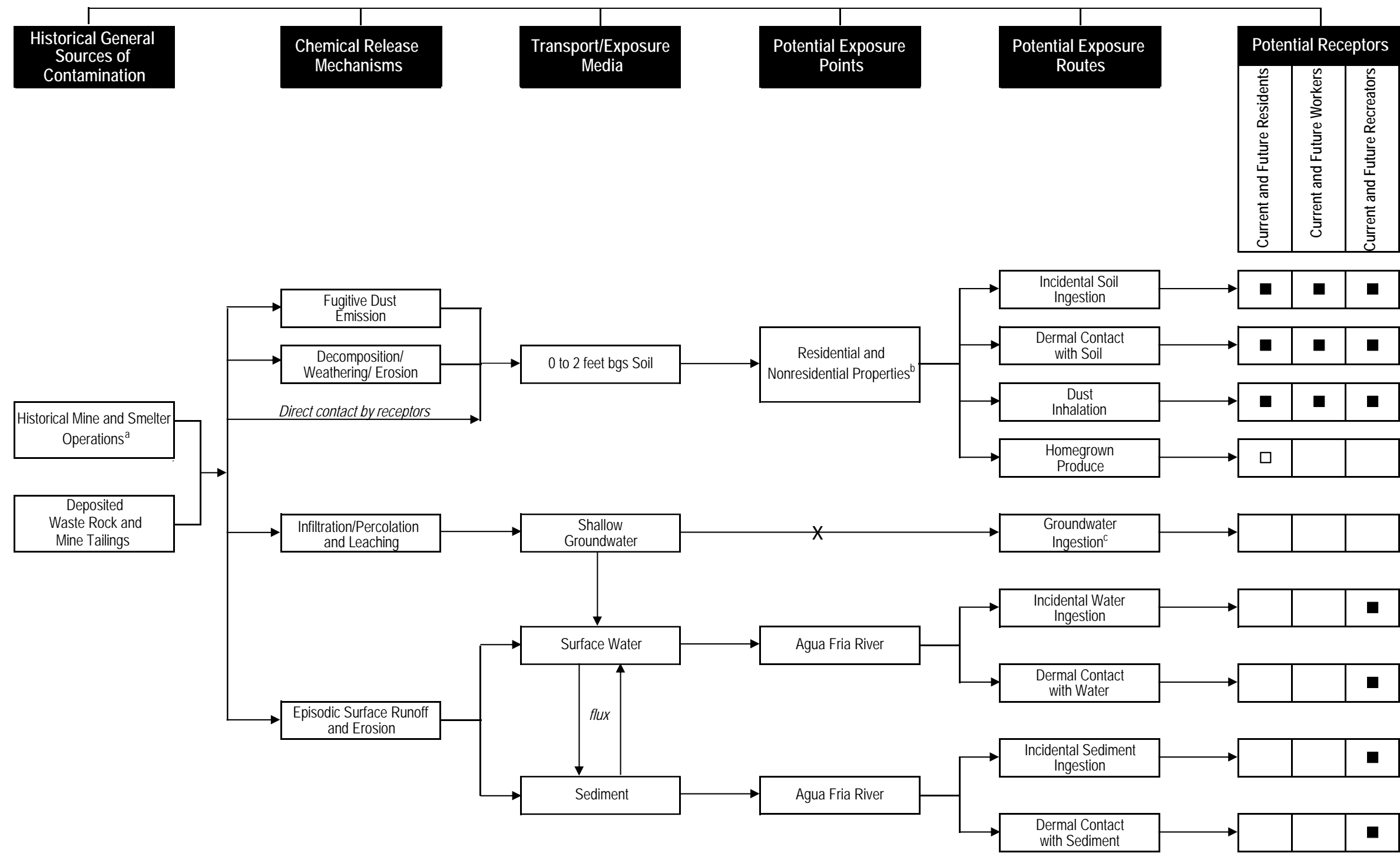


Elements of a Complete Exposure Pathway



**Notes:**

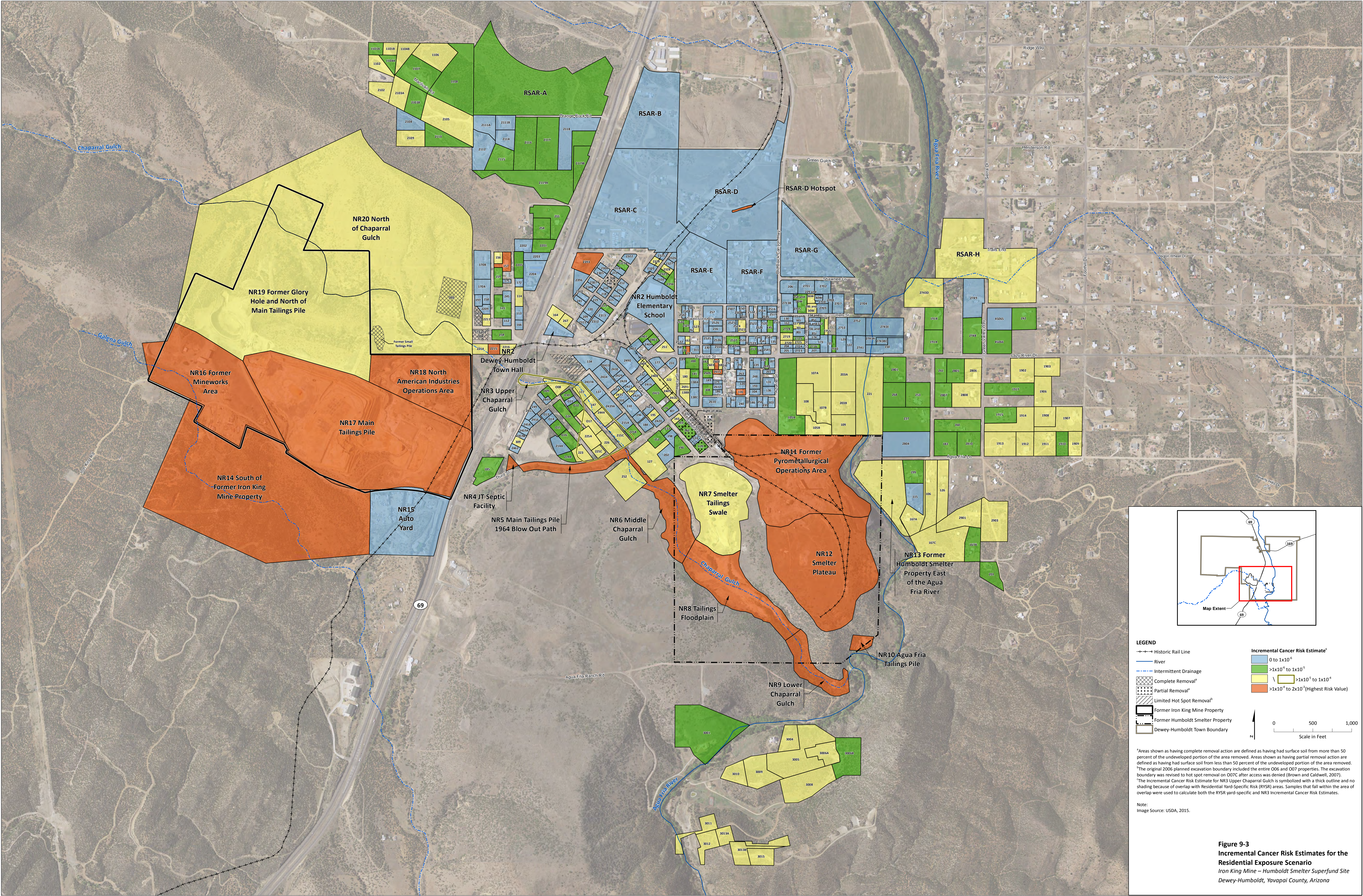
- = Potentially complete pathway quantitatively evaluated in the Baseline Human Health Risk Assessment
- = Minor pathway quantitatively evaluated in the Baseline Human Health Risk Assessment
- Blank = Incomplete pathway
- <sup>a</sup>. Includes tailings, ash, slag, building debris, and other sources associated with historical mining and smelter operations.
- <sup>b</sup>. Residential exposure scenario is evaluated for all exposure areas; worker and recreator exposure scenarios are evaluated for all non-residential exposure areas (See Table 9-1).
- <sup>c</sup>. Groundwater data were not evaluated as part of the human health risk assessment because (1) site-related impacts to groundwater appear to be confined to the former Iron King Mine and Humboldt Smelter properties and the area between them, and (2) regional groundwater quality includes naturally elevated arsenic, and local domestic water quality may be affected by septic systems and other non-mine related activity (See Section 5.5.6 and Section 7.6).

**Figure 9-1**  
**Conceptual Site Model for Potential Human Exposures**  
Iron King Mine – Humboldt Smelter Superfund Site  
Dewey-Humboldt, Yavapai County, Arizona









**LEGEND**

--- Historic Rail Line  
— River  
- - - Intermittent Drainage  
Complete Removal<sup>a</sup>  
Partial Removal<sup>b</sup>  
Limited Hot Spot Removal<sup>c</sup>  
Former Iron King Mine Property  
Former Humboldt Smelter Property  
Dewey-Humboldt Town Boundary

**Incremental Cancer Risk Estimate<sup>d</sup>**

0 to 1x10<sup>-6</sup>  
>1x10<sup>-6</sup> to 1x10<sup>-5</sup>  
>1x10<sup>-5</sup> to 1x10<sup>-4</sup>  
>1x10<sup>-4</sup> to 2x10<sup>-3</sup> (Highest Risk Value)

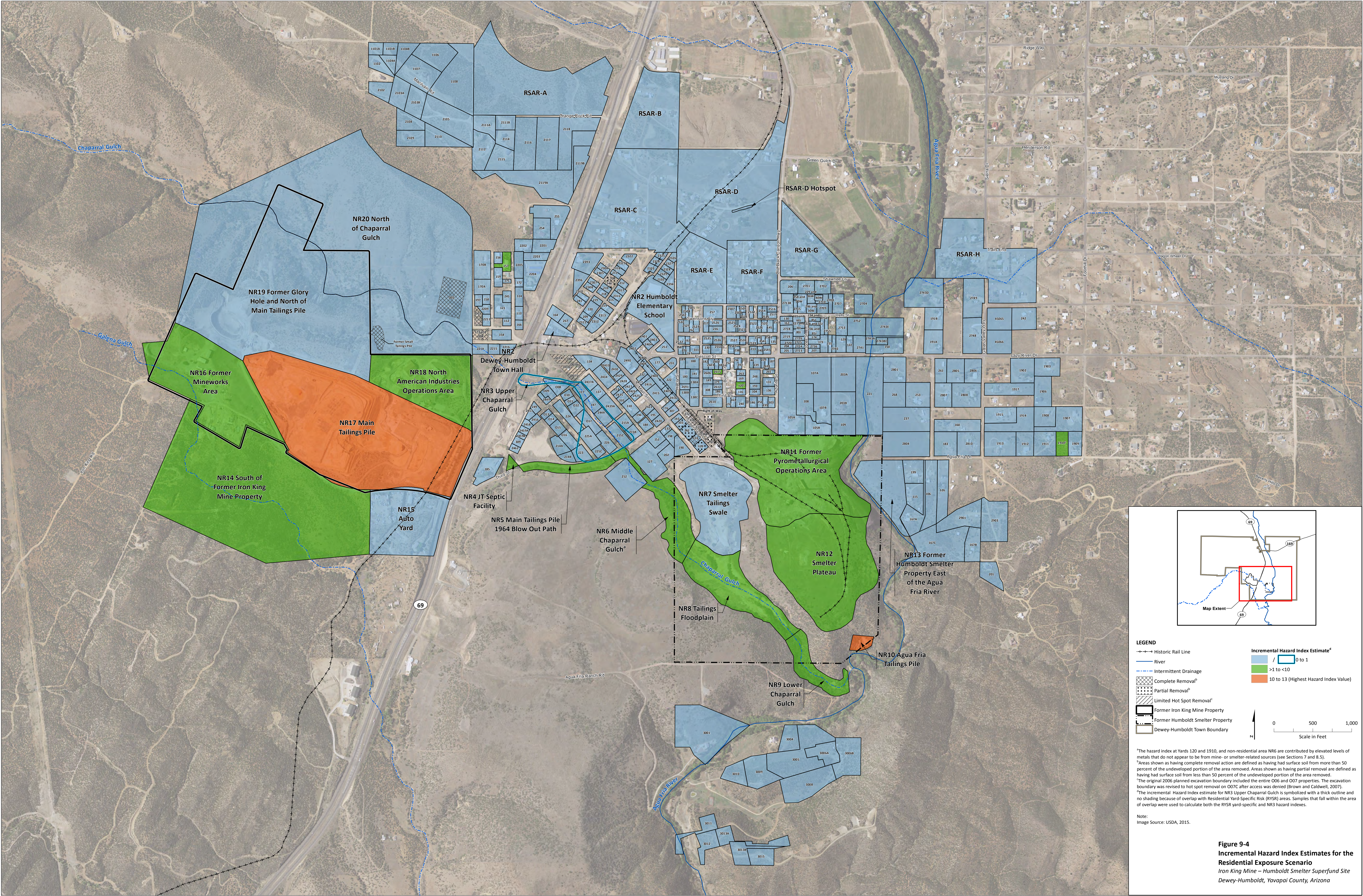
0 500 1,000  
Scale in Feet

<sup>a</sup>Areas shown as having complete removal action are defined as having had surface soil from more than 50 percent of the undeveloped portion of the area removed. Areas shown as having partial removal action are defined as having had surface soil from less than 50 percent of the undeveloped portion of the area removed.  
<sup>b</sup>The original 2006 planned excavation boundary included the entire O06 and O07 properties. The excavation boundary was revised to hot spot removal on O07C after access was denied (Brown and Caldwell, 2007).  
<sup>c</sup>The Incremental Cancer Risk Estimate for NR3 Upper Chaparral Gulch is symbolized with a thick outline and no shading because of overlap with Residential Yard-Specific Risk (RYSR) areas. Samples that fall within the area of overlap were used to calculate both the RYSR yard-specific and NR3 Incremental Cancer Risk Estimates.

Note:  
Image Source: USDA, 2015.

**Figure 9-3**  
**Incremental Cancer Risk Estimates for the Residential Exposure Scenario**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*





**LEGEND**

- Historic Rail Line
- River
- Intermittent Drainage
- Complete Removal<sup>a</sup>
- Partial Removal<sup>b</sup>
- Limited Hot Spot Removal<sup>c</sup>
- Former Iron King Mine Property
- Former Humboldt Smelter Property
- Dewey-Humboldt Town Boundary

**Incremental Hazard Index Estimate<sup>d</sup>**

- 0 to 1
- >1 to <10
- 10 to 13 (Highest Hazard Index Value)

Scale in Feet: 0, 500, 1,000

<sup>a</sup>The hazard index at Yards 120 and 1910, and non-residential area NR6 are contributed by elevated levels of metals that do not appear to be from mine- or smelter-related sources (see Sections 7 and 8.5).

<sup>b</sup>Areas shown as having complete removal action are defined as having had surface soil from more than 50 percent of the undeveloped portion of the area removed. Areas shown as having partial removal are defined as having had surface soil from less than 50 percent of the undeveloped portion of the area removed.

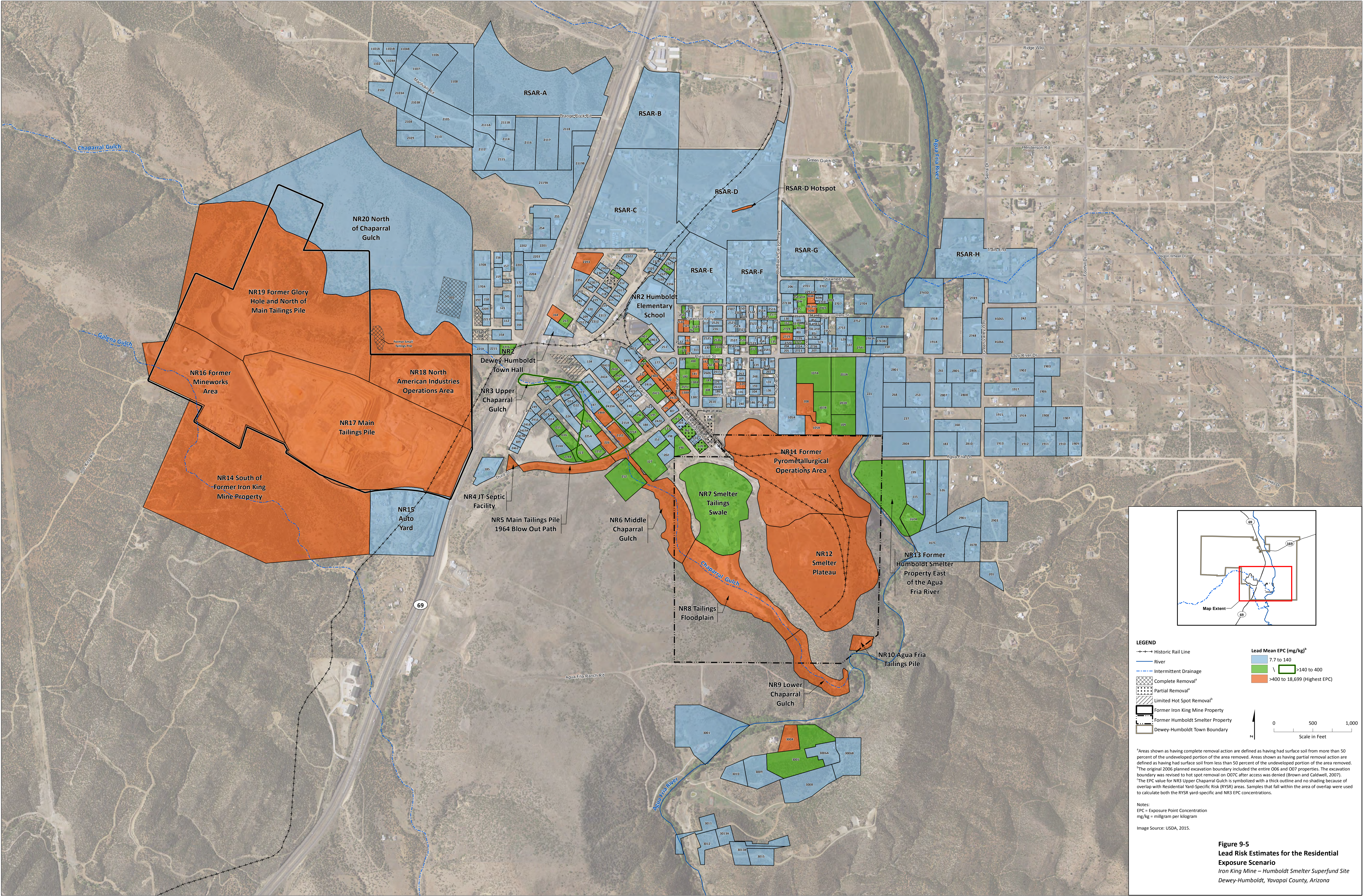
<sup>c</sup>The original 2006 planned excavation boundary included the entire O06 and O07 properties. The excavation boundary was revised to hot spot removal on O07C after access was denied (Brown and Caldwell, 2007).

<sup>d</sup>The incremental Hazard Index estimate for NR3 Upper Chaparral Gulch is symbolized with a thick outline and no shading because of overlap with Residential Yard-Specific Risk (RYSR) areas. Samples that fall within the area of overlap were used to calculate both the RYSR yard-specific and NR3 hazard indexes.

Note:  
Image Source: USDA, 2015.

**Figure 9-4**  
**Incremental Hazard Index Estimates for the Residential Exposure Scenario**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*





**LEGEND**

- Historic Rail Line
- River
- Intermittent Drainage
- Complete Removal<sup>a</sup>
- Partial Removal<sup>b</sup>
- Limited Hot Spot Removal<sup>c</sup>
- Former Iron King Mine Property
- Former Humboldt Smelter Property
- Dewey-Humboldt Town Boundary

**Lead Mean EPC (mg/kg)<sup>d</sup>**

- 7.7 to 140
- >140 to 400
- >400 to 18,699 (Highest EPC)

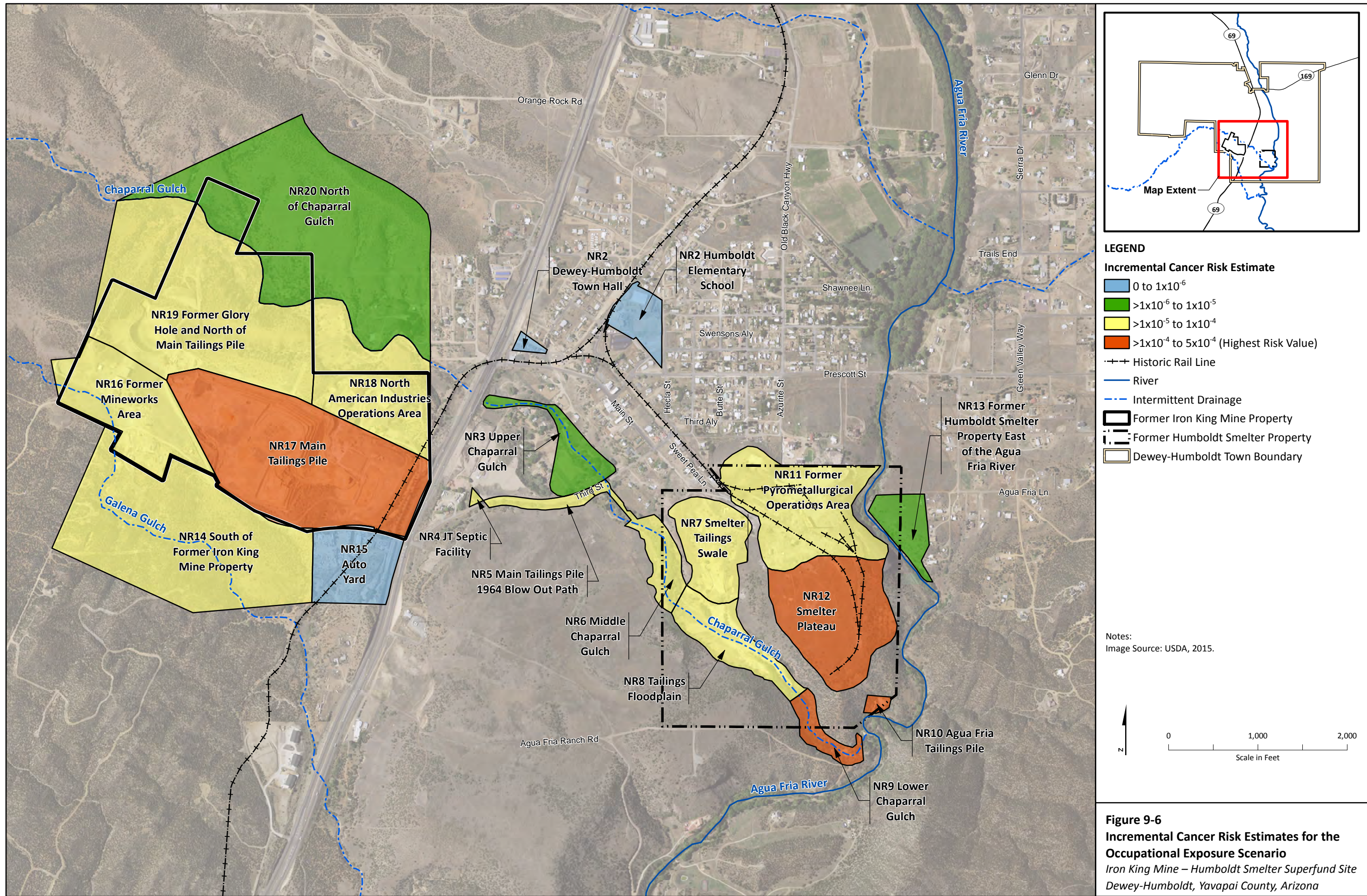
0 500 1,000  
Scale in Feet

<sup>a</sup>Areas shown as having complete removal action are defined as having had surface soil from more than 50 percent of the undeveloped portion of the area removed. Areas shown as having partial removal action are defined as having had surface soil from less than 50 percent of the undeveloped portion of the area removed.  
<sup>b</sup>The original 2006 planned excavation boundary included the entire O06 and O07 properties. The excavation boundary was revised to hot spot removal on O07C after access was denied (Brown and Caldwell, 2007).  
<sup>c</sup>The EPC value for NR3 Upper Chaparral Gulch is symbolized with a thick outline and no shading because of overlap with Residential Yard-Specific Risk (RYSR) areas. Samples that fall within the area of overlap were used to calculate both the RYSR yard-specific and NR3 EPC concentrations.

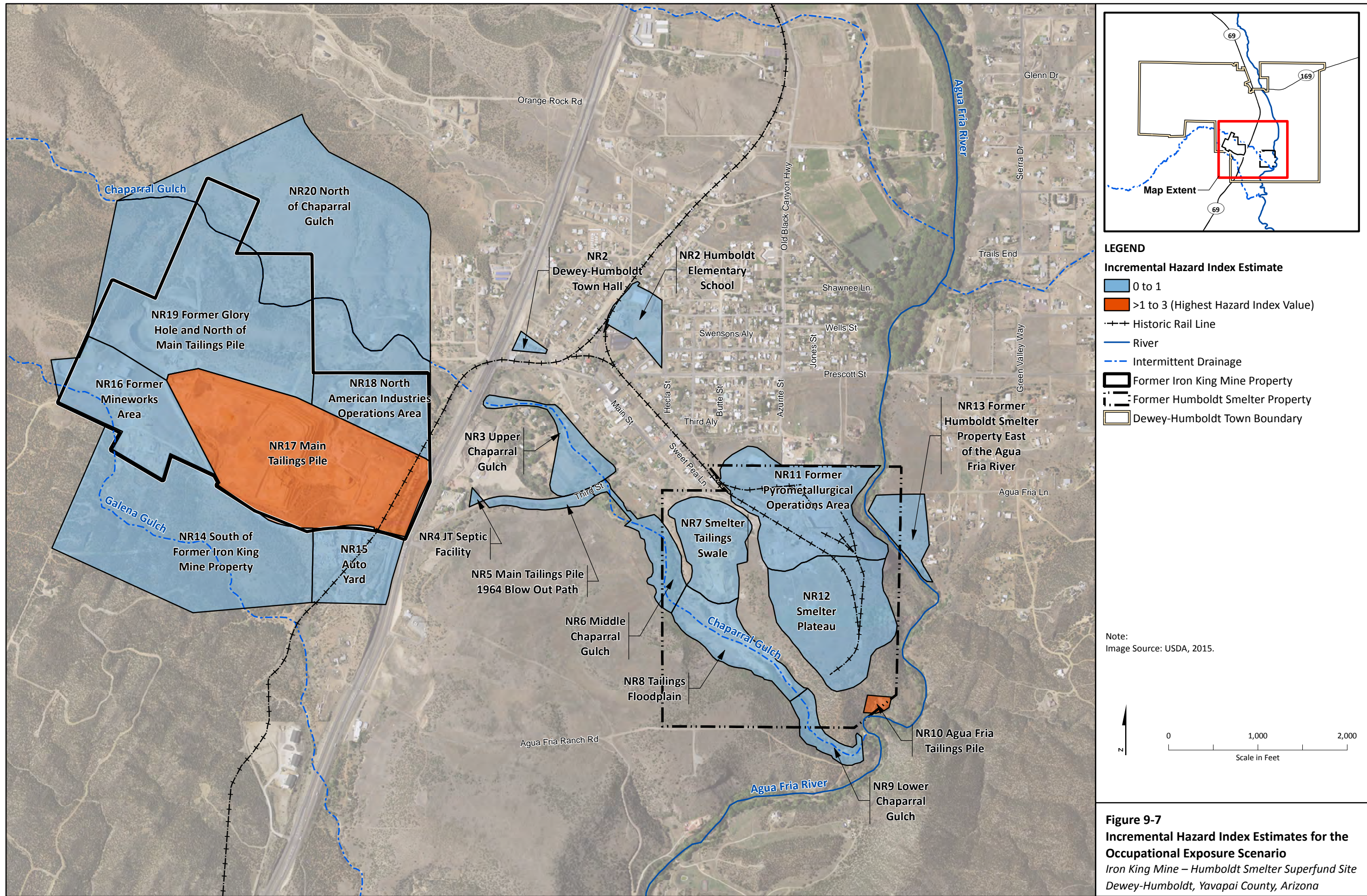
Notes:  
EPC = Exposure Point Concentration  
mg/kg = milligram per kilogram  
Image Source: USDA, 2015.

**Figure 9-5**  
**Lead Risk Estimates for the Residential Exposure Scenario**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*

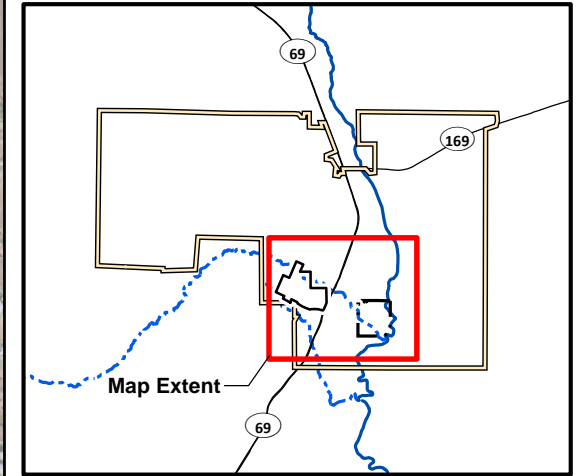
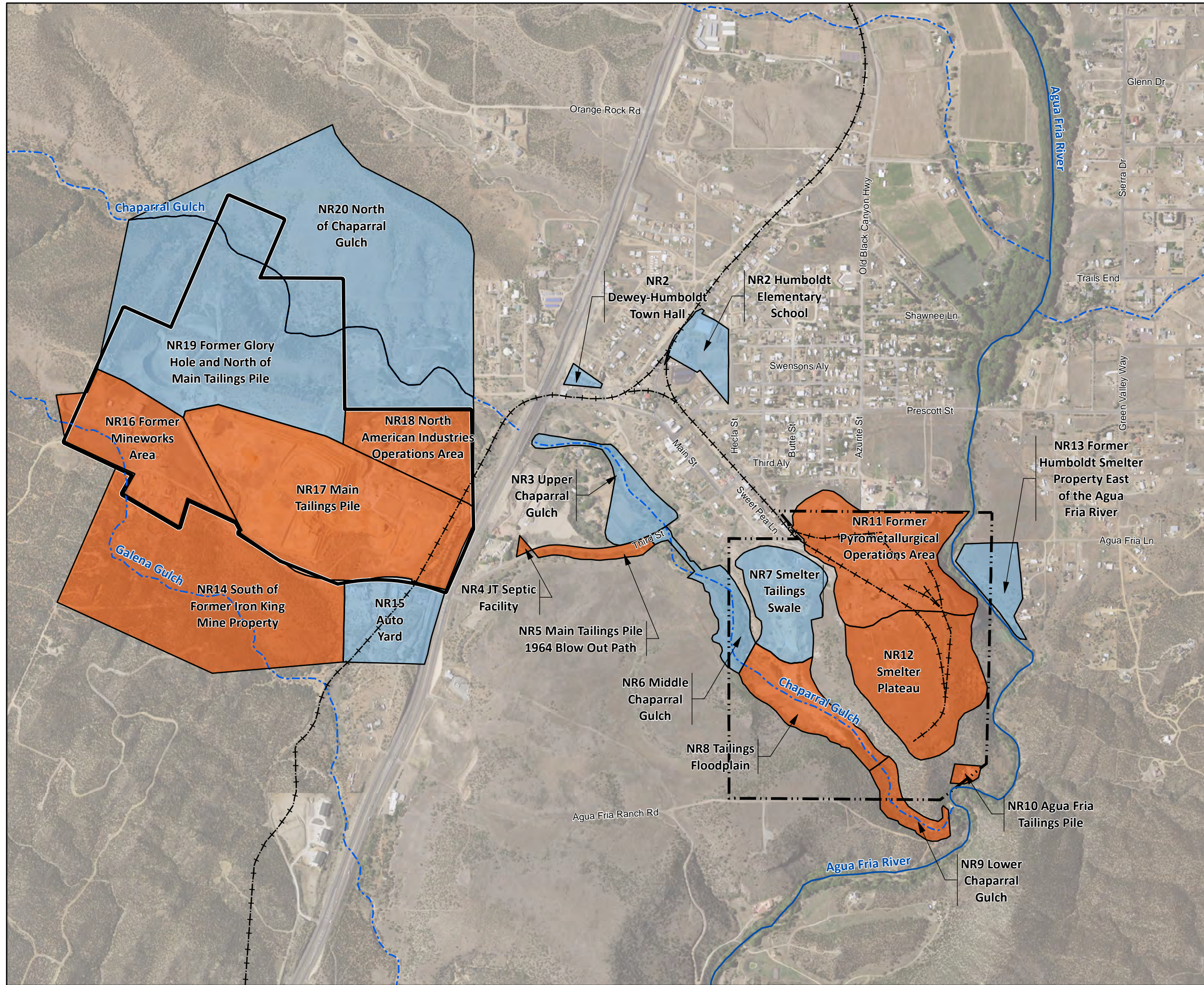












**LEGEND**

**Lead EPC (mg/kg)**

- 18.4 to 800
- >800 to 8,726 (Highest EPC)

--- Historic Rail Line

— River

- - - Intermittent Drainage

▭ Former Iron King Mine Property

- - - Former Humboldt Smelter Property

▭ Dewey-Humboldt Town Boundary

Notes:  
EPC = Exposure Point Concentration

Image Source: USDA, 2015.

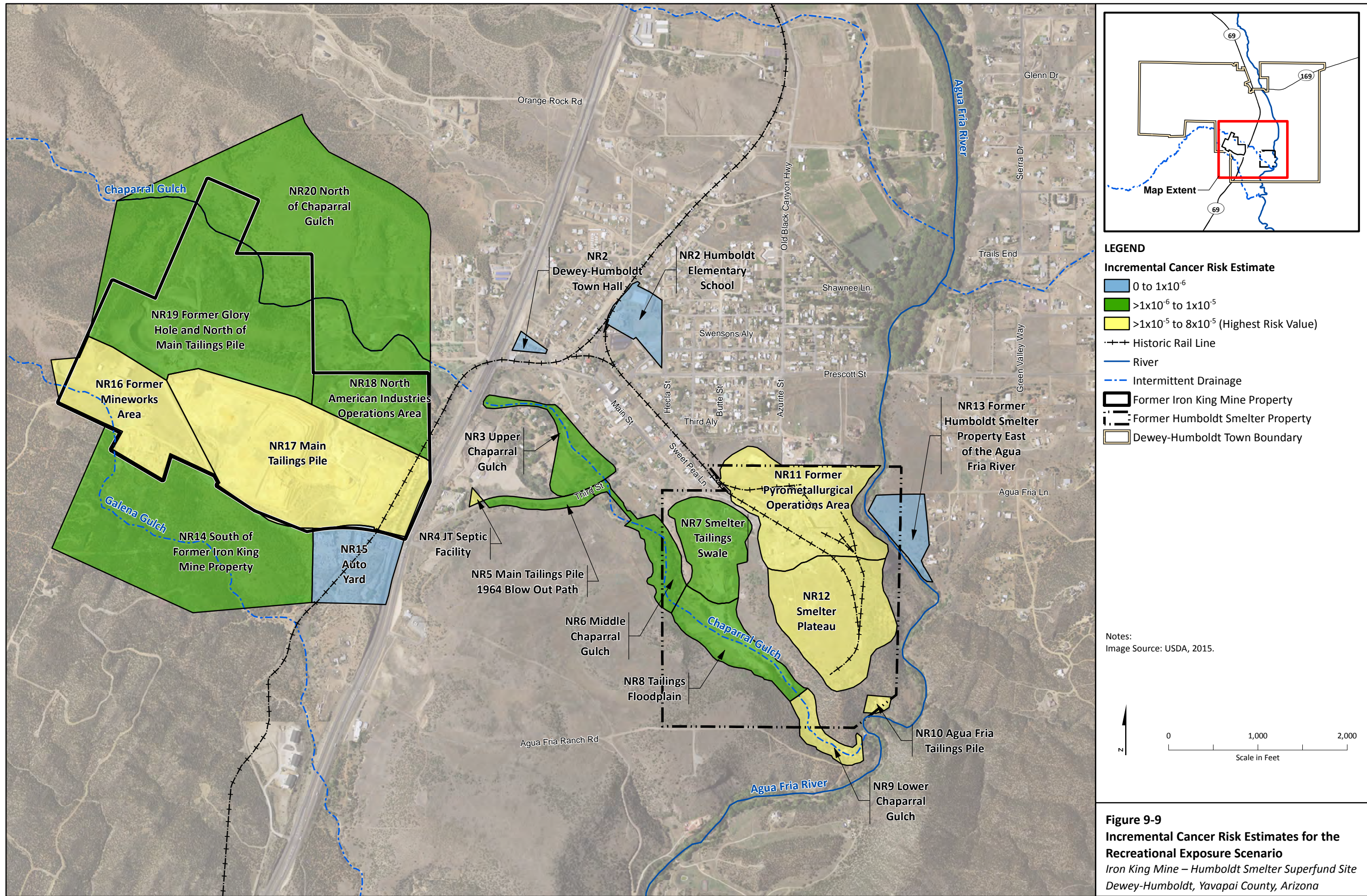
Scale in Feet

0 1,000 2,000

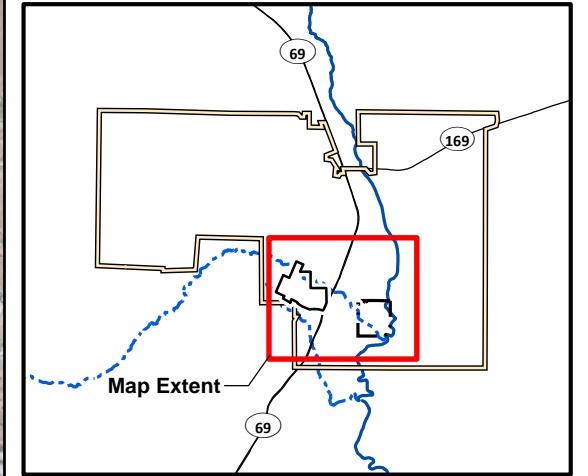
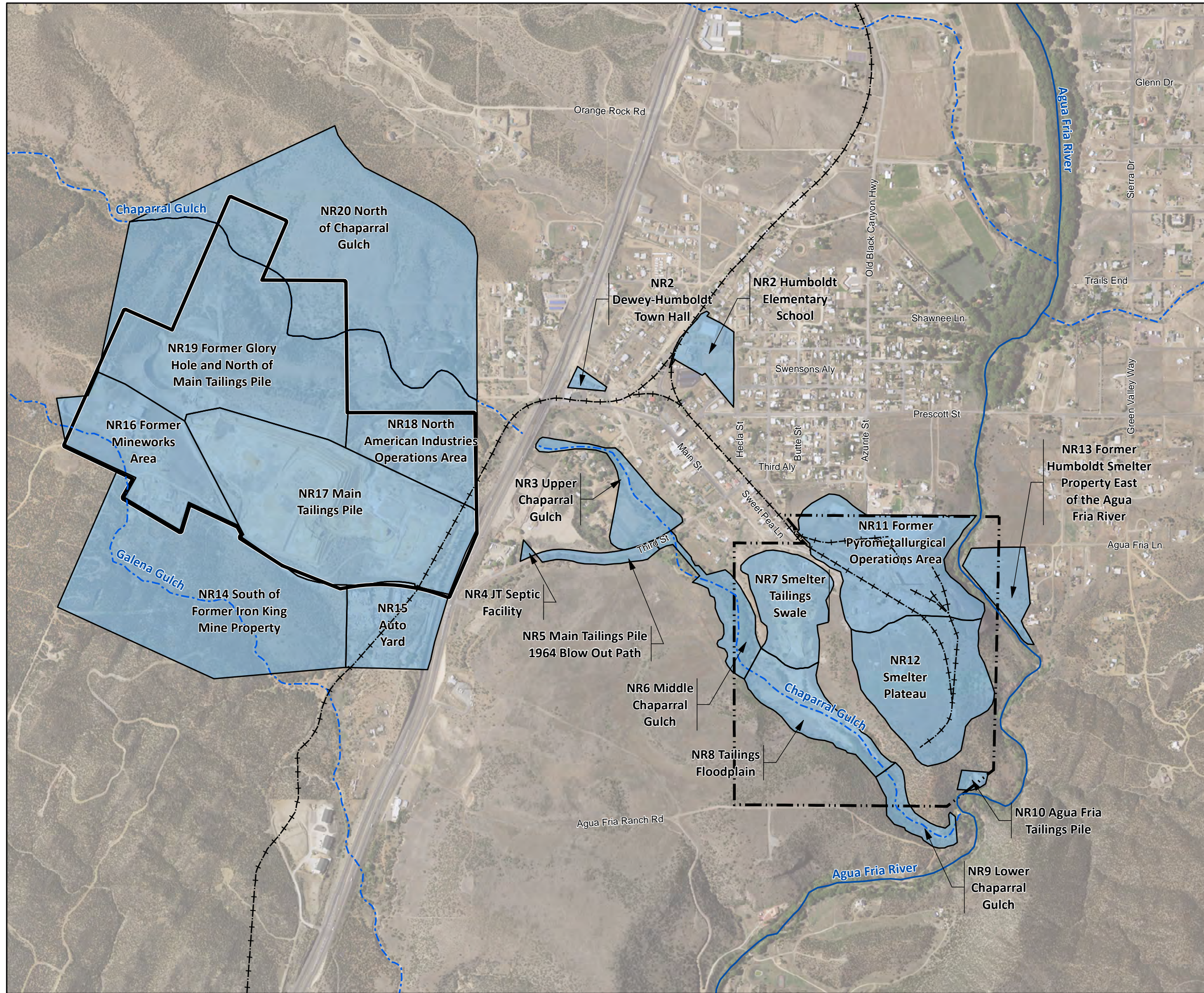
N

**Figure 9-8**  
**Lead Risk Estimates for the Occupational Exposure Scenario**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*









**LEGEND**

**Incremental Hazard Index Estimate**

- 0 to 1 (Highest Hazard Index Value)
- >1<sup>a</sup>

--- Historic Rail Line

— River

- - - Intermittent Drainage

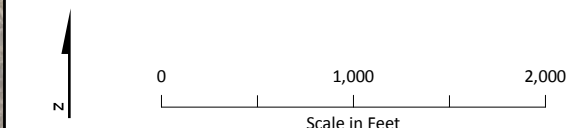
□ Former Iron King Mine Property

□ Former Humboldt Smelter Property

□ Dewey-Humboldt Town Boundary

<sup>a</sup>No areas exceeded a Hazard Index value of 1. The highest Hazard Index value was 1.

Notes:  
Image Source: USDA, 2015.



**Figure 9-10**  
**Incremental Hazard Index Estimates for the**  
**Recreational Exposure Scenario**  
*Iron King Mine – Humboldt Smelter Superfund Site*  
*Dewey-Humboldt, Yavapai County, Arizona*