

Why We Need Good Information to Cleanup Bad Places

Susan Maret

"...Military facilities took very few notes, especially when they were gearing up for war. Their attitude was to just dump it into a lagoon or toss it away."

Robert Hayton, EPA Project Manager, Picatinny, (qtd in Shulman 1992: 41) ¹

Locating historical records for FUDS [[Formerly Used Defense Sites](#)] weapons manufacturing or [Atomic Energy Commission](#) sites is an arduous process. A search through the [Declassified Documents Reference Service \(DDRS\)](#), the [DTIC STINET database](#) [Defense Technical Intelligence Agency], National Archives and Records Administration [NARA] [Records Groups](#), requesting documents through [FOIA](#), or that agencies perform a declassification review of documents are often required to attain a composite picture of a site's pollution history. Onpost records rarely tell the entire waste history of a [Comprehensive Environmental Response, Compensation, and Liability Act](#) (CERCLA, or Superfund) site, but when it comes to recreating the past pollution practices of FUDS, historical understanding is further compromised by poor agency record keeping and information organization practices that exist within [a culture of secrecy](#).

During the [Superfund cleanup process](#), "information collection cycles," which primarily occur during the [Preliminary Assessment/Site Inspection Phase](#) and the [Remedial Investigation/Feasibility Study](#), contribute to the ongoing understanding of history of the site, waste handling practices, and environmental pathways by which pollution poses a potential risk to ecosystems and humans. This early critical phase in the CERCLA cleanup process is essential to the design of a specific remedy and eventual site cleanup. The entire CERCLA process is further compromised by information that remains under [security classification](#) and is therefore buried in numerous agency files, records, and archives. Additional assaults on the CERCLA cleanup process arise with information that is "recycled" from one regulatory document to another during CERCLA's stages, thereby reducing the ability and efficacy of information to act as a catalyst or change agent. Known as "clean up by paperwork only (CUPO)," these informational techniques lead to the belief that remediation has been successful and public and ecosystem health are protected.

Roughly up until the 1970's, the [U.S. Army Chemical Corps](#) was responsible for "defensive and offensive aspects of biological and chemical warfare, the latter comprising incendiary and smoke activities as well as those of gas; and the defensive aspects of radiological warfare." One of the Corps lead chemical and biological weapons manufacturing facilities was the [Rocky Mountain Arsenal](#), located near Denver, Colorado. The history of the Corps – FUDS, including the Arsenal – is tied to secrecy, poor recordkeeping, and accompanying [tampering of](#)

¹ Note: This article was written in 2000–2001 and many links are dead. I did not revise this account for historical reasons and direct readers to use the Wayback Machine and other Web archival tools to locate original information.

[communications](#) involving what I term *generational pollution and waste* [we don't know what to do with this toxic goo, so let's bury it in a landfill for another generation to deal with].

This is why I believe we need good information to clean up bad places and documented the pollution history of Rocky Mountain Arsenal.

A Brief History of Rocky Mountain Arsenal

The history of [Rocky Mountain Arsenal](#), like many of the sites in the Chemical Corp complex, provides a context for understanding government secrecy and its relationship to weapons development, waste practices, lack of agency recordkeeping. In part due too much of one kind of information, and not enough of another, the Arsenal's pollution history is incomplete, and future generations are *de facto* assigned responsibility for continuing the inquiry into the Arsenal's contamination and waste practices.

Rocky Mountain Arsenal is the Department of Defense's [most expensive Superfund cleanup project](#), estimated at a \$75 million cost per year to taxpayers. After release from the Environmental Protection Agency (EPA), the Arsenal will become an official [National Wildlife Refuge](#) in accordance with the [National Wildlife Refuge Act](#). Per the Act, approximately 940 acres of the total 17,000 acres have been designated for transfer to Commerce City's tax base for commercial use. Legislation introduced by Colorado Senator Wayne Allard has given Commerce City the first right to buy the (contaminated) transferred land. Extensive litigation between the federal parties, Shell Oil, and the State of Colorado has resulted in a massive tug of wills in which there many losers and the emergence of two winners: the U.S. Army and Shell Oil Company. As *Denver Post* reporter Penelope Purdy, says

Worst of all: The 1996 pact between the feds and the state of Colorado really doesn't insist on decontaminating the land. It just calls for the feds and Shell to dig up the worst toxic goo and rebury it elsewhere on the property. So the pact is less a cleanup plan than a reburial plot.

The Arsenal, a 27 square mile facility located adjacent to Commerce City and Denver, Colorado, is a Superfund site that was proposed for inclusion on the [National Priorities List](#) (NPL) on October 15, 1984. The Arsenal was placed permanently on the NPL July 22, 1987 with 165 "possibly polluted" sites. RMA's "[Hazardous Risk Score](#)" (HRS) was 58.15, considered one of the most contaminated NPL sites in the country. In [Daigle v. Shell Oil](#). (972 F.2d 1527), it was said the of the Arsenal that the combined activities of the Army and Shell on the Arsenal resulted in one of the "worst hazardous waste pollution sites in the country." Contamination levels at the Arsenal have been detected in soils, biota, groundwater, lake-bed sediments, sewers, surface waters, ditches, structures and in wildlife.

By the conclusion of World War Two, the Arsenal "was in one hundred percent production of items other than those for which it was originally designed." At its peak, the Arsenal employed 3,100 civilians, including [WAC officers](#) assigned to do war work. RMA's initial design included a two-mile wide buffer zone said to "allow dilution of chemical gas leaks (see [History of Pollution Sources and Hazards at Ricky Mountain Arsenal](#)). At various times during the Arsenal's history, the U.S. Army, Colorado Fuel & Iron, J.S. Hyman, and Shell Oil Company independently manufactured and released into the environment chlorine, DIMP ([diisopropyl methylphosphonate](#)), used in the manufacture of the organophosphate nerve agent [GB Sarin](#), the pesticides methyl and ethyl parathion, DBCP, [aldrin, dieldrin, endrin](#), DDT, and metals such as cadmium, arsenic and vaporized mercury. Chemical agents (Sarin, VX²) and blister agents such as mustard gas (H – Levinstein, HD – Distilled Mustard, HT – Mustard –T–Mixture), Lewisite (L) and the explosives, white phosphorous and napalm, were also either produced or transported to the Arsenal for destruction.

Agent filled [M55 rockets](#) were stored at the Arsenal during the 1950s–1970s. In the 1970s, Weteye MK–116 bombs containing Sarin were open air stored not far from runways located near to the former Stapleton Airport. Approximately 900 Weteyes were stored at the Arsenal in the [Toxic Storage Yards](#) in Sections 5, 6, and 31, some leaking into the Arsenal soils. During the 1970's, [Project Eagle](#) was undertaken by the Army to destroy and contain chemical agent through various methods such as incineration, solar evaporation, [deep well injection](#), and chemical neutralization. The bombs were air lifted under heavy security to Utah's Tooele Army Depot, the topic of [Chip Ward's](#) *Canaries on the Rim: Living Downwind in the West*. The Army also manufactured seven million "sandwich button" bombs in the [South Plants](#) area between 1967–68. Many [chemical weapons were also dumped at sea](#). Hydrazine was blended at the Arsenal for use by the U.S. Air Force. Biowarfare agent [TX anticrop agent](#) (wheat stem rust spores) was also housed, destroyed, and buried at the Arsenal. Seven to eight incinerators operated at the Arsenal during various times in RMA history.

Most World War II and post–War defense production [FUDs] sites are subject to cleanup under CERCLA. CERCLA [section 120](#) contains a waiver of sovereign immunity; that is, the federal facilities provision provides that all departments and agencies of the federal government are subject to CERCLA's provisions "in the same manner and to the same extent, both procedurally and substantively, as any nongovernmental entity, including liability under section 9607." While holding specific branches of the military are legally accountable for their pollution, CERCLA at federal facilities often clashes with state pollution laws and jurisdiction, and with other federal laws such as the Resource Conservation and Recovery Act [RCRA]. The state of Colorado, for example, was not consulted by the Army on its remediation activities until [United States v.](#)

2 I didn't realize before reading the [Chemical Weapons Movement History Compilation](#) (June 12, 1987, Aberdeen Proving Ground) how much VX – trainloads and trainloads – were brought to RMA for destruction. Again, several workers, off the record, told me traincars were buried in toto onsite.

[State of Colorado](#) (990 F.2d 1565; 10th Cir. 1993), which gave Colorado the right to exert regulatory control over hazardous waste. The court, in giving Colorado the green light, decided that states must possess “muscle to regulate federal facilities under state RCRA authority and impose penalties for regulatory violations” (Bissonnette 1993).³

Over the history of its cleanup, the Arsenal evolved into what can only be likened to as a Potemkin Village.⁴ With the dramatic Rocky Mountains as a backdrop, the Arsenal's calendar-perfect wildlife, prairie wildflowers, and bald eagles, calls to mind Hannah Arendt's (p. 258) words that “Potemkin's villages never lead to the real thing but only to a proliferation and perfection of make-believe.” Make-believe is a poor companion for the realities of threats, hazards, and pollution; the Arsenal's Potemkinesque “make believe” nature is illustrated in promotional materials that portray the Arsenal as wilderness:

...twelve-page glossy color booklet about Arsenal contamination called “Meeting the Challenge.” A large color photograph inside depicted a young family holding hands, walking together through a lush open field; another showed a handsome deer at the edge of a forest...But the innocuous presentation could not alter the grim reality of the Rocky Mountain Arsenal – a reality that ultimately left a chilling effect that stuck with me and caused me to redirect my work. (Shulman, p. xi-xii)

Specific Contaminated Areas

It's impossible to go into RMA's entire complex waste and pollution history. Here are highlights:

The earliest of the Arsenal's liquid waste dumps, lettered A–E were large ditches, “intermediate hollows lined with lime, in an effort to reduce toxins” (Shulman, p. xii):

Basin A, an unlined “solar evaporation” hole in the ground was constructed in 1943 to hold liquid wastes, started overflowing as waste volumes increased. To catch the overflow, a series of smaller evaporation basins, Basins C, D, E, and F were built in the early 1950's. [Basin F](#) is only basin to be lined with asphalt. One of the former guards I

3 See James M. Lenihan (1990), “RCRA versus CERCLA: The Clash of the Titans in Colorado v. United States Dep't of the Army.” *Pace Env'tl. L. Rev.* 8: 621; Peter M. Manus (1994), “Federalism Under Siege at the Rocky Mountain Arsenal” *Columbia Journal of Environmental Law* 19:327–389, and James T. Heeney's (1995) “A Sizeable Sling Stone: The Staggering Impact of the *United States V. Colorado* on the EPA Goliath.” *Villanova Environmental Law Journal* 6: 163.

4 Wayback Machine 1787: Potemkin Villages, named after Russian Field Marshall, Grigori Potemkin (1739–91), Russian statesman and favorite of Catherine II), were an idealized facade of Russian village life specifically designed to mislead Catherine II of Russia as to the actual economic and social conditions that existed in her kingdom. Although Potemkin Villages are a fabrication, the tale remains a good metaphor for the Arsenal cleanup.

interviewed (who declined to be identified) said that "Basin F was the prettiest thing I've ever seen in the moonlight. It glowed green and blue." Shulman (p. xi) recalls Basin F as a "phosphorescent toxic lake" which "glowed ominously beneath the majestic Rocky Mountains." Basin F was an open air "storage container" for 11 million of gallons of various chemicals and 661 chemicals that could be detected. To prevent Basin F from overflowing, sprays were installed to shoot wastes 100 feet into the air to evaporate and disperse the toxic waste. And a nearby well was injected with such a large volume of liquid waste, it caused tremors in the Denver metro area. The liquid was eventually siphoned into the [Submerged Quench Incinerator](#) (SQI) and incinerated.

Basins A and F, probably the most heavily contaminated areas on the Arsenal, will be capped in place; the Basin F waste pile was created from contaminated sludge from Basin F. It was Basin F that the Army and the state of Colorado fought over in the 10th Circuit Court: In Colorado's lawsuit over Basin F, the state argued "in callous disregard of public health and welfare and the environment, [the Army] has done little or nothing to stop the hazardous waste from leaking from Basin F and has not determined the nature and extent of contamination caused by its ongoing, illegal operation."

In 1986, Colorado issued its own Basin F closure plan under Colorado's hazardous waste rules. The Army argued that CERCLA preemption overruled Colorado's haz waste rules. The Court ruled in favor of Colorado, stating that EPA's monitoring of the site was not "appropriate or effective check on the Army's efforts," and Colorado's involvement would guarantee the salutary effect of a truly adversary proceeding that would be more likely in the long run, to achieve a thorough cleanup" (*Colorado v. United States Dept. of the Army*, 707 F. Supp 1562).

Old Toxic Storage Yard, located in Section 6 of the Arsenal, was used to store one-ton containers and 55-gallon drums of LeVinson, distilled mustard, phosgene, and incendiary bombs. In 1969, chemical agent was moved to the newer Toxic Storage Yard in Section 31. "Spills of phosgene were documented in the Section 6 yard, although the gaseous nature of phosgene is thought to have resulted into its volatilization into the air rather than its contamination of soil." (*Survey and Analysis Report* p.A-114). VX was also demilled in the Yard by dumping it on the ground and combining it with caustic.

Section 29, Disposal area for rocket motors and miscellaneous explosives; 500 pounds of M76 incendiary bombs were disposed of in 1962.

Section 32 was used for the disposal from the 1950s to the 1960s for incendiary munitions. The SW corner was used for storage of one ton containers of [phosgene](#). Remains of simulant-filled M55 rockets were buried in the south central part of Section 32.

Offsite (offpost), approximately eighty different compounds have been detected. Human and wildlife exposures are believed to stem from chronic exposure to contaminated soil, air and water. One example of offpost contamination is the migration of the pesticide [dibromochloropropane](#) (DBCP) into residential water wells. Shell Oil, one of the manufacturers of DBCP at the Arsenal, had been aware since the 1950s that dibromochloropropane, used in pineapple and banana growing, caused male sterility in lab animals, but did not include this information in their product descriptions. EPA banned DCPB in 1979. In 1984, [Costa Rican workers filed suit](#) against Shell and Dow Chemical. In 1992, workers reached a settlement (see Jed Greer and Kenny Bruno's *Greenwash: The Reality behind Corporate Environmentalism*. Apex Press, 1996: 51–59).

Another offsite contaminant is DIMP, a byproduct of the production and demil of the 10,000 tons of Sarin produced at the Arsenal between 1954 and 1958; the Arsenal also released an estimated 45 tons of DIMP which migrated into residential wells. By the late 1980s, DIMP had contaminated groundwater for at approximately 130 homes and businesses. DIMP standards are a [contentious issue](#) for citizens and the state of Colorado. During the past few years, the Department of Defense has spent approximately \$5.5 million studying mink tolerance to DIMP into order to lower Colorado's safety standards of 8 parts per billion (ppb).

Wheat Rust Spores

According to [Jim Knipp](#), former head of the Operations Division, Office of the Program Manager for Demilitarization of Chemical Materiel, in the in the early 1960s wheat rust spores were transported to the Arsenal for purification and storage. The Department of Agriculture advised the Army to contain the spores by burying them in trenches 18 inches deep. The Army buried the spores in a thirty-acre plot three feet deep, under the code name "Buried Treasure." In the late 1960s, Knipp reported the Army checked on the viability of the spores and found them to be alive. Knipp claims the Army "lost" the position of the original trenches after its testing. Efforts continued into the 1970s to locate the material; Knipp concluded that "apparently the material, of unknown viability, is still interred at RMA." In 1999, the Army conducted a review of records related to [TX disposal](#).⁵

Worker Health

At the January 26, 2000 EPA Ombudsman's hearing on RMA, [Dr. Robert McFarland](#), a resident at Colorado General Hospital during the late 1950s, testified to treating [exposed Arsenal workers at Colorado General](#). The medical school, McFarland claimed, did an Army funded study on an antidote to Sarin exposure using 2PAM, or pyridine 2-aldoxime; this antidote was

5 See [Col. Harold Shear's handwritten, previously unpublished account](#) of the TX disposition. Col. Harold Shear's handwritten, previously unpublished account is reprinted with permission from the Shear family, and gives an important historical perspective on TX destruction at RMA. Col. Shear was in command of the Arsenal from 1969–1971.

an alternative to the traditionally used atropine to treat toxicity. [Dr. McFarland](#) reported the physicians who administered the study were ordered to by their dean saying the medical school “was so hard up for money after World War II we had to take any study we could get.”

What has become public in recent years regarding Arsenal workers is very spotty. In its September 1976 issue, *Denver Magazine* ran a story entitled "[Denver's Human Guinea Pigs](#)" written by Douglas C. DiMarco. DiMarco interviewed former RMA worker Ray Laughbridge, who had five acute exposures to Sarin during the 1955–1957. DiMarco reported that Colorado General Hospital (once a part of the Health Sciences Center, University of Colorado, Denver) with the Army's blessing had been studying Laughbridge and other RMA workers without their written consent. DiMarco believes by monitoring the exposure of its own employees, the Army could analyze the physical and neurological effects of Sarin nerve gas on a potential enemy. Laughbridge told DiMarco that some workers were so ill they could not drive to the Arsenal to work, so the Army sent ambulances to pick them up. When the workers arrived at RMA they were given light duty, oftentimes reading comic books the entire work day so the Army would not have to report lost time.

Out of concerns with retribution, former workers I spoke to did not wish to be identified. However, several told me off record of many burials (unknown contaminants in unknown quantities) and spills. I also learned that gas masks were only issued to workers in certain areas, such as the North Plants area where GB was produced. ⁶

The February 2001 issue of *Stars and Stripes* reports the Veterans Administration has ordered health exams for veterans exposed to nerve gas and toxins in tests conducted in the 1960s. Most of the tests, according to the article, were conducted on U.S. military ships and involved the use of animals as test subjects. The projects identified were [Project Shipboard Hazard and Defense \(SHAD\)](#), Autumn Gold, Copperhead and related tests, including 68–50, 69–31, Eager Belle, Flower Drum, Fearless Johnny, HalfNote, Purple Sage, Red Beva, Scarlet Sage and Shady Grove. The testing involved possible exposure of personnel to the chemical warfare agents sarin and VX; the bacterium *Bacillus globigii* and zinc cadmium sulfide; it is not clear that former Arsenal workers will be eligible for VA testing.

Public and Ecosystem Health

Poor documentation of toxic releases and waste disposal methods and practices by the Army and its lease holders resulted in lack of informed consent and community right-to-know. This complex situation is in part due to the lack of a regulatory framework in the 1940s–1970s, wherein no mandatory environmental regulations provided for institutionalized recordkeeping of pollution, monitoring of air, water and soils, or waste handling and disposal. Pollution records do exist at the Arsenal; Shell Oil Company also has records in its possession that

⁶ Very little information has been released by the Army on the health of former RMA workers. I compiled some information that I discovered [here](#).

clearly outlines its pollutant releases during the years of its Arsenal lease. It is easy to imagine chronic releases of chemical substances into the surrounding Arsenal community, in part from the Army's chemical agent manufacturing process, Shell's manufacture and chemical blending of pesticides, various spills, accidents, leaking sewers, drums, incineration, and destruction of chemical agent under [Project Eagle](#) and other chem demil projects. Poor recordkeeping and nonrelease of information lead to fragmented medical care for those residents who lived in communities that surround the Arsenal – it is simply not possible for health professionals to reconstruct an accurate exposure history for citizens living near the Arsenal. Unfortunately, well into today, this is the case around most U.S. weapons facilities located in the U.S. and around globe.

The excavation of [Basin F](#) in 1988 released the Army and Shell Oil's toxic soup of byproducts, breakdown constituents, the "real thing" such as Sarin, and pesticides that didn't make manufacturing grades. Irondale residents reported their pets dying, going blind, and the development of "boils" and asthma. Contaminated land offpost was remediated with minor institutional controls. This condition led [citizens](#) to become their own scientists. For example, the Baseline Health Subcommittee Minority Report was written by citizen members of the Site Specific Advisory Board (SSAB). Previous studies such as the ATSDR's [Public Health Assessments](#) failed to include many of the concerns brought to light by the Baseline report. It is important to consider that CERCLA's List of Priority Hazardous Substances does not include Sarin, nor most of the chemicals and chemical byproducts at RMA, so no special efforts were made to monitor the public for these substances. The [Non-Stockpile Chemical Weapons Group](#) also acts as a watchdog on Arsenal nonstockpile chem agent issues. In July 1999, after taking the Danish dieldrin breast cancer⁷ study to heart, citizen members of the Restoration Advisory Board (RAB), of which I served, were advised by former EPA Ombudsman [Robert Martin](#) to no longer agree to attend public meetings at the Arsenal, and instead request the Army hold RAB meetings at an alternative location offsite. This request was not granted.

The [Medical Monitoring Program](#) (MAG) addresses health concerns, but it is unlikely the MAG will be able to retrospectively study residents (or workers) who have had undocumented long-term exposures to Arsenal contaminants. In recent years, the Medical Monitoring Advisory Group has evolved into the CAG (Citizens Advisory Group), and become increasingly politicized.

7 [The Lancet](#) reported that [dieldrin](#) was "associated with a significantly dose-related risk of breast cancer" and that women with the highest traces of the pesticide dieldrin in their blood were twice as likely as women with the lowest levels to develop breast cancer. Dr Annette Pernille Hoyer, who worked on the study, said: "I fear that the link is significant. "The use of pesticides should be reduced as much as possible in general. Human beings are naive when they do not believe that a poison designed to kill living organisms does not harm them. We should have as healthy food and a clean environment as possible."

The Colorado Department of Health and Environment (CDPHE) has a long history of concerns about contaminant impacts on RMA wildlife and ecosystem health, and has

- Commented extensively on the biota remedial investigation, identifying substantial concerns with sampling frequency, detection limits and analytes. The Department publicly voiced its concerns with the investigations done by the Army and our concerns with the health of numerous species of biota inhabiting RMA. We demanded that additional studies be performed by independent laboratories to validate the health of many different species of RMA wildlife.
- The Department lead the charge in demanding a wildlife/ecological specific risk assessment, requiring the Army to generate health based clean-up standards specifically for all tropic levels of biota on RMA (although never used; a complex political situation). Jeff Edson, former RMA program manager, had numerous heated open debates with the Army and U.S. Fish and Wildlife focused on the Department's concerns with contamination impacts on wildlife. This debate lead to one of the most extensive ecological risk assessments in the country.
- The Department has independently sampled wildlife tissue taken from both on and off the RMA.
- The Department hired nationally recognized experts from across the country (Shecter, Lee, and others) to evaluate the effects of contamination, including dioxins and furans, in wildlife substrate.
- And finally, the primary objection to the concept of converting the RMA into a refuge was the Department's concerns with the health of the RMA's wildlife. This lead to modification of numerous parts of the Refuge Act.

Liability and Shell Oil

In 1952–53, Shell Chemical Co. took over the Arsenal's South Plants area and manufactured Dichloro MC for the U.S. Government, along with its own pesticides [aldrin](#), [dieldrin](#) and [endrin](#). Shell's leasehold at the Arsenal also gave them access to three freshwater lakes (Derby, Mary, Ladora). Shell Oil also created a proprietary chemical process called "di-di" the Army required to efficiently manufacture Sarin. In turn, the Arsenal had a chlorine plant that Shell could employ for its pesticide production. Shell maintained no public records as to the quantities or types of waste materials generated. Shell records that do exist are considered proprietary company (trade secrets) information that legally need not be released to the public (see [The Blue Book](#), below).

In 1975, after Shell and Army chemicals were discovered in water sources north of the Arsenal, the Colorado Department of Health ordered that the Army and Shell "immediately take whatever steps are necessary to clean up all sources" of the chemicals. In meetings with Shell to discuss the response to the cease and desist orders, the Army proposed a 17-year, \$345 million environmental restoration plan for the Arsenal. Soon after, the Army asked Shell to participate in the cost of cleaning up the Arsenal. Shell took the position that groundwater contamination was the Army's responsibility because waste disposal was the Army's obligation under Shell's Arsenal lease and related agreements. In 1978, the Army asked Shell to contribute to a \$50 million program to clean up Basin F; Shell again asserted that it had no such responsibility. In addition, Shell did not notify its insurance carriers of these matters at the time.

Wastes that Shell could not put in basins or the chemical sewer were placed in drums for disposal in shallow earthen trenches (often referred to as the "Shell Trenches"). The trenches were 300 feet long, 20 feet wide, and 10 feet deep. Shell dumped drums of concentrated offspec contaminated materials, solid wastes, and sludges into the trenches, and also poured in heated, tar-like wastes from a tank truck. When the trenches were nearly full, fuel oil was poured over them and ignited to "decontaminate" the chemical wastes through incineration. The trenches were then covered with a layer of soil. When air pollution problems halted open trench burnings Shell stockpiled these wastes in thousands of covered and uncovered drums near the trenches. The drums held over 200,000 gallons of contaminated wastes. Shell knew by December 1965 that some drums had deteriorated from exposure to the elements and that some were leaking. In 1968, the Army's Mr. Donnelly believed that Section 36 was so polluted that decontamination was impossible; it had been "putrefied for eternity." Shell argued this evidence does not show it knew that burying its wastes in trenches would damage others' property (Taken from the Summary of [*Shell Oil Co. v. Winterthur Swiss Ins. Co.*](#) 12 Cal. App.4th 715, Cal.App.1.Dist., 1993. Jan. 21, 1993).

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which set the stage for the Army to hold Shell liable for its share of the cleanup. Between January 1982 and June 1983, Shell sent a series of notices to its insurers on its potential liability for the Army's claims. In 1983, the Army sued Shell Oil for their malfeasance at RMA; the last notice asked the insurers for their position on Shell's insurance coverage for those claims. For example, in December 1983, the United States and Colorado filed environmental damage lawsuits against Shell in the United States District Court in Denver, Colorado. The suit alleged that the environmental damage and pollution cleanup costs at the Arsenal amounted to \$1.8 billion. In 1993, the United States and Shell signed a consent decree to settle the federal claims. Under this decree, Shell's liability for cleanup costs is open-ended, with Shell being responsible for 50 percent of the first \$500 million, 35 percent of the next \$200 million, and 20 percent of any amount over \$700 million.

In addition, the Arsenal Consent Decree holds Shell responsible for only 20% of the cleanup costs, even though 80% of the contamination identified belongs to Shell (*The Blue Book*, below).

In addition to three primary insurers, the defendants and respondents include over fifty insurance companies that issued excess policies to Shell and a group known as Froude and Companies (who made up more than 400 Lloyd's of London underwriting syndicates, and nearly 200 other insurance companies that subscribed to excess policies ([Shell Oil Co. v. Winterthur Swiss Ins. Co.](#)); "Shell polluted the Arsenal for 40 years and they knew they were polluting the area, and that is not what liability insurance is about" (*Business Insurance* February 8, 1988). Shell identified [six "distinct causes of pollution at the Arsenal."](#) and asserts each cause was an 'occurrence' covered by its insurers, except Oil Insurance Limited (OIL)...for many reasons the insurers denied any obligation to indemnify Shell for Arsenal pollution" ([Shell Oil Co. v. Winterthur Swiss Ins. Co.](#))

Missing Information and Information Recycling

During the most intense chemical weapons production periods at the Arsenal, from 1942–1969, there were no legal or statutory requirements for the Army to maintain records on pollutant release and the storage and disposal of wastes. Environmental laws such as National Environmental Policy Act of 1969 (NEPA), the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) had not been enacted which mandated recordkeeping, tracking of waste, and permitting of specific chemical substances. Collins and Daly (1986) write that "details of disposal operations are sketchy though since requirements for mandatory waste disposal records were minimal at the time if not nonexistent."

There are **three main problems with information at Rocky Mountain Arsenal**. The first relates to secrecy. The second I characterize as "information recycling." The third issue refers to information that was simply bypassed in the construction and writing of the Arsenal Record of Decision.

Missing Information: the *Survey and Analysis Report* and *The Blue Book*

- In mid-1996, while representing Sierra Club, I attended a meeting in Washington, DC that included members from the Chemical Weapons Working Group and the newly formed U.S. Army Non-Stockpile Chemical Materiel Program (NSCMP). At this meeting, I was given a document compiled by the U.S. Army's Chemical Materiel Destruction Agency's entitled the [Survey and Analysis Report, Second Edition](#). This report gives clear descriptions of chemical agent disposal and burial sites in DOD facilities around the country; it was constructed using historical records from both the Arsenal and other defense agencies involved in chemical weapons manufacture.

During this period, I was also a member of the Arsenal Restoration Advisory Board (RAB). *The Survey and Analysis Report* had never been presented for RAB review. I later discovered that it was never consulted or cited in the construction of the Record of Decision, and to this day, it is

not part of the [Administrative Record](#). It is interesting to note the *Survey and Analysis Report* was first published in 1993, well before the Arsenal Record of Decision was signed in 1995. This brought to light a very serious question that has never been addressed by the Army: why wasn't the Arsenal, a major chemical agent manufacturing site, *not included in the Army's Nonstockpile Chemical Materiel Program?*

- In its defense of the Army, the U.S. Department of Justice (DOJ) prepared an extensive, historical document that has come to be known as *The Blue Book*. (The actual title is more bureaucratic: *Assessment of CERCLA Hazardous Substances Released by Shell Oil Company and the United States Army at Rocky Mountain Arsenal*, U.S. Department of Justice, December 30, 1986, 3 volumes, plus appendices). It is called *The Blue Book* due to its light blue color paper cover.

[The Blue Book](#) was prepared for *United States v. Shell Oil Company*, and discussed, in gross detail, Shell's wanton contamination of the Arsenal. *The Blue Book* was an attorney work product, and considered "confidential material," never publicly released. In fact, only selected legislators and officials at EPA Region 8 and Colorado Department of Health knew of its existence. *The Blue Book* was sealed at the court level and never considered in the Record of Decision, although DOJ showed without a doubt through its extensive research into Shell's own records, the "Denver Plant Waste Disposal Survey," that waste ownership was certainly not equal:

Shell was responsible for deliberate disposal	149,095 dry weight tons // 1,017 accidental release
Army was responsible for deliberate disposal	26, 358 dry weight tons // 47 accidental leaked or spilled

As regulators who knew of *The Blue Book* were prohibited in using the information to hold Shell accountable under CERCLA, they also could not employ the detailed information DOJ uncovered to design an adequate remedy as required under Superfund. Regulators could also not divulge this information to the community. Shell held the Army and the State of Colorado hostage in that it would not sit at the accountability table; it had made it very clear in similar lawsuits that it would not pay for cleanup (see [Shell Oil Co. v. Winterthur Swiss Ins. Co.](#)).

The Blue Book reports that wastes were excluded by the DOJ "because of time limitations and lack of sufficient information concerning a production unit, not all waste streams from every Shell or Hyman production unit were included..." (C-27). In addition, many waste flows from Shell's production of Bladex, Landrin, Chlordane, and other substances, including wastes in the form of gas or emissions were not taken into account by the DOJ (C-27). Basin A wastes were not considered or releases to drainage ditches were not included. Accidental releases into

chemical sewers not included. DOJ believes Shell's survey "provides a low estimate of the true amount of hazardous substances disposed of by Shell at the Arsenal." (C-29).

The DOJ also found that no evidence of cleanup was ever undertaken by Shell at the Arsenal. The Record of Decision – the final remedy document for a Superfund site – never cites Shell's waste pollution history as reported by DOJ in *The Blue Book*, or held Shell accountable for their pollution and cleanup costs; it took a General Accounting Office investigation to discover costs were not being recovered appropriately.

Concrete information unearthed by the DOJ investigation that held Shell Oil accountable for its pollution was kept out of the most critical information gathering phases in the entire CERCLA research process, which includes the Preliminary Assessment. How can an effective remedy to clean a site – the congressional intent of CERCLA – be designed and implemented without knowledge of wastes and locations? The Arsenal's [Federal Facility Agreement](#) basically "indemnifies" pesticide production by Shell by not holding it to natural resources damages.

Information Recycling at RMA: The Evolution of a Misleading, Inaccurate Administrative Record and ROD ⁸

Information used to construct the Record of Decision was "recycled" from document to document. That is, in routinely folding the same information from document to document, information not only lost its "convictional ability," but history "shrunk," and context was displaced, resulting in a condition that Allport and Postman characterize as a state where information is "lost" as it is re-used. This recycling of information may have hampered further inquiry in waste history or cleanup strategies; fresh questions might have been posed that potentially have lead to improved protection of public health, the Arsenal's unique ecosystem, the use of innovative remedial technologies, and locations of buried chemical agent. Hence, essential cleanup decisions were based on a life cycle consisting of information that was quoted, summarized, recycled, bureaucratized, and then repeatedly put forth as "fact." Along the way, no critical questions were posed regarding the quality of information. Below is the list of documents that were recycled into the Arsenal Record of Decision, a process which began formally in the year 1985:

CARs: 1985 Contamination Assessment Reports based on interviews and a paper search of records at RMA [**note:** RMA, not Chem Corps docs, or those materials still classified] encompassed a survey of 170–209 contaminated areas,

CARs evolved into SARs "Study Area Reports,"

Which then became the Remedial Investigation (RI),

⁸ Thanks to my colleague Rick Warner for this important association.

Then became the Endangerment Assessment (EIA),

Became the DSA Detailed Summary of Alternatives,

The DAA Detailed Analysis of Alternatives (seven volumes); four–seven different versions,

Then 1996 RMA Wildlife Refuge Surplus Property Master Plan,

Then Conceptual Remedy (1995),

Onpost Record of Decision (June 1996).

As information was recycled and quoted from one document, to the next, it fed the appearance that information gathering continued through the Preliminary Assessment down to the [Record of Decision](#). Had ongoing, fresh research been undertaken throughout the cleanup process, an accurate characterization of Arsenal waste history and burial sites would have potentially influenced the outcome of the Record of Decision. This in turn, would have influenced the number of [Interim Response Actions](#) (IRAs) implemented by the Army, especially the IRAs involving Sarin bomblets ⁹(IRAs drive up cleanup costs). At the root of DOD CERCLA overspending at the Arsenal is poor research. For example, as EPA's [Max Dodson states](#) in a 200 page letter to Arsenal Program Manager Charles Scharmann, "relatively little information regarding Sarin munitions is discussed in the 1996 On Post Record of Decision." The result was yet another IRA for addressing destruction of the bomblets.

The Federal Facilities Environmental Restoration Dialogue Committee (FFERDC), the Arsenal, and a Lack of Ethics

In April 1996, the [Federal Facilities Environmental Restoration Dialogue Committee](#) released "Consensus Principles and Recommendations for Improving Federal Facilities Cleanup." Aldo Leopold, in Principle 1, FFERDC lays out almost a "[federal land ethic](#)" that calls on the government to not only take responsibility for its pollution, but to protect citizens in a precautionary manner. Principle 1 states:

9 As I write this case study in November of 2000 and June 2001, the Army has "found" six and four Sarin bomblets respectively that were produced during the Honest John phase at the Arsenal. These bomblets somehow escaped chemical demil in the 1970s and had been sitting in a metal scrap pile between Basin A (section 36, a 100 acre waste pond) and the North Plants (a primary GB Sarin manufacture and disposal area) area since an excavation project in 1983. So much for a Preliminary Assessment!

Nature of the Obligation -- The federal government has caused or permitted environmental contamination. Therefore, it has not only a legal, but an ethical and moral obligation to clean up that contamination in a manner that, at a minimum, protects human health and the environment and minimizes burdens on future generations. In many instances, this environmental contamination has contributed to the degradation of human health, the environment, and economic vitality in local communities. The federal government must not only comply with the law; it should strive to be a leader in the field of environmental cleanup, which includes addressing public health concerns, ecological restoration, and waste management.

Further linking the government's role and responsibility for cleanup, FFERDC (p. 10) writes the

federal government bears an ethical burden on behalf of the communities that host federal facilities. Some of the most significant contamination is at facilities that contributed to the national security during World War II and the Cold War period that followed. Activities such as weapons production and testing were characterized by secrecy and urgency. As a result, communities made sacrifices they were not even aware of at the time.

These are profound words that are deeply relevant to Rocky Mountain Arsenal.

A Funny Thing

While writing this piece in the summer of 2000, a funny thing happened. I learned through a confidential source of the existence of *The Blue Book* and sought to obtain its release. I was told by various Colorado officials that I could not gain access to it, and the document was sealed by the Court as a document that was entered as part of the discovery process in the Shell lawsuit.

Imagine my surprise when I was searching Arsenal records one day at the [JARDF](#), and found *The Blue Book* scanned into the Administrative Record. Although the critical information contained in *The Blue Book* couldn't be used by regulators to enforce a genuine, lasting cleanup, or to hold Shell to the fire, it is at least now a public document. I don't know if Shell or the DOJ know it is scanned. But it doesn't matter. What matters is that "...despite the eagles and tour groups, here's the harsh reality about the Arsenal: It will harbor deadly wastes for longer than our great-grandchildren will be alive."

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