# United States Commercial "Low-Level" Radioactive Waste Disposal Sites Fact Sheet

Nuclear Information and Resource Service

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For as long as the United States has used nuclear power to produce electricity, it has also encountered a most critical question: **Where do we put the leftover nuclear waste?** So-called "low-level" radioactive waste (sometimes known as LLRW or LLW) is any radioactive waste that is not considered "high-level" [1]; that is, anything that is not irradiated reactor fuel or waste from reprocessing the irradiated fuel.

In 1980, the Low-Level Radioactive Waste Policy Act (LLRWPA and its 1985 Amendments Act P.L. 99-240) was passed by Congress, placing the responsibility for so-called "low-level" radioactive waste disposal in the hands of the states. Through this act, states could form disposal compacts, within which they could create a single disposal site for use by multiple states. [2] In some compacts the plan was to rotate disposal sites, potentially creating more than one in each compact over time.

Actually implementing disposal sites, however, has been extremely difficult due to the fact that all classes of so-called "low-level" radioactive waste can have very long-lasting components (some literally millions of years hazardous) while the federal regulations only require 100 years of institutional control (see 10 CFR 61.59). The NRC attributes the difficulty in opening new sites to "the controversial nature of nuclear waste disposal and public opposition to the siting of new LLW disposal facilities" [2].

Only 7 commercial "low-level" radioactive waste disposal facilities have operated in the U.S., 3 of which are still open today. As of March 2009, two new sites have been licensed, but one was cancelled (in Ward Valley, California) and one (in Andrews County, TX) has been licensed with dozens of "conditions" and other challenges as yet unmet.

The following is a brief synopsis of the locations, operations, and problems associated with the commercial so-called "low-level" radioactive waste disposal sites in the U.S.

## Richland, WA

Dates of Operation: 1965-present

This U.S. Ecology-owned radioactive waste site covers 100 acres of land situated in the middle of the Department of Energy's Hanford nuclear site, about 23 miles northwest of Richland, Washington [3]. Richland is licensed to receive Class A, B, and C "low-level" radioactive waste, as well as naturally occurring and accelerator-produced radioactive materials, or NARM [4]. Waste is only accepted here from the Northwest Interstate (WA, OR, ID, MT, UT, WY, HI, AK) and Rocky Mountain Compacts (CO, NM and NV) [4] [5].

The Richland site has had many problems over the years. According to the Final EIS of the site, "unauthorized hazardous wastes were disposed…from 1965 to June 1970" [3]. In 1979, the Richland site was shut down temporarily for "waste packaging violations and transportation safety issues" [2]. And in 2000, Spanish NARM (Naturally Occurring Radioactive Material which is regulated differently than other commercial so-called "low-level" radioactive waste) was shipped to the site, although U.S. Ecology has promised not to accept foreign wastes in the future [3].

Richland also poses unique problems because of its close proximity to the Columbia River. Cleanup operations are currently underway for the surrounding DOE Hanford site in response to concerns that the Hanford tanks

are leaking into the Columbia River. According to The Daily News Online, 67 of 177 storage tanks are leaking, contaminating the groundwater and posing a huge health risk to over 1 million people [6]. Moreover, radiation standards have been breached at the Richland fence line, where US Ecology's 1991 TLD readings revealed the area to be as much as 270 mrem/yr above background levels [7].

## Barnwell, SC

Dates of Operation: 1971-present

Operated by Chem-Nuclear Systems, a subsidiary of EnergySolutions, Barnwell is the only other operating disposal site that accepts all classes of "low-level" radioactive waste (A, B, and C). The site has been diminishing in capacity, with over 90% of the available volume already in use. [8] In response to this development, as of July 1, 2008, only states in the Atlantic Compact (SC, NJ and CT) have access to radioactive waste disposal there, whereas Barnwell previously took waste from all states. This leaves 36 states without anywhere to store their class B and C waste (the Clive, UT site still takes Class A waste from all states). [5]

Water contamination is a very serious issue at the Barnwell site. In 2007 South Carolina residents reacted in outrage over the state's secrecy regarding a 2004 test showing exceedingly high levels of tritium in monitoring wells beneath the site [9]. Tritium can cause biological harm if ingested, as would be the case if a person were to drink the contaminated groundwater [10]. In response to this revelation, the South Carolina Department of Health and Environmental Control has agreed to yearly reports concerning site contamination. The Fall 2008 newsletter cited that the highest tritium concentration in a well is 18,303,000 pCi/L—well over the EPA drinking water standard of less than 20,000 pCi/L [11].

## Beatty, NV

Dates of Operation: 1962-1992

The U.S. Ecology-owned Beatty site, located 105 miles northwest of Las Vegas [12], is one of four sites now closed, and for good reasons. The United States Geological Survey (USGS) found well-above-background levels of tritium at depths of up to 357 feet below ground and carbon-14 at depths of up to 112 feet below ground in its 1994 study of the site, probably as a result liquid waste dumping. In 1998, the USGS indicated that a 1997 test found even higher concentrations of these radionuclides in the same area. [1]

It has also been confirmed that employees at the Beatty facility had taken contaminated tools and materials off-site, even using a contaminated cement mixer to pour cement for buildings in the surrounding town [13]. In 1979, the site ran into multiple problems, first with a temporary shut-down for waste packaging and transportation issues [2], and then again when the USGS found radioactive waste containers buried outside of the boundaries of the site [1]. The site closed permanently in 1992.

## West Valley, NY

Dates of Operation: 1963-1975

The West Valley disposal site is located 30 miles south of Buffalo, NY, in an eroding bedrock valley, and is home to the only commercial reprocessing of irradiated nuclear fuel in the U.S. Despite the fact that the site has been closed for decades, it still poses huge health and environmental risks to the surrounding areas. [14]

From December 2008 until June 8, 2009, public comment is open on the revised Draft Environmental Impact Statement on the final condition of the site. The Department of Energy "preferred alternative" is to excavate 1% of the radioactivity now and decide how to proceed with the rest over the next 30 years [15]. Local, state, and national groups are calling for the full excavation alternative in order to protect the Great Lakes, most notably Lakes Erie and Ontario, which the radioactivity could contaminate if the waste is allowed to stay in the underground storage tanks, trenches and holes buried on the site. According to the Synapse Energy Economics report, "Landslides, gullies, and stream cuts all put the West Valley site at high risk of erosional failure," and thus make it likely that the radioactivity will leak. If only 1% of the radioactivity leaked into the Great Lakes 500 years from now, it would cost 3 times more—up to $27 billion—to remediate the situation than if the waste was fully excavated over the course of the next 73 years. [14]

Public comment period on the Draft EIS ends June 8, 2009. See the NIRS West Valley page for more information on how you can submit written comments and ensure the safety of the Great Lakes.

## Maxey Flats, KY

Dates of Operation: 1963-1977

US Ecology, under its previous name of NECO (Nuclear Engineering Company), operated the Maxey Flats "low-level" radioactive waste disposal site until its closure in 1977, when the state of Kentucky took back the site [1]. With a hazard ranking of 31.7 out of 100, Maxey Flats was found to be so contaminated that it was added to the National Priorities List as a Superfund site in 1986 (it takes a hazard ranking of at least 28.5 to make the National Priorities List) [16]. According to the EPA, "Radionuclides…have been found in ground water, soil and surface water at the Site." In its 5-year review of the remediation measures at Maxey Flats, the EPA states that without action, individuals could come into contact with dangerous doses of radiation from the site. [17]

Among the radionuclides found both on the site and in the unrestricted areas are tritium, cobalt-60, strontium-90, and plutonium-239 [1]. Even NRC admits that Maxey Flats was "leaking" radioactivity, thus leading to the closure of the site [2]. Obviously the site was not appropriate for nuclear waste, as the prediction that plutonium would only migrate one-half inch in 24,000 years was shown to be severely wrong when—after only 10 years—plutonium was found 2 miles offsite [18]. The site continues to undergo remediation activities today.

## Sheffield, IL

Dates of Operation: 1967-1978

US Ecology, known as Nuclear Engineering Company or NECO at the time, also operated the Sheffield facility, where environmental hazards and legal problems plagued the site. It is located near Trout Lake, where higher-than-natural doses of tritium were found in 1982; the tritium was determined to be moving at a rate of 5 feet per day, 600 times predicted velocities [1]. To counter the claims that radioactivity was migrating offsite, the company kept buying up surrounding farmland, moving the boundary (which now includes Trout Lake). When NRC rejected an application to build more trenches, Sheffield closed, and in 1979 the company abandoned the site [1]. Through an injunction, the state forced NECO to return later that year and start cleaning the leaking radioactivity [7]. In 1998 the State of Illinois took over and is now fully liable for the site, which continues to require maintenance, monitoring and control [16].

## Clive, UT

Dates of Operation: 1991-present

Like the Barnwell site, Clive is operated by EnergySolutions; however, it only accepts Class A radioactive waste (the least concentrated but still long-lasting nuclear waste) [19]. The site started as a place to dispose of abandoned nuclear waste with no place to go. The license kept expanding, increasing the kinds and amounts of waste that can be accepted, which today includes NARM (Naturally Occurring Radioactive Materials), byproduct materials, and mixed radioactive and hazardous waste [19].

EnergySolutions raised much controversy when it applied to NRC to allow the importation of 20,000 tons of "low" and intermediate–level radioactive waste from Italy in 2008 [20]. The State of Utah and the Northwest Compact oppose the import. EnergySolutions tried to get the State of Utah to accept foreign waste but as of the end of the 2009 Utah legislative session, no bill was passed allowing this [21]. EnergySolutions challenged the State's and Compact's authority to refuse foreign waste, and the US Nuclear Regulatory Commission placed the application on hold until legal action is resolved [22]. HEAL Utah argues that allowing the importation of Italian waste would open the doors to the U.S. becoming a "nuclear dumping ground" for the nuclear waste of the world—an option that is most definitely NOT in the best interest of the U.S., since we still don't have a viable solution for our own radioactive waste [20].

## The future of radioactive waste disposal sites

With few options for radioactive waste disposal—and currently, for most states, no options at all for Classes B, C and GTCC—nuclear waste generators' search for new places and ways to get rid of nuclear waste and the accompanying liability is on. In the 1990s, a proposed disposal site in Ward Valley, California, was stopped from opening, due in part to a 113-day sit-in by members of surrounding Native American nations for whom the land is sacred. The site was poorly chosen due to its location near the Colorado River, various aquifers, the habitat of the endangered desert tortoise, and multiple Native American tribes. [23] Even the National Academy of Sciences found the site to be sorely lacking, although this realization failed to affect the agendas of Congressmembers who pushed for the site license up until the last moments [24].

Now the nuclear waste generators' hopes are pinned on a proposed nuclear waste site in Andrews County, Texas. Waste Control Specialists, LLC (WCS) has received a license for "byproduct" material (meaning Atomic Energy Act-defined 11e.(2) byproduct material) and a conditional (over 90 conditions) license for "low-level" radioactive waste (meaning Atomic Energy Act-defined 11e.(1) byproduct material), despite 3 state licensing agency staff members' resignations in opposition to the licenses, concerned that the applications fail to show how the aquifers beneath and near the site will be protected. WCS is gearing up to start burying 60 million cubic feet of radioactive waste potentially starting summer of 2009, as long as the last finalizations go through. [25] This site not only affects the people living in the Andrews County community, but also those in New Mexico, as the proposed site is on the Texas-New Mexico border. Despite the fact that the Texas Compact only includes Texas and Vermont, a loophole could allow the Andrews dump to accept waste from all states—a very attractive prospect to states without current "low-level" radioactive waste disposal options [26].

## Other Options

As always, our best option for the problem of nuclear waste is to **stop making more of it**. With no place to put the radioactive waste—plus the potential for dangerous health effects at every step of the nuclear fuel chain—it makes sense to cease the use of this energy source and look to better, cheaper, and safer alternatives like wind and solar power.

However, there are other options that could be even MORE dangerous. DOE has allowed the deregulation of nuclear wastes that it considers eligible for free release or clearance—essentially treating it as not radioactive and thus able to go to regular or hazardous waste sites or be sold into commercial recycling to make everyday household items [27]. This decreases the amount of nuclear waste that needs to be stored and monitored—and increases the danger to the public.

With a lack of permanent disposal options available to most states, the NRC is looking to interim long-term storage at nuclear power plants until a new disposal site comes into operation. Previously, nuclear facilities would have needed an additional license in order to store radioactive waste long-term, but that has been waived in light of the current disposal situation. [28] Long-term interim storage at reactor sites will most likely continue in many states until more disposal sites are opened or a better option is found.

Other schemes to process Class B and C waste include:
• EnergySolutions' pilot project in TN to dilute or "down-blend" the more concentrated Class B and C waste to the less concentrated Class A so it can go into EnergySolutions' site in Utah, the one Class A waste site open to most of the country [29].
• Studsvik (TN) and WCS (TX) plan to send reactors' Class B and C waste to Studsvik to be "thermally processed." Then the Tennessee (subsidiary of the Swedish) company will take title and liability for it, and the waste will be stored in Texas until disposal becomes available. [30] It is unclear for what length of time WCS in Texas may store out-of-compact waste.
• Anonymous ideas to concentrate Class B and C up to Greater than Class C (GTCC) concentrations and wait for DOE to find a disposal site for GTCC waste, since DOE is responsible for GTCC under the 1985 Low Level Radioactive Waste Policy Amendments Act. (P.L. 99-240)

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**List of Acronyms**

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| ACNW | Advisory Committee on Nuclear Waste of the Nuclear Regulatory Commission |
| CBG | Committee to Bridge the Gap |
| CRCPD | Conference of Radiation Control Program Directors, Inc. |
| DOE | Department of Energy |
| DOH | Washington State Department of Health |
| EIS | Environmental Impact Statement |
| EPA | United States Environmental Protection Agency |
| GOA | Government Accountability Office |
| GPO | Government Printing Office |
| GTCC | Greater Than Class C "Low-Level" Radioactive Waste |
| LLRW | "Low-Level" Radioactive Waste |
| LLRWPA | Low-Level Radioactive Waste Policy Act |
| NARM | Naturally-occurring and Accelerator-produced Radioactive Materials |
| NECO | Nuclear Engineering Company |
| NIRS | Nuclear Information and Resource Service |
| NRC | United States Nuclear Regulatory Commission |
| NYSERDA | New York State Energy Research and Development Authority |
| TLD | Thermo-Luminescent Dosimeter |
| USGS | United States Geological Survey |
| WCS | Waste Control Specialists, LLC |

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