

## EPA-Confirmed Damage from Coal Ash as Fill – Case Summaries

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The following provides more detail about the damage<sup>1</sup> and environmental justice<sup>2</sup> data for each of the 22 sites confirmed by EPA to be CCR damage cases that involve structural fill sites or other unencapsulated use on the land, which are listed in Table 1 of the Comments of Earthjustice *et al.* Complete narrative information for each of the structural or unencapsulated fill site damage cases listed below can be found in EPA’s Damage Case Database and Damage Case Compendiums,<sup>3</sup> but case summaries are provided below:

### 1) **Town of Pines Groundwater Superfund Site, Indiana<sup>4</sup>**

*Damage.* The Town of Pines, Indiana became a Superfund site<sup>5</sup> when coal ash was used in a landfill and as construction fill in roads throughout the town. “The ash is pervasive on site, visible in roads and driveways. Resident complaints lead to discovery of contaminated groundwater,” and residential water wells were contaminated with heavy metals (manganese, boron, molybdenum, arsenic, lead) and ionizing radiation from fly ash at concentrations above human-health risk-based comparison levels.<sup>6</sup>

While this site also includes a landfill that contributed to or caused groundwater contamination, evidence links arsenic, sulfate, and boron pollution specifically to the fill applications due to contamination of groundwater “beyond the contaminant plumes of” the landfill.<sup>7</sup>

*Environmental justice.* The Town of Pines site is in a minority and low-income area according to EPA’s environmental justice mapping tool, EJSCREEN. The 3-mile area surrounding the site has a minority population of 37% (compared with 20% state-wide), and the populations within 1 and 3 miles of the site have low-income populations (defined on EJSCREEN as less than two times the poverty level) of 38% and 43%, respectively, compared with state and national averages of 34%.

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<sup>1</sup> See Damage Case Database and Damage Case Compendium Vols. I, IIa, IIb. Pt. 1, & IIb. Pt. 2.

<sup>2</sup> Minority, low-income, state average, and national average values for each site were derived by entering latitude and longitude into EPA’s EJSCREEN Mapper website, <http://ejscreen.epa.gov/mapper/>. Note that environmental justice data was only included at sites at which the percent of the population that was low-income and/or minority exceeded either the state or national average (or both). For additional information, *see* Comments.

<sup>3</sup> See Damage Case Database and Damage Case Compendium Vols. I, IIa, IIb. Pt. 1, & IIb. Pt. 2.

<sup>4</sup> Damage Case Compendium, Vol. 1, at 17–25 (internal citations omitted).

<sup>5</sup> See Damage Case Compendium, Vol. 1, at 18, n.68 (stating that Pines was a technically a Superfund Alternative site, meaning it was not listed on the National Priorities List (to save time) but was subject to the same analysis and cleanup standards).

<sup>6</sup> *Id.* at 18.

<sup>7</sup> *Id.* at 18, n.69.

## 2) Constellation Energy's BBSS&G Quarries, Gambrills, Maryland<sup>8</sup>

*Damage.* At the Gambrills site, off-site drinking water wells were contaminated when 4.6 million tons of fly ash and bottom ash from Constellation Energy's Brandon Shores and Wagner power plants were used to "reclaim" two unlined sand and gravel pits. "The minimal separation between the base of the ash and groundwater table at the Turner Pit was less than 2 feet."<sup>9</sup>

Arsenic, beryllium, cadmium, lead, thallium, nickel, aluminum, manganese, and sulfate were found in residential drinking water from the Gambrills site. Testing of drinking water at 83 homes revealed MCL exceedances at 34 homes and SMCL exceedances at 63 homes.

Ultimately, the Maryland Department of the Environment imposed a \$1 million fine on Constellation Energy, and a lawsuit by 84 homeowners resulted in a settlement of \$54 million and conversion of all 84 homes to public water, in addition to other measures by Constellation including remediation of the site.<sup>10</sup>

## 3) North Lansing Landfill, Lansing Board of Light & Water, Michigan<sup>11</sup>

*Damage.* The North Lansing Landfill site is actually a fill site at which over one million cubic yards of coal ash were placed in a former gravel quarry. After the filling, "[o]n-site groundwater exceeded MCLs for lead and selenium, state standards for lithium, and SMCLs for manganese, boron, and sulfate."<sup>12</sup> "The site is located about 5,000 feet from the Grand River, and wetlands are about 1,000 feet away at Bancroft Park and Groesbeck Golf Course."<sup>13</sup>

*Environmental justice.* According to EJSCREEN, the surrounding community is both minority and low-income, with a 37% minority population within one mile (compared to 24% statewide, and increasing to 38% within three miles). The North Lansing site also has a 44% low-income population (compared to 34% both state-wide and nationally) within one mile of the site, increasing dramatically to 55% using a three-mile radius.

## 4) Swift Creek Structural Fill (ReUse/Full Circle Solutions), Rocky Mount, North Carolina<sup>14</sup>

*Damage.* The Swift Creek Structural fill is a 25-acre site that "was classified as beneficial use site, and as such did not require a permit from the North Carolina Department of Environment and Natural Resources (NC DENR)."<sup>15</sup> In addition:

CCR was placed only one foot above the water table and into a wetland, contaminating off-site groundwater and causing off-site CCR dust impacts to

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<sup>8</sup> Damage Case Compendium, Vol. 1, at 25–32 (internal citations omitted).

<sup>9</sup> *Id.* at 27.

<sup>10</sup> *Id.* at 25–32.

<sup>11</sup> Damage Case Compendium, Vol. I, at 49–51 (internal citations omitted).

<sup>12</sup> Damage Case Compendium, Vol. I, at 49 (internal citations omitted).

<sup>13</sup> *Id.*

<sup>14</sup> *Id.* at 88–91 (internal citations omitted).

<sup>15</sup> *Id.* at 88 (internal citations omitted).

adjacent property. In 2002, the owner determined that as much as seven feet of standing water was present in the bottom of the CCR fill. A site investigation report in 2003 demonstrated that groundwater existed throughout the entire fill area.

EIP (2010) indicates that the primary EPA Maximum Contaminant Level (MCL) for lead and arsenic was exceeded onsite, as well as in offsite groundwater down-gradient of the fill site. EIP (2010) also notes sulfate exceeded the North Carolina Code 2L Groundwater Standard both onsite and offsite.<sup>16</sup>

*Environmental justice.* The Swift Creek Structural Fill is in a very high minority and low-income area, with minority percentages of 70% (1 mile) and 75% (3 mile) (versus 36% state-wide and 38% nationally). The low-income percentages are also high, at 37% (1 mile) and 47% (3 miles), compared with 38% state-wide and 34% nationally.

**5) DOE Oak Ridge Y-12 Plant Chestnut Ridge Operable Unit 2, Department of Energy, Oak Ridge, Tennessee<sup>17</sup>**

*Damage.* CCR placement at this site included placement in an abandoned quarry named Rogers Quarry (“RQ”); after the surface impoundment on site “was filled to capacity (1967),” and CCR slurry was diverted (1989) through a bypass pipe to the RQ.” According to EPA, “[t]his case has been categorized as a proven ecological damage case based on scientific documentation of impacts to fish and other wildlife on-site.” EPA noted exceedances of primary MCLs and SMCLs in on-site monitoring locations. Violations of federal RCRA and TDEC requirements have also been acknowledged and the entire Oak Ridge Reservation was placed on the National Priorities List (“NPL”).

The site was placed on the NPL due to ground and surface water contamination, with arsenic onsite above the MCL and significant ecological damage including fish deformities.

*Environmental justice.* The low-income population estimate within 3 miles of the Rogers Quarry is 41%, exceeding the state-wide and national low-income populations of 38% and 34%.

**6) Coal Combustion Waste Landfill, Trans-Ash, Inc., Camden, Benton County, Tennessee<sup>18</sup>**

*Damage.* The Trans-Ash Coal Combustion Waste Fill is a structural fill monofill in a former gravel quarry site.<sup>19</sup> “Due to previous gravel mining activities penetrating into groundwater, Trans-Ash was required to install a lining throughout the landfill (a 0.25” thick geosynthetic clay liner, GCL); however, Trans-Ash failed to do so, resulting in coal ash in direct contact with groundwater.”<sup>20</sup>

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<sup>16</sup> *Id.* at 88–89 (internal citations omitted).

<sup>17</sup> *Id.* at 154–57 (internal citations omitted).

<sup>18</sup> *Id.* at 157–62 (internal citations omitted).

<sup>19</sup> *Id.* at 157.

<sup>20</sup> *Id.* at 158.

Documented damage at this site includes that the groundwater in two residential wells exceeded the primary drinking water standard (maximum contaminant level, or MCL) for mercury, on-site wells exceeded the MCLs for arsenic, chromium, lead, and mercury, and EPA implemented an Emergency Removal Action to connect one impacted residential well to the city water supply.<sup>21</sup>

*Environmental justice.* Fifty-five percent of the population within one mile and 50% within three miles of the Trans-Ash site is low-income, compared with 38% state-wide and 34% nationally.

**7) Virginia Power (VEPCO) Yorktown Power Station Chisman Creek Disposal Site, Yorktown, Virginia Superfund Site (NPL)<sup>22</sup>**

*Damage.* At the VEPCO Chisman Creek site, “four abandoned, unlined sand and gravel pits at the 27-acre site received over 500,000 tons of fly ash from the combustion of coal and petroleum coke at the Yorktown Power Station. The site [includes] the upper tidal portion of the Chisman Creek estuary. Chisman Creek discharges into the Chesapeake Bay.” Topographically, “[s]urface elevations range from approximately 45 feet above mean sea level immediately to the west of the site down to sea level in the east,” and “[s]hallow groundwater flow has been interrupted by the presence of the borrow pits and ponds.”

“In 1980, nearby shallow residential wells became contaminated with nickel and vanadium. Arsenic, beryllium, chromium, copper, selenium, and molybdenum were also detected at elevated concentrations,” and the site was placed on the NPL. EPA’s proven damage case designation was also based on the facts that “[o]ffsite groundwater exceeded MCLs for selenium” and an “[a]dministrative order specified groundwater use restrictions to mitigate risk from CCR leachates.”

**8) WEPCO Cedar-Sauk Landfill, Cedarburg, Ozaukee County, Wisconsin<sup>23</sup>**

*Damage.* The WEPCO Cedar-Sauk Landfill is a placement in a sand and gravel pit that EPA deemed a proven damage case due to “[d]ocumented study of ecological impact in adjacent wetland due to CCR contamination, including stressed vegetation and bioaccumulation in plant tissues of boron.” “This unlined, 25-acre landfill, located in a former sand and gravel pit, received about 650,000 cubic yards of fly and bottom ash from the Wisconsin Electric Power Company (WEPCO) Port Washington Power Plant between 1969 and 1979. The landfill was located over shallow groundwater in highly permeable (10-3 to 10-4 cm/sec) media.”

At this site, “[t]he sand and gravel mining operation removed the unconsolidated material over the underlying Silurian dolostone of the Niagaran Series, considered a regional aquifer that is used by private water supply wells in the Town. This allowed waste to be placed directly on the fractured and dissolved dolostone knob beneath the landfill.” According to EPA’s Damage Case Compendium:

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<sup>21</sup> *Id.* at 161–62.

<sup>22</sup> *Id.* at 182–185 (internal citations omitted).

<sup>23</sup> *Id.* at 191–95 (internal citations removed).

Sometime after closure, the water table rose, saturating portions of the ash fill. With Wisconsin Department of Natural Resources' (WDNR) approval, WEPCO installed and began monitoring a series of monitoring wells in late 1978. After closure of the facility, ground water monitoring revealed onsite groundwater exceedance of the MCL for selenium, the State standard for boron, and the secondary MCL for sulfate. The boron and sulfate plume extended southeast from the central portion of the ash fill area to the creek (see EPRI, 2001, Fig. 3-2 and Fig. 3-3), while selenium was limited to three wells at the down-gradient edge of the ash fill area and one well about 200 feet down-gradient, near the down-gradient edge of the ash fill area.

Groundwater intercepted ash, and a “[c]omparison of mapped base of ash elevations to groundwater table elevation suggests that there are areas where base of ash is less than 5 feet above the water table.”

In addition to groundwater impacts, surface waters and wetlands were impacted. For example, EPA's Damage Case Compendium, Volume I, states, “Mole's Creek is considered a groundwater discharge point for shallow groundwater that flows from the landfill area” and “the boron and sulfate plume, delineated by boron concentrations greater than 1 mg/L and sulfate concentrations greater than 100 mg/L, extended to a creek roughly 600 feet east of the ash fill area.”

Regarding wetlands, “vegetation monitoring in a wetland immediately east of the fill area found stress characteristic of boron toxicity. Leaf tissue samples had boron concentrations of 300 to 1,600 ppm compared to 7 to 61 ppm in healthy plants from other areas of the site.”<sup>24</sup>

**9) WEPCO Highway 59 Landfill, WE Energies, Waukesha, Waukesha County, Wisconsin<sup>25</sup>**

*Damage.* Placement of more than 500,000 cubic yards of fly ash and bottom ash from the Valley Power Plant in a 30-acre unlined structural fill resulted in groundwater pollution, including arsenic. The site is in direct contact with groundwater, as the lower sand and gravel unit is in direct contact with bedrock that “serves as the primary aquifer for the City of Waukesha.” The soil underlying the sites is also “highly permeable,” and the site lies in a regional groundwater recharge area.

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<sup>24</sup> Note that while there is no information in EPA's Damage Case Compendium that private residential wells were tested, EPA noted the potential for impacts in private wells, stating that “[t]here are two residences located between the CCR fill and this wetland northeast of the site that may have private wells and mentioning that “[t]he sand and gravel mining operation removed the unconsolidated material over the underlying Silurian dolostone of the Niagaran Series, considered a regional aquifer that is used by private water supply wells in the Town. This allowed waste to be placed directly on the fractured and dissolved dolostone knob beneath the landfill.”

<sup>25</sup> Damage Case Compendium, Vol. I, at 199–202 (internal citations omitted).

“Approximately 7,500 cubic yards of ash was deposited below the water table in the pond on the northern portion of the site, and 30,000 cubic yards - in the southern portion of the site behind an earthen dike constructed on clay till.”

“State agency staff considered this site one of the most seriously affected coal ash sites in the State.” Monitoring data showed arsenic, selenium, and chloride above the State’s Preventive Action Levels and sulfate, boron, manganese, and iron above the State’s Enforcement Standards. Twelve private wells around the site had elevated boron levels from initial testing. WE Energies had to pay for replacement of contaminated private drinking water wells and a connection to city water. Even though the site’s remediation plan included excavation of 7,500 cubic yards of ash that were in direct contact with groundwater, the pollution of private wells did not cease:

Recent test results suggest that contamination at some active private wells near the landfill is still continuing, fifteen years after the cleanup was completed. Four private drinking wells show molybdenum levels recently above Wisconsin’s health standards. In those wells, the test results show that since 2002, molybdenum (up to 62 ppb), boron, and sulfate levels are fluctuating up and down more or less in tandem with each other. This suggests that the elements are all coming from the same source – CCR. These pollutants have exceeded health levels at times, and for some wells the levels appear to be increasing.

*Environmental justice.* The minority population within 3 miles of the WEPCO Highway 59 site is 22%, exceeding the state average minority population of 18%.

**10) Oak Creek Power Plant, Wisconsin Energy (WE) – Wisconsin Electric Power Company, Oak Creek, Racine County, Wisconsin (Structural Fill Collapse)<sup>26</sup>**

*Damage.* This damage case involved the collapse of a CCR structural fill on October 31, 2011 that included the release of about 25,000 cubic yards of fly ash that had been used as structural fill onto the shore and into Lake Michigan. Monitoring showed elevated levels of arsenic and chromium in Lake Michigan following the collapse event.

Wisconsin Department of Natural Resources levied a \$100,000 penalty for violations of state environmental regulations.

*Environmental justice.* At the Oak Creek Structural Fill Collapse site, the minority population is 26% within one mile and 19% within 3 miles, exceeding the state average of 18%.

**11) Dynegy Midwest (formerly: Illinois Power Co.) Hennepin Power Station, Hennepin, Putnam County, Illinois<sup>27</sup>**

*Damage.* The Hennepin site includes damage from multiple CCR ponds placed as embankment fill of a gravel pit. The site is located on the South Bank of the Illinois River. EPA explained that, “[t]he original WAPS [West Ash Pond System] (Ponds 1 and 3) was constructed

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<sup>26</sup> Damage Case Compendium, Vol. I, at 202–06 (internal citations omitted).

<sup>27</sup> Damage Case Compendium, Vol. II.a, at 29–36 (internal citations omitted).

in the 1950's. The ponds appear to have been constructed as unlined earthen embankments which consist of sand and gravel materials," and the Eastern Ash Pond System Ponds "are located in a sand and gravel terrace above the river."

The alluvial formation near the river is "highly permeable," in addition to the site having a "high potential for groundwater recharge." "Because of the steep gradient from the pond, the groundwater seepage velocities are high, between 100 and 1,000 feet/year. The flow direction at the time of the 1993 monitoring was toward the river, except that a mounded flow system existed beneath the pond (EPRI, 1999, Case Study HN, narrative and Fig. 3-3)." Portions of the site are located less than 5 feet from groundwater, "[depth to groundwater varies from less than 5 feet in the lowlands south and west of the impoundment to 15 to 20 feet in wells on the impoundment berm and in upland wells." "Based on the Illinois Administrative Code (IAC) Title 35, Section 620.210, groundwater within the Upper Groundwater Unit at the WAPS meets the definition of a Class I, Potable Resource Groundwater."<sup>28</sup>

EPA claims that Hennepin's "CCR disposal system and its groundwater impacts is one of the best studied coal-fired management systems in the U.S. thanks to several EPRI and contractor studies conducted at the site between 1996 and 2014." Although metals were historically not monitored at this site, monitoring data showed high levels of "ash indicator parameters, such as boron and sulfate," as well as manganese and total dissolved solids, with boron and sulfate exceeding state standards. Later testing showed arsenic and selenium exceedances in downgradient wells (but EPRI disputed whether these may have come from other sources).

Owner Dynegy entered into a consent order with the Illinois Environmental Protection Agency as a result of the groundwater exceedances, resulting in closures of the units and a Groundwater Management Zone, and long-term monitoring.

*Environmental justice.* Within three miles of the Hennepin site, the minority population is 54%, compared with a state average of 38%, and the low-income population is 49%, compared with the much lower state average of 31%.

## **12) Commonwealth Edison/Midwest Generation Powerton Plant – Mahoney Landfill, Pekin, Tazewell County, Illinois<sup>29</sup>**

*Damage.* The Powerton Plant's Mahoney Landfill site includes two adjacent landfills in a former gravel borrow pit. EPA's evaluation of sampling done to determine the impacts from these landfills shows that there were "exceedances of primary MCLs for cadmium, lead, and nitrate and secondary MCLs for iron, manganese, and sulfate in ground water and surface water at the site. The exceedances of secondary MCLs in ground water appear attributable to the management of CCR."<sup>30</sup>

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<sup>28</sup> Note that "EPRI (2010) claims that there are no human receptors between the impoundments and the river."

<sup>29</sup> Damage Case Compendium, Vol. IIa, at 41–44 (internal citations omitted).

<sup>30</sup> Damage Case Compendium, Vol. IIa, at 43.

Enforcement actions include in 2012, “[t]he Illinois EPA issued Notices of Violation for groundwater contamination after testing of wells showed numerous exceedances of heavy metals including arsenic and selenium,” in 2010, Illinois Environmental Protection Agency and the utility signed a Compliance Commitment Agreement, and in 2012 environmental groups filed a complaint with the Illinois Pollution Control Board regarding discharges of arsenic, boron, chloride, iron, lead, manganese, mercury, nitrate, selenium, sulfate, thallium and TDS in excess of Illinois groundwater quality standards and/or open dumping standards at Powerton (in an action that was also against three other Midwest Generation plants).

The contamination at Powerton has continued and, in June 2019, the Illinois Pollution Control Board ruled on environmental groups’ challenge, finding Midwest Generation liable for groundwater contamination at all four plants, and specifically held that placement of coal ash cinders on the ground contributed to contamination and did not meet the Illinois definition of “beneficial use” and that CCRs built up outside of repositories and in historic disposal sites also did not meet Illinois’s definition of beneficial reuse. The Board’s statements included that, “strict requirements apply to uses permitted under [Illinois’ beneficial use rules] . . . The record does not show that coal ash from the Stations met these requirements,” and that “the existence of a market for a material that qualifies as CCB [coal combustion by-products, meaning coal combustion waste that is beneficially reused in accordance with Illinois’ requirements, *see* 415 Ill. Compiled. Stat. 5/3.135 (2016)] by itself does not qualify the material as CCB. To qualify as CCB, the material must comply with Section 3.135.”<sup>31</sup>

*Environmental justice.* At the Powerton Mahoney Landfill site, the low-income population within one mile, 40%, and three miles, 35%, exceeded the state average low-income population of 31% and the United States average of 34%.

**13) K.R. Rezendes South Main Street Ash Landfill – PG&E, Freetown, Bristol County, Massachusetts<sup>32</sup>**

*Damage.* “The Rezendes South Main Street Ash Landfill in Freetown is a 35-acre coal ash, state-permitted, unlined, off-site monofill in a former sand and gravel quarry adjacent to Assonet Bay.” The site accepted “2.5 million tons of coal ash from PG&E’s Salem Harbor and Brayton Point power (Somerset) power plants as a structural fill to bring the quarry to natural grade.”

Selenium exceeded MCLs in on-site groundwater, and sulfate, total dissolved solids, iron, manganese, and aluminum exceeded secondary MCLs. The state required modifications to the groundwater monitoring program, and placement at the site stopped when the local Town of Freetown approved a bylaw in 2001 that banned disposal of coal combustion waste within the town.

*Environmental justice.* At the K.R. Rezendes site, the low-income population within a one-mile radius is 26%, compared with a state average of 24%.

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<sup>31</sup> *Sierra Club, et al. v. MidWest Generation, LLC.*, PCB 2013-15, Interim Order, at 14, 88–89 (Ill. Pollution Control Bd., June 20, 2019) (attached).

<sup>32</sup> Damage Case Compendium, Vol. IIa, at 84–88 (internal citations omitted).



**14) Cincinnati Gas & Electric Co. Miamiview Landfill, Hamilton County, Ohio<sup>33</sup>**

*Damage.* The Miamiview Landfill is an offsite FGD fill site in a former sand and gravel pit. “Located on the floodplain of the Great Miami River in a former (1962/63) sand and gravel quarry as part of a reclamation project, the landfill had a two-feet-thick clay liner.” The “groundwater discharges to nearby surface water (Great Miami River, which discharges to the Ohio River several miles downstream).”

While data were only available for sulfate, sulfate exceeded the secondary MCL in groundwater near the boundary of the landfill, and the sulfate plume extends to 400 feet south of the site.<sup>34</sup>

**15) Dominion Virginia Power’s Battlefield Golf Course, Chesapeake, Virginia<sup>35</sup>**

*Damage.* “At the 216-acre Battlefield site, 1.5 million cubic yards of fly ash, amended with 1.7 to 2.3 percent cement kiln dust, were used as fill and for contouring of a golf course. Groundwater contamination above drinking water levels has been found at the edges and corners of the golf course.” The site is “located within the Coastal Plain physiographic province of southeast Virginia,” “[t]he surficial aquifer is unconfined (i.e., under water table conditions), and the depth to groundwater in the site vicinity is generally less than 5 feet.” Furthermore, the site “may allow locally hydraulic communication between the surficial and the Yorktown aquifers,” and both of these aquifers are “used locally for residential water supplies.”

“Baseline groundwater tests of the golf course site in 2001, before any fly ash was placed there, did not detect arsenic, lead, vanadium and other fly-ash related contaminants.” However, “concentrations of arsenic, boron, chromium, copper, lead, and vanadium in groundwater from on-site monitoring wells were significantly above background concentrations. Of these, only boron has been detected in about 25 drinking water wells.” EPA’s footnotes state that a study of 40 private residential wells within 2,000 feet of the Battlefield site showed exceedances of health based levels, including the MCL Action Level for copper:

Some of the properties did exhibit detectible levels for arsenic, beryllium, cadmium, chromium, fluoride, lead, mercury, and zinc, but none of these were above levels cited in SDW standards. Of the tested properties, nine exhibited detectible levels of copper, two of which exhibited copper concentrations that were above the national primary safe drinking water standard and also above the Virginia action level. Of the twenty-four properties with detectible iron, fourteen exhibited concentrations above the national and Virginia’s secondary safe drinking water standards; of the eleven properties with detectible manganese, ten exhibited concentrations above the national and Virginia’s secondary safe drinking water standards; and of the eleven properties with detectible thallium, three exhibited

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<sup>33</sup> *Id.* at 119–20 (internal citations omitted).

<sup>34</sup> There was also an onsite manganese exceedance with an “unknown source.”

<sup>35</sup> Damage Case Compendium, Vol. IIa, at 127–33 (internal citations omitted).

concentrations that are at national and Virginia's primary safe drinking water standards and one – above these standards.

In groundwater, “[t]en constituents in shallow groundwater onsite that [were] elevated as compared to the baseline data set: aluminum, ammonia, iron, magnesium, manganese, nickel, nitrate, nitrite, sulfate, and zinc.”

In surface water, on-site exceedances included aluminum, chromium, iron, lead, manganese, and thallium in one or more on-site samples, and the “lone off-site surface water sample had elevated levels of aluminum, iron, and manganese.”

“Virginia’s Administrative Code allowed the use of fly ash as fill material: it was considered a beneficial use under Virginia’s Administrative Code without a liner as long as the fly ash was placed at least two-feet above groundwater and covered by an 18” soil cap.” However, the City of Chesapeake petitioned the EPA’s Regional Administrator to perform a Preliminary Assessment of the Golf Course, and a Final EPA Site Inspection Report found that metals were below MCLs in all residential wells at that time. However, Dominion offered to pay the costs for installing public water to the two communities closest to the site and agreed to pay the water line connection fees and water meter installation fee and continue to monitor wells on the golf course. Several suits were filed by nearby residents.

**16) Lemberger Landfill, Whitelaw, Franklin Township, Manitowoc County, Wisconsin (NPL)<sup>36</sup>**

*Damage.* The Township used a 21-acre sand and gravel pit as “an open dump” for “dual” uses of municipal solid waste and off-site industrial waste disposal from 1940 to 1969. From 1976 through 1977, an excavation company transported 1,750 to 2,500 cubic yards of fly ash per month from Manitowoc Public Utilities to the site and used fly and bottom ash as cover. The Lemberger Landfill site is 3,000 feet from the Branch River, which drains into Lake Michigan. “The upper part of the bedrock is more weathered and fractured, and fracture frequency decreases with depth. The horizontal and vertical fractures provide significant migration pathways.”

Damage includes “seepage of landfill leachate onto adjacent property.” Groundwater at the site is contaminated with arsenic, barium, chromium, cadmium, and lead. The Branch River is contaminated by cadmium and lead. Twenty-three private wells were sampled as part of continuing site activities but there were no MCL exceedances of metals in these wells (there was a VOC exceedance that was not attributed to the landfill).

The Lemberger Landfill was added to the National Priorities List in 1986 due to groundwater contamination. EPA’s Remedial Investigation found unacceptable lifetime incremental cancer risks from future usage of the groundwater for children ages 1 to 6. Potentially responsible parties signed a consent decree with EPA to remedy the pollution.

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<sup>36</sup> Damage Case Compendium, Vol. IIa, at 142–45 (internal citations omitted).

**17) Wisconsin Electric Power Company (WEPCO) Port Washington Facility/ Druecker Quarry Fly Ash Site, Ozaukee County, Wisconsin<sup>37</sup>**

*Damage.* “WEPCO placed 40- to 60-foot-deep column of fly ash in the unlined Druecker sand and gravel pit from 1948 to 1971. This 15-acre coal ash fill in and adjacent to a former limestone quarry received approximately 735,000 cubic yards of coal ash. Some ash in the quarry is below the water table. A well located about 250 feet south of the old quarry was reportedly impacted.” Downgradient groundwater is used for drinking, and there are “approximately 30 residences located within one mile down-gradient. The site borders Sauk Creek on the west, which is designated an Area of Special Natural Resource Interest.”

Selenium in an off-site well exceeded the Preventative Action Level (although not the MCL), and boron exceeded the current Wisconsin enforceable standard, but there was no enforceable standard at the time the sample was collected. Sulfate exceedances were also recorded onsite. The impacted well was replaced with a deeper well, an engineered cap was installed, and “40,000 cubic yards of ash were pulled back from the bank of Sauk Creek,” creating a wetland that was then vegetated.

**18) Joliet Generating Station 9 – Lincoln Stone Quarry Landfill, Midwest Generation, Joliet, Will County, Illinois<sup>38</sup>**

*Damage.* The Joliet 9 Quarry Landfill is described by EPA as a “Slurried CCR Receptacle and a Settling Pond in a Former Quarry.”<sup>39</sup> Coal ash “has been placed in standing water in the bottom” of the quarry landfill “for many years,” and although “[Illinois EPA] has known of contamination of surrounding groundwater by coal ash since 1994,” it granted Midwest Generation “an adjusted standard allowing continued degradation of onsite groundwater.”<sup>40</sup> Specifically:

IEPA has approved applicable groundwater quality standards at levels exceeding Illinois Class I standards for boron, cadmium, and selenium by 5.9 times, 52 times, and 6.5 times, respectively. Similarly, the applicable groundwater quality standard IEPA approved at this site for molybdenum is more than 34 times above USEPA’s long-term health advisory (LTHA) level.<sup>41</sup>

When Midwest Generation sampled 18 private wells near the quarry landfill and boron was found up to five times above background concentrations in eight downgradient wells, it offered to either buy out the properties or drill new wells for these homes.<sup>42</sup> Boron was the only CCR indicator pollutant monitored at these wells.

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<sup>37</sup> Damage Case Compendium, Vol. II.a., at 150–54 (internal citations omitted).

<sup>38</sup> Damage Case Compendium, Vol. IIb. Pt. 1, at 43–50 (internal citations omitted).

<sup>39</sup> *Id.*

<sup>40</sup> *Id.* at 45.

<sup>41</sup> *Id.*

<sup>42</sup> *Id.*

Onsite groundwater exceeded primary MCLs for arsenic, selenium, and cadmium and exceeded IEPA standards for ammonium, boron, and molybdenum, among other exceedances.<sup>43</sup>

Leachate discharges to the Des Plaines River through a NPDES permitted outfall. “IEPA issued a Notice of Violation (NOV) for ‘failure to operate a leachate collection and management system that assures the protection of Class I potable resource groundwater’ citing a number of AGCS exceedances, including some at the NPDES permitted discharge.” Although the permit had only required monitoring for pH and total suspended solids, “separate sampling related to the Groundwater NOV found exceedances of the [Applicable Groundwater Quality Standards for barium, copper, and nitrate at the No. 5 Outfall.”

*Environmental justice.* The community surrounding the Joliet 9 site has high minority and low-income populations at both a 1-mile and 3-mile radius from the quarry landfill. The minority population around the Joliet 9 site is 67% within 1 mile and 64% within 3 miles, compared with state and national averages of 38%. The low-income population around the site is 33% within 1 mile and 45% within 3 miles, compared with 31 state-wide and 34 nationally.

**19) George Neal Station North Landfill, Berkshire Hathaway - MidAmerican Energy Company, Sergeant Bluff, Woodbury County, Iowa<sup>44</sup>**

*Damage.* This site includes an unlined sand and gravel pit. It is “located on the outside of a meander bend on the Missouri River’s floodplain.” Groundwater contamination is extensive:

[W]hen a groundwater monitoring program was implemented in 2001, every down-gradient well in the shallow and deeper alluvial aquifers exceeded the federal Maximum Contaminant Level (MCL) for arsenic, with average values in all but one of the wells ranging from 0.0251 to 0.0882 mg/L (2.5 to 8.8 times the MCL) and a maximum concentration recorded of 0.218 mg/L (22 times the MCL). Available information indicates that the monofill is the primary source of arsenic in the shallow and deep aquifers, though there may be some contribution of arsenic to the deep aquifer from an up-gradient source. High levels of manganese, iron, and sulfate have also been found in groundwater down-gradient of the CCR monofill.

MidAmerican Energy’s consultants did not identify any human receptors or water wells downgradient of the CCR monofill, but their “report did note that the closest water wells are two wells MidAmerican Energy uses for drinking water at the NNEF. These wells were sampled four times for arsenic in 2002, but the detection limit (0.08 mg/L) was eight times higher than the current MCL, making it impossible to determine whether there were any exceedances of the MCL.”

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<sup>43</sup> *Id.* at 47.

<sup>44</sup> *Id.* at 73–78 (internal citations omitted).

**20) George Neal Station South Ash Monofill, Berkshire Hathaway – MidAmerican Energy Company, Salix, Woodbury County, Iowa<sup>45</sup>**

*Damage.* This site is a 30-acre CCR monofill in a former sand and gravel quarry. At this site, “average arsenic concentrations from the landfill were above the primary EPA Maximum Contaminant Level (MCL) in onsite down-gradient monitoring wells. The report also notes that average concentrations of iron, manganese, and sulfate were above secondary EPA MCLs (SMCLs) at various onsite groundwater monitoring wells.” In addition, “[w]hen a groundwater monitoring program was implemented in 2000, the average concentrations of arsenic in two down-gradient wells ranged from 0.011 to 0.035 mg/L, 1.1 to 3.5 times the MCL, and the maximum concentration was more than x8 the MCL. High levels of manganese, iron, sulfate, barium, selenium, and zinc have also been found in groundwater down-gradient of the landfill.”

“[B]arium, selenium, and zinc have all exceeded the UCLs in wells down-gradient of the landfill, indicating the migration of contaminants. There are indications that the only “up-gradient” monitoring point (MW4) has been affected by CCR constituents as a result of groundwater mounding within the landfill.”

**21) Portland Generating Station's Bangor Quarry Ash Disposal Site, RRI Energy, Inc., Bangor, Upper Mount Bethel Township, Bangor Borough, Northampton County, PA<sup>46</sup>**

*Damage.* The Bangor Quarry Ash Disposal Site is a landfill placed in an abandoned slate quarry. EPA SMCLs “have been exceeded for aluminum, fluoride, iron, manganese, sulfate, and total dissolved solids (TDS),” and “increasing trends were found for a number of constituents (including arsenic, boron, potassium, and others) in down-gradient wells. “Boron, cadmium, hexavalent chromium, and selenium exceeded Pennsylvania’s WQC [Water Quality Criteria] in effluent discharge into Brushy Meadow Creek from both outfalls at the site.”

*Environmental justice.* The low-income population within 1 mile of the Portland Generating Station’s Bangor Quarry Ash Disposal Site is 34%, exceeding the Pennsylvania state average of 30%.

**22) Oak Creek Power Plant, Wisconsin Energy (WE) – Wisconsin Electric Power Company (WEPCO), Oak Creek, Structural Fill Sites, Milwaukee and Racine Counties, WI<sup>47</sup>**

*Damage.* “Groundwater exceedances of the WDNR Enforcement Standards (ES) for molybdenum, manganese, and sulfate have been found onsite. Groundwater exceedances of molybdenum [were] found in offsite private drinking wells that appear to be upgradient of the landfill although investigations are underway to better establish local background and gradients to determine if the CCRs are the source.”

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<sup>45</sup> *Id.* at 79–82 (internal citations omitted).

<sup>46</sup> Damage Case Compendium, Vol. IIb, Pt. 2, 72–76 (internal citations omitted).

<sup>47</sup> *Id.* at 125–34 (internal citations omitted).

There are private drinking water wells within 1,500 feet of the landfills. Twelve “offsite private wells found contamination related to CCR. Two clusters of private wells, the Douglas Avenue Cluster and the Botting Avenue Cluster, lie within 1,500 feet of the closed Oak Creek South landfill and the Caledonia Landfill, respectively.” “[M]olybdenum in many of the wells in these clusters had shown exceedances of the Wisconsin Department of Natural Resources (WDNR) NR140 Enforcement Standard (ES) of 0.04 mg/L, which is also the EPA Lifetime Health Advisory (LHA) level for molybdenum. . . . The report also notes that boron exceeded its Wisconsin Preventive Action Limit (PAL) of 0.19 mg/L at a number of these offsite wells. The contamination was first reported to the residents in August 2009, at which time WE voluntarily began to supply bottled water to several dozen residents in the area, though WE did not claim responsibility for the contamination.” Furthermore, “there are very high concentrations of molybdenum (up to 15 mg/L, 375 times the ES) in leachate from the Caledonia landfill,” and “molybdenum, manganese, and sulfate were above the WDNR ES and arsenic, boron, fluoride, and mercury were above the PALs in onsite wells.”

Private wells were also contaminated with molybdenum above state health standards:

[M]olybdenum in many of the wells in these clusters had shown exceedances of the Wisconsin Department of Natural Resources (WDNR) NR140 Enforcement Standard (ES) of 0.04 mg/L, which is also the EPA Lifetime Health Advisory (LHA) level for molybdenum. . . . The report also notes that boron exceeded its Wisconsin Preventive Action Limit (PAL) of 0.19 mg/L at a number of these offsite wells. The contamination was first reported to the residents in August 2009, at which time WE voluntarily began to supply bottled water to several dozen residents in the area, though WE did not claim responsibility for the contamination. EIP (2010a) finds it significant that there are very high concentrations of molybdenum (up to 15 mg/L, 375 times the ES) in leachate from the Caledonia landfill. EIP (2010a) also notes that molybdenum, manganese, and sulfate were above the WDNR ES and arsenic, boron, fluoride, and mercury were above the PALs in onsite wells. . . .

WDNR reports the following levels of contamination in monitoring wells around the Caledonia Landfill: 504 arsenic – up to 17µg/L; boron – up to 9.3ppm; sulfate – 260-430ppm (mean: 311.6ppm); and manganese - up to 110µg/L. According to WDNR, “Additional sampling in the area has found a total of 33 private water supply wells with a molybdenum concentration (since 2006) that exceeds the Wisconsin groundwater standard of 40 µg/L, out of 149 private wells sampled (22 percent).

Wisconsin Energy voluntarily began to supply bottled water to several dozen residents in the area in 2009.

*Environmental justice.* The population within one mile of this site is 20% minority, exceeding the state average of 18%.