

**Commonwealth of Pennsylvania
Department of Environmental Protection
Northeast Region**

**Review of the Environmental Integrity
Project and Earthjustice Report:**

Out of Control: Mounting Damages From Coal Ash Waste Sites

Thirty-one New Damage Cases of Contamination
From Improperly Disposed Coal Combustion Waste Sites

February 24, 2010

**UGI Hunlock Power Station
RRI Energy, Inc., Portland Generating Station**

October 25, 2011

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Executive Summary

This report is in response to the document prepared by the Environmental Integrity Project and Earthjustice (Out of Control: Mounting Damages from Coal Ash Waste Sites) dated February 24, 2010. Specifically, this report addresses the two facilities located in the Northeast Region of PADEP (UGI Hunlock Power Station and RRI Portland Generating Station).

The Department reviewed and responded to each specific allegation point by point for each of the above referenced facilities. The Department's responses are based on the methodical, organized and scientific review of the data contained in our regional files (groundwater data is submitted and reviewed by the Department on a quarterly basis.) Since the EIP report did not contain standard scientific documentation, the Department has responded based on a scientific review of each facility's data and the Department's familiarity of the sites and their groundwater data and impacts.

Based on the review of the information in the report for each of the Northeast Region's facilities, the Department concludes that the allegations regarding groundwater and surface water contamination by Primary MCL's are unfounded.

- *DAMAGE CASE CLAIMS ARE REFERENCED VERBATIM FROM THE REPORT*
- *THE MCL FOR ARSENIC WAS 50 UG/L UNTIL 2004 WHEN EPA REDUCED IT TO 10 UG/L FOR DRINKING WATER SUPPLIES*

I. UGI Hunlock Power Station, UGI Development, Luzerne County

1. Damage Case Claim

The coal ash surface impoundment at this site has contaminated the underlying groundwater with concentrations of arsenic, iron, and manganese that are several to hundreds of times the primary MCLs.

- Dissolved arsenic has been found at 3 to 12 times primary MCLs in multiple downgradient wells.
- Iron has been measured at up to 131 times the secondary MCL and
- Manganese has been measured at up to 314 times the secondary MCL in downgradient water.
- The evidence of ash contamination is reinforced by alkalinity that doubles and pH that increases by a unit in groundwater that moves from upgradient wells to downgradient wells.

DEP Response

The site operated as a coal-fired generating station from 1929 until May of 2010. Prior to the 1950's ash was not disposed of in a controlled manner. Upon construction of basins in the 1950's, ash was sluiced from the pulverized coal-fired boiler to two storage impoundments and dewatered for removal from the site. In May 2010 UGI switched from the coal-fired unit to a propane system. Since then, the facility has been preparing for closure of the basins.

The Department has been working with UGI since January 2008 to assess groundwater contamination at the site. Improvements to the groundwater monitoring system were made in 2007 and 2009. The monitoring system now provides meaningful data as to the potential sources of contamination. Operational changes during the transition period from coal to propane, then closure, include: April 2009 ash placement was limited to only one basin; May 22, 2010 the coal-fired unit ceased operations and UGI ceased sluicing ash into the basin; May 2011 UGI began ash removal as part of closure. The groundwater monitoring system detected changes to water quality with each of these steps. While arsenic, iron, and manganese concentrations remain elevated, decreasing concentrations of arsenic and iron have been noted. The Department does not expect groundwater conditions to stabilize until after closure activities have been completed.

The closure plan (currently under DEP review) has been developed to include the removal of coal ash and a grading plan with stormwater controls that will limit or prevent surface water runoff and limit stormwater infiltration into the closed basin. As indicated by the data. There is groundwater contamination from past site activities; However, there are no groundwater drinking water supplies in the vicinity of the facility. The level of contamination does not pose a significant threat to the River, or warrant immediate corrective action other than site closure and continued monitoring of the ash basins.

2. Damage Case Claim

In the ten years of monitoring, total arsenic levels have reached as high as 1.40 to 1.60 mg/L in MW-5, a downgradient monitoring well at this site. Low dissolved components and high turbidity in these measurements indicate the arsenic is largely floating in suspension in the groundwater. However, numerous measurements of dissolved arsenic have been found at other downgradient monitoring points at levels exceeding the federal primary MCL for arsenic of 10 µg/L and often by several times. In all, dissolved arsenic concentrations have exceeded the primary MCL 59 times at downgradient points from 1999 to 2009.

Every 1 of 22 samples taken from MW-7 for the last three years has exceeded the primary MCL. Some 22 of the 59 total exceedances have also been at concentrations more than three times higher than the primary MCL, including at least seven samples of dissolved arsenic in MW-6 from September 2002 through September 2008 that ranged from 6 to 12 times the primary MCL (maximum concentration was 0.119 mg/L in Sept. 2008). This compares to no exceedances of the primary MCL by dissolved arsenic at any of four upgradient monitoring wells. In fact, since monitoring at the site began, arsenic has only been measured above a detection limit once at an upgradient well (0.006 mg/L in December 2000 at MW-4).

Iron and manganese concentrations have also jumped noticeably in wells impacted by the ash and to a lesser extent apparently by runoff from coal storage areas.

DEP Response

The DEP believes that the excessive total arsenic concentration in MW-5 is a reflection of turbidity created by sample collection techniques. The facility, in cooperation with DEP, upgraded sampling equipment and techniques in mid-2007 through mid-2009 to improve sampling protocols. In MW-5, the average concentration of dissolved arsenic is 5.6 µg/L (MCL = 10) and total arsenic is 22.82 µg/L. Since cessation of sluicing coal ash in May 2010, the average concentration of dissolved arsenic is 3.6 µg/L and total arsenic is 8.25 µg/L.

Data since September 2007 show total arsenic in four downgradient wells (2 network, 2 assessment) exceeding the MCL with an approximate average of 29µg/L; dissolved arsenic exceeded MCLs in the four downgradient wells with an average concentration of 26 µg/L. However, two of the four wells have levels that fluctuate above and below the MCL. This fluctuation is expected to continue at least until closure has been completed. Until final closure, monitoring will continue to determine if closure is effective or additional action is necessary to remedy groundwater contamination.

3. Damage Case Claim

Iron concentrations have been found as high as 39.2 mg/L in the original downgradient ash monitoring wells (measured in MW-7 in April 2009). This is 436 times higher than the highest iron concentration measured in the sole original upgradient well (0.090 mg/L in MW-4) and 131 times higher than the secondary

MCL for iron (0.30 mg/L). Since PADEP required additional monitoring wells to be installed to assess the contamination, iron has been found at upgradient MW-9 next to the coal storage area at concentrations ranging as high as 2.870 mg/L. This is far over the standard but still dwarfed by maximum iron concentrations at downgradient ash wells (which are 13-14 times higher).

DEP Response

Decreasing iron concentrations have been observed in some monitoring wells from the recent site operational changes identified above. Ultimately it is expected that concentrations will continue a downward trend as closure is implemented and groundwater flows stabilize.

4. Damage Case Claim

Manganese concentrations have continually exceeded the secondary MCL (0.050 mg/L) in downgradient ash wells. Highest manganese measurements have occurred more recently in MW-7 ranging from 12.9 to 15.7 mg/L (some 314 times the standard) and the highest manganese was measured at upgradient MW-4. However, manganese has been measured next to the coal storage area in upgradient MW-9 at levels as high as 13.0 mg/L in September 2009. PADEP staff indicates that MW-9 may be seeing some mounding effects from groundwater flowing laterally from the ash impoundments.

DEP Response

Removal of the coal began in mid-2010. Concentrations of manganese remain elevated from the removal activities, but it is expected that the levels will decrease after the coal has been removed. MW-9 has had insufficient groundwater during the last two quarters of 2010 to collect a full round of samples indicating that the groundwater mounding effect seen in the past may no longer exist. Until closure is completed and groundwater flows, stabilize, concentrations are expected to fluctuate.

5. Damage Case Claim

Similarly, concentrations of barium, boron and lithium are also noticeably higher downgradient of the ash impoundment than at upgradient monitoring points, although none are exceeding any health-based standards.

DEP Response

Downgradient concentrations of barium, lithium and boron are elevated above background. Wells with reported concentrations of lithium exhibited a significant percentage of non-detect values; barium concentrations are consistent in downgradient wells at concentrations significantly less than the health based standard. Elevated boron is localized to one well, possibly related to the coal storage. Until closure is completed and groundwater flows stabilize, concentrations are expected to fluctuate.

6. Damage Case Claim

In addition, the pH of upgradient water, including water influenced by the coal storage areas, is less than the pH of water downgradient of the ash impoundment usually by at least one pH unit (an order of magnitude). Lab pH readings between 5.0 and 6.0 Standard Units are found with few exceptions at upgradient points compared to a lab pH of 6.0 to 7.0 Standard Units and sometimes higher for all wells downgradient of the ash. In addition, the average alkalinity at downgradient wells is approximately twice that measured at upgradient wells. In fact, when wells that are marginally downgradient or upgradient are removed from the comparison, average alkalinity increases by 5-6 times as water moves from upgradient to downgradient monitoring points. This chemistry indicates the chemical interaction of CCW with site groundwaters. While the monitoring data in downgradient wells appears to change as the flow patterns of coal ash slurry have changed within the impoundment, the evidence of this interaction is most pronounced presently at MW-7, which is the closest well to where surface water discharges from the impoundment into a small canal that in turn discharges to the Susquehanna River.

DEP Response

Wells in proximity to the coal storage and basin area show higher pH than the more isolated upgradient well MW-4. After ending active ash sluicing, wells across the site thought to intercept higher groundwater flow zones (MWs 7, 10, 11, and 15) exhibited very similar pH values. It is expected that as closure is implemented, there will be less impact from coal combustion activities.

7. Damage Case Claim

Assessment wells document that the contamination is migrating off-site into the Susquehanna River. All 11 monitoring wells at the Hunlock site (four original wells and seven added to assess the contamination in 2009) are screened in the shallow alluvium measuring groundwater that is moving into the Susquehanna River.

DEP Response

It is the goal of the closure plan to eliminate all sources of groundwater contamination, and migration to the Susquehanna River.

8. Damage Case Claim

While UGI Hunlock maintains there is natural clay lining the impoundment, this clay may have been excavated entirely in parts of the impoundment resulting in ash being placed as much as eight feet under the water table allowing for ready migration of contaminants from the site.

DEP Response

Wells are located to monitor this area. UGI characterized the site and did 273 borings to determine the depth of ash in and around the basins, location of the clay liner, and depth to natural soil. Borings indicated areas where the clay was over-excavated and the closure of the site will address that condition.

9. Damage Case Claim

One of the assessment wells, MW-11, is approximately 240 feet downgradient of the waste boundary and very close to the Susquehanna River. Every one of six samples taken from downgradient MW-11 has measured arsenic exceeding the primary MCL by two to three times (0.024 to 0.0342 mg/L) since samples were first taken from this well in April 2009. Furthermore, surface water samples taken from Outfall 005, which discharges from the impoundment to the Susquehanna River, contained total arsenic concentrations of 0.0111 mg/L in May 2009 and 0.0249 mg/L in December 2009. The dissolved concentration in the December sample was 0.0149 mg/L. These levels are well under surface water quality standards that protect aquatic life. Nevertheless, depending upon how many other sources of arsenic are discharging to the Susquehanna, given the authorized volume of this discharge is 1500 gallons per minute (2.16 million gallons per day), such concentrations of arsenic from a discharge this large, combined with arsenic in contaminated groundwater discharging from the impoundment to the River, may contribute to an arsenic loading problem in downstream surface waters.

DEP Response

With the cessation of sluicing of coal ash into the basins, MW-11 has exhibited decreasing concentrations of arsenic. Due to the ongoing closure activities the concentrations have fluctuated. It is expected that fluctuations will continue until after closure is completed and groundwater stabilizes, since December 2009, total and dissolved arsenic have been less than the 10ug/L MCL.

10. Damage Case Claim

Due to concentrations of arsenic, iron and manganese exceeding background concentrations in upgradient MW-4 and Statewide health standards, PADEP ordered a groundwater assessment to be conducted at this site by UGI Utilities on January 10, 2008, pursuant to 25 Pa. Code Chapters 299.144(a)(5) & 289.266. Seven additional monitoring wells were installed to sample groundwater per this assessment starting in April 2009. The facility is planning to close in May 2010 although PADEP has found a plan for closing the site submitted in November 2007 on behalf of UGI Utilities to be inadequate. Presently PADEP staff is assessing monitoring data to determine if they have sufficient wells in sufficient locations to fully determine groundwater impacts in order to determine the scope of abatement necessary under closure.

DEP Response

Ongoing assessment requirements include data review incorporated with site activities and correlation with contaminant source (coal storage and/or ash). An additional assessment well was installed in early 2010. The coal-derived electric generation ended on May 22, 2010, and the coal ash areas will undergo closure. The closure plan will address impacts to surface and groundwater. As discussed above, cessation and associated lack of slurring into the basins has resulted in concentration changes, both decreases and increases, but with site stabilization and closure, we expect to see decreasing trends.

II. Portland Generating Station's Bangor Quarry Ash Disposal Site, RRI Energy, Inc., Northampton County

1. Damage Case Claim

Groundwater concentrations in downgradient wells at this landfill exceed primary and secondary MCLs and groundwater standards for arsenic, aluminum, fluoride, boron, iron, manganese, sulfate, and total dissolved solids (TDS), and the landfills consultant concedes that the landfill is responsible for the degradation.

DEP Response

Portland is required to monitor groundwater quarterly and annually at the impoundment and landfill. Monitoring has been occurring for more than 14 years. There are a total of seven monitoring wells around the disposal area and consist of two upgradient wells (BMW-7 & BMW-4) and five downgradient wells (BMW-3D, BMW-6S, BMW-6D, fill run-off Leachate & BMW-2D). In addition, there are three surface water sampling points (SWMP-A (upgradient), SWMP-B (intermediate) & SWMP-C (downgradient)). Based upon groundwater monitoring data, the facility is functioning as designed and is currently not required to perform groundwater assessment or abatement activities.

Our review of the groundwater data and split sampling data (2003-2009) suggest the groundwater has been impacted for the following listed parameters:

- Manganese exceeds secondary drinking water standards (SDWR), a non-health based standard of 50 µg/L in all monitoring wells including the up-gradient wells.
- Sulfate exceeds secondary drinking water standards (SDWR), a non-health based standard of 250 µg/L in all monitoring wells including the upgradient wells.
- Arsenic has never exceeded EPA established Maximum Contaminant Levels (MCLs) of 10 µg/L.
- Lead and Selenium are found to be well below MCLs.

2. Damage Case Claim

Surface water discharges from the landfill are sending concentrations of boron, cadmium, hexavalent chromium, and selenium into Brushy Meadow Creek that are notably higher than Pennsylvanians Water Quality Criteria Continuous Concentration for Fish and Aquatic Life (CCC). In some instances the exceedances are extreme. For example, boron was measured from Outfall 001 at 86.6 mg/L, more than 54 times the states CCC of 1.600 mg/L. Selenium was measured at 41.3 µg/L from this Outfall, almost nine times the PA CCC of 4.6 µg/L (adjusted for a hardness of 400). These discharges were not authorized by RRIs NPDES permit for this site.

DEP Response

Our review of the surface water data indicates the concentration of the above-listed parameters is already elevated in the upgradient surface water sample that is located above the Bangor Ash Disposal Site facility boundary. Thus, it is incorrect to conclude that the Brushy Meadow Creek is being impacted from the runoff discharge it receives from the Bangor Ash Disposal Site facility. Also, based on our comparison and review of split sampling data (2003-2009) for the sampling points SWMP-A, SWMP-B & SWMP-C the concentrations are quite similar. The higher concentrations for the listed parameters at the upgradient surface water location suggest that the water is impacted upstream and not impacted by discharges at the Bangor Ash site.

3. Damage Case Claim

The ash that has been dumped at this landfill has sometimes been more toxic than regulations allow. Trona test ash was disposed of on-site despite having failed two of nine leachability tests for arsenic.

A letter from RRI to PADEP in 2007 reports that of nine composite samples of trona ash (a test ash) disposed of at this site, two samples exhibited high levels of leachable arsenic in excess of Pennsylvania Class II landfill limits. Specifically, the Class II landfill limit for leachable arsenic is 0.5 mg/L; however leach test results measured arsenic at 1.61 mg/L (more than three times the limit) and 2.02 mg/L (more than four times the limit).

DEP Response

The maximum concentration of a contaminant, based on chemical analysis for its leachate for a Class II Residual Waste landfill is 50 times the waste classification standard for that contaminant (§288.523(a)(1)). For arsenic, the Class II limit would be 2.5 mg/L. None of the trona ash samples exceeded this limit.

4. Damage Case Claim

A GAI Consultants 2006 Annual Evaluation Summary of this site, describing results collected from downgradient monitoring wells during 2006, states: Analytical results for dissolved iron, dissolved manganese, pH (field), pH (lab), sulfate, and total dissolved solids exceed the USEPA [MCLs]. Furthermore, results from GAI Consultants trend analysis of data collected after July 1, 1995, and prior to January 1, 2007, state: "Upward trends for dissolved arsenic, dissolved boron, and dissolved potassium and downward trends for pH (field) and pH (lab) are unique to downgradient monitoring wells and may be the result of actions occurring at Bangor."

DEP Response

The GAI Consultants 2006 report suggests an upward trend for pH and sodium at both upgradient and downgradient wells. However, the report further suggests that

the upward trend is due to seasonal variation and not attributed from the ash disposal at the facility. Our review of the report and the data also derive the same conclusion.

The report also suggests an upward trend for sulfate in the upgradient wells only indicates that the ash disposal facility is not impacting the downgradient wells as these do not show an upward trend. Our review and analysis also derive the same conclusion.

The upward trend for pH, dissolved arsenic, and dissolved boron do indicate an impact in downgradient monitoring wells. However, these concentrations do not exceed the MCLs as stated in the prior comment.

5. Damage Case Claim

Monitoring well BMW-6D exceeded in pH (field and lab) during the last quarter of 2006. These exceedances have occurred before in the years 2001 through 2002. The predicted time for drinking water standard exceedances ranges from 1 year for dissolved arsenic to 1127 years for dissolved barium.

DEP Response

The GAI Consultants 2006 report suggests an upward trend for pH and sodium at both upgradient and downgradient wells. However, the report further suggests that the upward trend is due to seasonal variation and not attributed from the ash disposal at the facility. Our review of the report and the data also derive the same conclusion.

The report also suggests that an upward trend for sulfate in the upgradient wells only indicates that the ash disposal facility is not impacting the downgradient wells as these do not show an upward trend. Our review and analysis derive the same conclusion.

The upward trend for pH, dissolved arsenic, and dissolved boron do indicate an impact in downgradient monitoring wells. However, these concentrations do not exceed the MCLs as stated in the prior comment.

6. Damage Case Claim

The 2005 trend analysis from July 1, 1995, to January 1, 2006, found upward trends in downgradient wells for dissolved arsenic, dissolved boron, chloride, pH (lab), and dissolved potassium.

DEP Response

The GAI Consultants 2006 report suggests an upward trend for pH and sodium at both upgradient and downgradient wells. However, the report further suggests that the upward trend is due to seasonal variation and not attributed to the ash disposal at the facility. Our review of the report and the data derive the same conclusion.

The report also suggests that an upward trend for sulfate in the upgradient wells only indicate that the ash disposal facility is not impacting the downgradient wells as these do not show an upward trend. Our review and analysis derive the same conclusion.

The upward trend for pH, dissolved arsenic, and dissolved boron do indicate an impact in downgradient monitoring wells. However, these concentrations do not exceed the MCLs as stated in prior comment.

7. Damage Case Claim

Unpermitted discharges of boron, cadmium, hexavalent chromium, and selenium into Brushy Meadow Creek from Outfall 001 exceeded the Pennsylvania water quality standard for the protection of aquatic life from pollutant concentrations that are chronically toxic (Criteria Continuous Concentration or CCC) in samples analyzed in October 2006:

- Boron was measured at 8.6 mg/L, more than 54 times the PA CCC of 1.6 mg/L.
- Cadmium was measured at 1 µg/L, exceeding the PA CCC of 0.64 µg/L (adjusted for a hardness of 400).
- Hexavalent chromium was measured at 11 µg/L, exceeding the PA CCC of 10 µg/L.
- Selenium was measured at 41.3 µg/L, almost nine times the PA CCC of 4.6 µg/L (adjusted for a hardness of 400).

Unpermitted discharges of boron, cadmium, and selenium into Brushy Meadow Creek from Outfall 002 also exceeded the PA CCC in samples analyzed in November 2006. Specifically:

- Boron was measured at 1.780 mg/L, exceeding the PA CCC of 1.6 mg/L.
- Cadmium was measured at 1 µg/L, exceeding the PA CCC of 0.64 µg/L (adjusted for a hardness of 400).
- Selenium was measured at 10 µg/L, exceeding the PA CCC of 4.6 µg/L by more than double.

DEP Response

Our review of the surface water data indicates the concentration of the above-listed parameters is already found to be elevated in the upgradient surface water sample that is located above the Bangor Ash Disposal Site facility boundary. Thus, it is incorrect to conclude that the Brushy Meadow Creek is being impacted from the run-off discharge it receives from Bangor Ash Disposal Site. Surface discharges are regulated through a NPDES permit, and Reliant has not been in violation of their permit.

8. Damage Case Claim

Exceedances of PA MCLs in groundwater on-site have occurred in 2001, 2002, 2005, and 2006, with an upward trend detected between 1995 and 2006. Exceedances of PA CCC were documented in unpermitted discharges to surface waters in 2006. No regulatory actions required.

DEP Response

The above-referenced exceedances are for Secondary Drinking Water Regulations (SWDR) that set non-mandatory water quality standards for 15 contaminants. These are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor. These contaminants are not considered to present a risk to human health at the SMCL, and exceedances do not require regulatory action. The exceedances in the surface water are also present in the upgradient surface water sample. Unless demonstrated that the intermediate and downgradient surface water samples show change in parameter concentration that are indicative of impact from the site, no action would be initiated against the facility.

9. Damage Case Claim

Constituents are leaching from the disposal site into groundwater, as well as being discharged off-site into Brushy Meadow Creek through Outfalls 001 and 002.

DEP Response

Refer to comments in items 4, 7, and 8 above. Based upon groundwater and surface water monitoring data, the facility is not leaching constituents from the disposal site and is currently not required to perform groundwater assessment or abatement activities.

10. Damage Case Claim

There are least two public water supply wells approximately ¾-mile away from the site; Hartzell's Auction Inc. serves three families and Meadowbrook Mobile Home Park serves approximately 98 individuals.

DEP Response

There are three, Public Water Supply Wells (PWS) that are less than a mile from the Ash Disposal Facility. However, all 3 wells are upgradient from the Ash Disposal Area and not affected by the ash disposal site.