The Toxic

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At the inaugural Colorado College State of the Rockies Conference in May 2004, speaker Ed Marston—former editor of *High Country News* — posed a resounding question continually revisited throughout the conference by speakers and attendees: to what degree does the West control its own destiny, and to what degree is that destiny ruled by the 'colonial power' of the greater United States? As Ed writes in his Challenge Essay "Home and Hope in the Rockies" for the 2004 Rockies Report Card:

> "The West suffers not just from the actions imposed on it by force majeure, but also the loss of morale that comes from being the roadkill of national politics and national economics. Does the nation need to get rid of radioactive waste? Does it need to base missiles somewhere? Does it need 5,000 square miles of airspace so that Top Guns can practice bombing and dog fighting? Are we short of oil or natural gas? Do we need space for recreation? Or for Solitude? Eyes turn West." [1]

Rockies

Ed touched on a harsh reality of United States' history. The nation—from government to business to citizen—takes what it wants from the Rockies and leaves behind what it wants nothing to do with. The greater U.S. gets lumber, gold, and vacation homes from the region and leaves behind piles of hazardous waste, weapons-testing craters, and cold-bed communities.

Surely, some jobs are garnered and money is left behind as well, but it's still a raw deal. These incidents have threatened the Rockies' landscape, environment, and sense of freedom that make the region such a unique and spectacular part of the country. The high concentration of the nation's nuclear activity in the Rockies is a clear and popular example of just how raw these deals can be.

Of the 1,149 total nuclear detonations conducted by the US from 1945-1992, 1,035, or 90% of them, took place in the Rockies: mostly at the Nevada Test Site but also in Colorado, New Mexico, and other parts of Nevada.[2] Little was understood then about the full dangers of the nuclear explosions that scarred the immediate landscape and covered nearby and distant lands with radiation as radioactive fallout spewed many miles downwind. It took a long struggle for many victims to receive compensation for radiation-related health problems, and in Idaho many are still fighting.

Currently, the nuclear spotlight is focused on Yucca Mountain, Nevada, where the federal government is trying to ship and store all of the nation's spent nuclear fuel and high-level nuclear waste. Without what some consider a full scientific understanding of long-term waste disposal, the federal government is hurrying to relocate all of the nation's most hazardous nuclear waste to the Rockies as current storage facilities around the country rapidly approach maximum capacity. Not only are nearby residents concerned with the Yucca Mountain plan, but so are people scattered across the Rockies living in communities through which tons of nuclear waste would have to be shipped.

Here at the Rockies Project we value our speakers' ideas and decided to look into a less readily apparent issue than the nuclear testing and disposal conundrum: that of dealing with the apparently inequitable dumping and disposal of hazardous substances in the US and our eight-state Rocky Mountain Region—industrial and federal facility toxic pollution.

Tens of thousands of industrial and federal facilities, from pit mines to coal-burning power plants to food-processing facilities, release tens of millions of pounds of toxic pollution into the environment across the country every day. Toxic pollution can be extremely harmful to humans and the environment and can lead to expensive government-mandated cleanup.

From gray clouds spewed from the smokestacks of an industrial city to the gaping wound of a hillside pit mine in the remote desert, sources of toxic pollution come in many familiar forms. But it is difficult to estimate how much toxic pollution actually occurs in a given region and to what extent it impacts human and environmental health in that region and elsewhere.

It is often assumed that the Rockies, with its relatively sparse population, few large cities, and low number of manufacturing facilities, is exposed to less industrial/federal facility pollution than the rest of the country. It also seems reasonable that the vast Rockies easily dilutes pollution. However, as this report shows, an inequitably high share of industrial/federal toxic pollution is released to the Rockies' environment, and many parts of the Rockies are failing to meet EPA pollution standards. For example, 14 percent of the Rockies' counties failed to meet federal air quality attainment standards for one or more of the six criteria pollutants in 2004, and 11 of those counties were in non-attainment for more than one criteria pollutant. In 72 Rockies counties, more than 10 percent of water bodies are threatened or impaired according to the EPA. There are currently 86 Superfund sites in the Rockies, which are highly toxic areas in need of major cleanup (*See* **Figures 1-3**).

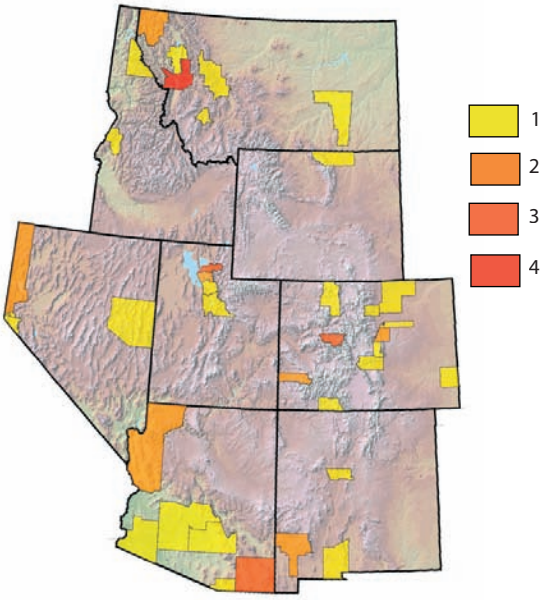
It is a little less clear who, in this case, can be blamed. In some instances, an industrial/federal facility may be irresponsibly polluting with little regard to local concerns. Or the facilities operations may be so huge that, although it uses the best pollution prevention technology available, it still pollutes its surroundings too much. In other cases, the federal, state, and/or local government may be too lax in setting pollution standards

and in regulating polluters. Or it could be that communities are allowing excessive pollution in exchange for jobs and economic prosperity. It may just be that no one is paying attention to the issue. But whatever the situation is, community residents are supposed to have some say.

In 1986 under the Emergency Planning and Community Right-to-Know Act, the EPA created a publicly accessible database of industrial and federal facility toxic pollution called the Toxics Release Inventory (TRI). Some argue the EPA program generously empowers citizens with the ability to keep a tab on industrial pollution and the environment. Others argue that the EPA simply wanted to shed regulatory responsibility without any concern for the program's effectiveness. Either way, the EPA equipped citizens with information for identifying and pressuring notable polluters and the government—giving them some degree of power and say. The EPA claims that since the TRI has been available, the releases of TRI chemicals by facilities reporting since the program began has decreased 49 percent, and they attribute part of that reduction to the influence of citizens on both polluters and the government. [3]

The following piece — "The Toxic Rockies" — takes a more focused look at the question of whether there is a toxic inequity in the Rockies, whose origins and explanation are summarized above. Our analysis leads to the conclusion that indeed inequities of major proportions exist towards and in the Rockies. First, we lay out the details of the inequity between the Rockies and the United States and touch on its environmental impact. Then, our county-level industrial/federal facility toxic pollution analysis—broken down by air, water, and land pollution with supplemental sections on agriculture and toxic threat—serves as an initial framework for targeting possible areas of concern. It's up to you, the Rockies citizens, to take the next steps. You may conclude that the tradeoff of jobs for waste is acceptable, indeed essential. Or you may decide that the very essence of the Rockies is being abused and harmed in ways that will destroy the unique features of the region. Regardless of your perspective, we urge you to investigate further and thus help take control of this vital aspect of the Rockies Region's destiny.

Figure 1. Counties in Non-attainment for 1 to 4 Criteria Air Pollutants in 2004 [4]



The Toxics Release Inventory

The Environmental Protection Agency (EPA) is mandated by law to provide a publicly accessible database on the yearly management details of over 600 toxic chemicals released by around 25,000 industrial and federal facilities in the United States. The Toxics Release Inventory is accessible at www.epa.gov/tri.

The TRI has drawbacks as a toxic pollution accountability tool and as an indicator of toxic threat to humans and the environment. Facilities are only required to report estimates of toxic releases. The dangers associated with toxic releases vary by chemical, manner released, and natural setting into which they are released, which are not directly assessed by the TRI. And only facilities meeting three EPA criteria are required to report. Facilities must:

- -employ 10 or more full-time-equivalent employees,
- -manufacture or process more than 25,000 pounds or otherwise use 10,000 pounds of any listed chemical during the year,
- -be a federal facility or a non-federal facility operating within certain industry sectors inculuding metal mining, coal mining, food, lumber, paper, chemicals, petroleum, plastics, primary metals, fabricated metal products, electric utilities, RCRA/solvent recovery, and about 18 other industry sectors.

Nonetheless, the TRI is still a valuable tool with a wealth of information for identifying noteworthy sources of toxic pollution.

Evaluating Toxic Releases in the Rockies

Of all toxic waste managed, only some is actually released directly into the environment. It can also be recycled, burned for energy recovery, or treated. Although these methods still have potential for toxic problems, they are not nearly as direct a threat as toxic chemicals emitted to the air, discharged to surface water, and released to the land. "The Toxic Rockies" uses these toxic "releases" in its analysis.

This Rockies Project report uses TRI data from 1998 through 2002. The 2002 data, released in June of 2004, is the most recent data available. A controversial federal court decision that exempts the mining industry from reporting the movement of unprocessed waste rock took effect for the 2002 reporting year. This had a very noticeable impact on the 2002 numbers, and it is debatable as to whether or not the reclassification was warranted. So our analysis looks at pounds released in 2002 as well as the 1998-2001 multi-year average to factor in both reporting methods as well as to account for inconsistency from year-to-year. The analysis also factors in the change in both pounds and percent released from the 1998-2001 average to 2002 to detect improvement. When computing the county rankings, half the weight of our score for each county is given to the 2002 releases, one quarter is given to the 1998-2001 average, and one quarter is given to the change between the two time periods.

This report assesses the release of all toxic chemicals as well as the release of five different groups of toxic chemicals to account for the fact that different types of chemicals are dangerous in different quantities. When computing the county rankings, half the weight is given to All Toxic Chemicals and the other half is divided equally among the other five chemical groups:

- All Toxic Chemicals (or 'All Toxics') includes all 600+ TRI chemicals. These are chemicals known or suspected to be harmful to humans in certain quantities according to the EPA.
- Hazardous Air Pollutants (or 'HAPs') consists of 188 chemicals, including chlorine and asbestos, and are known or suspected to cause serious health problems such as cancer.
- Dioxin and Dioxin-like Chemicals (or 'Dioxin') refers to chlorinated dibenzo-p-dioxins (CDDs), chlorinated dibenzofurans (CDFs) and certain polychlorinated biphenyls (PCBs). Studies have shown that even low-level exposure to dioxins may cause a number of adverse health effects.
- Persistent and Bioaccumulative Toxic Chemicals (or 'PBTs') are toxic chemicals that persist and accumulate in the environment and pose significant health and environmental concerns, including mercury, PCBs, and some pesticides.
- Metals and Metal Compounds (or 'Metals') include toxic chemicals like lead, to which people are commonly overexposed, and mercury, which causes nervous system and kidney damage.
- OSHA Carcinogens (or 'Carcinogens' throughout the report) include toxic chemicals that cause increased incidence of benign or malignant tumors as decided by the Occupational Safety and Health Administration.

Some toxic chemicals fall into more than one or no chemical group, so the sum of released HAPs, Metals, Carcinogens, PBTs, and Dioxin may be greater than or less than the release of All Toxic Chemicals.

The county-level analysis divides the counties into Metropolitan and Non-metropolitan as defined by the Office of Management and Budget. Metro counties have an aggregate urban population of 50,000+ or are adjacent to these counties and linked through commuting trends. Though these divisions do not perfectly group similar counties, they do split the counties into more reasonable groups for comparison. Most of the analysis looks at toxic releases per square mile of the geographic area (county, state, region) in which they are released to get the concentration of toxic releases in the area and thus to make areas of different sizes comparable.

Figure 2. Percent of County Water Bodies Threatened or Impaired in 2002 [5]

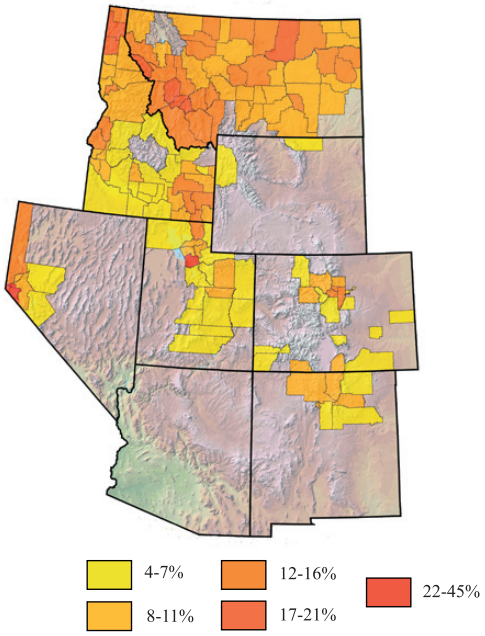
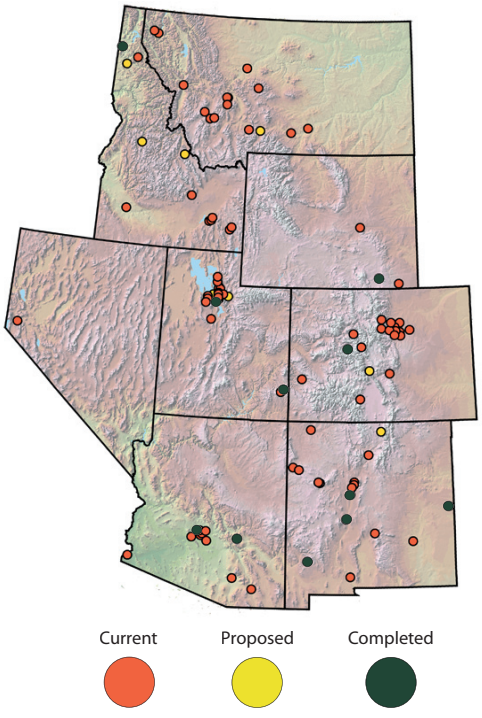


Figure 3. Superfund Sites [6]



Initial Findings

The Rockies releases a higher percent of its managed toxic waste to the environment and releases more pounds per capita to the environment than does the U.S. as a whole (*See* **Figures 4 & 5**). But is this necessarily worthy of concern? It may be that the vast, sparsely populated Rockies can handle an extra share of the country's toxic releases. However, it turns out that more pounds of toxic chemicals are released to the Rockies' environment per square mile than in the whole United States, meaning toxic pollution is more concentrated in the Rockies than in the entire United States (*See* **Table 1**).

In 2002 as well as on average from 1998-2001, the Rockies released more of each chemical group except dioxin per square mile than did the US (*See* **Table 1**).

Looking at the industrial breakdown of toxic pollution in the Rockies and the United States reveals some notable differences that may contribute to the discrepancy. In the Rockies, 63% of total toxic releases come from the metal mining industry, whereas only 30% of US releases come from metal mining. Only 3% of the Rockies releases come from electric utilities, but in the US electric utilities make up 24% of all releases (*See* **Table 2**).

Looking at total releases in the Rockies states, Nevada released the most toxic chemicals to the environment in 2002 per square mile, and 98% of those releases came from the metal mining industry. Arizona, where only 11% of releases came from metal mining and 86% came from primary metals, released the next most. Utah was next, where 66% of releases came from metal mining and 25% from primary metals. All three of these states released more pounds of toxic chemicals to the environment per square mile in 2002 and on average from 1998-2001 than did either the United States or the Rockies Region (*See* **Table 1**).

Figure 4. Percent of Managed Toxics Released to the Environment

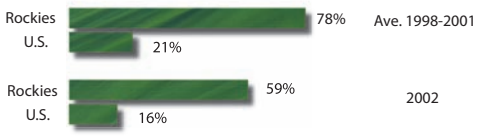


Figure 5. Pounds of Toxics Released to the Environment Per Capita

Table 1. Toxic Releases Per Square Mile

	All Toxics		HAPs		Metals		Carcinogens		PBTs		Dioxin	
	2002	Ave. '98-01	2002	Ave. '98-01	2002	Ave. '98-01	2002	Ave. '98-01	2002	Ave. '00-01	2002	Ave. '00-01
United States	1,043	1,551	670	807	609	1,013	266	313	107	53	17.8	20.5
The Rocky Mountains	1,263	3,167	877	1,267	1,305	3,079	642	856	165	108	3.7	3.5
-Arizona	2,821	7,412	793	429	2,831	7,369	215	198	101	49	0.1	0.1
-Colorado	144	250	174	221	208	273	58	29	54	40	0.3	0.2
-Idaho	748	1,133	939	661	1,086	1,050	150	206	55	43	5.3	5.7
-Montana	96	731	100	206	203	696	48	126	38	39	0.1	0.2
-Nevada	4,471	9,679	4,265	6,486	4,426	9,632	4,014	5,080	566	205	0.1	0.1
-New Mexico	54	1,344	20	436	91	1,392	11	124	7	30	0.0	0.1
-Utah	1,960	4,905	901	1,954	1,783	4,313	679	1,181	605	562	31.2	28.4
-Wyoming	107	117	28	39	106	105	6	8	2	2	0.1	0.1
	----------Pounds----------										Milligrams	

Table 2. Industry Composition of 2002 All Toxics Total Releases

2002 All Toxics: Releases to the Environment	US	Rockies
Metal Mining	30%	60%
Electric Utilities	24%	4%
Chemicals	12%	1%
Primary Metals	11%	29%
RCRA/Solvent Recovery	3%	4%
Food	3%	1%
Coal Mining	0%	1%

Table 4. Industry Share 2002 All Toxic Air Releases

Source: All data from the Toxics Release Inventory unless otherwise noted

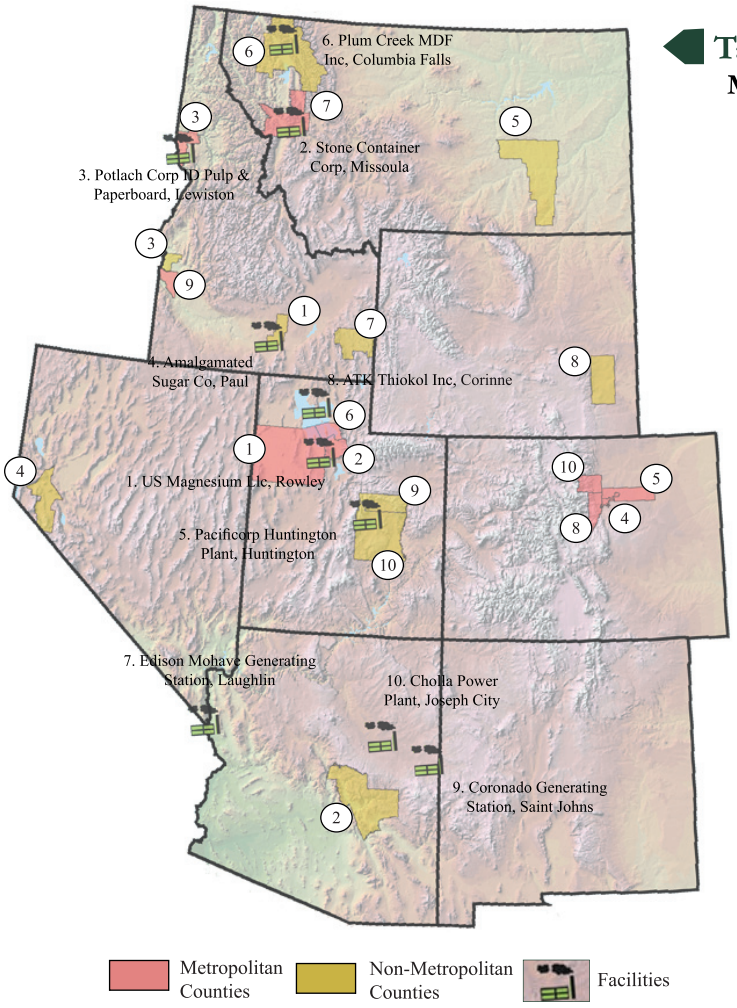
Toxic Air Emissions

Airborne toxic pollutants are easily transported throughout the environment and have been found to cause cancer, birth defects, and respiratory problems in humans. Additionally, toxic air pollutants cause acid deposition, smog, climate change, and the depletion of the ozone layer. Yet hazardous levels of toxic chemicals spew from the smoke stacks of industrial/federal facilities, from coal power plants to food processing plants to manufacturing facilities, every day across the United States. The Rockies, with relatively less manufacturing and lower power needs, fares relatively well compared to the rest of the U.S. with respect to pounds of toxic chemicals emitted to the air by industrial/federal facilities per square mile (*See* **Table 3**). Nevertheless, 38 of 280 counties in the Rockies failed to meet EPA standards for criteria pollutants in 2004 (*See* **Figure 1**).

About the Indicators

All data comes originally from the EPA's Toxics Release Inventory and has been normalized by the square miles covered by each geographic area. Using the statistical technique documented in *the Methods section*, counties were first scored independently for each criteria found in **Table 3**—the 2002 air emissions per square mile of All Toxics, HAPs, Metals, Carcinogens, PBTs, and Dioxin for all TRI-reporting industrial facilities—as well as the same values for the 1998-2001 average and the change in pounds and percent from then to 2002. Next, each county was assigned a final composite rank based on each of the individual scores and their corresponding weighting. These rankings are based only on the amount of various toxic chemicals emitted to the air per square mile, and do not necessarily indicate human and environmental threat nor reflect specific industrial/federal facility practices. The rankings are intended to locate the places with the highest concentration of toxic releases to the air and, therefore, the places with the most need to look into these other issues. The top ten facilities (table 3 map) were ranked on their 2002 air emissions of All Toxics.

Table 3. Map



	US	Rockies	AZ	CO	ID	MT	NV	NM	UT	WY
Electric Utilities	44%	18%	39%	37%	0%	16%	43%	40%	8%	36%
Chemicals	14%	4%	1%	6%	8%	2%	9%	1%	1%	27%
Paper	9%	4%	4%	0%	0%	30%	0%	0%	0%	0%
Plastics	4%	3%	13%	8%	1%	0%	5%	5%	1%	0%
Primary Metals	3%	39%	5%	3%	0%	4%	0%	1%	80%	0%
Food	3%	7%	1%	4%	43%	10%	0%	4%	0%	8%
Petroleum	3%	4%	0%	5%	0%	15%	0%	35%	2%	13%
Fabricated Metals	2%	3%	6%	21%	0%	0%	0%	3%	0%	9%
Lumber	2%	3%	2%	3%	0%	21%	0%	0%	0%	0%
Metal Mining	0%	3%	9%	0%	0%	2%	23%	1%	1%	0%

Table 3. Toxic Air Emissions: Regional, Top 10 Metro Counties, and Top 10 Non-metro Counties

2002 Toxic Air Emissions: Pounds Per Square Mile	All Toxics	HAPs	Metals	Carcinogens	PBTs	Dioxin*
United States	427	330	6	31	0.6	0.9
The Rocky Mountains	46	36	1	3	0.2	0.2
-Arizona	36	25	2	6	0.4	0.1
-Colorado	31	22	1	2	0.1	0.1
-Idaho	51	21	1	5	0.0	0.0
-Montana	30	24	1	4	0.1	0.1
-Nevada	20	10	2	2	0.6	0.1
-New Mexico	8	6	0	1	0.0	0.0
-Utah	220	206	2	3	0.2	0.9
-Wyoming	20	10	1	1	0.1	0.1
1. Tooele, Utah	2,032	2,032	0	2	0.7	8.8
2. Salt Lake, Utah	1,017	306	142	125	11.8	0.6
3. Nez Perce, Idaho	1,431	1,259	1	238	0.3	0.5
4. Denver, Colorado	967	494	11	15	1.4	0.8
5. Adams, Colorado	661	512	4	73	0.6	0.3
6. Davis, Utah	566	396	2	116	0.4	0.0
7. Missoula, Montana	598	560	0	82	0.1	0.3
8. Jefferson, Colorado	787	465	1	3	0.0	0.6
9. Canyon, Idaho	765	21	2	14	0.0	0.0
10. Boulder, Colorado	332	302	1	30	0.1	0.1
1. Minidoka, Idaho	1,248	0	0	0	0.1	0.0
2. Gila, Arizona	103	12	40	11	7.2	0.1
3. Payette, Idaho	373	373	0	0	0.0	0.0
4. Lyon, Nevada	286	0	0	236	0.0	0.0
5. Rosebud, Montana	119	85	22	1	0.5	2.7
6. Flathead, Montana	170	152	0	64	2.0	0.0
7. Caribou, Idaho	168	0	39	9	0.5	0.0
8. Platte, Wyoming	43	30	19	6	1.8	1.7
9. Carbon, Utah	245	225	1	0	0.1	0.5
10. Emery, Utah	214	193	3	1	0.2	0.2

*Dioxin values are in milligrams per square mile

About the Indicators

All data comes originally from the EPA's Toxics Release Inventory and has been normalized by the square miles of surface water in each geographic area. Using the statistical technique documented in *the Methods section*, counties were first scored independently for each criteria found in **Table 5**—the 2002 surface water discharges per square mile of surface water of All Toxics, HAPs, Metals, Carcinogens, PBTs, and Dioxin for all TRI-reporting industrial facilities—as well as the same quantities on average from 1998-2001 and the change in pounds and percent from then to 2002. Next, each county was assigned a final composite rank based on each of the individual scores and their corresponding weighting. These rankings are based only on the amount of various toxic chemicals discharged to surface water per square mile, and do not necessarily indicate human and environmental threat nor reflect specific industrial/federal facility practices. The rankings are intended to locate the places with the highest concentration of toxic releases to surface water and, therefore, the places with the most need to look into these other issues. The top ten facilities (table 5 map) are ranked on their 2002 water discharges of All Toxics.

Toxic Water Discharges

Water covers most of the Earth's surface and is essential for life. Our bodies are composed mostly of this precious resource that we must consume daily. Yet, some industrial/federal facilities discharge dangerous levels of toxic chemicals into our nation's water bodies. Toxic pollution in drinking, bathing, fishing, and swimming water directly exposes humans to hazardous substances, and polluted waters are less able to maintain functioning aquatic communities, further threatening human health. Per capita and per square mile of land, less toxic chemicals are discharged to the Rockies' surface water than in the whole U.S. However, water is sparse in the Rockies, so per square mile of surface water more pounds of toxic chemicals are discharged to water in the Rockies (*See* **Table 5**). In each Rockies state somewhere between 1 to 11 percent of all assessed water bodies are categorized as threatened or impaired for failing to meet EPA quality standards for their designated use in the combined 1998 and 2002 testing period (*See* **Figure 2**).

Table 5. Toxic Water Discharges: Regional, Top 10 Metro Counties, and Top 10 Non-metro Counties

2002 Toxic Surface Water Discharges: Pounds Per Square Mile of Surface Water	All Toxics	HAPs	Metals	Carcinogens	PBTs	Dioxin*
United States	895	60	43	6	0.6	4.3
The Rocky Mountains	1,438	92	66	8	0.3	0.6
-Arizona	19	15	4	0	0.0	0.0
-Colorado	13,464	89	84	1	0.7	0.3
-Idaho	6,503	694	468	56	1.1	5.2
-Montana	69	21	18	1	0.3	0.0
-Nevada	126	38	16	5	0.1	0.0
-New Mexico	295	1	13	1	0.5	0.0
-Utah	23	5	6	3	0.1	0.0
-Wyoming	29	7	22	0	0.0	0.0
1. Nez Perce, Idaho	38,710	35,034	12,559	6,207	25.7	586.2
2. Canyon, Idaho	21,705	1,529	0	0	0.0	0.0
3. Clear Creek, Colorado	17,035	1,188	1,188	0	0.0	0.0
4. Adams, Colorado	7,438	61	253	18	18.0	16.4
5. Jefferson, Colorado	15,712	0	0	0	0.0	0.0
6. El Paso, Colorado	9,709	0	6	0	0.0	0.0
7. Weld, Colorado	11,954	374	1	0	0.0	0.0
8. Pueblo, Colorado	1,171	1,004	1,171	18	17.9	0.0
9. Yellowstone, Montana	5,375	293	9	8	7.3	0.0
10. Missoula, Montana	1,381	1,352	1,294	62	18.0	0.0
1. Shoshone, Idaho	184,698	183,448	184,698	434	432.7	0.0
2. Minidoka, Idaho	695,646	0	0	0	0.0	0.0
3. Morgan, Colorado	529,014	0	0	0	0.0	0.0
4. Cheyenne, Colorado**	0	0	0	0	0.0	0.0
5. Rio Grande, Colorado	31,802	22,181	31,802	0	0.0	0.0
6. Cassia, Idaho	154,275	240	0	0	0.0	0.0
7. Humboldt, Nevada	7,677	1,141	1,194	335	7.0	0.0
8. Otero, New Mexico	70,942	0	0	0	0.0	0.0
9. Montrose, Colorado**	1	1	1	1	1.0	0.0
10. Box Elder, Utah**	0	0	0	0	0.0	0.0

*Dioxin values are in milligrams per square mile

**It is unclear from this table why these three counties made the top ten. Cheyenne, CO has by far the highest non-metro discharges of dioxin to surface water per square mile of surface water, even though the number does not show up here. Although Montrose, CO and Box Elder, UT have low discharges, they both had huge percent increases in those releases from the 1998-2001 average to 2002.

Table 5. Map

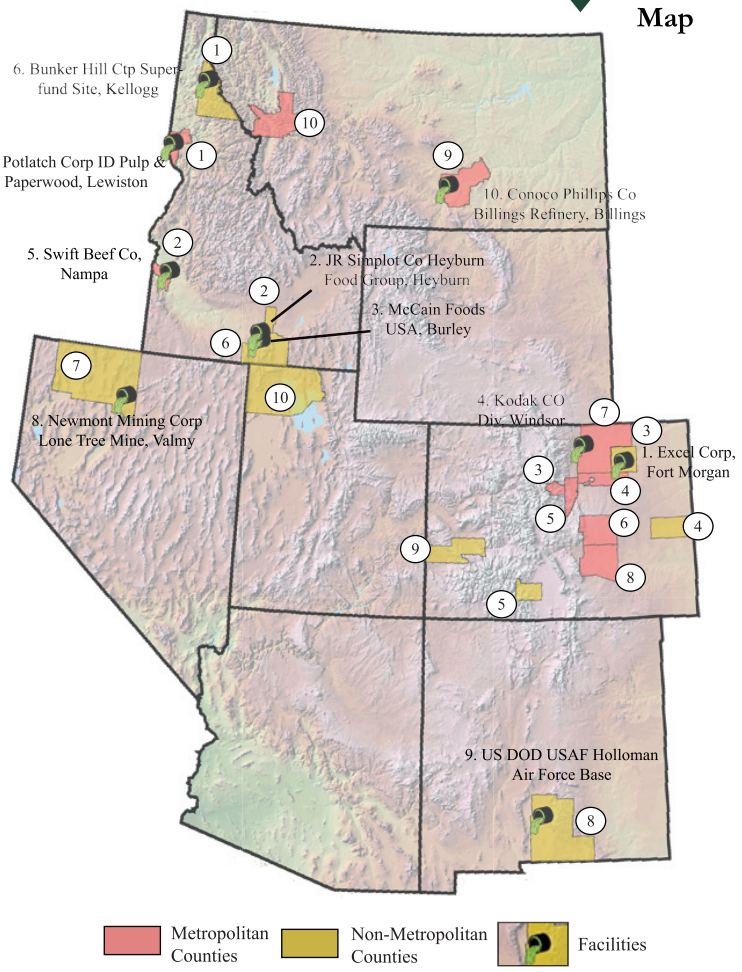


Table 6. Industry Share: 2002 All Toxic Water Discharges

	US	Rockies	AZ	CO	ID	MT	NV	NM	UT	WY
Food	30%	64%	0%	89%	46%	1%	0%	0%	0%	15%
Chemicals	25%	0%	0%	0%	0%	0%	0%	0%	0%	10%
Primary Metals	18%	0%	15%	0%	0%	0%	0%	0%	12%	0%
Petroleum	7%	1%	0%	1%	0%	71%	0%	0%	59%	0%
Paper	7%	0%	0%	0%	0%	27%	0%	0%	0%	0%
Electric Utilities	1%	0%	4%	0%	0%	0%	18%	4%	0%	75%
Metal Mining	0%	1%	4%	0%	0%	0%	82%	0%	29%	0%

Toxic Land Releases

The bulk of toxic chemicals released in the Rockies are deposited to the land under a wide range of circumstances from tightly contained landfills to lightly monitored, highly exposed waste heaps. In 2002, over 2 times as many pounds of toxic chemicals were released to each square mile of land in the Rockies than in the US as a whole and from 1998-2001 it was 3 times as much (*See* **Table 7**). Land pollution may not seem very threatening, but natural processes, like wind and rain, readily transport land pollution to the air and water. Although the EPA's Superfund program helps remediate contaminated lands deemed most hazardous, there are no nation-wide standards for comprehensively measuring and maintaining land pollution levels. In the Rockies, there are currently 86 Superfund sites (*See* **Figure 3**), but countless other toxically potent lands in need of clean-up exist. Such high levels of toxic land pollution will only create more.

About the Indicators

All data comes originally from the EPA's Toxics Release Inventory and has been normalized by the square miles of land in each geographic area. Using the statistical technique documented in *the Methods section* counties were first scored independently for each criteria found in **Table 7**—the 2002 land releases per square mile by TRI-reporting industrial facilities of All Toxics (mining industry only), All Toxics (non-mining industry), All Toxics (released to RCRA landfills only), HAPs, Metals, Carcinogens, PBTs, and Dioxin—as well as the same values for the average from 1998-2001 and the change in percent and pounds from then to 2002. Next, each county was assigned a composite rank presented in the county tables based on each of the independent scores and their corresponding weighting. These rankings are based only on the amount of various toxic chemicals released to land per square mile, and do not necessarily indicate human and environmental threat nor reflect specific industrial/federal facility practices. The rankings are intended to locate the places with the highest concentration of toxic releases to land and, therefore, the places with the most need to look into these other issues. The top ten facilities (table 7 map) are ranked on their 2002 land releases of All Toxics.

Table 7. Map

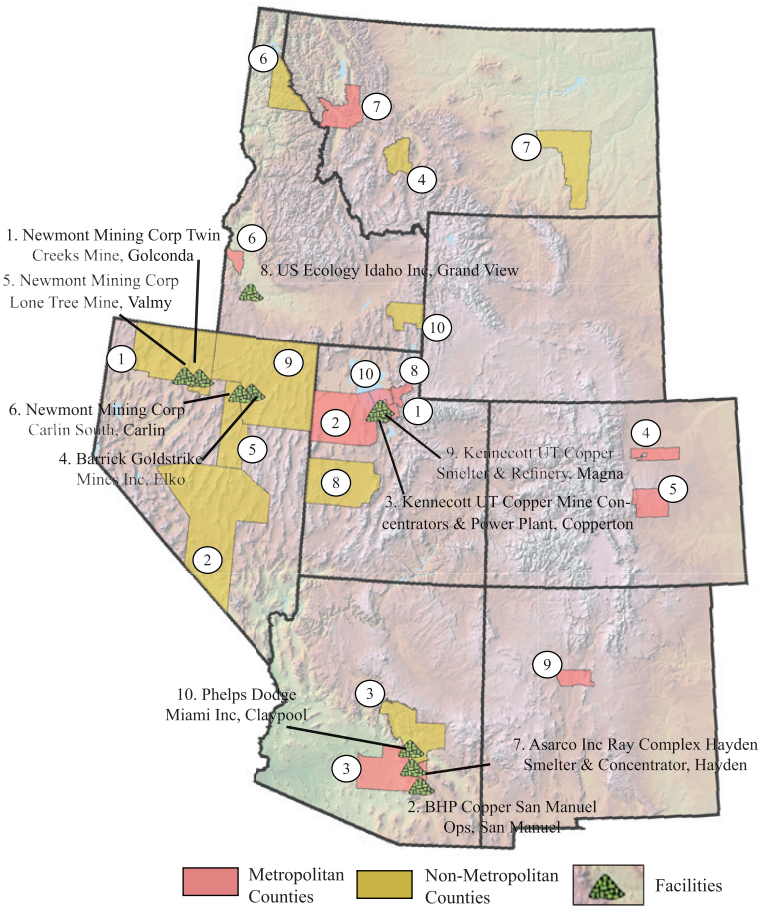


Table 8. Industry Share: 2002 All Toxic Land Releases

	US	Rockies	AZ	CO	ID	MT	NV	NM	UT	WY
Metal Mining	59%	63%	11%	46%	35%	64%	98%	36%	74%	0%
Primary Metals	18%	29%	87%	0%	0%	0%	0%	0%	18%	0%
Electric Utilities	13%	3%	2%	32%	0%	36%	0%	17%	3%	99%
RCRA/Solvent Recovery	6%	4%	0%	1%	54%	0%	1%	0%	4%	0%
Coal Mining	1%	1%	0%	19%	0%	0%	0%	42%	0%	0%

Table 7. Toxic Land Releases: Regional, Top 10 Metro Counties, and Top 10 Non-metro Counties

2002 Toxic Land Releases: Pounds Per Square Mile of Land	All Toxics (Mining)	All Toxics (Non-mining)	All Toxics (RCRA Landfills)	HAPs	Metals	Carcinogens	PBTs	Dioxin*
United States	341	214	32	281	561	229	106	12.6
The Rocky Mountains	795	409	46	749	1,238	631	164	3.0
-Arizona	301	2,483	0	753	2,824	209	101	0.0
-Colorado	80	-16	1	64	123	55	53	0.0
-Idaho	223	410	346	224	616	89	54	0.1
-Montana	119	-54	0	55	184	43	38	0.0
-Nevada	4,398	52	44	4,217	4,407	4,007	565	0.0
-New Mexico	62	-17	0	14	78	9	6	0.0
-Utah	1,345	395	74	691	1,776	674	605	30.3
-Wyoming	0	87	0	11	83	5	1	0.0
1. Salt Lake, Utah	154,063	34,204	102	73,601	187,071	72,990	67,678	0.0
2. Tooele, Utah	0	925	896	416	879	342	151	352.5
3. Pinal, Arizona	427	45,906	0	13,298	46,334	2,305	626	0.0
4. Adams, Colorado	0	69	68	61	68	46	12	0.0
5. El Paso, Colorado	0	614	0	48	614	45	32	0.0
6. Canyon, Idaho	0	808	0	1	40	1	1	0.0
7. Missoula, Montana	0	13	0	13	13	0	0	0.0
8. Morgan, Utah	0	32	0	18	32	18	17	0.0
9. Bernalillo, New Mexico	0	25	0	22	25	23	23	0.0
10. Davis, Utah	0	8	0	0	4	5	4	0.0
1. Humboldt, Nevada	36,321	18	0	35,814	36,046	34,576	4,126	0.0
2. Nye, Nevada	63	269	269	237	312	237	186	0.0
3. Gila, Arizona	4,709	7,292	0	1,968	12,002	1,512	1,008	0.0
4. Jefferson, Montana	10,242	0	0	3,452	10,049	3,339	3,321	0.0
5. Eureka, Nevada	10,435	0	0	9,068	10,278	8,375	690	0.0
6. Shoshone, Idaho	6,927	524	0	6,433	7,451	1,016	767	0.0
7. Rosebud, Montana	0	1,952	0	376	1,950	52	11	0.0
8. Millard, Utah	83	169	0	70	187	47	6	1.0
9. Elko, Nevada	4,860	0	0	4,127	4,719	3,662	526	0.0
10. Caribou, Idaho	0	1,546	0	0	1,545	378	27	0.0

*Dioxin values are in milligrams per square mile

About the Indicators

Using the statistical technique documented in *the Methods section* counties were given an overall ranking based on each of their rankings for the air, water, and land sections. Each ranking was converted to an index value as seen in the tables below. The mean index value is zero for each index, so positive index values are above average pollution levels and negative index values are below average pollution levels. Metro and non-metro county index values should not be compared. These rankings are based only on the amount of various toxic chemicals released to air, water, and land per square mile, and do not necessarily indicate human and environmental threat nor reflect specific industrial/federal facility practices. The rankings are intended to locate the places with the highest concentration of toxic releases to the environment and, therefore, the places with the most need to look into these other issues.

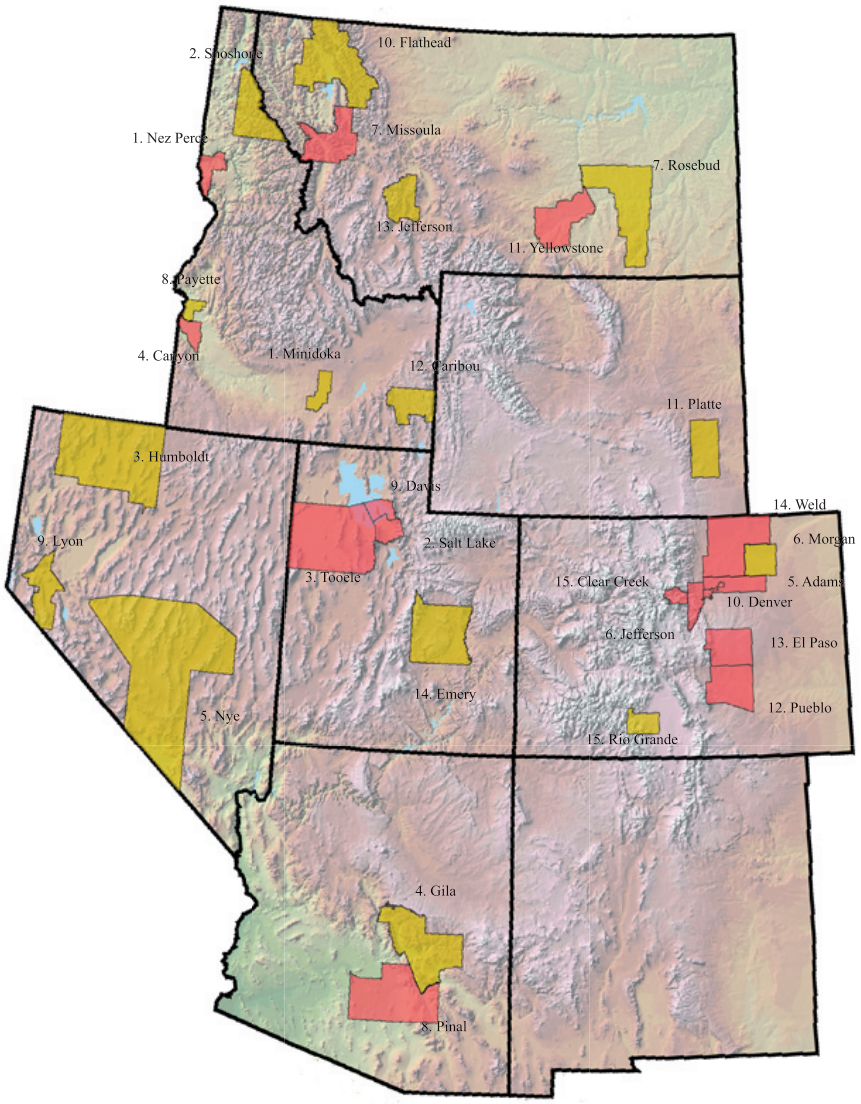
The Toxic Rockies: Final Rankings

Industrial and federal facility pollution is widespread in the Rockies and contributes to the degradation of this unique, beautiful, and fragile part of the country and threatens its inhabitants. Although industry is and should be a major contributor to the Rockies economy, we need to make sure we are not risking too much. Government law and enforcement need to be strict enough to ensure that industrial/federal facilities abide by appropriate business practices. Facilities need to be using the best available/practical technology to control pollution. Rockies citizens need to work together to ensure that the government and facilities live up to these standards. Industrial/federal facility toxic releases to air, water, and land each pose serious, though sometimes different, threats to human and environmental health. Combining these three types of pollution to take a look at overall toxic pollution highlights those places in serious need of further inquiry.

Figure 6. Table

Top 15 Metro Counties	Air Index	Water Index	Land Index	Composite Index
1. Nez Perce, Idaho	209	683	-6	295
2. Salt Lake, Utah	253	-1	325	193
3. Tooele, Utah	292	-41	123	125
4. Canyon, Idaho	55	140	-0	65
5. Adams, Colorado	87	95	6	63
6. Jefferson, Colorado	70	82	-16	45
7. Missoula, Montana	74	48	-1	40
8. Pinal, Arizona	-31	27	104	33
9. Davis, Utah	79	16	-1	31
10. Denver, Colorado	103	-4	-8	30
11. Yellowstone, Montana	32	49	-4	26
12. Pueblo, Colorado	27	53	-14	22
13. El Paso, Colorado	2	59	0	20
14. Weld, Colorado	11	58	-11	19
15. Clear Creek, Colorado	-48	109	-4	19
Mean Index Value	0	0	0	0

Top 15 Non-metro Counties	Air Index	Water Index	Land Index	Composite Index
1. Minidoka, Idaho	430	368	-11	262
2. Shoshone, Idaho	-15	535	77	199
3. Humboldt, Nevada	23	60	374	153
4. Gila, Arizona	199	-7	264	152
5. Nye, Nevada	10	-7	358	121
6. Morgan, Colorado	20	298	22	113
7. Rosebud, Montana	160	-35	54	60
8. Payette, Idaho	185	-6	0	60
9. Lyon, Nevada	180	8	-29	53
10. Flathead, Montana	153	-7	3	50
11. Platte, Wyoming	115	-7	36	48
12. Caribou, Idaho	121	-35	39	42
13. Jefferson, Montana	19	-6	106	40
14. Emery, Utah	90	-7	6	30
15. Rio Grande, Colorado	-12	97	-1	28
Mean Index Value	0	0	0	0



"Utahns beat back radioactive waste"
High Country News 12/8/2003

"Tests find water from Wyoming coal site toxic"
Casper Star Tribune 3/7/2004

"Toxic gases blamed for Yellowstone bison deaths"
Billings Gazette 3/24/2004

"DOE will commence nuclear waste shipments to Nevada"
Reno Gazette 4/16/2004

2004

"Utah would get pollution from Nevada power plants"
Salt Lake Tribune 3/4/2004

"Broken barrel found in Idaho lab's n-waste pit"
Twin Falls Tribune 3/31/2004

"Utah chemical-weapons incinerator let safety slip, Army memo says"
Salt Lake Tribune 4/7/2004

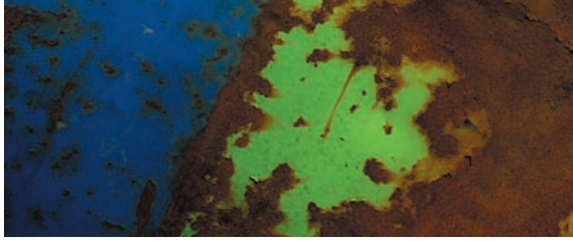


Figure 7. A Closer Look at Some of the Most Toxic Counties

Go to www.epa.gov/triexplorer to identify the facilities that are polluting in your home county.

1. Nez Perce, ID (Metro)	2002 Air Emissions		2002 Surface Water Discharges		2002 Land Releases	
Top Facility of Nez Perce's 7 TRI-Reporting Facilities	Pounds	%	Pounds	%	Pounds	%
POTLATCH CORP. IDAHO PULP & PAPERBOARD, LEWISTON	1,184,030	97%	281,287	99.8%	282,667	100%
-Lumber and Wood Products (Sawmills)						
-Paper Products (Pulp, Paper, and Paperboard Mills)						
County Total	1,225,624	100%	281,812	100%	282,667	100%

1. Minidoka, Idaho (Non-metro)	2002 Air Emissions		2002 Surface Water Discharges		2002 Land Releases	
Top Facilities of Minidoka's 3 TRI-Reporting Facilities	Pounds	%	Pounds	%	Pounds	%
AMALGAMATED SUGAR CO, PAUL	949,919	99.8%	0	0%	2,848	100%
-Food (Beet Sugar)						
J. R. SIMPLOT CO. HEYBURN FOOD GROUP, HEYBURN	2,000	0%	2,337,369	100%	0	0%
-Food (Vegetables/Industrial Organic Chemicals)						
County Total	951,919	100%	2,337,369	100%	2,848	100%

Figure 6. The Rockies Top 15 Toxic Metro Counties and Non-metro Counties

2. Salt Lake, UT (Metro)	2002 Air Emissions		2002 Surface Water Discharges		2002 Land Releases	
Top Facilities of Salt Lake's 63 TRI-Reporting Facilities	Pounds	%	Pounds	%	Pounds	%
KENNECOTT UTAH COPPER MINE CONCENTRATORS & POWER PLANT, COPPERTON	19,421	2%	18,178	29%	113,603,195	82%
-Metal Mining (Copper Ores)						
CHEVRON PRODUCTS CO SALT LAKE REFINERY, SALT LAKE CITY	42,103	5%	37,092	59%	0	0%
-Petroleum Refining						
-Wholesale Trade (Petroleum Stations and Terminals)						
BD MEDICAL SYS., SANDY	166,204	20%	0	0%	0	0%
-Medical Goods (Surgical and Medical Instruments)						
TESORO REFINING & MARKETING CO, SALT LAKE CITY	154,362	19%	0	0%	2,860	0%
-Petroleum Refining						
KENNECOTT UTAH COPPER SMELTER & REFINERY, MAGNA	102,640	12%	7,334	12%	25,110,922	18%
-Primary Metals (Primary Copper)						
County Total	821,509	100%	62,640	100%	138,824,328	100%

4. Gila, AZ (Non-metro)	2002 Air Emissions		2002 Surface Water Discharges		2002 Land Releases	
Top Facilities of Gila's 5 TRI-Reporting Facilities	Pounds	%	Pounds	%	Pounds	%
ASARCO INC. RAY COMPLEX HAYDEN SMELTER & CONCENTRATOR, HAYDEN	173,197	35%	0	-	34,767,994	61%
-Metal Mining (Copper Ores)						
-Primary Metals (Primary Copper)						
PHELPS DODGE MIAMI INC., CLAYPOOL	311,488	63%	0	-	22,452,944	39%
-Metal Mining (Copper Ores)						
-Primary Metals (Primary Copper/Copper Rolling and Drawing)						
County Total	492,180	100%	0	-	57,220,938	100%

"Toxic chemicals creeping toward Colorado River"
High Country News 5/24/2004

"Feds investigate shipping errors from Idaho lab to N.M. waste site"
Idaho Falls Register 7/19/2004

"Students count up toxic trainloads passing through Salt Lake City"
Salt Lake Tribune 10/1/2004

"Ranchers fear waste fallout"
Denver Post 2/13/2005

"Feds break promises with elimination of monitoring at N.M. n-waste site"
Santa Fe New Mexican 5/4/2004

"Administration's Failure to Support 'Polluter Pays' Principle Endangers Americans"
US Newsweek 7/27/2004

"Gas fields cloud up Wyoming skies"
Casper Star Tribune 11/7/2004

2005

Note: many headlines come from the on-line new service *Headwaters News*, available at www.headwatersnews.org

About the Indicators

All data in **Table 9** comes originally from the 2002 USDA-NASS Census of Agriculture and has been normalized by the square miles covered by each geographic region. Using the statistical technique documented in *the Methods section* counties were first scored independently for each criteria found in **Table 9**—the 2002 acres per square mile application of commercial fertilizer, lime, and soil conditioners; manure; chemicals used to control weeds, grass, or brush; chemicals used to control nematodes; chemicals used to control diseases in crops and orchards; and chemicals used to control growth, thin fruit, or defoliate. Next, each county was assigned a final composite rank based on each of the individual scores. These rankings are based only on the amount of various fertilizers and pesticides applied to land and do not necessarily indicate human and environmental threat or reflect specific farm's practices. The rankings are intended to locate the places with the highest concentration of fertilizer and pesticide use and, therefore, the places with the most need to look into these other issues. The animal waste data in **Table 10** is an estimate from www.scorecard.org based on the numbers of different types of livestock in the county.

Toxic Supplement: Agriculture

One notable source of toxic pollution not covered in the TRI is agriculture. To aid agriculture in 2002, 20 acres of farmland and pastureland per square mile of all land in the Rockies were treated with commercial fertilizer, lime, or soil conditioners. Many fertilizers contain metals and other dangerous chemicals, which can wash away and contaminate surface and groundwater. One acre per square mile of the Rockies was treated with manure, which can cause respiratory irritation, chest tightness, headaches, sore throat, and diarrhea. Four Rockies acres per square mile were treated with chemicals to combat insects, and 15 acres per square mile were treated with chemicals to combat weeds, grass, and brush. Pesticides are designed to harm or kill living things and in humans, can damage the nervous system, cause cancer, and impair the hormone and endocrine systems.

Table 9. Agricultural Toxics: Regional, Top 10 Metro Counties, and Top 10 Non-metro Counties

2002 Acres Treated Per Square Mile with…	Commercial fertilizer, lime, and soil conditioners	Manure	Chemicals used to control insects	Chemicals used to control weeds, grass, or brush	Chemicals used to control nematodes	Chemicals used to control diseases in crops and orchards	Chemicals used to control growth, thin fruit, or defoliate
United States	65	6	17	51	2	3	3
The Rocky Mountains	20	1	4	15	0	1	1
-Arizona	7	1	5	5	0	1	1
-Colorado	34	2	8	26	0	1	1
-Idaho	42	3	12	30	3	5	2
-Montana	45	2	3	39	0	2	0
-Nevada	3	0	1	2	0	0	0
-New Mexico	6	1	2	3	0	0	0
-Utah	7	1	3	4	0	0	0
-Wyoming	9	1	1	5	0	0	0
1. Canyon, Idaho	218	22	117	175	19	36	15
2. Jefferson, Idaho	142	9	39	68	11	18	15
3. Bonneville, Idaho	98	4	34	63	6	25	6
4. Power, Idaho	108	2	30	70	10	15	5
5. Nez Perce, Idaho	153	3	27	135	0	8	0
6. Adams, Colorado	167	3	21	157	0	0	0
7. Weld, Colorado	77	12	32	57	2	4	0
8. Franklin, Idaho	63	21	12	60	0	0	0
9. Pinal, Arizona	35	4	24	19	1	2	12
10. Bannock, Idaho	60	6	10	64	4	0	2
1. Madison, Idaho	258	6	102	198	45	53	59
2. Minidoka, Idaho	249	13	115	193	22	27	15
3. Jerome, Idaho	199	38	49	145	13	18	20
4. Bingham, Idaho	122	7	48	86	25	31	9
5. Phillips, Colorado	317	5	85	302	3	7	1
6. Gooding, Idaho	129	46	26	80	4	5	1
7. Alamosa, Colorado	74	4	33	50	12	25	21
8. Teton, Idaho	133	8	52	99	0	8	12
9. Cassia, Idaho	105	8	34	77	11	11	7
10. Lewis, Idaho	268	1	41	253	0	0	0

Figure 8. A Look at the Top 10s from Table 9

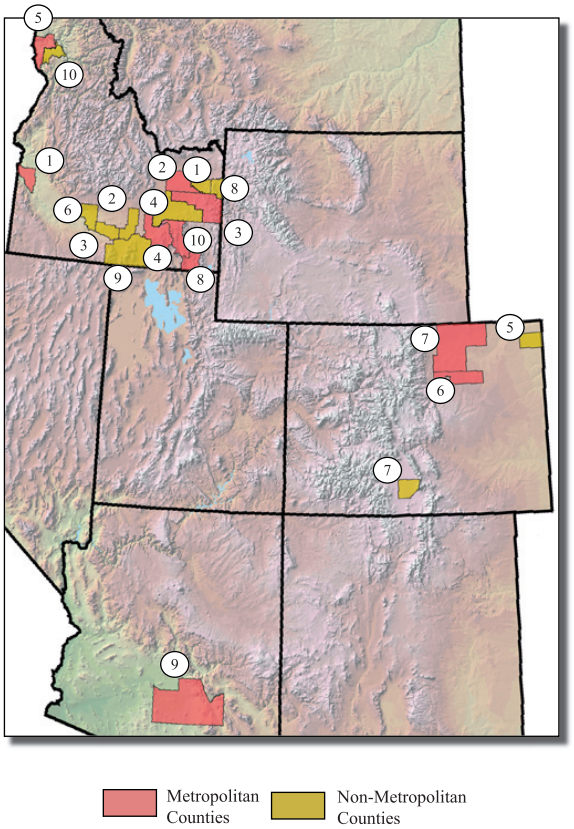


Table 10. Estimated Animal Waste: Regional, Top 10 Metro Counties, and Top 10 Non-metro Counties

1997 Estimated Pounds of Animal Waste per Square Mile	
United States	239
The Rocky Mountains	113
-Arizona	61
-Colorado	192
-Idaho	179
-Montana	129
-Nevada	37
-New Mexico	107
-Utah	92
-Wyoming	123
1. Canyon, Idaho	1,591
2. Weld, Colorado	945
3. Cache, Utah	682
4. Franklin, Idaho	673
5. Ada, Idaho	509
6. Gem, Idaho	407
7. Jefferson, Idaho	380
8. Weber, Utah	379
9. Laramie, Wyoming	372
10. Maricopa, Arizona	282
1. Jerome, Idaho	2,658
2. Gooding, Idaho	2,317
3. Morgan, Colorado	927
4. Curry, New Mexico	781
5. Yuma, Colorado	718
6. Payette, Idaho	707
7. Custer, Colorado	635
8. Twin Falls, Idaho	622
9. Logan, Colorado	531
10. Sedgwick, Colorado	455

Toxic Supplement: Toxic Threat

Different toxic chemicals pose different types and levels of threat to humans and the environment. The Environmental Defense Fund's Scorecard uses TRI data along with chemical properties, toxicity, and exposure potential to come up with rankings for various environmental and human-health problems. To supplement our analysis, this section uses Scorecard rankings to obtain an estimate of a few specific toxic threats in the Rockies. Ozone depleting potential, which is of global environmental concern due to its believed links to global warming, is 10 times greater per square mile in the US than in the Rockies (*See* **Table 12**). Cancer Health Risk, however, is 1.5 times greater in the Rockies (*See* **Table 11**). Non-cancer Health Risk in the Rockies is approximately 3/4 of what it is in the US (*See* **Table 10**).

About the Indicators

All county data comes originally from Environmental Defense Fund's Scorecard (www.scorecard.org), and has been normalized by the square miles covered by each geographic region. For Ozone Depleting Potential, counties are ranked on Scorecard's estimated pounds of CFC 11-equivalents released in the county to air and water in 2002 per square mile. For Cancer Health Risk, counties are ranked on Scorecard's estimated pounds of Benzene-equivalents released in the county to air and water in 2002 per square mile. For Non-cancer Health Risk, counties are ranked on Scorecard's estimated pounds of Toluene-equivalents released in the county to air and water in 2002 per square mile.

Table 12. Ozone Depletion in the Rockies

2002 Ozone Depleting Potential (Pounds of CFC 11-equivalents per Square Mile)	
United States	1.25
The Rocky Mountains	0.11
-Arizona	0.16
-Colorado	0.09
-Idaho	0.00
-Montana	0.00
-Nevada	0.05
-New Mexico	0.01
-Utah	0.33
-Wyoming	0.00

Figure 9. Non Cancer Risk Top 10s: Metro Counties and Non-metro Counties

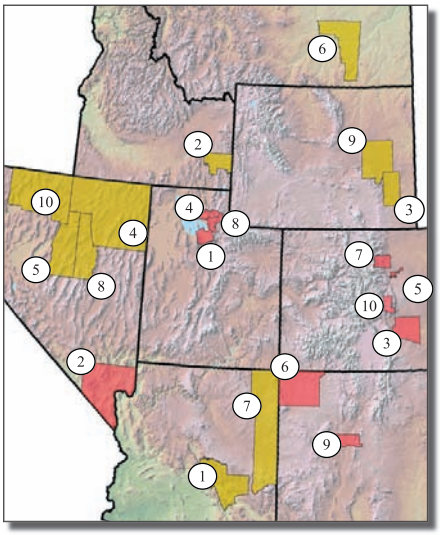
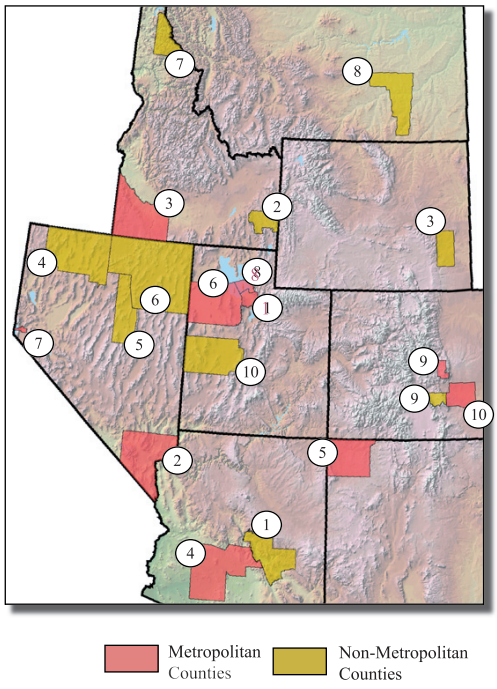


Figure 10. Cancer Risk Top 10s: Metro Counties and Non-metro Counties



Tables 10 & 11. Health Risks: Regional and Top 10 Metro and Non-metro Counties

2002 Non-Cancer Health Risk (Pounds of Toluene-equivalents Per Square Mile)	
United States	489,481
The Rocky Mountains	365,593
-Arizona	394,743
-Colorado	124,888
-Idaho	102,908
-Montana	50,326
-Nevada	777,853
-New Mexico	61,683
-Utah	176,681
-Wyoming	143,129
1. Salt Lake, Utah	9,284,706
2. Clark, Nevada	4,573,174
3. Pueblo, Colorado	3,169,665
4. Weber, Utah	2,274,588
5. Denver, Colorado	1,161,740
6. San Juan, New Mexico	1,119,465
7. Boulder, Colorado	1,051,413
8. Morgan, Utah	704,006
9. Bernalillo, New Mexico	667,437
10. Teller, Colorado	518,821
1. Gila, Arizona	5,421,478
2. Caribou, Idaho	4,058,667
3. Platte, Wyoming	2,037,046
4. Elko, Nevada	1,802,018
5. Lander, Nevada	1,358,826
6. Rosebud, Montana	974,748
7. Apache, Arizona	855,735
8. Eureka, Nevada	765,558
9. Converse, Wyoming	656,491
10. Humboldt, Nevada	538,421

2002 Cancer Health Risk (Pounds of Benzene-equivalents Per Square Mile)	
United States	1,081
The Rocky Mountains	1,452
-Arizona	2,368
-Colorado	4
-Idaho	838
-Montana	42
-Nevada	2,894
-New Mexico	25
-Utah	695
-Wyoming	532
1. Salt Lake, Utah	63,136
2. Clark, Nevada	5,562
3. Owyhee, Idaho	1,247
4. Maricopa, Arizona	726
5. San Juan, New Mexico	506
6. Tooele, Utah	453
7. Carson City, Nevada	430
8. Davis, Utah	82
9. Teller, Colorado	68
10. Pueblo, Colorado	67
1. Gila, Arizona	56,300
2. Caribou, Idaho	31,135
3. Platte, Wyoming	24,634
4. Humboldt, Nevada	19,673
5. Eureka, Nevada	8,613
6. Elko, Nevada	2,558
7. Shoshone, Idaho	1,518
8. Rosebud, Montana	1,154
9. Custer, Colorado	676
10. Millard, Utah	615