Screening Level Human Health Risk Assessment Fire Event at Martinez Refining Company

May 15, 2025

PROJECT BACKGROUND

- Refinery Fire on February 1, 2025, Martinez Refining Company facility
- Fire caused by a hydrocarbon leak (1160 barrels) during turnaround maintenance, diethanolamine and sulfur dioxide were also released, the fire burned for 4 days
- Concerns with air quality from smoke led to a health advisory as well as a shelter in place order for the nearby community
- County conducted analytical testing of nearby soil to assess potential for human health effects in the residential and commercial areas
- The Bay Area Air District and Contra Costa Water District took air and surface water data

Air Sampling and Surface Water Sampling

Air Sampling – Bay Area Air District (BAAD)

- Air samples were collected February 1st and 2nd, 2025 from three (3) locations based on the prominent wind direction at the time of the fire
- Laboratory analysis conducted for volatile organic compounds (VOCs) associated with hydrocarbons (benzene, toluene, ethylbenzene, xylene, and naphthalene), plus diethanolamine (DEA) and 17 metals

Surface Water Sampling – Contra Costa Water District (CCWD)

- Surface water samples were collected on February 4, 2025 from Martinez Reservoir and Mallard Reservoir
- Laboratory analysis included organochlorine pesticides, chlorinated herbicides, polychlorinated biphenyls (PCBs), VOCs, and semi-volatile organic compounds (SVOCs)

Air Sampling Locations

Surface Water Sampling Locations

Soil Sampling

Soil Sampling

- Soil samples were collected at 5 locations selected by Contra Costa Health (CCH) based on the prominent wind direction at the time of the fire
- Laboratory analysis conducted for VOCs associated with hydrocarbons (such as benzene, toluene, ethylbenzene, xylene, and naphthalene), plus DEA and 17 metals

Soil Sampling Locations

Screening Level Human Health Risk Assessment

Risk Assessment Objectives and Scope:

- Provide community with an understanding of the potential for risk from exposure to chemicals deposited from the fire which may be present in surface water and surface soil.

- Final report will identify whether a long-term health impact could be present and provides guidance on next steps, if necessary.

Results of Air and Surface Water Sampling

Air Data

- Air data were compared to short-term screening levels for sensitive individuals including residents.
- Short-term screening levels are based on OEHHA RELs or ATSDR MRLs
- There were no exceedances of short-term screening levels for analytes detected in ambient air other than naphthalene
- The detections of some analytes in the air samples prompted further sampling of soil and surface water.

Surface Water Data

- No analytes were detected in surface water at both Mallard and Martinez Reservoirs.
  - Therefore, surface water data were not compared to health-based screening levels
- No further evaluation was warranted

OEHHA – Office of Environmental Health Hazard Assessment
REL – Reference Exposure Level
ATSDR – Agency for Toxic Substances and Disease Registry
MRLs – Minimal Risk Levels

Data Evaluation for Soil

Compared Soil Data to:

- Expected range of regional background soil levels
- Protective health standards for residential soil

Definitions

- Background – the naturally occurring or other non-site related levels of chemicals (cars, household use of chemicals)
  - Geology: metals are primarily present simply due to geology, and CA is known to have metals in proportions to regional/local geology
- Health Standards – California-specific screening levels for protection of residential land use. Note if a CA-specific screening level was not available, USEPA residential screening levels were applied.

Data Evaluation for Soil Cont.

The Following Graphs include:

- Soil samples only
- Units are in parts per million (ppm), which is same as milligrams per kilogram (mg/kg) as shown on graphs
- Colors used include green shading (expected background range), yellow line (residential soil health standard), and blue dots (sample concentrations)

Antimony

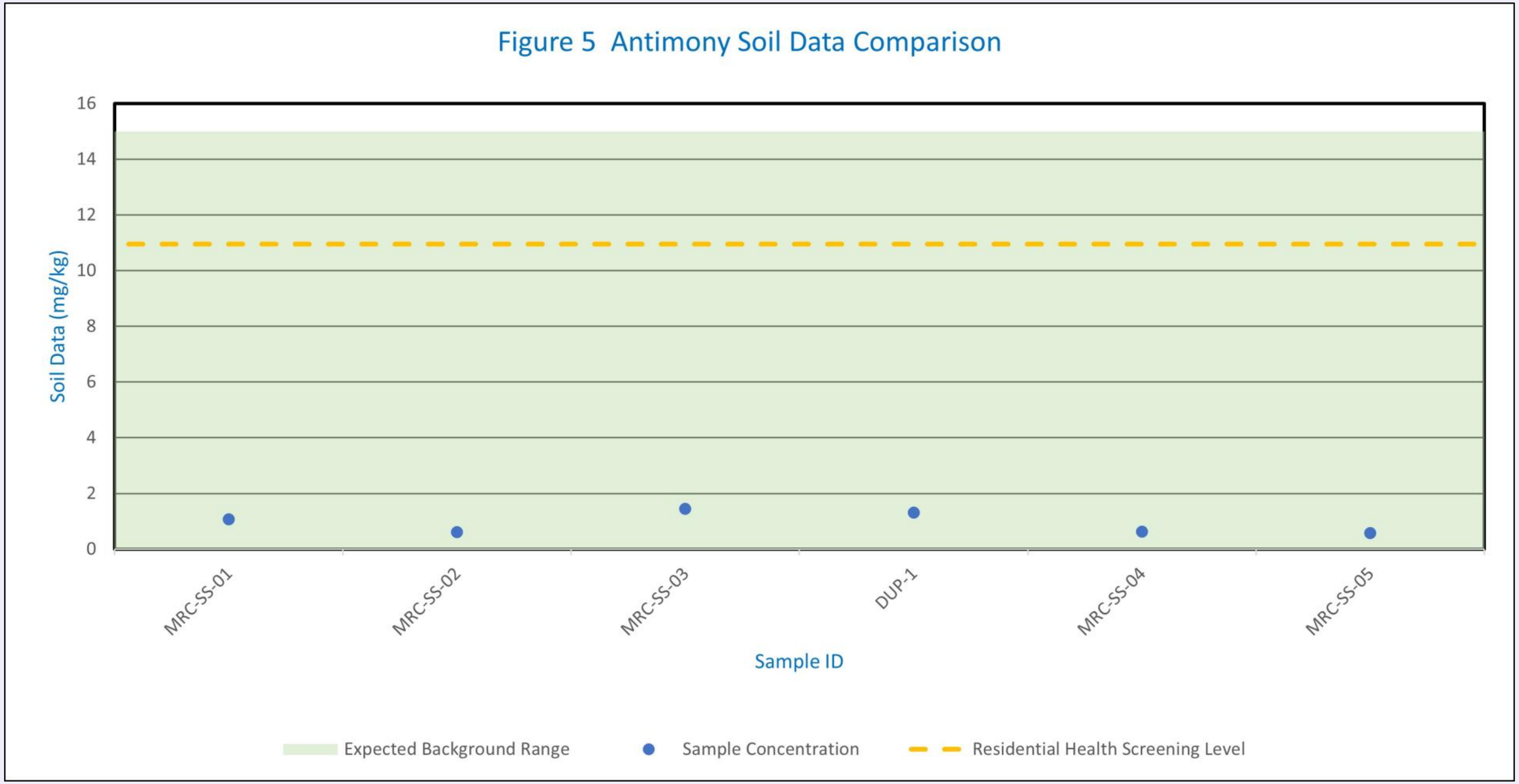


Figure 5 Antimony Soil Data Comparison
16
14
12
10
8
6
4
2
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Arsenic

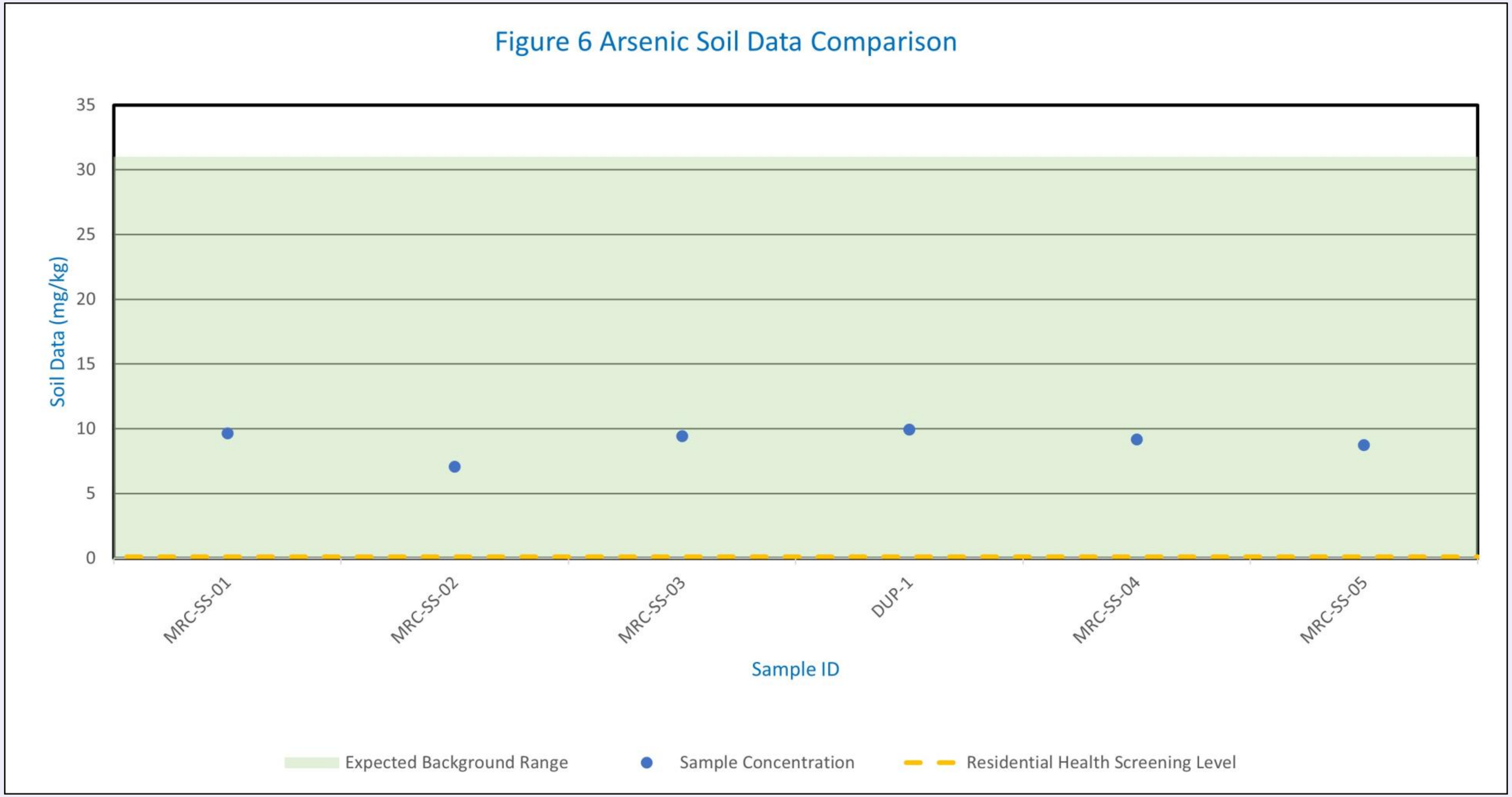


Figure 6 Arsenic Soil Data Comparison
35
30
25
20
15
10
5
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Barium

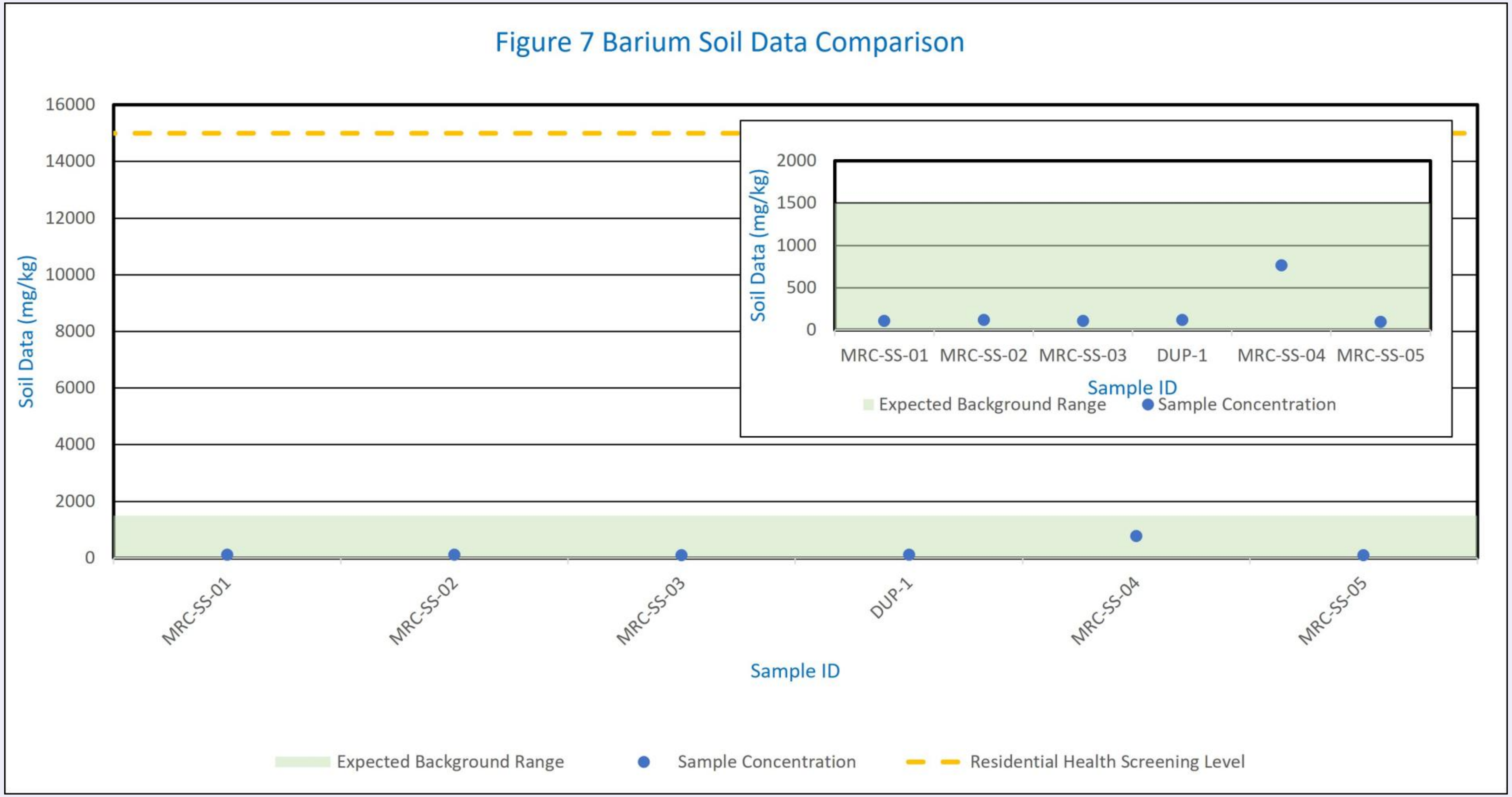


Figure 7 Barium Soil Data Comparison
16000
14000
12000
10000
8000
6000
4000
2000
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
2000
1500
1000
500
0
Soil Data (mg/kg)
MRC-SS-01 MRC-SS-02 MRC-SS-03 DUP-1 MRC-SS-04 MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Expected Background Range
Sample Concentration
Residential Health Screening Level

Beryllium

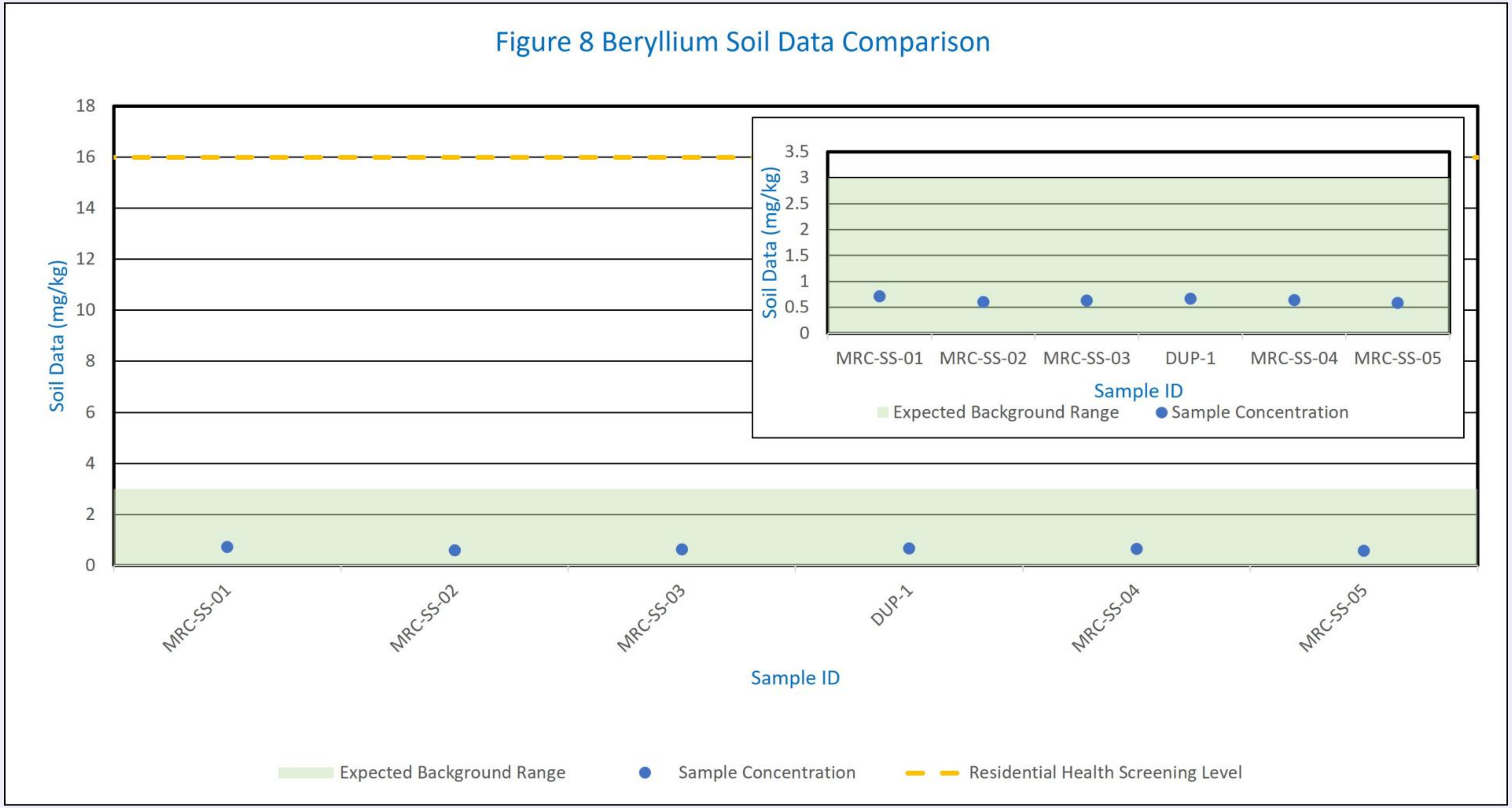


Figure 8 Beryllium Soil Data Comparison
Soil Data (mg/kg)
18
16
14
12
10
8
6
4
2
0
3.5
3
2.5
2
1.5
1
0.5
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Cadmium

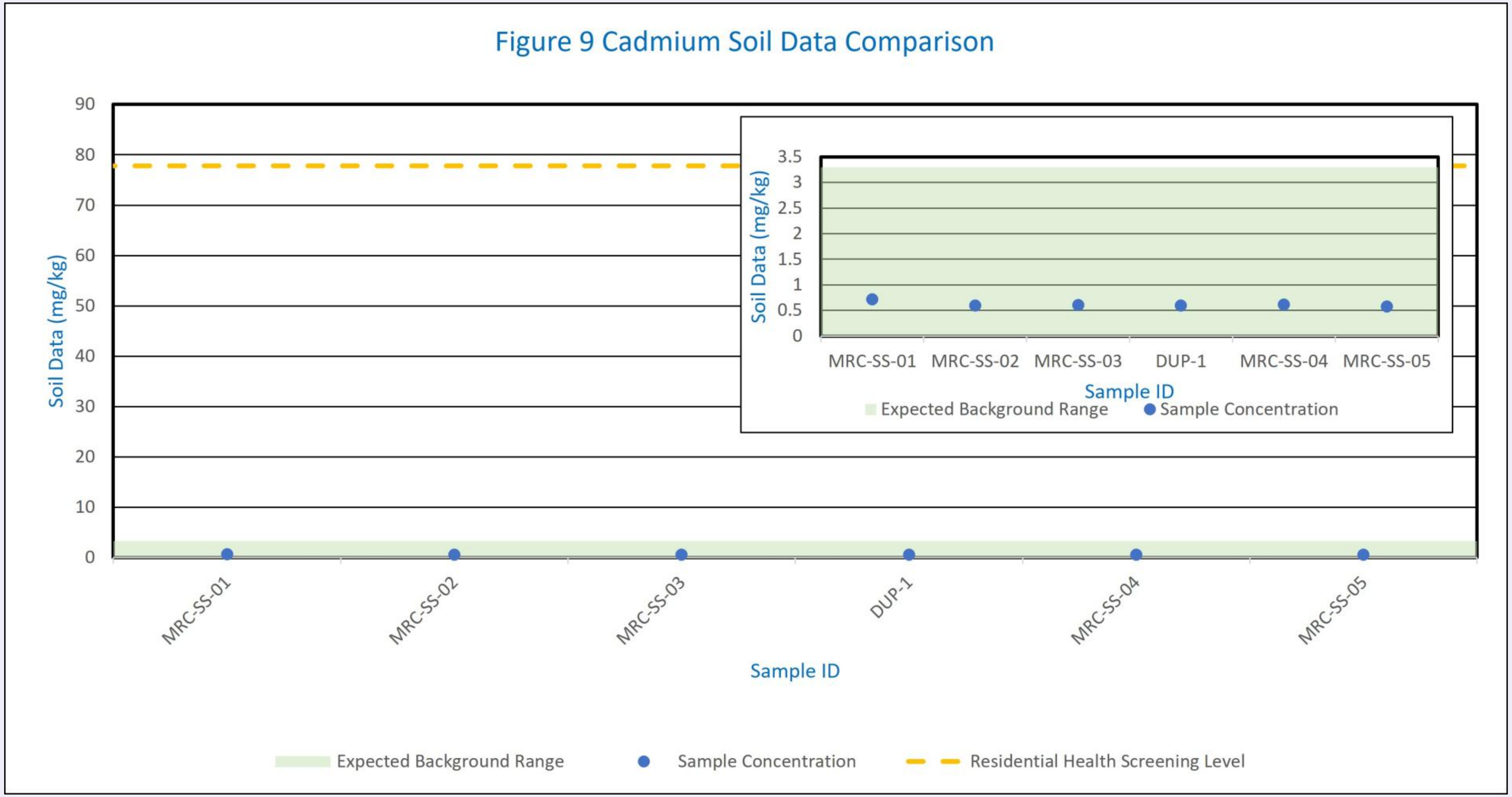
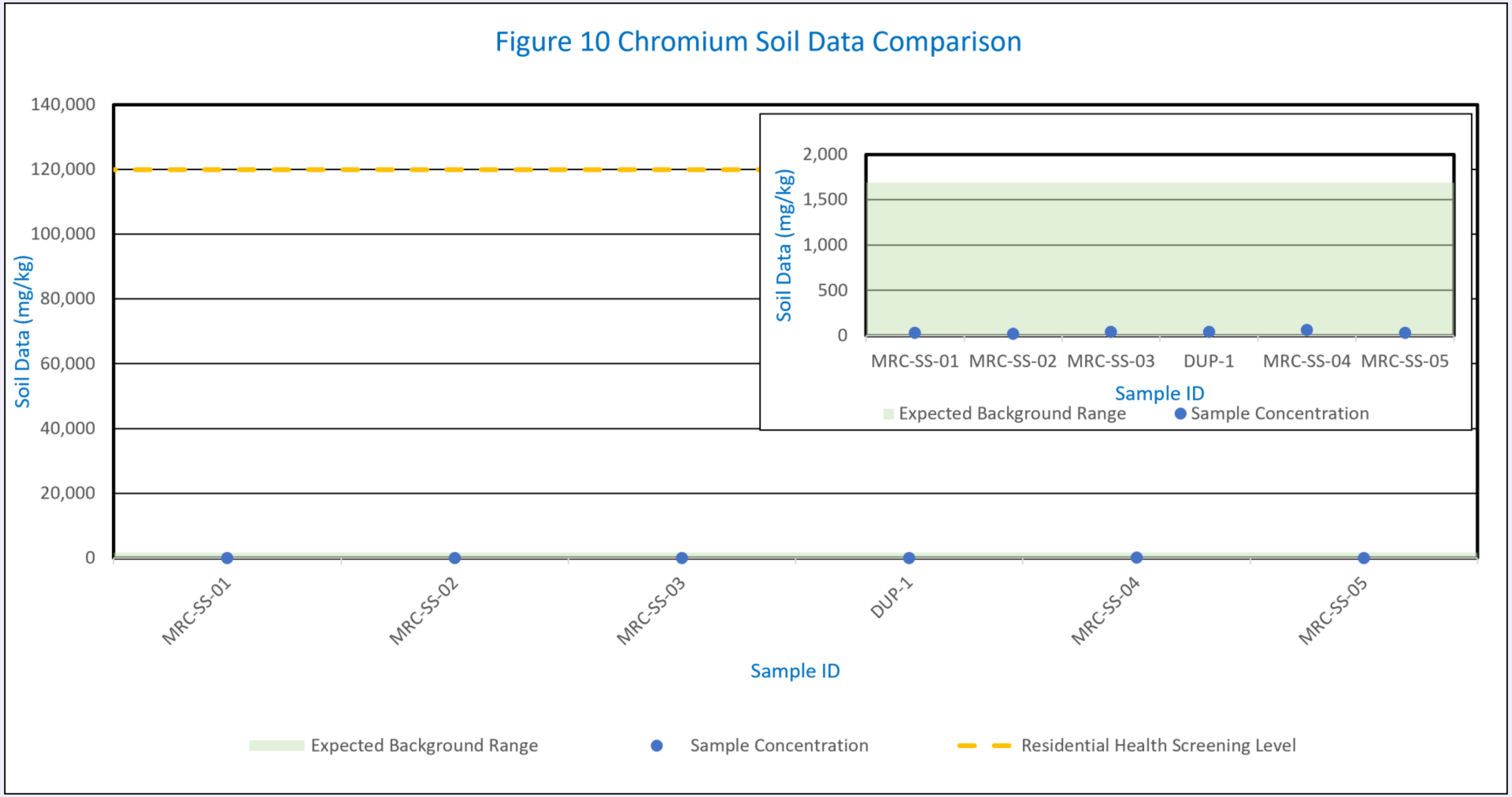


Figure 9 Cadmium Soil Data Comparison
90
80
70
60
50
40
30
20
10
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
3.5
3
2.5
2
1.5
1
0.5
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Expected Background Range
Sample Concentration
Residential Health Screening Level

Chromium, Total



Cobalt

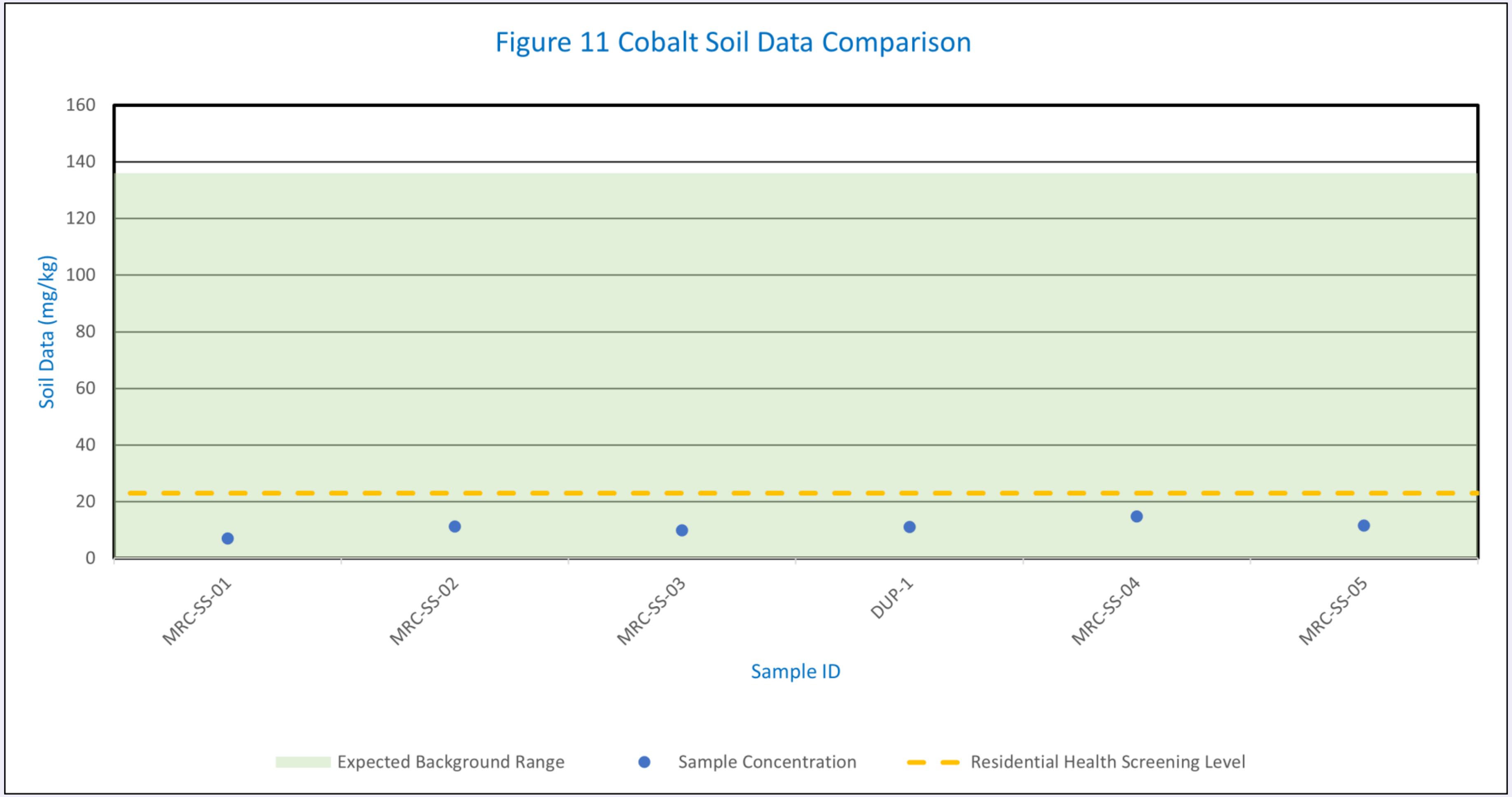


Figure 11 Cobalt Soil Data Comparison
Soil Data (mg/kg)
160
140
120
100
80
60
40
20
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Copper

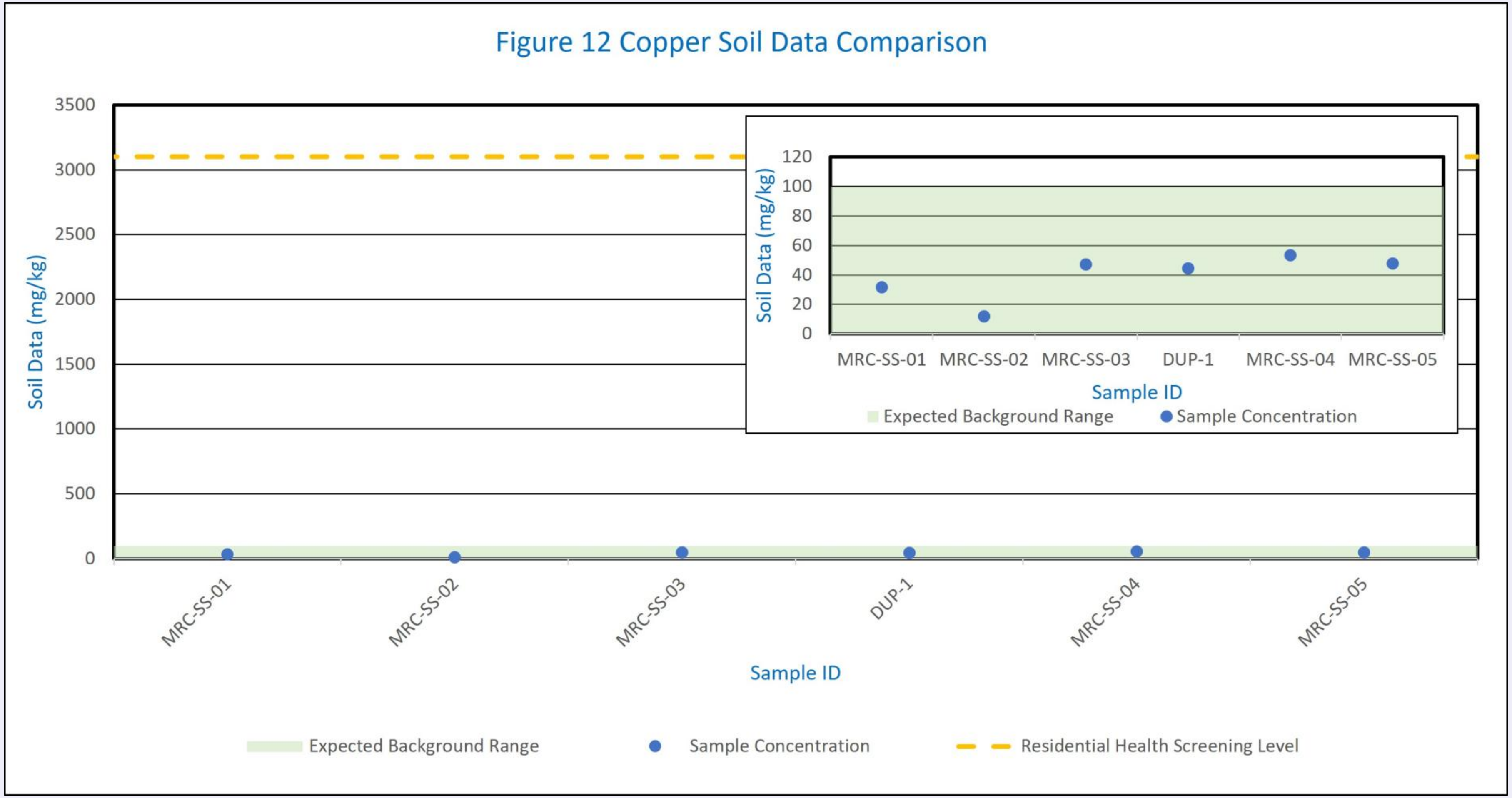


Figure 12 Copper Soil Data Comparison
Soil Data (mg/kg)
3500
3000
2500
2000
1500
1000
500
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
120
100
80
60
40
20
0
Expected Background Range
Sample Concentration
Residential Health Screening Level

Lead

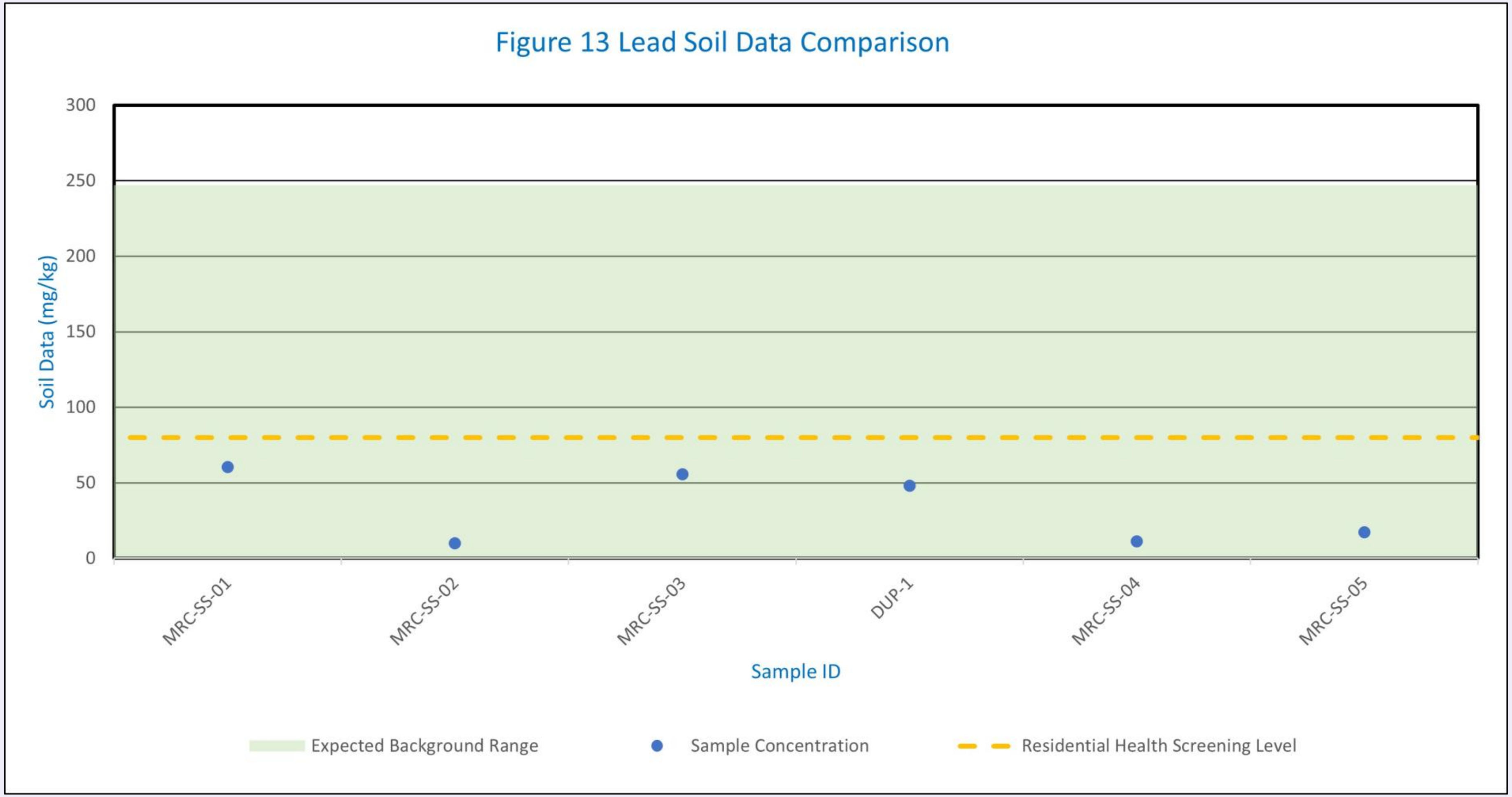


Figure 13 Lead Soil Data Comparison
Soil Data (mg/kg)
300
250
200
150
100
50
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Mercury

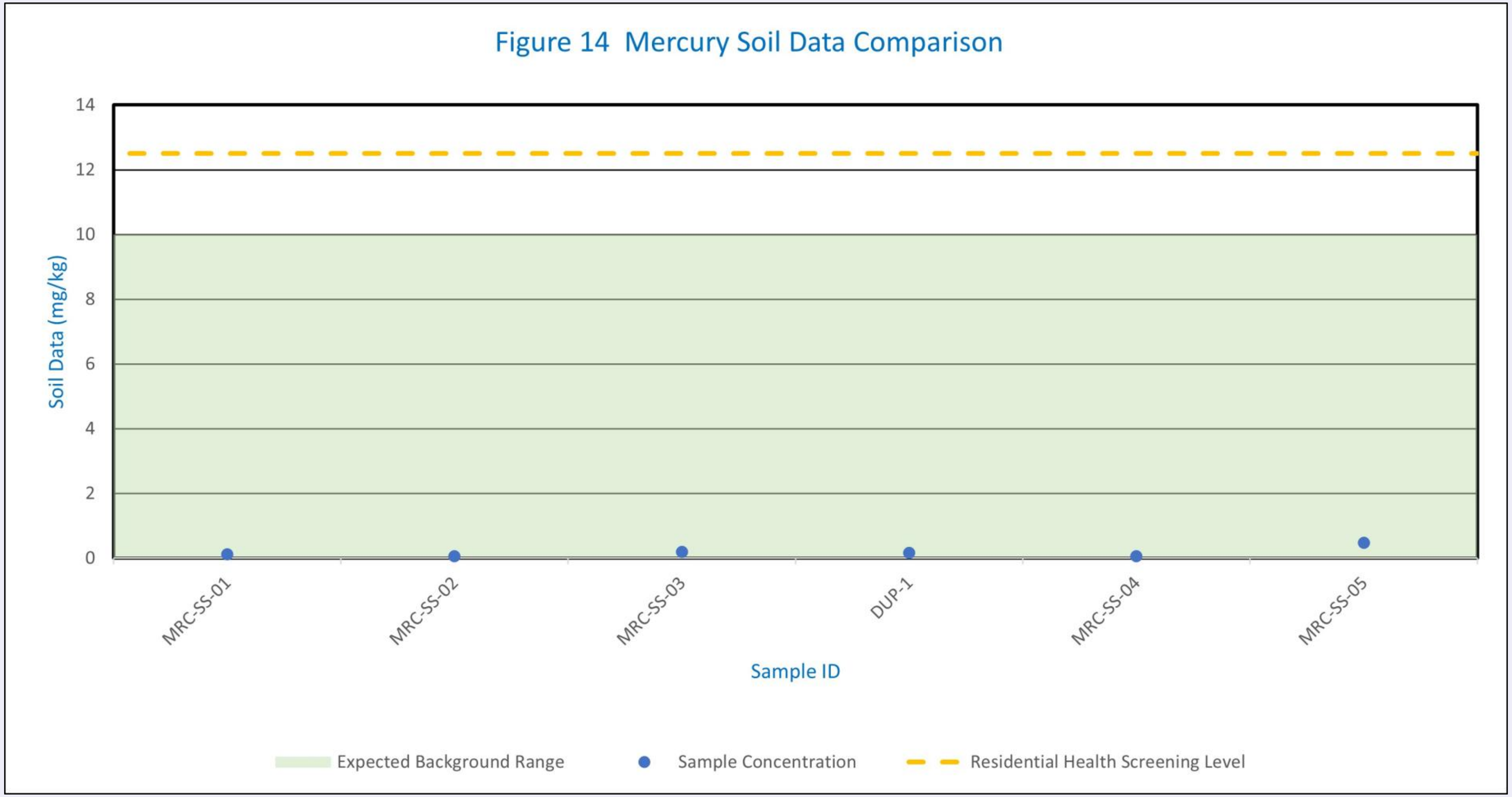


Figure 14 Mercury Soil Data Comparison
Soil Data (mg/kg)
14
12
10
8
6
4
2
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Molybdenum

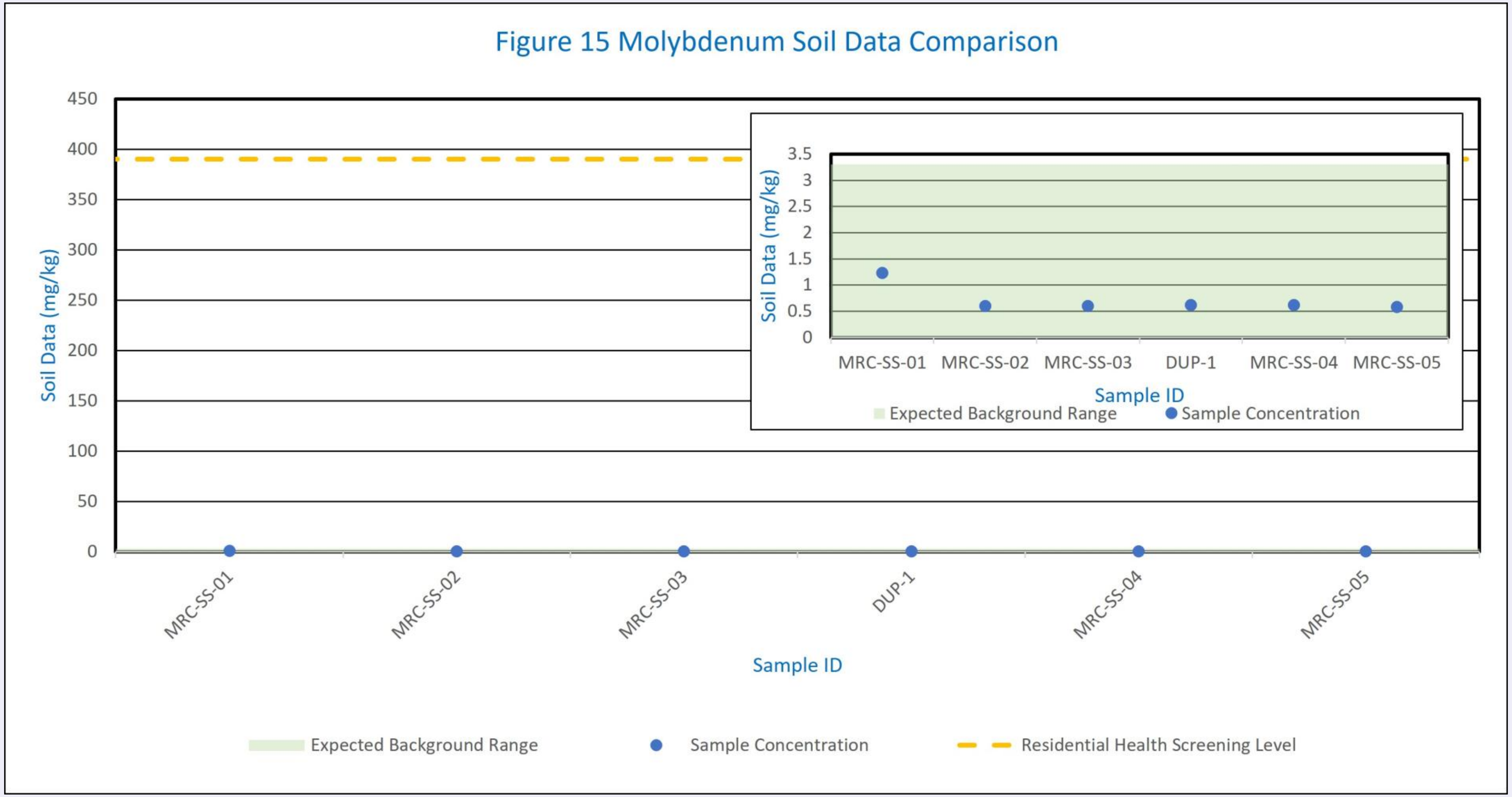


Figure 15 Molybdenum Soil Data Comparison
450
400
350
300
250
200
150
100
50
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
3.5
3
2.5
2
1.5
1
0.5
0
Soil Data (mg/kg)
MRC-SS-01 MRC-SS-02 MRC-SS-03 DUP-1 MRC-SS-04 MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Expected Background Range
Sample Concentration
Residential Health Screening Level

Nickel

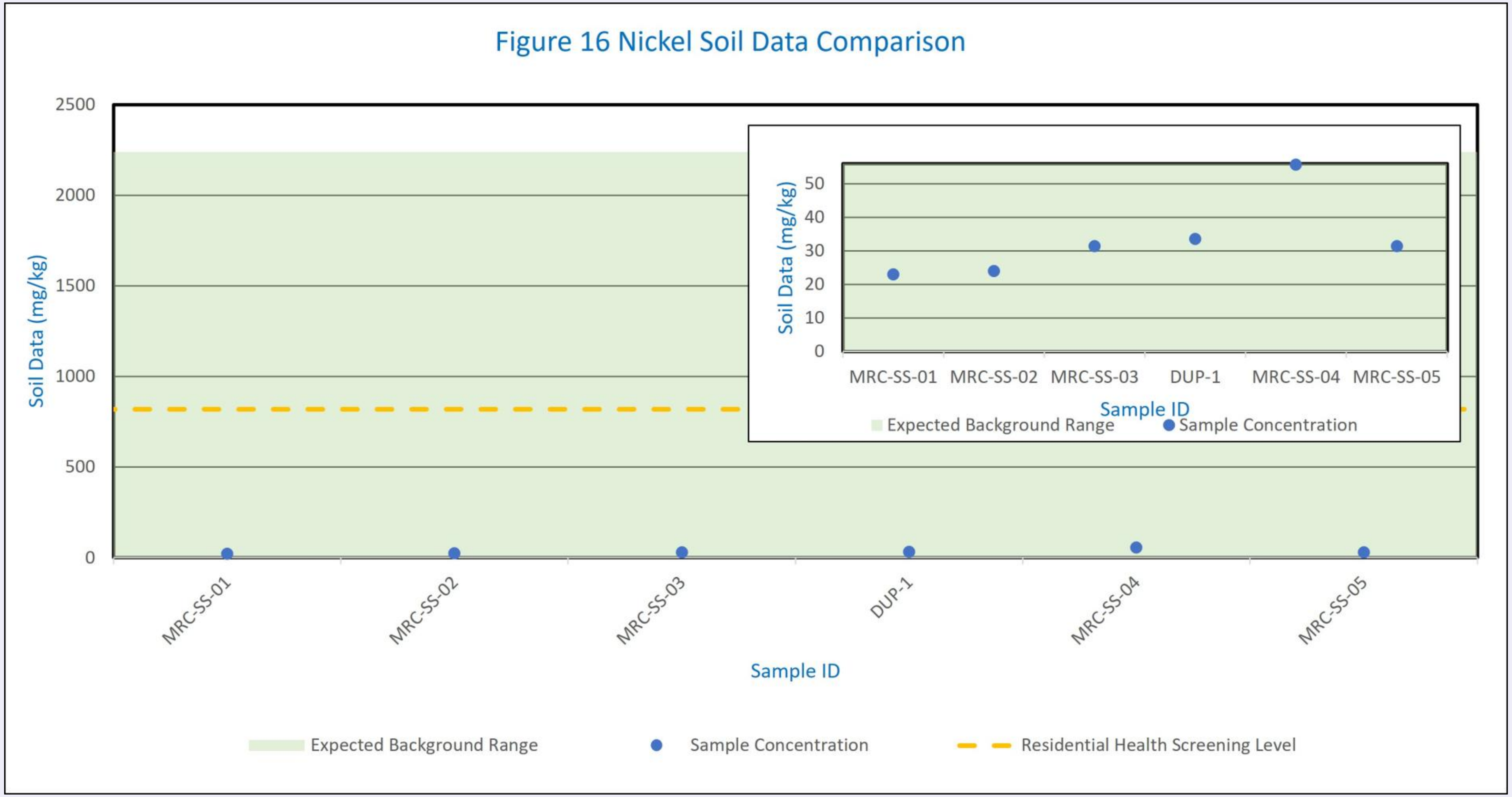


Figure 16 Nickel Soil Data Comparison
Soil Data (mg/kg)
2500
2000
1500
1000
500
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
50
40
30
20
10
0
Expected Background Range
Sample Concentration
Residential Health Screening Level

Selenium

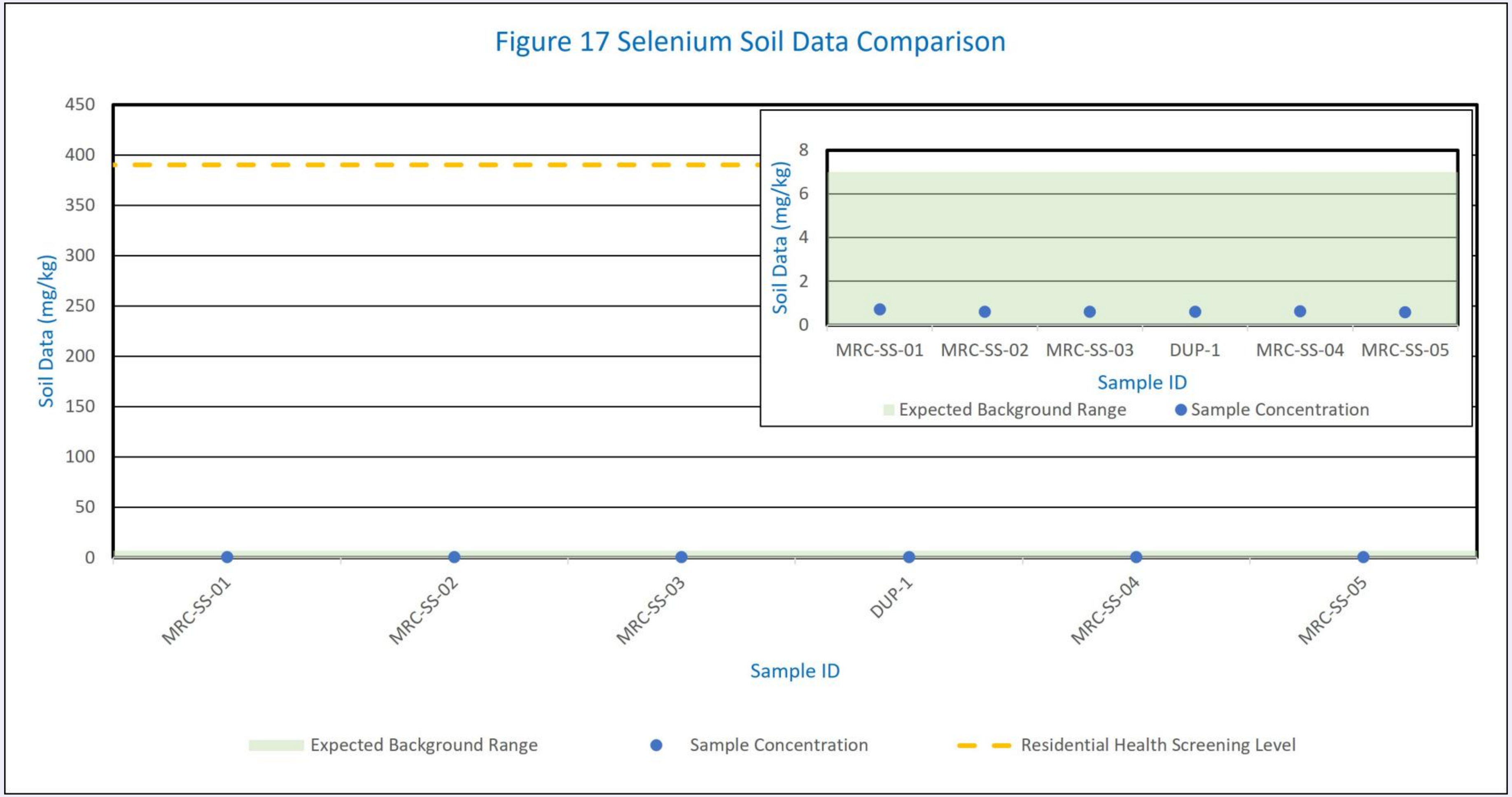


Figure 17 Selenium Soil Data Comparison
450
400
350
300
250
200
150
100
50
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level
8
6
4
2
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration

Silver

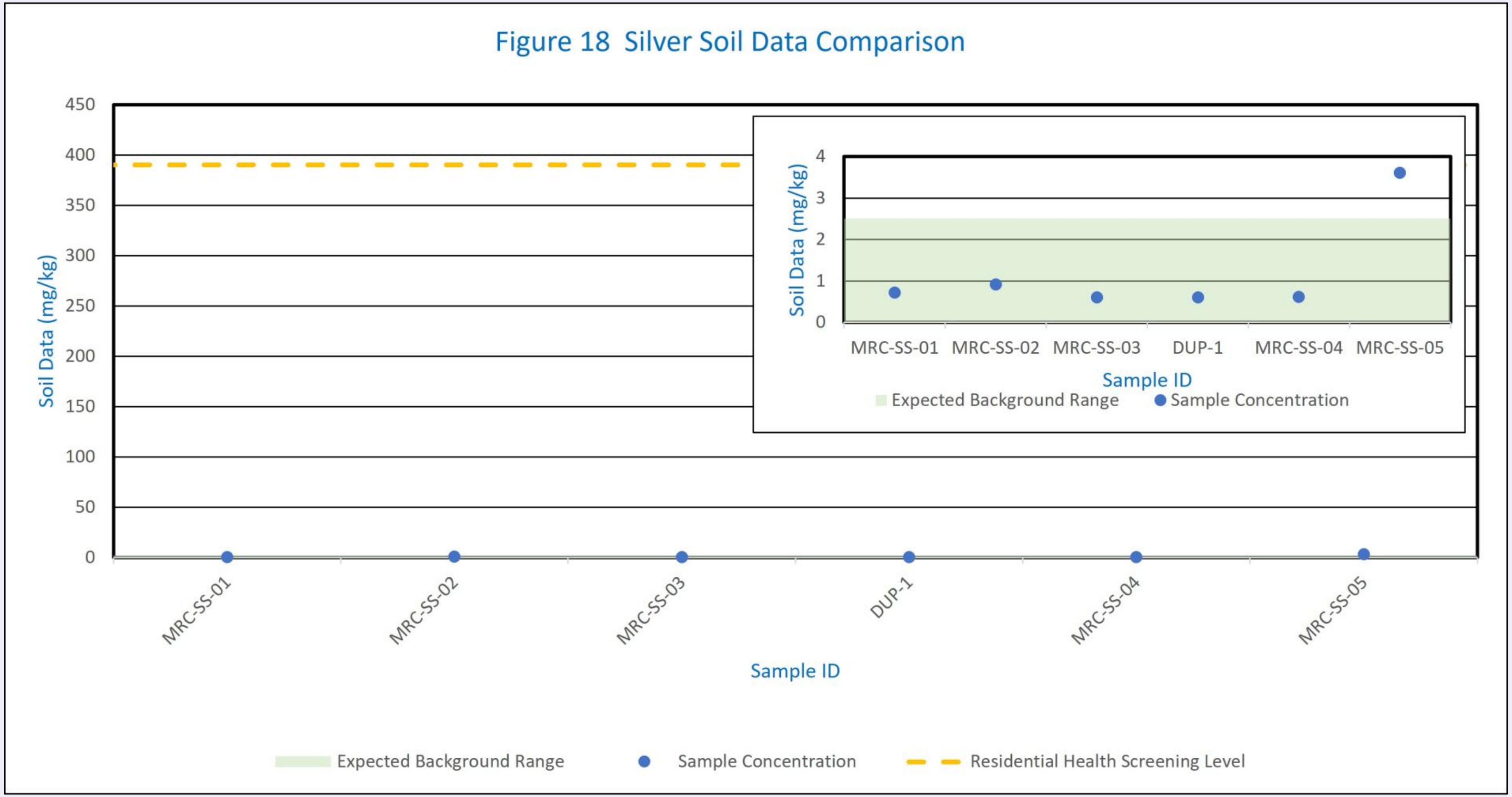


Figure 18 Silver Soil Data Comparison
Soil Data (mg/kg)
450
400
350
300
250
200
150
100
50
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
4
3
2
1
0
Expected Background Range
Sample Concentration
Residential Health Screening Level

Thallium

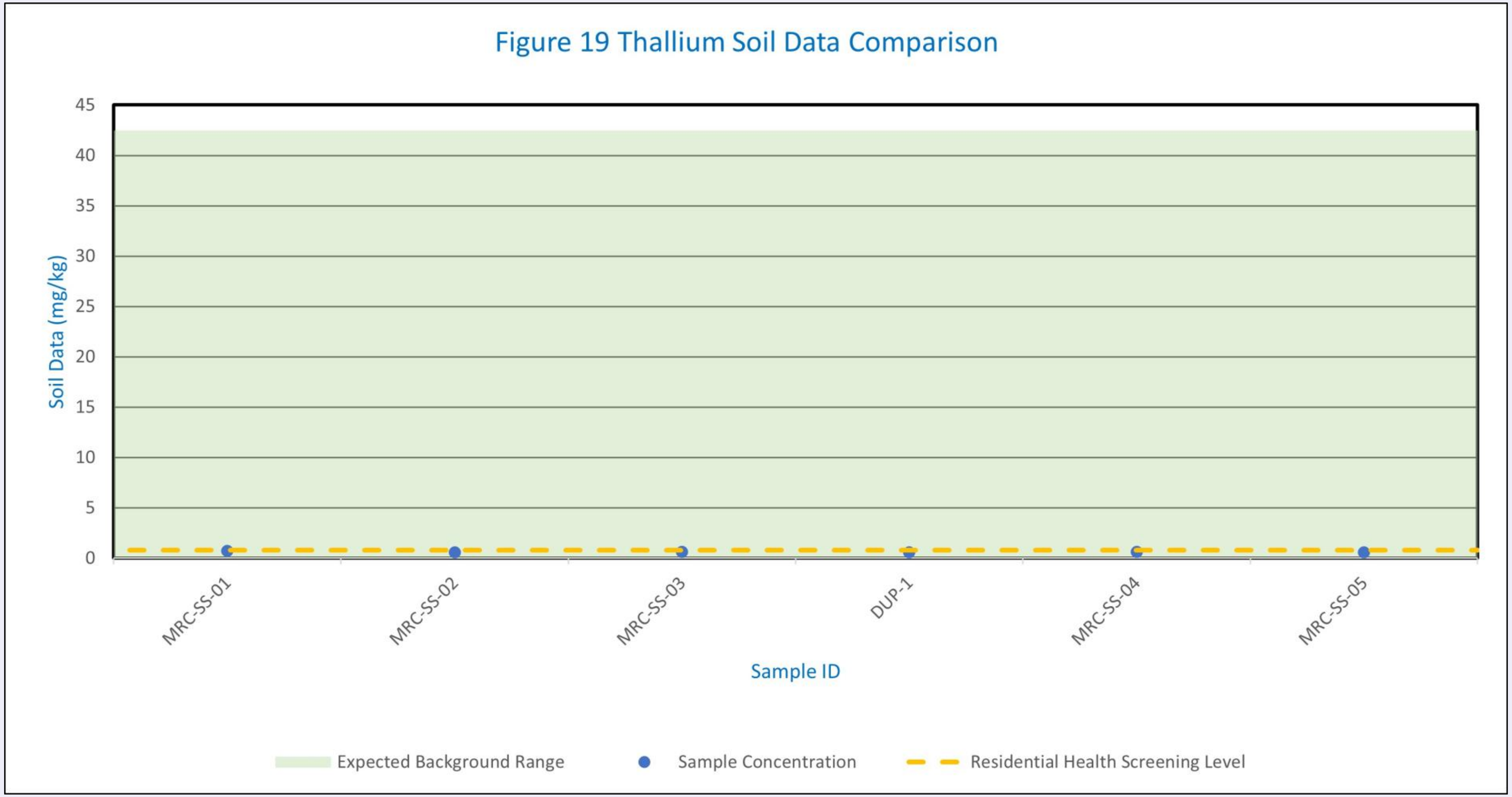


Figure 19 Thallium Soil Data Comparison
45
40
35
30
25
20
15
10
5
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level

Vanadium

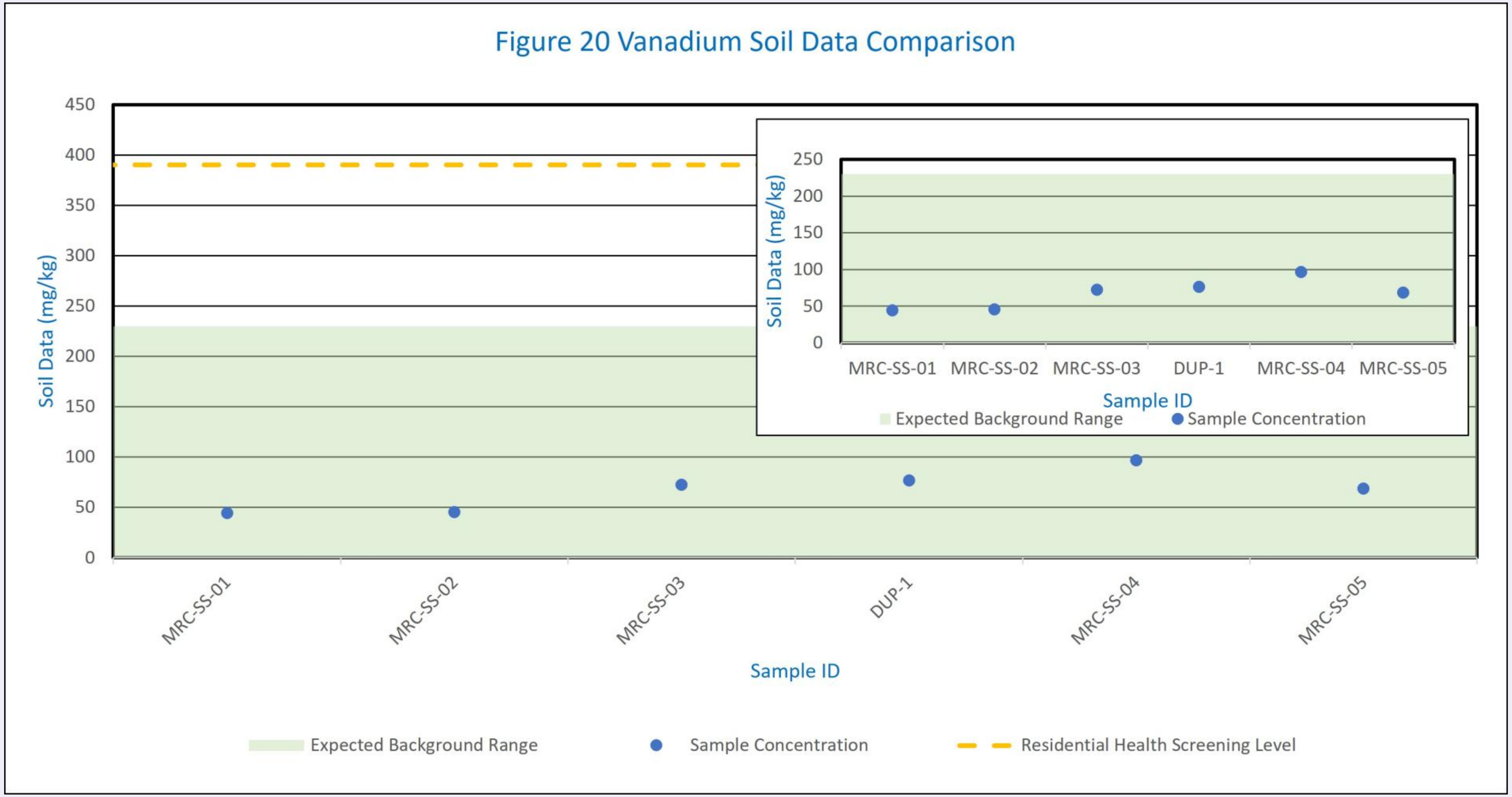


Figure 20 Vanadium Soil Data Comparison
450
400
350
300
250
200
150
100
50
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Residential Health Screening Level
250
200
150
100
50
0
Soil Data (mg/kg)
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration

Zinc

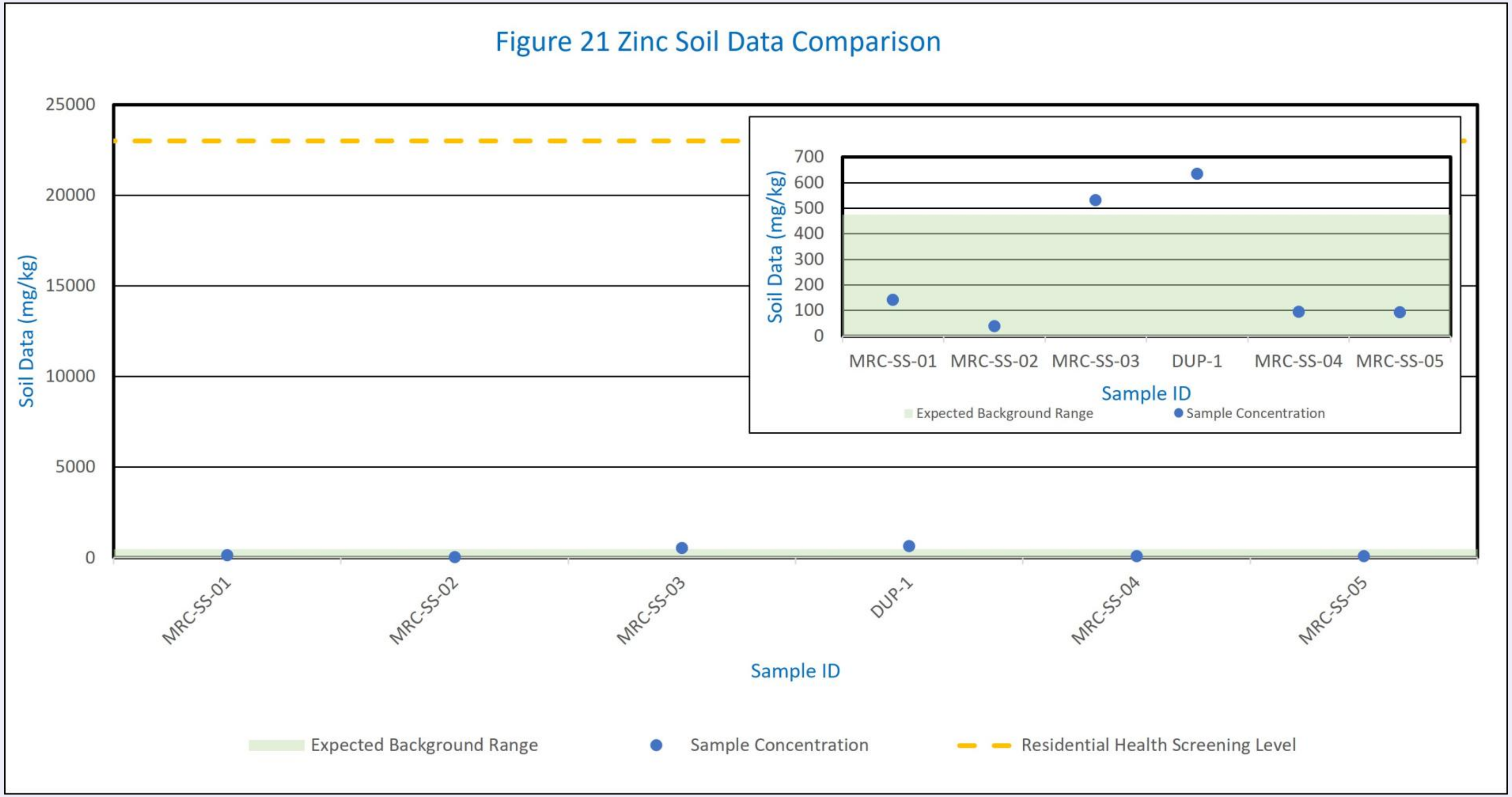


Figure 21 Zinc Soil Data Comparison
Soil Data (mg/kg)
25000
20000
15000
10000
5000
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Soil Data (mg/kg)
700
600
500
400
300
200
100
0
MRC-SS-01
MRC-SS-02
MRC-SS-03
DUP-1
MRC-SS-04
MRC-SS-05
Sample ID
Expected Background Range
Sample Concentration
Expected Background Range
Sample Concentration
Residential Health Screening Level

Soil Sampling Results

- **Surface Soil.** None of the metals analyzed exceed the expected regional background range, except silver and zinc. However, concentrations of silver and zinc in surface soil are well below the residential screening level and do not pose an unacceptable risk.

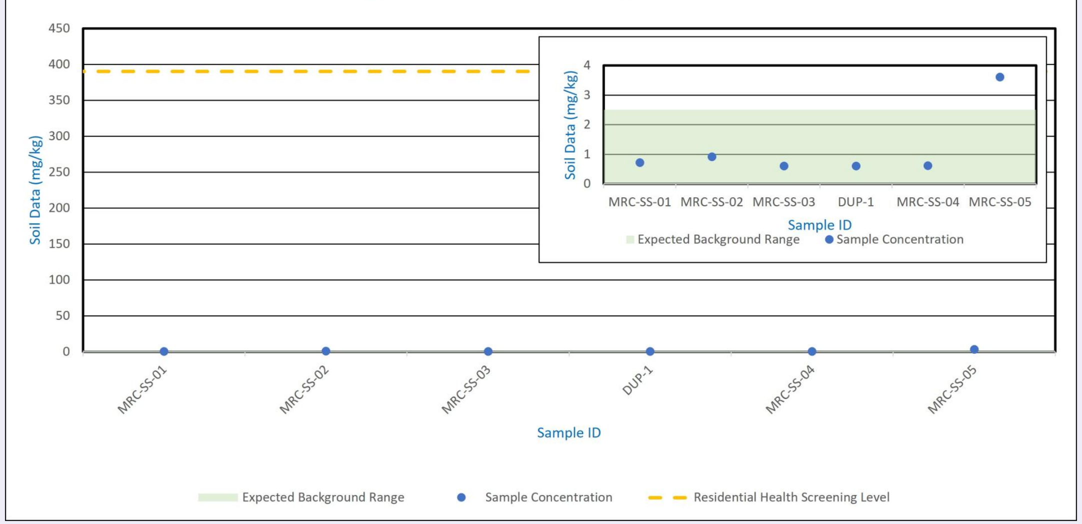


Figure 18 Silver Soil Data Comparison

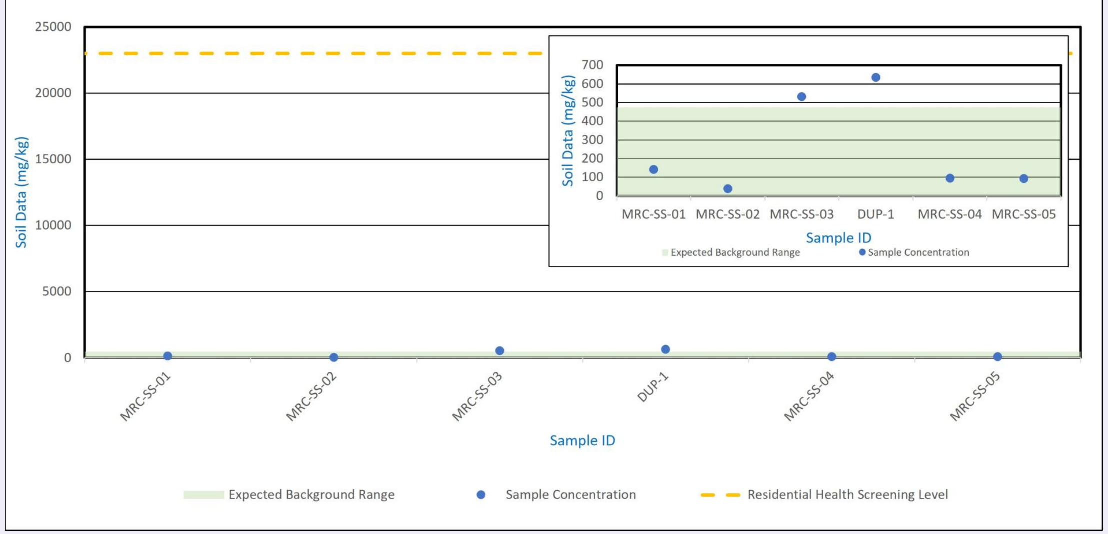
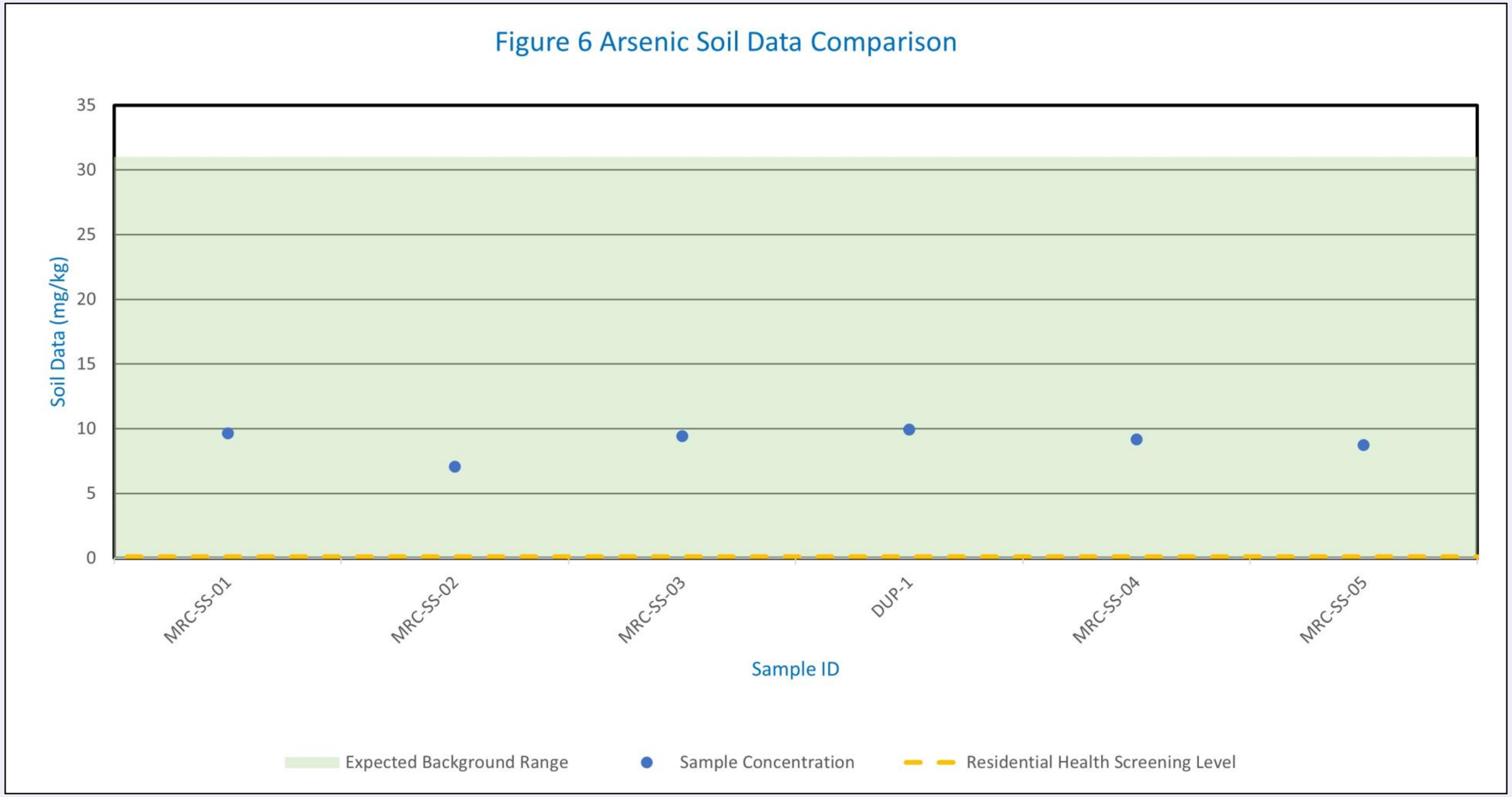


Figure 21 Zinc Soil Data Comparison

Soil Sampling Results

- **Surface Soil.** Arsenic exceeds residential soil screening levels. However, as previously discussed, arsenic concentrations range from 7.08 mg/kg to 9.94 mg/kg, which are consistent with expected background levels.



Conclusions

- Air sample results are below short-term screening levels considered protective of sensitive individuals for all compounds other than naphthalene which exceeded the screening level.
- Soil samples results indicated that all analytes were either non detect or the detected concentrations were below risk based residential screening levels and/ or within the range of regional background concentrations.
- Surface water sample analytical results were non-detect at both the Martinez and Mallard Reservoir. Therefore, the fire did not impact water quality and no potential for adverse human health risk exists.

Based on these findings, TRC does not recommend additional sampling or further evaluation of this event.

Thanks!

Write any extra information here.

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