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# TECHNICAL MEMORANDUM

**To:** Rob Hanson, IDEQ, Boise
Anne McCauley, EPA Seattle
Jerry Cobb, PHD Kellogg

**From:** Tom Bourque, TG, Moscow

**Subject:** Bunker Hill Superfund Site Populated/Non-Populated Areas Estimated Waste Stream Summary

**Date:** May 9, 2008

**Project No.:** 2005-3060

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## Introduction

The primary Non-Populated and Populated Areas clean-up is nearing completion in the original 3 x 7 mile Bunker Hill Superfund Site (BHSS), known as the Box. Waste materials from these Superfund activities have been disposed of at several sites within the project boundaries including: 1) Smelter Landfill, 2) Central Impoundment Area (CIA), 3) Borrow Area Landfill (BAL), and 4) Page Repository. Generally, Non-Populated Area wastes were directed to the Smelter Landfill, CIA, and BAL and were a function of the government-led clean-up activities. The Populated Areas clean-up focused on property soil removal and barrier placement and has been conducted by the Upstream Mining Group (UMG) and, to a lesser extent, the federal and State governments. The "Yard Program" is generally complete and has utilized Page Repository for disposal of yard soil.

Concurrent with the large-scale clean-up activities, the Institutional Controls Program (ICP) was developed, which requires property owners, development projects, infrastructure projects, and any other activity that generates waste material to dispose of that material at an approved site. The principal approved site within the Box is the Page Repository. This Bunker Hill Populated Areas' Record of Decision (ROD) disposal requirement is enforced as part of the ICP and will remain a component of all waste generation activities for the foreseeable future (USEPA 1991). Therefore, long-term management of waste materials within the Box and especially at the Page Repository is a critical component of the ICP and protection of the remedy.

## SECTION 1.0 IN-SITU MATERIAL CROSS-SECTION

Waste material excavations from developments, infrastructure, or any other similar activities within the Box will potentially intersect a variety of contaminated materials. Characterization of these strata, particularly the valley floor, produces the following generalization (MFG 1993):

- Soil – imported topsoil within residential areas. Top 1-2 ft in depth.
- Sediment – flood placed sediment within flood prone areas. Top 1-3 ft in depth.
- Soil/tailings – the soil matrix within undeveloped or fill areas. Top 1-10 ft in depth.
- Sawdust – waste material placed as dust cover and general sawdust wasting. Top1-3 ft in depth.
- Alluvium/tailings mix – Gravels, sands, organics, wood and concrete debris, and slimes/float/jig tailings layers 3-10 ft in depth.
- Alluvium/tailings mix – Gravels, cobbles, wood, and jigs tailings 7 to 14 ft in depth.

These cross-sections are variable and represent pre-remedial action conditions, as the characterization was prepared in 1993. However, most of these conditions persist except in those areas where 1 ft of yard or driveway surface soil has been removed. Future waste generation activities will likely encounter some representation of this stratification as witnessed at the Kellogg Gondola Base expansion starting in 2005 and several infrastructure projects.

Hillsides development will likely encounter different strata unless the development uncovers a former mill/mine/industrial site or is within a drainage or gulch. Most contamination on the hillsides is surficial and is contained within the top 6 to 18 inches (TerraGraphics 1996, 1997). These materials may be removed for disposal or incorporated into the development's grading plan while meeting ICP requirements.

TerraGraphics and Ralston Hydrologic Services (2007) estimated that approximately 20,400,00 cubic yards (cy) of contaminated soils exist in-situ under barriers or unremediated within the BHSS Populated and Non-Populated Areas. See Appendix A, Table A4, titled *Summary of Contaminated Sources Areas of OU2.* This does not include the approximate 29,000,000 cy of contaminated materials contained within the Smelter Landfill and CIA.

## SECTION 2.0 FUTURE PROJECTS AND WASTE TYPES

Future lead-contaminated waste streams are anticipated to originate due to ICP regulation compliance from the following sources: 1) Small Projects (i.e. local/small mixed development projects, government, and utility projects), 2) Development, and 3) Infrastructure. Each of these sources have different financial and market factors, trends, and volumes. In addition, the excess material characteristics can vary between these sources. All these factors influence the waste stream that ICP and the excess material system must manage.

The information presented in Tables 1 and 2 is derived from the *Bunker Hill Superfund Site (BHSS) Populated Area Five Year Review* (USEPA 2005), *ICP White Paper* (TerraGraphics and Panhandle Health District 2005), and *Phase 1 Remedial Action Characterization Report for Bunker Hill Mining and Metallurgical Complex Operable Unit 1*, (TerraGraphics and Ralston Hydrologic Services 2006). Specifically, community and BHSS site contaminated soils were inventoried to estimate the remaining wastes at the site. Tables 1 and 2 continue this analysis by assigning a depth of excavation that may occur at the various identified locations based on land use, potential for development, or infrastructure projects targeted in the *Consolidated Bunker Hill Communities Infrastructure and Revitalization Plan* (IRP) (TerraGraphics, Revised 2006). Also considered is assigning a percentage of the area that may be excavated, again based on land use, future development, and anticipated construction components. An example would be for residential areas that may have a small, old house demolished and a larger home with a basement constructed. Therefore, 10% of the lot is excavated to a depth of a basement (7 feet), assuming the typical small lots in the BHSS communities. A more complete explanation of remediation depths and percentages is included in Appendix A. No requirement has been established for on-site utilization of excess soil and the typical small property sizes and right-of-way limitations within the Bunker Hill communities can be very restrictive regarding on-site utilization of excess soil. . As a result, it is assumed excess materials that may be produced over the long-term at the different areas within the Box will be sent for disposal at the Page Repository. Larger, Non-Populated Areas have the advantage of utilizing available space for regrading excess soils and then incorporating that effort into the final barrier, infrastructure, and development configurations. It is when land is restricted by parceling, land use, and available space that excess materials are more likely to require off-site disposal. The following tables present the possible long-term disposal waste stream from Non-Populated Areas, including commercial and industrial sites, as BHSS is redeveloped over the next several decades. Location maps are provided in the Appendix. Some slight changes in total acreages between the original maps and tables exist because of rounding and area refinement from aerial map review of waste source areas within the Populated Areas during the development of this memo.

Development, and therefore waste production, will be influenced by the Federal Emergency Management Agency (FEMA) floodplain designation, especially in undeveloped areas. Although contaminated materials still exist in areas such as the Airport Industrial Area, Smelterville Flats Capped Area, and Government Gulch, a material balance will be needed to avoid any impact on flood water storage and zero rise on flood elevation. As a result, these areas have very limited waste production associated only with simple underground utilities.

**Table 1 Non-Populated Areas Anticipated Waste Material Quantities**

| Non-Populated Areas Commercial / Industrial Area | Area in Acres | Removal Depth, ft | % Area Expected to be Removed | Volume of Disposal, cy |
|---|---|---|---|---|
| West County Remediation Area | 13 | 2 | 0% | 0 |
| Airport Industrial Area | 47 | 3 | 2% | 4,550 |
| Smelterville Flats Capped Area | 85 | 3 | 2% | 8,228 |
| Theater Bridge Industrial Area | 34 | 5 | 20% | 54,853 |
| Boulevard Area | 12 | 7 | 20% | 27,104 |
| Mining Operations Area | 7 | 5 | 15% | 8,470 |
| Union Pacific Railroad (UPRR) | 48 | 5 | 5% | 19,360 |
| Central Treatment Plant | 9 | 5 | 2% | 1,452 |
| **Total** | **272** | | | **124,017** |

**Table 1 Non-Populated Areas Anticipated Waste Material Quantities cont'd.**

| Non-Populated Areas Commercial / Industrial Area | Area in Acres | Removal Depth, ft | % Area Expected to be Removed | Volume of Disposal, cy |
|---|---|---|---|---|
| | | | | |
| **Dust Control Caps – veg. cover** | | | | |
| Magnet Gulch | 14 | 2 | 5% | 2,259 |
| Deadwood Gulch | 50 | 2 | 5% | 8,067 |
| Deadwood Gulch Mouth | 5 | 7 | 25% | 14,117 |
| Hillsides | 929 | 1 | 10% | 149,879 |
| Hillside Road | 1 | 2 | 80% | 2,581 |
| **Total** | **999** | | | **176,902** |
| | | | | |
| **Waste Repositories** | | | | |
| Slag Pile Area | 31 | 4 | 20% | 40,011 |
| Smelter Closure Area | 50 | 5 | 0% | 0 |
| A-4 Gypsum Pond | 15 | 5 | 0% | 0 |
| CIA | 243 | 5 | 0% | 0 |
| Borrow Area – Golf Course | 36 | 5 | 0% | 0 |
| UMG Repository – Page Rep. | 4 | 5 | 0% | 0 |
| ICP Repository - West Cell | 27 | 5 | 0% | 0 |
| SFSD Wastewater Treatment Plant | 51 | 5 | 5% | 20,570 |
| ICP Soil Repository - East Cell | 16 | 5 | 0% | 0 |
| **Total** | **473** | | | **60,581** |
| | | | | |
| **Flood Plain / Gulches** | | | | |
| North Flats Remediation Area | 174 | 3 | 2% | 16,843 |
| Industrial Landfill – Galena Ridge | 10 | 3 | 2% | 968 |
| Government Gulch | 95 | 5 | 2% | 15,327 |
| Grouse Creek | 8 | 1 | 5% | 645 |
| Lower Grouse Creek Impact Area | 7 | 2 | 25% | 5,647 |
| Upper Grouse Creek | 4 | 4 | 100% | 25,813 |
| Bunker Creek | 11 | 5 | 5% | 4,437 |
| Milo Gulch | 4 | 5 | 2% | 645 |
| Milo Creek | | See note* | | 5,400 |
| **Total** | **313** | | | **75,725** |
| | | | | |
| **Natural Resource Area** | | | | |
| West End Remediation Area | 20 | 4 | 2% | 2,581 |
| SFCDR Remediation Area | 96 | 2 | 2% | 6,195 |
| East Page Swamp | 54 | 5 | 2% | 8,712 |
| SFCDR | 65 | 5 | 0% | 0 |
| West Page Swamp (to be determined) | 27 | 5 | 0% | 0 |
| **Total** | **262** | | | **17,489** |

**Table 1 Non-Populated Areas Anticipated Waste Material Quantities cont'd.**

| Non-Populated Areas Commercial / Industrial Area | Area in Acres | Removal Depth, ft | % Area Expected to be Removed | Volume of Disposal, cy |
|---|---|---|---|---|
| **Major Rights-of-Way** | | | | |
| I-90/Interchange | 75.3 | 3 | 50% | 182,300 |
| UPRR | 17 | 3 | 5% | 1,372 |
| *Other Areas (see Pop)* | 70.8 | | | 27,671 |
| **Total** | **163.1** | | | **211,343** |
| | | | | |
| **Non-Populated Area Waste Total** | **2,302** | | | **666,056** |

*Milo Creek has periodic sediment removal from sediment basins typical from upstream sources

Table 1, Anticipated Non-Populated Areas waste quantities, predicts an average waste disposal volume of 666,000 cy. This value is rounded to the nearest 1,000 cubic yard. Variability in this value is a function of how development will likely occur within the site. This is particularly true at the Airport/Smelterville Flats, East Theater Bridge area, Government Gulch area (Government Gulch and SPA), and hillsides. Currently, water and sewer mains to support large-scale development in the Airport/Smelterville Flats, Government Gulch areas, and hillsides have been installed with additional work identified in the *Consolidated Bunker Hill Communities Infrastructure and Revitalization Plan* (IRP) (TerraGraphics, Revised 2006). Due to the geography in the area, these relatively flat and accessible areas have been targeted for redevelopment by various private and government entities. The probability that large-scale development will occur at these locations over the next 50 years is high, thus waste material production is justifiably identified. However, floodplain issues may reduce or control Airport/Smelterville Flats area development, so the Flats may well have a lower probability of development. Loss of this area for redevelopment from the Flats will put more pressure on the Populated Areas. Major rights-of-way contain areas within or adjacent to communities that will produce a waste stream over time, but are not included in the Populated Areas designation boundaries (i.e. UPRR, I-90).

Table 2 illustrates a variety of waste streams from different sources in the Populated Areas. An earlier version of Table 2 included some rights-of-way and properties not assigned to UMG because they were within the OU1 area and were viewed from a waste location perspective, not an assignment of responsibility. Tables 1 and 2 now reflect Area 1/OU1 responsibilities.

Within Table 2, "remediated properties" represent those properties where yard removal has occurred. These properties are typically within the valley floor or floodplains. Experience from the Milo Creek project suggests that as material is excavated from depths below surface soil, it is likely that lead concentrations will exceed 1,000 parts per million (ppm) and trigger ICP and ROD material management requirements, including disposal. Structures, levees, and other features represent buildings, private infrastructure, and community improvements that produce a waste material when maintained, repaired, and replaced. "Streets and alleys" are contained within city rights-of-way and will be reconstructed over time to meet local ordinance requirements. The Appendix contains examples of typical road and utility cross-sections from the City of Kellogg Comprehensive Plan. This plan has extensive requirements for design and construction of roadways, storm water systems, landscaping, etc.

**Table 2 Populated Areas Anticipated Waste Material Quantities**

| Barrier Classification | Area (acres) | Depth (feet) | % Area Expected to be Removed | Volume for Disposal, cy |
|---|---|---|---|---|
| **Kellogg** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 260.1 | 4 | 10% | 167,870 |
| Gravel or Dirt Caps | 14.2 | 3 | 10% | 6,870 |
| No Remediation Required | 55.2 | 4 | 10% | 35,603 |
| No Action Taken / Remaining | 50.5 | 5 | 10% | 40,741 |
| Owner Refused Remediation | 1.7 | 1 | 100% | 2,724 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 100.6 | 3 | 60% | 292,212 |
| Gravel or Dirt | 4.1 | 1 | 60% | 3,999 |
| I-90 (Non-Pop) | 31.0 | 3 | 0% | 0 |
| **Development Areas** | | | | |
| Railroad Ave | 5.0 | 3 | 25% | 6,050 |
| Gondola Base (Non-Pop) | 10.0 | 4 | 0% | 0 |
| Northeast End | 5.0 | 4 | 25% | 8,067 |
| **Other** | | | | |
| Structures | 72.2 | 4 | 10% | 46,588 |
| Paved Parking/Access | 29.2 | 2 | 100% | 94,270 |
| SFCDR Levees (Non-Pop) | 15.9 | 4 | 0% | 0 |
| UPRR Trail (Non-Pop) | 12.0 | 1 | 0% | 0 |
| **Total Area of Boundary** | **667** | | | |
| **Total Disposal** | | | | 704,993 |
| **Wardner** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 27.3 | 4 | 10% | 17,624 |
| Gravel or Dirt Caps | 1.5 | 3 | 10% | 721 |
| No Remediation Required | 5.8 | 4 | 10% | 3,738 |
| No Action Taken / Remaining | 5.3 | 5 | 10% | 4,277 |
| Owner Refused Remediation | 0.2 | 1 | 100% | 286 |
| **Street and Alley Classifications** | | | | |
| Paved Parking/Access | 3.1 | 2 | 100% | 9,897 |
| Paved Roads | 10.6 | 3 | 60% | 30,678 |
| Gravel or Dirt | 0.4 | 1 | 60% | 420 |
| **Other** | | | | |
| Structures | 7.6 | 4 | 10% | 4,891 |
| **Total Area of Boundary** | **64.6** | | | |
| **Total Disposal** | | | | 77,935 |

**Table 2 Populated Areas Anticipated Waste Material Quantities**

| Barrier Classification | Area (acres) | Depth (feet) | % Area Expected to be Removed | Volume for Disposal, cy |
|---|---|---|---|---|
| **Pinehurst** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 224.3 | 4 | 10% | 144,769 |
| Gravel or Dirt Caps | 12.2 | 3 | 10% | 5,925 |
| No Remediation Required | 47.6 | 4 | 10% | 30,703 |
| No Action Taken / Remaining | 43.6 | 5 | 10% | 35,135 |
| Owner Refused Remediation | 1.5 | 1 | 100% | 2,349 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 86.8 | 3 | 60% | 252,000 |
| Gravel or Dirt | 3.6 | 1 | 60% | 3,448 |
| I-90 (Non-Pop) | 26.7 | 3 | 0% | 0 |
| **Development** | | | | |
| North End | 10.0 | 4 | 20% | 12,907 |
| Levee Area | 10.0 | 4 | 20% | 12,907 |
| **Other** | | | | |
| Structures | 62.3 | 4 | 10% | 40,177 |
| Paved Parking/Access | 25.2 | 2 | 100% | 81,297 |
| Levee (Non-Pop) | 15.0 | 2 | 0 | 0 |
| Pine Creek/Little Pine Creek (Non-Pop) | 20.0 | 3 | 0 | 0 |
| **Total Area of Boundary** | **588.7** | | | |
| **Total Disposal** | | | | 621,617 |
| **Page** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 37.4 | 4 | 10% | 24,130 |
| Gravel or Dirt Caps | 2.0 | 3 | 10% | 988 |
| No Remediation Required | 7.9 | 4 | 10% | 5,118 |
| No Action Taken / Remaining | 7.3 | 5 | 10% | 5,856 |
| Owner Refused Remediation | 0.2 | 1 | 100% | 391 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 14.5 | 3 | 60% | 42,003 |
| Gravel or Dirt | 0.6 | 1 | 60% | 575 |
| I-90 (Non-Pop) | 4.5 | 3 | 0% | 0 |
| **Other** | | | | |
| Structures | 10.4 | 4 | 10% | 6,697 |
| Paved Parking/Access | 4.2 | 2 | 100% | 13,550 |
| **Total Area of Boundary** | **89** | | | |
| **Total Disposal** | | | | 99,307 |

## Table 2 Populated Areas Anticipated Waste Material Quantities

| Barrier Classification | Area (acres) | Depth (feet) | % Area Expected to be Removed | Volume for Disposal, cy |
|---|---|---|---|---|
| **Smelterville** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 64.3 | 4 | 10% | 41,514 |
| Gravel or Dirt Caps | 3.5 | 3 | 10% | 1,699 |
| No Remediation Required | 13.6 | 4 | 10% | 8,804 |
| No Action Taken / Remaining | 12.5 | 5 | 10% | 10,075 |
| Owner Refused Remediation | 0.4 | 1 | 100% | 674 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 24.9 | 3 | 60% | 72,263 |
| Gravel or Dirt | 1.0 | 1 | 60% | 989 |
| I-90 (Non-Pop) | 7.7 | 3 | 0% | 0 |
| **Development** | | | | |
| Washington/K Streets Area | 3.0 | 4 | 25% | 4,840 |
| Main Street Area | 3.0 | 4 | 25% | 4,840 |
| **Other** | | | | |
| Structures | 17.9 | 4 | 10% | 11,521 |
| Paved Parking/Access | 7.2 | 2 | 100% | 23,312 |
| Grouse Creek (Non-Pop) | 7.0 | 2 | 0% | 0 |
| UPRR Trail (Non-Pop) | 3 | 1 | 0% | 0 |
| **Total Area of Boundary** | **173** | | | |
| **Total Disposal** | | | | 180,530 |
| **Elizabeth Park** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 38.6 | 4 | 10% | 24,908 |
| Gravel or Dirt Caps | 2.1 | 3 | 10% | 1,019 |
| No Remediation Required | 8.2 | 4 | 10% | 5,283 |
| No Action Taken / Remaining | 7.5 | 5 | 10% | 6,045 |
| Owner Refused Remediation | 0.3 | 1 | 100% | 404 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 14.9 | 3 | 60% | 43,358 |
| Gravel or Dirt | 0.6 | 1 | 60% | 593 |
| I-90 (Non-Pop) | 4.6 | 3 | 0% | 0 |
| **Development** | | | | |
| Housing Development | 5.0 | 5 | 15% | 6,050 |
| **Other** | | | | |
| Structures | 10.7 | 4 | 10% | 6,913 |
| Paved Parking/Access | 4.3 | 2 | 100% | 13,987 |
| SFCDR Levees (Non-Pop) | 2.4 | 4 | 0% | 0 |
| UPRR Trail (Non-Pop) | 1.8 | 1 | 0% | 0 |
| **Total Area of Boundary** | **101.0** | | | |
| **Total Disposal** | | | | **108,560** |

**Table 2 Populated Areas Anticipated Waste Material Quantities**

| Barrier Classification | Area (acres) | Depth (feet) | % Area Expected to be Removed | Volume for Disposal, cy |
|---|---|---|---|---|
| **Montgomery Gulch (both sides of SFCDR)** | | | | |
| **Property Remedial Classifications** | | | | |
| Remediated Properties | 7.2 | 4 | 10% | 4,670 |
| Gravel or Dirt Caps | 0.4 | 3 | 10% | 191 |
| No Remediation Required | 1.5 | 4 | 10% | 990 |
| No Action Taken / Remaining | 1.4 | 5 | 10% | 1,133 |
| Owner Refused Remediation | 0.0 | 1 | 100% | 76 |
| **Street and Alley Classifications** | | | | |
| Paved Roads | 2.8 | 3 | 60% | 8,130 |
| Gravel or Dirt | 0.1 | 1 | 60% | 111 |
| I-90 (Non-Pop) | 0.9 | 3 | 0% | 0 |
| **Development** | | | | |
| Housing | 5.0 | 5 | 20% | 8,067 |
| **Other** | | | | |
| Structures | 2.0 | 4 | 10% | 1,296 |
| Paved Parking/Access | 0.8 | 2 | 100% | 2,623 |
| UPRR Trail (Non-Pop) | 0.3 | 1 | 0% | 0 |
| SFCDR Levees (Non-Pop) | 0.4 | 4 | 0% | 0 |
| **Total Area of Boundary** | **23** | | | |
| **Total Disposal** | | | | **27,287** |
| **Populated Areas Waste Material Total** | | | | **1,820,230 cy** |

Table 3 presents a summary of the results from Tables 1 and 2.

**Table 3 Populated and Non-Populated Areas Waste Generation Summary**

| Area | Volume (cy) | Percent of Total |
|---|---|---|
| **Populated** | 1,820,000 | 73% |
| **Non-Populated** | 666,000 | 27% |
| **Combined** | 2,486,000 | 100% |

The categories of No Action Taken and Owner Refusal were current in 2005, but may be slightly different in 2008. The excess waste production from those properties projected in the table is still consistent because the assumption of 10% of the property area producing a disposal waste will not change. Depth of removal varies in the range of 1-5 ft, but the impact on the final disposal quantity and percentage of Populated versus Non-Populated Area disposal waste is insignificant, especially since the Owner Refusal is a contaminated site that needs 1 ft removal depth in the table. If remediated, these properties convert to “Remediated Property” and have only a slightly larger a disposal waste generation projection.

## SECTION 3.0 GENERATION OF WASTE STREAMS

Generation of the total ICP waste material combines small local projects with development and infrastructure. These materials remain the ICP's primary concern and require disposal within the BHSS. . The estimated development trend within the Box is currently underway with Eagle Crest/Galena Ridge providing the catalyst. The infrastructure trend reflects five-year government funding cycles and implements the priority IRP projects over the next 20 to 30 years.

The interplay of the three categories: 1) Small Projects, 2) Development, and 3) Infrastructure impact the timing and magnitude of various groups of waste generation indentified in Tables 1 and 2. All these waste sources are ICP and ROD regulated and enforced. Sections 3.1, 3.2, and 3.3 discuss these sources and quantities.

The UMG and Government yard programs also generate remediation materials. Yard materials typically consist of soil, sediment, sod, landscaping (bark, stumps, shrubs, etc. in small quantities), gravels, concrete, piping, and bricks. UMG has disposed of approximately 492,000 cy while the government has disposed of 87,000 cy (IDEQ Yard Soils records). These removals targeted the top 6-inches or 12-inches (commercial or residential property) within the Populated Areas.

Earlier waste stream projections from July 2005 and provided to UMG (Potential long-term ICP Contamination Soil Generation within the Bunker Hill Superfund Site (Box) Table July 2005) estimated a Populated Area waste stream total at 1,718,000 cy. The Populated Areas waste stream potential has been adjusted to 1,820,000 cy. The primary difference is due to infrastructure and specifically the street and utility replacement and upgrade in the city rights-of-way. Typical cross-sections required by local ordinance for streets, curbs, gutters, and storm drains are recognized in the excess waste volumes. When sidewalks are required, approximately 80% to 90% of the right-of-way is affected. When sidewalks and utilities are eliminated, such as alleys, the depth producing an excess material is reduced from 3 ft to 18 inches and the impacted width is closer to 50%. The combination of both types of impact (80% at 3 ft depth and 50% at 2 ft depth) is represented in Table 3 as 60% of the right-of-way width throughout the Populated Areas at 3 ft. deep excavation producing an excess material. Non-Populated Areas estimated volumes also increased relative to the 2005 estimate from 637,000 to 666,000 cy.

### *3.1 Small Projects Waste Generation*

Small project waste materials are generated by the daily activities of government, business, and community. Small projects often are generated by residents and are usually less than 1 cy. Projects generated by the cities and business can be up to 3,000 cy. Larger projects usually fall within the category of Development or Infrastructure. Waste materials tend to consist primarily of the upper soils, sediment, and debris. The projects are typically city infrastructure and utilities operations, maintenance, and smaller community upgrades; small and private improvement projects; and local contractors.

The small project waste stream has historically totaled 1,700 cy and 11,900 cy between 2002 and 2007, with the last three years averaging approximately 10,600 cy (UMG 2008). This Populated

Area volume has been generated by a population of approximately 5000 people within the distinct city boundaries of Kellogg, Smelterville, Pinehurst, and Wardner based on UMG's Populated Area waste stream breakout at Page Repository. This waste stream is expected to increase for a variety of reasons. First, Kellogg has expanded its boundaries to include much of the Bunker Hill property to the west of town. This expansion has nearly doubled the city's geographic extent. Population growth is now focused not only within the historical city boundaries, but is expanding into areas not previously developed. However, the Populated and Non-Populated Areas of Tables 1 and 2 do not recognize this expansion and continue to use the Area 1 designation of Populated Areas. Second, several development initiatives are being presented to the City of Kellogg and City of Pinehurst. These developments consist of housing, condominium complexes, golf course, ski resort expansion, commercial expansion, roadways, and utilities. These activities are currently occurring within the BHSS. Projects have varied from several hundred cubic yards to over 30,000 cy (Wal-Mart). Third, north Idaho is still experiencing growth. This growth is already impacting the cities within the BHSS, with higher property values, renovation, and new construction.

The City of Kellogg represents the epicenter of redevelopment within the Silver Valley. A *Kellogg Development Impact Fees* study (Tischler & Associates 2004) was prepared to evaluate growth and impacts on the City within its historic boundaries. Kellogg's population is expected to increase from 2,213 residences in 2004 to 7,024 temporary and permanent residences in 2014. Single-family housing units are expected to increase from 1,707 in 2004 to 3,193 in 2014. Multi-family housing individual units are expected to increase from 428 in 2004 to 3,753 in 2014.

The geographic, population, and economic expansions will increase the small ICP waste stream beyond historical levels. Utilizing the last three year average of ICP waste at 10,600 cy and a 5,000 person population, the per capita waste stream is about 2 cy/person. Kellogg's current population is 44% of the BHSS total with the following population breakdown in 2004: Kellogg (2,213), Pinehurst (1,700), Smelterville (700), and Wardner (350). Assigning the annual waste stream distribution according to population (2004), the cities' waste streams are as follows: Kellogg (4,400 cy), Pinehurst (3,400 cy), Smelterville (1,400 cy), and Wardner (700 cy).

Assuming that only future single family housing produces the historical waste stream of 2 cy/person and using the *Kellogg Development Impact Fees* study persons per house figure of 2.27, the incremental increase above 10,600 cy per year due to new single family homes is 3,000 cy per year (2014) in Kellogg. Multi-family housing will likely not have the direct production of small ICP project waste, but does represent an increase in city and utility maintenance and operations in the historical and expansion areas. Assuming the remaining population applies to this category and assigning 0.25 cy per year per capita, this incremental increase equals 550 cy per year (2014) in Kellogg, or 16% of Kellogg's future waste stream. The total incremental increase is 3,550 cy per year for Kellogg in 2014 and total waste production in Kellogg is estimated at about 8,000 cy per year (2014). Single and multi-housing waste stream values are 2cy/person in 2004 due to poor infrastructure and economy. As these items improve, the multi-housing waste stream factor reduces to 0.25 cy/person because it is directly affected by the community waste production sources.

If Pinehurst's population growth is half of Kellogg's, its population will be about 150% greater in 2014 at 2,600 residents. Assuming Smelterville and Wardner grow at 33% by 2014, their populations will be about 900 and 400, respectively. In 2014, Kellogg will produce 8,000 cy of small ICP project waste or 1.1 cy per person per year. Applying the same factor to the other cities, whose total population is 3,900, produces a waste stream of 4,300 cy. Combining Kellogg and the other cities produces a total ICP small projects waste stream in 2014 of 12,300 cy per year or a 16% increase.

The City of Kellogg has forecasted that the city's population will approach 15,000 people by 2024. This population increase is provided by significant developments within the hillsides south of Kellogg and east of Pinehurst. Current developments, either approved or in process, are Alhambra, Silver Meadows, Galena Ridge, and Silverhorn Alpine Meadows. These developments alone represent single and multiple housing for 9,000 permanent and seasonal residents. Much of this development is in the Non-Populated Areas, but will have impacts on the Populated Areas. This distinction is not broken out as an assignment of Populated and Non-Populated Areas waste volumes. Rather, it is support information on how growth in the cities will occur and how waste streams will increase with that growth.

Kellogg is anticipated to duplicate its growth pattern between 2014 and 2024. It is reasonable that Pinehurst, Smelterville, and Wardner would also have a similar growth forecast for 2024. With this foundation, the waste stream would incrementally increase by another 33% or 4,000 cy per year. The new total ICP small projects waste stream in 2024 is projected to be about 16,000 cy. For planning purposes, it is assumed that this represents the peak followed by a slow downward trend to 10,000 cy over the subsequent 20 years and then remaining constant.

This trend represents the impacts of continued development over the first 20 years (2004-2024) where small project wastes within the population centers are being encountered for the first time. This timeline is consistent with the schedules of Galena Ridge and the other previously mentioned developments. After 20 years, waste streams should stabilize and lessen as contaminated soils are either replaced with clean soils or development has covered contaminated soils with permanent barriers, i.e. buildings, parking lots. Finally, subsequent small project wastes will likely stabilize after the initial major redevelopment, infrastructure, and Superfund remedy stabilization has been completed.

### *3.2 Development Waste Materials*

Development waste materials refer to the large-scale economic projects that have been initiated around the area that must comply with ICP requirements. Material quantities typically range from 5,000 cy to 40,000 cy or higher per project. These projects may penetrate the entire contamination strata for both the valley floor and hillsides.

Development activity is increasing within the Kellogg area, primarily due to expansion of the Silver Mountain Resort. Development has consisted of condominiums, a water park, golf course/housing, and associated support facilities and infrastructure. Other developments are being planned. Examples include: 1) Building remodeling, i.e. McConnell Hotel, 2) Housing developments, i.e. Brown's Ranch, 3) Condominium development, i.e. Alhambra, and 4) Retail/Commercial development, i.e. Wal-Mart. Excess material for disposal will likely follow the general pattern of Jeld-Wen Silver Mountain Resort Galena Ridge's expansion schedule.

Jeld-Wen has completed its second and third phase of Gondola Base condominiums and is implementing water park. In addition, Jeld-Wen is constructing a Galena Ridge development and golf course south of the McKinley Boulevard area in the vicinity of Deadwood and Magnet Gulches. This effort is anticipated to be completed by 2008. Jeld-Wen's plans are fluid, but the current understanding is that their main development activities should be competed within the next five to ten years. To date, 375 acres of private lands have been identified for development.

Available land for large development will likely be secured within the next couple years with subsequent development somewhat lagging Galena Ridge. For planning purposes, development is assumed to be most active over the next 15 years with a peak between 5 and 10 years.

Waste generation will vary with the different projects. Large projects within the SFCDR floodplain, i.e. Gondola Base expansion, have already demonstrated waste material quantities approaching 40,000 cy per phase. Floodplain materials consist of several categories including soil, sawdust, silt/sand/gravel, cobbles, woody debris, and miscellaneous debris. Hillside development will not have the deep contamination issues, so excess quantities requiring disposal should be much less. Table 2 presents excess material quantities from potential development.

Larger developments provide an opportunity for various degrees of segregation and screening. Currently, large projects involve segregating and reusing excavated materials to reduce hauling and back filling costs. The development carries this cost and provides the most cost-effective opportunity for generating fill material that meets stable gradation and composition requirements. Once a large development is in place, then excess material for ICP disposal from additional development may be more likely.

### *3.3 Infrastructure Waste Generation*

Infrastructure projects are the upgrades and improvements to community systems, such as sewer, water, storm drainage, streets, and flood control. Large quantities of ICP wastes are expected to be generated from these types of projects. Infrastructure projects usually focus on the top 3 ft from the ground surface with utility trenching penetrating up to 10 feet. Large flood control structures, such as the Milo Creek system, may require up to 22 feet of excavation over large areas. In addition to the *in situ* soil/sediment materials, these projects produce a waste stream of debris from the old system being replaced. This waste stream may include concrete, asphalt, piping, and bedding. A common bedding material was slag, a black sand-like byproduct of the smelting process. Excess material quantities have historically ranged between 3,000 cy and 100,000 cy for each project.

Project types relative to waste material generation can be categorized into three areas: 1) Development service connections to existing system, 2) New system installations, and 3) Existing public system upgrades. Projects requiring connections will likely generate small quantities of waste material. New installations refer to utilities such as fiber optics and cable that typically are large projects, but generally don't produce large waste quantities.

The category expected to generate large waste quantities is system upgrades. These projects are replacing the large infrastructure systems that exist within the BHSS and will require large-scale construction. Sewer, water, flood control, drainage, streets, etc., have been in place for 50 to 100 years, but have had little improvement over the last 20 years. These infrastructure systems are critical to facilitating economic redevelopment and ensuring long-term effectiveness of the remedy. Table 4 presents infrastructure project quantities predicted in the *Consolidated Bunker Hill Communities Infrastructure and Revitalization Plan* (TerraGraphics, Revised June, 2006). This plan (IRP) combined local and State infrastructure assessment, planning, quantification, and costing for comprehensive infrastructure upgrade and replacement within the Box. These projects were selected based on current priorities and do not represent all possible projects that will occur over the life of ICP nor all projects that will occur within the rights-of-way, private property, or public property within the OU1 and OU2 areas. The excess waste from the IRP selected projects is estimated to produce 995,000 cy, with 829,000 cy within the OU1 area. These waste volumes do not include flood control projects that have yet to be defined. The IRP projections also reflect the projects identified in 2006 and do not anticipate future projects. Regardless of the specific infrastructure projects, the contaminated material within OU1 and OU2 still exists and is anticipated to produce an excess waste material for disposal once future projects are established that involve those properties and rights-of-way.

Funding these projects is likely cyclic and subject to many factors outside local control. City and county planning and zoning can prioritize projects and work together to plan financial packages, but no community in the Coeur d'Alene Basin has the capacity to fund larger infrastructure projects without State and federal assistance. City and county governments are on annual budget cycles with many competing factors that make sustained financial assistance impossible.

Two projects currently underway and that will contribute to the ICP waste stream are: 1) Smelterville Sewer Collection System Upgrades, and 2) City of Kellogg Railroad Avenue Improvements. These projects are occurring, and will subsequently generate excess material over the next couple of years. Table 4 presents Infrastructure quantities estimated from the IRP. Specific cities are identified and are included in the OU1 (Populated Areas) infrastructure quantity. The Water and Sewer district projects are also partially contained within the cities, and will produce disposal material within OU1. However, for these projects the breakdown between OU1 and OU2 has not been calculated, so the anticipated total OU1 volume will be greater than the 829,000 cy estimate presented earlier. The Appendix contains additional future infrastructure quantities detail.

**Table 4 Infrastructure Anticipated Excess Material Quantities**

| City Infrastructure Disposal Waste Quantities | | | |
|---|---|---|---|
| **Location** | | **Total Waste (cy)** | **OU1 / OU2** |
| **Shoshone County Water District** | | 39,000 | mix |
| **South Fork Sewer System** | | 19,000 | mix |
| **City of Pinehurst** | | 267,000 | OU1 |
| **City of Kellogg** | | 444,000 | OU1 |
| **City of Wardner** | | 37,000 | OU1 |
| **City of Smelterville** | | 81,000 | OU1 |
| **Business Centers** | | 44,000 | OU2 |
| **Development Centers** | | 64,000 | OU2 |
| | **Total** | **995,000** | |

### *3.4 Catastrophic Events*

Another source of disposal material will come from catastrophic events that impact the remedy or deposit contaminated material within the Superfund Site. All these materials will fall within the ICP waste management rules and must comply with the ROD, including clean-up and disposal if lead concentrations exceed 1,000 ppm or remedies, i.e. barriers, have been damaged.

Catastrophic events have historically occurred within the Silver Valley. These events cause significant damage to humans, property, and infrastructure. They typically consist of large floods; however, the 1910 wildfire remains one of the largest catastrophes in the country. Large flood events are documented in 1932, 1948, 1956, 1974, 1996, and 1997. The 1997 flood resulted in recontamination of remediated properties and destruction of existing infrastructure within Kellogg and Wardner. An emergency response by FEMA, the State Bureau of Disaster Services, and the U.S. Army Corps of Engineers resulted in a $16M flood control and infrastructure project. This flood event resulted in elevated lead levels in children's blood; damage to the Milo Creek conveyance system; and contamination of 50 properties, five-miles of public rights-of-way within Kellogg, and 20 additional properties throughout the three-mile project site. The immediate emergency response produced 20,000 cy of excess material and the main project produced over 100,000 cy of excess material for disposal. The permanent improvement project contained an additional 50,000 cy on-site by adjusting grading and capping at the hydraulic structure sites. Similar large-scale reconstruction projects also provide this same opportunity for incorporating waste materials into the project.

The BHSS has several areas susceptible to flooding that are subject to ICP disposal under the BHSS Record of Decision. The risk exists for catastrophic events recontaminating the community, thus impacting and potentially destroying Superfund remedies. Example areas of concern for catastrophic events include the following:

1. Pine Creek (Pinehurst) – Levee failure and flooding leading to large-scale recontamination of remedies and damage to infrastructure and property.
2. Little Pine Creek (Pinehurst) – Flooding.
3. Grouse Creek (Smelterville) – Conveyance failure and flooding leading to large-scale recontamination of remedies and damage to infrastructure and property.
4. Upper Wardner Mine Dumps (Wardner) – Mine dump failure and sloughing into community.
5. South Fork Coeur d'Alene River (Kellogg/Smelterville) – Floodway designation through Kellogg and Wardner. Flooding leading to large-scale recontamination of remedies and damage to infrastructure and property.
6. BHSS Drainage System (Kellogg/Smelterville/Pinehurst) – The Bunker Creek outlet is undersized. As area develops, Bunker Creek channel remains undersized and risks damage within corridor and insufficient capacity to properly drain Kellogg. Neither Smelterville nor Pinehurst has a functional drainage system. A distinct flooding risk exists for these cities that would recontaminate remedies and damage infrastructure and property.

Quantification of catastrophic events is difficult. Using Milo Creek (1997), Grouse Creek

(1986), Pine Creek (1974), and the proposed FEMA floodplain maps (see Appendix), an order of magnitude quantity matrix is presented below in Table 5.

**Table 5 Catastrophic Event Waste Material Matrix**

| Location | Affected Area | Impact | Material Quantity |
|---|---|---|---|
| Pine Creek | Pinehurst | Remediated Properties – 10 ac<br>ROW – 5 ac | 27,000 cy |
| Grouse Creek | Smelterville | Remediated Properties – 5 ac<br>ROW – 2 ac | 13,000 cy |
| Box drainage | Kellogg<br>Smelterville | Remediated Properties – 10 ac<br>ROW – 5 ac | 27,000 cy |
| SFCDR | Kellogg<br>Smelterville | Remediated Properties – 10 ac<br>ROW – 5 ac | 27,000 cy |

* These quantities are focused within the Populated Areas.

Impacts to Superfund remedies within the communities typically focus on barriers. Impacts can occur through deposition of contaminated sediments, scour of barriers into underlying contaminated materials, and redistribution of scoured materials onto adjacent barriers. Recontaminated barriers that are not damaged will require replacement. Eroded barriers will disperse materials that may impact large areas that will be requiring re-remediation and disposal of this larger area. Surface water and flood control systems within a community play a major role in how recontamination would occur. Table 5 assumes disposal quantities equal to the barrier thickness plus an additional percentage depending on the type of city control systems. Table 5 quantities are based on flood pathways into the communities of Pinehurst, Smelterville, and Kellogg. Barrier replacement and re-remediation is based on all properties that contact floodwaters and undersized drainage. This is a particular problem in Pinehurst and Smelterville as neither city has a local drainage system. Pinehurst's Division Street has a storm water collection pipe; however, the outlet is blocked by a flap gate with Pine Creek flowing higher than Little Pine Creek (drainage outlet) most of the time during higher storm events.

FEMA is expanding the floodplain and flood impact areas. Control and restriction within the floodplain is likely to increase. These maps illustrate the increased concern and risk management of flood impacts within the Silver Valley and BHSS.

Other site features within the BHSS may cause local flood impacts from contaminated sediments or erosion of the barrier system resulting requiring additional disposal. Two examples are: 1) side drainages around north Kellogg, and 2) Little Pine Creek around Pinehurst. Barrier impacts may occur at dozens of residences and rights-of-way.

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Coeur d A'lene Basin RI/FS (URSG and CH2M HILL 2001)

# APPENDIX A

## Explanation of Anticipated Remediation Depths and Percentages

## Support Quantification Tables from IRP

## FEMA Floodplain Map

## ICP White Paper

# Explanation of Anticipated Remediation Depths and Percentages

Explanation of Anticipated Remediation Depths and Percentages for Populated Areas

- Populated Areas
  - Property remediation classification:
    - Remediated Property: Assume that 10% of the property will need to be excavated at some point. The average depth is 4 ft. This averages structures with and without basements, with greater weighting for structures without basements because of the nature of the floodplain.
    - Gravel or Dirt Caps: Gravel: Driveways, Dirt: Non-residential (e.g. Gardens) Depth: Shallow removal of unsuitable materials consistent with current land use.
    - No remediation required: Soil lead concentration below action level.
    - No action taken/ Remaining: Precursor activities not complete or (possibly alleys in use). Unremediated properties that are anticipated to require some action outside the yard program. No barrier required because area wide average lead concentration is 350 ppm, shallow removal for disposal still anticipated.
    - Owner refused remediation: 100% of the property will still require remediation to a 1ft depth.
  - Street/Alley classification:
    - Roads- Paved: 60% of a road's right-of-way is assumed to be pavement and will need to be removed when the pavement is replaced. This will be removed to a depth of 3 ft.
    - Paved Parking/Access: 100% removed to a depth of 2 ft is assumed because of limited utilities and engineering requirements.
    - Gravel or dirt: 60% of gravel or dirt road will be replaced, to a depth of 1ft.
  - Development Areas Classification:
    - Commercial areas: Commercial property will be excavated to bottom of contamination, or no more than 7ft. 25% of the property's footprint (area) will need to be excavated.
  - Other Classifications"
    - Structures – Bridges, other civil structures
    - Pavement – All parking lots or other (non-road) pavement will be removed and replaced at some point in their history.
    - SFCDR Levees
    - Milo Creek
    - Levee (Pinehurst)
    - Pine Creek/Little Pine Creek (Pinehurst)

## IRP Infrastructure Disposal Waste Quantities

| Location | Quantity | Unit | Waste/Unit | Total Waste (CY) |
|---|---|---|---|---|
| **Shoshone County Water District** | | | | |
| Enaville Well Filtration Plant | 1 | LS | 525 | 525 |
| Upgrade Transmission Line 18-in | 31,680 | LF | 0.7 | 22,176 |
| Smelterville Water Line Upgrades | 10,000 | LF | 0.6 | 6,000 |
| Smelterville Restoration | 10,000 | LF | | 0 |
| Smelterville Utility Conflicts | 10,000 | LF | | 0 |
| 100,000 gal Water Storage Tank | 2 | EA | 525 | 1,050 |
| Localized Water Transmission Main Upgrades | 10,000 | LF | 0.6 | 6,000 |
| Localized Surface Restoration | 10,000 | LF | 0.15 | 1,500 |
| Localized Utility Conflicts | 10,000 | LF | 0.2 | 2,000 |
| | | | **Sub-Total** | **39,251** |
| **South Fork Sewer System** | | | | |
| Pinehurst Lift Station | 1 | LS | 40 | 40 |
| Silverton Sewer Collection Upgrade | 9,150 | LF | 0.6 | 5,490 |
| Wallace Sewer Collection Upgrade - High Priority | 5,650 | LF | 0.6 | 3,390 |
| Wallace Sewer Collection Upgrade - Second Priority | 16,150 | LF | 0.6 | 9,690 |
| | | | **Sub-Total** | **18,610** |
| **City of Pinehurst** | | | | |
| Storm Drain System | 18,300 | LF | 0.6 | 11,300 |
| Wetland Storage | 1 | LS | 6500 | 6,500 |
| Surface Water Treatment | 1 | LS | 6500 | 6,500 |
| *Pine Creek* | | | | |
| Levee Upgrade | 5,000 | LF | 1 | 5,000 |
| Channel/Alignment Reconfiguration | 5,000 | LF | 2 | 10,000 |
| *Little Pine Creek* | | | | |
| Channel Upgrades | 4,000 | LF | 2 | 8,000 |
| Street and Alleyway Replacement 2 ft 60% of ROW | 116 | AC | 1900 | 220,000 |
| | | | **Sub-Total** | **267,300** |
| **City of Kellogg** | | | | |
| Sewer System | 24,000 | LF | 0.6 | 14,400 |
| Streets 24 ft | 80,000 | SY | 1 | 80,000 |
| Storm Drain System | 20,000 | LF | 0.5 | 10,000 |
| Curb | 10,000 | LF | 0.1 | 1,000 |
| Local Improvements | 10,000 | LS | 0.1 | 1,000 |
| Water Line Upgrades | 12,000 | LF | 0.6 | 7,200 |
| Flood Conveyance (B.C./Hill St.) | 3,000 | LS | 1 | 3,000 |
| Alleyways 12 ft | 26,667 | SY | 0.5 | 13,334 |
| Street and Alleyway Replacement 2 ft 60% of ROW | 165 | AC | 1900 | 314,000 |
| | | | **Sub-Total** | **443,934** |

## City of Wardner

| | | | | |
|---|---|---|---|---|
| Streets - 24ft | 3,000 | LF | 1 | 3,000 |
| Storm Drain System | 3,000 | LF | 0.5 | 1,500 |
| Curb | 3,000 | LF | 0.1 | 300 |
| Street and Alleyway Replacement 2 ft 60% of ROW | 17 | AC | 1900 | 32,000 |
| | | | **Sub-Total** | **36,800** |

## City of Smelterville

| | | | | |
|---|---|---|---|---|
| *Storm Sewer System* | | | | |
| City Collection System | 1 | LS | | 0 |
| Outfall | 300 | LF | 0.7 | 210 |
| Street/Curb/Gutter | 10,000 | LF | 1.2 | 12,000 |
| Hillside Drainage Control | 10,000 | LF | 2 | 20,000 |
| *Grouse Creek Improvements* | | | | |
| City Channel | 5000 | LS | 1 | 5,000 |
| Channel and Culverts to Discharge | 5000 | LS | 2 | 10,000 |
| *Sewer System* | | | | |
| Remove and Replace Sewer System | 20,500 | LF | 0.6 | 12,300 |
| Street/Curb/Gutter | 10000 | LS | 1.5 | 15,000 |
| Lagoon Pump Station | 1 | LS | 40 | 40 |
| *Downtown Revitalization* | | | | |
| Asphalt Replacement | 10,000 | LF | 0.5 | 5,000 |
| Downtown Improvements | 5000 | LF | 0.2 | 1,000 |
| | | | **Sub-Total** | **81,000** |

**Development Center Infrastructure Disposal Waste Quantities**

| Location | Quantity | Unit | Waste/Unit | Total Waste (CY) |
|---|---|---|---|---|
| **Business Centers** | | | | |
| *South I-90* | | | | |
| Sewer lines | 5,500 | LF | 0.6 | 3,300 |
| Streets - 24ft | 4,000 | LF | 1 | 4,000 |
| Storm Drain System | 5,500 | LF | 0.5 | 2,750 |
| Curb | 5,500 | LF | 0.1 | 550 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Boulevard* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Curb | 2,000 | LF | 0.1 | 200 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Kellogg* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Curb | 2,000 | LF | 0.1 | 200 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Smelterville* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |

| | | | | |
|---|---|---|---|---|
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Pinehurst* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *County* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| | | | **Sub-Total** | **44,000** |

## Development Centers

| | | | | |
|---|---|---|---|---|
| *Government Gulch* | | | | |
| Sewer lines | 5,500 | LF | 0.6 | 3,300 |
| Streets - 24ft | 4,000 | LF | 1 | 4,000 |
| Storm Drain System | 5,500 | LF | 0.5 | 2,750 |
| Curb | 5,500 | LF | 0.1 | 550 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Boulevard* | | | | |
| Sewer lines | 8,500 | LF | 0.6 | 5,100 |
| Streets - 24ft | 8,000 | LF | 1 | 8,000 |
| Storm Drain System | 8,500 | LF | 0.5 | 4,250 |
| Curb | 8,500 | LF | 0.1 | 850 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Hillsides* | | | | |
| Sewer lines | 5,500 | LF | 0.6 | 3,300 |
| Streets - 24ft | 4,000 | LF | 1 | 4,000 |
| Storm Drain System | 5,500 | LF | 0.5 | 2,750 |
| Curb | 5,500 | LF | 0.1 | 550 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *CIA* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *SPA* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| *Smelterville Flats* | | | | |
| Sewer lines | 2,000 | LF | 0.6 | 1,200 |
| Streets - 24ft | 2,000 | LF | 1 | 2,000 |
| Storm Drain System | 2,000 | LF | 0.5 | 1,000 |
| Local Improvements | 20,000 | SY | 0.1 | 2,000 |
| | | | **Sub-Total** | **64,000** |

| IRP City Infrastructure Disposal Waste Quantities | |
|---|---|
| **Location** | **Total Waste (CY)** |
| **Shoshone County Water District** | 39,000 |
| **South Fork Sewer System** | 19,000 |
| **City of Pinehurst** | 267,000 |
| **City of Kellogg** | 444,000 |
| **City of Wardner** | 37,000 |
| **City of Smelterville** | 81,000 |
| **Business Centers** | 44,000 |
| **Development Centers** | 64,000 |
| **Total** | **995,000** |

IRP Projects do not include all potential infrastructure or street replacement projects where contaminated soils exist within the Populated Areas

**Table A-4Summary of Contaminant Source Areas in OU2**

| Area | Pre-Remediation Contaminated[a] Material (cubic yards) | Contaminated Material Removed (cubic yards) | Repository | Contaminated Material Added (cubic yards) | Contaminated Material Remaining (cy) | Contaminated Material Below Impermeable Cap (cy) | Uncertainty[b] |
|---|---|---|---|---|---|---|---|
| Hillsides | 1,000,000 | 0 | | 0 | 1,000,000 | NA | Low |
| Government Gulch[d] | 760,000 | 370,000 | SCA | 0 | 390,000 | NA | Low |
| Grouse Creek[d] | 5,000 | 5,000 | SCA | 0 | 0[e] | NA | Medium |
| Magnet Gulch[d] | 230,000 | 210,000 | SCA | 0 | 20,000 | NA | Low |
| Deadwood Gulch[d] | 490,000 | 490,000 | CIA | 0 | 0[e] | NA | Low |
| Smelterville Flats | | | | | | | |
| areas with removal[d] | 2,030,000 | 1,600,000 | CIA | 0 | 430,000 | NA | Low |
| areas with no removal (including airport)[d] | 2,220,000 | 0 | | 0 | 2,220,000 | NA | Medium |
| CIA[n] | | | | | | | |
| above valley floor | 25,650,000 | NA | | 2,430,000 | 0 | 28,080,000 | Low |
| below valley floor | 2,570,000 | 0 | | 0 | 2,570,000 | NA | Medium |
| Slag Pile Area (SPA) | 90,000 | 0[f] | | 170,000[m] | 260,000 | NA | Medium |
| Page Ponds area | | | | | | | |
| Page Tailings Site[g] | 2,800,000 | 0 | | 390,000 | 3,190,000 | NA | Low |
| East Page Swamp | 90,000 | 0 | | 0 | 90,000 | NA | Medium |
| West Page Swamp | 220,000 | 40,000 | Page | 380,000 | 560,000 | NA | Medium |
| Smelter Closure Area[n] | | | | | | | |
| area with impermeable cap[d] | 150,000 | 0 | | 680,000 | 0 | 830,000 | High |
| area without impermeable cap[d] | 170,000 | 20,000 | SCA | 0 | 150,000 | NA | High |
| Borrow Area Landfill | 0 | 0 | | 190,000 | 190,000 | NA | Medium |
| Boulevard[d] | 90,000 | 40,000 | SCA | 0 | 50,000 | NA | Low |

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|---|---|---|---|---|---|---|---|
| Mine Operations Area[h] | 100,000 | 10,000 | CIA | 0 | 90,000 | NA | High |
| Industrial Landfills/Railroad Gulch | 90,000 | 80,000 | ⅔ CIA / ⅓ BAL | 0 | 10,000 | NA | High |
| CTP area[i] | 260,000 | 0 | | 0 | 260,000 | NA | Low |
| Bunker Creek[d] | 190,000 | 80,000 | SCA/CIA | 0 | 110,000 | NA | Low |
| UPRR[c] | 500,000 | 50,000 | CIA | 0 | 450,000 | NA | High |
| Milo Creek/Reed Landing[c] | 150,000 | 40,000 | Milo | 40,000 | 150,000 | NA | High |
| A-4 Gypsum Pond[j] | | | | | | | |
| within Gypsum Pond | 800,000[j] | 100,000[j] | | 0 | 800,000[j] | NA | Low |
| under Gypsum Pond[h] | 100,000 | 0 | | 0 | 100,000 | NA | High |
| SFCDR | 390,000 | 180,000 | CIA | 0 | 210,000 | NA | High |
| *Populated Areas* | | | | | | | |
| *Smelterville*[c,k] | 1,200,000 | 80,000 | Page | 0 | 1,120,000 | NA | High |
| *Kellogg*[c,k] | 4,510,000 | 440,000 | Page | 0 | 4,070,000 | NA | High |
| *Wardner*[c,k] | 210,000 | 60,000 | Page | 0 | 150,000 | NA | High |
| *ICP* | NA | 260,000 | Page | 0 | | NA | Medium |
| *I-90 Corridor*[l] | 2,580,000 | 0 | | 0 | 2,580,000 | NA | High |
| **Total** | 48,845,000 | 4,055,000 | | 4,110,000 | 20,420,000 | 28,910,000 | |

[a]"Contaminated" refers to material with lead concentration exceeding 1,000 mg/kg.

[b] The uncertainty is related to the detail of subsurface information for the areas. A "low" uncertainty is listed for those sites where soil chemistry data or non-existent.

[c]Information taken from *The Role of Community Infrastructure in the Cleanup Bunker Hill* Superfund Site - Issue Analysis and Whitepaper (TerraGraphics and PHD, 2005).

[d]Information taken from the *Final Phase I Remedial Action Characterization Report for the Bunker Hill*

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|---|---|---|---|---|---|---|---|

Mining and Metallurgical Complex Operable Unit 2 (TerraGraphics and Ralston, 2006)

[e]Contamination remaining is unknown, but is believed to be small.

[f]Contaminated material was brought to this area for consolidation.

[g]Information taken from *Preliminary Hydrogeologic Evaluation of the Page Pond Site* (Ralston and TerraGraphics, 2007).

[h]Depth used is an assumption due to lack of available information.

[i]Depth based on information from Bunker Creek test pits.

[j]Gypsum waste not included in total.

[k]Approximate volumes of material removed as part of the yard cleanup program were estimated based on amount of material taken to the Page Pond Site from 1995 to 2005, and also include Pinehurst.

[l]Includes material added for roadbase/embankment.

[m]This material was brought in from outside OU2 and is not included in the total volume.

[n]These areas also contain an unknown amount of demolition debris that is not included in the volume of material under the impermeable cap.