONOXIDE

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	726,782	0.82%
FUEL COMB. INDUSTRIAL	978,076	1.10%
FUEL COMB. OTHER	2,705,352	3.03%
CHEMICAL & ALLIED PRODUCT MFG	185,605	0.21%
METALS PROCESSING	840,076	0.94%
PETROLEUM & RELATED INDUSTRIES	265,226	0.30%
OTHER INDUSTRIAL PROCESSES	425,362	0.48%
SOLVENT UTILIZATION	5,341	0.01%
STORAGE & TRANSPORT	17,829	0.02%
WASTE DISPOSAL & RECYCLING	1,377,598	1.54%
HIGHWAY VEHICLES	36,049,690	40.43%
OFF-HIGHWAY	18,127,567	20.33%
MISCELLANEOUS	20,991,031	23.54%
BIOGENICS	6,474,274	7.26%
TOTAL:	**89,169,808**	100.00%

Total Industrial:	8.44%
Total Non Industrial:	91.56%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: AMMONIA

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	27,121	0.62%
FUEL COMB. INDUSTRIAL	12,532	0.29%
FUEL COMB. OTHER	63,326	1.45%
CHEMICAL & ALLIED PRODUCT MFG	18,719	0.43%
METALS PROCESSING	1,989	0.05%
PETROLEUM & RELATED INDUSTRIES	1,422	0.03%
OTHER INDUSTRIAL PROCESSES	56,016	1.28%
SOLVENT UTILIZATION	382	0.01%
STORAGE & TRANSPORT	4,959	0.11%
WASTE DISPOSAL & RECYCLING	67,896	1.55%
HIGHWAY VEHICLES	138,684	3.18%
OFF-HIGHWAY	4,040	0.09%
MISCELLANEOUS	3,969,665	90.91%
TOTAL:	**4,366,751**	100.00%

Total Industrial:	5.82%
Total Non Industrial:	94.18%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: NITROGEN OXIDES

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	3,112,839	16.17%
FUEL COMB. INDUSTRIAL	1,470,991	7.64%
FUEL COMB. OTHER	582,456	3.03%
CHEMICAL & ALLIED PRODUCT MFG	54,597	0.28%
METALS PROCESSING	79,209	0.41%
PETROLEUM & RELATED INDUSTRIES	432,367	2.25%
OTHER INDUSTRIAL PROCESSES	412,044	2.14%
SOLVENT UTILIZATION	5,354	0.03%
STORAGE & TRANSPORT	8,661	0.05%
WASTE DISPOSAL & RECYCLING	96,833	0.50%
HIGHWAY VEHICLES	7,134,479	37.07%
OFF-HIGHWAY	4,516,766	23.47%
MISCELLANEOUS	261,640	1.36%
BIOGENICS	1,077,859	5.60%
TOTAL:	**19,246,094**	100.00%

Total Industrial:	32.50%
Total Non Industrial:	67.50%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: PM-10

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	406,730	1.87%
FUEL COMB. INDUSTRIAL	192,209	0.89%
FUEL COMB. OTHER	377,361	1.74%
CHEMICAL & ALLIED PRODUCT MFG	26,812	0.12%
METALS PROCESSING	81,770	0.38%
PETROLEUM & RELATED INDUSTRIES	30,283	0.14%
OTHER INDUSTRIAL PROCESSES	1,085,840	5.01%
SOLVENT UTILIZATION	4,052	0.02%
STORAGE & TRANSPORT	48,838	0.23%
WASTE DISPOSAL & RECYCLING	239,167	1.10%
HIGHWAY VEHICLES	375,527	1.73%
OFF-HIGHWAY	326,253	1.50%
MISCELLANEOUS	18,497,445	85.27%
TOTAL:	**21,692,287**	100.00%

Total Industrial:	11.49%
Total Non Industrial:	88.51%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: PM-2.5

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	308,738	5.04%
FUEL COMB. INDUSTRIAL	147,494	2.41%
FUEL COMB. OTHER	369,590	6.04%
CHEMICAL & ALLIED PRODUCT MFG	20,678	0.34%
METALS PROCESSING	63,484	1.04%
PETROLEUM & RELATED INDUSTRIES	23,126	0.38%
OTHER INDUSTRIAL PROCESSES	350,472	5.72%
SOLVENT UTILIZATION	3,551	0.06%
STORAGE & TRANSPORT	22,067	0.36%
WASTE DISPOSAL & RECYCLING	205,004	3.35%
HIGHWAY VEHICLES	295,373	4.82%
OFF-HIGHWAY	301,179	4.92%
MISCELLANEOUS	4,012,455	65.53%
TOTAL:	**6,123,211**	100.00%

Total Industrial:	24.73%
Total Non Industrial:	75.27%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: SULFUR DIOXIDE

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	7,776,675	71.82%
FUEL COMB. INDUSTRIAL	1,056,343	9.76%
FUEL COMB. OTHER	283,706	2.62%
CHEMICAL & ALLIED PRODUCT MFG	184,667	1.71%
METALS PROCESSING	177,173	1.64%
PETROLEUM & RELATED INDUSTRIES	147,499	1.36%
OTHER INDUSTRIAL PROCESSES	252,925	2.34%
SOLVENT UTILIZATION	473	0.00%
STORAGE & TRANSPORT	5,559	0.05%
WASTE DISPOSAL & RECYCLING	21,031	0.19%
HIGHWAY VEHICLES	117,639	1.09%
OFF-HIGHWAY	664,642	6.14%
MISCELLANEOUS	138,980	1.28%
TOTAL:	**10,827,311**	100.00%

Total Industrial: 91.49%

Total Non Industrial: 8.51%

Source: USEPA National Emissions Inventory, 2008

NATIONAL EMISSIONS SUMMARY: VOLATILE ORGANIC COMPOUNDS

EMISSIONS SOURCE (USEPA TIER1 NAME)	EMISSIONS (TONS/YEAR)	% OF TOTAL
FUEL COMB. ELEC. UTIL.	43,230	0.09%
FUEL COMB. INDUSTRIAL	109,166	0.22%
FUEL COMB. OTHER	380,990	0.77%
CHEMICAL & ALLIED PRODUCT MFG	87,208	0.18%
METALS PROCESSING	37,657	0.08%
PETROLEUM & RELATED INDUSTRIES	1,801,334	3.63%
OTHER INDUSTRIAL PROCESSES	364,148	0.73%
SOLVENT UTILIZATION	3,298,405	6.65%
STORAGE & TRANSPORT	1,193,084	2.40%
WASTE DISPOSAL & RECYCLING	185,099	0.37%
HIGHWAY VEHICLES	3,055,362	6.16%
OFF-HIGHWAY	2,618,719	5.28%
MISCELLANEOUS	4,696,390	9.47%
BIOGENICS	31,743,796	63.98%
TOTAL:	**49,614,587**	100.00%

Total Industrial:	15.12%
Total Non Industrial:	84.88%

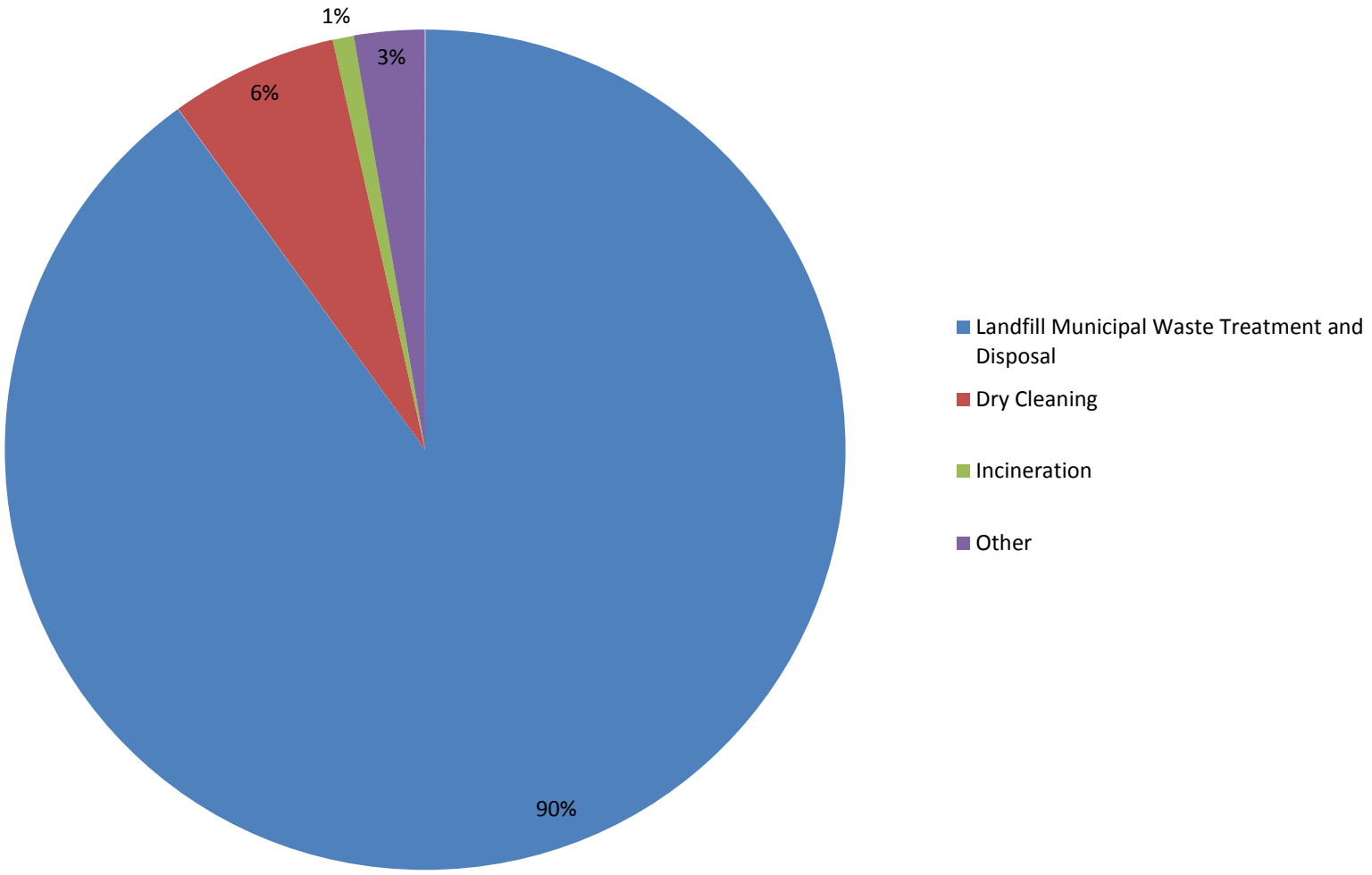
Source: USEPA National Emissions Inventory, 2008

Appendix B

Sources of United States Toxic Air Pollutants

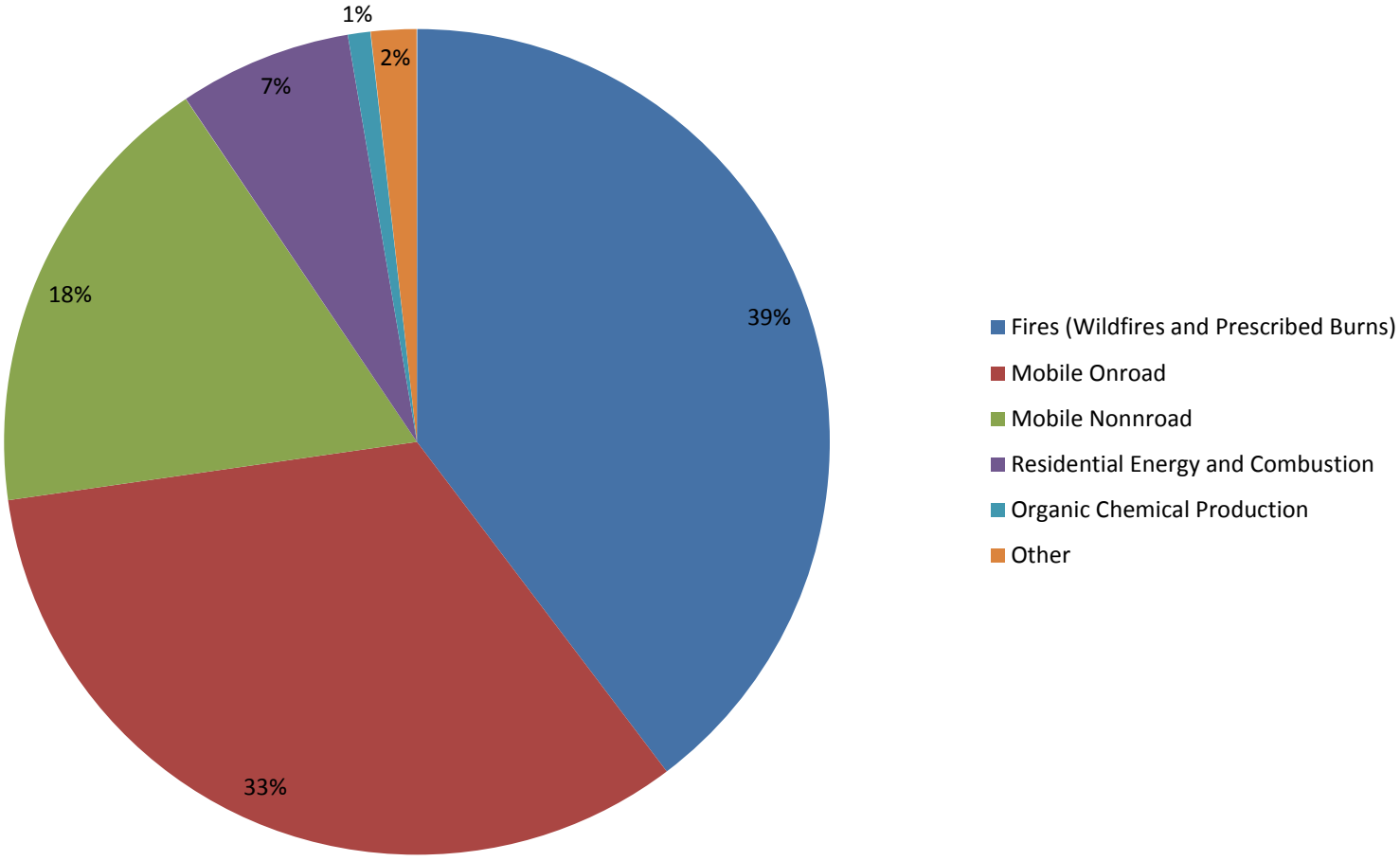
2005 NATA 1,1,2,2-Tetrachloroethane Emissions

Percent Contribution By Sector



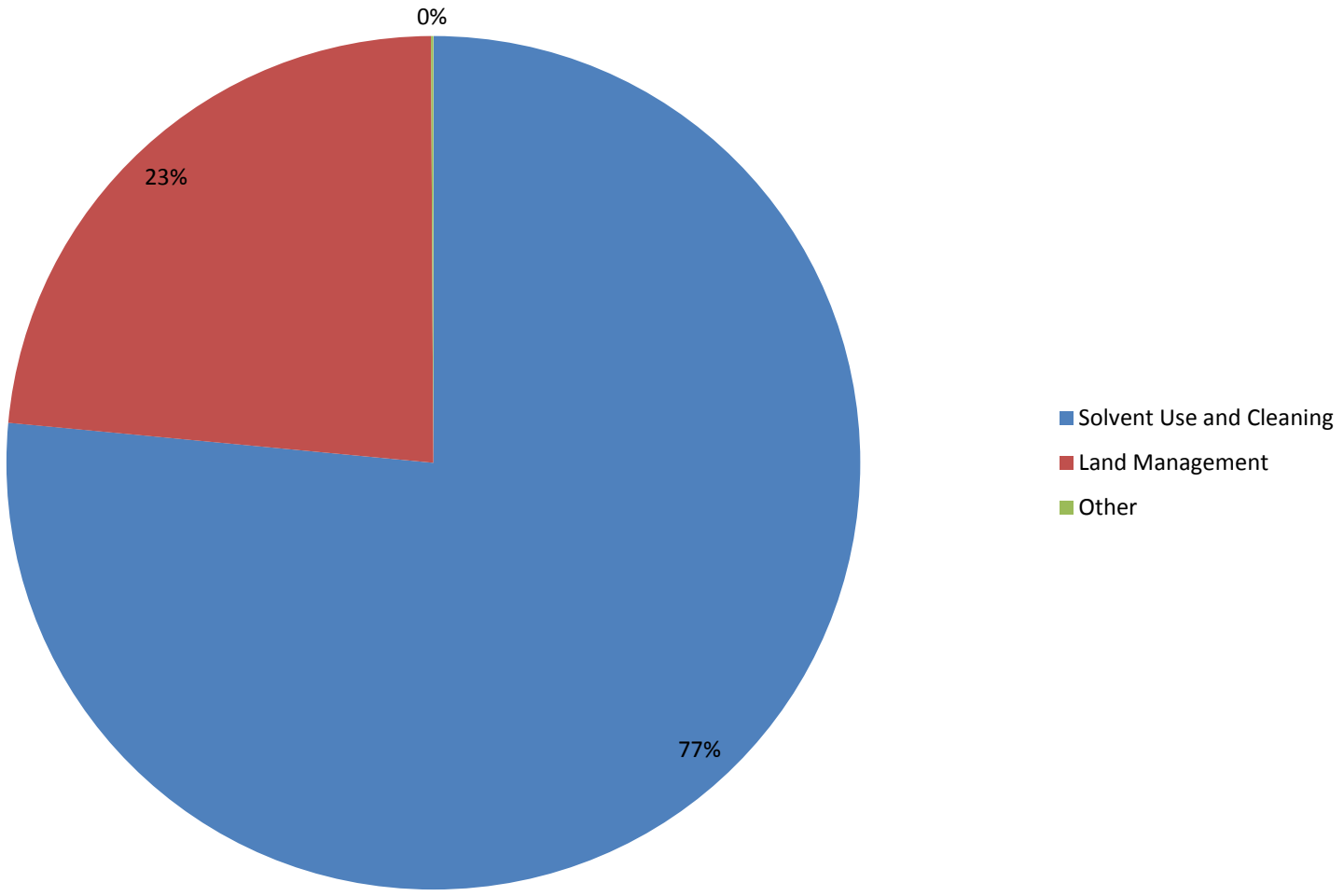
2005 NATA 1,3-Butadiene Emissions

Percent Contribution By Sector



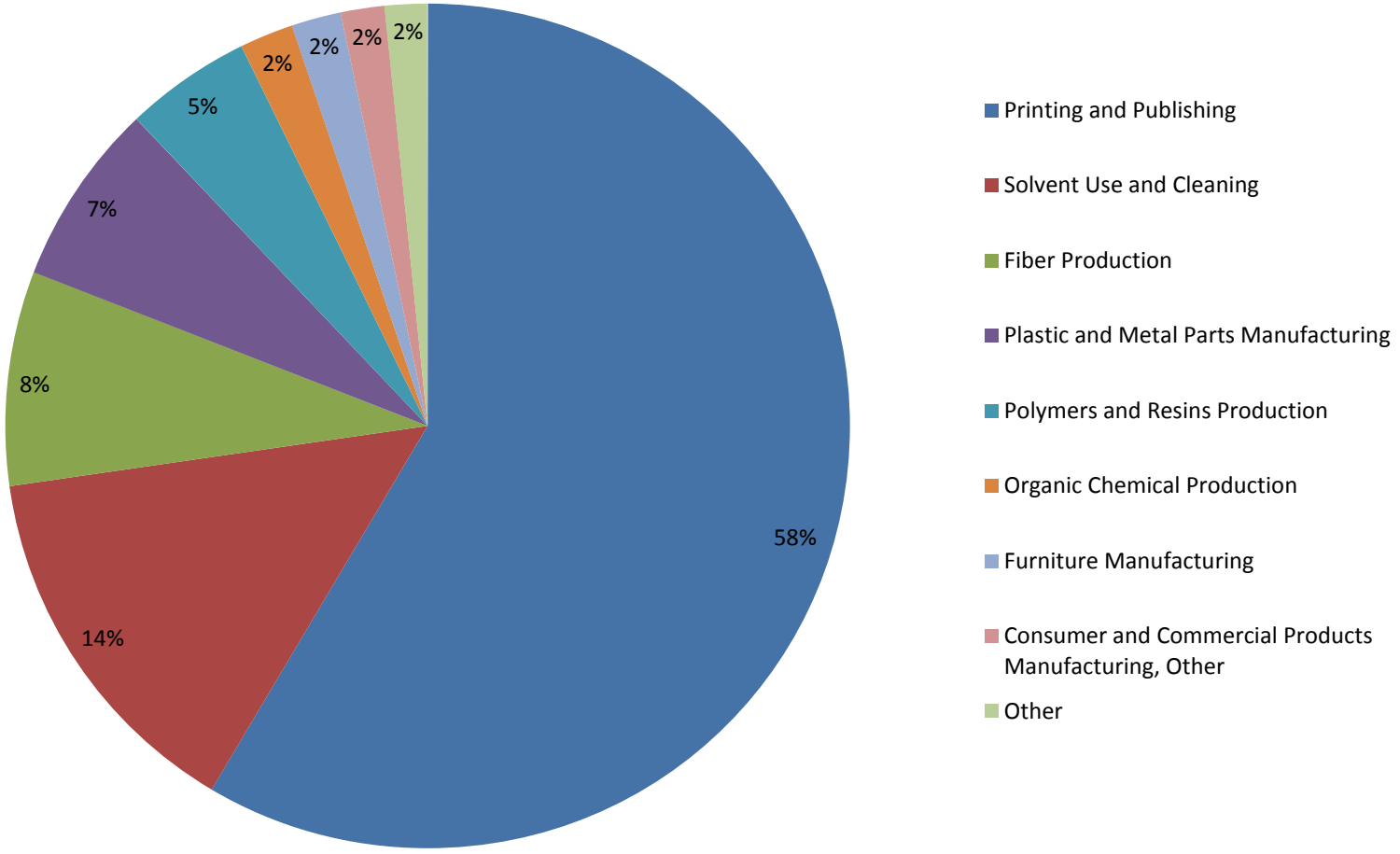
2005 NATA 1,3-Dichloropropene Emissions

Percent Contribution By Sector



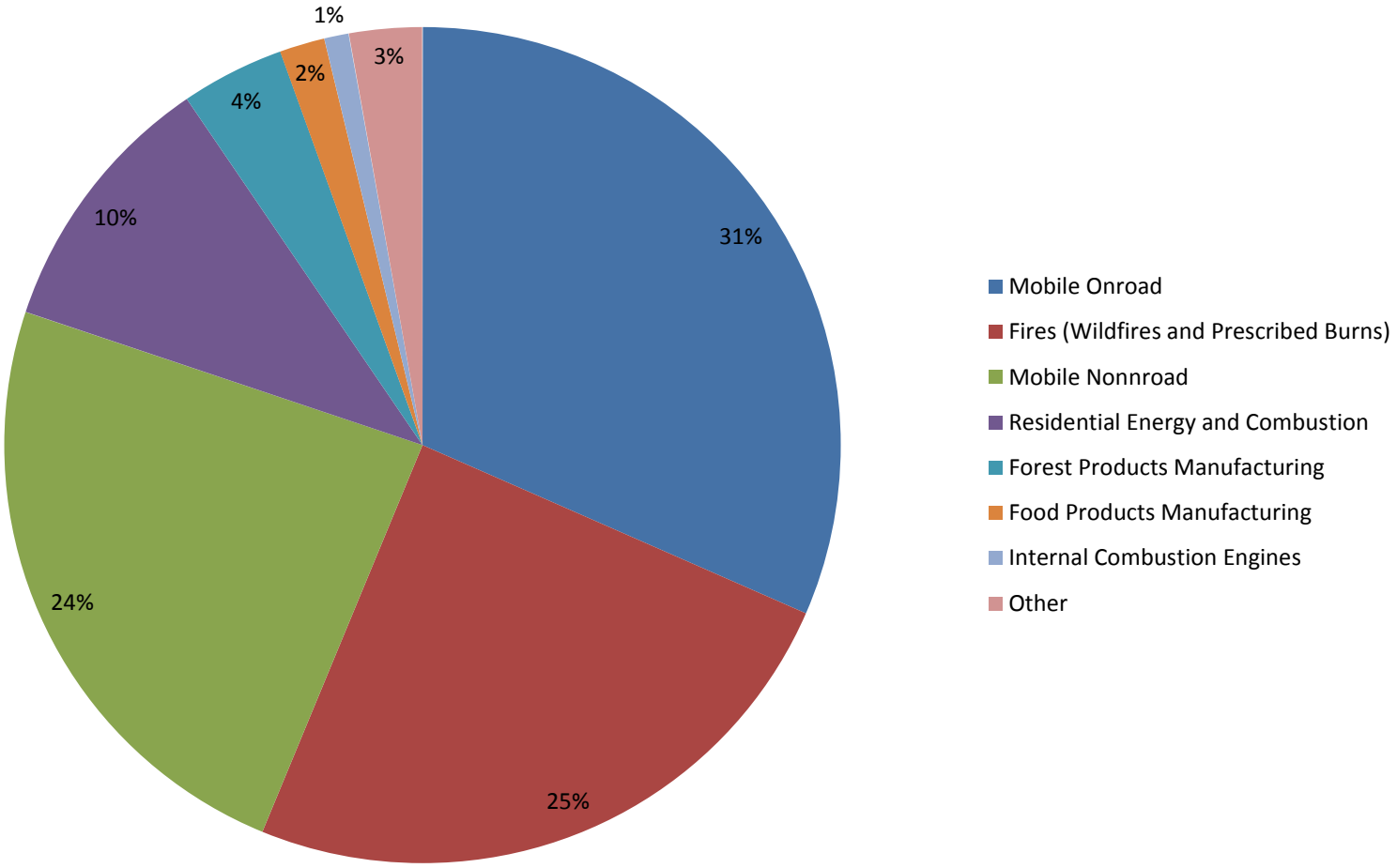
2005 NATA 2,4-Toluene Diisocyanate Emissions

Percent Contribution By Sector



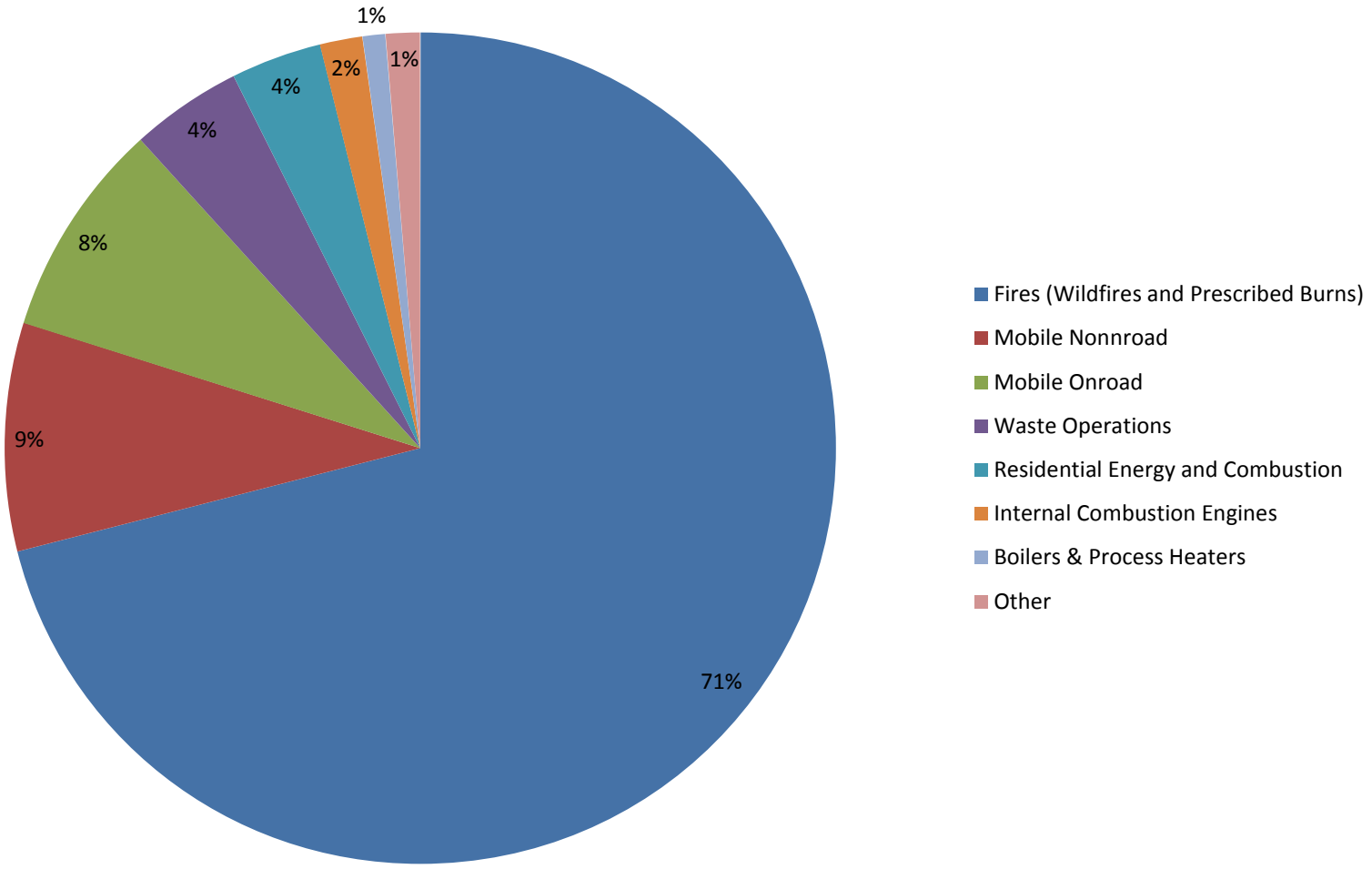
2005 NATA Acetaldehyde Emissions

Percent Contribution By Sector



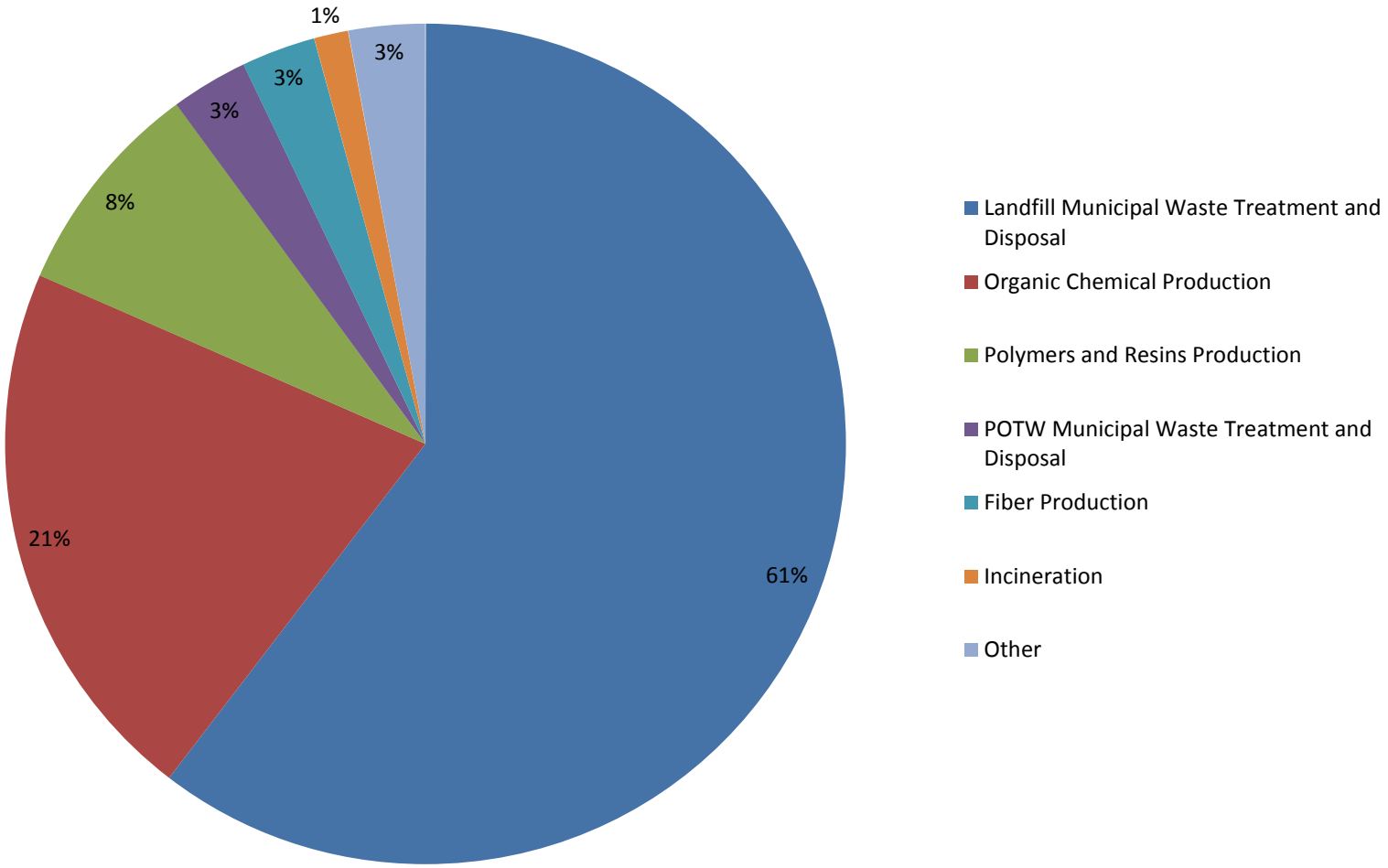
2005 NATA Acrolein Emissions

Percent Contribution By Sector



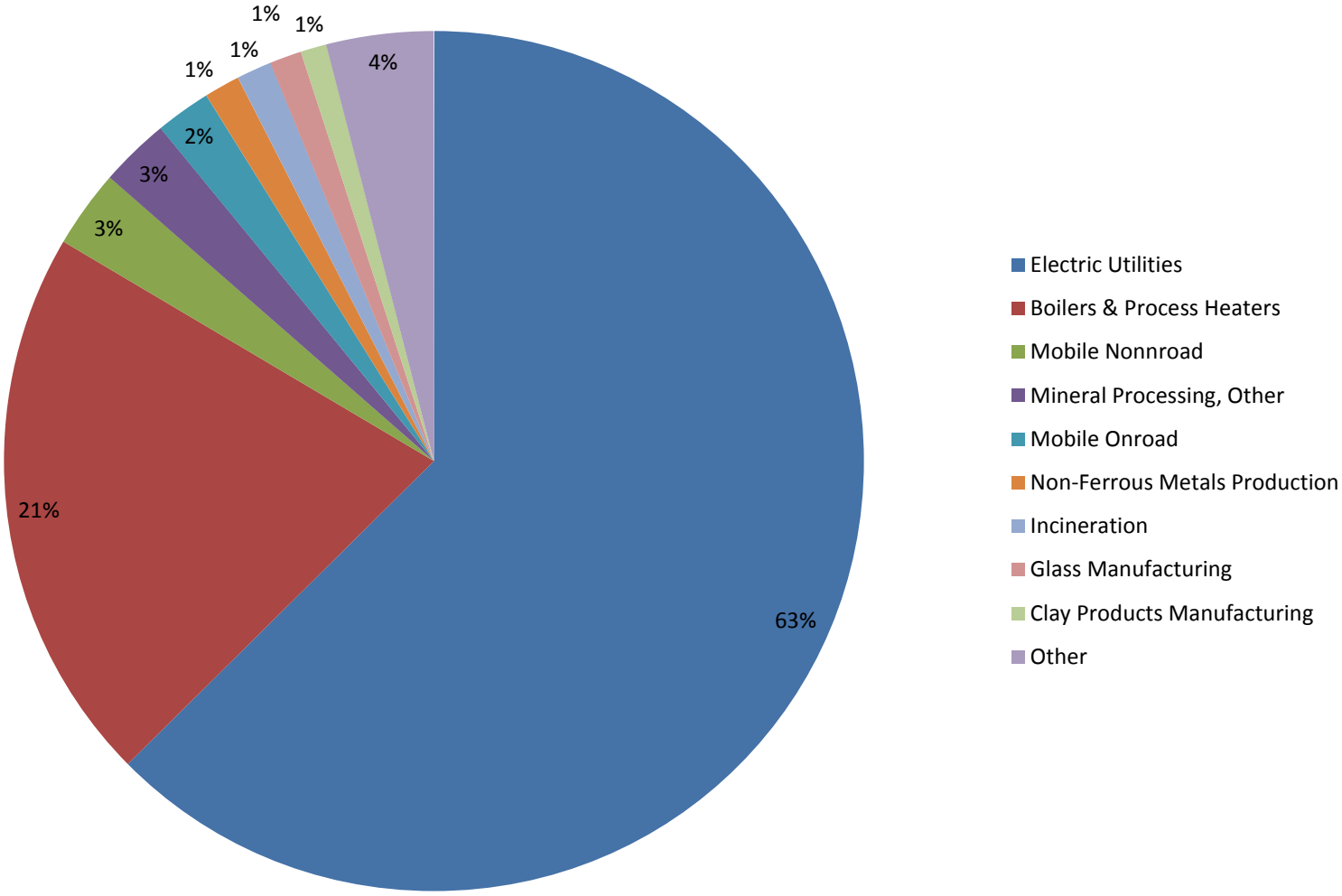
2005 NATA Acrylonitrile Emissions

Percent Contribution By Sector



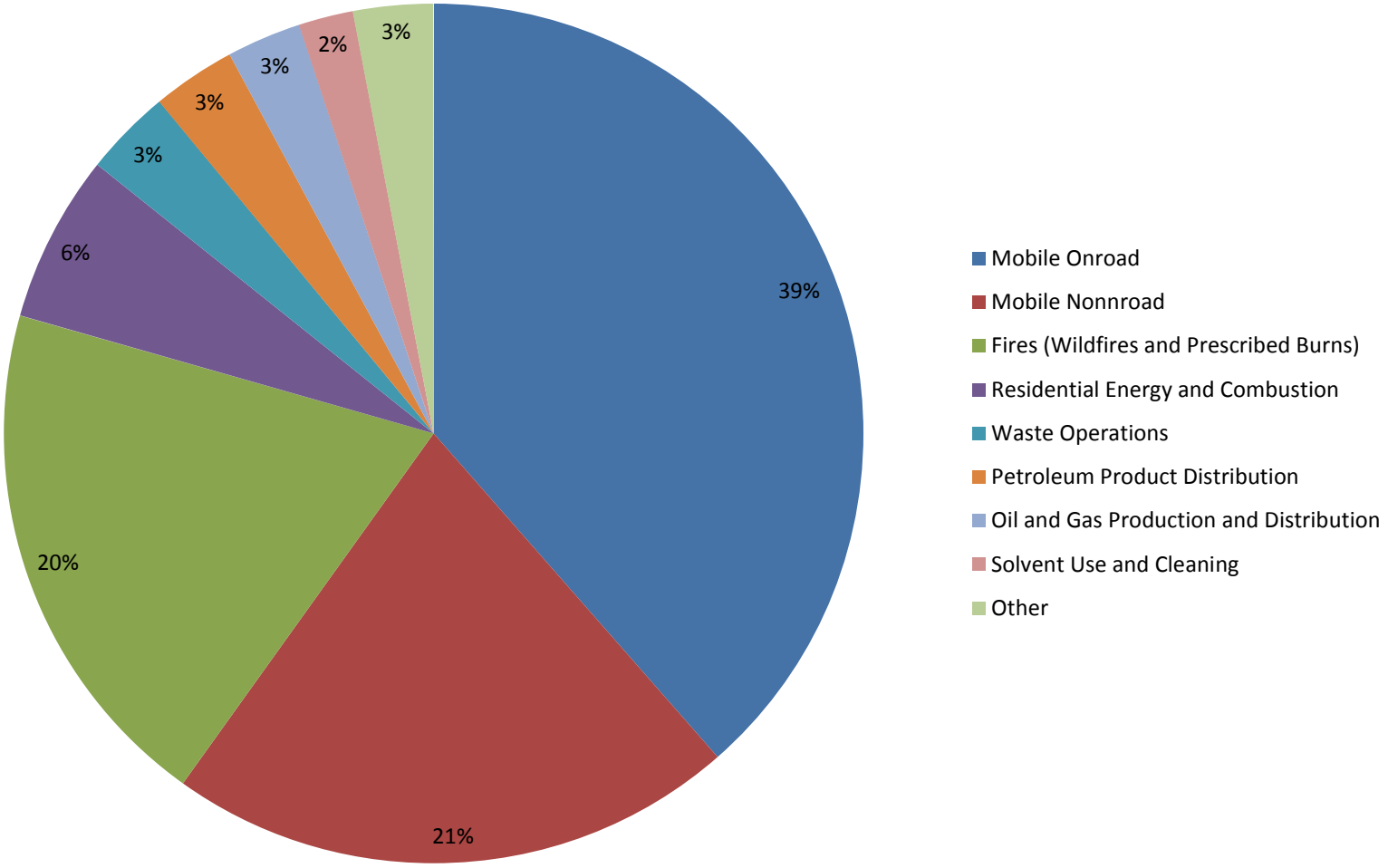
2005 NATA Arsenic Compounds Emissions

Percent Contribution By Sector



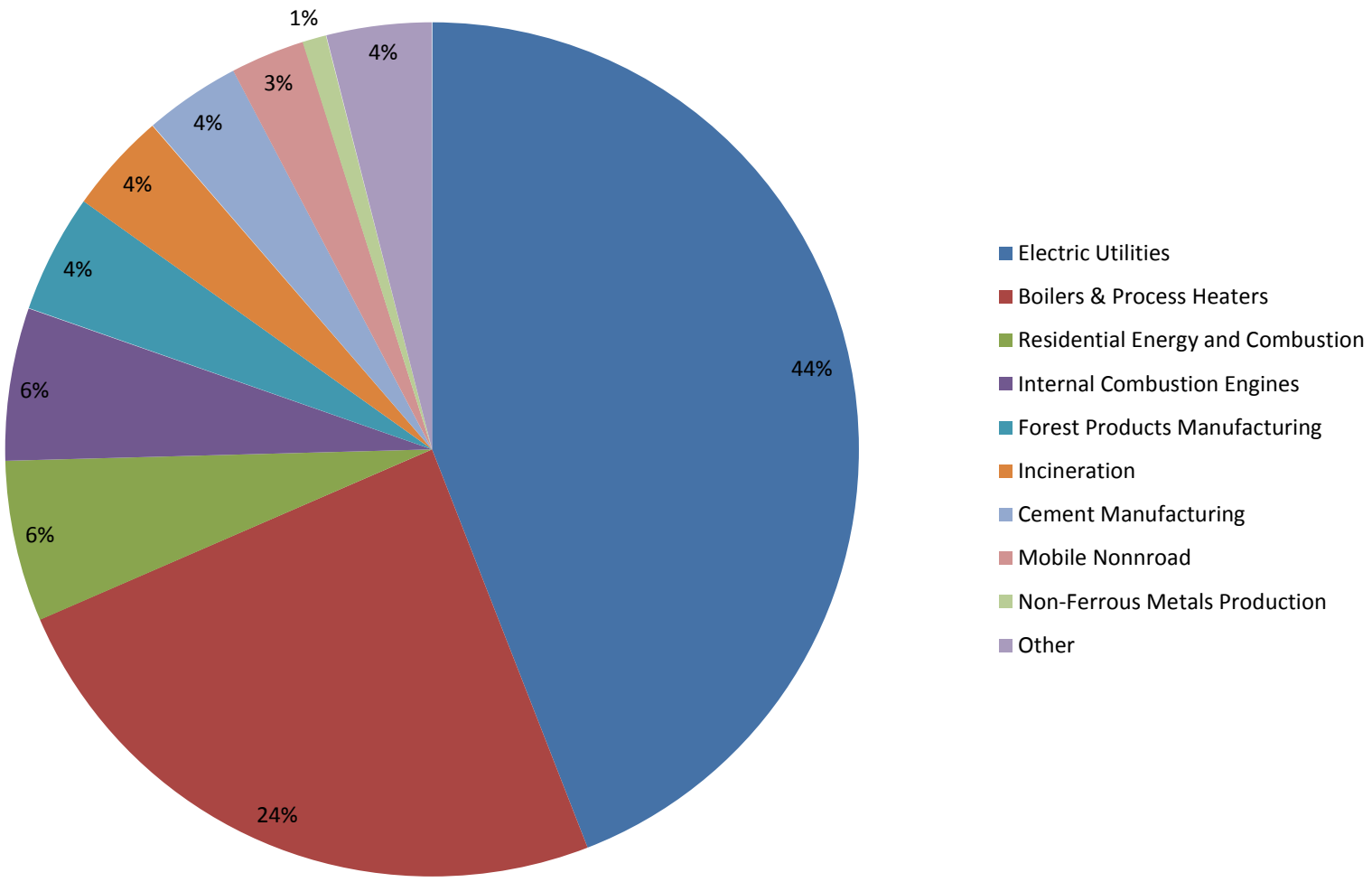
2005 NATA Benzene Emissions

Percent Contribution By Sector



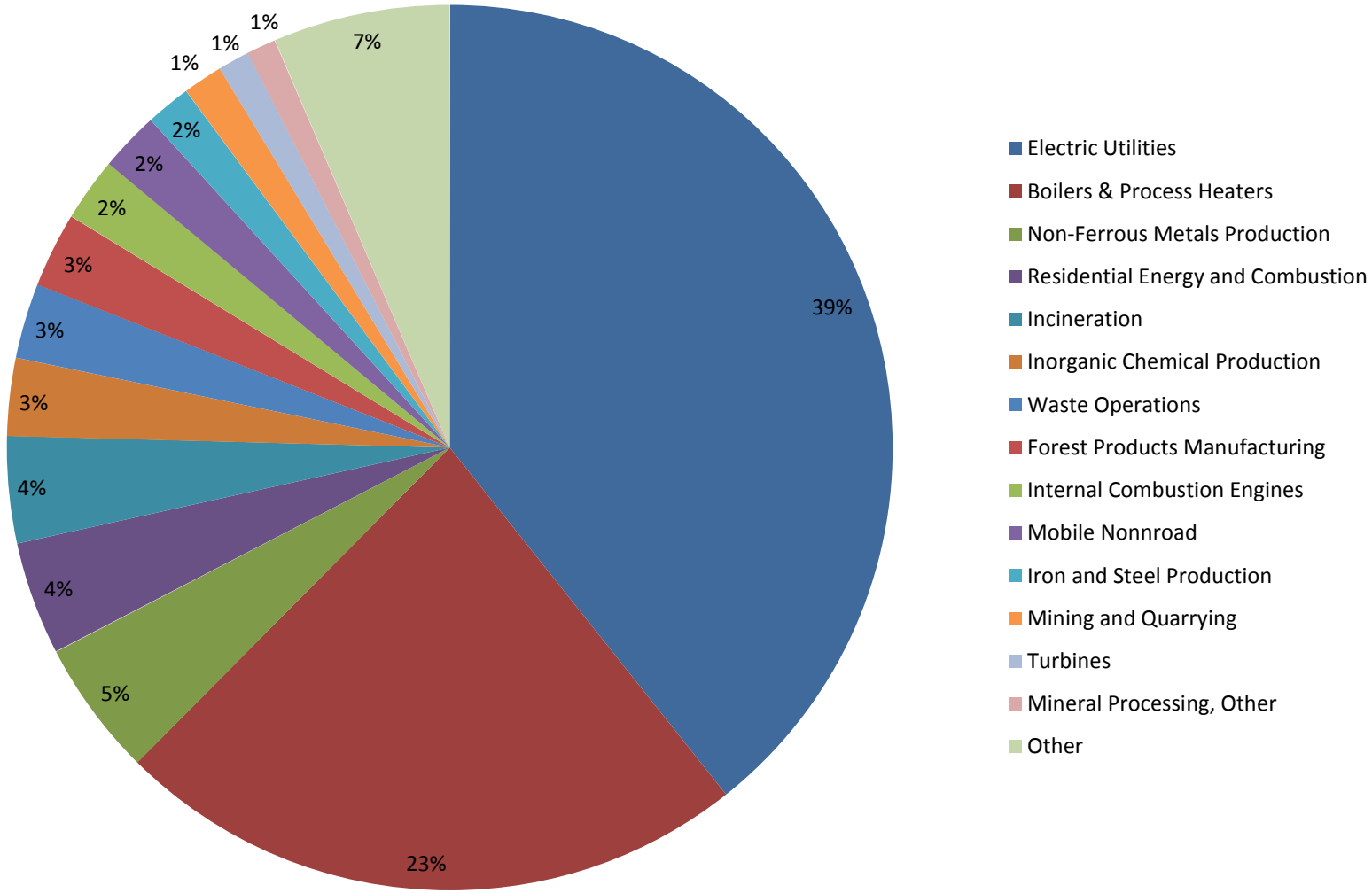
2005 NATA Beryllium Compounds Emissions

Percent Contribution By Sector



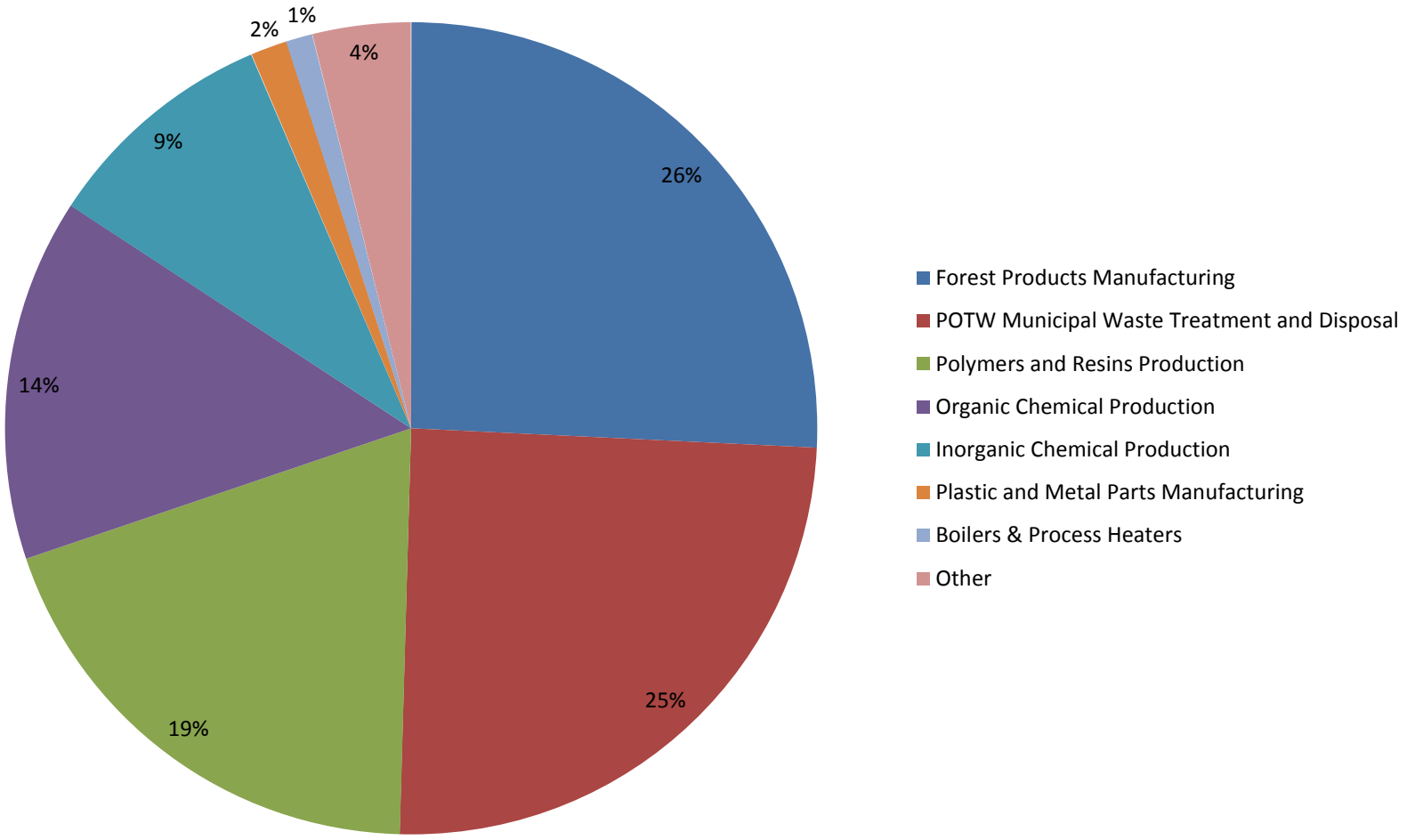
2005 NATA Cadmium Compounds Emissions

Percent Contribution By Sector



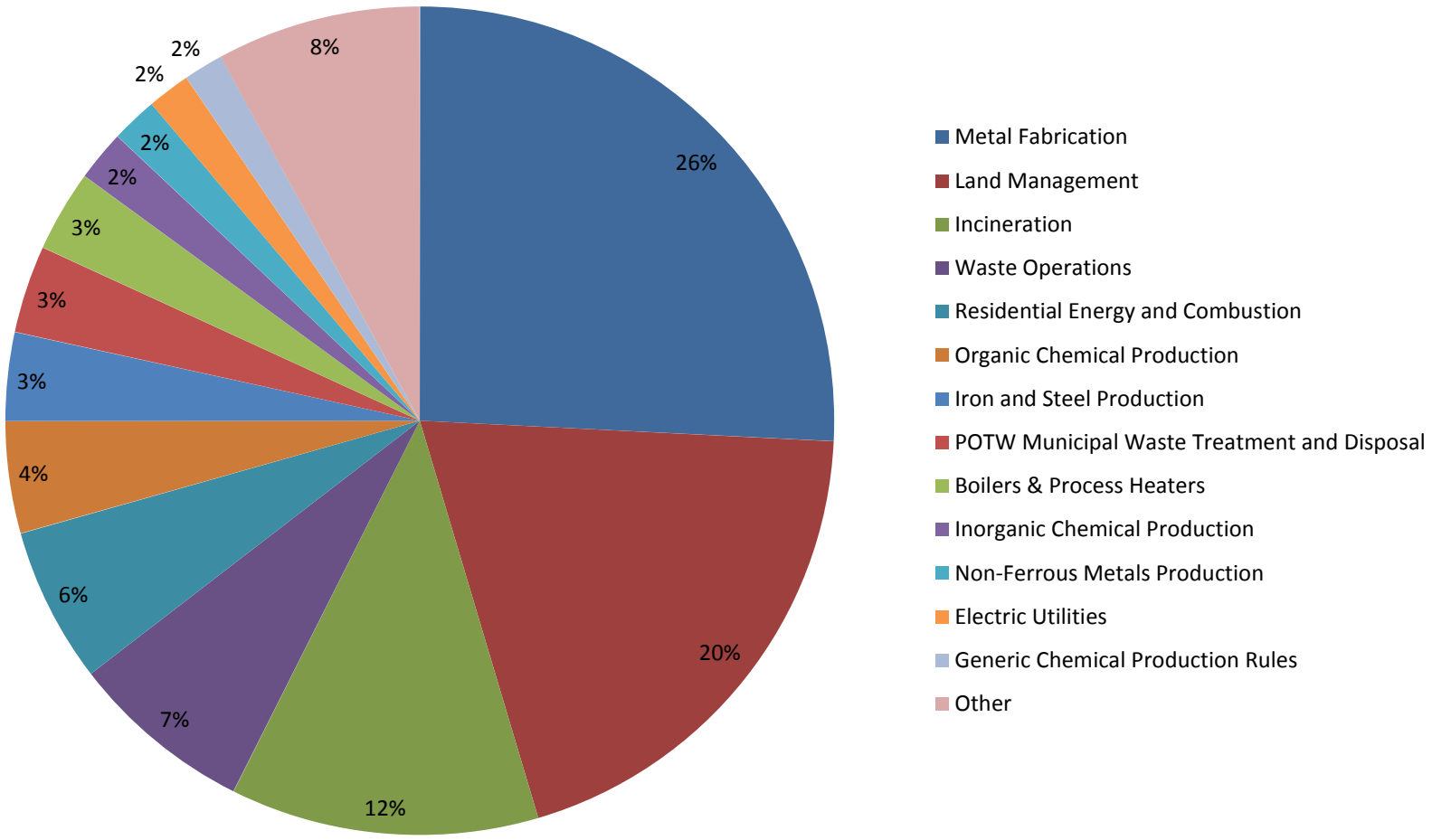
2005 NATA Carbon Tetrachloride Emissions

Percent Contribution By Sector



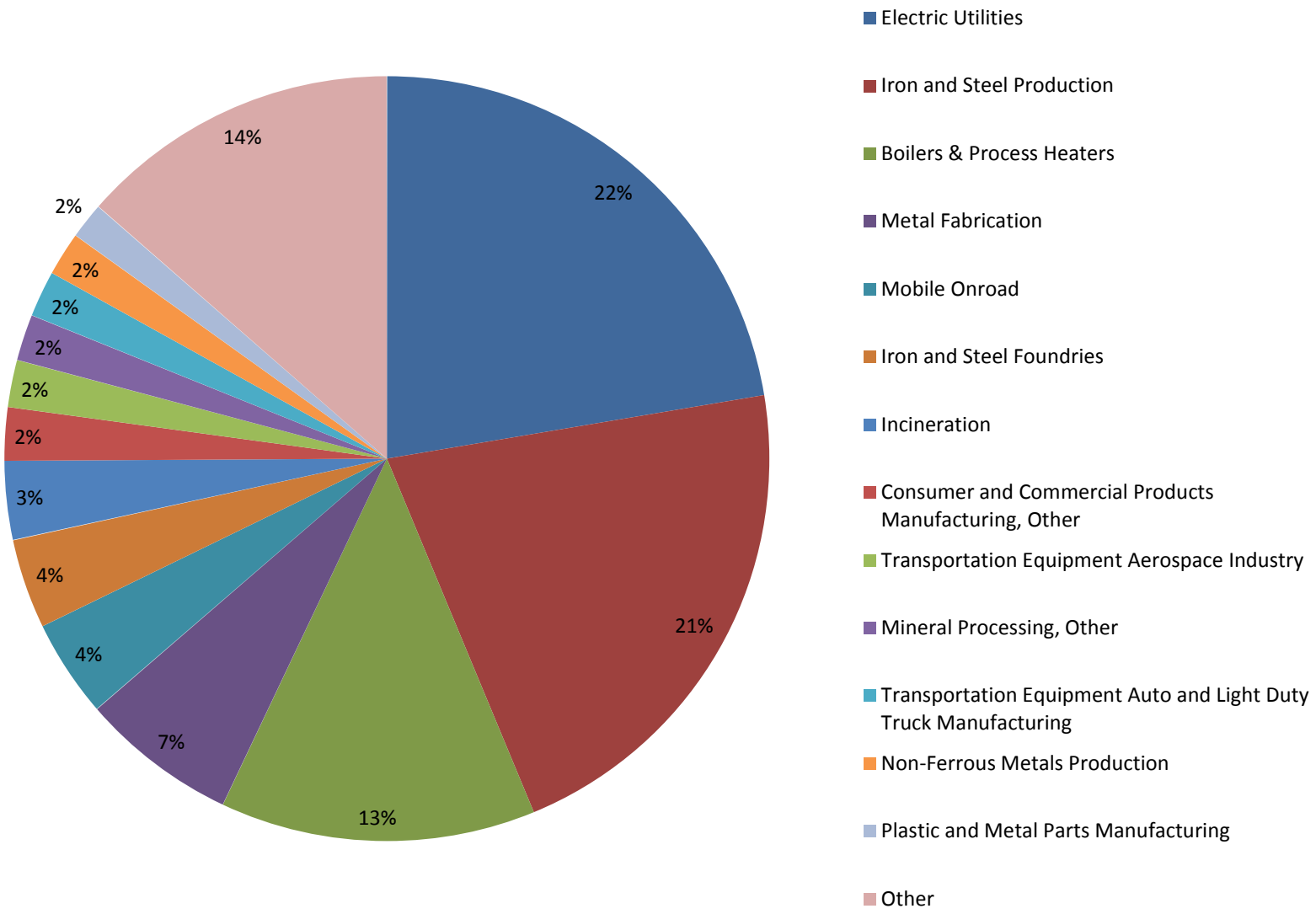
2005 NATA Chlorine Emissions

Percent Contribution By Sector

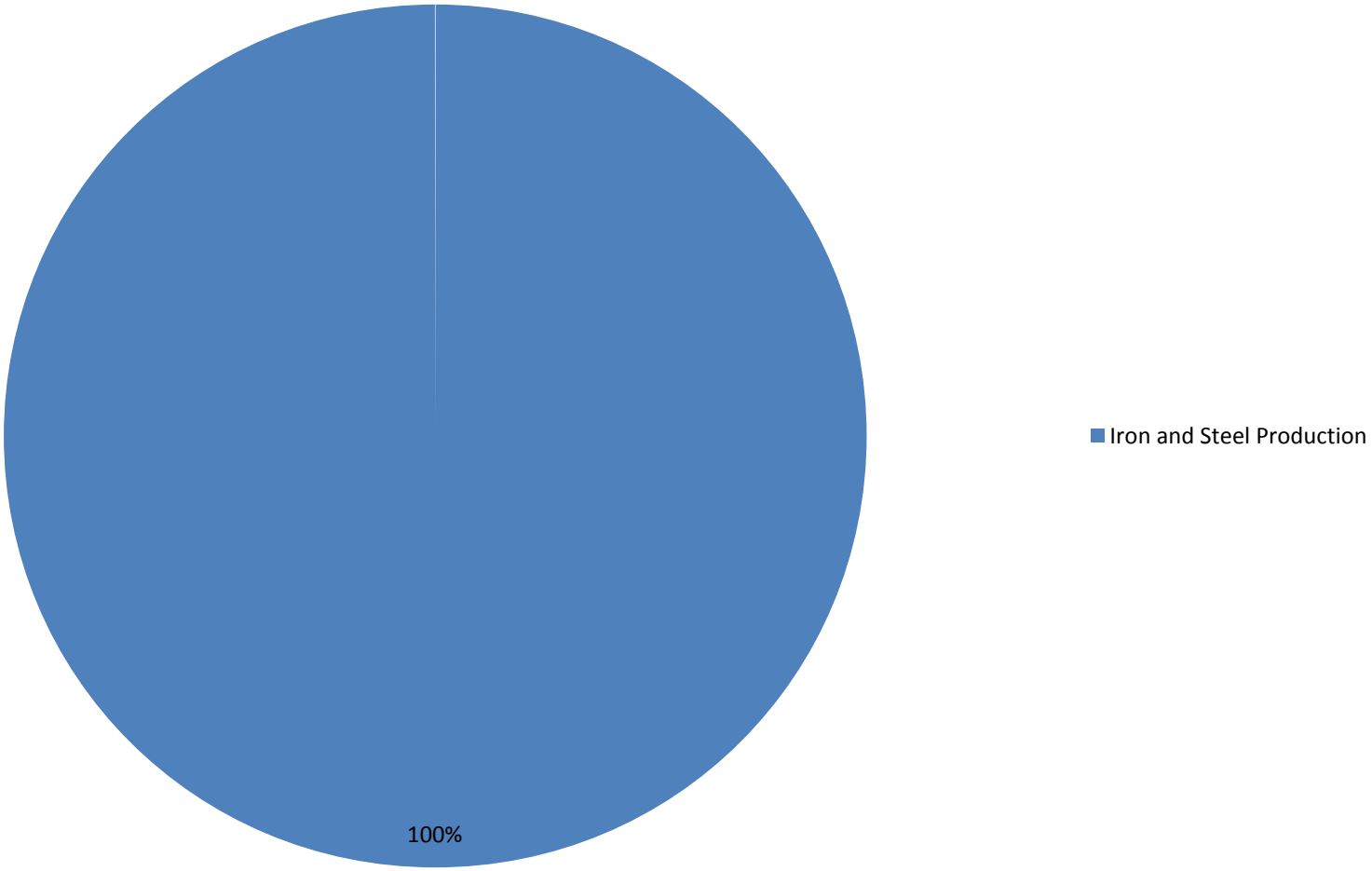


2005 NATA Chromium Emissions

Percent Contribution By Sector

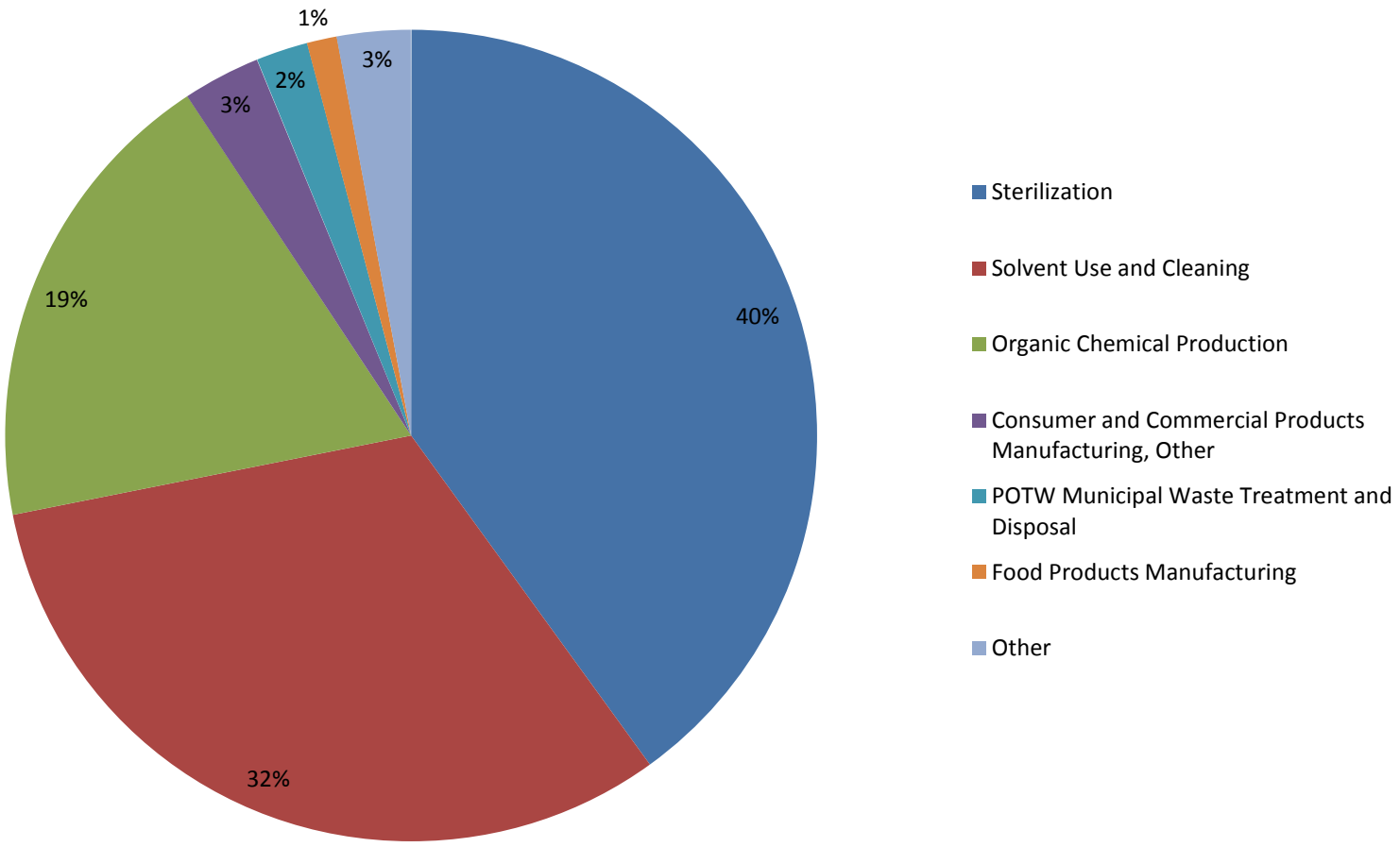


2005 NATA Coke Oven Emissions
Percent Contribution By Sector



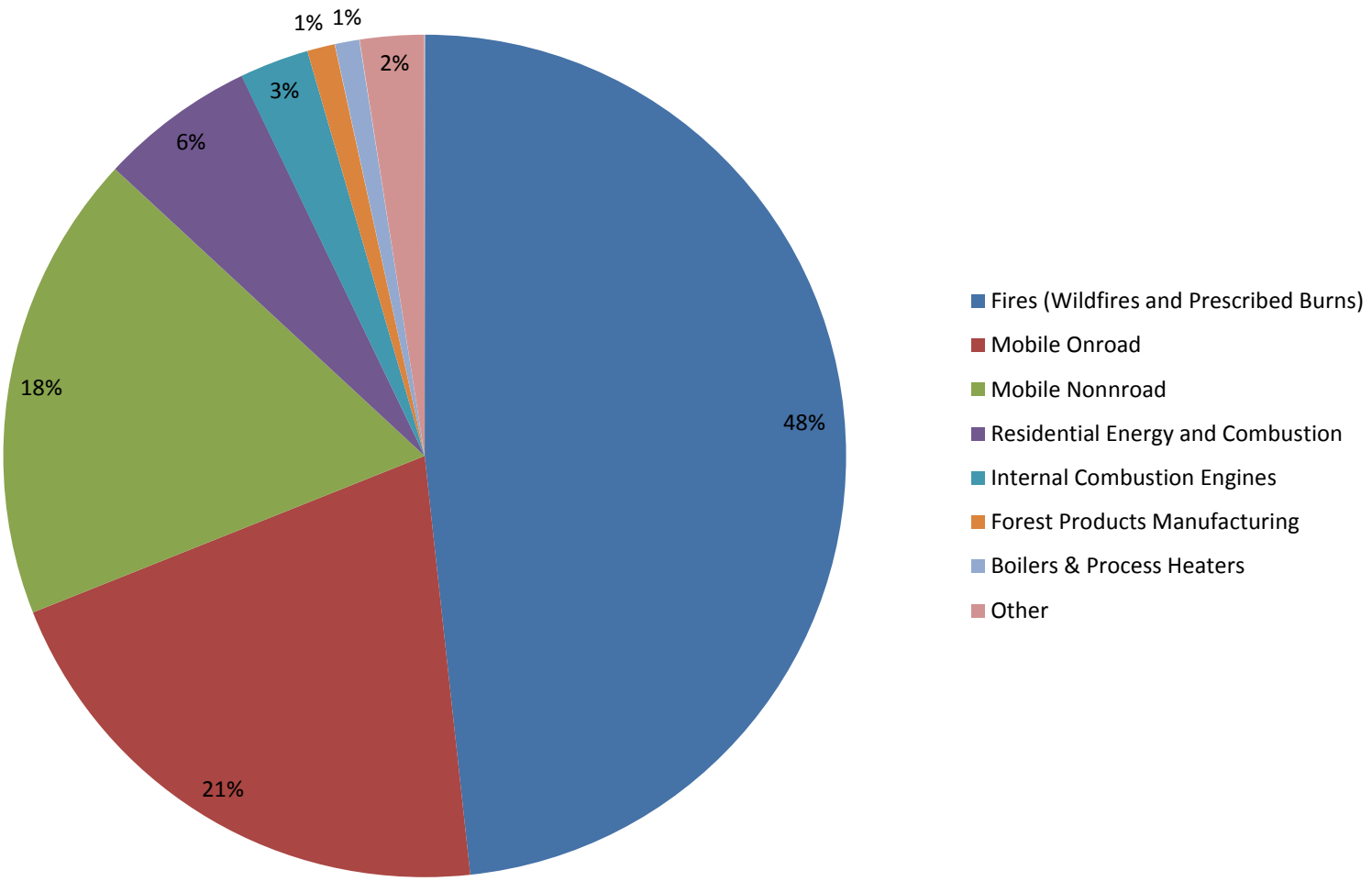
2005 NATA Ethylene Oxide Emissions

Percent Contribution By Sector



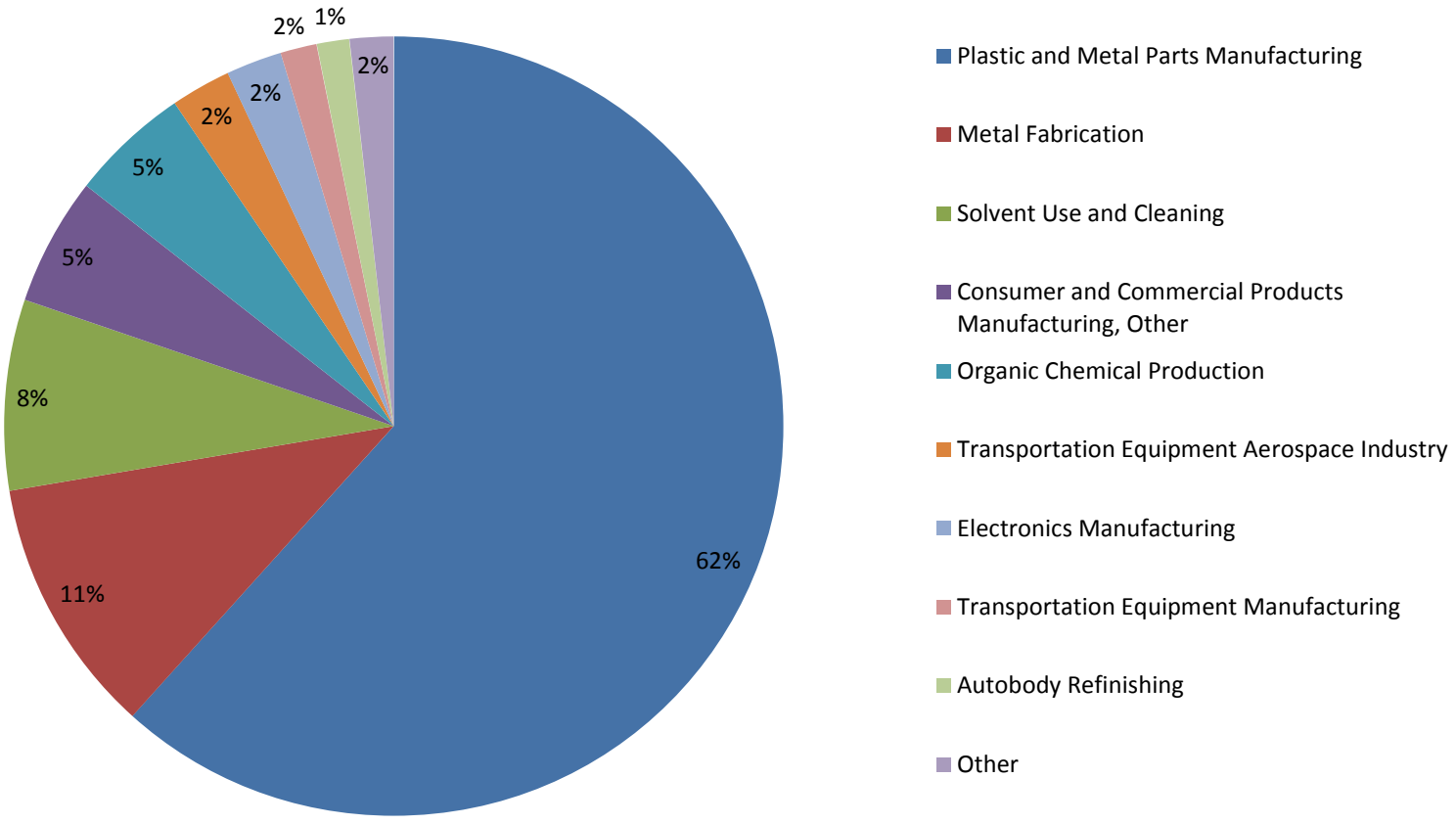
2005 NATA Formaldehyde Emissions

Percent Contribution By Sector



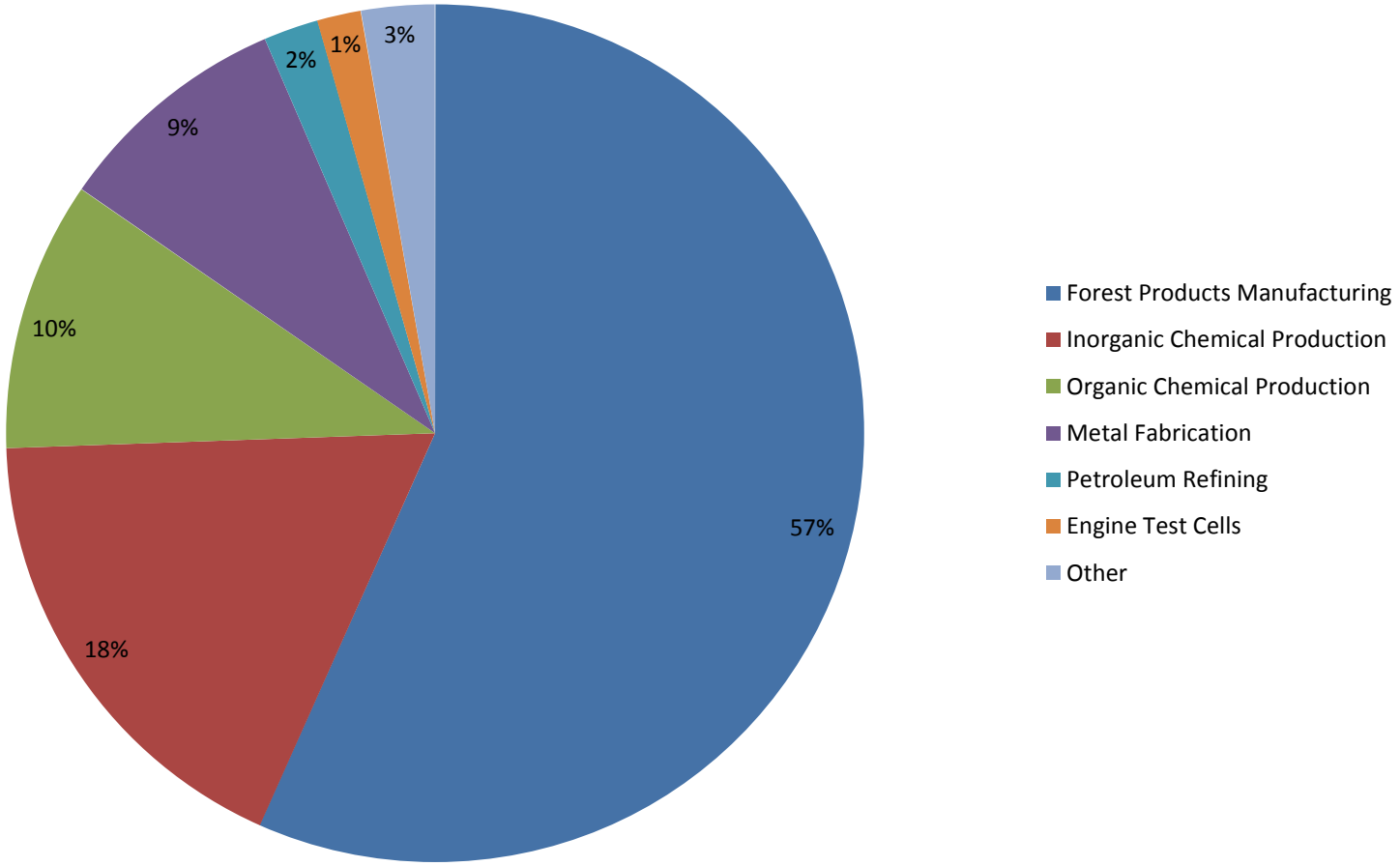
2005 NATA Hexamethylene Diisocyanate Emissions

Percent Contribution By Sector



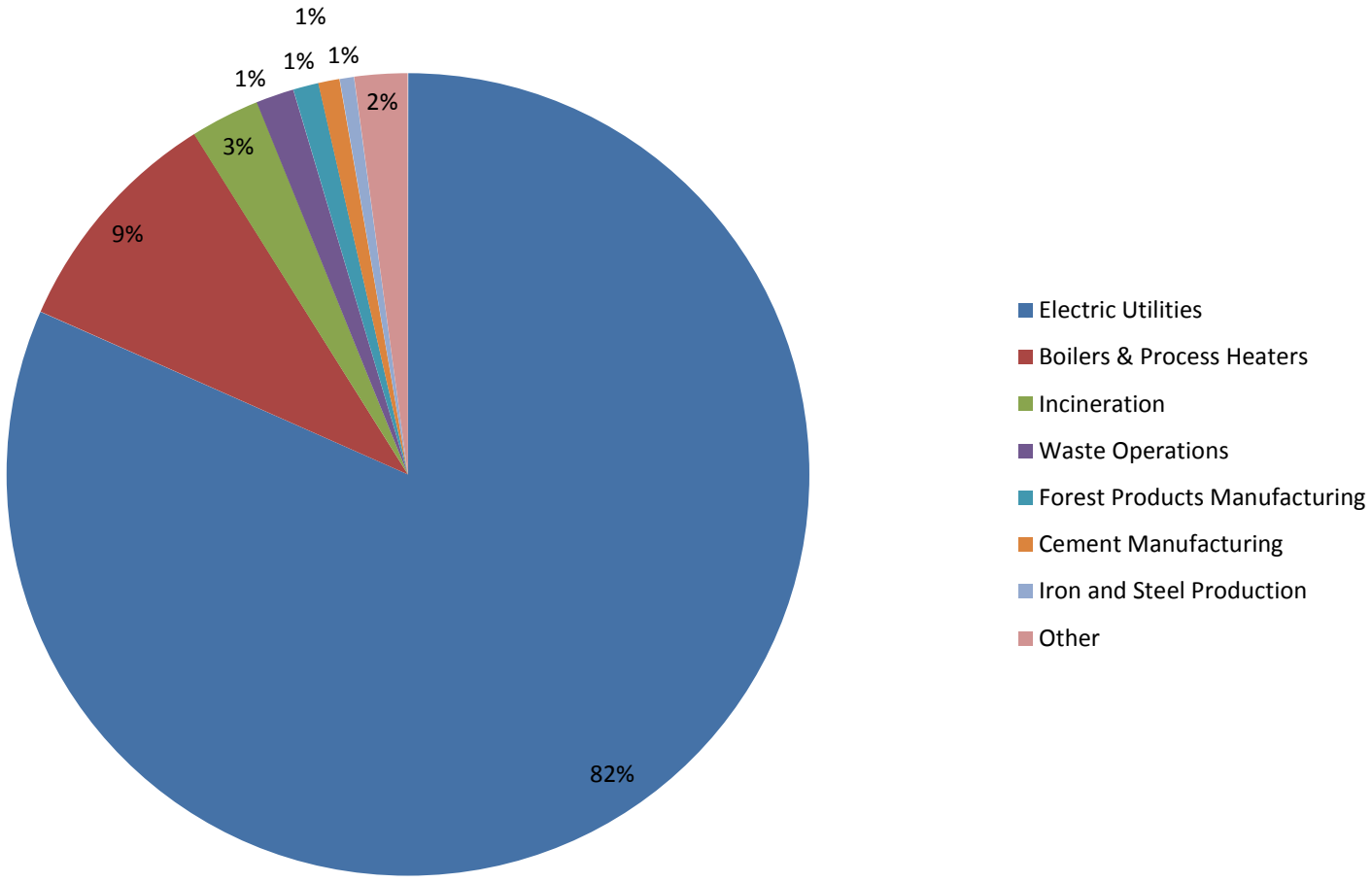
2005 NATA Hydrazine Emissions

Percent Contribution By Sector



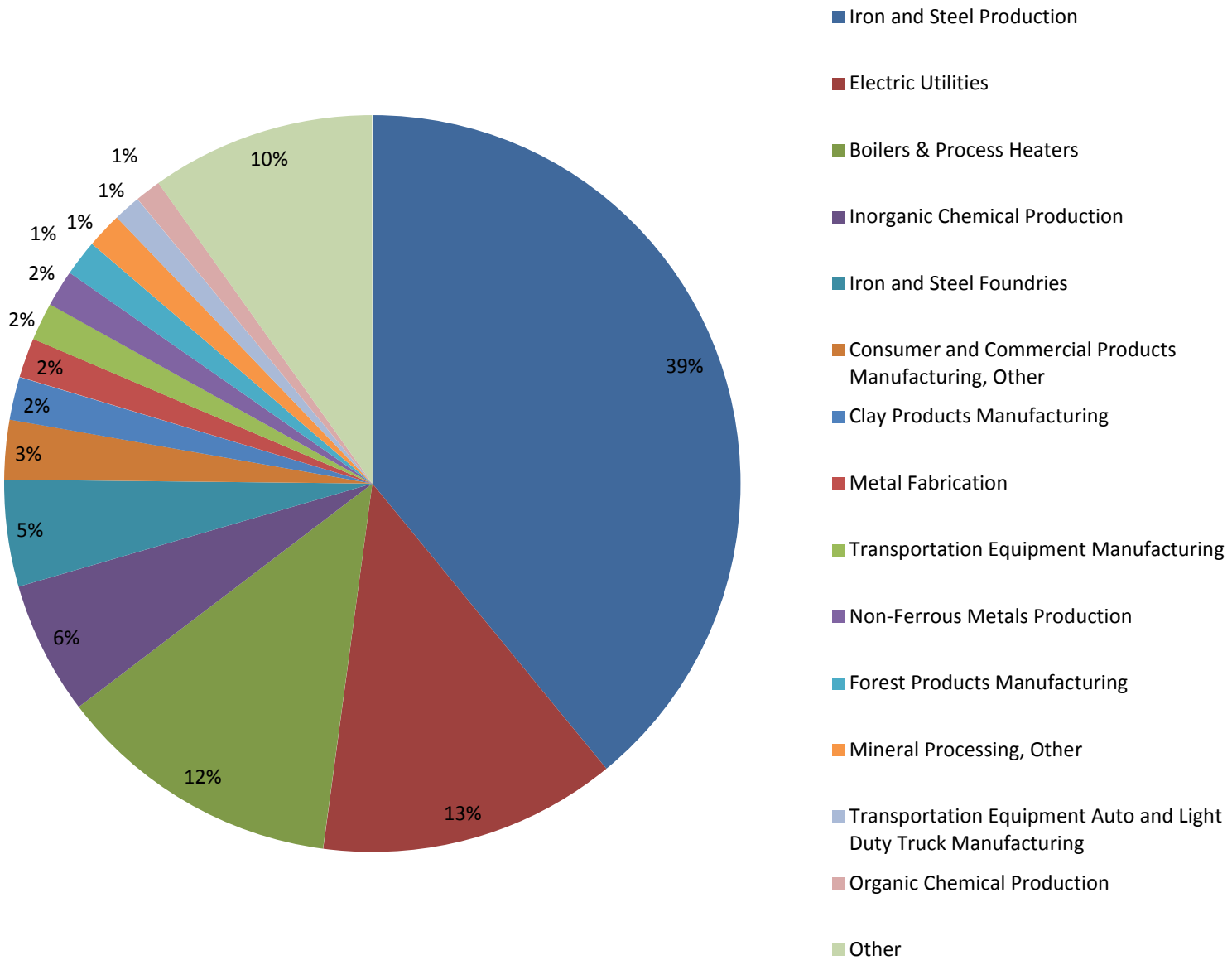
2005 NATA Hydrochloric Acid Emissions

Percent Contribution By Sector



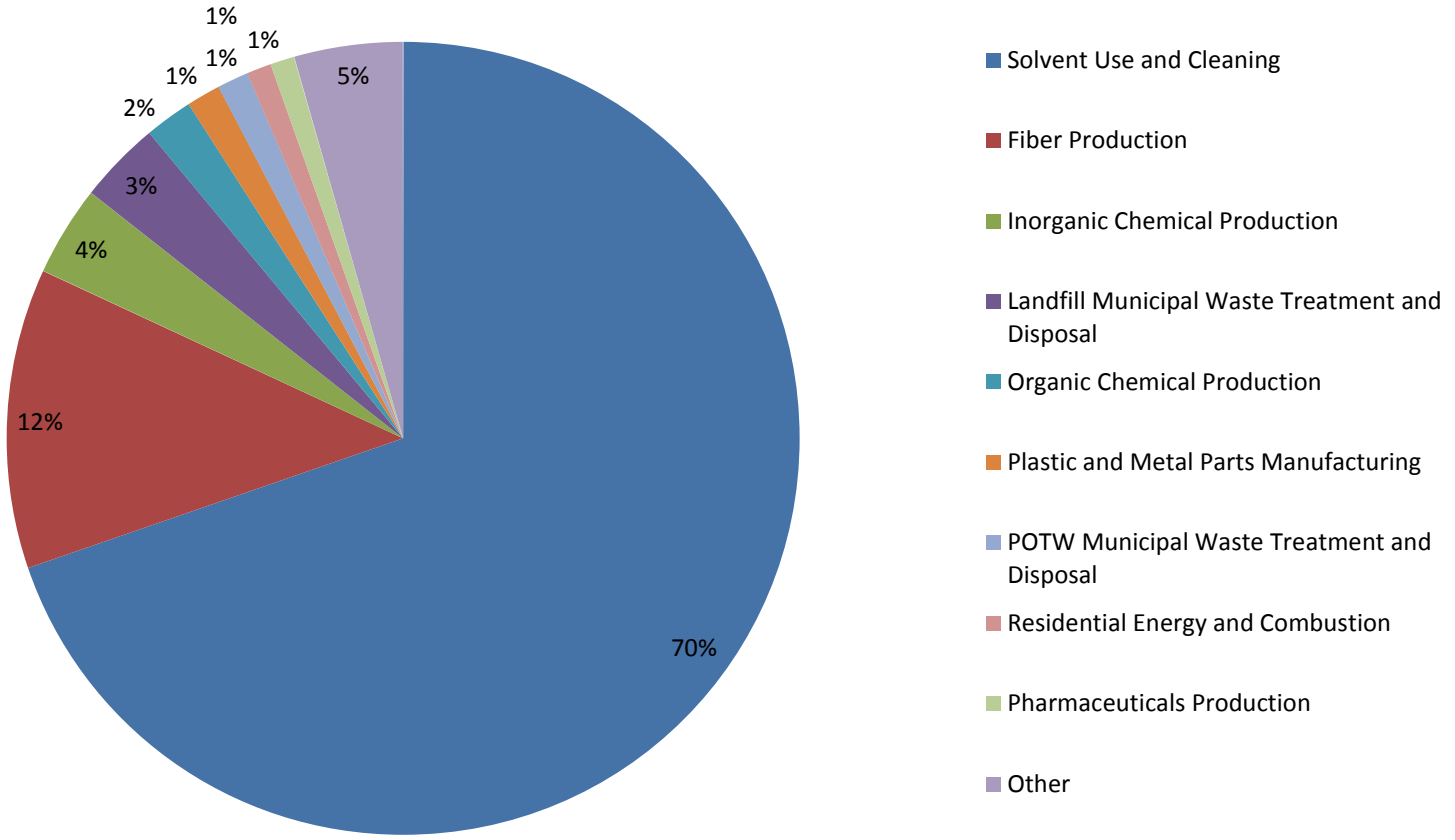
2005 NATA Manganese Compounds Emissions

Percent Contribution By Sector



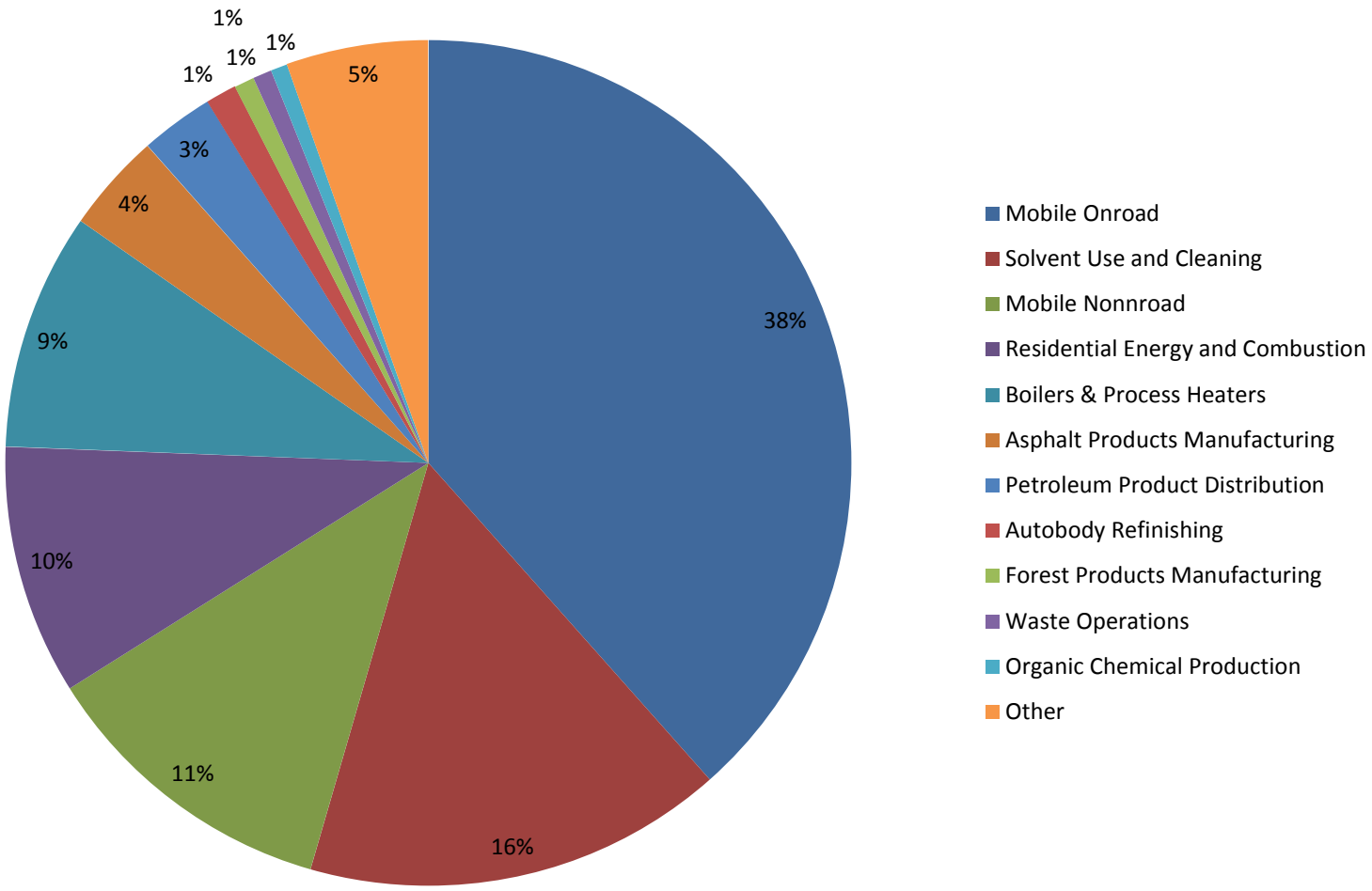
2005 NATA Methylene Chloride Emissions

Percent Contribution By Sector



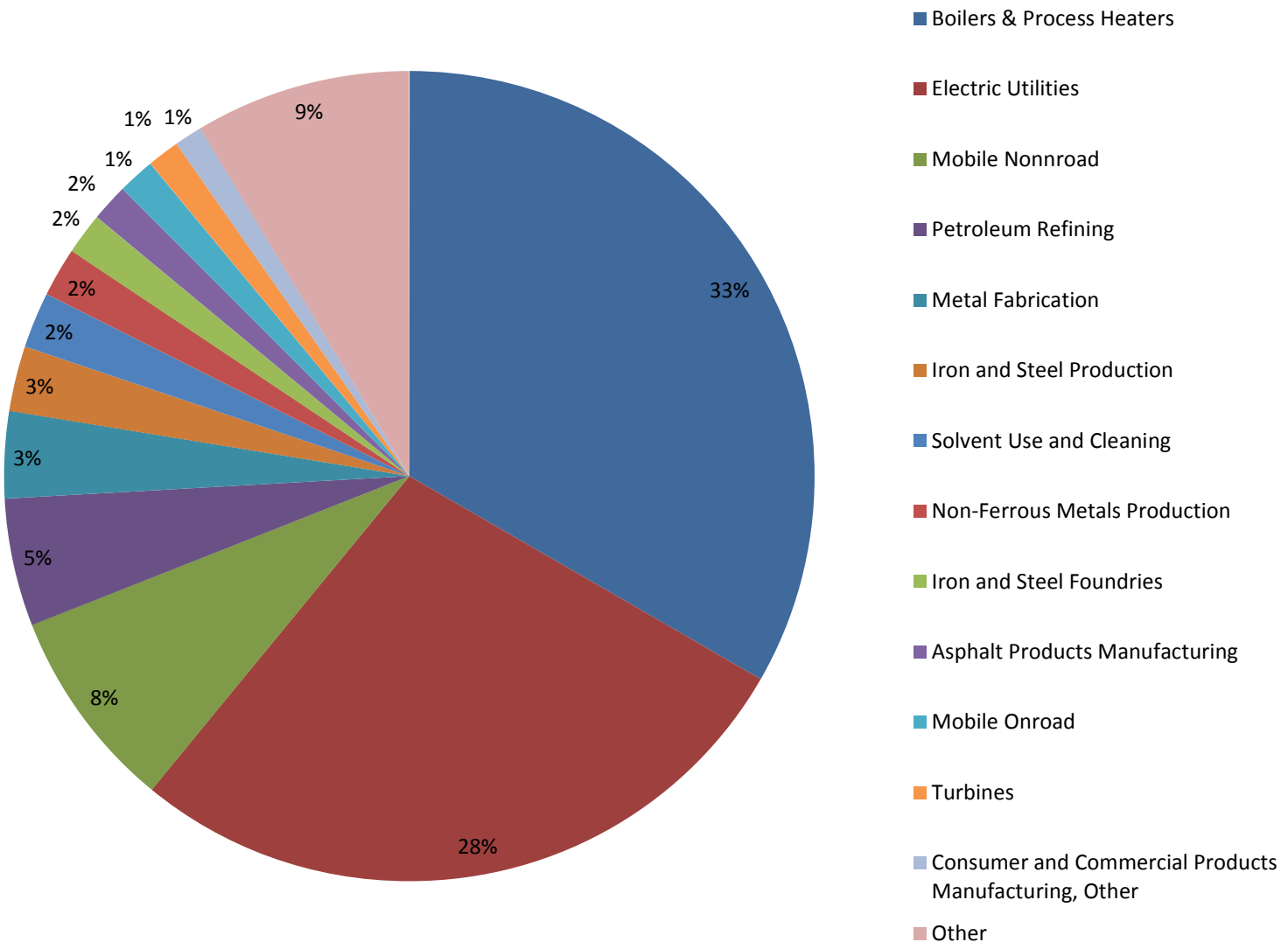
2005 NATA Naphthalene Emissions

Percent Contribution By Sector



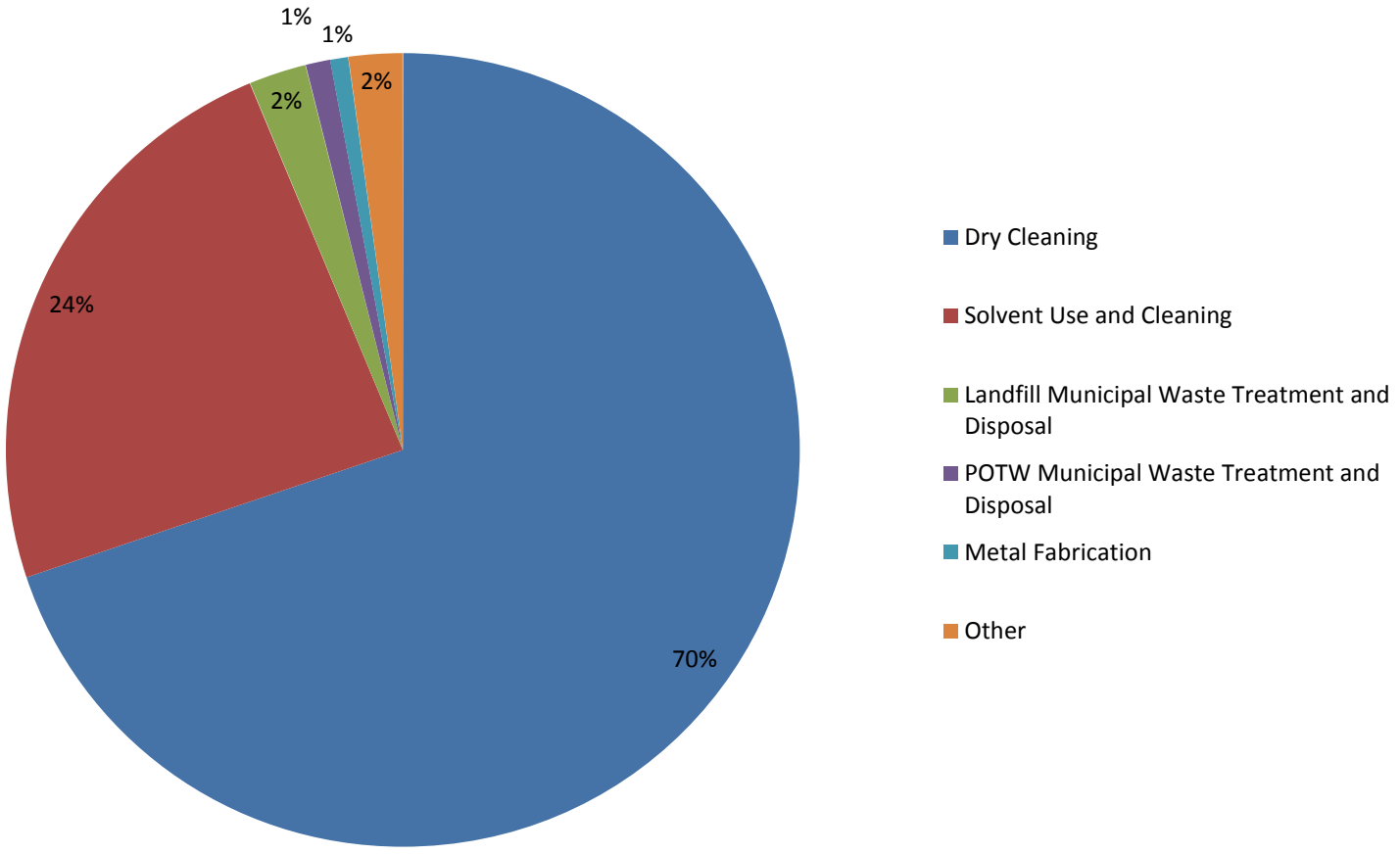
2005 NATA Nickel Compounds Emissions

Percent Contribution By Sector



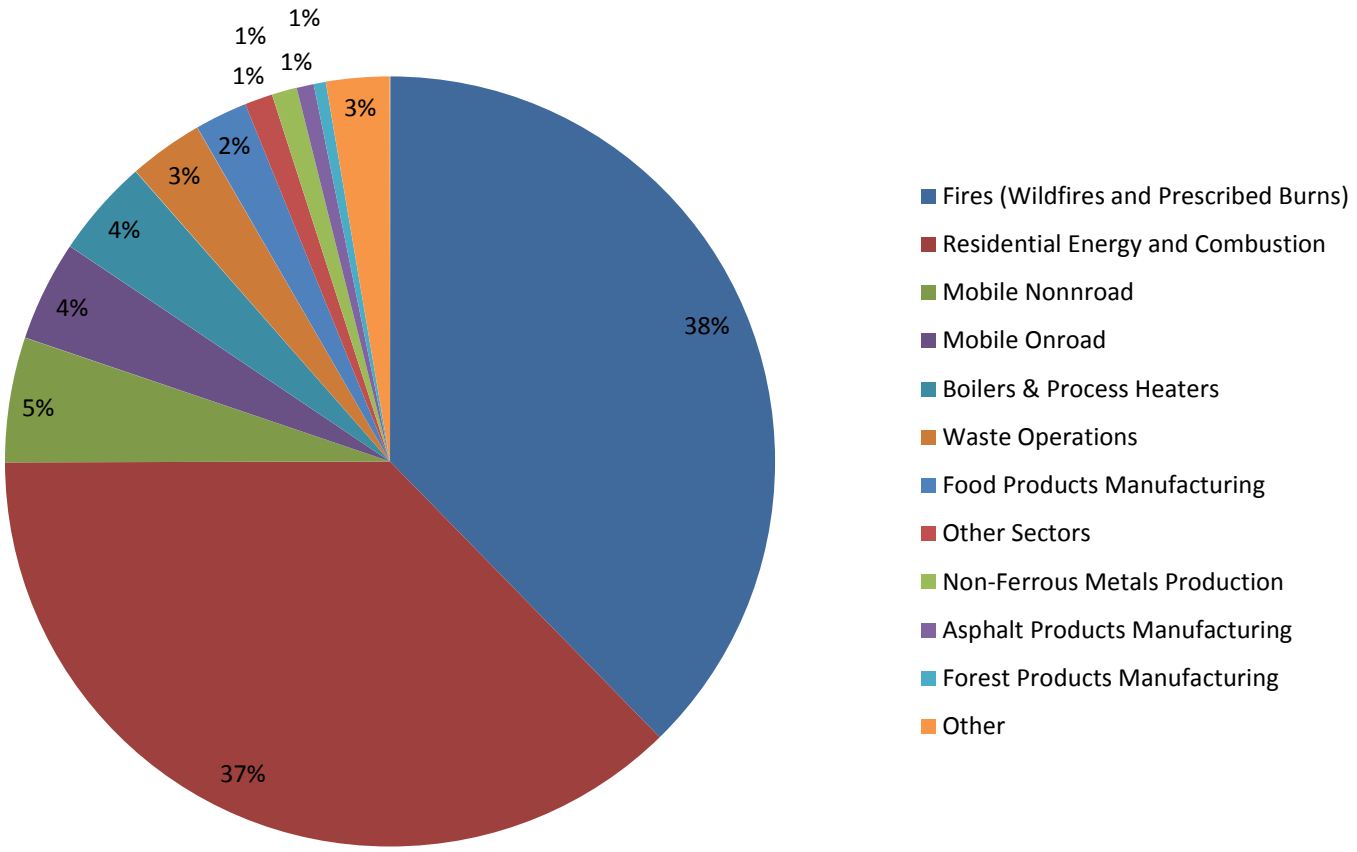
2005 NATA Tetrachloroethylene (Perchloroethylene) Emissions

Percent Contribution By Sector



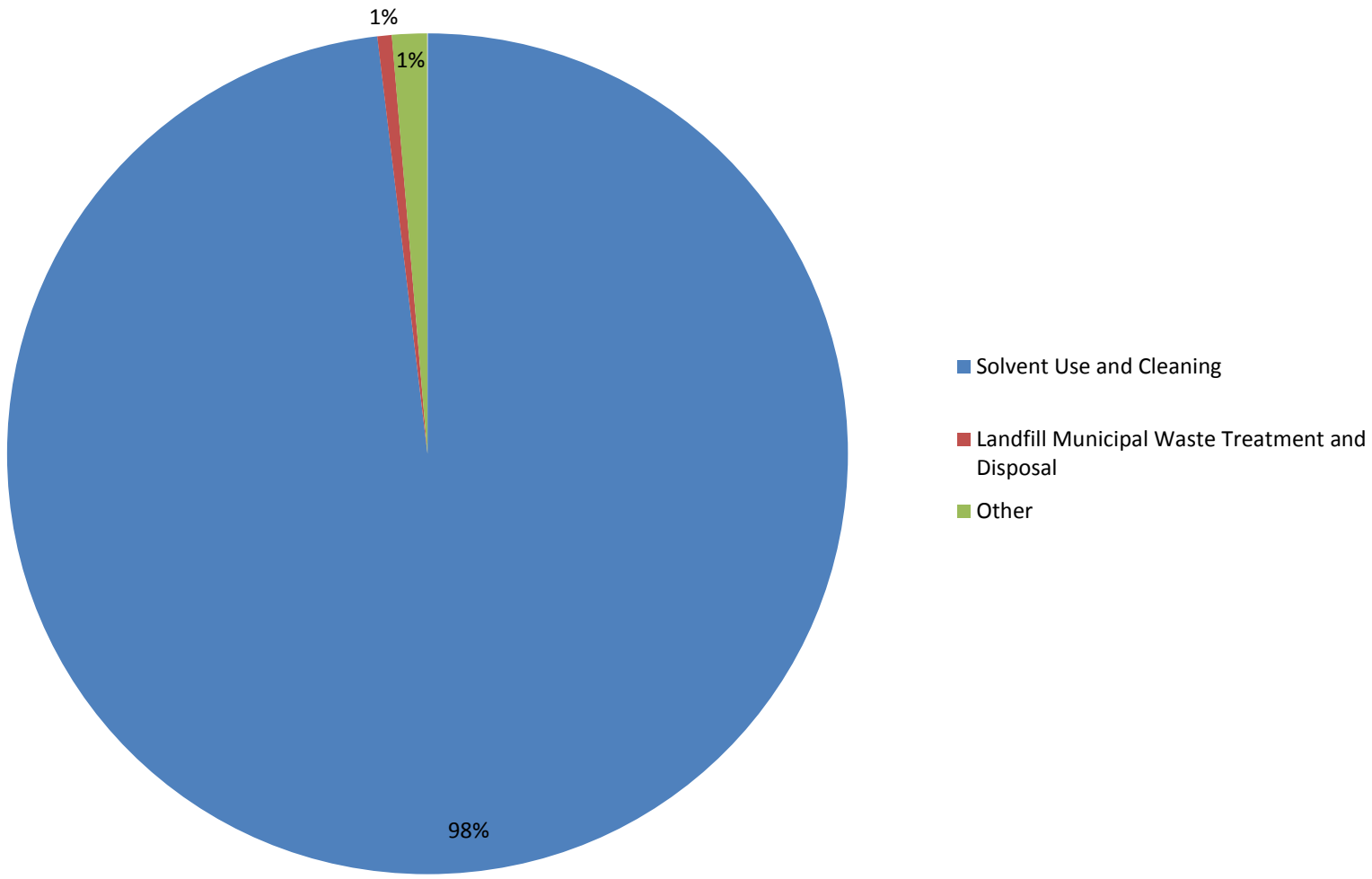
2005 NATA Polycyclic Organic Matter Emissions

Percent Contribution By Sector



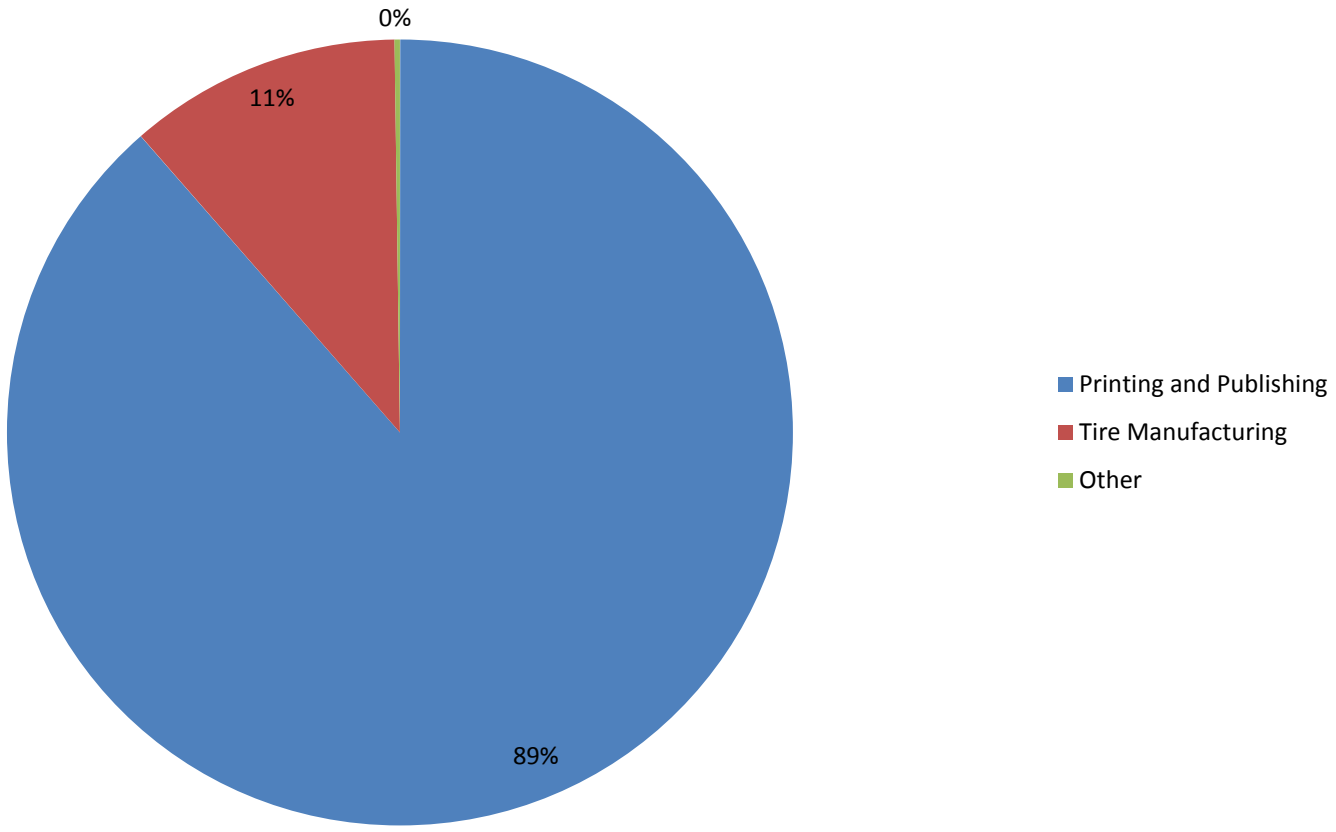
2005 NATA 1,4-Dichlorobenzene Emissions

Percent Contribution By Sector



2005 NATA N-Nitrosomorpholine Emissions

Percent Contribution By Sector



2005 NATA Methyl Tert-Butyl Ether Emissions

Percent Contribution By Sector