PC 302

Illinois Pollution Control Board Case No. AS 08-10

Comments on
The Proposed RCRA Delisting of
PDC EAF Dust Stabilized Residue

By
Environmental Stewardship Concepts
On Behalf of

Heart of Illinois Group Sierra Club and
Peoria Families Against Toxic Waste

September 24, 2008

A major problem with Peoria Disposal Company's (PDC) petition to delist treated Electric Arc Furnace (EAF) waste is the lack of information about the processes utilized to treat the material. The designation of this information as proprietary prevents us and the public from making informed decisions about the risks and effectiveness of the process, a necessary component of the public participation process. Without this information we cannot properly evaluate PDC's claims that the final treated product will remain stable indefinitely or that the process itself does not generate unacceptable environmental releases. The technical information that has been provided is not sufficient to be considered a pilot study, and does not provide enough evidence that the process or its products are safe for non-hazardous waste landfills.

The safety of the treatment process itself is also unknown. The treatment reagents, wastes created, and the risks of catastrophic failure of this process are all unknown. Without this information, it is unclear if PDC could even obtain an NPDES permit to create and discharge the wastes associated with this process. It is quite likely that during the curing process a significant amount of off-gassing/ volatilization of compounds with low vapor pressures occurs (see below). What is the composition of these vapors and how does PDC intend on capturing them? Before the treated EAF waste can be delisted, a full accounting of the entire treatment process and its consequences must be evaluated and PDC must demonstrate that their process is viable in all ways, not just in binding the contamination. However, PDC's own data do not support the assertion that this is a viable option to treat EAF waste to Subtitle D Standards, and the risk based concentrations (RBCs) calculated by PDC cannot be considered accurate.

One tremendous data gap in PDC's petition is the long-term stability of the completed product. The only data with which we are provided are the results of the Toxicity

Characteristic Leaching Procedure (TLCP) and Multiple Extraction Procedure (MEP) analyses. Neither of these approaches provide any data about the long-term integrity of the treated waste. TCLP likely underestimates the leaching of metals in field conditions (Ghosh et al. 2004), and MEP does not, as one of PDC's consultants claimed, "simulate the leaching potential over 1,000 years" (Testimony of Laura Curtis, August 25, 2008). A mere ten extractions, no matter how rigorous, cannot possibly simulate 1,000 years of exposure to municipal waste leachate or physical stress on the material. MEP also does not evaluate exposure to various types of acid, only using nitric acid to create low pH conditions. Acetic acid is much more corrosive to materials similar to the treated waste, and has been demonstrated to corrode as much as 5mm of cement made with furnace slag in 60 days (Shi and Stegemann 2000). Stabilized material, such as the PDC treated waste, is well documented to leach over time (Shi and Stegemann 2000, Baur et al. 2001), and conditions within landfill leachate can be highly variable and contain a tremendous array of compounds including different species of the same metals that would not normally coexist under normal conditions (Ponthieu et al. 2007, Jiménez et al. 2002). The complex chemical nature of this leachate can make metals in these materials even more mobile than acetic acid alone (Halim et al. 2004).

PDC has not been able to provide evidence that the long-term stability of its treated waste can be maintained under these conditions, and their own data suggest that it cannot. Since the treatment does not physically remove metal or contamination, degradation of the final product would have roughly the same result as placing untreated waste into the landfill. Without any evidence that the product is stable in the long-term, the public and regulators have to assume that the original contents of the EAF waste will enter any municipal landfill the treated waste is placed in.

Experimental evidence reported by Fuessle and Taylor (2004) demonstrates that stabilized waste from electric arc furnaces does leach toxic metals and that leaching increases after 50 days. Fuessle and Taylor measured cadmium and lead from stabilized arc furnace ash and found that cadmium increases continuously after about 100 days of cure, and that some stabilized lead waste also continues to leach for as long as measured. The authors concluded that insufficient information is available now to adequately determine the long term effectiveness of stabilized wastes in binding contaminants, especially toxic metals.

The procedures used by PDC to evaluate risks from the treated waste are not appropriate. With the exception of the Round 9 sampling, PDC chose the material to be treated and tested, rather than having them selected randomly. This method can lead to significant amounts of bias, and the public and regulatory authorities have no way of knowing if these materials were more or less treatable using PDC's treatment method. Sampling for Round 9 was performed on smaller batches of waste which could have

impacted results, and Rounds 9-11 evaluated a different treatment method than Rounds 1-8 (by increasing curing time and allowing for retreatment). PCD attributes this difference to the inadequacy of the initial Sampling and Analysis Plan (SAP) to evaluate retreatment and longer curing times, but the failure of the initial SAP to address these aspects of the treatment indicates that the process continues to be under development. The sampling was also plagued by QA/QC issues when testing for silver, cyanide, and total sulfide. These problems indicate that the process cannot be considered reliable enough to be implemented on a full production scale.

There are obvious issues with the Delisting Risk Assessment Software (DRAS) used to calculate the RBCs used by PDC. RBCs for tin and phenol are greater than physically possible to encounter in reality. Both of these compounds are known to be toxic. Tin forms endocrine disrupting organotin compounds, while the toxicity of phenols is well known and high enough to warrant a Reference Dose listed in EPA's IRIS database. Combined with the fact that DRAS v.3 was used for some compounds because of known errors in DRAS v.2, these problems provide strong evidence that the RBCs calculated by PDC are not scientifically sound. The DRAS does not use current RfDs or cancer slope factors that can be found in the EPA IRIS database. DRAS v.2 uses outdated toxicological data, and is one of the main drivers behind the development of Version 3, which is not available to the public at this time.

One example of toxicological problems is the failure of DRAS v.2 to adequately address risks from lead. EPA's IEUBK software would most certainly be more accurate than DRAS for evaluating risks from lead. The current screening value for blood lead is 10 ug/dl, but research has shown that there is no threshold for adverse effects for lead and significant impacts to the health and development of children at blood level concentrations less than 5 ug/dl. An EPA Science Advisory Board (SAB) for the Clean Air Scientific Advisory Committee (CASAC) has acknowledged these findings in a recent review of air quality standards, and recommended that National Ambient Air Quality Standards (NAAQS) for lead be based on limiting impacts to less than 5% of the nation's children assuming a loss of 3 IQ points per 1 ug/dL under 7.5 ug/Dl (CASAC 2007). Similar arguments could be made that the risk-based standards for arsenic and dioxin are as outdated as those for lead. Given the controversies surrounding many risk-based standards, the most important test of the suitability of the treated material for landfilling is the standards for Subtitle D landfills leachate.

The Subtitle D Standards are not suggestions and supersede any site specific values calculated by the DRAS software. Initial treatments using the proposed method still exceeded Subtitle D Standards for both cadmium and mercury. The results of PDC's resampling several days later or after re-treatment should not be accepted as they constitute a change in the treatment process. The low vapor pressure of mercury makes

it likely that the lower concentrations that were sampled later were the result of evaporation/volatilization. If this process were implemented on a full production scale, fugitive mercury emissions could pose a risk to both the surrounding communities and workers within the PDC facility. Regardless of these emissions, the material still had to be retreated before it met Subtitle D Standards. PDC has obviously tried to put this result in the best light by noting that their process was able to identify and address a sample that exceeded limits. However, it is unclear how often waste would have to be retreated on a full production scale. These results indicate that the process still has a number of problems and is not ready for full-scale use. It is unclear if these issues can be resolved at all, given what little data have been provided on the process itself. Under these circumstances the only sound option is to deny PDC's application to have the treated EAF waste delisted.

The potential consequences of delisting PDC's hazardous waste are too great to ignore from many perspectives, including the disposal sites. PDC proposes to dispose of the treated waste in two Illinois landfills. Indian Creek Municipal Waste Landfill, Tazewell County, and the Clinton Municipal Waste Landfill, DeWitt County, are both known to overlie the Mahomet Aquifer, a major water resource for thousands of Illinois residents. Should PDC's treated waste leach as anticipated based on lab and experimental results, to the same degree that the TLCP tests indicate, then leachate from this landfill would be particularly dangerous. It contains toxic metals such as lead and mercury as well as persistent organic compounds such as dioxins. Even a small leak, much less a failure of the landfill liner would result in the contamination of a major aquifer with difficult to treat compounds.

Summary

PDC's treatment technology clearly does not meet Federal requirements for placement in a Subtitle D landfill. Treatment of the final product with acid produces unacceptable concentrations of cadmium, mercury, and zinc in leachate. It is quite possible given the sampling issues identified above and the likelihood that the tests performed underestimate the leaching potential of the material; other metals could also be a problem once it has been disposed in a landfill. Both of the two landfills where PDC has proposed to dispose of this waste are over the Mahomet Aquifer, a major water resource for thousands of Illinois residents. This aquifer serves significant populations and it's contamination would be a major environmental catastrophe. These problems should leave the Illinois Pollution Control Board with no option other than to deny PDC's petition to delist its treated EAFDSR.

Biographical Sketch for Peter L. deFur

Dr. Peter L. deFur is president of Environmental Stewardship Concepts, an independent private consulting firm, and is an Affiliate Associate Professor in the Center for Environmental Studies at Virginia Commonwealth University where he conducts research on environmental health and ecological risk assessment. Dr. deFur has served on numerous state and federal advisory committees.

Dr. deFur presently serves as technical advisor to citizen organizations concerning the cleanup of contaminated sites at FUDS, CERCLA and RCRA sites around the country. His projects include the Housatonic River, MA; the Delaware River; Lower Duwamish River, WA; Rayonier site in Port Angeles, WA; and the Spring Valley site in Washington, DC. Many of these sites and others on which he has worked are contaminated with PCB's, dioxins and toxic metals.

Dr. deFur received B.S. and M.A. degrees in Biology from the College of William and Mary, in Virginia, and a Ph.D. in Biology (1980) from the University of Calgary, Alberta. He was a postdoctoral fellow in neurophysiology in the Department of Medicine at the University of Calgary, and an environmental fellow at AAAS in 1989. Dr. deFur held faculty positions at George Mason University and Southeastern Louisiana University before joining the staff of the Environmental Defense Fund (EDF) in Washington, DC. In 1996, deFur formed ESC and accepted a part-time position at VCU.

Dr. deFur has extensive experience in risk assessment and ecological risk assessment regulations, guidance and policy. He served on the NAS/NRC Risk Characterization Committee that prepared Understanding Risk. Dr. deFur served on a number of scientific reviews of EPA ecological and human health risk assessments, including the Framework for Cumulative Risk Assessment, the assessment for the WTI incinerator in Ohio and EPA's Ecological Risk Assessment Guidelines. deFur served on three federal advisory committees for EPA's Endocrine Disruptor Screening and Testing Program.

References

Baur, I., C. Ludwig, and C.A. Johnson. 2001. The Leaching Behavior of Cement Stabilized Air Pollution Control Residues: A Comparison of Field and Laboratory Investigations. Environmental Science and Technology. 35: 2817-2822.

CASAC. 2007. Clean Air Scientific Advisory Committees Review of the 2nd Draft Lead Human Exposure and Health Risk Assessment Document. EPA Office of the Administrator, Science Advisory Board. Washington, D.C. EPA-CASAC-07-007.

Fuessle, R. W. and M. A. Taylor. 2004. Long-Term Solidification/Stabilization and Toxicity Characteristic Leaching Procedure for an Electric Arc Furnace Dust. Journal of Environmental Engineering. 130: 492-498.

Ghosh, A., M. Mukiibi, and W. Ela. 2004. TLCP Underestimates Leaching of Arsenic from Solid Residuals under Landfill Conditions. Environmental Science and Technology. 38: 4677-4682.

Halim, C.E., J.A. Scott, H. Natawardaya, R. Amal, D. Beydoun, and G. Low. 2004. Comparison between Acetic Acid and Landfill Leachates for the Leaching of Pb(II), CD(II), As(V), and Cr(IV) from Cementitious Wastes. Environmental Science and Technology. 38: 3977-3983.

IPCB. 2008. Transcript of April 25 Hearing In the Matter of RCRA Delisting Adjusted Standard Petition of Peoria Disposal Company.

Jiménez, L., R. Alzaga, and J.M. Bayona. 2002. Determination of Organic Contaminants in Landfill Leachates: A Review. International Journal of Analytical Chemistry. 82(7): 415-430.

Ponthieu, M., P. Pinel-Raffaitin, I. Le Hecho, L. Mazaes, D. Amouroux, O.F.X. Donard, and M. Potin-Gautier. 2007. Speciation analysis of arsenic in landfill leachate. Water Research. 41: 3177-3185.

Shi, C. and J.A. Stegemann. 2000. Acid corrosion resistance of different cementing materials. Cement and Concrete Research. 30: 803-808.