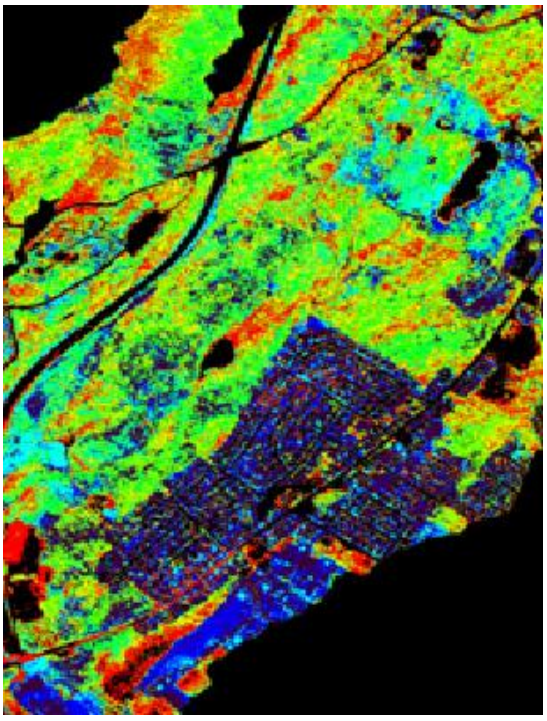
U.S. ENVIRONMENTAL PROTECTION AGENCY

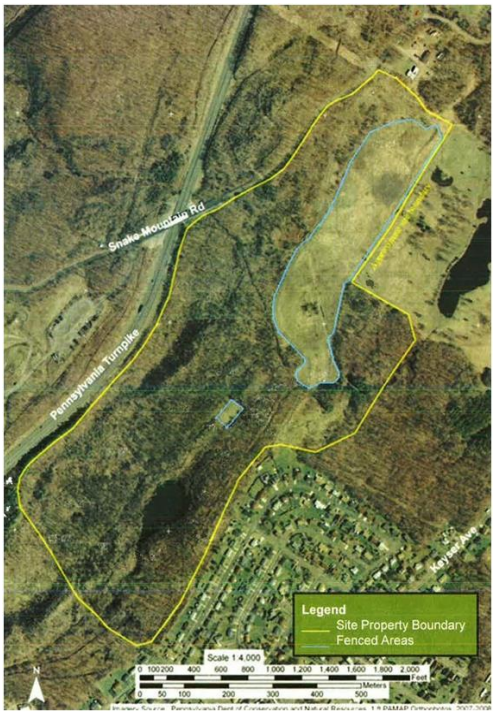
OFFICE OF INSPECTOR GENERAL

Cleaning Up Communities

No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites

Report No. 15-P-0013 **November 10, 2014**





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Abbreviations

ARCHER	Airborne Real-time Cueing Hyperspectral Enhanced Reconnaissance
ATV	All-terrain vehicle
EPA	U.S. Environmental Protection Agency
HSI	Hyperspectral imaging
OIG	Office of Inspector General
USGS	U.S. Geological Survey
XRF	X-ray fluorescence

Cover photo: Left: Hyperspectral image of vegetation stress at the Taylor Borough Dump site, Taylor, Pennsylvania. (USGS-created image from ARCHER hyperspectral data)

Right: Aerial photo of the Taylor Borough Dump site. (Fifth Five-Year Review Report for the Taylor Borough Dump Superfund Site, June 2013)

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U.S. Environmental Protection Agency
Office of Inspector General

15-P-0013
November 10, 2014

At a Glance

No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites

Why We Did This Review

We conducted this review to assess whether hyperspectral imaging (HSI) data can be used to assess stress in vegetation as an indication of pollutant concentrations at deleted Superfund sites. This work was part of an effort by the U.S. Environmental Protection Agency (EPA) Office of Inspector General (OIG) to assess the feasibility of the OIG using remote sensing technologies to assess the effectiveness of EPA cleanup actions. We reported on this separately in September 2014.

We collected and analyzed HSI data and soil sample results, and conducted site visits at deleted Superfund sites in three states located in EPA Region 3. Deletion of sites from the National Priorities List may occur once all response actions are complete and all cleanup goals have been achieved. In August 2011, we reported on our observations regarding five sites in Maryland and Virginia. This report presents our observations for 11 sites in Pennsylvania and results of an OIG review of actions the EPA took in response to our 2011 report.

This report addresses the following EPA goal or cross-agency strategy:

- *Working to make a visible difference in communities.*

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The full report is at: www.epa.gov/oig/reports/2014/20141110-15-P-0013.pdf

What We Found

Generally, pollutant levels were within acceptable levels, but continued security breaches at some sites could impair the effectiveness of the remedy to protect human health and the environment and could expose trespassers to safety or health risks.

HSI indicated vegetation stress at three Pennsylvania sites, but the results of soil testing at these sites did not always confirm that the stress was due to elevated metals. We did not identify any significant residual soil contamination at the 11 Pennsylvania sites reviewed. However, lead exceeded the EPA risk-based screening level for industrial land use in one sample collected at the Taylor Borough Dump site, Taylor, Pennsylvania. In addition, on-site observations found significant amounts of debris, metal equipment, and other discarded material at two sites—the Taylor Borough Dump and the Hranica Landfill, Buffalo Township, Pennsylvania.

When we visited the sites, we noted operations and maintenance concerns at the Taylor Borough Dump site and the Lackawanna Refuse site, Old Forge, Pennsylvania. Operations and maintenance procedures are designed to ensure a Superfund remedy remains protective of human health and the environment when hazardous materials are left on-site. At the Taylor site, the fence surrounding the remediated areas was damaged and the site showed evidence of trespassing and vandalism. The un-remediated portions of the site contained considerable amounts of trash and debris from the prior landfill operations and showed indications of all-terrain vehicle (ATV) use. This site also showed signs of continued dumping of new trash. Since our visit to the site, the EPA completed a 5-year review of the Taylor Borough Dump. That review noted that the damaged fences had been repaired. At the Lackawanna site, the fence was damaged and portions of it had been removed. The site showed evidence of ATV use and vandalism.

Region 3's actions were sufficient to address the intent of recommendations from our 2011 report.

Recommendations and Planned Agency Corrective Actions

We recommend that Region 3 establish procedures for ensuring that corrective actions have been completed before attesting to its completion in the EPA's tracking system, place the results of our reviews for the 11 deleted Superfund sites in their respective case files, and verify whether repairs were made to the damaged fence at the Lackawanna site. Region 3 has taken action to address our recommendations. All recommendations are resolved and closed.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

November 10, 2014

MEMORANDUM

SUBJECT: No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites
Report No. 15-P-0013

FROM: Arthur A. Elkins Jr.

TO: Shawn M. Garvin, Regional Administrator
Region 3

This is our report on the subject evaluation conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

EPA Region 3 offices having primary responsibility over the issues discussed in this report are the Office of Superfund Site Remediation within the Hazardous Site Cleanup Division, and the Grants and Audit Management Branch within the Office of Policy and Management.

Action Required

All recommendations are resolved and closed. Therefore no further response is needed on the final report. Should you choose to provide a response to this final report, your response will be posted on the OIG's public website, along with our memorandum commenting on your response. Your response should be provided as an Adobe PDF file that complies with the accessibility requirements of Section 508 of the Rehabilitation Act of 1973, as amended.

We will post this report to our website at http://www.epa.gov/oig.

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Appendices

Purpose

This work was initiated to determine whether hyperspectral imaging (HSI) data can be used to assess stress in vegetation as a potential indication of pollutant concentrations at deleted Superfund sites. Efforts to address this objective by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA) were reported in September 2014.[1]

Background

On September 25, 2007, the OIG issued a report, *Limited Investigation Led to Missed Contamination at Ringwood Superfund Site*, which documented problems of insufficient characterization of contamination and cleanup at the Ringwood, New Jersey, Superfund site. One of the key findings of the report was that hazardous waste was missed during the initial site investigation, and could have been detected earlier if the EPA had made greater use of available aerial photographs. Based on the results of the 2007 Ringwood report, the OIG decided to evaluate whether HSI could be an effective tool for the OIG in our oversight of the effectiveness of the EPA's cleanup actions.

HSI is a type of remote sensing[2] that collects and processes information from across the electromagnetic spectrum. HSI, or imaging spectroscopy, combines the power of digital imaging and spectroscopy. For each pixel in an image, a hyperspectral camera acquires the light intensity (radiance) for a large number (typically, from a few tens to several hundreds) of contiguous spectral bands. By comparison, the human eye processes light in three spectral bands. Every pixel in the image thus contains a continuous spectrum (in radiance) and can be used to characterize the objects in the scene with great precision and detail.

Researchers have used HSI to detect and map a wide variety of materials. For example, geologists have used HSI to detect soil properties including moisture, organic content and salinity. Vegetation scientists have used HSI to identify vegetation species, study plant canopy chemistry and detect vegetation stress. Vegetation stress can be from natural causes such as drought, but can also be indicative of other stressors. In most cases, soil or groundwater contaminants—such as hydrocarbons, heavy metals and organic chemicals—will have negative effects on the metabolism and growth of typical cover vegetation, such as trees or grasses.

[1] *Hyperspectral Imaging Can Be a Useful Evaluation Tool for Office of Inspector General Reviews Focused on Contaminated Land* (Report No. 14-N-0360, September 26, 2014), http://www.epa.gov/oig/reports/2014/20140926-14-N-0360.pdf

[2] Remote sensing is the science of obtaining information about objects or areas from a distance.

Responsible Offices

EPA Region 3 offices having primary responsibility over the issues discussed in this report are the Office of Superfund Site Remediation within the Hazardous Site Cleanup Division, and the Grants and Audit Management Branch within the Office of Policy and Management.

Scope and Methodology

The OIG entered into an interagency agreement with the U.S. Geological Survey (USGS), Eastern Geographic Science Center, to test hyperspectral remote sensing technologies for the detection of fugitive and residual contamination at deleted Superfund sites. To obtain HSI data for this assignment, the USGS entered into an interagency agreement with the U.S. Air Force Civil Air Patrol to collect HSI for the deleted National Priorities List sites in Pennsylvania using the Air Patrol's Airborne Real-time Cueing Hyperspectral Enhanced Reconnaissance (ARCHER) system. The ARCHER system provides:

- **Spectral signature matching**—by comparing reflected electromagnetic radiation against a library of spectral signatures to identify specifically targeted objects.
- **Anomaly detection**—by comparing reflected electromagnetic radiation against a continuously calculated background spectrum. Spectral anomalies are flagged as potential targets for further evaluation.
- **Change detection**—by conducting a pixel-by-pixel comparison of ground conditions between current and past images.

The USGS processed and analyzed the HSI data to identify vegetation stress and site anomalies. After analyzing the ARCHER data, USGS and OIG representatives visited the 11 sites (see Table 1) to collect soil and sediment samples. USGS analyzed the samples for hydrocarbons and organic signatures using an Analytical Spectral Devices full range spectrometer, and analyzed the samples for metals using x-ray fluorescence (XRF) technology. USGS sent 16 soil samples to a commercial laboratory for confirmatory analysis of metals by the inductively coupled plasma – atomic emission spectrometry method. Appendix 1 presents the confirmatory results for the 16 soil samples. The USGS used and followed the Quality Assurance Project Plan[3] that was developed during the first phase of the work.

We conducted our review from March 2012 to July 2014. Site visits were conducted from April to September in 2012 (see Table 1).

[3] Research Implementation and Quality Assurance Project Plan: An Evaluation of Hyperspectral Remote Sensing Technologies for the Detection of Fugitive Contamination at Selected Superfund Hazardous Waste Sites (USGS Open-File Report # 2009-1048).

Table 1: Deleted National Priorities List sites in Pennsylvania reviewed by OIG[4]

Site name	Site ID	Location	Date of on-site visit and collection of soil samples
Aladdin Plating	PAD075993378	Clarks Summit	April 30, 2012
Berkley Products Co. Dump	PAD980538649	Denver	September 17, 2012
Berks Landfill	PAD000651810	Sinking Springs	September 17, 2012
Brodhead Creek	PAD980691760	Stroudsburg	August 31, 2012
Bruin Lagoon	PAD980712855	Bruin	April 19, 2012
Hranica Landfill	PAD980508618	Buffalo Township	April 18, 2012
Lackawanna Refuse	PAD980508667	Old Forge	May 2, 2012
McAdoo Associates	PAD980712616	McAdoo	September 18, 2012
Publicker Industries	PAD981939200	Philadelphia	September 19, 2012
Taylor Borough Dump	PAD980693907	Taylor	May 1 and 2, 2012
Wade (ABM)	PAD980539407	Chester City	September 19, 2012

Source: OIG and USGS.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Prior to conducting work at the Pennsylvania sites, we conducted similar work at five sites in Maryland and Virginia. We issued an early warning report, *Observed Conditions at Five Deleted Superfund Sites*, Report No. 11-P-0433, August 3, 2011, presenting our observations for those five sites. The agency conducted corrective actions in response to the 2011 report. This report presents our observations at the 11 sites in Pennsylvania and the results of our review of Region 3's corrective actions in response to our 2011 report.

Prior Report and Follow-Up

In our 2011 early warning report, we recommended that EPA Region 3's Office of Superfund Site Remediation add information from the report to the appropriate site-specific case files and assess whether any additional action was warranted for two of the deleted sites we visited. Region 3 agreed with our recommendations and stated that it would add the information provided by the OIG to the Matthews

[4] We collected HSI data for an additional four Pennsylvania sites. We did not visit these four sites because we were unable to obtain timely site access at three sites (Hebelka Auto Salvage Yard, Lansdowne Radiation Site, and Metropolitan Mirror & Glass) and, for the fourth site, the remote sensing equipment failed during the flyover of the site (Voortman Farm). As a result, these four sites are not discussed further in this report. Additionally, we conducted site visits at the two operable units of the McAdoo Associates site (the McAdoo-Blaine and McAdoo-Kline units). These two operable units, shown as separate sites in USGS' report, are parts of the same facility and reported as one site in this report.

Electroplating and Middletown Road case files, and also determine whether additional work was warranted at these sites.

Results of Follow-Up to Assess Completion of Prior Report Recommendations

We conducted a follow-up review to assess Region 3's corrective actions taken in response to our prior report's two recommendations. EPA Manual 2750 establishes agency policies and procedures, and assigns agency responsibilities, for audit management and follow-up within the EPA. Manual 2750 identifies requirements for the timely, efficient and effective resolution of OIG audit findings and recommendations. Audit Follow-Up Coordinators located in every EPA national program and regional office are responsible for coordinating audit management activities within their organizations, maintaining records, and entering data on audit follow-up activities in the EPA's Management Audit Tracking System.

Our 2011 final report was added to the appropriate case files during our follow-on review in July 2013. Therefore, the corrective action for Recommendation 1 is complete. However, Region 3 certified in the agency's Management Audit Tracking System that this action was completed in June 2011. The OIG will address this record keeping and documentation matter during the upcoming review of EPA Manual 2750.

The Remedial Project Managers and a Region 3 Toxicologist reviewed the information in our 2011 report, as well as additional data provided by the OIG. The Remedial Project Managers and the Toxicologist determined that no further action was needed at either the Middletown Road Dump or Matthews Electroplating sites. Given that the OIG relied upon the expertise of Region 3 personnel, we consider the corrective action for Recommendation 2 to be complete.

Results of OIG Confirmatory Sampling for XRF Samples Taken in Maryland and Virginia

Our early warning report included the results of soil samples analyzed by XRF technology. XRF is considered a screening method and is not an EPA-approved analytical method for making Superfund site characterizations or determinations. After issuing our early warning report, USGS conducted confirmatory laboratory analyses for metals on 10 soil samples using USGS method ICP40. USGS Method ICP40 employs inductively coupled plasma – atomic emission spectrometry analysis. We computed the correlation coefficient for these two sets of samples to assess the comparability of the XRF screening results to the ICP40 method. A moderate to strong positive correlation was observed between the XRF and the confirmatory results for arsenic (0.91), strontium (0.77), and manganese

(0.76). A moderate negative correlation was observed for total chromium (-0.66).[5] Also, during our Pennsylvania work, we discovered that an instrument calibration error caused the XRF unit to produce elevated antimony readings. This likely explains the high antimony readings indicated by the XRF unit for the Maryland and Virginia sites.

Hyperspectral Imaging and Soil Testing Results and Observations

HSI data showed little indication of vegetation stress or anomalies at eight of the 11 sites in Pennsylvania we visited. On-site observations showed these sites to be generally free of substantial residual debris that would be detected by the ARCHER anomaly detection routine. Further, soil sample results indicated that these sites contained low levels of metal concentrations that were below the appropriate EPA risk-based screening levels.

HSI analysis detected vegetation stress and/or anomalies at the Taylor Borough Dump, Hranica Landfill and Bruin Lagoon sites. On-site observations found substantial amounts of debris, metal equipment and other discarded material at the Taylor Borough Dump and Hranica Landfill. The following images provide an example of the correlation between HSI-detected anomalies and debris at the Taylor Borough Dump.

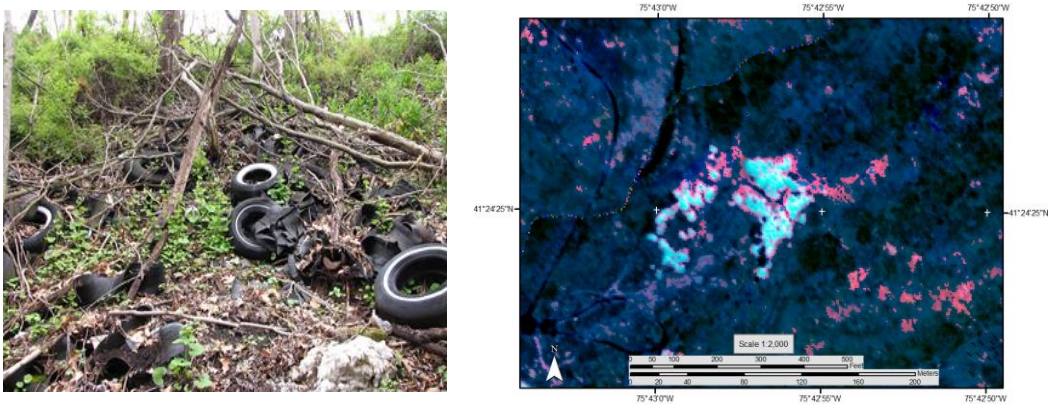

Photo at left is of debris at the Taylor Borough Dump. These areas of debris correlated to the anomalies identified by the light blue-colored areas on the HSI image on the right. (Photo and image from USGS)

HSI imaging indicated vegetation stress and anomalies at the Bruin Lagoon site. The reasons for the hyperspectral anomalies at the site were not revealed during on-site observations. Sampling results from these areas indicated low residual amounts of metals, which would not be expected to cause the anomalies. A

[5] The numbers in parentheses represent the correlation coefficient between the two analytical methods. The correlation coefficient measures the strength of the linear relationship between two values. A value of +1 indicates a perfect positive linear relationship: as one value increases the other value increases in an exact linear rule. Conversely, a value of –1 indicates a perfect negative linear relationship: as one value increases the other values decrease in an exact linear rule.

hyperspectral re-flight was done for the site after soil samples were collected and analyzed, which revealed only slight anomalies that were less visible than those in the previous HSI analysis. Staff from the Pennsylvania Department of Environmental Protection visited this site and found the conditions to be normal. USGS analysis was not conclusive in identifying reasons for the HSI vegetation stress and anomalies.

We did not identify any significant residual contamination at the 11 Pennsylvania sites where soil samples were collected. However, both the XRF and confirmatory laboratory results indicated that one soil sample taken from the Taylor Borough Dump site exceeded the EPA risk-based screening level for lead at industrial sites.

Site Operations and Maintenance Observations

We observed operations and maintenance concerns at two sites—the Taylor Borough Dump and the Lackawanna Refuse site. The EPA's guidance states, "Adequately addressing operation and maintenance issues throughout the life of a Superfund remedy is critical to the successful implementation of the Superfund program."[6] Operations and maintenance procedures are designed to ensure a Superfund remedy remains protective of human health and the environment.

Protective rock mound installed around a damaged gas vent (see arrow) at the Lackawanna Refuse site. (USGS Photo.)

The EPA turned over the operation and maintenance of the Taylor Borough Dump site to the city of Scranton in 2011. The site comprises approximately 125 acres. About 20 acres were addressed during the remediation, which included removal of drums and contaminated soil, and the placement of a ground cover over the remediated areas. At the time of our visit in May 2012, the fences surrounding the remediated areas were damaged and the site showed evidence of trespassing and vandalism. The larger unfenced portions of the site contained considerable amounts of trash and debris from prior landfill operations and showed indications of all-terrain vehicle (ATV) use. These areas also showed signs of continued dumping of new trash. The EPA completed a 5-year review of the Taylor Borough Dump site in June 2013, after our visit. The review noted that the damaged fences had been repaired.

At the Lackawanna Refuse site, the site owner is responsible for operations and maintenance with oversight from the Pennsylvania Department of Environmental

[6] *Operation and Maintenance in the Superfund Program*, OSWER 9200.1-37FS, EPA 540-F-01-004; May 2001.

Protection. The fence surrounding the site was damaged and portions of it had been removed. The site showed evidence of ATV use and vandalism, which has been a recurring problem as noted in the 2009 5-year review. For example, the tops of the plastic off-gas vents appeared to have been shot off. Consequently, the Pennsylvania Department of Environmental Protection had built mounds of rock around the base of the vents to protect them from further damage. This remedy appeared to be successful in protecting the remaining undamaged portions of the vents. Table 2 summarizes the results of our work for the 11 Pennsylvania sites we visited.

Table 2: Summary of site review for Pennsylvania deleted Superfund sites

Site name	HSI anomalies	Vegetation stress	Elevated soil sample results	O&M concerns*	Comments
Aladdin Plating	No	No	No	No	
Berkley Products Co. Dump	No	No	No	No	
Berks Landfill	No	No	No	No	
Brodhead Creek	No	No	No	No	
Bruin Lagoon	Yes	Yes	No	No	HSI indicated vegetation stress and anomalies, but unable to confirm with soil samples or on-site observations.
Hranica Landfill	No	Yes	No	Yes	Significant amounts of debris
Lackawanna Refuse	No	No	No	Yes	Damaged fence, evidence of ATV use and vandalism.
McAdoo Associates	No	No	No	No	
Publicker Industries	No	No	No	No	
Taylor Borough Dump	Yes	Yes	Yes	Yes	Significant amounts of debris at the site. Debris corresponded to anomalies detected by HSI. One soil sample exceeded the lead industrial risk-based screening level.
Wade (ABM)	No	No	No	No	

Source: OIG and USGS.

* O&M: Operations and maintenance

Conclusions

Region 3 has taken the corrective actions it agreed to take to address the recommendations in our 2011 report on five deleted sites in Maryland and Virginia. However, Region 3 did not have documentation supporting that all of the actions were completed prior to their certification in the agency's Management Audit Tracking System.

Although HSI indicated vegetation stress at three Pennsylvania sites, the results of soil testing at these sites did not always confirm that the stress was due to elevated metals. We found only one soil sample that exceeded an appropriate EPA risk-based screening level. We have not made any conclusions regarding the adequacy or effectiveness of these prior remedial actions. However, security at some sites was breached and could potentially impair the continued effectiveness of the remedial actions if not addressed.

Recommendations

We recommend that the Regional Administrator, Region 3:

1. Establish procedures for ensuring that corrective actions have been completed in accordance with EPA Manual 2750 before the Audit Follow-Up Coordinator attests to this information in the EPA's Management Audit Tracking System.

2. Document the results of our reviews for the 16 sites in their respective case files so that they can be considered for future reference and during any subsequent 5-year reviews.

3. Verify whether repairs were made to the damaged fence at the Lackawanna site.

Agency Comments and OIG Evaluation

We received comments from the Director of the Region 3 Hazardous Sites Cleanup Division. The region's full response is in Appendix C.

Region 3 agreed with Recommendations 2 and 3, and provided corrective actions taken which meet the intent of the recommendations. Recommendations 2 and 3 are therefore considered resolved and closed.

In its response to Recommendation 1, Region 3 stated that our early warning report was placed in the two site files—Middletown Road Dump and Matthews Electroplating—prior to the region's certification that all actions in response to the report were completed. Thus, Region 3 did not believe additional procedures were needed to address its audit follow-up and certification process in the agency's Management Audit Tracking System. Based on the region's response, we are closing Recommendation 1 because actions were completed. However, because the region did not maintain documentation enabling us to verify that this corrective action occurred prior to the region's certification, the OIG will address this matter in our upcoming review of EPA Manual 2750.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in $000s)	
Rec. No.	Page No.	Subject	Status[1]	Action Official	Planned Completion Date	Claimed Amount	Agreed-To Amount
1	8	Establish procedures for ensuring that corrective actions have been completed in accordance with EPA Manual 2750 before the Audit Follow-Up Coordinator attests to this information in the EPA's Management Audit Tracking System.	C	Regional Administrator, Region 3	7/16/13		
2	8	Document the results of our reviews for the 16 sites in their respective case files so that they can be considered for future reference and during any subsequent 5-year reviews.	C	Regional Administrator, Region 3	8/19/14		
3	8	Verify whether repairs were made to the damaged fence at the Lackawanna site.	C	Regional Administrator, Region 3	7/25/14 [2]		

[1] O = Recommendation is open with agreed-to corrective actions pending.
C = Recommendation is closed with all agreed-to actions completed.
U = Recommendation is unresolved with resolution efforts in progress.

[2] As noted in the Region 3 response to our draft report, fence repair is a recurring issue and presents an ongoing maintenance requirement.

Appendix A

Soil Testing Results[7] for Pennsylvania Sites

Sample No.	AP-6	AP-26	BC-15	BL-1	BL-3	BP-6	HR-9	HR-15
Latitude	41.49103	41.49156	40.98897	41.05103	41.05122	40.25558	40.67686	40.67761
Longitude	-75.66522	-75.66281	-75.18692	-79.72506	-79.72547	-76.15286	-79.74775	-79.74789
Units	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)
Antimony	6.59	< 4.51	< 4.52	< 4.52	< 4.30	< 4.39	< 4.61	< 4.37
Arsenic	20.7	6.33	< 5.42	< 5.42	< 5.16	9.52	< 5.54	< 5.25
Barium	70.7	95.7	216	42.2	85.5	50.2	112	58.3
Beryllium	< 1.12	< 1.08	< 1.08	< 1.08	< 1.03	< 1.05	< 1.11	< 1.05
Cadmium	2.69	3.61	6.18	3.57	3.42	3.46	5.99	4.58
Chromium	11.1	13.6	33.9	525	11.1	18.1	21.3	32.2
Cobalt	7.85	10.2	7.14	25.5	8.05	7.56	9.21	7.84
Copper	27.6	13.6	399	99.4	15.6	< 8.79	27.2	26.4
Lead	30.5	19.6	379	36.3	31.1	25.4	127	92.3
Mercury	<8.83	<8.57	<8.59	<8.59	<8.17	< 8.35	< 8.76	< 8.31
Molybdenum	8.63	<4.51	<4.52	10.7	<4.3	< 4.39	< 4.61	< 4.37
Nickel	14.7	21.6	25.6	318	13.6	9.59	16.7	45.6
Selenium	<3.25	<3.16	<3.16	<3.16	<3.01	< 3.08	< 3.23	< 3.06
Silver	<9.3	<9.02	15.4	<9.04	<8.6	< 8.79	< 9.23	< 8.75
Thallium	<2.88	<2.80	<2.80	<2.80	<2.67	< 2.72	< 2.86	< 2.71
Vanadium	5.4	4.16	6.37	37.8	6.97	20.1	2.93	5.28
Zinc	54.4	67.9	592	91.4	66.2	50.1	179	140

AP-6 = Aladdin Plating sample #6
AP-26 = Aladdin Plating sample #26
BC-15 = Brodhead Creek sample #15
BL-1 = Bruin Lagoon sample #1
BL-3 = Bruin Lagoon sample #3
BP-6 = Berkley Products sample #6
HR=9 = Hranica sample #9
HR-15 = Hranica sample # 15

[7] These soil samples were analyzed by a commercial laboratory using EPA methods 3050 and 6010.

Sample No.	LR-4	MK-1	MB-4	TB-5	TB-12	TB-22	W-1	W-2
Latitude	41.3745	40.87775	40.90361	41.40722	41.40458	41.41008	39.83308	39.83283
Longitude	-75.75678	-76.00275	-75.99847	-75.71828	-75.72372	-75.71725	-75.37597	-75.36714
Units	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)
Antimony	< 4.40	< 4.74	< 4.33	< 4.63	< 4.62	< 4.52	< 4.54	<4.74
Arsenic	< 5.28	< 5.69	< 5.20	< 5.55	< 5.54	< 5.42	< 5.45	<5.69
Barium	30.2	40.2	73.3	584	27.3	259	163	185
Beryllium	< 1.06	< 1.14	< 1.04	< 1.11	< 1.11	< 1.08	< 1.09	<1.14
Cadmium	1.55	< 1.61	2.62	7.91	2.30	7.60	3.84	4.1
Chromium	7.14	7.78	11.8	11.2	5.15	65.7	35.2	38.6
Cobalt	5.20	3.49	6.17	7.71	5.22	10.5	13.5	13.7
Copper	< 8.80	32.3	12.0	51.7	< 9.23	107	54.7	42
Lead	8.94	21.3	45.1	318	14.7	1,580	46.4	60.2
Mercury	< 8.36	< 9.01	< 8.23	< 8.79	< 8.77	< 8.58	< 8.63	<9.00
Molybdenum	< 4.40	< 4.74	< 4.33	< 4.63	< 4.62	< 4.52	< 4.54	<4.74
Nickel	9.94	5.97	11.6	23.6	10.5	107	22.4	20.1
Selenium	< 3.08	< 3.32	< 3.03	< 3.24	< 3.23	< 3.16	< 3.18	<3.32
Silver	< 8.80	< 9.49	< 8.66	< 9.25	< 9.23	< 9.04	< 9.08	<9.48
Thallium	< 2.73	< 2.94	< 2.68	< 2.87	< 2.86	< 2.80	< 2.82	<2.94
Vanadium	1.38	9.91	8.17	< 0.925	< 0.923	2.22	35.2	39.9
Zinc	26.9	47.4	74.0	557	40.2	505	91.6	125

LR-4 = Lackawanna Refuse sample # 4
MK-1 = McAdoo Assoc. Kline operable unit sample # 1
MB-4 = McAdoo Assoc. Blaine operable unit sample # 4
TB-5 = Taylor Borough sample # 5
TB-12 = Taylor Borough sample # 12
TB-22 = Taylor Borough sample #22
W-1 = Wade sample #1
W-2 = Wade sample #2

Appendix B

Soil Testing Results for Maryland and Virginia Sites[8]

Sample No.	DC-5	MR-2	MR-8	MR-13	MR-17
Latitude	37.26028	39.029611	39.029944	39.029667	39.029778
Longitude	-80.1921	-76.46192	-76.46169	-76.46153	-76.46114
Units	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)
Arsenic (As)	20	< 10	< 10	10	10
Barium (Ba)	442	240	155	288	225
Chromium (Cr)	19	17	23	32	32
Cobalt (Co)	18	4	4	7	6
Copper (Cu)	22	16	12	14	11
Lead (Pb)	23	16	19	31	31
Manganese (Mn)	267	160	172	268	253
Molybdenum (Mo)	< 2	< 2	< 2	< 2	< 2
Nickel (Ni)	19	19	20	15	12
Strontium (Sr)	82	113	62	58	37
Uranium (U)	< 100	< 100	< 100	< 100	< 100
Vanadium (V)	49	38	75	94	101
Zinc (Zn)	101	56	62	63	60

DC-5 = Dixie Caverns Landfill sample # 5
MR-2 = Middletown Road sample # 2
MR-8 = Middletown Road sample # 8
MR-13 = Middletown Road sample # 13
MR-17 = Middletown Road sample # 17

[8] We previously reported the results of XRF screening analysis for these sites in OIG Report No. 11-P-0433, *Early Warning Report: Observed Conditions at Five Deleted Superfund Sites*, issued August 3, 2011. This table presents the results of confirmatory analysis conducted by USGS' Crustal Geophysics and Geochemistry Science Center using the USGS method ICP40. These results were not available at the time we issued our prior report.

Sample No.	MA-1	MA-4	MA-8	MA-11	MA-14
Latitude	39.16131	39.16194	39.16203	39.16164	39.16180
Longitude	-76.6981	-76.6975	-76.6982	-76.6988	-76.7002
Units	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)	mg/kg (ppm)
Arsenic (As)	< 10	< 10	20	30	40
Barium (Ba)	171	96	173	109	146
Chromium (Cr)	5	29	26	13	13
Cobalt (Co)	3	2	7	4	5
Copper (Cu)	17	30	30	22	38
Lead (Pb)	22	26	22	23	41
Manganese (Mn)	137	83	245	109	164
Molybdenum (Mo)	< 2	< 2	< 2	< 2	< 2
Nickel (Ni)	15	12	20	51	30
Strontium (Sr)	30	19	33	51	76
Uranium (U)	< 100	< 100	< 100	< 100	< 100
Vanadium (V)	33	33	47	22	49
Zinc (Zn)	49	74	362	56	101

MA-1 = Mid-Atlantic Wood Preservers sample # 1
MA-4 = Mid-Atlantic Wood Preservers sample # 4
MA-8 = Mid-Atlantic Wood Preservers sample # 8
MA-11 = Mid-Atlantic Wood Preservers sample # 11
MA-14 = Mid-Atlantic Wood Preservers sample # 14

Appendix C

Region 3 Response to Draft Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

September 4, 2014

MEMORANDUM

SUBJECT: Response to Office of Inspector General Draft Report No. OPE-FYl1-0026 "No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites" dated July 31, 2014

FROM: Cecil Rodrigues, Director
Hazardous Sites Cleanup Division

TO: Carolyn Copper, Assistant Inspector General

Thank you for the opportunity to respond to the issues and recommendations in the subject audit report, *No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites* (Project No OPE-FYl1-0026) dated July 31, 2014. For the report recommendations with which the agency agrees, we have provided either high-level intended corrective actions and estimated completion dates to the extent practicable, or reasons why we are unable to provide high-level intended corrective actions and estimated completion dates at this time. For the report recommendations with which the agency does not agree, we have explained our position on the recommendations.

Disagreement

No.	Recommendation	Agency Explanation/Response	Proposed Alternative
1	Establish procedures for ensuring corrective actions have been completed in accordance with EPA Manual 2750.	We do not believe additional procedures are needed to the existing process.	None.

EPA Region 3 placed the early warning report in the two site files, Middletown Road Dump and Matthews Electroplating, in response to the draft early warning report entitled, *Observed Conditions at Five Deleted Superfund Sites,* Report No. 11-P-0433, May 23, 2011. The Region documented this action in our June 21, 2011 memorandum from Ronald Borsellino, Director of the Hazardous Site Cleanup Division, to Wade Najjum, Assistant Inspector General for Program Evaluation. When the final report was issued on August 3, 2011, the "At a Glance" document indicated that the Region's "ongoing and planned actions meet the intent of our recommendations."

When the auditors began their follow-up review in June 2013, their initial memorandum indicated that they wanted to verify whether Region 3 had added the early warning report to five site files:

Middletown Road Dump, Matthews Electroplating, Dixie Caverns, Rhinehart Tire, and Mid-Atlantic Wood Preservers. Although our interpretation of the recommendation in the early warning report, and what was accepted by the IG, was that the IG only wanted the report added to two site files, we added the report to the five site files electronically on July 16, 2013. Our program provided a document report number (Doc ID 2173266) and access to SDMS for the IG auditors to verify the report was filed in the five site files. Since the early warning report was placed in the site files (Middletown Road and Matthews Electroplating) in 2011, we do not believe that additional procedures need to be incorporated into our existing process.

The Grants and Audit Management Branch (GAMB) agrees with the Hazardous Site Cleanup Division that the process established for assuring that corrective actions are complete is acceptable, and is accurately reported in the Management Audit Tracking System. Region 3 does not agree that we prematurely attested to adding the information to the case files, as we contend that the IG draft report 11-P-0433 was added to the sites files Middletown Road Dump and Matthew Electroplating in June 2011.

Agreement

No.	Recommendation	High-level Intended Corrective Actions	Estimated Completion by Quarter and FY
2	Document the results of the reviews in 16 site files.	Report No. OPE-FY11-0026 was added to the 16 files on August 19, 2014	Completed
3	Verify whether repairs were made to the damaged fence at the Lackawanna Site	The fence has been repaired on several occasions and boulders were brought in to discourage trespassers. However, this is an ongoing issue and will require additional attention.	Ongoing maintenance requirement.

The Report *No Significant Residual Contamination Found at Deleted Superfund Sites, But Security Fences Were Damaged at Some Sites* (Project No OPE-FYl1-0026) dated July 31, 2014, was added to the following 16 site files (document id number **2195330):** 1) Aladdin Plating, 2) Berkley Products Co Dump, 3) Berks Landfill, 4) Brodhead Creek, 5) Bruin Lagoon, 6) Hranica Landfill, 7) Lackawanna Refuse, 8) McAdoo Associates, 9) Publicker Industries, 10) Taylor Borough Dump, 11) Wade (ABM), 12) Middletown Road, 13) Matthews Electroplating, 14) Dixie Caverns, 15) Rhinehart Tire, and 16) Mid-Atlantic Wood Preservers on August 19, 2014.

Appendix D

Distribution

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