

Jewett White Lead

Port Richmond, Staten Island

March 2010

Off-Site Sampling

- Overview & results of off-site sampling
- Summary of soil investigation
- EPA soil investigation findings

Jewett White Lead Off-Site Sampling

- Investigation to determine if lead from the Jewett site has moved into the neighboring yards and the surrounding community



Jewett White Lead Off-Site Sampling

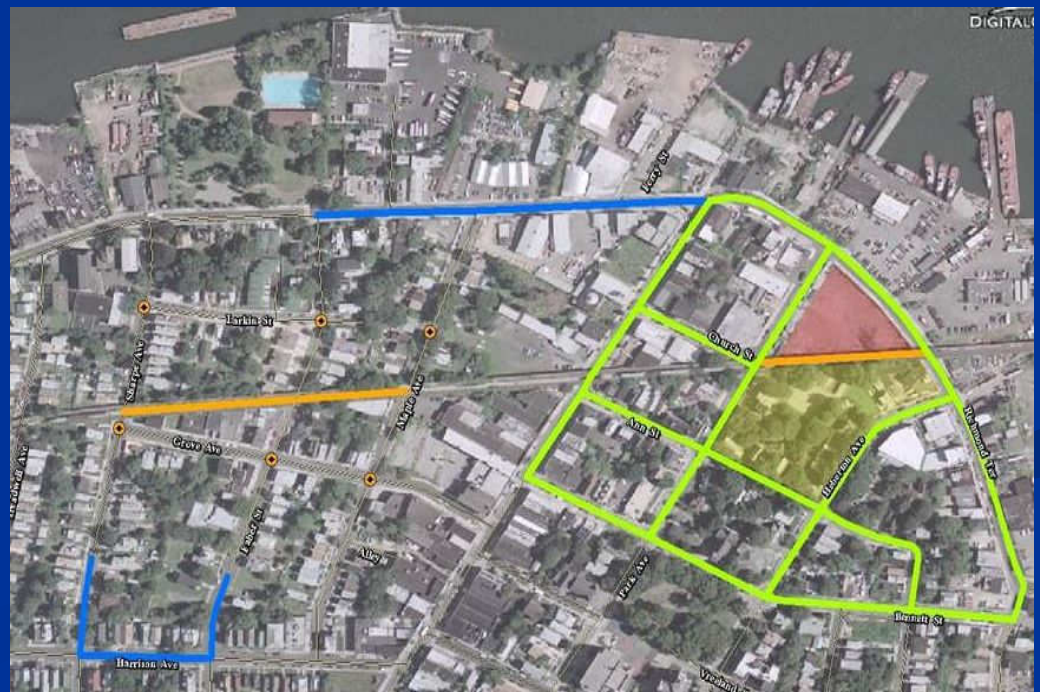
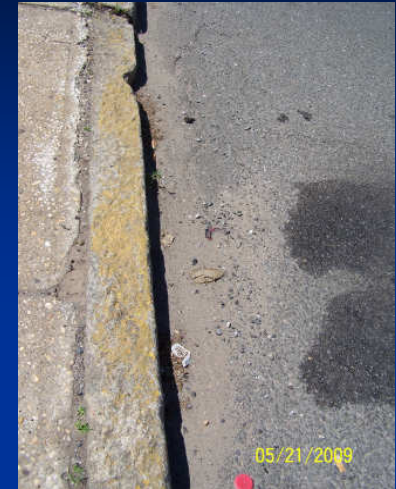
Complicating factors:



- Other potential lead sources
 - Former industries
 - Older homes with lead-based paint
 - Historic leaded gasoline emissions
- Unknown background lead levels

Overview of Off-Site Sampling

- Soil samples collected from grassy areas between the sidewalks and curbs
- Road grit collected from curb lines
- Six block area bound by Port Richmond, Bennett, Heberton, and Richmond Terrace
- Background area along Harrison Avenue between Faber and Sharpe



Overview of Off-Site Sampling



- Samples collected beneath the rail line directly south of the site both at the Site fence line and the fenceline closer to the residential properties
- Collected samples of road grit/dust from street curbs next to and under train trestle
- Soil samples collected beneath the rail line in a background area (Maple to Sharpe)

Jewett White Lead Off-Site Sampling

- From June 8th to June 12th collected 248 samples
 - Moran property
 - Train trestle
 - Residential backyards
 - Grassy areas near curbs in six block area near the Site
 - Road grit
 - Background area





Jewett White Lead

- What is a **PPM**?
 - PPM = Parts Per Million
 - A scientific measurement of the amount of a pollutant or contaminant in a sample
 - One ppm is like \$1 out of \$1 Million
- What do we compare soil lead levels to?
 - **400 ppm** is the EPA screening level for lead in residential soils

Grass Patch Sampling Results

- Lead levels in the samples collected from the background are higher on average than the samples collected closer to the Jewett Site
- Statistically the lead content of the soil samples is the same at all depths

- Average lead concentrations:

BACKGROUND –

0-2'' depth = 788 ppm

2-6'' depth = 792 ppm

6-12'' depth = 352 ppm

NEAR SITE –

0-2'' depth = 666 ppm

2-6'' depth = 663 ppm

6-12'' depth = 546 ppm

Road grit sampling



- Road grit samples generally lower in lead levels than other samples collected
 - Overall average = **171 ppm**
 - Avg around Site = **133 ppm**
 - Avg on Richmond Terrace = **154 ppm**
- Road grit samples had low levels of lead below a level of concern

Train Trestle Sampling

- Surface soil samples collected beneath the train trestle in the background are higher in lead on avg than surface samples collected beneath the train trestle near the Jewett Site
- Avg conc = **1,039 ppm** (background)
- Avg conc = **683 ppm** (near Site)



Residential Property Sampling



- Backyards of **13** residential properties sampled in one block immediately behind Jewett Site

Residential Property Sampling

- **Average** lead concentration in the backyard soil samples collected in the one block = **549 ppm** in top soils (0-2" depth)
- In the backyard soil samples, the lead concentrations ranged from **11.4 ppm** to **3,510 ppm**

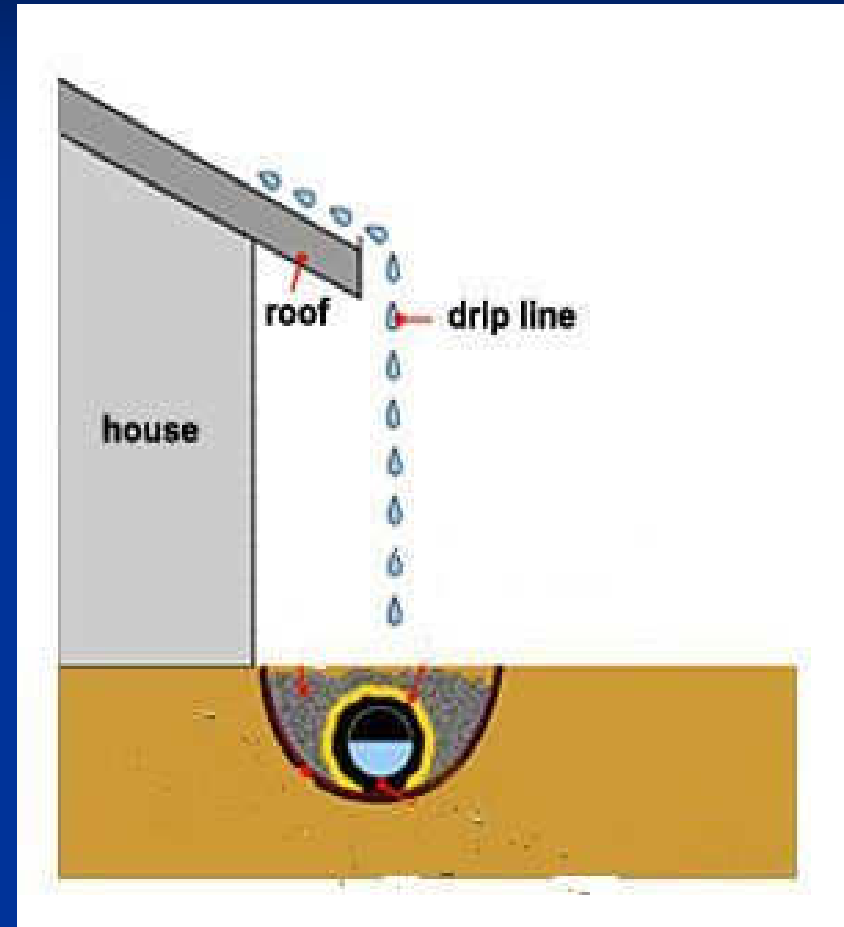
Lead-Based Paint

- EPA used an XRF to see if lead-based paint was present on homes
- It is a portable x-ray machine that can tell if lead paint is present
- Soil samples were collected from the dripline of the homes if lead-based paint was found to be present



Lead-Based Paint

- Highest lead levels in the samples collected in the backyards were found in the drip line of homes with lead-based paint
- Drip line = area surrounding and extending out about 3' from a building
 - 4 highest lead levels in backyard soil samples found within a drip line
 - **3,510 ppm**
 - **2,440 ppm**
 - **2,340 ppm**
 - **2,340 ppm**



Moran Towing Property

2015 Richmond Terrace

- 14 surface soil samples (0-2" depth) collected from the property
 - Collected in bare soil areas, or areas where asphalt was broken and bare soil may be exposed
 - Collected 6 soil samples, 8 grit samples
- Lead levels ranged from **145 ppm** to **2,730 ppm** in the surface samples
- Average lead in surface soil was **1,030 ppm**
- Additional sampling is needed to see if there are higher levels of lead are present at depth

Off-Site Sampling Summary

- Lead is present in surface soils in the residential backyards. The **average** lead level is slightly higher than EPA screening level of 400 ppm for lead
- Highest lead levels were in samples collected closest to homes and other structures
- Lead levels in the background area are similar to the lead levels seen closer to the Jewett Site

Off-Site Sampling Conclusions

- EPA will not be conducting a cleanup in the residential yards or the surrounding Community
- EPA will be conducting a cleanup at the Jewett White Lead Site
- Results of the soil investigation point to other environmental sources, and not a release from the Jewett Site

Data Studied for EPA Conclusion

- All of the sampling data was reviewed and contributed to the conclusion
- **KEY** pieces of evidence supporting conclusion:
 - **Spatial distribution**
 - **Background results**
 - **Lead-based paint on homes**
 - **Urban soil studies**
 - **Elemental Correlation**
 - **Lead Isotope Ratios**
 (“fingerprinting”)

Off-Site Soil Sampling Conclusion

- **Spatial distribution**

- Background results
- Lead-based paint on homes
- Urban soil studies
- Elemental Correlation
- Lead Isotope Ratio (“fingerprinting”)

Spatial Distribution

■ What does this mean?

- Geographic distribution of lead across an area

■ What are we looking for when we look at spatial distribution?

- When a contaminant, like lead is released you will see a clustering of high levels near the release, with levels getting lower the further you move from the release
- We are looking for a pattern in the backyard soil samples and in the community soil samples that shows us a release has occurred

Spatial Distribution in Residential Yards

- No concentration gradient
- No pattern of lead concentrations
- Hot spots located closest to structures
- Highest lead levels were found in soil samples collected in the drip line of homes with lead-based paint
 - The dripline is the area surrounding and extending out about 3' from a building

Off-Site Soil Sampling Conclusion

- Spatial distribution
- **Background results**
- Lead-based paint on homes
- Urban soil studies
- Elemental Correlation
- Lead Isotope Ratio (“fingerprinting”)

Background Results

- Lead levels in soil samples in the grassy sidewalk areas in the background and in the six block area surrounding the Jewett Site are similar at all depths
- Average lead concentrations:

BACKGROUND

0-2'' depth = 788 ppm

2-6'' depth = 792 ppm

6-12'' depth = 352 ppm

NEAR SITE

0-2'' depth = 666 ppm

2-6'' depth = 663 ppm

6-12'' depth = 546 ppm

Background Results

- Collected ¼ mile upwind, wind blows mostly out of the NW
- No observed pattern in the background
- Avg lead found in background soil samples the same as the avg lead in the samples collected in 6-block area near the Site
- Lead levels in soil are similar to those seen in urban soil studies

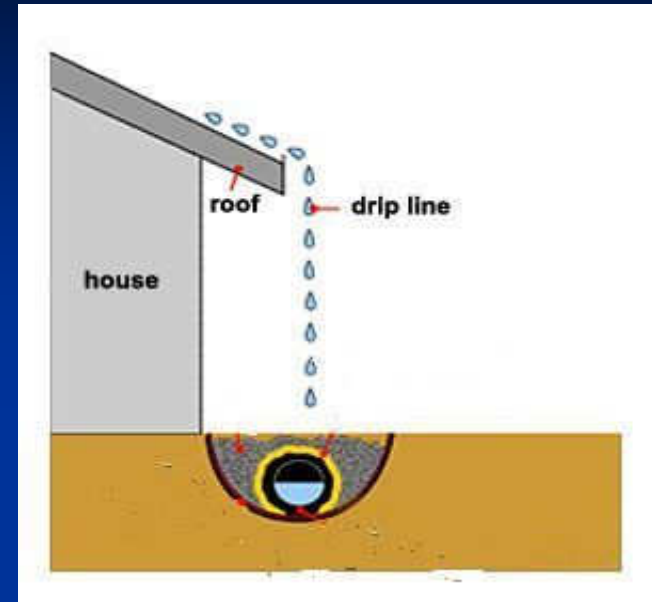


Off-Site Soil Sampling Conclusion

- Spatial distribution
- Background results
- **Lead-based paint on homes**
- Urban soil studies
- Elemental Correlation
- Lead Isotope Ratio (“fingerprinting”)

Lead-Based Paint

- Highest lead levels in the backyard soil samples were found in the drip line of homes with lead-based paint
- Lead-based paint is present on at least half of the homes in the one block residential area sampled
- Paint used before the 1950s may be composed of up to 50% lead



Lead-Based Paint

- Soils around older homes are often contaminated from lead-based paint that has chipped away and fallen to the ground
 - If lead paint is on the outside of a building, lead levels in soil will typically be highest in the dripline
 - As paint weathers, chips, peels, or flakes it can reach the soil in the form of chips and dust
 - Scraping, sandblasting, and routine home maintenance may cause the lead to contaminate the soil if proper precautions are not taken



Off-Site Soil Sampling Conclusion

- Spatial distribution
- Background results
- Lead-based paint on homes
- **Urban soil studies**
- Elemental Correlation
- Lead Isotope Ratio (“fingerprinting”)

Urban Lead Soil Studies



- Several studies in urban areas found similar lead concentrations in soils (New Orleans, Boston, Baltimore, Jersey City, Pittsburgh, Cincinnati, etc)
- Soil lead concentrations tend to be higher in city centers with high traffic patterns

Urban Lead Soil Studies

Lead based paint is a significant source of lead in soil



- EPA has found that private homes built before 1940 have significantly higher levels of lead in soil than homes built between 1960 and 1979*
 - *Lead Safe Yard Program – EPA/625/R-00/012
- In NYC, Lead-based paint banned from use in 1960
- Lead levels in soil typically highest in driplines

Urban Lead Soil Studies

Leaded gasoline is a significant source of lead in soils

- Studies found a strong link between high soil lead levels and leaded gasoline emissions in cities with heavy traffic
- Lead was used in gasoline from 1929 to 1986 as an anti-knock agent
- About 75% of lead added to gasoline was emitted from the tailpipe in the form of a fine lead dust



Off-Site Soil Sampling Conclusion

- Spatial distribution
- Background results
- Lead-based paint on homes
- Urban soil studies
- **Elemental Correlation**
- Lead Isotope Ratio (“fingerprinting”)

Elemental Correlation

- Elemental Correlation
 - An observation of the relationships that exist between various metals in a sample
- Jewett Site samples vs. Off-site samples
 - Strong relationships observed between lead and other low level metals in Jewett soil samples
 - Specifically barium and magnesium
 - Did not see the same relationship in the off-site soil samples

Elemental Correlation

- Provides us with a little more information about the lead found in the community
 - Other contributing sources may be present that can influence and change the elemental relationships in the off-site soils
 - Not much evidence that the lead in the off-site samples is from the Jewett Site

Off-Site Soil Sampling Conclusion

- Spatial distribution
- Background results
- Lead-based paint on homes
- Urban soil studies
- Elemental Correlation
- **Lead Isotope Ratio
 (“fingerprinting”)**

Jewett White Lead
2000 Richmond Terrace
Port Richmond, Staten Island

Lead (Pb) Stable Isotope Analysis

March 23, 2010

Attribution Analysis

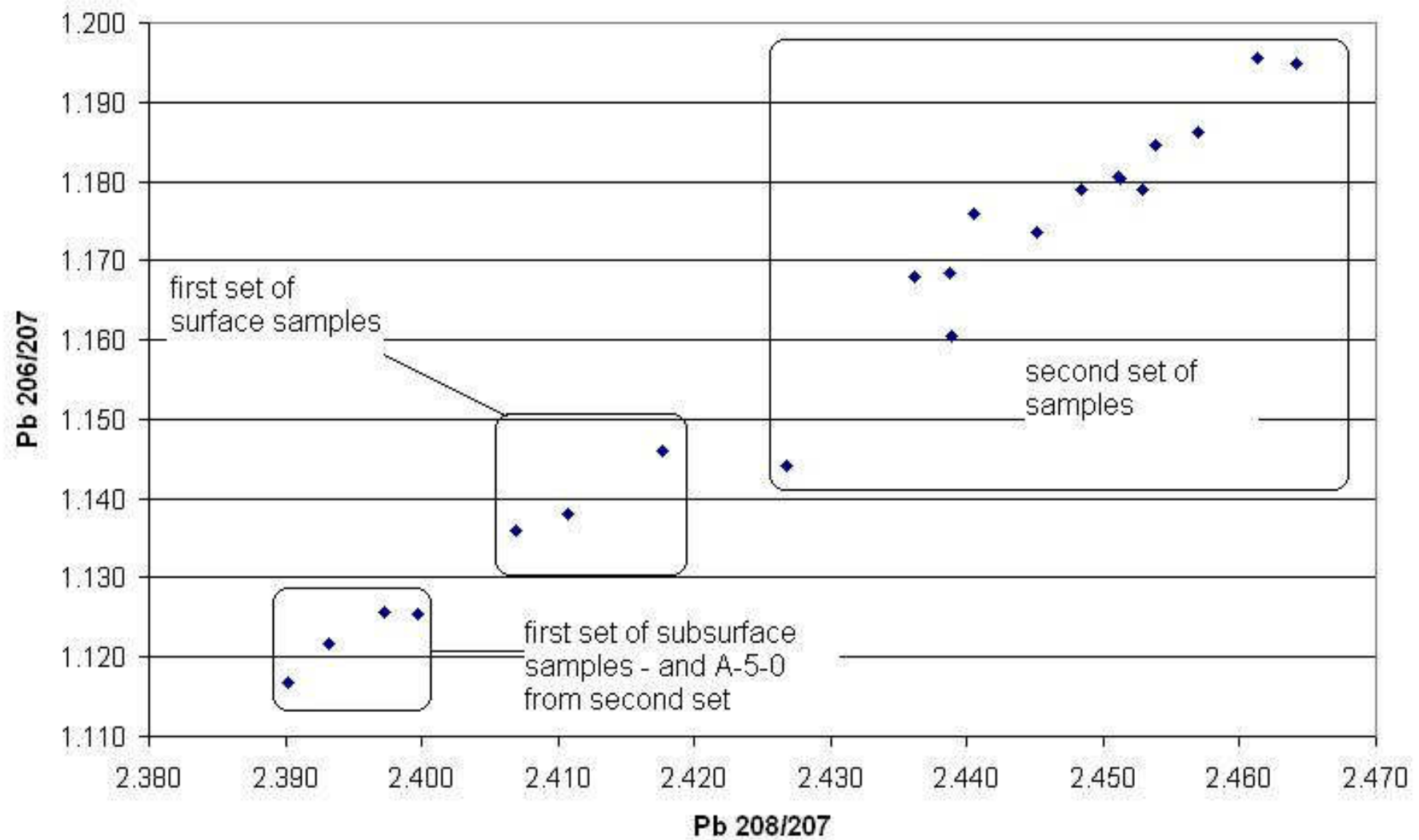
Lead Isotopic Ratio Analysis (Pb IR)

- Natural lead is a mixture of four forms (isotopes): ^{204}Pb (1.5%), ^{206}Pb (23.6%), ^{207}Pb (22.6%), and ^{208}Pb (52.3%)
- Pb isotopes can be measured with great precision
- The precise ratio of the isotopes in a particular Pb source is determined by the geologic age of the lead ore in the earth and imparts on that source a geologic fingerprint that is not affected by physical or chemical processes
- The Pb isotope fingerprinting method can be used to identify sources of lead in the environment

Lead Isotopic Ratio Analysis (Pb IR)

- The isotopic fingerprint of the Jewett Pb (site sub-surface samples) is unique (low Pb^{206/207} ratio) and indicates a Precambrian (old) source - possibly from Australia, South Africa or Europe
- Major deposits in the U.S. Missouri Pb belt are of younger origin and have a higher Pb^{206/207} ratio
- When sources of lead with different isotopic ratios are mixed the isotopic ratio will change in direct proportion to the source contribution
- If Jewett was a major contributor to off-site Pb contamination the isotopic ratios (fingerprint) off site would be similar to the on-site fingerprint

Staten Island Pb data



Urban Lead Soil Studies

- Adgate et al. study reported Jersey City soils with a range of Pb 206/207 from 1.155 to 1.200 and street dust ranging from 1.155 to 1.200
- Carvanos et al. published Pb 206/207 isotopes measured for boroughs in NYC in 2003-2004 (excludes Staten Island) with a range of 1.172 to 1.222
- Soil samples from the June sampling event resulted in a range of 1.160 to 1.196 for Pb 206/207; similar to both Pb isotopic composition studies published for NYC and Jersey City

Lead Isotopic Ratio Analysis Summary

- Interpretation of Pb IR results indicate that lead in background and backyards appears different from lead on Jewett
- Background and backyard lead appears to be anthropogenic lead pollution and is consistent with lead found in other NE industrialized urban areas
- Based upon Pb IR results, it appears that the lead in the backyards and in the community is predominantly from environmental sources other than the site

Off-Site Sampling Conclusions

- Similar levels of lead in background soil samples
- Higher concentrations of lead closer to foundations of homes in backyard samples, likely from lead-based paint
- Similar levels of lead to other urban areas across the country

Off-Site Sampling Conclusions

- Elemental correlation results indicate that Jewett White Lead site is not the major source of lead in the community
- Off-Site lead fingerprint **IS** similar to the urban lead fingerprint typically seen in the industrialized North East U.S.
 - Off-Site lead fingerprint is **NOT** similar to Jewett Lead fingerprint

Off-Site Sampling Conclusions

- Based upon all sampling data collected, EPA will not be performing a cleanup in the residential backyards or the surrounding community
- Investigation found evidence that significant amount of lead found in soils on residential properties and the community is from other sources, including paint on homes and the use of leaded gasoline
- EPA remains committed to completing a cleanup at the former Jewett Site

For information and updates on EPA activities related
to the Jewett White Lead Site contact:

Wanda Ayala
Community Involvement Coordinator, USEPA
(212) 637-3676

Kimberly Staiger
On-Scene Coordinator, USEPA
(732) 452-6415

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