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New data show widespread nationwide contamination

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Perchlorate, the explosive main ingredient of rocket and missile fuel, contaminates drinking water supplies, groundwater or soil in hundreds of locations in at least 43 states, according to Environmental Working Group's updated analysis of government data. EWG's analysis of the latest scientific studies, which show harmful health effects from minute doses, argues that a national standard for perchlorate in drinking water should be no higher than one-tenth the level the U.S. Environmental Protection Agency currently recommends as safe.

Rocket Fuel in Drinking Water: Perchlorate Pollution Spreading Nationwide

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one-tenth the level the U.S. Environmental Protection Agency currently recommends as safe.

Perchlorate is a powerful thyroid toxin that can affect the thyroid's ability to take up the essential nutrient iodide and make thyroid hormones. Small disruptions in thyroid hormone levels during pregnancy can cause lowered IQ and larger disruptions cause mental retardation, loss of hearing and speech, or deficits in motor skills for infants and children.

In California, Arizona and Nevada, where testing has been most extensive, well over 20 million people drink water from public and private sources known to be polluted with perchlorate. This estimate includes millions of customers of 81 contaminated public water systems in California and approximately 20 million customers in the three states who get at least part of their drinking water from the perchlorate-tainted Colorado River. (Because there is some overlap between systems that are supplied by groundwater sources and those supplied by the Colorado River, a total cannot be calculated by adding the two figures.)

Link: [Perchlorate-contaminated drinking water sources in California.](#)

Link: [More than 20 million people in California, Arizona and Nevada get at least part of their drinking water from the perchlorate-contaminated Colorado River.](#)

On March 3, 2003, Sen. Barbara Boxer, D-CA, introduced legislation that would mandate that the federal government set a drinking water standard for perchlorate by July 1, 2004. California health officials are working toward setting a state drinking water standard sometime in 2004, but the EPA is not expected to set enforceable national standards before 2008, if then.

California's current provisional drinking water standard, which is only advisory, is 2 to 6 parts per billion (ppb). The EPA's current draft standard is equivalent to 1 ppb. Boxer's legislation does not specify what the standard should be but mandates that it be set at a level that will protect the most sensitive populations. EWG's analysis of new studies, showing harmful effects from very low doses, argues that to protect children the standard should be no higher than one-tenth the EPA's recommendation, or 0.1 ppb.

Link: [New Studies Show Harm From Much Lower Doses of Perchlorate.](#)

EWG's analysis of the latest federal and state data shows:

- Outside of California, perchlorate contamination has been found by testing in more than 100 drinking water sources in 19 states.

Link: [Perchlorate contamination of drinking water sources outside of California.](#)

- Perchlorate contamination of soil or of groundwater sources, not all of which are used for drinking water, has been found at more than 50 sites in 17 states.

Link: [Perchlorate contamination of soil or groundwater nationwide.](#)

- Perchlorate is known to have been made, used or stored at more than 150 sites in 36 states. At some of these locations, water or soil contamination has already been detected by testing, but the U.S. Environmental Protection Agency says it is certain that further tests would confirm contamination at all of the sites.

Link: [Sites of known perchlorate use in 36 states.](#)

- Perchlorate testing is urgently needed on at least 63 military sites in 32 states where rockets, missiles or munitions have been developed, produced, tested, stored, maintained, or disposed of. To date, testing is planned at only a few of these sites.

Link: [Military sites where perchlorate testing is urgent.](#)

Perchlorate is used in fireworks, safety flares, matches and car air bags, but 90 percent of it goes into solid rocket fuel for military missiles and the NASA space shuttle. American Pacific Corp. of Las Vegas and Kerr-McGee Corp. of Oklahoma City were the sole U.S. producers until 1998, when American Pacific bought out its rival.

National data is still spotty, but extensive drinking water testing is now taking place under the federal Unregulated Contaminant Monitoring Rule, which requires testing by all large water systems and some smaller ones. As the data comes in, perchlorate contamination is being found in many places where there was no record of the chemical's use.

Once thought to affect only Air Force facilities and contractors, more recently perchlorate contamination has been found in tests at many Army and Navy sites as well, especially where munitions have been disposed of by open burning or detonation. Among known contaminated sites is the McGregor Naval Weapons Plant in central Texas, just a few miles from President Bush's ranch. Underground plumes of perchlorate have also been found spreading from non-military industrial sites, such as an abandoned flare factory in San Martin, Calif., formerly operated by Olin Corp. of Norwalk, Conn., that has polluted more than 100 private wells.

Although the majority of known and suspected perchlorate-contaminated sites are operated by the military or contractors such as St. Louis-based Lockheed Martin, the Department of Defense and the aerospace and defense industry are

stubbornly resisting the efforts of regulators to set adequate safety standards or clean up contaminated sites.

Despite volumes of new evidence showing that very low doses are harmful to fetuses, infants and children, the Pentagon and its contractors argue that the risks of perchlorate should be assessed on the basis of a single study, funded by the defense industry, on short-term exposure of a handful of adult men and non-pregnant women. Last year, Kerr-McGee and Lockheed Martin successfully sued California health authorities to reconsider the state's provisional drinking water standard, which likely will force the state to miss a January 2004 deadline, mandated by state law, for setting an enforceable standard.

Both the Defense Department and Lockheed Martin, which is being sued by 800 residents of San Bernardino, Calif., for cancer and other illnesses they believe were caused by decades of drinking perchlorate-contaminated water, maintain that perchlorate is safe at levels 200 times higher than the EPA's current recommendation. In fact, there is strong evidence that the EPA's recommended level of 1 ppb is far too high.

Neither the EPA nor the state of California have taken into account the numerous common anti-thyroid chemicals which may worsen the effects of perchlorate, notably the drinking water contaminant nitrate. Neither the EPA nor California have taken note of epidemiological studies that found effects on infant thyroid hormone levels at 1 to 6 ppb.

And neither the EPA nor California have adequately considered the extra perchlorate that may be consumed by eating lettuce or other produce grown with contaminated water. Documents obtained and published by EWG in December 2002 showed that a 1997 study in San Bernardino, Calif., of leafy vegetables growing in perchlorate-contaminated water found that the crops took up and stored perchlorate and concentrated it by an average factor of 65. This high rate of bioaccumulation means that a pregnant woman who ate a two-ounce serving of the vegetables would get a dose of perchlorate more than 100 times higher than what the EPA recommends as safe in a liter of drinking water.

Link: [High Levels of Toxic Rocket Fuel Found in Lettuce.](#)

Known Health Effects

Rocket Fuel in Drinking Water: New Studies Show Harm From Much Lower Doses

Perchlorate was first discovered to affect the thyroid 50 years ago, but only recently has research focused on its effects at low levels. The trend in the

findings is both clear and ominous: The more scientists look, the lower they find the threshold for adverse effects.

Perchlorate's main effect is on the thyroid gland, which is responsible for controlling growth, development and metabolism. Perchlorate inhibits the thyroid's ability to take up iodide, a necessary nutrient, which is important in the production of thyroid hormones. An underactive thyroid gland in adults can lead to fatigue, depression, anxiety, unexplained weight gain, hair loss, and low libido.

More serious, however, are the effects of thyroid hormone disruption in the developing fetus and child: Small changes in maternal thyroid hormone levels during pregnancy have been associated with reduced IQs in children. Fetuses, infants and children who experience more significant changes in hormone levels may suffer mental retardation, loss of hearing and speech, abnormal testicular development or deficits in motor skills. In older children, depressed thyroid levels have been associated with lower motivation to learn and attention deficit disorder. (Haddow et al. 1999, Pop et al. 1999.)

As recently as 1998, only one study had shown any adverse effect of perchlorate at levels as low as 0.01 micrograms per kilogram of drinking water a day. More recent research has shown that even at this very low dose level, perchlorate induces significant effects on the levels of thyroid hormones in the mother, fetus and offspring. (Crofton 2001.) And similar low dose studies have found "a large number of significant effects" on brain structure and thyroid structure. (Argus 2001, EPA 2002.)

A clear trend among the most recent perchlorate studies is more profound effects were seen in laboratory animals who were exposed in utero. This is unsurprising, given that research has shown that marginal iodine deficiency has significant effects on the fetal thyroid even if no effects are seen in the mother. One study, for instance, found that the thyroids of pregnant rats were able to compensate for marginal iodide deficiency in the diet but that such compensation did not take place in the fetal offspring which showed a 50 percent decrease in iodide uptake. (Versloot et. al. 1997.)

One recent study found thyroid tumors in second-generation exposed rats at extremely young ages. In fact, out of thirty rat pups which were exposed to perchlorate both in utero and as pups, two developed thyroid tumors after just 19 weeks. (Argus 1999.) These types of thyroid tumors are extremely rare, especially when seen this early: The National Institute for Environmental Health Sciences (NIEHS) had estimated the probability of this occurring at less than two-tenths of one percent. (EPA 2002.) Although the dose tested was significantly higher than what might be consumed in drinking water, the findings are troubling because they point to the possibility of in utero programming. This phenomenon, in which fetal exposure leads to a higher

susceptibility to hormone perturbation during development and adulthood, has been seen in other cases of endocrine disruption. (Prins et al. 2001, Phillips et al. 1998. Seckl 1997.)

Because iodide is concentrated not only by the thyroid gland, but also by the mammary gland, one of the questions lingering after the peer review of EPA's 1998 provisional reference dose was whether perchlorate would be found or concentrated in breast milk. Recent technological improvements made it possible to look into this question and the results were troubling. Perchlorate was found in the milk of rats that were given very low doses of perchlorate in drinking water (0.01 mg/kg-day), leading the EPA to conclude that rat pups "are in fact exposed to significant levels of perchlorate through the maternal milk." (Yu 2000, EPA 2002.)

Of several epidemiological studies looking at the effects of perchlorate exposure on newborn infants, only two were funded by entities that did not have a significant stake in the outcome of the results. One study, conducted by the Arizona Department of Health Services, found differences in infant thyroid hormone levels among babies in Arizona born to mothers who had consumed perchlorate-tainted Colorado River water as compared to mothers who had not been exposed to perchlorate during pregnancy. (Brechner et al. 2000.)

These findings were confirmed by another recent study of California newborns which found that concentrations of perchlorate at about the same level proposed as a drinking water standard may affect infant thyroid hormone levels. The study looked at the hormone levels of all infants born in California in 1996 and compared the hormone levels of infants whose mothers had drunk perchlorate-contaminated water to those whose mothers had not. The study found a statistically significant effect on infant thyroid hormone levels from perchlorate exposure by the mother of only 1 to 2 ppb. The effects were more pronounced at higher dose levels. (Schwartz 2001.)

Studies looking at the ecological effects of perchlorate contamination also raise red flags. For example, one study exposed frog embryos to perchlorate at levels found in some surface and groundwaters. The frogs were found to have inhibited forelimb emergence, significantly lower percentages of animals completing tail resorption, reduced hind limb development, and a skewed sex ratio. (Goleman et al. 2002.) The study notes: "These effects were observed at concentrations at or below concentrations reported in surface waters contaminated with ammonium perchlorate, suggesting that this contaminant may pose a threat to normal development and growth in natural amphibian populations."

Despite all this new evidence, the Department of Defense and the aerospace and defense industry have been trying to get state and federal officials to base perchlorate risk assessments on the results of a single industry-funded human

study. This study (Greer et al. 2002) was designed to characterize the effects of a 14-day exposure on adult males and non-pregnant females. How much its results can be extrapolated to the real world is severely limited by several factors.

- First, the study subjects had healthy thyroids and high iodine intake levels relative to the normal population – whereas 15 percent of U.S. women of reproductive age may have low iodide consumption. (OEHHA 2002.)
- Second, adult humans have an extensive reserve of thyroid hormones which would limit the effects of a short-term exposure, but not the harm from the lifelong perchlorate exposure that most people would experience.
- Third, the study was not conducted on the population of concern: pregnant women, children and infants. Because pregnancy puts stress on the thyroid, and the hormone reserves that exist in adults are smaller in children and virtually nonexistent in infants and neonates, these populations are much more susceptible to inhibition of iodide uptake (Delange and Ermans 1991.)
- Finally, although the lowest dose tested was designated as a no-effect level in this study, decreased iodide uptake was in fact observed. The EPA has concluded that the study was statistically underpowered to detect significant effects at the lowest dose level, due in part to the small sample size of just seven people. (EPA 2002.)

Despite these numerous and obvious flaws, the Pentagon and industry have used these results to argue for a drinking water standard of 200 ppb.

While state and federal authorities inch towards establishing the first enforceable drinking water standard for perchlorate, an array of proposed standards, action levels” and other proto-standards are circulating. Understandably, this has led to a considerable amount of confusion and frustration within the water-supply industry, which is left with contaminated water and little firm guidance on what level of perchlorate is safe to serve their customers. Unfortunately, none of the proposed standards are likely to be adequate to protect children’s health.

California’s Office of Environmental Health Hazard Assessment (OEHHA) is explicitly directed to draft Public Health Goals that protect public health including sensitive subpopulations “with an adequate margin of safety.” Yet in its most recent draft, OEHHA relies solely on the results of the small industry-funded human study and uses an inadequate uncertainty factor of only three to account for such considerable uncertainties as the variability between individuals, extrapolating from short-term exposure to long-term exposure, extrapolating from the study population to the population of concern and questions of whether perchlorate concentrates in breast milk. (OEHHA 2002.)

Of the 35 other Public Health Goals OEHHA has developed for other contaminants, only four have used uncertainty factors of less than 30. Of those four, one is an essential nutrient (copper), one is deliberately added to water (fluoride), and the other two have extensive databases on chronic human effects (lead and nitrate).

In developing its provisional reference dose, the EPA has used a wide base of short- and medium-term animal studies which look at the populations of concern, rather than relying on the single short-term human used by OEHHA. The EPA has also proposed an uncertainty factor of 300 – which, given the considerable uncertainty remaining, still may not be large enough. However, the EPA continues to assert that infant body weight and drinking water figures do not need to be used in the calculation of a drinking water standard. (EPA 2002, EPA 2003.) This is unacceptable.

Neither the EPA nor OEHHA have taken into account the numerous common anti-thyroid chemicals that may worsen the effects of perchlorate, notably the drinking water contaminant nitrate. Neither the EPA nor OEHHA seem to be concerned that epidemiological studies have found effects on infant thyroid hormone levels at about the same perchlorate concentrations which have been proposed as a drinking water standard. And neither have the EPA nor OEHHA adequately taken into consideration the extra perchlorate that may be consumed by eating food grown with contaminated water or fertilizer. (EWG 2002.) To adequately protect the health of the nation's children a drinking water standard for perchlorate must be set no higher than 0.1 part per billion.

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Table 1: Perchlorate-contaminated drinking water sources in California

Table 1. There are hundreds of perchlorate-contaminated drinking water sources in California.

County	Contaminated water sources (1)	Contaminated water systems (1)	Maximum perchlorate level detected (ppb) (2)	Contaminated sources still active (2)	Average level (ppb) in contaminated active sources (2)
Los Angeles	127	37	159	107	12.1
Orange	15	7	10.7	12	6.3
Riverside	49	8	65	40	9.7
Sacramento	13	3	400	0	-
San Bernardino	78	16	820	50	18.3

San Diego	1	1	4.7	1	4.5
Santa Clara (3)	133	4	8.5	3	6.2
Sonoma	1	1	5	1	4.5
Tulare	7	3	9.1	1	5.8
Ventura	2	1	20	2	11.6
Statewide	426	81	820	217	8.7

Source: EWG 2003

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2. EWG analysis of California Department of Health Services (CADHS) drinking water quality database from June 2002 (CADHS 2002).
3. Number includes 4 public drinking water wells and 129 private wells. A large new perchlorate plume in the San Martin area of Santa Clara County was discovered in late 2002, but testing of all potentially affected wells has not been completed. Wells that tested positive for perchlorate contamination but had concentrations lower than the "reporting limit" of 4 ppb were not included in this number.

Table 2: Population Drinking Contaminated Water

Table 2. More than 20 million people drink perchlorate-contaminated water from the Colorado River.

State	County	Population drinking
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		Colorado River water (1)
Arizona	Maricopa	2,458,000
	Mohave	43,000
	Pima	15,044
	Pinal	46,281
	Yuma	119,182
California	Imperial	10,300
	Los Angeles	8,898,633
	Orange	2,737,176
	Riverside	954,000
	San Bernardino	700,000
	San Diego	2,800,000
	Ventura	517,000
Nevada	Clark	1,384,505
Total		20,683,121

(1) Underestimate: Does not include systems with fewer than 2,500 customers or those serving Native American tribes.

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Table 3: Contaminated Drinking Water Outside California

Table 3. Outside California, more than 100 drinking water sources in 19 states are known to be contaminated with perchlorate.

State	Location	Number of contaminated sources	Maximum concentration (ppb)*
	Colorado River		9
	Lake Mead		24
AL	Escambia County: Atmore Utility Board	2	8.9
AZ	Maricopa County	(1)	(4)
AZ	La Paz County: Brooke Water-Lakeside	3	6
GA	Oconee County: Oconee Co. - Watkinsville	1	38
GA	Houston County: Feagin Mill	1	5.2
IA	Clinton	(3)	(6)
IN	Greenwood	(1)	(4)
MA	Bourne	2	0.4
MD	Aberdeen	3	2
MD	Hagerstown	1	4
MN	Rice County: Northfield Water	1	6.02
MN	Ramsey County: New Brighton Water	1	4.54

NC	Nash County: Vick's MHP	2	6.2
NE	Lewiston	1	5
NJ	Middlesex County: Middlesex Water Co	3	7.1
NM	Clovis	(1)	(4)
NM	Near eastern border of state	7	7.1
NV	Clark County: Mohave Generating Station	3	6.8
NY	Westhampton	1	16
NY	Yaphank	1	24
NY	Nassau County: Plainview WD	5	11
NY	Nassau County: Bethpage WD	3	5
PA	Yardley	(1)	(5)
PA	Lancaster County: Columbia Water Co	1	12.1
PA	Crawford County: Meadville Area Water Authority	1	32.7
PA	Huntington County: Huntington Boro Water Dept	1	6.7
PA	Berks County: Muhlenberg	1	4

	Town Municipal Authority		
TX	Midland, Hockley, Gaines, Dawson, Glascock, Martin, Andrews, Ector, and Howard Counties	47 systems**	32
UT	Magna	1	16
UT	Promontory	1	42
VA	Accomack County: Perdue Farms Inc	1	4.3
WA	Puyallup	4	8
WA	Pierce County: Lakewood WD	2	6

*Parentheses indicates unconfirmed detections. PPB = parts per billion.

**Number of contaminated sources in these systems not available

Source: EWG 2003

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Table 4: Sites Where Top Soil or Ground Water is Contaminated by Perchlorate

Table 4. More than 50 sites nationwide have high levels of perchlorate contamination of ground water or soil.

State	City	Facility	Source of contamination	Type of contamination	Maximum concentration (ppb)
AL	Huntsville	Redstone Arsenal Missile Plant	Explosives production	Ground Water	19,000
AZ	Benson	Apache Nitrogen Products	Explosives manufacturing	Ground Water	670
AZ	Chandler, Gila River Indian Reservation	Aerodyne	Propellant testing	Ground Water	18
AZ	Tucson	Davis Monthan Air Force Base	Explosives/propellant disposal	Soil	NA
AZ	Goodyear, Phoenix Goodyear Airport	Unidynamics Phoenix, Inc.	Explosives/ordnance manufacturing	Ground Water	80
AZ	Phoenix	Universal Propulsion	Rocket manufacturing	Soil	NA

AZ	Maricopa County	Unidynamics Phoenix, Inc. White Tanks Disposal Area	Explosives/ordnance disposal	Soil	NA
AR	East Camden	Atlantic Research	Rocket manufacturing and disposal-open burn/open detonation	Ground Water	2,000,000
				Surface Water	480,000
				Soil	1,000,000
CA	Glen Avon	Grand Central Rocket	Dumping at Stringfellow toxic waste dump	Ground Water	87,000
CA	Yuba City	Beale AFB	Titan missile production		NA
CA	Rancho Cordova and Mather Air Force Base	Aerojet General	Rocket manufacturing	Ground Water	640,000
CA	Lincoln	Alpha explosives	Explosives manufacturing	Ground Water	67,000
CA	Santa Susana	Boeing/Rocket dyne, NASA at Santa Susana Field Lab US DOE	Rocket research, testing and production	Ground Water	750
CA	Edwards	Edwards Air Force Base, Jet Propulsion Lab, North Base	Rocket research	Ground Water	300
CA	Orange County	El Toro Marine Corps Air Station	Explosives disposal	Ground Water	380

CA	Tracy	Lawrence Livermore National Laboratory Site 300	US Department of Energy explosives research	Ground Water	84
CA	Redlands	Lockheed Propulsion	Rocket manufacturing	Ground Water	NA
CA	Pasadena	NASA Jet Propulsion Lab	Rocket research	Ground Water	6,000
CA	Rialto	B.F. Goodrich and/or Fireworks Facility	Rocket research and manufacturing and/or fireworks manufacture	Ground Water	NA
CA	Glendale	Grand Central Rocket	Rocket manufacturing	Ground Water	84
CA	Baldwin Park	Aerojet General	Rocket manufacturing	Ground Water	2,180
CA	San Nicholas Island, Ventura County	US Navy Firing Range	Explosives	Ground Water	NA
CA	San Jose	United Technologies (UTC)	Rocket testing	Ground Water	180,000
CA	Santa Clarita	Whittaker-Bermite Ordnance	Ordnance manufacturing	Surface Water	3,000
CA	Hollister	Whittaker Ordnance	Ordnance manufacturing	Ground Water	810
IA	Ewart	Unknown	Unknown	Ground Water	29
IA	Napier	Unknown	Unknown	Ground Water	10

KS	Herington	Ammunition Facility	Ammunition	Ground Water	9
MA	Bourne	Massachusetts Military Reservation	Rocket disposal-open burn/open detonation	Ground Water	300
MD	Indian Head	Naval Surface Warfare Center	Propellant handling	Surface Water	>1000
MD	Aberdeen	Aberdeen Proving Ground	Unknown	Ground Water	24
MO	Joplin	ICI Explosives	Unknown	Ground Water	107,000
MO	Independence	Lake City Army Ammunition Facility	Ammunition	Ground Water	79
NE	Mead	Unknown	Fireworks facility	Ground Water	24
NM	Gallup	Fort Windgate Depot Activity	Explosives disposal	Ground Water	2,860
NM	Alamogordo	Hollomon Air Force Base	Rocket testing	Ground Water	40
				Surface Water	16,000
NM	Los Alamos	Los Alamos National Lab	US DOE lab chemicals	Ground Water	1,662
				Surface Water	NA
NM	White Rock	Los Alamos National Lab	US DOE lab chemicals	Surface Water	9
NM	Melrose	Melrose Air Force Range	Explosives	Ground Water	25
NM	White Sands	White Sands Missile Range	Rocket testing	Ground Water	21,000
NV	Henderson	Kerr-McGee/BMI	Perchlorate manufacturing	Ground Water	3,700,000

				Surface Water	120,000
NV	Henderson	American Pacific Corp/PEPCON	Perchlorate manufacturing	Ground Water	600,000
NY	Westhampton	Unknown	Unknown	Ground Water	3370
NY	Yaphank	Unknown	Unknown	Ground Water	122
TX	Karnak	Longhorn Army Ammunition Depot	Munitions manufacture, Propellant handling	Ground Water	169,000
				Surface Water	11,000
TX	McGregor	McGregor Naval Weapons Plant	Propellant handling	Ground Water	91,000
				Surface Water	22,000
TX	Amarillo	Pantex (Department of Energy)	Open burning/ Open detonation, Explosives	Ground Water	5
TX	Texarkana	Red River Army Depot	Open burning/ Open detonation, Propellant handling	Ground Water	80
TX	Texarkana	Lone Star Army Ammunition Plant	Open burning/ Open detonation, Propellant handling	Ground Water	NA
UT	Magna	Alliant Tech Systems	Rocket manufacturing	Ground Water	13
UT	Kennecott	Alliant Tech	Rocket	Ground	5

		Systems	manufacturing	Water	
UT	Promontory	Thiokol	Rocket manufacturing	Ground Water	NA
WA	near Vancouver	Camp Bonneville	Explosives/propellant disposal	Soil	NA
WV	Rocket Center	Allegheny Ballistics Lab	Rocket research production, open burn/open detonation	Surface Water	400

NA = not available.

Source: EWG 2003

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Table 5: Sites of Known Perchlorate Use in 36 States

Table 5. At least 162 sites in 36 states have known manufacturers or users of perchlorate.

State	City	Facility	Activity
AL	Bessemer	Hercules/Alliant Techsystems	Munitions, Propellant Supply
AL	Huntsville	Marshall Space Flight Center	Rocket Research
AL	Huntsville	Thiokol (former); Army Aviation & Missile Command	Rocket Motor Mfg.
AL	Parrish	Boren-Ireco Co.	Explosives
AR	East Camden	Atlantic Research Corp.	Rocket Mfg., Disposal-OB/OD
AR	Midland	Austin Powder Co	Explosives
AR	Pine Bluff	Pine Bluff Arsenal (US Army)	Pyrotechnic/ Munitions Mfg.
AR	Woodbury	HiTech	Unknown
AZ	Benson	Apache Powder Co.	Explosive Mfg.
AZ	Mesa	Talley Defense Systems, Inc., Mesa	Propellant Mfg.
AZ	Phoenix	Universal Propulsion Co., Inc.	Rocket Mfg.
AZ	Tempe	Aerodyne Corp.	Rocket Mfg.

AZ	Tucson	Davis Monthan Air Force Base	Propellant/Explosives Disposal
AZ	Yuma	Yuma Proving Ground (US Army)	Rocket Testing
CA	Alisa Viejo	G.G. Industries	Propellant Mfg.
CA	Azusa	Aerojet General Corp.	Rocket Mfg.
CA	Baldwin Park	Aerojet General Corp.	Rocket Mfg.
CA	Barstow	Mojave Pyrotechnics	Fireworks
CA	China Lake	Naval Air Weapons Station, China Lake	Rocket Research/Testing
CA	Concord	Weapons Support Facility, Seal Beach	Weapons Storage
CA	Culver City	Western Electrochemical (American Pacific)	Unknown
CA	Edwards	Edwards AFB/Jet Propulsion Lab	Rocket Research and Testing
CA	Fallbrook	Weapons Support Facility, Seal Beach	Weapons Storage
CA	Gardena	TOPTH Inc.	Unknown
CA	Herlong	Sierra Army Depot	Munitions
CA	Hollister	FMC	Rocket Mfg.

CA	Hollister	Whittaker Ordnance	Missile Mfg.
CA	Ione	M.P. Associates	Pyrotechnic Mfg.
CA	Lincoln	Alpha Explosives	Explosives Mfg.
CA	Llano	Odee Mfg. Co.	Unknown
CA	Long Beach	TOPTH Inc.	Unknown
CA	Middletown	Reynolds Systems Inc. /FMC	Rocket Mfg.
CA	Morgan Hill	Olin Corporation	Flare and Ammunition Mfg.
CA	Ontario	Dynamic Propellant	Propellant Mfg. (?)
CA	Pasadena	Jet Propulsion Laboratory (NASA)	Rocket Testing
CA	Pomona	US Rocket	Rockets: Hobby Mfg.
CA	Rancho Cordova	Aerojet General Corp.	Rocket Mfg.
CA	Redlands	Lockheed Propulsion Company (Former)	Rocket Mfg.
CA	Rialto	Astro Pyrotechnics	Theatrical Pyrotechnics Mfg.
CA	Riverside	McKesson Chemical Co.	Chemical Mfg. ?
CA	San Diego	Space Warfare Systems Center, San Diego	Weapons Research
CA	San Jose	Pratt & Whitney Space Propulsion	Rocket Mfg.

		(United Technologies)	
CA	Santa Clarita	Whittaker-Bermite Ordnance	Ordnance Mfg.
CA	Saugus	Bermite Division., Whittaker corp.	Ordnance Mfg.
CA	Saugus	Hi-Shear Technology Corp.	Defense Pyrotechnics
CA	Torrance	Hi-Shear Industries	Rocket Mfg.
CA	Tracy	Lawrence Nat'l Lab, DOE Experimental Site 300	Explosives Research
CA	Vandenberg AFB	Vandenberg AFB	Rocket Testing/Launching
CA	Windsor	Starflight Space Technologies	Rocket Mfg.
CO	Colorado Springs	Vulcan Systems Inc. (Former)	Unknown
CO	Englewood	Gateway Safety Products	Industrial Protective Gear
CO	Penrose	Estes Industries, Inc. / Vulcan Systems Inc.	Hobby Rocket Mfg
CO	Whitewater	KSI Inc.	Aerospace (?)
FL	Brooksville	Thermex Energy	Explosives Mfg
FL	Cape Canaveral	Patrick Air Force Base	Rocket Launch Site
FL	Hollywood	CCT	Rocket Launch Site
FL	Niceville	Eglin Air Force	Munitions Testing

		Base	
FL	Tampa	Girindus	Chemical Mfg.
GA	Byron	ICI Americas Inc.	Explosives Mfg
ID	Pocatello	Firefox Enterprises	Chemical Retailer
IL	Danville	World /Star Fireworks	Fireworks
IL	Edwardsville	Propellex Corp.	Military Explosives
IL	Joliet	Talley Defense Systems (former)	Propellant Mfg.
IL	Marion	Olin Corp (currently Primex)	Explosives Storage/Mfg.
IL	Savanna	JOCG - U.S. Army Defense Ammunition Center	Explosives/Munitions Training
IL	South Beloit	Orion Safety Products	Warning Flares Production
IN	Crane	Naval Surface Warfare Center, Crane Division	Missile/ Pyrotechnic Storage/Mfg.
IN	Kingsbury	Melrose Pyrotechnics Inc.	Fireworks
IN	Peru	Olin Corp	Sporting Ammunition
KS	Hallowell	Slurry Explosives Corp.	Explosives
KS	Herington	Pyrodex Corp.	Sporting Ammunition
LA	New Orleans	Bartlett Chemicals Inc.	Chemical Mfg.

MD	Aberdeen	Aberdeen Proving Ground (US Army)	Weapon Testing/Research
MD	Cumberland	Allied Tech	Aerospace ?
MD	Elkton	Cordant Technologies, Inc.	Rocket Propulsion Technology
MD	Elkton	Elkton Sparkler Fireworks Mfg. Co.	Mfg & Wholesale Fireworks
MD	Indian Head	Naval Surface Warfare Center, Indian Head Division	Propellant Mfg.
MD	Silver Springs	Naval Surface Warfare Center, White Oak	Explosives Research
MD	West Bethesda	Naval Surface Warfare Center, Carderock Division	Rocket Testing
MI	Ishpeming	Ireco	Explosives Mfg.
MN	Biwabik	Nitrochem Energy Group - Thermex	Explosives Mfg ?
MN	Foley	Aerial Arts	Unknown
MN	Gilbert	Cook Slurry Co.	Explosives Mfg.
MO	Joplin	ICI Explosives USA Inc.	Explosives Mfg.
MS	Columbus	Hooker Chemical, Foote Mineral (now Eka Nobel)	Chemical Mfg.
MS	Iuka	GenCorp - Aerojet	Rocket Research

		(Former)	
MS	Iuka	Yellow Creek Production Facility (NASA/Thiokol)	Rocket Research
NC	Greensboro	Vick Chemical (former)	Unknown
NC	Mcleansville	Gulf Oil/Thermex Energy	Explosives Mfg ?
NC	Riegelwood	Wright Chemical, Atlas Powder	Explosives
ND	Fargo	Starr Display Fireworks	Fireworks Mfg.
ND	Kindred	Dakota Pyrotechnics Inc.	Fireworks Mfg.
NJ	Newark	Fairmount Chemical Co Inc.	Chemical Mfg.
NJ	Newfield	Shieldalloy Corp.	Explosives Mfg.
NJ	Orange	H. Reisman Corp	Unknown
NJ	Morris County	Picatinny Arsenal (US Army)	Explosives Research, Mfg., Disposal
NJ	South Plainfield	Hummel Chemical Co.	Unknown
NM	Las Cruces	White Sands Missile Range (NASA/NASA)	Rocket Testing
NM	Los Alamos	Los Alamos National	Lab Chemical

		Laboratory DOE	
NM	Roswell	Longhorn Manufacturing	Fireworks
NV	Fernley	BOKMA Resources	Unknown
NV	Hawthorne	Hawthorne Army Depot	Unknown
NV	Henderson	Kerr-McGee Chemical	Chemical Mfg.
NV	Henderson	PEPCON (aka American Pacific)	Chemical Mfg.
NV	Las Vegas	AeroTech / Industrial Solid Propulsion Inc.	Rocket Research
NV	Lockwood	Largo Marsino	Unknown
NV	Sparks	Hi-Shear Industries	Unknown
NY	Brooklyn	Witco Corp.	Chemical Mfg.
NY	Delanson	Atlas Advance Pyrotechnics	Fireworks
NY	Mineola	Island Pyrotechnical	Fireworks
NY	Niagara Falls	Hooker Chemicals	Chemical Mfg.
OH	Columbus	GFS Chemicals, Inc.	Chemical Mfg.
OH	Fostoria	Standard RWY Fusee	Flare Mfg.
OH	Lisbon	Hilltop Energy (AnGel)	Explosives Mfg.
OH	Marietta	Servo Dynamics	Creators of Propellant Gas

			Petroleum Extraction
OH	Steubenville	Barium & Chemicals, Inc.	Chemical Mfg.
OK	Claremore	Cardox Corp	Chemical Mfg.
OK	McAlester	McAlester Army Ammunition Plant	Ammunition/ Explosives Storage
OR	Portland	Elf Atochem North America	Chemical Mfg.
PA	Chambersburg	Letterkenny Army Depot	Missile/Ammo Storage/Maintenance
PA	Hatfield	Aerial Arts	Unknown
PA	Kittanning	Kesco Inc.	Explosives Mfg.
PA	Mechanicsburg	Naval Inventory Control Point, Mechanicsburg	Weapons Distribution
PA	Mt. Carmel	Explo-Tech Inc. (AnGel)	Explosives Mfg.
PA	Philadelphia	Naval SWC, Carderock Division, SSES Philadelphia	Propellant Handling
PA	Tamaqua	Atlas Powder Co.	Explosives Mfg.
PA	Telford	Service Chemical	Chemical Mfg.
SC	Columbia	Phillips Components	Unknown
TN	Louisville	AnGel (?DYNO Southeast Inc)	Unknown
TN	Toone	Alliant Techsystems, Kilgore Corp.	Propulsion/Munitions Mfg.

TX	Corpus Christi	Servo-Dynamics Inc.	Explosives
TX	Karnack	Longhorn Army Ammunition	Propellant Handling
TX	Kennedale	Harrison Jet Guns	Unknown
TX	Mansfield	Shaped Charge Specialist Inc.	Explosives
TX	Marshall	RTF Industries Inc.	Pyrotechnic Mfg.
TX	McGregor	Naval Weapons Industrial Reserve Plant	Rocket Mfg.
TX	Rosharon	Schlumberger	Explosives
TX	Waco	M & M Chemical	Chemical Mfg.
UT	Brigham City	Thiokol	Rocket Mfg.
UT	Cedar City	AeroTech / Industrial Solid Propulsion Inc.	Rocket Mfg.
UT	Cedar City	Western Electrochemical (American Pacific Corp)	Chemical Mfg.
UT	Dugway	Dugway Proving Ground (US Army)	Rocket Testing
UT	Lehi	Dyno Nobel Inc.	Explosives Mfg, Research, Testing
UT	Magna	Bacchus Works, Alliant Techsystems, Inc.	Rocket Mfg.
UT	Ogden	Autoliv Inc.	Auto Air Bags
UT	Ogden	Defense Depot	Chemical Distribution

		Utah	
UT	Ogden	Hill AFB	Missile Maintenance, propellant testing
UT	Thiokol	Thiokol	Rocket Mfg. Waste Discharge
UT	Tooele	Tooele Army Depot	Ammunition storage, Mfg, Repair, open burning
UT	West Valley City	Alliant Tech, Niro Plant	Rocket Research/ Testing
VA	Duffield	Paige Ireco (formerly Gibson Explosives) (Dyno Nobel)	Explosives Mfg.
VA	Gainsville	Atlantic Research Corp	Rocket Research/Mfg
VA	Radford	Radford Army Ammunition Plant	Explosives Mfg.
VA	Yorktown	Naval Weapons Station-Yorktown	Explosives Mfg.
WA	Olympia	Ireco (Alaska Pacific Powder Co)	Explosives Mfg.
WA	Port Hadlock	Weapons Support Facility, Seal Beach	Ammunition Storage, Distribution
WI	Delafield	Bartolotta Fireworks	Fireworks Mfg.
WV	Newell	Newell Specialties	Unknown
WV	Rocket Center	Alliant Tech;	Rocket Mfg.

		Naval Ordnance, Allegheny Ballistics Lab	
WV	Romney	Appalachian Explosives (AnGel)	Unknown
WY	Mills	Thermex Energy	Explosives Mfg.

Source: Environmental Protection Agency (EPA). 2001. Memorandum re: Perchlorate occurrence table and maps. March 2, 2001.

Table 6: Military Sites Where Perchlorate Testing is Urgent

Table 6. Perchlorate testing is urgently needed at 63 Department of Defense sites.

State	City	Facility	Why testing needed
AL	Childersburg	Alabama Army Ammunition Plant	Munitions production
AL	Anniston	Anniston Air Force base	Ammunition/ missile maintenance and storage
AR	East Camden	Shumaker Ordnance Plant/ Camden Naval Ordnance Plant, US Naval Ammunition Depot	Mfg, testing, disposal of ammunitions, explosives and rockets
AZ	Tucson	Air Force Plant 44	Missile production, explosives storage

AZ	Flagstaff	Camp Navajo, Navajo Depot Activity	Ammunition/explosives disposal, rocket/missile maintenance
AZ	Pinal County	Florence Military Reservation	Explosive ordnance disposal
AZ	Gila Bend	Barry M. Goldwater Range	Rocket, ordnance testing
CA	Modesto	Riverbank Army Ammunition Plant	Ammunition plant
CA	Fresno	Fresno Air National Guard Base	Munitions storage area
CA	Burbank	Air Force Plant 14	Missile production
CA	Point Magu	Naval Air Weapons Station	Missile testing
CA	Alameda and San Joaquin Counties	Lawrence Livermore National Labs Site 300	Explosives testing, open burn/detonation
CA	Rancho Cordova	Air Force Plant 70	Rocket mfg.
CO	Denver	Lowry Air Force Base	Solid rocket fuel used on base
HI	Western Oahu	Makua Military Reservation	Open burn/detonation of ordnance
IA	Middletown	Iowa Army Ammunition Plant	Munitions/ explosives mfg, testing, disposal

ID	Mountain Home	Mountain Home AFB	Titan missile production, maintenance, munitions storage
IL	Near Chicago	Joliet Army Ammunitions Plant	Burning and demolition of explosives
IL	Savanna	Savanna Army Depot	Storage/disposal of munitions/explosives
IL/IA	Rock Island/Davenport	Rock Island Arsenal	Ordnance mfg. - largest weapons mfg arsenal in western world
IN	Bloomington	NSWC Crane Division	Explosive disposal, ammunitions production, storage
IN	Charlestown	Indiana Army Ammunition Plant	Rocket propellant plant
IN	Madison	Jefferson Range/ Jefferson Proving Ground	Rocket testing
KS	Parson	Kansas Army Ammunition Plant	Burning and demolition of explosives
KS	Kansas City	Sunflower Army Ammunition Plant	Powder plant
KY	Richmond	Blue Grass Chemical Activity	Rocket/munitions storage/disposal
LA	Shreveport	Louisiana Army Ammunition Plant	Ammunition plant

MA	Watertown	Army Materials Technology Laboratory/ Waterman Arsenal	Munitions development, testing
MI	Hanson	Camp Grayling	Ammunition supply point
MN	St Paul	Twin Cities Army Ammunition Plant	Ammunition production and demilitarization
MO	St Louis	St Louis Army Ammunition Plant, St Louis Ordnance Plant	Munitions plant
MO	Neosho	Camp Crowder, Air Force Plant 65	Test-firing rocket engines
MS	Slidell	Mississippi Army Ammunition Plant	Munitions production
ND	Minot	Minot AFB	Missile production and testing
NE	Grand Island	Cornhusker Army Ammunition Plant	Munitions production
NE	Omaha	Offutt AFB	Missile production testing
NM	Albuquerque	Kirtland AFB	Rocket research
NM	Alamogordo	Holloman AFB	Missile testing
NV	Las Vegas	Nellis AFB	Munitions storage

NV	Tonopah	Tonopah Test Range	Explosives testing
NY	Buffalo	Air Force Plant 38	Rocket motors (construction support)
NY	Watervliet	Watervliet Arsenal	Rocket motor/artillery production
NY	Romulus	Seneca Army Depot	Ammunition/explosives/missile burning
OH	Ravenna	Ravenna Army Ammunition Plant	Explosives mfg. and ammunitions demilitarization
OH	Scranton	Scranton Army Ammunition Plant	Ammunition plant
OH	Cleveland	NASA Glenn Research Center	Perchlorate/propulsion research
OK	McAlester	McAlester Army Ammunition Plant	Munitions manufacture, rocket production
PA	Chambersburg	Letterkenny Army Center	Missile/ammunition storage, testing, maintenance, disposal
PA	Tobyhanna	Tobyhanna Army Depot	Missile maintenance/ repair
SC	Sumter	Poinsett Range, Shaw AFB	Open burn/detonation for waste munitions
SD	Rapid City	Ellsworth AFB	Titan missile production
TN	Kingsport	Holston Army Ammunition Plant	Explosives and propellant production

TN	Tullahoma	Arnold Engineering Development Center	Rocket testing
TN	Milan	Milan Army Ammunition Plant	Ammunitions testing and storage
TN	Chattanooga	Volunteer Army Ammunition Plant	Explosives mfg.
TX	Abilene	Dyess AFB	Missile production (Atlas), testing (Minuteman)
TX	Boerne	Camp Stanley Storage Activity	Munitions production, testing, maintenance
TX	Fort Worth	Air Force Plant 4	Produces missile components
TX	San Antonio	Kelly AFB	Propellant handling
UT	Brigham City	Air Force Plant 78	Rocket motor and missile mfg.
UT	Ogden	Air Force Plant 77	Rocket motor and missile mfg.
WI	Badger	Badger Army Ammunition Plant	Munitions manufacture
WI	Madison	Badger Army Ammunition Plant	Munitions manufacture

Source: EWG 2003

BOXER INTRODUCES BILL TO REGULATE PERCHLORATE

Washington, DC — U.S. Senator Barbara Boxer (D-CA) today introduced legislation to protect drinking water from contamination by the toxic chemical perchlorate.

Boxer's bill would require the Environmental Protection Agency (EPA) to establish a standard for perchlorate contamination in drinking water supplies by July 1, 2004. Under EPA's current schedule, 2006 is the earliest date a standard would be finalized.

"Perchlorate is a clear and present danger to California's public health," said Boxer. "We can't wait four more years to address this threat. EPA needs to get moving and protect our drinking water sooner rather than later."

Drinking water sources for at least 7 million Californians and millions of other Americans are contaminated with perchlorate. Perchlorate is the main ingredient in missile and rocket fuel, which accounts for 90 percent of its use. Perchlorate is also used for ammunition, fireworks, highway safety flares, air bags, and fertilizers. It dissolves readily in many liquids, including water, and moves easily and quickly through cracks and water.

Perchlorate was first discovered in drinking water in 1957. The chemical has been demonstrated to pose a variety of serious health risks relating to thyroid function, especially in newborns, children, and pregnant women. Exposure to perchlorate interferes with the thyroid gland's ability to produce the hormones needed for normal prenatal development. This can cause both physical and mental retardation. Perchlorate is also linked to thyroid cancer.

Californians face special threats from perchlorate contamination because so many rockets and missiles were built and tested in the state during World War II and the Cold War. Groundwater can become contaminated wherever the chemical is manufactured, used, disposed of, or stored.

Alarming levels of perchlorate have been discovered in Lake Mead and the Colorado River, the drinking water source for millions of Southern Californians. Communities in the Inland Empire, San Gabriel Valley, Santa Clara Valley, and the Sacramento area are also grappling with perchlorate contamination.

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SEN. BOXER INTRODUCES BILL TO SET SAFETY STANDARD

OAKLAND, Calif., March 3 — Environmental Working Group (EWG) applauded Sen. Barbara Boxer's introduction today of a bill to set a national safety standard for rocket fuel waste in drinking water, and released exclusive up-to-date data on all known or suspected occurrences of the contaminant in hundreds of locations in 43 states. EWG also released an analysis of the latest scientific studies on the health risks of exposure to even low doses of perchlorate, arguing that the national drinking water standard should be no higher than one-tenth the EPA's current recommendation.

More than 20 million Americans drink water from public and private sources known to be polluted with perchlorate. This figure includes customers of 81 contaminated water systems in California and all residents of California, Arizona and Nevada who get at least part of their drinking water from the perchlorate-tainted Colorado River.

But EWG's analysis of the latest government data shows that perchlorate pollution is now known to be a serious problem nationwide:

- Outside of California, perchlorate contamination has been confirmed by testing in more than 100 drinking water sources in 19 states.
- Perchlorate contamination of soil or of groundwater sources, not all of which are currently used for drinking water, has been confirmed at more than 50 sites in 17 states.
- Perchlorate is known to have been made, used or stored at more than 150 sites in 36 states. At some of these locations, water or soil contamination has already been detected by testing, but the U.S. Environmental Protection Agency says it is certain that further tests would confirm contamination at all of the sites.
- Perchlorate testing is urgently needed on at least 63 military sites in 32 states where rockets, missiles or munitions have been developed, produced, tested, stored, maintained, or disposed of. To date, testing is planned at only a few of these sites.

(Lists of all known or suspected sites of perchlorate contamination, plus detailed analysis of the health risks, are available at www.ewg.org.)

"Sen. Boxer's legislation is a long-overdue step toward addressing a toxic legacy of the Cold War that poses a health risk to Americans from California to Cape Cod," said Bill Walker, West Coast vice president of EWG, which has studied perchlorate pollution since 2000. "Now the Pentagon and the defense industry must stop trying to block safety standards and cleanup of contaminated sites, and let the EPA do its job of protecting the public."

Perchlorate is a powerful thyroid toxin that can affect the thyroid's ability to take up the essential nutrient iodide and make thyroid hormone. Small disturbances in thyroid hormone levels during pregnancy can cause lowered IQ

and larger disturbances can cause mental retardation, loss of hearing and speech, or deficits in motor skills for infants and children.

Legislation introduced today by Sen. Boxer, D-CA, would mandate that the federal government set a drinking water standard for perchlorate by July 1, 2004. California health officials are working toward setting a state drinking water standard sometime in 2004, but the EPA does not plan to set enforceable national standards before 2008, if then.

California's current provisional drinking water standard, which is only advisory, is 2 to 6 parts per billion (ppb). The EPA's current draft standard is equivalent to 1 ppb. Boxer's legislation does not specify what the standard should be but mandates that it be set at a level that will protect the most sensitive populations. To protect children, EWG says the standard should be no higher than one-tenth the EPA's recommendation, or 0.1 ppb.

Perchlorate is used in fireworks, safety flares, matches and car air bags, but 90 percent of it goes into solid rocket fuel for military missiles and the NASA space shuttle. National contamination data is still spotty, but extensive drinking water testing is now underway. Among known contaminated sites is the McGregor Naval Weapons Plant in central Texas, just a few miles from President Bush's ranch.

Although the majority of known and suspected perchlorate-contaminated sites are operated by the military or contractors such Lockheed Martin, the Department of Defense and the aerospace and defense industry are stubbornly resisting the efforts of regulators to set adequate safety standards or clean up contaminated sites. Despite volumes of new evidence showing that very low doses are harmful to fetuses, infants and children, the Pentagon and its contractors argue that the risks of perchlorate should be assessed on the basis of a single study, funded by the defense industry, on short-term exposure of a handful of adult men and non-pregnant women.

Source URL:

<http://www.ewg.org/reports/rocketwater>