

**EPA's Technical Assistance Grant****The Year in Retrospect**

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for

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The process of primary zinc smelting occurred in Palmerton, Pennsylvania between 1898 and 1980. During the more than 80 years of smelter operation, it is estimated that airborne emissions averaged approximately 47 tons of cadmium per year, 95 tons of lead per year, 3,575 tons of zinc per year, and between 1,400 to 3,600 pounds of sulfur dioxide per hour.(3) The sulfur dioxide combined with fog and/or precipitation to form sulfuric acid which contributed to the deforestation of Blue Mountain and Stoney Ridge, as well as sections of Palmerton and Aquashicola. The heavy metals zinc, cadmium, and lead accumulated in the soils to concentrations which are phytotoxic, inhibiting the re-establishment of vegetation in many areas. Heavy metal concentrations in soil on Blue Mountain have been recorded as high as 1,300 ppm cadmium, 6,474 ppm lead, and 32,085 ppm zinc.(3) During more than 70 years of operating the East Smelter facility the New Jersey Zinc Company dumped approximately 33 million tons of residue at the site creating a cinder bank 500 to 1,000 feet wide, 200 feet tall, and 2 1/2 miles in length.(5) Soil erosion from the Blue Mountain and runoff from the cinder bank have contaminated the Aquashicola Creek and Lehigh River. Elevated levels of lead and cadmium were detected in the blood and hair of children from Palmerton. Horses and cattle in the area developed substantiated cases of illness and fatigue from high concentrations of lead and cadmium.(5) Consequently, the U.S. EPA proposed the site for placement on the Superfund National Priorities List (NPL) on December 1, 1982. The U.S. EPA Palmerton Zinc Pile fact sheet identifies the final NPL date as September 1, 1983. Although primary zinc smelting was discontinued in Palmerton in 1980, other metal refining processes, including the refining of Electric Arc Furnace (EAF) dust has continued.

Electric Arc Furnace (EAF) dust is a common waste product of the steelmaking industry. Using a process called High Temperature Metal Recovery, Horsehead Resource Development Company, Inc. accepts zinc-bearing wastes such as EAF dust and industrial sludges and refines the materials into zinc calcine, lead, and cadmium concentrates.(2) Although the process is marketed as recycling and generates several products of commercial value, it also generates revenue by functioning as a disposal facility for wastes which are commonly classified as hazardous. Out of concern that activities at the East Plant were continuing to pollute the environment with contaminant concentrations sufficient to pose a significant health threat, local residents formed the Palmerton Citizens for a Clean Environment on October 1, 1990.

With a sincere interest in improving the overall environmental quality of the Palmerton area, the PCCE also began monitoring activities related to the Palmerton Zinc Pile Superfund site. Before long it became apparent that monitoring the Superfund program required reviewing a greater volume of technically complex material than the PCCE membership could accomplish on its own. Although the cost of securing professional assistance was prohibitively expensive, Technical Assistance Grants of up to \$50,000 were made available from EPA through a provision in the Superfund Amendment and Reauthorization Act of 1986. The PCCE applied for a grant, and with the assistance of EPA officials Tony Koller, Amy Barnett, Fred Warren, and Veronica Kruzinski, were awarded the maximum \$50,000 amount on May 17, 1991.(4)

The next step in the process involved selecting a qualified technical assistant. After performing the appropriate levels of solicitation and review as outlined in the Superfund Technical Assistance Grant (TAG) Handbook, members of PCCE chose the project team of McTish, Kunkel & Associates (MKA). The environmental expertise offered by MKA included the services of a Project Manager, a Geologist/Engineer, a Hazardous Waste Specialist/Environmental Engineer, and three Ph.D. level scientists specializing in Environmental Toxicology, Geology/Sedimentology, and Hydrogeology. By mid-November 1991, all the necessary contracts were completed and signed, and the technical review process was initiated.

The first step in the technical review process involved the development of specific task schedules by members of the PCCE. Because the Administrative Order by Consent had been signed by EPA in September of 1985, a Record of Decision (ROD) had already been issued for OU I, and remedial investigation studies were already in progress for Operable Unit II (OU II) the cinder bank, and Operable Unit III (OU III) contamination of the Palmerton Valley. Consequently, technical assistance funds were not appropriated for the review of OU I documents, and the first task schedule involved the review of documents related to both OU II and OU III.

In general, two primary factors appear to have influenced the development of PCCE task schedules: The release of reports and enforcement documents by EPA, Zinc Corporation of America (ZCA), Horsehead Resources Development Corp. (HRD), Paramount, or any of their subcontractors which relates to OU II or OU III; and the proposition or initiation of any action by anyone, related to OU II or OU III, which has the potential to effect the health and safety of Palmerton area residents. Many documents reviewed by the MKA project team were multifaceted, requiring technical expertise in a broad range of subject areas. Also, task schedules commonly requested the review of more than one document. To accommodate these circumstances, the MKA Project Manager has commonly responded by submitting summary reports which are a synthesis of internal memorandum reports, each prepared by the appropriate experts from the MKA Project Staff. In addition to producing summary reports, the MKA Project Team has assisted the PCCE in preparing information for news releases, assisted in the preparation of articles for the PCCE newsletter, attended community meetings, reviewed the administrative records file at Palmerton Library, reviewed relevant supplementary materials at PCCE membership meetings, developed a functional library of pertinent reference materials, and conducted numerous formal and informal oral presentations.

Many important documents have been released during 1992, including 3 related to Additional Studies for Remedial Action of the Cinder Bank Superfund Site by GAI Consultants, Inc., a Draft Work Plan to assess the Feasibility of Recycling the Cinder Bank by Dames and Moore, the Housedust Sampling Results prepared by Dynamac Corp., the Response Action Plan prepared by REWAI, and the Second Draft Field Trip Report prepared by CDM Federal Programs Corp. Because of the volume of documents released, and the perceived need to review more historic documents, summary reports for one of the aforementioned document remains uncompleted to date.

MKA summary reports completed for the PCCE during the past year include:

1. Review of Soil Samples from 24 Palmerton Residences. (1/9/92) This summary report reviews soil and dust sampling and analysis conducted by CDM Federal Programs Corp. during the summer of 1991. In addition, the analytical interpretation of the sample logs by Dr. Roy Smith, Ph.D. of EPA, in the form of a letter to Mr. Tony Koller et.al (also of EPA), is also reviewed.
2. Palmerton Superfund Operable Unit 2 - the Cinder Bank. (5/14/92) Several reports relevant to OU II were reviewed in preparation for this report including 3 prepared by GAI Consultants, Inc., and the Feasibility Study prepared by Dames and Moore.
3. Heavy Metals Distribution versus Soil Types in the Palmerton Area. (7/31/92) This report reviews statistical data analysis provided by USEPA (1987), and maps provided by R.E. Wright (figures 1-3), and the USDA Soil Conservation District, Carbon County.
4. Review of Palmerton Zinc Off-Site Study Area, Draft of Remedial Investigation and Risk Assessment. (7/31/92) This summary report is a synthesis of memorandum reports prepared by Dr. Rowell, Dr. Bruns, and Dr. Redmond. The material reviewed includes: REWAI project 8498, Volume I, Chapters 1-4; An Executive Summary of the Risk Assessment Heavy Metal Contamination in Palmerton, PA; appendix 4-1 to Phase I - Soil Sampling Protocol; U.S. EPA Statistical Analysis of Second Palmerton Soil Survey dated April 1987; EPA Environmental News dated 10/5/91; U.S. EPA F. Burns letter dated 7/10/91, titled Palmerton Zinc Superfund Site Off-Site Soil Study; and Karam & Beck, 1990, Current Issues in Determining Acceptable Lead Concentrations in Soils; USEPA Superfund Region III updates were also reviewed in preparation of this report.
5. Housedust Sampling Results. (8/10/92) Material reviewed for this report includes: Dynamac Corp's Housedust Sampling Results dated June 4, 1992; NTH Corp's Housedust Data dated June 15, 1992; and a report by Craig Risinger.
6. Review of Palmerton Zinc Off-Site Study Area, Draft of Remedial Investigation and Risk Assessment. (10/8/92) Although this report appears similar to item 4 above, it is actually a review of a different document. This report reviews REWAI project 8498, Volume II, Chapters 5-6; a letter from Fran Burns to John McAleese dated 7/10/91; and a letter from Tony Koller dated 9/8/92.

7. Palmerton Zinc Site, Second Draft Field Trip Report and Environmental Sampling Data Report, Discussion of Issues for Immediate Problem, November 19, 1992. (12/10/92)  
This report reviews the Draft CDM Federal Programs Corps sampling and analysis of 193 Palmerton residences, and 125 Jim Thorpe residences. In addition, an EPA distributed questionnaire titled Environmental Sampling Data Report, Discussion of Issues for Immediate Problem, November 19, 1992, was also addressed.

Typically, summary reports were submitted to the PCCE membership before their general membership meeting, at which time, with a MKA representative in attendance, the contents were open for discussion and questions. It should be noted that PCCE general membership meetings are publicly advertised and open to the general public. Concerned citizens who are not PCCE members have an opportunity to share their concerns, and gain a better understanding of the Palmerton Superfund program.

Occasionally, the subject of discussion or formal presentation, at scheduled PCCE meetings, has generated sufficient interest to attract members of the press. When necessary, a press release was prepared and distributed to the public attendees. If a press release was not prepared, members of the press were given copies of the summary report which formed the basis of discussion. In general, the press has maintained a strong interest in events related to the Palmerton Superfund Site.

As technical assistants to PCCE, the primary objective of the MKA Project Team has been to review and interpret site related documents, and assist the PCCE membership in understanding the overwhelming and complex technical data associated with the Palmerton Superfund program. The technical complexity of the Palmerton site is clearly demonstrated by the history of scientific investigations which have been conducted to evaluate the extent of heavy metal contamination, the potential for human health hazards, and the substantiated need or possible effectiveness of various proposed remediation technologies.

More than the usual compliment of unanticipated anomalies and scientific uncertainties have developed during the remedial investigation and risk assessment process. For example, Jim Thorpe was chosen as a comparison community for the Agency for Toxic Substances and Disease Registry (ATSDR) health study, and the CDM Federal Programs Corp. environmental contamination study. The results of the two studies suggest that body burdens for some contaminants and contaminant levels for some sample media, from the two towns, are too similar to serve as the basis for a suitable comparison. Consequently, an entirely new set of studies will have to be conducted to determine the source of contamination in Jim Thorpe, and the significance of the similar contaminant levels when assessing the potential threat to human health.

One important issue of scientific uncertainty involves the possible significance of zinc for minimizing the adverse health effects from high lead and cadmium concentrations. Although causality has not been clearly established, the results of human blood lead testing suggest that Palmerton area residents do not exhibit body burdens as high as predicted by the U.S. EPA Uptake Biokinetic Model for Lead. Numerous articles have been published on the subject of dietary therapy (with zinc, and in some articles iron and/or vitamin C) to abate the effects of exposure to high concentrations of heavy metals, but the specific pathways have not been identified, and the dose/response relationships have not been adequately quantified.

Many issues need to be considered when addressing remediation for any contaminated site, but remediation of the Palmerton Superfund site seems especially problematic. To begin with, the contaminants are present in the soil, water, and air (as dust) making them available for both inhalation and ingestion exposure pathways. The contaminants are elemental and conservative, and therefore cannot be simply degraded by chemical or biological processes. The site is large and covers a variety of settings including Blue Mountain, the cinder pile, the HRD facility, the Aquashicola Creek and possibly sections of the Lehigh River, and the towns of Aquashicola and Palmerton. Because of the size of the site (the cinder pile alone contains approximately 33 million tons of material) it is simply not feasible to remove the contaminated material and deposit it somewhere else. Also, the contaminants are present in high concentrations both inside (as dust) and outside (as soil) many of the homes and businesses in Palmerton. Consequently, cleanup activities in residential areas are likely to temporarily displace, or at best seriously inconvenience, those residents it is intended to help. Excavation of the cinder pile or soil material adjacent to residential areas is likely to increase the volume of contaminated airborne dust, considered by many experts to be more hazardous to human health than contaminated soil. Finally, because the HRD facility continues to operate, albeit with a different process and under stricter environmental controls, it is difficult to determine what percentage of the airborne contamination is due to historical sources and what percentage is due to current operations.

The revegetation of Blue Mountain (OU I) is an interesting project that appears to be effective, but because it is a novel and innovative technology, leaves many questions unanswered. For example, what short and long term effects will spreading sewage sludge and fly ash (both are commonly classified as hazardous materials) over such a large land area have on surface and groundwater quality? Will the necessary organic constituents of the sludge oxidize with time, causing the soil to become phytotoxic once again? Will it be necessary to periodically apply new sludge? Will it be possible to eventually re-establish trees? What are the potential impacts to other environmental receptors, especially carnivorous species who may be susceptible to the effects of bioaccumulation and biomagnification? And finally, will remediation of OU I interfere with the investigation of surface and groundwater quality scheduled for OU IV.

The remediation of OU II is also fraught with difficulties and uncertainty. For example, because sections of the 2 1/2 mile long, 80 year old cinder pile continue to burn, it is doubtful that the material within the pile has ever been adequately characterized. Because some studies suggest that contaminated windblown dust is originating from the surface of the cinder pile, PADER is recommending establishing vegetative cover similar to OU I as an interim remedial measure. But achieving vegetative cover in some areas will be very difficult, because the cinder pile is very steep in places, and the material which comprises the cinder pile is much less stable than the material on Blue Mountain. If it becomes necessary to regrade portions of the pile, a temporary increase in contaminated airborne dust will likely occur. In addition, many of the same questions and concerns expressed about OU I will also apply.

As stated earlier, the remediation of residential areas in Palmerton and Aquashicola (OU III) is primarily focused on lead and cadmium in soil and interior house dust. Problems related to the inconvenience of removing interior house dust, and the potential hazards of excavating contaminated soil have already been discussed. The potential importance of lead based paint has not been adequately evaluated, and remains a contentious issue. Equally contentious, but not as adequately investigated, is the contribution of current operations to contaminated house dust in the Palmerton area. These issues need to be resolved to assure the community that the expense and inconvenience of remedial activities will be justified by the effective attainment of a long term improvement in environmental quality.

The Technical Assistance Grant (TAG) program was established so that groups of individuals effected by Superfund sites which are on the National Priorities List (NPL) can obtain independent interpretations of site cleanup reports and studies. This program is especially important for communities adjacent to the Palmerton Superfund Site because the political situation has eroded public confidence in the scientific objectivity of the results and conclusions reached by some studies. The level of public cynicism is not unjustified, however, because experts representing different interests have reached very different conclusions by conducting very similar studies. The situation is further complicated by the dichotomy of opinion regarding the industry (identified as, or in economic partnership with, the Potentially Responsible Parties) which has provided the primary source of economic sustenance to the community while causing obvious environmental degradation for over 80 years.

The situation in Palmerton can best be described as controversial. The Superfund designation is considered by many business interests, both commercial and industrial, to be detrimental to the image of the community. In spite of efforts by the EPA to remediate contamination on Blue Mountain (OU I), the cinder pile (OU II), and off-site areas including portions of Palmerton and Aquashicola (OU III), the official position of the Palmerton Chamber of Commerce (as stated by a paid advertisement which was published in the May 8, 1992 Times News) is that only the cinder bank is a Superfund Site. Similarly, in spite of visible evidence of extensive environmental damage from more than 80 years of smelter operations, both ZCA and Paramount have expressed objections to EPA's determination that "...both companies are potentially responsible for response or removal action or costs at Palmerton".(1)

The Palmerton Superfund Site is and will continue to remain controversial. At times it appears as though everybody is conducting their own study for the sole purpose of expressing their respective interests. The situation is especially confusing to concerned citizens of the community who lack the technical training necessary to glean factual information from what appears to be contradictory conclusions. Ten years of Superfund status is sufficient time to conclude that there will be no easy answers, but with the technical assistance provided by the MKA project team, the efforts of the PCCE have made a positive impact upon the community. By helping the PCCE membership and other concerned citizens in the community maintain a positive, objective, and results oriented approach to environmental concerns related to the Palmerton Superfund Site, the Technical Assistance Grant program has been a success.

References:

- (1) Allen, James F., and Karen Flynn. October 25, 1992. Letter to Cynthia Nadolski, USEPA Region III
- (2) Horsehead Resource Development Company, Inc. September 1992. HRD Metals Recovery Services, Eliminating Wastes and Landfill Liability Through Recycling Technology.
- (3) Oyler, John A. 1988. Remediation of Metals - Contaminated Site Near a Zinc Smelter Using Sludge/Fly Ash Amendments: Herbaceous Species. Reprinted from Trace Substances in Environmental Health - XXII, A symposium, D.D. Hemphill, Ed.
- (4) Palmerton Citizens for a Clean Environment. July 1991. Clean Up Times, Vol. 1, Issue 2.
- (5) USEPA. March 1990. Palmerton Zinc Pile. NPL Hazardous Waste Sites Fact Sheet.