Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VI: St. Joe River Drainage

John Kauffman
Earl H. Bennett
Victoria E. Mitchell
Report originally prepared in 1999 for the U.S. Forest Service, Region 1, Under Participating Agreement No. FS-01-96-14-2800

Field Inspection conducted by Earl Bennett and John Kauffman
## CONTENTS

1.0 PROJECT OVERVIEW ................................................................. 1
  1.1 INTRODUCTION ........................................................................... 1
  1.2 PROJECT OBJECTIVES ............................................................... 1
  1.3 ABANDONED AND INACTIVE MINES DEFINED ............................. 2
  1.4 HEALTH AND ENVIRONMENTAL PROBLEMS AT MINES .......... 2
    1.4.1 Acid Mine Drainage ........................................................... 3
    1.4.2 Solubility of Selected Metals .............................................. 3
    1.4.3 The Use of pH and Specific Conductivity to Identify Water Quality Problems .............................................. 5
  1.5 METHODOLOGY ........................................................................ 6
    1.5.1 Data Sources .................................................................... 6
    1.5.2 Pre-field Screening ............................................................ 6
    1.5.3 Field Inspection Procedures .............................................. 7
      1.5.3.1 Soil, Rock, and Mine Waste Sampling Procedures .... 8
      1.5.3.2 Water Sampling Procedure ......................................... 8
    1.5.4 Analytical Methods ......................................................... 9
    1.5.5 Standards ....................................................................... 9
      1.5.5.1 Water-Quality Standards ........................................... 9
      1.5.5.2 Soil and Rock Background Standards ......................... 10
    1.5.6 Analytical Results ......................................................... 13
    1.5.7 Sample and Site Identification Numbers ......................... 13

2.0 ST. JOE RIVER BASIN (St. Maries and Avery Ranger Districts) .... 14
  2.1 INTRODUCTION ....................................................................... 14
    2.1.1 Summary of the St. Joe River Basin Study Area .............. 14
  2.2 GEOLOGY .............................................................................. 14
  2.3 ECONOMIC GEOLOGY .............................................................. 20
    2.3.1 General Characteristics of the Ore .................................... 20
    2.3.2 Summary of Mill Development ....................................... 20
  2.4 HYDROLOGY AND HYDROGEOLOGY ........................................ 24
  2.5 SUMMARY OF THE ST. JOE RIVER DRAINAGE ...................... 24
    2.5.1 Summary of Environmental Observations ..................... 24
    2.5.2 Mine Waste and Stream Sediment Samples .................... 31

3.0 ST. JOE NATIONAL FOREST (avery AND ST. MARIES DISTRICTS) MINE DESCRIPTIONS ................................................................. 34
  3.1 LUCKY SWED MINE (Site No. WL-496) ...................................... 34
    3.1.1 Site Location and Access .................................................. 34
    3.1.2 Geologic Features ............................................................ 34
    3.1.3 Site History .................................................................... 34
    3.1.4 Environmental Conditions .............................................. 35
      3.1.4.1 Site Features ............................................................. 35
      3.1.4.2 Sample Locations ....................................................... 35
<table>
<thead>
<tr>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.1.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.1.4.2.3 Analytical Results</td>
</tr>
<tr>
<td>3.1.5 Structures</td>
</tr>
<tr>
<td>3.1.6 Safety</td>
</tr>
<tr>
<td>3.2 PEARSON MINE (Site No. WL-497)</td>
</tr>
<tr>
<td>3.2.1 Site Location and Access</td>
</tr>
<tr>
<td>3.2.2 Geologic Features</td>
</tr>
<tr>
<td>3.2.3 Site History</td>
</tr>
<tr>
<td>3.2.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.2.4.1 Site Features</td>
</tr>
<tr>
<td>3.2.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.2.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.2.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.2.4.2.3 Analytical Results</td>
</tr>
<tr>
<td>3.2.5 Structures</td>
</tr>
<tr>
<td>3.2.6 Safety</td>
</tr>
<tr>
<td>3.3 SUMNER MINE (Site No. WL-491)</td>
</tr>
<tr>
<td>3.3.1 Site Location and Access</td>
</tr>
<tr>
<td>3.3.2 Geologic Features</td>
</tr>
<tr>
<td>3.3.3 Site History</td>
</tr>
<tr>
<td>3.3.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.3.4.1 Site Features</td>
</tr>
<tr>
<td>3.3.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.3.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.3.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.3.5 Structures</td>
</tr>
<tr>
<td>3.3.6 Safety</td>
</tr>
<tr>
<td>3.4 PARK COPPER MINE (Site No. WL-478)</td>
</tr>
<tr>
<td>3.4.1 Site Location and Access</td>
</tr>
<tr>
<td>3.4.2 Geologic Features</td>
</tr>
<tr>
<td>3.4.3 Site History</td>
</tr>
<tr>
<td>3.4.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.4.4.1 Site Features</td>
</tr>
<tr>
<td>3.4.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.4.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.4.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.4.4.2.3 Analytical Results</td>
</tr>
<tr>
<td>3.4.5 Structures</td>
</tr>
<tr>
<td>3.4.6 Safety</td>
</tr>
<tr>
<td>3.5 UNNAMED PROSPECT (Site No. B8129704)</td>
</tr>
<tr>
<td>3.5.1 Site Location and Access</td>
</tr>
<tr>
<td>3.5.2 Geologic Features</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>3.5.3</td>
</tr>
<tr>
<td>3.5.4</td>
</tr>
<tr>
<td>3.5.4.1</td>
</tr>
<tr>
<td>3.5.4.2</td>
</tr>
<tr>
<td>3.5.4.2.1</td>
</tr>
<tr>
<td>3.5.4.2.2</td>
</tr>
<tr>
<td>3.5.5</td>
</tr>
<tr>
<td>3.5.6</td>
</tr>
<tr>
<td>3.6</td>
</tr>
<tr>
<td>3.6.1</td>
</tr>
<tr>
<td>3.6.2</td>
</tr>
<tr>
<td>3.6.3</td>
</tr>
<tr>
<td>3.6.4</td>
</tr>
<tr>
<td>3.6.4.1</td>
</tr>
<tr>
<td>3.6.4.2</td>
</tr>
<tr>
<td>3.6.4.2.1</td>
</tr>
<tr>
<td>3.6.4.2.2</td>
</tr>
<tr>
<td>3.6.5</td>
</tr>
<tr>
<td>3.6.6</td>
</tr>
<tr>
<td>3.7</td>
</tr>
<tr>
<td>3.7.1</td>
</tr>
<tr>
<td>3.7.2</td>
</tr>
<tr>
<td>3.7.3</td>
</tr>
<tr>
<td>3.7.4</td>
</tr>
<tr>
<td>3.7.4.1</td>
</tr>
<tr>
<td>3.7.4.2</td>
</tr>
<tr>
<td>3.7.4.2.1</td>
</tr>
<tr>
<td>3.7.4.2.2</td>
</tr>
<tr>
<td>3.7.4.2.3</td>
</tr>
<tr>
<td>3.7.5</td>
</tr>
<tr>
<td>3.7.6</td>
</tr>
<tr>
<td>3.8</td>
</tr>
<tr>
<td>3.8.1</td>
</tr>
<tr>
<td>3.8.2</td>
</tr>
<tr>
<td>3.8.3</td>
</tr>
<tr>
<td>3.8.4</td>
</tr>
<tr>
<td>3.8.4.1</td>
</tr>
<tr>
<td>3.8.4.2</td>
</tr>
<tr>
<td>3.8.4.2.1</td>
</tr>
<tr>
<td>3.8.4.2.2</td>
</tr>
<tr>
<td>3.8.5</td>
</tr>
<tr>
<td>3.8.6</td>
</tr>
<tr>
<td>3.9</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.12.6 Safety</td>
</tr>
<tr>
<td>3.13 IDAHO STAR MINE (Site No. WL-517)</td>
</tr>
<tr>
<td>3.13.1 Site Location and Access</td>
</tr>
<tr>
<td>3.13.2 Geologic Features</td>
</tr>
<tr>
<td>3.13.3 Site History</td>
</tr>
<tr>
<td>3.13.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.13.4.1 Site Features</td>
</tr>
<tr>
<td>3.13.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.13.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.13.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.13.4.2.3 Analytical Results</td>
</tr>
<tr>
<td>3.13.5 Structures</td>
</tr>
<tr>
<td>3.13.6 Safety</td>
</tr>
<tr>
<td>3.14 HANSY MINE (Site No. WL-516)</td>
</tr>
<tr>
<td>3.14.1 Site Location and Access</td>
</tr>
<tr>
<td>3.14.2 Geologic Features</td>
</tr>
<tr>
<td>3.14.3 Site History</td>
</tr>
<tr>
<td>3.14.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.14.4.1 Site Features</td>
</tr>
<tr>
<td>3.14.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.14.4.2.1 Solid Samples</td>
</tr>
<tr>
<td>3.14.4.2.2 Water Samples</td>
</tr>
<tr>
<td>3.14.4.2.3 Analytical Results</td>
</tr>
<tr>
<td>3.14.5 Structures</td>
</tr>
<tr>
<td>3.14.6 Safety</td>
</tr>
<tr>
<td>3.15 MASTODON (Site No. WL-515) AND MACEDONIA (Site No. WL-505)</td>
</tr>
<tr>
<td>PROSPECTS</td>
</tr>
<tr>
<td>3.15.1 Site Location and Access</td>
</tr>
<tr>
<td>3.15.2 Geologic Features</td>
</tr>
<tr>
<td>3.15.3 Site History</td>
</tr>
<tr>
<td>3.15.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.15.4.1 Site Features</td>
</tr>
<tr>
<td>3.15.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.15.5 Structures</td>
</tr>
<tr>
<td>3.15.6 Safety</td>
</tr>
<tr>
<td>3.16 BULLION MINE, UPPER WORKINGS (Site No. WL-489)</td>
</tr>
<tr>
<td>3.16.1 Site Location and Access</td>
</tr>
<tr>
<td>3.16.2 Geologic Features</td>
</tr>
<tr>
<td>3.16.3 Site History</td>
</tr>
<tr>
<td>3.16.4 Environmental Conditions</td>
</tr>
<tr>
<td>3.16.4.1 Site Features</td>
</tr>
<tr>
<td>3.16.4.2 Sample Locations</td>
</tr>
<tr>
<td>3.16.4.2.1 Solid Samples</td>
</tr>
</tbody>
</table>
3.20.4.2 Sample Locations ........................................... 177
  3.20.4.2.1 Solid Samples ......................................... 177
  3.20.4.2.2 Water Samples ......................................... 177
  3.20.4.2.3 Analytical Results ..................................... 178
3.20.5 Structures ...................................................... 178
3.20.6 Safety .......................................................... 178
3.21 WONDERFUL MINE, Prospect Cut (Site No. WL-484) ............ 184
  3.21.1 Site Location and Access .................................. 184
  3.21.2 Geologic Features .......................................... 184
  3.21.3 Site History ................................................ 184
  3.21.4 Environmental Conditions ................................ 184
    3.21.4.1 Site Features ......................................... 184
    3.21.4.2 Sample Locations ..................................... 184
      3.21.4.2.1 Solid Samples ..................................... 184
      3.21.4.2.2 Water Samples ..................................... 185
  3.21.5 Structures .................................................. 185
3.21.6 Safety ........................................................ 185
3.22 PEACOCK COPPER PROSPECT (Site No. WL-487) .................... 188
  3.22.1 Site Location and Access .................................. 188
  3.22.2 Geologic Features .......................................... 188
  3.22.3 Site History ................................................ 188
  3.22.4 Environmental Conditions ................................ 188
    3.22.4.1 Site Features ......................................... 188
    3.22.4.2 Sample Locations ..................................... 188
      3.22.4.2.1 Solid Samples ..................................... 188
      3.22.4.2.2 Water Samples ..................................... 188
  3.22.5 Structures .................................................. 188
3.22.6 Safety ........................................................ 188
3.23 UNNAMED PROSPECT (Site No. K7159802) .......................... 191
  3.23.1 Site Location and Access .................................. 191
  3.23.2 Geologic Features .......................................... 191
  3.23.3 Site History ................................................ 191
  3.23.4 Environmental Conditions ................................ 191
    3.23.4.1 Site Features ......................................... 191
    3.23.4.2 Sample Locations ..................................... 191
      3.23.4.2.1 Solid Samples ..................................... 191
      3.23.4.2.2 Water Samples ..................................... 191
  3.23.5 Structures .................................................. 191
3.23.6 Safety ........................................................ 191
3.24 UNNAMED PROSPECT (Site No. K7159803) .......................... 196
  3.24.1 Site Location and Access .................................. 196
  3.24.2 Geologic Features .......................................... 196
  3.24.3 Site History ................................................ 196
### 3.24.4 Environmental Conditions
- 3.24.4.1 Site Features .................................................. 196
- 3.24.4.2 Sample Locations ............................................ 196
  - 3.24.4.2.1 Solid Samples ...................................... 196
  - 3.24.4.2.2 Water Samples .................................. 196
- 3.24.5 Structures ......................................................... 196
- 3.24.6 Safety ................................................................. 197

### 3.25 ALPINA PROSPECT (Site No. WL-500) and ALICE PROSPECT (Site No. WL-501)
- 3.25.1 Site Location and Access ........................................ 201
- 3.25.2 Geologic Features ............................................... 201
- 3.25.3 Site History ......................................................... 201
- 3.25.4 Environmental Conditions
  - 3.25.4.1 Site Features .............................................. 202
  - 3.25.4.2 Sample Locations .................................... 202
    - 3.25.4.2.1 Solid Samples .................................. 202
    - 3.25.4.2.2 Water Samples ................................. 203
    - 3.25.4.2.3 Analytical Results .......................... 203
- 3.25.5 Structures ......................................................... 203
- 3.25.6 Safety ................................................................. 204

### 3.26 CONRAD’S CROSSING PROSPECT (Site No. WL-541)
- 3.26.1 Site Location and Access ........................................ 210
- 3.26.2 Geologic Features ............................................... 210
- 3.26.3 Site History ......................................................... 210
- 3.26.4 Environmental Conditions
  - 3.26.4.1 Site Features .............................................. 210
  - 3.26.4.2 Sample Locations .................................... 211
    - 3.26.4.2.1 Solid Samples .................................. 211
    - 3.26.4.2.2 Water Samples ................................. 211
- 3.26.5 Structures ......................................................... 211
- 3.26.6 Safety ................................................................. 211

### 3.27 BLUFF CREEK COPPER CLAIMS (Site No. WL-540)
- 3.27.1 Site Location and Access ........................................ 214
- 3.27.2 Geologic Features ............................................... 214
- 3.27.3 Site History ......................................................... 214
- 3.27.4 Environmental Conditions
  - 3.27.4.1 Site Features .............................................. 214
  - 3.27.4.2 Sample Locations .................................... 215
    - 3.27.4.2.1 Solid Samples .................................. 215
    - 3.27.4.2.2 Water Samples ................................. 215
- 3.27.5 Structures ......................................................... 215
- 3.27.6 Safety ................................................................. 215

### 3.28 ST. JOE QUARTZ PROSPECT (Site No. WL-536) ........................................ 223
3.28.1 Site Location and Access ........................................ 223
3.28.2 Geologic Features ................................................ 223
3.28.3 Site History ...................................................... 223
3.28.4 Environmental Conditions ....................................... 223
   3.28.4.1 Site Features ................................................ 223
   3.28.4.2 Sample Locations .......................................... 223
      3.28.4.2.1 Solid Samples ..................................... 223
      3.28.4.2.2 Water Samples ..................................... 224
3.28.5 Structures ....................................................... 224
3.28.6 Safety ............................................................ 224

3.29 UNNAMED PROSPECT (Site No. K7169801) ....................... 228
   3.29.1 Site Location and Access .................................... 228
   3.29.2 Geologic Features .......................................... 228
   3.29.3 Site History ................................................ 228
   3.29.4 Environmental Conditions .................................. 228
      3.29.4.1 Site Features .......................................... 228
      3.29.4.2 Sample Locations ..................................... 228
         3.29.4.2.1 Solid Samples ................................ 228
         3.29.4.2.2 Water Samples .................................. 228
   3.29.5 Structures ................................................... 228
3.29.6 Safety .......................................................... 229

3.30 UNNAMED PROSPECT (Site No. K7169802) ....................... 232
   3.30.1 Site Location and Access .................................... 232
   3.30.2 Geologic Features .......................................... 232
   3.30.3 Site History ................................................ 232
   3.30.4 Environmental Conditions .................................. 232
      3.30.4.1 Site Features .......................................... 232
      3.30.4.2 Sample Locations ..................................... 232
         3.30.4.2.1 Solid Samples ................................ 232
         3.30.4.2.2 Water Samples .................................. 232
   3.30.5 Structures ................................................... 232
3.30.6 Safety .......................................................... 233

3.31 BALD MOUNTAIN PROSPECT (Site No. K7209801) ............. 236
   3.31.1 Site Location and Access .................................... 236
   3.31.2 Geologic Features .......................................... 236
   3.31.3 Site History ................................................ 236
   3.31.4 Environmental Conditions .................................. 237
      3.31.4.1 Site Features .......................................... 237
      3.31.4.2 Sample Locations ..................................... 237
         3.31.4.2.1 Solid Samples ................................ 237
         3.31.4.2.2 Water Samples .................................. 237
   3.31.5 Structures ................................................... 237
3.31.6 Safety .......................................................... 238
3.32 BIG ELK MINE (Site No. WL-503) ........................................ 244
  3.32.1 Site Location and Access ........................................ 244
  3.32.2 Geologic Features .............................................. 244
  3.32.3 Site History .................................................. 244
  3.32.4 Environmental Conditions ...................................... 244
    3.32.4.1 Site Features ........................................... 244
    3.32.4.2 Sample Locations ....................................... 245
      3.32.4.2.1 Solid Samples ..................................... 245
      3.32.4.2.2 Water Samples .................................... 245
  3.32.5 Structures .................................................. 246
  3.32.6 Safety ...................................................... 246

3.33 MANHATTAN PROSPECT (Site No. K7219801) ......................... 263
  3.33.1 Site Location and Access ...................................... 263
  3.33.2 Geologic Features ............................................ 263
  3.33.3 Site History ................................................ 263
  3.33.4 Environmental Conditions .................................... 263
    3.33.4.1 Site Features ......................................... 263
    3.33.4.2 Sample Locations ...................................... 264
      3.33.4.2.1 Solid Samples .................................... 264
      3.33.4.2.2 Water Samples .................................... 264
  3.33.5 Structures .................................................. 264
  3.33.6 Safety ...................................................... 264

3.34 COPPER KOPJE PROSPECT (Site No. K7219802) ..................... 270
  3.34.1 Site Location and Access .................................... 270
  3.34.2 Geologic Features ........................................... 270
  3.34.3 Site History ................................................ 270
  3.34.4 Environmental Conditions .................................... 270
    3.34.4.1 Site Features ......................................... 270
    3.34.4.2 Sample Locations ...................................... 270
      3.34.4.2.1 Solid Samples .................................... 270
      3.34.4.2.2 Water Samples .................................... 271
  3.34.5 Structures .................................................. 271
  3.34.6 Safety ...................................................... 271

3.35 MONITOR MINE (Site No. WL-507) .................................. 276
  3.35.1 Site Location and Access .................................... 276
  3.35.2 Geologic Features ........................................... 276
  3.35.3 Site History ................................................ 276
  3.35.4 Environmental Conditions .................................... 277
    3.35.4.1 Site Features ......................................... 277
    3.35.4.2 Sample Locations ...................................... 278
      3.35.4.2.1 Solid Samples .................................... 278
      3.35.4.2.2 Water Samples .................................... 278
      3.35.4.2.3 Analytical Results ............................... 279
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.43.4.2 Sample Locations</td>
<td>347</td>
</tr>
<tr>
<td>3.43.4.2.1 Solid Samples</td>
<td>347</td>
</tr>
<tr>
<td>3.43.4.2.2 Water Samples</td>
<td>347</td>
</tr>
<tr>
<td>3.43.5 Structures</td>
<td>347</td>
</tr>
<tr>
<td>3.43.6 Safety</td>
<td>347</td>
</tr>
<tr>
<td>3.44 TILLICUM NICKEL PROSPECT (Site No. WL-558)</td>
<td>349</td>
</tr>
<tr>
<td>3.44.1 Site Location and Access</td>
<td>349</td>
</tr>
<tr>
<td>3.44.2 Geologic Features</td>
<td>349</td>
</tr>
<tr>
<td>3.44.3 Site History</td>
<td>349</td>
</tr>
<tr>
<td>3.44.4 Environmental Conditions</td>
<td>350</td>
</tr>
<tr>
<td>3.44.4.1 Site Features</td>
<td>350</td>
</tr>
<tr>
<td>3.44.4.2 Sample Locations</td>
<td>351</td>
</tr>
<tr>
<td>3.44.4.2.1 Solid Samples</td>
<td>351</td>
</tr>
<tr>
<td>3.44.4.2.2 Water Samples</td>
<td>351</td>
</tr>
<tr>
<td>3.44.4.2.3 Analytical Results</td>
<td>352</td>
</tr>
<tr>
<td>3.44.5 Structures</td>
<td>352</td>
</tr>
<tr>
<td>3.44.6 Safety</td>
<td>352</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>366</td>
</tr>
<tr>
<td>APPENDIX A: FIELD QUESTIONNAIRE</td>
<td>369</td>
</tr>
<tr>
<td>APPENDIX B: DATABASE FIELDS</td>
<td>383</td>
</tr>
<tr>
<td>APPENDIX C: GEOCHEMICAL DATA</td>
<td>386</td>
</tr>
<tr>
<td>GEOCHEMICAL DATA</td>
<td>387</td>
</tr>
<tr>
<td>Accuracy of Geochemical Data</td>
<td>387</td>
</tr>
<tr>
<td>Practical Quantitation Limits</td>
<td>388</td>
</tr>
<tr>
<td>Geochemical Data</td>
<td>390</td>
</tr>
<tr>
<td>APPENDIX D: FIELD FORMS FOR PROPERTIES IN THE STUDY AREA</td>
<td>391</td>
</tr>
<tr>
<td>APPENDIX E: REPORTS COMPLETED FOR U.S. FOREST SERVICE, REGION 1,</td>
<td>393</td>
</tr>
<tr>
<td>FIELD INSPECTION PROGRAM</td>
<td></td>
</tr>
<tr>
<td>1997 REPORTS</td>
<td>394</td>
</tr>
<tr>
<td>1998 REPORTS</td>
<td>394</td>
</tr>
<tr>
<td>1999 REPORTS</td>
<td>394</td>
</tr>
<tr>
<td>APPENDIX F: PROPERTIES THAT COULD NOT BE LOCATED</td>
<td>396</td>
</tr>
</tbody>
</table>
ILLUSTRATIONS

Figure 2.1-1a. Location of properties in the west part of the St. Joe River basin (U.S. Geological Survey St. Maries 1:100,000-scale map). .................................................. 15
Figure 2.1-1b. Location of properties in the eastern part of the St. Joe River basin (U.S. Geological Survey Wallace 1:100,000-scale map). .................................................. 16
Figure 2.2-1a. Geology of the western part of the St. Joe River basin, Idaho (Griggs, 1973). .............................................................................................................. 21
Figure 2.2-1b. Geology of the eastern part of the St. Joe River basin, Idaho (Harrison and others, 1986). ................................................................. 22
Figure 3.1-1. Location map of the Lucky Swede Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map). ............. 37
Figure 3.1-2. Sketch map of the Lucky Swede Mine. ........................................ 38
Figure 3.1-3. Looking east across the face of the unoxidized portion of the Lucky Swede waste dump (1997 Roll K11, frame #1). .............................................. 39
Figure 3.1-4. Looking east across the surface of the waste dump (1997 Roll K11, frame #2). ................................................................. 39
Figure 3.1-5. Looking east at the eastern, oxidized portion of the waste dump with a portion of the unoxidized dump in the foreground (1997 Roll K11, frame #4). ...... 40
Figure 3.1-6. Looking northeast at the remains of the log cabin near the west end of the waste dump (1997 Roll K11, frame #3). .............................................................. 40
Figure 3.2-1. Location map of the Pearson Prospect, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map). .............. 43
Figure 3.2-2. Probable waste dump of the Pearson Mine, looking northeast (1997 Roll K11, frame #5). ................................................................. 44
Figure 3.2-3. Staging area for Forest Service Trail 173 at the base of the waste dump, looking northeast (1997 Roll K11, frame #6). .................................................. 44
Figure 3.3-1. Location map of the Sumner Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map). ......................... 47
Figure 3.3-2. Sketch map of the Sumner Mine .................................................. 48
Figure 3.3-3. Upper caved and dry adit (Adit 1) along Forest Service Road 1428, looking southeast (1997 Roll B6, frame #16). .................................................. 49
Figure 3.3-4. Lower Adit 2 (100 feet southwest of Adit 1) on Forest Service Road 1428, looking southeast (1997 Roll B6, frame #18). ........................................... 50
Figure 3.3-5. Old cabin on the west side of Champion Creek (1997 Roll B6, frame #17). ............................... 51
Figure 3.4-1. Location map of the Park Copper Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map). ......................... 55
Figure 3.4-2. Looking east at open Adit 1 of the Park Copper Mine, with water flowing from the portal (1997 Roll B10, frame #6). ................................................ 56
Figure 3.4-3. Looking north along the access road at Adit 1 of the Park Copper Mine, with water from the portal flowing across the road in front of the trail bike (1997 Roll B10, frame #7). ............................... 56
Figure 3.4-4. Looking west at the thin veneer of waste rock on the slope below Adit 1 of the Park Copper Mine (1997 Roll B10, frame #8). .................................................. 57
Figure 3.4-5. Looking east at the slump marking the location of caved Adit 2 at the Park Copper Mine (1997 Roll B10, frame #12). .................................................. 57
Figure 3.4-6. Looking west across the surface of Adit 2 waste dump (1997 Roll B10, frame #11). .................................................. 58
Figure 3.4-7. Looking west down the breached face of the waste dump for Adit 2 (1997 Roll B10, frame #10). .................................................. 58
Figure 3.5-1. Location map of Unnamed Prospect Site No. B8129704, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map). .................................................. 60
Figure 3.5-2. Looking north at the caved adit at Site No. B8129704 (1997 Roll B10, frame #13). .................................................. 61
Figure 3.5-3. Looking south-southeast down the face of the waste dump of Site No. B8129704 and down the Park Creek drainage (1997 Roll B10, frame #14). .................................................. 62
Figure 3.6-1. Location map of Unnamed Prospect Site No. B8129705, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map). .................................................. 65
Figure 3.6-2. Sketch map of Unnamed Prospect Site No. B8129705. .................................................. 66
Figure 3.6-3. Caved adit, with collapsed portal timbers in the caved debris, looking east (1997 Roll B10, frame #15). .................................................. 67
Figure 3.6-4. Moss-covered damp area on the surface of the waste dump in front of the adit, looking west (1997 Roll B10, frame #16). .................................................. 68
Figure 3.7-1. Location map of Unnamed Prospect Site No. B8129706, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map). .................................................. 71
Figure 3.7-2. Sketch map of Unnamed Prospect Site No. B8129706. .................................................. 72
Figure 3.7-3. Looking north at the slumping bank that marks the location of the caved adit at Unnamed Prospect Site No. B8129706 (1997 Roll B10, frame #17). .................................................. 73
Figure 3.7-4. Looking south across the brushy surface of the waste dump at Unnamed Prospect B8129706 (1997 Roll B10, frame #19). .................................................. 73
Figure 3.7-5. Looking south down the face of the waste dump at Site No. B8129706 toward the Rougin Creek drainage (1997 Roll B10, frame #18). .................................................. 74
Figure 3.8-1. Location map of the Sailor Boy Prospect, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map). .................................................. 77
Figure 3.8-2. Sketch map of the Sailor Boy Prospect. .................................................. 78
Figure 3.8-3. Open adit of the Sailor Boy Prospect, looking east (Roll K1, frame #1). .................................................. 79
Figure 3.8-4. Inside view of Sailor Boy adit (Roll K1, frame #2). .................................................. 80
Figure 3.8-5. Looking west at the small, grass-covered waste dump at the Sailor Boy Prospect (Roll K1, frame #3). .................................................. 80
Figure 3.9-1. Location map of the Silver Spray Prospect, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map). .................................................. 83
Figure 3.9-2. Sketch map of the Silver Spray Prospect. .................................................. 84
Figure 3.9-3. Caved adit of the Silver Spray Prospect, looking north (Roll K1, frame #4). .................................................. 85
Figure 3.9-4. Silver Spray waste dump, looking southwest (Roll K1, frame #5). .................................................. 86
Figure 3.13-5. Trickle of water flowing from Adit 1 at the Idaho Star Mine, looking east (Roll K2, frame #2). ................................................................. 116
Figure 3.13-6. View to the southeast across the grassy flat from the dump of Adit 1 at the Idaho Star Mine (Roll K2, frame #3). ................................................................. 117
Figure 3.13-7. Open Adit 2 at the Idaho Star Mine, looking northeast (Roll K2, frame #4). ................................................................. 117
Figure 3.13-8. Inside view of open Adit 2 at the Idaho Star Mine (Roll K2, frame #5). ................................................................. 118
Figure 3.13-9. Looking east at the waste dump for Adit 2 at the Idaho Star Mine (Roll K2, frame #6). ................................................................. 118
Figure 3.14-1. Location map of the Hansy Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). ................................................................. 124
Figure 3.14-2. Sketch map of the Hansy Mine workings examined for this study. ................................................................. 125
Figure 3.14-3. Looking west at the timbered portal of Adit 1 at the Hansy Mine (Roll K2, frame #7). ................................................................. 126
Figure 3.14-4. Inside view of Adit 1, showing the locked wooden gate and timber supports (Roll K2, frame #8). ................................................................. 127
Figure 3.14-5. Sketch map of Adit 1 at the Hansy Mine. ................................................................. 128
Figure 3.14-6. Looking southeast along the east edge of the north part of the waste dump for Adit 1 at the Hansy Mine (Roll K2, frame #9). ................................................................. 129
Figure 3.14-7. Looking south along the east edge of the south part of the waste dump for Adit 1, with the log ore bin along Olentange Creek (Roll K2, frame #10). ................................................................. 129
Figure 3.14-8. Looking west-northwest at caved Adit 2 at the Hansy Mine (Roll K2, frame #11). ................................................................. 130
Figure 3.14-9. Looking east-southeast down the face of the waste dump for Adit 2 at the Hansy Mine (Roll K2, frame #12). ................................................................. 131
Figure 3.14-10. Looking west at the sloughed slope at caved Adit 3 of the Hansy Mine (Roll K2, frame #13). ................................................................. 132
Figure 3.14-11. Sketch map of Adit 4 at the Hansy Mine. ................................................................. 133
Figure 3.14-12. Slumped debris in front of Adit 4 at the Hansy Mine, looking west (Roll K2, frame #14). ................................................................. 134
Figure 3.14-13. Eye-shaped opening into Adit 4 above the slumped debris (Roll K2, frame #15). ................................................................. 134
Figure 3.14-14. Looking south across the waste dump of Adit 4 at the stack of railroad ties and a few sections of 4-inch PVC drain pipe (Roll K2, frame #16). ................................................................. 135
Figure 3.14-15. Looking west at open Adit 5 of the Hansy Mine (Roll K2, frame #18). ................................................................. 135
Figure 3.14-16. Inside view of Adit 5 at the Hansy Mine (Roll K2, frame #19). ................................................................. 136
Figure 3.14-17. Looking northward across the surface of the waste dump for Adit 5 at the Hansy Mine (Roll K2, frame #17). ................................................................. 137
Figure 3.14-18. Sketch map of prospect cut 2 and Adit 6 (decline ?) at the Hansy Mine. ................................................................. 138
Figure 3.14-19. Looking north along the axis of prospect cut 2 at the Hansy Mine (Roll K2, frame #20). ................................................................. 139
Figure 3.14-20. Pile of collapsed timbers of Adit 6 at the Hansy Mine (Roll K2, frame #21). ................................................................. 139
Figure 3.19-2. Claim map of the Fourth of July Prospect showing the locations of three adits (Springer, 1972). .................................................. 172
Figure 3.19-3. Looking southwest at the timbered portal of Adit 1 at the Fourth of July Prospect (Roll K3, frame #21). .......................... 173
Figure 3.19-4. Small opening into Adit 1 at the top of the caved debris behind the portal (Roll K3, frame #23). .......................... 173
Figure 3.19-5. View to the west across the surface of the waste dump for Adit 1 at the Fourth of July Prospect (Roll K3, frame #22). .......... 174
Figure 3.19-6. Looking north across the surface of waste dump for Adit 1 (Roll K3, frame #24). .................................................. 174
Figure 3.19-7. Caved Adit 2 of the Fourth of July Prospect, looking northwest (Roll K3, frame #20). .................................................. 175
Figure 3.19-8. Looking north across Bullion Creek at the bulldozer road and cuts on the open slope (Roll K3, frame #25). ................. 175
Figure 3.20-1. Location map of the Wonderful Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map). .................. 179
Figure 3.20-2. Sketch map of the Wonderful Mine. .......................... 180
Figure 3.20-3. Looking east into the small opening of the Wonderful Mine adit (Roll K4, frame #2). .................................................. 181
Figure 3.20-4. Looking east toward the portal of the Wonderful Mine adit (Roll K4, frame #1). .................................................. 181
Figure 3.20-5. Looking south across the face of the waste dump at the Wonderful Mine (Roll K4, frame #3). .......................... 182
Figure 3.20-6. Old log cabin below the waste dump and near the creek (Roll K4, frame #5). .................................................. 182
Figure 3.20-7. Looking east at the log cabin and the waste dump at the Wonderful Mine (Roll K4, frame #8). .................................................. 183
Figure 3.21-1. Location map of the prospect cut at the Wonderful Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map). .................. 186
Figure 3.21-2. Prospect cut into a rock outcrop at the Wonderful Mine (Roll K4, frame #6). .................................................. 187
Figure 3.21-3. Collapsed remains of log cabin near the prospect cut at the Wonderful Mine (Roll K4, frame #7). .................................................. 187
Figure 3.22-1. Location map of the Peacock Copper Prospect, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map). .................. 190
Figure 3.23-1. Location map of the Unnamed Prospect, Site No. K7159802, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map). .............. 193
Figure 3.23-2. Sketch map of Unnamed Prospect, Site No. K7159802. .................................................. 194
Figure 3.23-3. Looking north up the slope at the waste dump of Site No. K7159802 (Roll K4, frame #9). .................................................. 195
Figure 3.29-1. Location map of Unnamed Prospect, Site No. K7169801, Shoshone County, Idaho (U.S. Geological Survey Three Sisters 7.5-minute topographic map) ......................................................... 230

Figure 3.29-2. Open adit at Site No. K7169801 along Forest Service Highway 50 (St. Joe River Road), looking north (Roll K5, frame #1) ................................................................. 231

Figure 3.29-3. Inside view of the short adit at Site No. K7169801 (Roll K5, frame #2) ......................................................... 231

Figure 3.30-1. Location map of Unnamed Prospect, Site No. K7169802, Shoshone County, Idaho (U.S. Geological Survey Three Sisters 7.5-minute topographic map) ......................... 234

Figure 3.30-2. Looking west across Bird Creek at Site No. K7169802 (Roll K4, frame #26) .................................................................................................................. 235

Figure 3.31-1. Location map of the Bald Mountain Prospect, Shoshone County, Idaho (U.S. Geological Survey Saltse 7.5-minute topographic map) ......................................................... 239

Figure 3.31-2. Sketch map of the Bald Mountain Prospect, Site No. K7209801 ................................................................. 240

Figure 3.31-3. Rock fragments from a breccia zone at the Bald Mountain Prospect (Roll K5, frame #8) ......................................................... 241

Figure 3.31-4. Looking south along the east trench, which is filled with pine and fir saplings (Roll K5, frame #5) ......................................................... 241

Figure 3.31-5. Looking northwest at the combined waste dumps for the caved shaft and the east trench of the Bald Mountain Prospect (Roll K5, frame #3) ......................................................... 242

Figure 3.31-6. Looking west at the excavated material from the shallow pits between the east and west trenches (Roll K5, frame #6) .............................................................................. 242

Figure 3.31-7. Looking west across the west trench (Roll K5, frame #7) .............................................................................. 243

Figure 3.32-1. Location map of the Big Elk Mine, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map) ......................................................... 247

Figure 3.32-2. Sketch map of the Big Elk Mine workings ......................................................... 248

Figure 3.32-3. Sketch map of Adit 1 at the Big Elk Mine ......................................................... 249

Figure 3.32-4. Opening of Adit 1 at the Big Elk Mine along the jeep access road, looking northeast (Roll K5, frame #10) ......................................................... 250

Figure 3.32-5. View inside Adit 1 at the Big Elk Mine (Roll K5, frame #11) ......................................................... 251

Figure 3.32-6. Looking southwest down the face of the waste dump for Adit 1 at the Big Elk Mine (Roll K5, frame #12) ......................................................... 251

Figure 3.32-7. Sketch map of Adit 2 at the Big Elk Mine ......................................................... 252

Figure 3.32-8. Adit 2 of the Big Elk Mine, looking north (Roll K5, frame #13) ......................................................... 253

Figure 3.32-9. Looking north at the opening into Adit 2 of the Big Elk Mine (Roll K5, frame #14) ......................................................... 254

Figure 3.32-10. Looking west at the toe of the waste dump for Adit 2 of the Big Elk Mine (Roll K5, frame #15) ......................................................... 254

Figure 3.32-11. Sketch map of the caved shaft and prospect cut of the Big Elk Mine .............................................................................. 255

Figure 3.32-12. Old logs, timbers, and rock debris in the caved shaft of the Big Elk Mine (Roll K5, frame #18) .............................................................................. 256

Figure 3.32-13. Looking west across part of the south lobe of the waste dump for the Big Elk shaft (Roll K5, frame #21) ......................................................... 256

xxiii
Figure 3.32-14. Looking north at the headwall of the prospect cut at the Big Elk Mine (Roll K5, frame #16). .................................................. 257
Figure 3.32-15. Looking northeast along the prospect cut (Roll K5, frame #17). .................................................. 257
Figure 3.32-16. Looking south from the recent prospect cut across the surface of the waste dump for the older shaft (Roll K5, frame #19). .................................................. 258
Figure 3.32-17. Sketch of Adit 3 of the Big Elk Mine. .................................................. 259
Figure 3.32-18. Looking north at the timbered portal of Adit 3 at the Big Elk Mine (Roll K5, frame #22). .................................................. 260
Figure 3.32-19. View inside Adit 3 at the Big Elk Mine (Roll K5, frame #23). .................................................. 261
Figure 3.32-20. Looking south down the face of the waste dump for Adit 3 at the Big Elk Mine (Roll K5, frame #25). .................................................. 261
Figure 3.32-21. Looking south from the portal of Adit 3 across the surface of the waste dump (Roll K5, frame #24). .................................................. 262
Figure 3.33-1. Location map of the Manhattan Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). .................................................. 265
Figure 3.33-2. Sketch map of the Manhattan Prospect, Site No. K7219801. .................................................. 266
Figure 3.33-3. Looking down into the south prospect pit of the Manhattan Prospect (Roll K6, frame #3). .................................................. 267
Figure 3.33-4. Rim of excavated material around the north side of the south pit at the Manhattan Prospect (Roll K6, frame #4). .................................................. 268
Figure 3.33-5. Weeds and wildflowers growing in the bottom of the shallow north pit of the Manhattan Prospect (Roll K6, frame #5). .................................................. 269
Figure 3.34-1. Location map of the Copper Kopje Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). .................................................. 272
Figure 3.34-2. Sketch map of the Copper Kopje Prospect. .................................................. 273
Figure 3.34-3. Looking down into the open shaft of the Copper Kopje Prospect (Roll K6, frame #7). .................................................. 274
Figure 3.34-4. Looking northwest at the orange plastic fencing and warning signs around the open Copper Kopje shaft (Roll K6, frame #6). .................................................. 274
Figure 3.34-5. Looking east at the face of the waste dump for the Copper Kopje shaft (Roll K6, frame #8). .................................................. 275
Figure 3.35-1. Location map of the Monitor Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). .................................................. 280
Figure 3.35-2. Sketch map of the Monitor Mine shaft. .................................................. 281
Figure 3.35-3. Sketch map of the Monitor Mine adit. .................................................. 282
Figure 3.35-4. Looking southeast into the caved Monitor shaft (Roll K6, frame #9). .................................................. 283
Figure 3.35-5. Looking northwest over the surface of the waste dump for the Monitor shaft (Roll K6, frame #10). .................................................. 284
Figure 3.35-6. Looking northwest down the northwest end of the waste dump for the Monitor shaft (Roll K6, frame #12). .................................................. 284
Figure 3.35-7. Moss growing in the water flowing from the Monitor tunnel (Roll K1, frame #20). .................................................. 285
Figure 3.35-8. Looking south across the surface of the waste dump for the Monitor tunnel (Roll K1, frame #21). ........................................... 286
Figure 3.35-9. Looking southwest down the west side of the waste dump for the Monitor tunnel (Roll K1, frame #22). ........................................... 286
Figure 3.35-10. Looking southeast up the west side of the waste dump for the Monitor tunnel (Roll K1, frame #25). ........................................... 287
Figure 3.35-11. Collapsed boards and timbers of a structure at the base of the waste dump, possibly a loading platform (Roll K1, frame #24). ........................................... 287
Figure 3.36-1. Location map of the Richmond Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). ........................................... 293
Figure 3.36-2. Sketch map of the adit at the Richmond Mine. ........................................... 294
Figure 3.36-3. Sketch map of the upper shafts and trenches at the Richmond Mine. ........................................... 295
Figure 3.36-4. Looking north at the caved adit at the Richmond Mine (Roll K6, frame #13). ........................................... 296
Figure 3.36-5. Looking west at the east end of the waste dump for the Richmond adit (Roll K6, frame #16). ........................................... 297
Figure 3.36-6. Looking west at the western part of the waste dump for the Richmond adit (Roll K6, frame #17). ........................................... 297
Figure 3.36-7. Looking west at the collapsed tram station off the west end of the waste dump for the Richmond adit (Roll K6, frame #14). ........................................... 298
Figure 3.36-8. Looking east from the surface of the waste dump for the Richmond adit (Roll K6, frame #15). ........................................... 298
Figure 3.36-9. Looking north at caved Shaft 1 at the upper Richmond workings (Roll K6, frame #18). ........................................... 299
Figure 3.36-10. Looking southwest at waste rock pile 1, just south of Forest Service Road 391 (Roll K6, frame #19). ........................................... 299
Figure 3.36-11. Looking southwest at waste rock pile 2 from pile 1 (Roll K6, frame #20). ........................................... 300
Figure 3.36-12. Looking north at two shallow prospect pits from waste rock pile 1 (Roll K6, frame #21). ........................................... 300
Figure 3.36-13. Caved Shaft 2 at the upper Richmond workings (Roll K6, frame #22). ........................................... 301
Figure 3.36-14. Caved Shaft 3 at the upper Richmond workings (Roll K6, frame #24). ........................................... 301
Figure 3.36-15. Low rim of waste rock around part of caved Shaft 3 of the upper Richmond workings, looking west (Roll K6, frame #23). ........................................... 302
Figure 3.36-16. Looking south into the west end of caved Shaft 4 of the upper Richmond workings (Roll K6, frame #25). ........................................... 303
Figure 3.36-17. Looking down into caved Shaft 5 of the upper Richmond workings (Roll K7, frame #4). ........................................... 304
Figure 3.36-18. Looking north up the axis of the west trench at the upper Richmond workings (Roll K7, frame #6). ........................................... 305
Figure 3.36-19. Looking north up the axis of the east trench at the upper Richmond workings (Roll K7, frame #7). ........................................... 306
Figure 3.36-20. Looking northeast at the “waste dumps” of the east trench and west trench (Roll K7, frame #5). ........................................... 307
Figure 3.36-21. Looking north across caved Shafts 6 and 7 at the upper Richmond workings (Roll K7, frame #2). .......................................................... 307
Figure 3.36-22. Looking north into caved Shaft 6 (Roll K7, frame #1). .......................................................... 308
Figure 3.36-23. Looking south down the trough of either a caved adit or long prospect trench at the southwest end of the upper Richmond workings (Roll K7, frame #3). . 309
Figure 3.37-1. Location map of the Copper Age (?) Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map). ......................... 312
Figure 3.37-2. Sketch of the Copper Age Prospect. .......................................................... 313
Figure 3.37-3. Looking down into the caved shaft of the Copper Age Prospect (Roll K7, frame #9). .......................................................... 314
Figure 3.37-4. Looking west at the side of the waste dumps for the Copper Age shaft and adit (Roll K7, frame #10). .......................................................... 315
Figure 3.37-5. Shallow trough of the caved adit above the pit of the caved shaft (Roll K7, frame #8). .......................................................... 316
Figure 3.37-6. Looking east at a small, shallow prospect (Roll K7, frame #11). .......................................................... 317
Figure 3.38-1. Location map of the Ward Prospect, Shoshone County, Idaho (U.S. Geological Survey McGee Peak 7.5-minute topographic map). ......................... 320
Figure 3.38-2. Sketch map of the Ward Prospect. .......................................................... 321
Figure 3.38-3. Looking north along the trough of the caved adit at the Ward Prospect (Roll K7, frame #13). .......................................................... 322
Figure 3.38-4. Close-up of the small opening into the Ward adit (Roll K7, frame #14). .......................................................... 323
Figure 3.38-5. Looking southwest down the south slope of Ward Peak over the small waste dump of the adit at the Ward Prospect (Roll K7, frame #12). .......................................................... 323
Figure 3.38-6. Looking south at the largest of the eastern group of prospect pits and several other pits and trenches at the Ward Prospect (Roll K7, frame #23). .......................................................... 324
Figure 3.38-7. Looking east at several of the shallow pits and a trench at the eastern group of prospects at the Ward Prospect (Roll K7, frame #24). .......................................................... 324
Figure 3.39-1. Location map of the Black Bear Claim Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map). ......................... 327
Figure 3.39-2. Sketch map of the Black Bear Claim Prospect. .......................................................... 328
Figure 3.39-3. Open adit at the Black Bear Claim Prospect (Roll K7, frame #15). .......................................................... 329
Figure 3.40-1. Location map of the Eureka Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map). ......................... 332
Figure 3.40-2. Sketch map of the Eureka Prospect. .......................................................... 333
Figure 3.40-3. Looking east at the open portal of the Eureka Prospect (Roll K7, frame #16). .......................................................... 334
Figure 3.40-4. Inside view of the adit at the Eureka Prospect (Roll K7, frame #17). .......................................................... 335
Figure 3.41-1. Location map of the Setser Prospect, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map). ......................... 338
Figure 3.41-2. Sketch map of the Setser Prospect. .......................................................... 339
Figure 3.41-3. One of the numerous shallow prospect pits at the Setser Prospect near Nelson Peak (Roll K7, frame #20). .......................................................... 340
Figure 3.41-4. Another of the shallow, brush- and grass-filled pits at the Setser Prospect (Roll K7, frame #19). ................................................................. 341
Figure 3.42-1. Location map of the Marble Creek Pegmatite Prospect, Shoshone County, Idaho (U.S. Geological Survey Marble Mountain 7.5-minute topographic map). .......................... 344
Figure 3.42-2. Looking northwest at the quarry face of the Marble Creek Pegmatite Prospect (Roll K7, frame #21). ......................................................... 345
Figure 3.43-1. Location map of the Tri-State Cedar Corporation Prospect, Shoshone County, Idaho (U.S. Geological Survey Marble Mountain 7.5-minute topographic map). ......................................................... 348
Figure 3.44-1. Location map of the Tillicum Nickel Prospect, Shoshone County, Idaho (U.S. Geological Survey Peggy Peak 7.5-minute topographic map). ......................................................... 353
Figure 3.44-2. Sketch of the Tillicum Nickel Prospect workings. ................................................................. 354
Figure 3.44-3. Map of the property, identified as the Granite Peak Prospect, in 1990 (Causey and Marks, 1993, Figure 4). ................................................................. 355
Figure 3.44-4. View to the northwest, looking at the waste dump for Adit 1 at the Tillicum Nickel Prospect, which is on the steep north slope of Granite Peak (1999 Roll K21, frame #24). ................................................................. 356
Figure 3.44-5. Trough on the slope above caved Adit 1 at the Tillicum Nickel Prospect, looking west (1999 Roll K21, frame #26). ................................................................. 357
Figure 3.44-6. One of two trenches cutting the oxidized zone above Adit 1 at the Tillicum Nickel Prospect (1999 Roll K22, frame #1). ................................................................. 358
Figure 3.44-7. View to the east down the face of the waste dump for Adit 1 at the Tillicum Nickel Prospect (1999 Roll K21, frame #25). ................................................................. 358
Figure 3.44-8. Looking south at Adit 2 at the Tillicum Nickel Prospect (1999 Roll K22, frame #3). ................................................................. 359
Figure 3.44-9. View inside Adit 2 at the Tillicum Nickel Prospect (1999 Roll K22, frame #4). ................................................................. 360
Figure 3.44-10. Scarp west of Adit 2 at the Tillicum Nickel Prospect (1999 Roll K22, frame #5). ................................................................. 361
Figure 3.44-11. Looking south at the portal of nearly caved Adit 3, the main tunnel at the Tillicum Prospect (1999 Roll K22, frame #6). ................................................................. 362
Figure 3.44-12. View of the narrow opening into Adit 3 at the Tillicum Nickel Prospect (1999 Roll K22, frame #7). ................................................................. 363
Figure 3.44-13. Looking west over the waste dump for Adit 3 at the Tillicum Nickel Prospect (1999 Roll K22, frame #8). ................................................................. 363
Figure 3.44-14. Looking south at the collapsed blacksmith on the dump for Adit 3 at the Tillicum Nickel Prospect (Roll K22, frame #9). ................................................................. 364
Figure 3.44-15. Collapsed cabin on the flat above Adit 4 at the Tillicum Nickel Prospect (Roll K21, frame #23). ................................................................. 364
Figure 3.44-16. Leaning outhouse on east side of the low knoll, about 200 feet west of the cabin (Roll K22, frame #2). ................................................................. 365

xxvii
TABLES

Table 1.5-1. Screening Criteria (answer Yes or No to each item) ........................................ 7
Table 1.5-2. Standards for contaminants in water ................................................................. 10
Table 1.5-3. Median values of metals in rock samples from various units of the Belt
   Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg). .................................... 11
Table 1.5-4. Median values of metals in soil samples from various units of the Belt
   Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg). .................................... 12
Table 1.5-5. Clark Fork Superfund background levels for selected elements ................... 13
Table 2.1-1. Summary of the sites inspected in the St. Joe River basin ............................ 17
Table 2.2-1. Generalized section of the Belt Supergroup (page 14 from Hobbs and others,
   1965) ......................................................................................................................... 23
Table 2.4-1. Dissolved metals screen for reference samples from the St. Joe River
   drainage ...................................................................................................................... 25
Table 2.4-2. Total metals screen for reference samples from the St. Joe River drainage .... 26
Table 2.5-1. Dissolved metals in water samples from the properties in the St. Joe River
   basin. Numbers in bold exceed one or more water quality standards ...................... 27
Table 2.5-2. Total recoverable metals in water samples from the properties in the St. Joe
   River basin. Numbers in bold exceed one or more water quality standards ............. 29
Table 2.5-3. Element screen for dump and stream sediment samples for properties in the
   St. Joe River basin ...................................................................................................... 32
Table 2.5-4. Toxicity Characteristic Leaching Procedure for dump and stream sediment
   samples from properties in the St. Joe River basin ..................................................... 33
### VIDEO TAPE INDEX

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Tape 1, 00:00:00-00:09:20</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Lucky Swede Mine (Site No. WL-496)</td>
<td>Tape 1, 00:09:30-00:14:44</td>
</tr>
<tr>
<td>3.2 Pearson Mine (Site No. WL-497)</td>
<td>Tape 1, 00:14:50-00:19:08</td>
</tr>
<tr>
<td>3.3 Summner Mine (Site No. WL-491)</td>
<td>Tape 1, 00:19:11-00:22:23</td>
</tr>
<tr>
<td>3.4 Park Copper Mine (Site No. WL-478)</td>
<td>Tape 1, 00:22:30-00:27:43</td>
</tr>
<tr>
<td>3.5 Unnamed Prospect (Site No. B8129704)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.6 Unnamed Prospect (Site No. B8129705)</td>
<td>Tape 1, 00:28:16-00:30:55</td>
</tr>
<tr>
<td>3.7 Unnamed Prospect (Site No. B8129706)</td>
<td>Tape 1, 00:31:00-00:33:28</td>
</tr>
<tr>
<td>3.8 Sailor Boy Prospect (Site No. WL-514)</td>
<td>Tape 1, 00:33:35-00:36:08</td>
</tr>
<tr>
<td>3.9 Silver Spray Prospect (Site No. WL-506)</td>
<td>Tape 1, 00:36:13-00:42:09</td>
</tr>
<tr>
<td>3.10 Franklin Prospect (Site No. WL-519)</td>
<td>Tape 1, 00:42:00-00:54:59</td>
</tr>
<tr>
<td>3.11 Fishhook Creek Prospect (Site No. WL-533)</td>
<td>Tape 1, 00:55:05-01:04:30</td>
</tr>
<tr>
<td>3.12 Miller Mine (Site No. WL-510)</td>
<td>Tape 1, 01:04:33-01:13:54</td>
</tr>
<tr>
<td>3.13 Idaho Star Mine (Site No. WL-517)</td>
<td>Tape 1, 01:14:00-01:21:58</td>
</tr>
<tr>
<td>3.14 Hansy Mine (Site No. WL-516)</td>
<td>Tape 1, 01:22:02-01:42:34</td>
</tr>
<tr>
<td>3.15 Mastodon (Site No. WL-515) and Macedonia (Site No. WL-505) Prospects</td>
<td>Tape 1, 01:42:40-01:48:25</td>
</tr>
<tr>
<td>3.16 Bullion Mine, Upper Workings (Site No. WL-489)</td>
<td>Tape 2, 00:00:46-00:14:12</td>
</tr>
<tr>
<td>3.17 Bullion Mine, Lower Workings (Site No. WL-489)</td>
<td>Tape 2, 00:14:18-00:25:18</td>
</tr>
<tr>
<td>3.18 Shirley Prospect (Site No. K7149811)</td>
<td>Tape 2, 00:25:23-00:27:44</td>
</tr>
<tr>
<td>3.19 Fourth of July Silver Prospect (Site No. WL-493)</td>
<td>Tape 2, 00:27:51-00:34:37</td>
</tr>
<tr>
<td>3.20 Wonderful Mine (Site No. WL-484)</td>
<td>Tape 2, 00:34:41-00:41:05</td>
</tr>
<tr>
<td>3.21 Wonderful Mine, Prospect Cut (Site No. WL-484)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.22 Peacock Copper Prospect (Site No. WL-487)</td>
<td>Tape 2, 00:41:29-00:45:11</td>
</tr>
<tr>
<td>3.23 Unnamed Prospect (Site No. K7159802)</td>
<td>Tape 2, 00:45:17-00:48:07</td>
</tr>
<tr>
<td>3.24 Unnamed Prospect (Site No. K7159803)</td>
<td>Tape 2, 00:48:12-00:50:17</td>
</tr>
<tr>
<td>3.25 Alpina Prospect (Site No. WL-500) and Alice Prospect (Site No. WL-501)</td>
<td>Tape 2, 00:50:20-01:00:11</td>
</tr>
<tr>
<td>3.26 Conrad’s Crossing Prospect (Site No. WL-541)</td>
<td>Tape 2, 01:00:17-01:01:56</td>
</tr>
<tr>
<td>3.27 Bluff Creek Copper Claims (Site No. WL-540)</td>
<td>Tape 2, 01:02:00-01:09:34</td>
</tr>
<tr>
<td>3.28 St. Joe Quartz Prospect (Site No. WL-536)</td>
<td>Tape 2, 01:09:41-01:11:37</td>
</tr>
<tr>
<td>3.29 Unnamed Prospect (Site No. K7169801)</td>
<td>Tape 2, 01:11:40-01:13:41</td>
</tr>
<tr>
<td>3.30 Unnamed Prospect (Site No. K7169802)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.31 Bald Mountain Prospect (Site No. K7209801)</td>
<td>Tape 2, 01:14:07-01:19:40</td>
</tr>
<tr>
<td>3.32 Big Elk Mine (Site No. WL-503)</td>
<td>Tape 2, 01:19:44-01:34:03</td>
</tr>
<tr>
<td>3.33 Manhattan Prospect (Site No. K7219801)</td>
<td>Tape 2, 01:34:07-01:38:06</td>
</tr>
<tr>
<td>3.34 Copper Kopje Prospect (Site No. K7219802)</td>
<td>Tape 2, 01:38:10-01:40:56</td>
</tr>
<tr>
<td>3.35 Monitor Mine (Site No. WL-507)</td>
<td>Tape 2, 01:41:00-01:53:27</td>
</tr>
<tr>
<td>3.36 Richmond Mine (Site No. WL-504)</td>
<td>Tape 3, 00:00:47-00:25:41</td>
</tr>
<tr>
<td>3.37 Copper Age(?) Prospect (Site No. WL-509)</td>
<td>Tape 3, 00:25:45-00:31:46</td>
</tr>
<tr>
<td>3.38 Ward Prospect (Site No. WL-526)</td>
<td>Tape 3, 00:31:50-00:41:02</td>
</tr>
</tbody>
</table>
3.39 Black Bear Claim Prospect (Site No. WL-538) .................. Tape 3, 00:41:05-00:44:12
3.40 Eureka Prospect (Site No. WL-535) ............................. Tape 3, 00:44:16-00:48:32
3.41 Setser Prospect (Site No. WL-523) ............................. Tape 3, 00:48:36-00:54:50
3.42 Marble Creek Pegmatite (Site No. SP-358) ..................... Tape 3, 00:54:55-00:57:19
3.43 Tri-State Cedar Corporation (Site No. SP-354) .................. No Video
3.44 Tillicum Nickel Prospect (Site No. WL-558) .................... Tape 3, 00:57:47-01:16:35
END OF TAPE ANNOUNCEMENT ........................................ Tape 3, 01:16:39-01:17:10
1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

In order to fulfill its obligations under the Clean Water Act and related legislation, the Northern Region of the United States Forest Service (USFS) needs to identify and characterize the abandoned and inactive mines with environmental, health, and/or safety problems that are on or could impact National Forest Service-administered lands. The Northern Region of the USFS administers National Forest lands in the northern part of Idaho, Montana, and parts of North and South Dakota. The Idaho Geological Survey (IGS) is the lead state agency for the collection, interpretation, and distribution of information about the geology and mineral resources of Idaho. The USFS and the IGS, having determined that an inventory and preliminary characterization of abandoned and inactive mines in Idaho would be beneficial to both agencies, have entered into a series of participating agreements to accomplish this work. The first forest inventoried was the Coeur d'Alene National Forest of the Panhandle National Forests. This volume presents the results of work done in the St. Joe National Forest (St. Maries and Avery Ranger districts). Appendix E contains a list of all reports prepared for this project. For continuity, the general design of this report follows that used by the Montana Bureau of Mines and Geology for similar studies in Montana.

1.2 PROJECT OBJECTIVES

In 1992, the USFS and IGS entered into an agreement to inventory abandoned and inactive mines on or affecting Forest Service lands in Idaho. Work on the initial phase of the project included developing a computerized database of all such mines and prospects and plotting the locations of these properties on National Forest base maps. Phase 2 work conducted the following year provided the Forest Service with screening forms containing site information from the database and map overlays at 7.5-minute scale for areas of dense mining activity. Phase 3 started in the summer of 1996 and included field examination of properties in the Prichard Creek and Eagle Creek basins (Summit mining district) in Shoshone County, field examination of properties in the Gold Creek drainage (Lakeview mining district) in Bonner County, and preparation of reports discussing the ownership and operational history of selected mines. Field work in the summer of 1997 covered properties in the Coeur d'Alene River basin surrounding the Coeur d'Alene mining district that had not been examined the previous summer. Properties in the St. Joe National Forest were examined during parts of the 1997, 1998, and 1999 field seasons.

The overall objectives of this inventory and preliminary characterization process, as defined by the USFS, are to:

1. Systematically identify all mine sites with possible human health, environmental, and/or safety related problems that either are on or affecting National Forest Service lands.

2. Identify the human health and environmental risks at each location based on site characterization factors (see Section 1.5), including screening-level soil and water samples.
taken and analyzed in accordance with Environmental Protection Agency (EPA) protocols and quality control procedures.

3. Based on site characterization factors, identify those sites that are not affecting National Forest Service lands and that can therefore be eliminated from further consideration.

4. Cooperate with other state and federal agencies, and integrate the Northern Region program with their programs.

5. Develop and maintain a data file of site information that will allow the Region to pro-actively respond to governmental and public interest group concerns.

In addition to the USFS objectives outlined above, the IGS objectives include gathering new information associated with these abandoned and inactive mines. The Survey’s enabling legislation (Sections 47-201–47-204 of the Idaho Code) designates the IGS as the lead state agency for the collection, interpretation, and distribution of all geologic and minerals data for Idaho.

1.3 ABANDONED AND INACTIVE MINES DEFINED

For the purposes of this study, mines, mills, or other processing facilities related to mineral extraction and/or processing are defined as abandoned or inactive as follows:

A mine is considered **abandoned** if there are no identifiable owners or operators for the facilities, or if the facilities have reverted to federal ownership.

A mine is considered to be **inactive** if there is an identifiable owner or operator of the facility, but the facility is not currently operating and there are no approved authorizations or permits to operate.

1.4 HEALTH AND ENVIRONMENTAL PROBLEMS AT MINES

A variety of safety, health, and environmental problems may occur at abandoned and inactive mines. These include metals that contaminate ground water, surface water, and soils; airborne dust from abandoned tailings impoundments; eroding mine and mill waste materials that contribute excessive amounts of sediment to surface waters; unstable waste piles with the potential for catastrophic failure; and physical hazards associated with mine openings and dilapidated structures. The most important environmental hazard is the contamination of both surface and subsurface water by metals, acid mine drainage, or sediment loading.

Metals are often transported from a mine by water (ground water discharge or surface runoff) and may be dissolved, suspended, or carried as part of the bedload. When sulfides are present, acid water can form; this, in turn, increases the solubility of metals. This condition, known as acid mine drainage (AMD), is a significant source of metal releases at some mine sites in Idaho.
1.4.1 Acid Mine Drainage

Trexler and others (1975) identified six factors that govern the formation of metal-laden acid mine waters. They are:

1) availability of acid-producing minerals, particularly pyrite,
2) presence of oxygen,
3) moisture in the atmosphere,
4) availability of leachable heavy metals,
5) availability of water to transport the dissolved constituents, and
6) mine characteristics, which affect movement of air and water through the mine workings.

These factors occur not only within the mines themselves, but also within mine dumps and mill tailings piles, making these waste materials potential sources of contamination as well. Formation of acid mine drainage can be reduced if minerals such as calcite, which can neutralize acidity, are present (Trexler and others, 1975; Marvin and others, 1995).

Acid mine drainage is formed by the oxidation and dissolution of sulfides, particularly pyrite (FeS₂) and pyrrhotite (Fe₁₋ₓS). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H₂SO₄), sulfate ions (SO₄²⁻), and reduced iron (Fe²⁺). When sulfide-bearing rock is mined, the sulfide minerals are exposed to atmospheric oxygen and oxygen-bearing water. Consequently, the sulfide minerals are oxidized, and acid mine waters are produced (Trexler and others, 1975; Marvin and others, 1995).

The oxidation of the reduced iron is the step that limits how much acid will form. The rate of this reaction can be greatly increased by iron-oxidizing bacteria (*Thiobacillus ferrooxidans*). The oxidized iron produced by biological activity promotes further oxidation and dissolution of pyrite, pyrrhotite, and marcasite (FeS₂, a dimorph of pyrite) (Trexler and others, 1975; Marvin and others, 1995).

Once formed, the acid can dissolve other sulfide minerals to produce high concentrations of copper, lead, zinc, and other metals. Minerals that can contribute heavy metals to acid mine drainage include arsenopyrite, FeAsS; chalcopyrite, CuFeS₂; galena, PbS; tetrathedrite, (CuFe)₁₂Sb₄S₁₃; and sphalerite, (Zn, Fe)S. Aluminum can be leached by the dissolution of aluminosilicates common in soils and waste material found in Idaho. The dissolution of any given metal is controlled by the solubility of that metal (Trexler and others, 1975; Marvin and others, 1995).

1.4.2 Solubility of Selected Metals

The following information is paraphrased from Marvin and others (1995, p. 5-6). This report cites the following references as sources for this material: Lindsay (1979), Stumm and Morgan (1981), Hem (1985), and Maest and Metesh (1993).
At a pH above 2.2, ferric hydroxide [Fe(OH)$_3$] produces a brownish orange color in surface waters and forms a precipitate with a similar color on rocks in affected streams. If other metals, such as copper, lead, cadmium, zinc, and aluminum, are present in the source rock, they may also precipitate with or adsorb onto the ferric hydroxide (Stumm and Morgan, 1981). Alunite [KAl$_3$(SO$_4$)$_2$(OH)$_6$] and jarosite [KFe$_6$(SO$_4$)$_2$(OH)$_6$] will precipitate at a pH of less than 4, depending on SO$_4^{2-}$ and K$^+$ activities (Lindsay, 1979).

Under acidic conditions, the solubility of the metal controls how much will be released into the environment:

**Manganese** solubility is strongly controlled by the redox state and is limited by the presence of minerals such as pyrolusite and manganite; under reducing conditions, pyrolusite [MnO$_2$] dissolves and manganite [MnO(OH)] precipitates. Manganese is found in mineralized environments as rhodochrosite [MnCO$_3$] and its weathering products.

**Aluminum** solubility is most often controlled by alunite [KAl$_3$(SO$_4$)$_2$(OH)$_6$] or by gibbsite [Al(OH)$_3$], depending on pH. Aluminum is one of the most common elements in rock-forming minerals such as feldspars, micas, and clays.

**Arsenic** tends to precipitate and adsorb with iron at low pH and de-sorb or dissolve at higher pH. Once oxidized, arsenic will be found in solution in higher pH waters. When the pH is between 3 and 7, the dominant arsenic compound is a monovalent arsenate, H$_2$AsO$_4$. Arsenic is abundant in metallic mineral deposits as arsenopyrite [FeAsS], enargite [Cu$_3$AsS$_4$], tennantite [Cu$_{12}$As$_8$S$_{13}$], and other minerals.

**Cadmium** solubility data are limited. When the pH of soils is above 7.5, the solubility of cadmium is controlled by the carbonate species octavite [CdCO$_3$]; when the pH of the soil is below 6, cadmium solubility is controlled by strengite [Cd$_3$(PO$_4$)$_2$]. Octavite is the dominant control on the solubility of cadmium in soils. In water, at low partial pressures of H$_2$S, CdCO$_3$ is easily reduced to CdS.

**Copper** solubility in natural waters is controlled primarily by the amount of carbonate present; malachite [Cu$_2$(OH)$_2$CO$_3$] and azurite [Cu$_2$(OH)$_2$(CO$_3$)$_2$] form when CO$_3^{2-}$ ions are available in sufficient concentrations. In soil, copper combines readily with iron to form cupric ferrite. Other compounds, such as sulfate and phosphates, may also control copper solubility in soils. Copper is present in many ore minerals, including chalcopyrite [CuFeS$_2$], bornite [Cu$_2$FeS$_4$], chalcocite [Cu$_2$S], and tetrahedrite [Cu$_{12}$Sb$_4$S$_{13}$].
Mercury readily vaporizes under atmospheric conditions and thus is most often found in concentrations well below the 25 μg/L equilibrium concentration. The most stable form of mercury in soil is its elemental form. Mercury is found in low temperature hydrothermal ores as cinnabar [HgS], in epithermal (hot springs) deposits as native mercury, and as native mercury in man-made deposits where mercury was used to process gold ores.

Lead concentrations in natural waters are controlled by the formation of lead carbonate, which has an equilibrium concentration of 50 μg/L when the pH is between 7.5 and 8.5. As with other metals, concentrations in solution increase with decreasing pH. In sulfate soils with a pH of less than 6, the formation of anglesite determines how much lead will remain in solution. The formation of cerussite, a lead carbonate, controls solubility in buffered soils. Lead occurs in the common ore mineral galena [PbS].

Zinc solubility is controlled by the formation of zinc hydroxide and zinc carbonate in natural waters. When the pH is above 8, the equilibrium concentration of zinc in water with a high bicarbonate content is less than 100 μg/L. Franklinithe may control solubility at pH less than 5 in water and soils, and its formation is strongly affected by sulfate concentrations. Thus, production of sulfate from acid mine drainage may ultimately control the solubility of zinc in water affected by mining. Sphalerite [ZnS] is common in mineralized systems.

1.4.3 The Use of pH and Specific Conductivity to Identify Water Quality Problems

Specific conductance (SC) and pH provide a rapid way to distinguish many "problem" mine sites from those that have no adverse water-related impacts. As a rough screening tool, low pH (<6.0) and high SC (variable) usually occur at sites with problems; neutral or higher pH and low SC indicate sites that are less likely to have serious problems.

Limiting data collection only to pH and SC largely ignores the various controls on solubility and can lead to overlooking some types of problems. Arsenic, for example, is most mobile in waters with higher pH values (>7), and its concentration is strongly dependent on the presence of dissolved iron. Cadmium and lead may also exceed standards in waters with pH values within acceptable limits.

Reliance on SC as an indicator of site conditions can also be misleading in certain situations. The SC value of a sample represents 55 to 75 percent of the total dissolved solids (TDS), depending on the concentration of sulfate. Also, it is necessary to have a statistically significant amount of SC data for a study area in order to define what constitutes a high or low SC value.

In some cases, a water sample with a near-neutral pH and a moderate SC could have one or more dissolved metal species that may exceed standards. The complete evaluation of a mine site for
adverse impacts on water and soil should include the collection of samples for analysis of metals, cations, and anions.

1.5 METHODOLOGY

1.5.1 Data Sources

The IGS began compiling a database of mining properties in Idaho in 1979. This work has continued to date, and the database (now digital) contains information on some 8,700 mines and prospects. All or parts of the following databases and information sources have been integrated into this digital information system:

1. the Mineral Industry Location Subsystem (MILS) database (U.S. Bureau of Mines)
2. the Mineral Resources Data System (MRDS) database (U.S. Geological Survey)
3. published compilations of mines and prospects data
4. state publications on Idaho mineral deposits
6. IGS mineral property files
7. all mines and prospects noted on the appropriate USGS 7.5-minute quadrangle maps
8. data held in private collections or company information.

Most of the data for this project were collated with existing data in the IGS Mines and Prospects digital database. As noted, this is the most complete compilation available for information on Idaho's mining properties. The IGS continues to update the database, which now contains an estimated 85-90 percent of the mining properties in the state. During the field visits, the IGS located some (but not many) mines and prospects for which no previous information existed. Also, a very few mines listed in the database were not found.

1.5.2 Pre-field Screening

Field crews visited almost all the mine sites in the study area, emphasizing the properties with the potential to release hazardous substances and those for which there was not enough information available to make that determination without a field visit. The IGS and the USFS developed screening criteria (Table 1.5-1) which they used to determine if a site had the potential to release hazardous substances or posed other environmental or safety hazards. The first page of the Field Form (Appendix A) contains the screening criteria. If any of the answers were "yes" or unknown, the site was visited. Personal knowledge of a site and published information were used initially to answer the questions. Forest Service mineral specialists used these criteria to "screen out" several sites using their knowledge of an area.

Mine sites which were not visited were retained in the database along with the data source(s) that were consulted. However, if these sites were close to a visited site, the geologist usually looked at them to verify that the screening information was correct.
Placer mines were not studied as part of this project. Although mercury was used in amalgamating free gold in placer mines, the complex nature of placer deposits makes detection of mercury difficult and is beyond the scope of this inventory. Due to their oxidized nature, placer deposits are not likely to contain other anomalous concentrations of heavy metals.

Table 1.5-1. Screening Criteria (answer Yes or No to each item).

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Screening Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mill site or tailings present.</td>
</tr>
<tr>
<td>2.</td>
<td>Adits with discharge or evidence of discharge.</td>
</tr>
<tr>
<td>3.</td>
<td>Evidence of or strong likelihood for metal leaching or AMD (water stains, stressed or lack of vegetation, waste below water table, etc.)</td>
</tr>
<tr>
<td>4.</td>
<td>Mine waste in floodplain or shows signs of water erosion.</td>
</tr>
<tr>
<td>5.</td>
<td>Residences, high public use area, or environmentally sensitive area (as listed in HRS) within 200 feet of the disturbance.</td>
</tr>
<tr>
<td>6.</td>
<td>Hazardous wastes/materials (chemical containers, explosives, etc.)</td>
</tr>
<tr>
<td>7.</td>
<td>Open adits/shafts, highwalls, or hazardous structures/debris.</td>
</tr>
</tbody>
</table>

If the answers to criteria 1 through 6 were all "NO" (based on literature, personal knowledge, or a site visit), the site was not investigated further.

1.5.3 Field Inspection Procedures

The sites which could not be screened out by using the criteria in Table 1.5-1 were visited by an IGS geologist. At sites for which little geologic or mining data existed, geologists characterized the geology, collected samples for geochemical analysis, evaluated the deposit, and described surface workings and processing facilities present. All information required to fill in the Field Questionnaire (Appendix A) was gathered.

When it was determined that a site had a possible environmental problem, more sampling and description were required. Information was collected concerning environmental degradation, hazardous mine openings, the presence of structures, and land ownership. After the potential problems were described, appropriate soil and water samples were collected. All site locations were refined using conventional field methods, and each site was located by latitude and longitude and by Township, Range, and Section. If previously determined, these values were checked and corrected, as needed.

On public lands, sites with ground-water discharge, flowing surface water, or contaminated soils (as indicated by impacts on vegetation) were mapped. Sketch maps show locations of the workings, exposed geology, dumps, tailings, and surface water and geologic sample locations. Oblique aerial photographs were sometimes substituted or used to supplement the field sketches.
The site was photographically recorded using both still images and videotape. The videotape record proved especially useful for site description and review, and is recommended for future studies.

1.5.3.1 Soil, Rock, and Mine Waste Sampling Procedures

At sites identified as having a potential problem, the geologist collected soil, rock, stream sediment, and waste samples, as appropriate. Sample locations were selected in areas where waste material was impinging on an active waterway. In most cases a composite sample was gathered to get as representative a sample as possible, or multiple samples were collected. All sample sites were located so as to assess conditions on National Forest lands. Three types of samples were collected:

1) select rock, soil, or waste samples—specimens representing a particular material taken for analysis;

2) composite samples—rock and soil taken systematically from a waste dump or tailings pile for analysis, representing the overall composition of material in the source;

3) leach samples—laboratory splits of the above samples (usually waste rock or mill tailings) for testing leachable metals.

The three types of samples were used to examine the value and metal content of dumps and tailings, and to check the availability of metals during leaching when sample sites were exposed to water. Outcrops and waste materials were not sampled extensively enough to provide reliable estimates of tonnages, grades, or economic feasibility.

1.5.3.2 Water Sampling Procedure

As noted, this project focused on the impacts of mining on surface water, ground water, and soils. The reasoning behind this approach was that a mine disturbance may have high total metal concentrations yet may be releasing few metals into the surface water, ground water, or soil. Conversely, another disturbance could have lower total metal content but be releasing metals in concentrations that adversely impact the environment.

The geologist selected and marked water sample sites based on field parameters (SC, pH, temperature) and observations (such as erosion and staining of soils or stream beds). Sample locations were chosen that would provide the best information on the relative impact of the site to surface water and soils. All sites were accurately located on topographic base maps. Surface water samples were collected at all discharge points at the site, as well as samples from upstream and downstream of the site.

At each water sampling site, the temperature, specific conductivity, and pH were measured. A unique sample number was affixed to the sample bottle. Two 125-ml samples were collected.
One sample was left raw and the other was acidified with 0.1N nitric acid. Both samples were stored in a secured ice box. The samples remained under constant refrigeration and security until submitted for analysis.

Since monitoring wells were not installed as part of this investigation, the evaluation of metal contamination of ground water was limited to strategic sampling of surface water and soils. In most cases, reference water-quality data at a particular mine site was restricted to upstream surface water samples. However, in some drainages reference samples were collected at sites with no visible contamination and no known mining activity upstream from the sampling location. Reference soil samples were not collected. Laboratory leach tests were used to determine if metals might be released from mine waste material, which could provide additional insight to possible ground-water contamination.

1.5.4 Analytical Methods

The Analytical Sciences Laboratory at the University of Idaho performed all of the laboratory analyses using the following EPA-approved protocols and quality assurance standards:

Water Samples (acidified and unfiltered)—Total Recoverable Metal Screen (EPA Test 200.7).
Water Samples (acidified and unfiltered)—Arsenic (EPA Test 200.9), Lead (EPA Test 200.9), and Mercury (EPA Test 245.1).
Water Samples (raw and filtered with 0.45 micron filter)—Dissolved Metal Screen (EPA Test 200.7).
Soil and Waste Material—Element Screen (EPA Test 3050/6010).
Leachable Metals, TCLP—Metal Screen (EPA Test 1311/6010).

1.5.5 Standards

EPA and various state agencies have developed human health and environmental standards for various metals. In an attempt to put the metal concentrations that were measured into some perspective, they were compared to these developed standards. However, it is understood that the background metal concentrations in mineralized areas may exceed these standards.

1.5.5.1 Water-Quality Standards

The Safe Drinking Water Act (SDWA) directs EPA to develop standards for potable water. Some of these standards are mandatory (primary) and some are desired (secondary). The standards established under the SDWA are often referred to as primary and secondary maximum contaminant levels (MCLs). Similarly, the Clean Water Act (CWA) directs EPA to develop water-quality standards (acute and chronic) that will protect aquatic organisms. These standards may vary with water hardness and are often referred to as the Aquatic Life Standards. The primary and secondary MCLs along with the acute and chronic Aquatic Life Standards for selected metals are listed in Table 1.5-2. As these standards can vary with water hardness, a range of values is given for some elements. Hardness was not measured for this study.
Table 1.5-2. Standards for contaminants in water.

<table>
<thead>
<tr>
<th>Element</th>
<th>Primary MCL (mg/L)</th>
<th>Secondary MCL (mg/L)</th>
<th>Aquatic Life, Acute (mg/L)</th>
<th>Aquatic Life, Chronic (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>---</td>
<td>0.05-0.2</td>
<td>0.75</td>
<td>0.087</td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.05</td>
<td>---</td>
<td>0.36</td>
<td>0.19</td>
</tr>
<tr>
<td>Barium</td>
<td>2</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.005</td>
<td>---</td>
<td>0.004/0.009</td>
<td>0.001/0.002</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.1</td>
<td>---</td>
<td>1.7/3.1</td>
<td>0.21/0.37</td>
</tr>
<tr>
<td>Copper</td>
<td>1.3</td>
<td>1</td>
<td>0.018/0.034</td>
<td>0.012/0.021</td>
</tr>
<tr>
<td>Iron</td>
<td>---</td>
<td>0.3</td>
<td>---</td>
<td>1</td>
</tr>
<tr>
<td>Lead</td>
<td>0.015</td>
<td>---</td>
<td>0.082/0.2</td>
<td>0.003/0.008</td>
</tr>
<tr>
<td>Manganese</td>
<td>---</td>
<td>0.05</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.002</td>
<td>---</td>
<td>0.0024</td>
<td>0.000012</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.1</td>
<td>---</td>
<td>1.4/2.5</td>
<td>0.16/0.28</td>
</tr>
<tr>
<td>Zinc</td>
<td>---</td>
<td>5</td>
<td>0.12/0.21</td>
<td>0.11/0.19</td>
</tr>
</tbody>
</table>

1.5.5.2 Soil and Rock Background Standards

It is useful to have some idea about the natural background values of rocks and soils when interpreting geochemical data. Although no whole rock or soil samples were run for this study, an estimate can be made from the analyses presented by Gott and Cathrall (1980). They analyzed both rock samples from the parent formation and soil samples from above the parent material. The median results from these analyses are presented in Tables 1.5-3 and 1.5-4, which show data for the Prichard, Burke, Revett, St. Regis, and Wallace Formations. These samples were analyzed by emission spectrophotometry, a much less accurate technique than we use today. However, due to the large number of analyses, the data is still useful, especially for estimating background values. For example, an average sample of soil above the Prichard Formation might contain 54 ppm (mg/Kg) lead, 140 ppm (mg/Kg) zinc, 21 ppm (mg/Kg) copper, 0.13 ppm (mg/Kg) mercury, and 10 ppm (mg/Kg) arsenic. These data were used by the Environmental Protection Agency as background data for their studies of the Bunker Hill Superfund Site (Nick Ceto, 1997, personal communication).

There are no federal standards for concentrations of metals and other constituents in soils; acceptable limits for such are often based on human and/or environmental risk assessments for an area. Since no assessments of this kind have been done, concentrations of metals in soils were
Table 1.5-3. Median values of metals in rock samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

<table>
<thead>
<tr>
<th>Element</th>
<th>Prichard Formation</th>
<th>Burke Formation</th>
<th>Revett Formation</th>
<th>St. Regis Formation</th>
<th>Wallace Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (percent)</td>
<td>3</td>
<td>1.8</td>
<td>1.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.4</td>
<td>0.1</td>
<td>0.05</td>
<td>0.19</td>
<td>0.48</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.05</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.3</td>
<td>0.19</td>
<td>0.13</td>
<td>0.19</td>
<td>0.21</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>224</td>
<td>386</td>
<td>381</td>
<td>600</td>
<td>360</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>343</td>
<td>360</td>
<td>235</td>
<td>543</td>
<td>378</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.3</td>
<td>---</td>
<td>---</td>
<td>0.9</td>
<td>0.89</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>5</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3.9</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>40</td>
<td>13</td>
<td>8.3</td>
<td>20</td>
<td>23.8</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>10</td>
<td>5.5</td>
<td>4.2</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>54</td>
<td>26</td>
<td>20</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>.01</td>
<td>0.007</td>
<td>0.006</td>
<td>0.007</td>
<td>0.009</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>.03</td>
<td>---</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>22</td>
<td>6.2</td>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>34</td>
<td>14</td>
<td>10</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>60</td>
<td>31</td>
<td>15</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.4</td>
<td>0.36</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>109</td>
<td>1.1</td>
<td>1.6</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>727</td>
<td>402</td>
<td>455</td>
<td>839</td>
<td>998</td>
</tr>
</tbody>
</table>
Table 1.5-4. Median values of metals in soil samples from various units of the Belt Supergroup (data from Gott and Cathrall, 1980; ppm = mg/Kg).

<table>
<thead>
<tr>
<th>Element</th>
<th>Prichard Formation</th>
<th>Burke Formation</th>
<th>Revett Formation</th>
<th>St. Regis Formation</th>
<th>Wallace Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (percent)</td>
<td>3.1</td>
<td>3.3</td>
<td>3.8</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.61</td>
<td>0.60</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>0.57</td>
<td>0.59</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.56</td>
<td>0.49</td>
<td>0.5</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>1,285</td>
<td>1,373</td>
<td>1,730</td>
<td>1,809</td>
<td>1,377</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>647</td>
<td>647</td>
<td>616</td>
<td>684</td>
<td>586</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.4</td>
<td>1.1</td>
<td>1</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>14</td>
<td>10</td>
<td>8.8</td>
<td>9.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>43</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Niobium (ppm)</td>
<td>9</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>159</td>
<td>178</td>
<td>157</td>
<td>164</td>
<td>154</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>98</td>
<td>90</td>
<td>97</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>0.13</td>
<td>0.09</td>
<td>0.08</td>
<td>0.1</td>
<td>0.13</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>21</td>
<td>20</td>
<td>29</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>54</td>
<td>35</td>
<td>41</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>140</td>
<td>89</td>
<td>77</td>
<td>86</td>
<td>115</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>1.3</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>10</td>
<td>8.6</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>1</td>
<td>1</td>
<td>1.8</td>
<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>0.029</td>
<td>0.035</td>
<td>0.053</td>
<td>0.049</td>
<td>0.046</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>1,705</td>
<td>573</td>
<td>699</td>
<td>1,586</td>
<td>2,298</td>
</tr>
</tbody>
</table>
compared to the limits postulated by the U.S. EPA for the Clark Fork Superfund site (Table 1.5-5). The proposed upper limit for lead in soils is 1,000 mg/Kg to 2,000 mg/Kg, and 80 to 100 mg/Kg for arsenic in residential areas.

Table 1.5-5. Clark Fork Superfund background levels for selected elements.

<table>
<thead>
<tr>
<th>Material</th>
<th>As (mg/Kg)</th>
<th>Cd (mg/Kg)</th>
<th>Pb (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Mean Soil</td>
<td>6.7</td>
<td>0.7</td>
<td>20.0</td>
</tr>
<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
<td>0.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Missoula Lake Bed Sediments</td>
<td>n.a.</td>
<td>0.2</td>
<td>34.0</td>
</tr>
<tr>
<td>Blackfoot River</td>
<td>4.0</td>
<td>&lt;0.1</td>
<td>n.a.</td>
</tr>
<tr>
<td>Phytotoxic Concentration</td>
<td>100.0</td>
<td>100.0</td>
<td>1,000.0</td>
</tr>
</tbody>
</table>

1.5.6 Analytical Results

The results of the sample analyses were used to estimate the nature and extent of potential impacts to the environment and human health. Selected results for each site are presented in the discussion; a complete listing of water quality, soil chemistry, and leach test results are presented in Appendix C. It should be noted that the sampling for this study was of a reconnaissance nature only, sufficient for outlining possible problem areas for future study. Sampling density was not sufficient to provide a statistically valid description of any specific site.

The data fields in the current database are presented in Appendix B, and the format (dBase IV) is compatible with the widely used ARC/INFO Geographical Information System (GIS). In addition, all of the field observations and analytical data were entered into a Paradox database, which is compatible with other studies under way by the U.S. Forest Service.

1.5.7 Sample and Site Identification Numbers

All water, tailings, and dump samples were assigned unique numbers. These were constructed according to the following system: 1) an initial letter code identifying the person who took the sample (usually the first letter of the last name); 2) one or two digits for the month (some sample numbers contain a leading zero); 3) two digits for the day on which the sample was taken; 4) the last two digits in the year in which the sample was taken (i.e., "97," if the samples was taken in 1997); and 5) one to three digits, including leading zeros, identifying the individual sample. Site numbers for properties that did not have a database identification number assigned to them were generated in the same manner.

13
2.0 ST. JOE RIVER BASIN (St. Maries and Avery Ranger Districts)

2.1 INTRODUCTION

This report describes forty-five properties in the St. Joe River Basin. Only two properties discussed in this volume had recorded production, although several others were reported to have made test shipments of ore in the early 1900s. The study area extends from the Montana border on the east to the forest boundary on the west and from the southern drainage divide for the South Fork of the Coeur d'Alene River on the north to the drainage divide of the St. Joe and Clearwater rivers on the south. Access is by paved road along the St. Joe River as far as Red Ives and along Gold Creek from the St. Joe River to Gold Summit on the Idaho-Montana border. Most of the secondary drainages have dirt roads, especially those with past mining activity.

The study area is in the St. Maries and Avery Ranger districts of the St. Joe National Forest, and most of the land is administered by the U.S. Forest Service (USFS). There are enclaves of private inholdings, which include patented mining claims and land owned by various forest-products companies.

The forty-five mines and prospects described in this report are located on eleven 7.5-minute topographic maps (U.S. Geological Survey). The location of these properties is shown in Figure 2.1-1. Elevations in the study area range from less than 2,200 feet on the St. Joe River to over 7,600 feet on the Idaho-Montana border. The area is heavily forested with dense brush and conifers, and the topography is generally very steep.

2.1.1 Summary of the St. Joe River Basin Study Area

Of the forty-five mines in the St. Joe River basin discussed in this volume, thirteen have the potential to have an environmental impact on or near USFS lands. Five of these have waste dumps in active waterways, three sites have water discharges that exceed one or more water quality standards, and five have both water quality concerns and waste rock impinging on an active waterway. Twenty-one properties in this volume have open adits or shafts. One of the open shafts was covered with a grate after the field inspection. A number of the properties in this area are difficult to reach, but the open workings that are readily accessible to the public could pose significant safety hazards.

2.2 GEOLOGY

The most recent general references on the geology of the St. Joe River basin are Griggs (1973) and Harrison and others (1986). The geology and ore deposits of parts of the area are discussed in Collier (1906), Pardee (1911), Calkins and Jones (1914), and Wagner (1949). Additional references include Umpleby and Jones (1923) and Pattee and others (1968). Gott and Cathrall (1980) discussed the geochemistry of the Coeur d'Alene district, which is north of the study area. A brief description of the geologic framework of the area follows.
Figure 2.1-1a. Location of properties in the west part of the St. Joe River basin (U.S. Geological Survey St. Maries 1:100,000-scale map).
Table 2.1-1. Summary of the sites inspected in the St. Joe River basin. The properties are arranged according to site number.

**Explanation:**

**Site No.:** Idaho Geological Survey file number, or field designation number.

**Surface Owner:** FS = Forest Service; S = State; P = Private; M = mixed Forest Service/Private, or undetermined; ? where ownership uncertain.

**Water/Solid Sample:** numbers indicate the number of samples collected.

**Environmental Concerns:** W = adit water; D = waste dump; SS = stream sediment. Environmental concerns are noted as follows: W - samples of adit water or seeps from waste dumps that exceed one or more water quality standards in the *Dissolved Metals Screen*, the *Total Recoverable Metals Screen*, or the arsenic, lead or mercury tests; D or SS - dump or stream sediment samples that exceed background or environmental standards for one or more elements in the *Element Screen*, and/or dump or stream sediment samples that show significant leaching of one or more metals in the *TCLP for Metals Screen*.

**Physical Conditions:** AO = open adit; AG = open adit, gated; AC = caved or otherwise closed adit; SO = open shaft; SC = caved shaft; T = trench or dozer cut; P = prospect pit; Q = quarry. Numbers indicate number of each type of opening at the site, queried when type or condition of workings uncertain or unknown.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Sample</th>
<th>Solid Sample</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-354</td>
<td>Tri-State Cedar Corp. Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>T?</td>
</tr>
<tr>
<td>SP-358</td>
<td>Marble Creek Pegmatite</td>
<td>P or M</td>
<td></td>
<td></td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td>WL-478</td>
<td>Park Copper Prospect</td>
<td>P, FS</td>
<td>2</td>
<td>1</td>
<td>W, D</td>
<td>1AO, 1AC</td>
</tr>
<tr>
<td>WL-484</td>
<td>Wonderful Mine</td>
<td>M</td>
<td>1</td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL-484</td>
<td>Wonderful Mine, prospect cut</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>1T</td>
</tr>
<tr>
<td>WL-487</td>
<td>Peacock Copper Prospect</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>1A(C?)</td>
</tr>
<tr>
<td>WL-489</td>
<td>Bullion Mine, upper workings</td>
<td>P? or FS</td>
<td>4</td>
<td>2</td>
<td>W, D</td>
<td>1AO, 1SO, 2AC</td>
</tr>
<tr>
<td>WL-489</td>
<td>Bullion Mine, lower workings</td>
<td>M</td>
<td>3</td>
<td>2</td>
<td>D, SS</td>
<td>2AC</td>
</tr>
<tr>
<td>WL-491</td>
<td>Sunner Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>2AC</td>
</tr>
<tr>
<td>WL-493</td>
<td>Fourth of July Silver</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>D</td>
<td>1AO, 1AC</td>
</tr>
<tr>
<td>WL-496</td>
<td>Lucky Swede Mine</td>
<td>FS</td>
<td>1</td>
<td>2</td>
<td>W, D</td>
<td>1AC</td>
</tr>
<tr>
<td>WL-497</td>
<td>Pearson Mining Co. Prospect</td>
<td>FS</td>
<td>3</td>
<td></td>
<td>W</td>
<td>1AC</td>
</tr>
<tr>
<td>WL-500</td>
<td>Alpina Prospect</td>
<td>FS</td>
<td>3</td>
<td>1</td>
<td>D</td>
<td>1AO</td>
</tr>
<tr>
<td>WL-501</td>
<td>Alice Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
</tbody>
</table>
Table 2.1-1. Summary of the sites inspected in the St. Joe River basin.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Sample</th>
<th>Solid Sample</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL-503</td>
<td>Big Elk Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>3AO, 1SC, 1T</td>
</tr>
<tr>
<td>WL-504</td>
<td>Richmond Mine</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>D</td>
<td>2AC, 6SC, 1SO, 2T</td>
</tr>
<tr>
<td>WL-505</td>
<td>Macedonia</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>several cuts</td>
</tr>
<tr>
<td>WL-506</td>
<td>Silver Spray Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>WL-507</td>
<td>Monitor Mine</td>
<td>FS</td>
<td>4</td>
<td></td>
<td>W</td>
<td>1AC, 15(?)C, 15C</td>
</tr>
<tr>
<td>WL-509</td>
<td>Copper Age Property</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC, 1SC</td>
</tr>
<tr>
<td>WL-510</td>
<td>Miller Mine</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>D</td>
<td>2AO, 1AC</td>
</tr>
<tr>
<td>WL-514</td>
<td>Sailor Boy Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL-515</td>
<td>Mastodon Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>2-3 A</td>
</tr>
<tr>
<td>WL-516</td>
<td>Hansy Mine</td>
<td>P or M</td>
<td>3</td>
<td>2</td>
<td>W, D, SS</td>
<td>1AG, 2AO, 3AC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>numerous T</td>
</tr>
<tr>
<td>WL-517</td>
<td>Idaho Star Mine</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>W, D</td>
<td>2AO</td>
</tr>
<tr>
<td>WL-519</td>
<td>Franklin Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO, 1AC</td>
</tr>
<tr>
<td>WL-523</td>
<td>Setser Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>12+ pits</td>
</tr>
<tr>
<td>WL-526</td>
<td>Ward Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO, numerous pits</td>
</tr>
<tr>
<td></td>
<td>(Gold Mountain Lode)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL-533; K7209802</td>
<td>Fishhook Creek Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>2AC; 1AO</td>
</tr>
<tr>
<td>WL-535</td>
<td>Eureka Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL-536</td>
<td>St. Joe Quartz Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL-538</td>
<td>Black Bear Claim</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td>WL-540</td>
<td>Bluff Creek Copper Claim</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>several cuts</td>
</tr>
<tr>
<td>WL-541</td>
<td>Conrad's Crossing Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
</tbody>
</table>
Table 2.1-1. Summary of the sites inspected in the St. Joe River basin.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Sample</th>
<th>Solid Sample</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL-558</td>
<td>Tillicum Nickel Prospect</td>
<td>FS</td>
<td></td>
<td>1</td>
<td></td>
<td>3AO, 2AC, cuts and trenches</td>
</tr>
<tr>
<td>K7149811</td>
<td>Shirley Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>K7159802</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AC</td>
<td></td>
</tr>
<tr>
<td>K7159803</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>K7169801</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AO</td>
<td></td>
</tr>
<tr>
<td>K7169802</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AC</td>
<td></td>
</tr>
<tr>
<td>K7209801</td>
<td>Bald Mountain Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>1SC, 3P, 2T</td>
<td></td>
</tr>
<tr>
<td>K7219801</td>
<td>Manhattan (?) Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td>2P</td>
<td></td>
</tr>
<tr>
<td>K7219802</td>
<td>Copper Kopje</td>
<td>FS</td>
<td></td>
<td></td>
<td>1SO</td>
<td></td>
</tr>
<tr>
<td>B8129704</td>
<td>Unnamed Prospect on Park Creek</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AC</td>
<td></td>
</tr>
<tr>
<td>B8129705</td>
<td>Unnamed Prospect on Rougin Creek</td>
<td>FS</td>
<td></td>
<td></td>
<td>1AC</td>
<td></td>
</tr>
<tr>
<td>B8129706</td>
<td>Unnamed Prospect on Rougin Creek</td>
<td>FS</td>
<td></td>
<td>1</td>
<td>W</td>
<td>1AC</td>
</tr>
</tbody>
</table>

Reference sample (mouth of Quartz Creek) --- 1
Reference sample (mouth of Slate Creek) --- 1
Reference sample (mouth of Ward Creek) --- 1
Reference sample (100 yds upstream from mouth of Loop Creek) --- 1
The metal mines in the district are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age (Figure 2.2-1). The characteristics of the various units comprising the supergroup are shown in Table 3.2.1. Many of the mines in the study area are replacement copper-gold deposits in the Wallace Formation (Pardee, 1911; Wagner, 1949). The stratigraphy and sedimentology of this formation is discussed by Grotzing (1981, 1986). East of the St. Joe River, some of these deposits are in or adjacent to the Wishards sill or smaller diabase dikes or sills (Umpleby and Jones, 1923).

Igneous rocks include Tertiary granitic rocks near the southwestern edge of the area (Harrison and others, 1986); the diabasic Wishards sill and other diabase intrusions, some probably of Tertiary age (Harrison and others, 1986; Griggs, 1973; Umpleby and Jones, 1923); and granodioritic to granitic rocks north of the St. Joe River near Black Prince Creek (Wagner, 1949). Pegmatite dikes near Marble Creek, which are associated with the granitic rocks in this area, have been quarried for stone or road metal.

West-northwest-trending strike-slip faults include the Placer Creek and St. Joe faults, which are parallel to the Lewis and Clark line. Rocks in the southern part of the area have been stacked by thrust faults and disrupted by north- or northeast-trending dip-slip faults. The larger folds in the area are generally parallel to nearby faults or other major structures (Harrison and others, 1986). The intensity of metamorphism increases toward the southeast across the area (Pardee, 1911).

2.3 ECONOMIC GEOLOGY

2.3.1 General Characteristics of the Ore

The metal mines in the area are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age (Figure 2.2-1). Most of the mines are copper-gold deposits, sometimes containing lead, zinc, and silver. Host rocks are predominantly the Wallace Formation of the Belt Supergroup, although some deposits are found in or near diabase sills or dikes (Umpleby and Jones, 1923; Calkins and Jones, 1914). The ore deposits are replacement lodes or fissure fillings in faulted or sheared host rock (Umpleby and Jones, 1923; Pardee, 1911; Wagner, 1949). The deposits in the Avery area may have formed in the Late Cretaceous or Early Tertiary (Wagner, 1949). Chalcopyrite and pyrite are the most widespread sulfide minerals in these deposits; varying amounts of sphalerite, galena, and pyrrhotite are often present. The gangue minerals are siderite, quartz, and/or calcite in varying amounts (Wagner, 1949; Pardee, 1911; Umpleby and Jones, 1923). Lead-silver prospects are found along Slate Creek and gold was the dominant metal in veins explored near Gold Mountain (Collier, 1906). Production was recorded for only two of the properties discussed in this volume, although several mines shipped test lots of ore in the early part of the century.

2.3.2 Summary of Mill Development

Production from the mines in the St. Joe National Forest was small, and all the ore was shipped directly from the mine to the smelter or to milling facilities in Montana. Although several of the
Figure 2.2-1a. Geology of the western part of the St. Joe River basin, Idaho (Griggs, 1973).  
\( p\text{Cqd} \) = Middle Proterozoic quartz diorite or amphibolite; \( p\text{Cp} \), \( p\text{Cpq} \) = Middle Proterozoic Prichard Formation; \( p\text{Cr} \) = Middle Proterozoic Revett Formation; \( p\text{Crb} \) = Middle Proterozoic Revett and Burke Formations, undivided; \( p\text{Csr} \) = Middle Proterozoic St. Regis Formation; \( p\text{Cw} \), \( p\text{Cwl} \) = Middle Proterozoic Wallace Formation; \( p\text{Csp} \) = Middle Proterozoic Striped Peak Formation; \( p\text{CI} \) = Middle Proterozoic Libby Formation; \( TMzg \) = Tertiary and Mesozoic granitic rocks; \( Tcl \) = Miocene and Pliocene Columbia River Basalt and Latah Formation; \( QTg \) = Tertiary and Quaternary older gravel deposits; \( Qls \) = Quaternary landslide deposits; \( Qal \) = Holocene alluvium.
Figure 2.2-1b. Geology of the eastern part of the St. Joe River basin, Idaho (Harrison and others, 1986). Xan = Early Proterozoic anorthosite, Xgn = Early Proterozoic gneiss and schist; Ypu, Ypl = Middle Proterozoic Prichard Formation; Yb = Middle Proterozoic Burke Formation; Yr = Middle Proterozoic Revett Formation; Ysr = Middle Proterozoic St. Regis Formation; Yw, Ywu, Ywm, Ywln = Middle Proterozoic Wallace Formation; Ysp = Middle Proterozoic Striped Peak Formation; ZYd = Late and Middle Proterozoic mafic dikes and sills; Kg = Cretaceous granitic rocks; Tg = Tertiary granitic plutons and plugs; Td = Tertiary dioritic intrusive rocks; Qg = Tertiary and Quaternary gravel deposits; Qg = Pleistocene glacial, fluvioglacial and flood deposits; Ql = Quaternary lake sediments; Qal = Holocene alluvium.
<table>
<thead>
<tr>
<th>Group</th>
<th>Formation</th>
<th>Lithology</th>
<th>Thickness (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missoula</td>
<td>Striped Peak Formation</td>
<td>Interbedded quartzite and argillite with some arenaceous dolomitic beds. Purplish gray and pink to greenish gray. Ripple marks, mud cracks common. Top eroded.</td>
<td>1,500+</td>
</tr>
<tr>
<td></td>
<td>Wallace Formation</td>
<td>Upper part Mostly medium- to greenish-gray finely laminated argillite. Some arenaceous dolomite and impure quartzite, and minor gray dolomite and limestone in the middle part.</td>
<td>4,500-6,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower part Light-gray more or less dolomitic quartzite interbedded with greenish-gray argillite. Ripple marks, mud cracks abundant.</td>
<td></td>
</tr>
<tr>
<td>Ravalli</td>
<td>St. Regis Formation</td>
<td>Upper part Light greenish-yellow to light green-gray argillite; thinly laminated. Some carbonate-bearing beds.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower part Gradational from thick-bedded pure quartzite at base to interbedded argillite and impure quartzite at top. Red-purple color characteristic; some green-gray argillite. Some carbonate-bearing beds. Ripple marks, mud cracks, and mud-chip breccia common.</td>
<td>1,400-2,000</td>
</tr>
<tr>
<td></td>
<td>Revett Quartzite</td>
<td>Thick-bedded vitreous light yellowish-gray to nearly white pure quartzite. Grades into nearly pure and impure quartzite at bottom and top. Cross-stratification common.</td>
<td>1,200-3,400</td>
</tr>
<tr>
<td></td>
<td>Burke Formation</td>
<td>Light greenish-gray impure quartzite. Some pale red and light yellowish-gray pure to nearly pure quartzite. Ripple marks, swash marks, and pseudo-conglomerate.</td>
<td>2,200-3,000</td>
</tr>
<tr>
<td>Prichard Formation</td>
<td>Upper part</td>
<td>Interbedded medium-gray argillite and quartzose argillite and light-gray impure to pure quartzite. Some mud cracks and ripple marks.</td>
<td>12,000+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower part Thin- to thick-bedded, medium gray argillite and quartzose argillite; laminated in part. Pyrite abundant. some discontinuous quartzite zones. Base buried.</td>
<td></td>
</tr>
</tbody>
</table>
mining companies discussed plans to construct mills, no mills were ever built. The Chicago, Milwaukee and Puget Sound Railway, completed in late 1908 or 1909, provided an easy means for the major mines to ship their ore. Wagon haulage over the divide to Montana was the alternate means of transport.

2.4 HYDROLOGY AND HYDROGEOLOGY

The study area includes all of the drainage of the St. Joe River upstream from its confluence with Marble Creek (about 10 miles due west of Avery). Downstream from Marble Creek, land ownership of the St. Joe drainage is mixed, with timber-products companies owning the largest blocks of land.

As noted, most of the copper-gold mines in the study area are hosted by rocks of the Wallace Formation. Table 1.5-3 (based on 998 samples) shows that rocks in the Wallace Formation contain 41 ppm zinc, 23 ppm lead, 2.4 percent iron, 11 ppm copper, and 0.5 percent cadmium, and soils developed on the Wallace reflect this metal content (Table 1.5-4 based on 2,298 samples) with 115 ppm zinc, 45 ppm lead, 3.7 percent iron, 29 ppm copper, and 0.5 ppm cadmium. Tables 1.5-3 and 1.5-4 show similar data for the other formations in the Belt Supergroup.

To test whether the high metal content from the Belt Supergroup was impacting stream waters, four reference water samples were collected. The chemical analyses for these samples are shown in Tables 2.4-1 and 2.4-2, along with water quality standards suggested by the Environmental Protection Agency (EPA). The following reference water samples were collected:

- K7289801 — mouth of Quartz Creek
- K7289802 — mouth of Slate Creek
- K7299801 — mouth of Ward Gulch
- K7299802 — upstream from mouth of Loop Creek

All these samples were below all EPA standards for all elements in both the total recoverable metals and the dissolved metals screens.

2.5 SUMMARY OF THE ST. JOE RIVER DRAINAGE

2.5.1 Summary of Environmental Observations

Most, but not all, samples which significantly exceed EPA water standards are from the larger mines in the area (Tables 2.5-1 and 2.5-2). Water quality variances include manganese from the Park Copper Mine, arsenic from the Lucky Swede, and minor amounts of copper from the Monitor and the Hamsy mines. Cadmium in excess of one or more water quality standards is the most prevalent water quality variance in the St. Joe River drainage; in many samples, cadmium is the only element that exceeds any standard. Most of the elements detected in the water samples are also found in the rock units underlying the drainages.
<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7289801</td>
<td>mouth of Quartz Creek</td>
<td>—</td>
<td>0.0072</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0023</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K7289802</td>
<td>mouth of Slate Creek</td>
<td>—</td>
<td>0.0110</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K7299801</td>
<td>mouth of Ward Creek</td>
<td>—</td>
<td>0.0021</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K7299802</td>
<td>upstream from mouth of Loop Creek</td>
<td>—</td>
<td>0.0041</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

EXPLANATION
Blank space equals no analysis
Below Detection Limit is —

WATER QUALITY STANDARDS

<table>
<thead>
<tr>
<th></th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.05</td>
<td>0.2</td>
<td>0.01</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.3</td>
<td>0.01-0.05</td>
<td>0.001-0.009</td>
<td>0.001-0.009</td>
<td>0.001-0.001</td>
<td>0.001-0.001</td>
<td>0.001-0.001</td>
<td>0.001-0.001</td>
<td>0.001-0.001</td>
<td>0.001-0.001</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.75</td>
<td>0.36</td>
<td>0.001-0.003</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.0001</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.00012</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td>0.001-0.002</td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.015</td>
<td>0.0005</td>
<td>0.0004</td>
<td>0.0020</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.010</td>
<td>0.0011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIELD NO.</td>
<td>REMARKS</td>
<td>Al (ppm)</td>
<td>As (ppm)</td>
<td>Ba (ppm)</td>
<td>Cd (ppm)</td>
<td>Cr (ppm)</td>
<td>Cu (ppm)</td>
<td>Fe (ppm)</td>
<td>Pb (ppm)</td>
<td>Mn (ppm)</td>
<td>Hg (ppm)</td>
<td>Ni (ppm)</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>K7289801</td>
<td>mouth of Quartz Creek</td>
<td></td>
<td>0.0100</td>
<td></td>
<td></td>
<td></td>
<td>0.065</td>
<td></td>
<td>0.0007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7289802</td>
<td>mouth of Slate Creek</td>
<td></td>
<td>0.0130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7299801</td>
<td>mouth of Ward Creek</td>
<td></td>
<td>0.0060</td>
<td></td>
<td></td>
<td></td>
<td>0.098</td>
<td></td>
<td>0.0034</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7299802</td>
<td>upstream from mouth of Loop Creek</td>
<td></td>
<td>0.0060</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.0500</td>
<td>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>1.000</td>
<td>0.050</td>
<td>0.002</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.3600</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td>0.11-0.19</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td>0.11-0.19</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.1900</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.0005</td>
<td>0.0010</td>
<td>0.002</td>
<td>0.0047</td>
<td>0.150</td>
<td>0.019</td>
<td>0.0049</td>
<td>0.0006</td>
<td>0.005</td>
<td>0.012</td>
<td>0.0028</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.5-1. Dissolved metals in water samples from the properties in the St. Joe River basin. Numbers in bold exceed one or more water quality standards.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129701</td>
<td>Park Copper (WL-478), Adit #1</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0460</td>
<td>0.2100</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B8129702</td>
<td>Park Copper (WL-478), Adit #2</td>
<td>---</td>
<td>0.0071</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0016</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B8129706</td>
<td>Unnamed Prospect B8129706, adit</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0013</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K09039701</td>
<td>Lucky Swede (WL-496), adit</td>
<td>0.170</td>
<td>0.0110</td>
<td>0.0066</td>
<td>0.0120</td>
<td>---</td>
<td>---</td>
<td>0.0058</td>
<td>0.033</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K09039704</td>
<td>Pearson Mine (WL-497), adit (?)</td>
<td>0.150</td>
<td>0.0320</td>
<td>0.0057</td>
<td>0.0120</td>
<td>---</td>
<td>---</td>
<td>0.0062</td>
<td>0.030</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K09039706</td>
<td>Pearson Mine (WL-497), downstream</td>
<td>---</td>
<td>0.0068</td>
<td>0.0029</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0020</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089802</td>
<td>Monitor (WL-507), Adit 1, water</td>
<td>0.037</td>
<td>0.0085</td>
<td>0.0034</td>
<td>---</td>
<td>0.0097</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089803</td>
<td>Monitor (WL-507), Adit 1 dump, seep</td>
<td>0.020</td>
<td>0.0059</td>
<td>0.0042</td>
<td>---</td>
<td>0.0120</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089804</td>
<td>Monitor (WL-507), downstream</td>
<td>---</td>
<td>0.0033</td>
<td>---</td>
<td>0.0060</td>
<td>---</td>
<td>0.0026</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089805</td>
<td>Monitor (WL-507), upstream</td>
<td>---</td>
<td>0.0040</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0053</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089806</td>
<td>Idaho Star (WL-517), Adit 1, water</td>
<td>0.025</td>
<td>0.0140</td>
<td>0.0041</td>
<td>---</td>
<td>0.0110</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089808</td>
<td>Harsy (WL-516), Adit 1, dump</td>
<td>0.033</td>
<td>0.0039</td>
<td>0.0042</td>
<td>---</td>
<td>0.0130</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7089810</td>
<td>Harsy (WL-516), downstream</td>
<td>---</td>
<td>0.0044</td>
<td>0.0050</td>
<td>0.0082</td>
<td>0.0130</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7099801</td>
<td>Harsy (WL-516), upstream</td>
<td>0.019</td>
<td>0.0046</td>
<td>0.0062</td>
<td>0.0080</td>
<td>0.0130</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149802</td>
<td>Bullion--upper workings (WL-489), upstream</td>
<td>---</td>
<td>0.0420</td>
<td>---</td>
<td>0.0034</td>
<td>0.0300</td>
<td>0.0065</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149803</td>
<td>Bullion--upper workings (WL-489), Adit 3, water</td>
<td>---</td>
<td>0.0019</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149804</td>
<td>Bullion--upper workings (WL-489), Adit 1, water</td>
<td>---</td>
<td>0.0012</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection limit is ---

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>2.000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td>0.11-0.19</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.00012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.0005</td>
<td>0.0004</td>
<td>0.0020</td>
<td>0.0060</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.010</td>
<td>0.0011</td>
<td></td>
</tr>
</tbody>
</table>

**Estimated Detection Level (33% confidence)**

---
Table 2.5-1 (continued). Dissolved metals in water samples from the properties in the St. Joe National Forest.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>AI  (ppm)</th>
<th>As  (ppm)</th>
<th>Ba  (ppm)</th>
<th>Cd  (ppm)</th>
<th>Cr  (ppm)</th>
<th>Cu  (ppm)</th>
<th>Fe  (ppm)</th>
<th>Pb  (ppm)</th>
<th>Mn  (ppm)</th>
<th>Hg  (ppm)</th>
<th>Ni  (ppm)</th>
<th>Zn  (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149806</td>
<td>Bullion--upper workings (WL-489), downstream</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0061</td>
<td>0.0280</td>
<td>0.0017</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149807</td>
<td>Bullion--lower workings (WL-489), Adit 1, water</td>
<td>---</td>
<td>0.0099</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149809</td>
<td>Bullion--lower workings (WL-489), upstream</td>
<td>---</td>
<td>0.0005</td>
<td>---</td>
<td>---</td>
<td>0.0038</td>
<td>0.0047</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7149810</td>
<td>Bullion--lower workings (WL-489), downstream</td>
<td>0.030</td>
<td>0.0500</td>
<td>---</td>
<td>---</td>
<td>0.0050</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7159801</td>
<td>Wonderful (WL-484), adit</td>
<td>---</td>
<td>0.0110</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7159804</td>
<td>Alpina (WL-500), downstream</td>
<td>---</td>
<td>0.0012</td>
<td>0.0035</td>
<td>0.0130</td>
<td>---</td>
<td>0.0120</td>
<td>---</td>
<td>0.0032</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7159805</td>
<td>Alpina (WL-500), adit</td>
<td>---</td>
<td>0.0004</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7159807</td>
<td>Alpina (WL-500), upstream</td>
<td>---</td>
<td>0.0014</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0130</td>
<td>---</td>
<td>0.0008</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K7219803</td>
<td>Richmond (WL-504), Adit 1, water</td>
<td>---</td>
<td>0.0035</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K9119901</td>
<td>Tippetum Nickel Prospect, Adit 2</td>
<td>0.370</td>
<td>1.3000</td>
<td>---</td>
<td>---</td>
<td>0.0200</td>
<td>0.8100</td>
<td>3.8000</td>
<td>0.021</td>
<td>0.5700</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**EXPLANATION**
Blank space equals no analysis

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>AI  (mg/L)</th>
<th>As  (mg/L)</th>
<th>Ba  (mg/L)</th>
<th>Cd  (mg/L)</th>
<th>Cr  (mg/L)</th>
<th>Cu  (mg/L)</th>
<th>Fe  (mg/L)</th>
<th>Pb  (mg/L)</th>
<th>Mn  (mg/L)</th>
<th>Hg  (mg/L)</th>
<th>Ni  (mg/L)</th>
<th>Zn  (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.05</td>
<td>2.00</td>
<td>0.005</td>
<td>0.100</td>
<td>1.000</td>
<td>0.300</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td>5.000</td>
<td>0.0024</td>
<td>1.4-2.5</td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>2.00</td>
<td>0.005</td>
<td>0.100</td>
<td>1.000</td>
<td>0.300</td>
<td>0.050</td>
<td>0.002</td>
<td>0.100</td>
<td>5.000</td>
<td>0.0024</td>
<td>1.4-2.5</td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.015</td>
<td>0.0005</td>
<td>0.0004</td>
<td>0.0020</td>
<td>0.006</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0049</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.010</td>
<td>0.0011</td>
</tr>
</tbody>
</table>
Table 2.5-2. Total recoverable metals in water samples from the properties in the St. Joe River basin. Numbers in bold exceed one or more water quality standards.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129701</td>
<td>Park Copper (WL-478), Adit #1</td>
<td>—</td>
<td>0.005</td>
<td>—</td>
<td>—</td>
<td>0.230</td>
<td>—</td>
<td>0.2400</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>B8129702</td>
<td>Park Copper (WL-478), Adit #2</td>
<td>—</td>
<td>0.008</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>B8129706</td>
<td>Unnamed Prospect B8129706, adit</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.00055</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K9039701</td>
<td>Lucky Swede (WL-496), adit</td>
<td>0.0650</td>
<td>0.010</td>
<td>—</td>
<td>—</td>
<td>0.460</td>
<td>0.026</td>
<td>0.0090</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K9039704</td>
<td>Pearson Mine (WL-497), adit (?)</td>
<td>0.0170</td>
<td>0.031</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K9039705</td>
<td>Pearson Mine (WL-497), upstream</td>
<td>—</td>
<td>0.006</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0040</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K9039706</td>
<td>Pearson Mine (WL-497), downstream</td>
<td>—</td>
<td>0.006</td>
<td>0.006</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0040</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>K7089802</td>
<td>Monitor (WL-507), Adit 1, water</td>
<td>0.0330</td>
<td>0.011</td>
<td>0.007</td>
<td>0.0060</td>
<td>—</td>
<td>0.110</td>
<td>—</td>
<td>0.0066</td>
<td>—</td>
<td>0.021</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7089803</td>
<td>Monitor (WL-507), Adit 1 dump, seep</td>
<td>0.0041</td>
<td>0.006</td>
<td>0.008</td>
<td>0.0050</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0014</td>
<td>—</td>
<td>0.029</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7089804</td>
<td>Monitor (WL-507), upstream</td>
<td>—</td>
<td>0.004</td>
<td>—</td>
<td>0.0082</td>
<td>—</td>
<td>0.023</td>
<td>—</td>
<td>0.0012</td>
<td>—</td>
<td>—</td>
<td>0.0072</td>
<td>—</td>
</tr>
<tr>
<td>K7089805</td>
<td>Monitor (WL-507), upstream</td>
<td>—</td>
<td>0.004</td>
<td>—</td>
<td>0.0150</td>
<td>—</td>
<td>0.024</td>
<td>—</td>
<td>0.0013</td>
<td>—</td>
<td>—</td>
<td>0.0043</td>
<td>—</td>
</tr>
<tr>
<td>K7089806</td>
<td>Idaho Star (WL-517), Adit 1, water</td>
<td>0.0110</td>
<td>0.014</td>
<td>0.007</td>
<td>0.0062</td>
<td>—</td>
<td>0.068</td>
<td>—</td>
<td>0.0034</td>
<td>—</td>
<td>0.033</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7089808</td>
<td>Hanley (WL-516), Adit 1, water</td>
<td>0.0100</td>
<td>0.004</td>
<td>0.011</td>
<td>0.0065</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0009</td>
<td>—</td>
<td>0.030</td>
<td>0.0041</td>
<td>—</td>
</tr>
<tr>
<td>K7099806</td>
<td>Hanley (WL-516), downstream</td>
<td>—</td>
<td>0.005</td>
<td>0.010</td>
<td>0.0050</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.026</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7149801</td>
<td>Hanley (WL-516), upstream</td>
<td>—</td>
<td>0.004</td>
<td>0.010</td>
<td>0.0052</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.029</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7149802</td>
<td>Bullion--upper workings (WL-489), upstream</td>
<td>—</td>
<td>0.002</td>
<td>—</td>
<td>0.0082</td>
<td>—</td>
<td>0.079</td>
<td>—</td>
<td>0.0039</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>K7149803</td>
<td>Bullion--upper workings (WL-489), Adit 3, water</td>
<td>—</td>
<td>0.005</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.360</td>
<td>—</td>
<td>0.0230</td>
<td>—</td>
<td>0.0052</td>
<td>—</td>
</tr>
<tr>
<td>K7149804</td>
<td>Bullion--upper workings (WL-489), Adit 1, water</td>
<td>0.0068</td>
<td>0.002</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0016</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0046</td>
<td>—</td>
</tr>
<tr>
<td>K7149806</td>
<td>Bullion--upper workings (WL-489), downstream</td>
<td>—</td>
<td>0.003</td>
<td>—</td>
<td>0.0150</td>
<td>—</td>
<td>0.044</td>
<td>—</td>
<td>0.0027</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is —

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.0500</td>
<td>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.0500</td>
<td>0.002</td>
<td>0.100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>5.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.1900</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Estimated Detection Level (33% confidence): 0.0005, 0.001, 0.002, 0.0047, 0.150, 0.019, 0.0049, 0.0006, 0.0005, 0.012, 0.0028
Table 2.5-2 (continued). Total recoverable metals in water samples from the properties in the St. Joe National Forest.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>Al (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149807</td>
<td>Bullion—lower workings (WL-489), Adit 1, water</td>
<td>0.0090</td>
<td>0.010</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0018</td>
<td>---</td>
<td>0.0068</td>
<td></td>
</tr>
<tr>
<td>K7149809</td>
<td>Bullion—lower workings (WL-489), upstream</td>
<td>---</td>
<td>0.004</td>
<td>0.002</td>
<td>0.0085</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0014</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>K7149810</td>
<td>Bullion—lower workings (WL-489), downstream</td>
<td>---</td>
<td>0.005</td>
<td>---</td>
<td>0.0086</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0023</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>K7159801</td>
<td>Wonderful (WL-484), adit</td>
<td>0.0084</td>
<td>0.011</td>
<td>---</td>
<td>---</td>
<td>0.040</td>
<td>---</td>
<td>0.0039</td>
<td>---</td>
<td>0.0082</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7159804</td>
<td>Alpina (WL-500), downstream</td>
<td>---</td>
<td>0.002</td>
<td>---</td>
<td>0.0069</td>
<td>---</td>
<td>0.034</td>
<td>---</td>
<td>0.0014</td>
<td>---</td>
<td>0.0130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7159805</td>
<td>Alpina (WL-500), adit</td>
<td>0.0026</td>
<td>0.002</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0018</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7159807</td>
<td>Alpina (WL-500), upstream</td>
<td>---</td>
<td>0.002</td>
<td>---</td>
<td>0.0070</td>
<td>---</td>
<td>0.027</td>
<td>---</td>
<td>0.0008</td>
<td>---</td>
<td>0.0053</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K7219803</td>
<td>Richmond (WL-504), Adit 1, water</td>
<td>0.0087</td>
<td>0.003</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0017</td>
<td>---</td>
<td>0.0038</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K9119901</td>
<td>Tllicum Nickel Prospect, Adit 2</td>
<td>0.0023</td>
<td>0.015</td>
<td>---</td>
<td>0.090</td>
<td>7.300</td>
<td>---</td>
<td>0.2800</td>
<td>0.00080</td>
<td>0.039</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EXPLANATION

Blank space equals no analysis

Below Detection Limit is ---

<table>
<thead>
<tr>
<th>WATER QUALITY STANDARDS</th>
<th>Al (mg/L)</th>
<th>As (mg/L)</th>
<th>Ba (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Cu (mg/L)</th>
<th>Fe (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Mn (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Ni (mg/L)</th>
<th>Zn (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.0500</td>
<td>2.0000</td>
<td>0.005</td>
<td>0.100</td>
<td>0.0500</td>
<td>0.002</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>2.00-0.01</td>
<td>0.00-0.05</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td>0.01-0.3</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</td>
<td>0.004-0.009</td>
<td>1.7-3.1</td>
<td>0.018-0.034</td>
<td>1.000</td>
<td>0.082-0.2</td>
<td>0.0024</td>
<td>1.4-2.5</td>
<td>0.12-0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.1900</td>
<td>0.001-0.002</td>
<td>0.21-0.37</td>
<td>0.012-0.021</td>
<td>0.003-0.008</td>
<td>0.000012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.0005</td>
<td>0.001</td>
<td>0.002</td>
<td>0.0047</td>
<td>0.150</td>
<td>0.019</td>
<td>0.0049</td>
<td>0.0006</td>
<td>0.0005</td>
<td>0.012</td>
<td>0.0028</td>
<td></td>
</tr>
</tbody>
</table>
2.5.2 Mine Waste and Stream Sediment Samples

Samples were collected from most of the properties where the mine waste dump impinged on an active waterway (Tables 2.5-3 and 2.5-4). As expected, many of these samples contain metal loadings, including arsenic, cadmium, copper, lead, and zinc, which exceed the Clark Fork Superfund Background Levels. No samples of mill tailings were collected from the properties examined in this volume because no mills ever operated.

Two stream sediment samples were collected, one from Olentange Creek downstream from the Hansy Mine and one on Bullion Creek downstream from the Bullion and Fourth of July mines. Metal loadings of arsenic, cadmium, copper, and lead were found in one or both of these samples.
Table 2.5-3. Element screen for dump and stream sediment samples for properties in the St. Joe River basin.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>At (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129703</td>
<td>Park Copper (WL-478), Adit #2 dump</td>
<td>NA</td>
<td>110</td>
<td>400</td>
<td>2.10</td>
<td>15.0</td>
<td>31</td>
<td>19,000</td>
<td>38</td>
<td>460</td>
<td>NA</td>
<td>21.0</td>
<td>35</td>
</tr>
<tr>
<td>K09039702</td>
<td>Lucky Swede (WL-496), oxidized dump</td>
<td>NA</td>
<td>—</td>
<td>42</td>
<td>4.10</td>
<td>6.2</td>
<td>31</td>
<td>96,000</td>
<td>52</td>
<td>2,400</td>
<td>NA</td>
<td>22.0</td>
<td>21</td>
</tr>
<tr>
<td>K09039703</td>
<td>Lucky Swede (WL-496), unoxidized dump</td>
<td>NA</td>
<td>140</td>
<td>170</td>
<td>3.20</td>
<td>21.0</td>
<td>33</td>
<td>31,000</td>
<td>56</td>
<td>1,200</td>
<td>NA</td>
<td>25.0</td>
<td>31</td>
</tr>
<tr>
<td>K7089801</td>
<td>Miller (WL-510), Adit 1, dump</td>
<td>NA</td>
<td>260</td>
<td>170.0</td>
<td>3.10</td>
<td>11.0</td>
<td>12,000</td>
<td>45,000</td>
<td>78</td>
<td>280</td>
<td>NA</td>
<td>77.0</td>
<td>70.0</td>
</tr>
<tr>
<td>K7089807</td>
<td>Idaho Star (WL-517), Adit 2, dump</td>
<td>NA</td>
<td>210</td>
<td>93.0</td>
<td>3.40</td>
<td>25.0</td>
<td>59.0</td>
<td>30,000</td>
<td>51</td>
<td>840</td>
<td>NA</td>
<td>98.0</td>
<td>33.0</td>
</tr>
<tr>
<td>K7089809</td>
<td>Haney (WL-516), Adit 1, dump</td>
<td>NA</td>
<td>2,900</td>
<td>73.0</td>
<td>4.90</td>
<td>11.0</td>
<td>15,000</td>
<td>98,000</td>
<td>75</td>
<td>1,500</td>
<td>NA</td>
<td>110.0</td>
<td>84.0</td>
</tr>
<tr>
<td>K7149801</td>
<td>Bullion—upper workings (WL-489), shaft/Adit 2, dump</td>
<td>NA</td>
<td>470</td>
<td>23.0</td>
<td>8.80</td>
<td>8.9</td>
<td>7,200.0</td>
<td>200,000</td>
<td>110</td>
<td>8,200</td>
<td>NA</td>
<td>48.0</td>
<td>140.0</td>
</tr>
<tr>
<td>K7149805</td>
<td>Bullion—upper workings (WL-489), Adit 1, dump</td>
<td>NA</td>
<td>1,100</td>
<td>71.0</td>
<td>6.70</td>
<td>11.0</td>
<td>7,200.0</td>
<td>130,000</td>
<td>92</td>
<td>5,000</td>
<td>NA</td>
<td>47.0</td>
<td>110.0</td>
</tr>
<tr>
<td>K7149808</td>
<td>Bullion—lower workings (WL-489), Adit 1, dump</td>
<td>NA</td>
<td>340</td>
<td>36.0</td>
<td>6.30</td>
<td>7.6</td>
<td>1,900.0</td>
<td>140,000</td>
<td>66</td>
<td>6,500</td>
<td>NA</td>
<td>37.0</td>
<td>45.0</td>
</tr>
<tr>
<td>K7149812</td>
<td>Fourth of July (WL-493), Adit 1, dump</td>
<td>NA</td>
<td>480</td>
<td>38.0</td>
<td>6.90</td>
<td>21.0</td>
<td>3,300.0</td>
<td>120,000</td>
<td>33,000</td>
<td>2,500</td>
<td>NA</td>
<td>55.0</td>
<td>180.0</td>
</tr>
<tr>
<td>K7159806</td>
<td>Alpina (WL-500), dump</td>
<td>NA</td>
<td>130</td>
<td>87.0</td>
<td>3.30</td>
<td>28.0</td>
<td>81.0</td>
<td>37,000</td>
<td>50</td>
<td>520</td>
<td>NA</td>
<td>30.0</td>
<td>79.0</td>
</tr>
<tr>
<td>K7219804</td>
<td>Richmond (WL-504), Adit 1, dump</td>
<td>NA</td>
<td>370</td>
<td>51.0</td>
<td>3.50</td>
<td>19.0</td>
<td>3,400.0</td>
<td>42,000</td>
<td>55</td>
<td>440</td>
<td>NA</td>
<td>46.0</td>
<td>27.0</td>
</tr>
</tbody>
</table>

**Stream Sediments**

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>At (ppm)</th>
<th>As (ppm)</th>
<th>Ba (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Cu (ppm)</th>
<th>Fe (ppm)</th>
<th>Pb (ppm)</th>
<th>Mn (ppm)</th>
<th>Hg (ppm)</th>
<th>Ni (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7099802</td>
<td>Haney (WL-516), stream sediment, downstream</td>
<td>NA</td>
<td>180</td>
<td>110.0</td>
<td>1.90</td>
<td>13.0</td>
<td>600.0</td>
<td>25,000</td>
<td>28</td>
<td>610</td>
<td>NA</td>
<td>22.0</td>
<td>17.0</td>
</tr>
<tr>
<td>K7149813</td>
<td>Bullion—lower workings (WL-489), stream sediment, downstream</td>
<td>NA</td>
<td>130</td>
<td>170.0</td>
<td>2.70</td>
<td>19.0</td>
<td>74.0</td>
<td>29,000</td>
<td>73</td>
<td>600</td>
<td>NA</td>
<td>24.0</td>
<td>38.0</td>
</tr>
</tbody>
</table>

**Clark Fork Superfund BG Levels (mg/Kg) = ppm**

<table>
<thead>
<tr>
<th></th>
<th>At</th>
<th>Cd</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Mean Soil</td>
<td>6.7</td>
<td>0.7</td>
<td>20.0</td>
</tr>
<tr>
<td>Helena Valley Mean Soil</td>
<td>16.5</td>
<td>0.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Missoula Lake Bed Sediments</td>
<td>NA</td>
<td>0.2</td>
<td>34.0</td>
</tr>
<tr>
<td>Blackfoot River</td>
<td>4.0</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>Phytotoxic Concentration</td>
<td>100.0</td>
<td>100.0</td>
<td>1000.0</td>
</tr>
</tbody>
</table>

**Explanation**

Below Detection Limit is ---

Not analyzed equals NA
Table 2.5-4. Toxicity Characteristic Leaching Procedure for dump and stream sediment samples from properties in the St. Joe River basin.

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>As (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Pb (ppm)</th>
<th>Hg (ppm)</th>
<th>Se (ppm)</th>
<th>Ag (ppm)</th>
<th>Ba (ppm)</th>
<th>PH</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129703</td>
<td>Park Copper (WL-478), Adit #2 dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2.300</td>
<td>8.2</td>
</tr>
<tr>
<td>K9039702</td>
<td>Lucky Swede (WL-496), oxidized dump</td>
<td>—</td>
<td>—</td>
<td>0.120</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.890</td>
<td>8.2</td>
</tr>
<tr>
<td>K9039703</td>
<td>Lucky Swede (WL-496), unoxidized dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.400</td>
<td>8.0</td>
</tr>
<tr>
<td>K7089801</td>
<td>Miller (WL-510), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K7089807</td>
<td>Idaho Star (WL-517), Adit 2, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.930</td>
<td></td>
</tr>
<tr>
<td>K7089809</td>
<td>Hansy (WL-516), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.300</td>
<td></td>
</tr>
<tr>
<td>K7149801</td>
<td>Bullion—upper workings (WL-489), shaft/Adit 2, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.800</td>
<td></td>
</tr>
<tr>
<td>K7149805</td>
<td>Bullion—upper workings (WL-489), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>K7149808</td>
<td>Bullion—lower workings (WL-489), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.760</td>
<td></td>
</tr>
<tr>
<td>K7149812</td>
<td>Fourth of July (WL-493), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>8.000</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.710</td>
<td></td>
</tr>
<tr>
<td>K7159806</td>
<td>Alpina (WL-500), dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.790</td>
<td></td>
</tr>
<tr>
<td>K7219804</td>
<td>Richmond (WL-504), Adit 1, dump</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.400</td>
<td></td>
</tr>
</tbody>
</table>

**Stream Sediments**

<table>
<thead>
<tr>
<th>FIELD NO.</th>
<th>REMARKS</th>
<th>As (ppm)</th>
<th>Cd (ppm)</th>
<th>Cr (ppm)</th>
<th>Pb (ppm)</th>
<th>Hg (ppm)</th>
<th>Se (ppm)</th>
<th>Ag (ppm)</th>
<th>Ba (ppm)</th>
<th>PH</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7099802</td>
<td>Hansy (WL-516), stream sediment, downstream</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K7149813</td>
<td>Bullion—lower workings (WL-489), stream sediment, downstream</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Not Detected is ND

Below Detection Limit is —

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th></th>
<th>As (mg/L)</th>
<th>Cd (mg/L)</th>
<th>Cr (mg/L)</th>
<th>Pb (mg/L)</th>
<th>Hg (mg/L)</th>
<th>Se (mg/L)</th>
<th>Ag (mg/L)</th>
<th>Ba (mg/L)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary MCL</td>
<td>0.050</td>
<td>0.005</td>
<td>0.100</td>
<td>0.050</td>
<td>0.002</td>
<td>0.05</td>
<td>2.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary MCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.360</td>
<td>0.004 - 0.009</td>
<td>1.7-3.1</td>
<td>0.082 -0.2</td>
<td>0.0024</td>
<td>0.0041 - 0.0134</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Chronic</td>
<td>0.190</td>
<td>0.001 - 0.002</td>
<td>0.21-0.37</td>
<td>0.005 - 0.008</td>
<td>0.000012</td>
<td>0.00012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Detection Level (33% confidence)</td>
<td>0.49</td>
<td>0.02</td>
<td>0.03</td>
<td>0.50</td>
<td>0.0017</td>
<td>0.65</td>
<td>0.27</td>
<td>0.05</td>
<td></td>
</tr>
</tbody>
</table>
3.0 ST. JOE NATIONAL FOREST (avery and ST. MARIES DISTRICTS) MINE DESCRIPTIONS

3.1 LUCKY SWEDEN MINE (Site No. WL-496)
Alternate names—Pearson Mine; Silica Gold and Copper Prospect.

3.1.1 Site Location and Access (Figure 2.1-1b)

The Lucky Swede Mine is on the north side of Lucky Swede Gulch about 1 mile from the North Fork of the St. Joe River, in the NE¼ of the SW¼, section 32, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.1-1). Access is via a good all-terrain-vehicle trail (shown as a pack trail on the topographic map) from Forest Service Road 456. The first ¼ mile of the trail follows the creek and can be driven to an open area beside the creek used by campers. The trail terminates at the mine. The Lucky Swede property is on Forest Service land.

3.1.2 Geologic Features (Figure 2.2-1b)

The Lucky Swede is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation. The property is cut by a northwest-trending fault that is parallel to the Placer Creek fault (Harrison and others, 1986). Good assays of gold and copper were reported from surface ores in the early 1920s (Sims, 1998).

3.1.3 Site History

The Lucky Swede claims were located in August 1907 by Morris Pearson and other individuals (Sims, 1998). Descriptions of the location and geology of the Lucky Swede are very similar to those given by Pardee (1911) for a property controlled by the Silica Gold & Copper Mining Company, and it is believed that they are the same.

The Lucky Swede Gold and Copper Mining Company was incorporated in 1909. The first work the new company did was to repair old buildings. The property had one 70-foot tunnel (Sims, 1998). Development proceeded steadily for the next few years. Sims (1998, p. 15) notes that a trial shipment of ore was made “in the early teens.” A stock assessment in 1913 provided funds for a 1,500-foot tunnel to be driven from near the railway line (Sims, 1998). By 1918, the mine had 1,200 feet of workings, mostly through the “lower” tunnel (believed to be the adit discussed in section 3.2.4.1, below). In 1920, Lucky Swede sold the property to the Pearson Mining Company and forfeited its corporate charter.

Pearson Mining Company (incorporated in 1920; Morris Pearson, president and manager) continued to develop the property, focusing primarily on the main tunnel during the first few years. Pearson also applied for patents on several of the claims (all of which had been renamed with the change in operating company). In 1923, total development was 3,450 feet, with 3,300-foot and 150-foot tunnels. Patents were granted on four of the claims. In 1924, the company
built a dam and installed a new power plant, as well as driving 475 feet of tunnels. In addition, the claim group was greatly expanded, and even more claims were added the following year. Also in 1925, Pearson announced that it was starting a 500-foot underground shaft, but how much actual work was done is unknown. By the end of 1925, the mine had three tunnels (525 feet, 2,800 feet, and 300 feet) and 4,970 feet of workings. Development continued until about 1930, when the lengths of the tunnels were 500 feet, 4,000 feet, and 4,050 feet. The length of the third tunnel may be inflated, since later reports give its length as 2,700 feet (instead of 4,050 feet). The claims were sold in 1938.

By 1949, the nine patented claims of the Pearson property were controlled by Day Mines, Inc. (incorporated in 1947 as a consolidation of a dozen predecessor companies). There are no reports of any recent activity at the property.

3.1.4 Environmental Conditions

3.1.4.1 Site Features

The Lucky Swede Mine was visited by John Kauffman on September 3, 1997. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:09:30-00:14:44). Documenting photos are 1997 series Roll K11, frames 1-4.

The Lucky Swede consists of a caved adit and a large waste dump (Figure 3.1-2). Dense brush covers the area around the adit and little evidence of its location remains except for a minor trickle of water and a slight depression on the slope. The water (1 gallon per minute or less) flows onto the dump surface, pools, and disappears into the dump about 20-30 feet in front of the adit. The waste dump measures 175 feet long, 45-60 feet wide, and 30-50 feet down the face (Figures 3.1-3, 3.1-4 and 3.1-5). The toe of the dump reaches the creek in Lucky Swede Gulch. About one-quarter of the waste rock shows strong brick-red to brown oxidation while the remainder is unoxidized host rock. The disturbed area covers 0.75 acre.

3.1.4.2 Sample Locations

3.1.4.2.1 Solid Samples

An oxidized sample (K09039702) and an unoxidized sample (K09039703) were collected from the face of the waste dump.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K09039702</td>
<td>Lucky Swede, oxidized dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K09039703</td>
<td>Lucky Swede, unoxidized dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.1.4.2.2 Water Samples

An adit water sample (K09039701) was taken 10-15 feet in front of the caved adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K09039701</td>
<td>Lucky Swede, adit</td>
<td>128</td>
<td>44</td>
<td>7.2</td>
<td>&lt;1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.1.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

The oxidized dump sample (K09039702) exceeds background and environmental levels for cadmium, copper, lead, manganese, and iron in the element screen. In the TCLP for metals screen, chromium shows a slight amount of leaching. The unoxidized dump sample K09039703 exceeds background and environmental levels for arsenic, cadmium, copper, and lead in the element screen.

Water Samples (Tables 2.5-1 and 2.5-2)

Adit water sample K09039701 exceeds all standards for aluminum and equals or exceeds all standards for cadmium in the dissolved metals screen. In the total recoverable metals screen, iron exceeds the Secondary MCL and arsenic the Primary MCL.

3.1.5 Structures

The remains of two structures are located at the southwest end of the waste dump where the trail comes onto the dump. The partially standing structure is a log cabin (Figure 3.1-6), and the totally collapsed structure was probably a storage shed.

3.1.6 Safety

No safety hazards were found at this site.
Figure 3.1-1. Location map of the Lucky Swede Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.1-2. Sketch map of the Lucky Swede Mine.
Figure 3.1-3. Looking east across the face of the unoxidized portion of the Lucky Swede waste dump (1997 Roll K11, frame #1).

Figure 3.1-4. Looking east across the surface of the waste dump. This photograph is to the left of the picture in Figure 3.1-3 (1997 Roll K11, frame #2).
Figure 3.1-5. Looking east at the eastern, oxidized portion of the waste dump with a portion of the unoxidized dump in the foreground (1997 Roll K11, frame #4).

Figure 3.1-6. Looking northeast at the remains of the log cabin near the west end of the waste dump. This photograph is to the left of the picture in Figure 3.1-4 (1997 Roll K11, frame #3).
3.2 PEARSON MINE (Site No. WL-497)
Alternate names—Lucky Swede Mine; Silica Gold and Copper Prospect.

3.2.1 Site Location and Access (Figure 2.1-1b)

The Pearson Mine is on the North Fork of the St. Joe River along Forest Service Road 456 about ¼ mile north of Lucky Swede Gulch, in the SW¼ of the SE¼, section 31, T. 47 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle (Figure 3.2-1). The caved adit is on the east side of the road. FS Road 456 crosses the waste dump, which extends to the west side of the road. This site is on Forest Service land and is at the head of Forest Service Trail 173.

3.2.2 Geologic Features (Figure 2.2-1b)

The Pearson Mine is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation. The property is cut by a northwest-trending fault that is parallel to the Placer Creek fault (Harrison and others, 1986).

3.2.3 Site History

For a detailed history of the Pearson Mining Company's operations, see section 3.1.3. This adit is believed to be the "lower" tunnel, probably the longest one on the property, started by the Lucky Swede Mining Company around 1916.

3.2.4 Environmental Conditions

3.2.4.1 Site Features

The Pearson Mine was visited by John Kauffman on September 3, 1997. A video segment describing the property is on the Avery and St. Mary's Districts Videotape (Tape 1, index 00:14:50-00:19:08). Documenting photos are 1997 series Roll K11, frames 5-6.

A culvert, which drains water out of the hillside at a rate of about 10-15 gallons per minute, is believed to be the site of a caved adit. The water flows under Forest Service Road 456 though a second culvert and disappears into the rock rubble along the edge of the waste dump west of the road. The road was built on top of the dump (Figure 3.2-2), and the turnoff for the trail (Figure 3.2-3) is at the north end of the dump. Some of the dump rock has been used as fill to level the staging area at the head of the trail. The rest of the dump is about 50-75 feet from the North Fork of the St. Joe River. The disturbed area, excluding the staging area, is less than 0.1 acre.

3.2.4.2 Sample Locations

3.2.4.2.1 Solid Samples

No samples were collected from the waste dump.
3.2.4.2.2 Water Samples

An adit water sample (K09039704) was collected between the culvert in the hillside and the culvert under the road. An upstream sample (K09039705) was taken from the North Fork of the St. Joe River at the river crossing for Forest Service Trail 173. A downstream sample (K09039706) was taken 300 feet south of the prospect on the North Fork of the St. Joe River.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K09039704</td>
<td>Pearson Mine, adit</td>
<td>124</td>
<td>48</td>
<td>7.99</td>
<td>10-15</td>
<td>Yes</td>
</tr>
<tr>
<td>K09039705</td>
<td>Pearson Mine, upstream</td>
<td>59</td>
<td>55</td>
<td>7.65</td>
<td>20 ft. wide, 1.5-3 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K09039706</td>
<td>Pearson Mine, downstream</td>
<td>58</td>
<td>56</td>
<td>7.64</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.2.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

The adit water sample (K09039704) equals or exceeds all standards for aluminum and cadmium in the dissolved metals screen. The upstream sample (K09039705) does not exceed any water quality standards. The downstream sample (K09039706) exceeds the Aquatic Life Chronic standard for cadmium in the dissolved metals screen and equals or exceeds all standards for cadmium in the total recoverable metals screen.

3.2.5 Structures

There are no structures at this site.

3.2.6 Safety

No safety hazards were found at this site.
Figure 3.2-1. Location map of the Pearson Prospect, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map).
Figure 3.2-2. Probable waste dump of the Pearson Mine, looking northeast. Forest Service Road 456 crosses the top of the dump (1997 Roll K11, frame #5).

Figure 3.2-3. Staging area for Forest Service Trail 173 at the base of the waste dump, looking northeast. The marker for the trail head is above the cab of the pickup along Forest Service Road 456. This photograph is to the left of the previous picture (1997 Roll K11, frame #6).
3.3 SUMNER MINE (Site No. WL-491)

3.3.1 Site Location and Access (Figure 2.1-1b)

The Sumner Mine is on Champion Creek about \(\frac{1}{4}-\frac{1}{2}\) mile east of its junction with Park Creek in the NW\(\frac{1}{4}\) of the NW\(\frac{1}{4}\), section 26, T. 47 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.3-1). The two adits and cabin at the property are shown on the topographic map. Access from Forest Service Road 456 (the Moon Pass-Avery Road) is via Forest Service Road 1428 up Champion Creek for slightly more than one mile. The Sumner Mine is on Forest Service land.

3.3.2 Geologic Features (Figure 2.2-1b)

The Sumner Mine is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation. To the south of the property is a northwest-trending fault that is parallel to the Placer Creek fault and a mafic sill of Precambrian age is on the north (Harrison and others, 1986).

3.3.3 Site History

Nothing is known of the history of this site.

3.3.4 Environmental Conditions

3.3.4.1 Site Features

The Sumner Mine was visited by Earl Bennett on July 30, 1997. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:19:11-00:22:23). Documenting photos are 1997 series Roll B6, frames 16-18.

The Sumner Mine consists of two adits on the south side of Champion Creek and an old cabin on the flat on the north side of the creek (Figure 3.3-2). A narrow foot trail about 20 feet above the road goes to Adit 2. Adit 1, the upper adit, is totally caved and difficult to see. Of the portal, only the tops of the side timbers and the cross beam can still be seen (Figure 3.3-3). A shallow trough is on the slope above the portal. Adit 2, the lower adit, is also caved. It is about 100 feet west of Adit 1 and slightly closer to the creek. The cross beam and tops of the upright posts for the portal timbers protrude through the sloughed rock rubble, and a large, weathered tree stump is on the portal cross beam (Figure 3.3-4). The waste dumps for both adits have been nearly eliminated by construction of the road. The disturbed area covers less than 0.5 acre.

3.3.4.2 Sample Locations

3.3.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.3.4.2.2 Water Samples
No water samples were collected at this site.

3.3.5 Structures
An old cabin and outhouse are just north of the access road on the north side of Champion Creek (Figure 3.3-5).

3.3.6 Safety
No safety hazards were found at this site.
Figure 3.3-1. Location map of the Sumner Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.3-2. Sketch map of the Sumner Mine.
Figure 3.3-3. Upper caved and dry adit (Adit 1) along Forest Service Road 1428, looking southeast. Several square-cut timbers are visible in the caved rock rubble (1997 Roll B6, frame #16).
Figure 3.3-4. Lower Adit 2 (100 feet southwest of Adit 1) on Forest Service Road 1428, looking southeast. Round portal timbers are visible beneath the large stump in the sloughed debris of the caved adit (1997 Roll B6, frame #18).
Figure 3.3-5. Old cabin (center of photograph) on the west side of Champion Creek (1997 Roll B6, frame #17).
3.4 PARK COPPER MINE (Site No. WL-478)

3.4.1 Site Location and Access (Figure 2.1-1b)

The Park Copper Mine consists of two adits on the east side of the upper reaches of Park Creek near the center of the E1/2 of the SW1/4, section 14, T. 47 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.4-1). The adits are shown as prospect symbols on the topographic map. Access is via a road that splits from Forest Service Road 45 (Moon Pass Road) and follows the north slope of Rougin Creek. After crossing a divide, the road drops into the upper end of the Park Creek drainage. The adits are about ½ mile north of Champion Point on a block of patented claims surrounded by Forest Service land.

3.4.2 Geologic Features (Figure 2.2-1b)

The Park Copper Mine is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.4.3 Site History

The Park Copper and Gold Mining Company, Ltd., was incorporated in 1899. Officers of this company included: Nellie J. Stockbridge, who held the position of secretary-treasurer of this company from 1913 (or earlier) until 1949; T.N. Barnard, who was president from 1913 (or earlier) to 1915; and E.A. Barnard, president from 1936 to 1949. By 1913, the company owned six patented claims, and the property had about 3,000 feet of workings. All of this development was apparently done before 1910. In 1917, the company replaced the buildings that had been burned in the 1910 forest fire and did a small amount of development. After that, the mine was idle for more than thirty years.

In 1951, a road was built to the property and the No. 4 tunnel was opened. (The company reported two tunnels on the property, 300 and 150 feet long.) After this, the property was again idle for a number of years.

In 1981, Bear Creek Mining Company signed an option agreement with Park and seven other companies on the east end of the Coeur d'Alene district. In September 1982, Bear Creek assigned its interest in the lease on these properties to Anaconda Minerals Company. Anaconda started exploring this large claim block soon after acquiring it. Drilling and other exploration work continued for the next three years, but Anaconda dropped its program late in 1985. Little, if any, of Anaconda's work focused on the Park property.

3.4.4 Environmental Conditions

3.4.4.1 Site Features

The Park Copper Mine was visited by Earl Bennett on August 12, 1997. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:22:30-00:27:43). Documenting photos are 1997 series Roll B10, frames 6-12.
This property consists of two adits on the slope east of Park Creek. Adit 1, the upper of the two, is at the end of the access road. The adit is open (Figure 3.4-2) and has water flowing from it at about 5 gallons per minute. The access road crosses the top of the small waste dump (Figure 3.4-3), which forms a veneer on the steep hillside (Figure 3.4-4).

Adit 2, about 400 feet downhill from Adit 1, is caved but has a substantial dump. A scarp, formed on the slope above the caved adit (Figure 3.4-5), has an eroded notch from seasonal water flow. A seep of 1-2 gallons per minute flows out of the adit (Figure 3.4-6) and forms a wetland on the dump. The flow from the adit and from the seasonal gully has breached the dump, cutting it in half (Figure 3.4-7). Park Creek is about 200 feet in elevation below the waste dump for Adit 2.

The total disturbed area is less than 0.5 acre.

3.4.4.2 Sample Locations

3.4.4.2.1 Solid Samples

A waste dump sample (B8129703) was collected at Adit 2.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129703</td>
<td>Park Copper Mine, Adit 2 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.4.4.2.2 Water Samples

Adit water samples were collected from Adit 1 (B8129701) and Adit 2 (B8129702).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129701</td>
<td>Park Copper, Adit 1</td>
<td>82</td>
<td>45</td>
<td>7.4</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>B8129702</td>
<td>Park Copper, Adit 2</td>
<td>93</td>
<td>50</td>
<td>7.5</td>
<td>1-2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.4.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

Waste dump sample B8129703 exceeds background and environmental levels for arsenic, cadmium, and copper in the element screen. In the TCLP for metals screen, there was no leaching for any elements of interest.
Water Samples (Tables 2.5-1 and 2.5-2)

The water sample from Adit 1 (B8129701) exceeds the Secondary MCL for manganese in both the dissolved metals screen and the total recoverable metals screen. The water sample from Adit 2 (B8129702) does not exceed any water quality standards.

3.4.5 Structures
No structures were found at this site.

3.4.6 Safety

Open Adit 1 is the only safety hazard identified at this site. Although well off the main Moon Pass Road, the site is accessible by four-wheel-drive vehicle, all-terrain vehicle, or trail bike. Some visits by the public are likely.
Figure 3.4-1. Location map of the Park Copper Mine, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.4-2. Looking east at open Adit 1 of the Park Copper Mine, with water flowing from the portal (1997 Roll B10, frame #6).

Figure 3.4-3. Looking north along the access road at Adit 1 of the Park Copper Mine, with water from the portal (to the right) flowing across the road in front of the trail bike (1997 Roll B10, frame #7).
Figure 3.4-4. Looking west at the thin veneer of waste rock on the slope below Adit 1 of the Park Copper Mine. The waste dump of Adit 2 can be seen in the distance near the center of the photograph (1997 Roll B10, frame #8).

Figure 3.4-5. Looking east at the slump marking the location of caved Adit 2 at the Park Copper Mine. Seasonal water flow has eroded a notch in the scarp above the slump (1997 Roll B10, frame #12).
Figure 3.4-6. Looking west across the surface of Adit 2 waste dump. The adit water seep can be seen trickling across the dump (1997 Roll B10, frame #11).

Figure 3.4-7. Looking west down the breached face of the waste dump for Adit 2 (1997 Roll B10, frame #10).
3.5 UNNAMED PROSPECT (Site No. B8129704)

3.5.1 Site Location and Access (Figure 2.1-1b)

Unnamed Prospect B8129704 is on a small tributary of Park Creek in the NW¼ of the SE¼, section 15, T. 47 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.5-1). It is shown as a prospect symbol on the topographic map. Access is via a dirt road that turns east off Forest Service Road 456 (Moon Pass Road) at a small tributary on the North Fork of the St. Joe River north of Rougin Creek. The prospect is on a steep hillside just south of the main Rougin Creek access road, which continues on to the Park Copper Mine. The prospect is on Forest Service land.

3.5.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.5.3 Site History

Nothing is known of the history of this site.

3.5.4 Environmental Conditions

3.5.4.1 Site Features

This prospect was visited by Earl Bennett on August 12, 1997. No video was taken. Documenting photos are 1997 series Roll B10, frames 13-14.

The adit is totally caved (Figure 3.5-2) and has water flowing from it at about 2-3 gallons per minute. The water disappears into a thicket of alders. The waste dump is about 30 feet long, 20 feet wide, and 40 feet down the face (Figure 3.5-3). Some ore car rails are on the overgrown dump surface. The disturbed area covers less than 0.25 acre.

3.5.4.2 Sample Locations

3.5.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.5.4.2.2 Water Samples

No water samples were collected at this site.

3.5.5 Structures

No structures were found at this site.

3.5.6 Safety

No safety hazards were found at this site.
Figure 3.5-1. Location map of Unnamed Prospect Site No. B8129704, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.5-2. Looking north at the caved adit at Site No. B8129704. The fir tree at the center of the photograph is growing in the trough of the caved adit (1997 Roll B10, frame #13).
Figure 3.5-3. Looking south-southeast down the face of the waste dump of Site No. B8129704 and down the Park Creek drainage (1997 Roll B10, frame #14).
3.6 UNNAMED PROSPECT (Site No. B8129705)

3.6.1 Site Location and Access (Figure 2.1-1b)

Unnamed Prospect B8129705 is near the head of a west-flowing branch of Rougin Creek in the NW¼ of the SW¼, section 15, T. 47 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.6-1). It is reached via a dirt road that turns east off Forest Service Road 456 (Moon Pass Road) at a small tributary to the North Fork of the St. Joe River about 1 mile north of Rougin Creek. A short spur road with several switchbacks leads down to the prospect from the Rougin Creek road. The property is on Forest Service land.

3.6.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.6.3 Site History

Nothing is known about the history of this site.

3.6.4 Environmental Conditions

3.6.4.1 Site Features

This property was visited by Earl Bennett on August 12, 1997. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:28:16-00:30:55). Documenting photos are 1997 series Roll B10, frames 15-16.

The prospect consists of a caved adit (Figures 3.6-2 and 3.6-3) that has a minor seep. The waste dump is 80 feet long and 75 feet wide. It extends at least 25-35 feet down the face but is well above the creek. The dump surface is mostly bare, but has some grasses, weeds, and a few large trees (Figure 3.6-4). It is moss-covered at the seep. Some old ore car rails remain on the dump, along with part of an old powder box. The disturbed area is less than 0.25 acre.

3.6.4.2 Sample Locations

3.6.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.6.4.2.2 Water Samples

No water samples were collected at this site. The adit seep had a volume too small to sample.

3.6.5 Structures

No structures were found at this site.
3.6.6 Safety
    No safety hazards were found at this site.
Figure 3.6-1. Location map of Unnamed Prospect Site No. B8129705, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.6-2. Sketch map of Unnamed Prospect Site No. B8129705.
Figure 3.6-3. Caved adit, with collapsed portal timbers in the caved debris, looking east. A minor seep supports a thick growth of moss in front of the adit (1997 Roll B10, frame #15).
Figure 3.6-4. Moss-covered damp area on the surface of the waste dump in front of the adit, looking west (1997 Roll B10, frame #16).
3.7 UNNAMED PROSPECT (Site No. B8129706)

3.7.1 Site Location and Access (Figure 2.1-1b)

Unnamed Prospect B8129706 is the prospect shown near the head of Rougin Creek on the topographic map in the NE¼ of the NE¼, section 16, T. 47 N., R. 5 E., on the Mullan 7.5-minute quadrangle (Figure 3.7-1). It is reached via a dirt road that goes around the nose of the ridge to the Rougin Creek drainage after turning east off the Moon Pass Road (Forest Service Road 456) at a tributary to the North Fork of the St. Joe River about 1 mile (by road) north of Rougin Creek. The prospect is on Forest Service land north of the main Rougin Creek road.

3.7.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.7.3 Site History

Nothing is known of the history of this site.

3.7.4 Environmental Conditions

3.7.4.1 Site Features

This property was visited by Earl Bennett on August 12, 1997. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:31:00-00:33:28). Documenting photos are 1997 series Roll B10, frames 17-19.

The property (Figure 3.7-2) consists of a caved adit (Figure 3.7-3) with water flowing from it at about 5 gallons per minute. The surface of the dump is covered with brush and a few saplings (Figure 3.7-4), and has ore car rails visible in places. The access road to the mine goes onto the dump, which measures about 65 feet north-south, 48 feet east-west, and is about 60 feet thick on the nose (Figure 3.7-5). The site covers less than 0.5 acre.

3.7.4.2 Sample Locations

3.7.4.2.1 Solid Samples

No waste dump samples were collected.

3.7.4.2.2 Water Samples

Sample B8129706 was taken from the adit water.

69
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity ($\mu$S)</th>
<th>Temperature ($^\circ$ F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B8129706</td>
<td>Site No. B8129706, adit</td>
<td>63</td>
<td>40</td>
<td>8.2</td>
<td>5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.7.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

No water quality standards were exceeded in either the dissolved metals or the total recoverable metals screens. In the ICP Cold Vapor test, mercury exceeds the Aquatic Life Chronic standard.

3.7.5 Structures

No structures were found at this site.

3.7.6 Safety

No safety hazards were identified at this site.
Figure 3.7-1. Location map of Unnamed Prospect Site No. B8129706, Shoshone County, Idaho (U.S. Geological Survey Mullan 7.5-minute topographic map).
Figure 3.7-2. Sketch map of Unnamed Prospect Site No. B8129706.
Figure 3.7-3. Looking north at the slumping bank that marks the location of the caved adit at Unnamed Prospect Site No. B8129706 (1997 Roll B10, frame #17).

Figure 3.7-4. Looking south across the brushy surface of the waste dump at Unnamed Prospect B8129706 (1997 Roll B10, frame #19).
Figure 3.7-5. Looking south down the face of the waste dump at Site No. B8129706 toward the Rougin Creek drainage (1997 Roll B10, frame #18).
3.8 SAILOR BOY PROSPECT (Site No. WL-514)

3.8.1 Site Location and Access (Figure 2.1-1b)

The Sailor Boy Prospect is along the east side of Slate Creek on the edge of Forest Service Road 225, in the NW¼ of the NW¼, section 13, T. 46 N., R. 4 E., on the Mastodon Mountain 7.5-minute quadrangle (Figure 3.8-1). Several washouts on Slate Creek road have been repaired, and the property is accessible by vehicle. This prospect is on Forest Service land.

3.8.2 Geologic Features (Figure 2.2-1b)

The Sailor Boy is in the upper part of the Wallace Formation, which in this area consists of bluish slate interbedded with buff-weathering to light-gray fine-grained shale and quartzite. The mineralized quartzite bed is 2 feet thick and has sparsely distributed chalcopyrite, galena, and sphalerite (Pardee, 1911).

3.8.3 Site History

In 1910, the Sailor Boy had a 75-foot-long tunnel which contained a 30-foot crosscut and a 20-foot shaft (Pardee, 1911).

3.8.4 Environmental Conditions

3.8.4.1 Site Features

The Sailor Boy Prospect was visited by John Kauffman on July 7, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:33:35-00:36:08). Documenting photos are Roll K1, frames 1-3.

This prospect is beside Forest Service Road 225 at road level (Figure 3.8-2). The open adit (Figures 3.8-3 and 3.8-4) was 75 feet long in 1910 (Pardee, 1911). The road crosses the top of the small, grass-covered waste dump (Figure 3.8-5). The dump (about 25 feet long, 18 feet wide and 6 feet thick) extends into the beaver ponds along the west side of the road, but is at least 200 feet east of Slate Creek. No mineralization was noted on the dump. The disturbed area covers about 0.1 acre.

3.8.4.2 Sample Locations

3.8.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.8.4.2.2 Water Samples

No water samples were collected at this site.
3.8.5 Structures

No structures are present at this site.

3.8.6 Safety

The open adit is easily accessible and Forest Service Road 225, although rough and narrow in places, is frequently used for recreational access. If the shaft inside is still open, it would be a significant hazard to anyone entering the adit.
Figure 3.8-1. Location map of the Sailor Boy Prospect, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map).
Figure 3.8-2. Sketch map of the Sailor Boy Prospect.
Figure 3.8-3. Open adit of the Sailor Boy Prospect, looking east. Forest Service Road 225 is in the foreground (Roll K1, frame #1).
Figure 3.8-4. Inside view of Sailor Boy adit (Roll K1, frame #2).

Figure 3.8-5. Looking west at the small, grass-covered waste dump at the Sailor Boy Prospect. Forest Service Road 225 is in the foreground (Roll K1, frame #3).
3.9 SILVER SPRAY PROSPECT (Site No. WL-506)
Alternate names—Enchanted Hill; Silver Lode; Slate Creek Prospect.

3.9.1 Site Location and Access (Figure 2.1-1b)

The Silver Spray Prospect is on the west side of Slate Creek near the mouth of Prospect Creek in the NE¼ of the NE¼, section 14, T. 46 N., R. 4 E., on the Mastodon Mountain 7.5-minute quadrangle (Figure 3.9-1). There is no longer any direct access to the property. Forest Service Road 225 follows along the east side of Slate Creek, but the creek must be waded to reach the prospect on the west bank. A pack trail (Forest Service Trail 30) crosses Slate Creek and follows the south side of Prospect Creek, but the Silver Spray is on the north side of the creek. The prospect is on Forest Service land.

3.9.2 Geologic Features (Figure 2.2-1b)

The prospect is in bluish slate interbedded with buff-weathering to light-gray fine-grained shale and quartzite of the Wallace Formation (Pardee, 1911). It is just north of the Mastodon Mountain fault (Wagner, 1949). "The mineralization occurs in a quartzite bed 1½ to 2½ feet thick, which dips 10⁰ N. and consists of siderite, pyrite, crystals of chalcopyrite, galena, a little micaceous hematite, and some zinc blende [sphalerite]. These minerals occur as small irregular replacement bunches peppered through the quartzite bed" (Pardee, 1911, p. 60).

3.9.3 Site History

Pardee (1911, p. 60) described two adits at the Silver Spray Prospect:
Tunnel A bears about N. 24⁰ W. and enters 700 feet from the mouth of Prospect Creek. It has been driven 58 feet into bluish slates representing the upper part of the Newland ("Wallace") formation. . . . Tunnel B, on Slate Creek 200 yards north of the mouth of Prospect Creek, has been driven 50 feet into the same formation and the mineralized conditions here are practically identical with those described above.

Tunnel B appears to be the Slate Creek prospect described by Collier (1906), which consisted of several prospect holes.

In 1925, the Silver Lode Mining and Milling Company (incorporated in 1919) purchased eight claims from the Silver Spray Mining Company. Silver Lode already held a block of eleven claims, some of which apparently overlapped the Silver Spray claims. Silver Lode reported the property had six tunnels (the longest was 132 feet) and one shaft. Half a ton of hand-sorted ore was shipped in September, which yielded 227 ounces of silver and ½ ounce of gold. By 1928, Silver Lode had apparently sold the Silver Spray.

The Enchanted Hill Mining Company (incorporated in 1928) next acquired the property. In 1929, Enchanted Hill described the workings as one 60-foot tunnel, one 50-foot shaft, and various open
cuts and discovery shafts. This company appears to have done only minimal work on the property and forfeited its corporate charter in 1934.

3.9.4 Environmental Conditions

3.9.4.1 Site Features

The Silver Spray was visited by John Kauffman on July 7, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:36:13-00:42:09). Documenting photos are Roll K1, frames 4-5.

Of the two adits reported by Pardee (1911), only the one 700 feet west of the mouth of Prospect Creek, was found (Figure 3.9-2). The adit is caved, but a few of the portal timbers are visible in the caved debris (Figure 3.9-3). The waste dump is overgrown on its surface, but is nearly bare where it fans out on the steep slope (Figure 3.9-4). It is about 25 feet long, 20 feet wide, and about 30 feet down the face. Maximum thickness on the slope is 6-8 feet. The toe of the dump is well above Prospect Creek. The disturbed area covers less than 0.25 acre.

A search was conducted along the slope north of Prospect Creek to locate the second tunnel described by Pardee, but no evidence of an adit or dump was found. The adit could be caved and the dump may have been removed by erosion.

3.9.4.2 Sample Locations

3.9.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.9.4.2.2 Water Samples
   No water samples were collected at this site.

3.9.5 Structures
   No structures were found at this site.

3.9.6 Safety
   No safety hazards were found at this site.
Figure 3.9-1. Location map of the Silver Spray Prospect, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map).
Figure 3.9-2. Sketch map of the Silver Spray Prospect.
Figure 3.9-3. Caved adit of the Silver Spray Prospect, looking north. A portal crossbeam is visible behind the twigs just above the center of the photograph (Roll K1, frame #4).
Figure 3.9-4. Silver Spray waste dump, looking southwest. Scrub brush and a few conifers are growing on the surface, but the face is nearly bare (Roll K1, frame #5).
3.10 FRANKLIN PROSPECT (Site No. WL-519)
Alternate names—Franklyn; Stanley Boys Mine; Helmer Silver Mines Co.; Copper Bell.

3.10.1 Site Location and Access (Figure 2.1-1b)

The Franklin Prospect is about 5 miles north of the Avery Ranger Station along Slate Creek in the N½ of the SE¼, section 27, T. 46 N., R. 4 E., on the Mastodon Mountain 7.5-minute quadrangle (Figure 3.10-1). Access is on Forest Service Road 225. The site is just north of Fritz Creek along a large meander of Slate Creek on Forest Service land.

3.10.2 Geologic Features (Figure 2.2-1b)

According to Wagner (1949, p. 45):
The deposit occurs in impure quartzite of the number 2 horizon of the Wallace formation and is explored by three short tunnels with a total length of 350 feet. The surface plant consists of a cabin for living quarters and the wrecked remains of a compressor house and tool shed. No work has been done on the property for a number of years other than opening the tunnel portals in 1942-43 for the purpose of sampling.

Adits numbers 1 and 2 are driven in opposite directions on a fracture zone that trends N. 70° W. and dips 30° to 50° S. The fracture pinches out toward the west in the number 2 tunnel. It increases in width and intensity to the east and attains its greatest breadth in the number 1 adit on the east side of Slate Creek. The fracture zone is made up of a number of sub-parallel breaks each of which contains thin gouge seams. The whole zone has been mineralized but the greatest mineralization is evident in the eastern workings. Siderite and quartz are the chief gangue minerals, and these have been fractured and the sulfides are scattered along the later breaks.

Adit No. 3 was driven into an irregular, lens-shaped body of siderite that was slightly mineralized with minor sulfides, mostly chalcopyrite (Wagner, 1949).

3.10.3 Site History

The original claims at the Franklin Mine, the Copper Belle Lode and the Silver Belle Nos. 1-3, were filed around 1930 by Chester A. Hanson (Stenz and Ruff, 1971). The Helmer Silver Mines Company, incorporated in 1936, acquired the claims in that year. Work during 1936 consisted of driving 281 feet of tunnels and 30 feet of shafts. Sporadic work continued until 1942. In 1940, the company built a bridge (presumably across Slate Creek), installed a compressor, and installed air pipe and track. In 1942, the property had three tunnels (170 feet, 190 feet, and 38 feet long), a 20-foot vertical shaft, and a 20-foot raise. Helmer forfeited its corporate charter in 1947.
Proofs of labor were filed on the property through 1951 (Stentz and Ruff, 1971). In the mid-1960s, the area was restaked as the Stanley Boys Claim Group by the seven Stanley brothers. Stentz and Ruff (1971) inspected the site in 1970 in response to a request by the Avery District Ranger to determine if the buildings and other improvements were being used for mining purposes. At that time, the site showed no evidence that any mining activity had taken place in many years. If the District Ranger challenged the validity of the claims following Stentz and Ruff's (1971) report, the District office should have this information. No evidence of any recent mining or exploration activity was noted during the site visit.

3.10.4 Environmental Conditions

3.10.4.1 Site Features

The Franklin Prospect was visited by John Kauffman on July 7, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:42:15-00:54:59). Documenting photos are Roll K1, frames 6-9.

The Franklin Prospect consists of two adits, an old cabin, and several collapsed structures; a third adit was not found. Figure 3.10-2 shows the three original adits, two on the east side of Slate Creek and one on the west side. Wagner (1949) mapped the underground workings of all three openings (Figure 3.10-3). Only the main adit on the east side of the creek and the tunnel on the west side were found (Figure 3.10-4).

Adit 1, the main tunnel on the east side of Slate Creek, is just below Forest Service Road 225 (Figure 3.10-5). The adit is caved, and the road crosses the top of the sloughed slope above the adit. The waste dump (Figure 3.10-6) has been modified to some degree by bulldozer work, but is roughly 90 feet long, 60 feet wide, and 10 feet thick.

Adit 2, on the west side of Slate Creek (Adit 1 on the Lucky Trail claim on Figure 3.10-2), is open (Figure 3.10-7) and about 15 feet above creek level. Most of the waste dump has been removed by the creek.

The third adit, which was north and east of Adit 1 and along the edge of Forest Service Road 225, was not found. According to Wagner (1949), it was 1,000 feet north and 75 feet vertically above Adit 1. It was about 60 feet long (Figures 3.10-2 and 3.10-3).

There is a considerable amount of junk scattered around the site, including old stoves, 55-gallon drums, black plastic hose, and boards, along with more recent garbage and debris left by campers.

Total disturbed area at the site is about 4 acres.
3.10.4.2 Sample Locations

3.10.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.10.4.2.2 Water Samples
   No water samples were collected at this site.

3.10.5 Structures

A cabin on the site remains standing but is in disrepair. Two sheds shown on the site map (Figure 3.10-4) have collapsed.

3.10.6 Safety

Open Adit 2 is a potential safety hazard. However, it is not easily accessible (the creek must be waded) and cannot easily be seen from the east side of Slate Creek.
Figure 3.10-1. Location map of the Franklin Mine, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map).
Figure 3.10-2. Sketch map of the general area of the Franklin Mine, showing the layout of the Stanley Boys claims and the Lucky Trail claim (Stentz and Ruff, 1971). The adit number in parentheses is from Wagner (1949, Plate VI [Figure 3.10-3]).
PORTAL ADIT No. 3

scattered sulfides.

Adit driven on lens-shaped body of siderite (FeCO₃) which has replaced calcareous country rock.

PORTAL ADIT No. 2

30° 45°
6° gauge on barren fractures

Country rock impure quartzite

PORTAL ADIT No. 1

Country rock impure, sericitic quartzite and some impure baryta

5'-12' low grade ore

considerable Cu stain

PLATE VI
FRANKLIN MINE
UNDERGROUND GEOLOGY

Figure 3.10-3. Underground geology of the Franklin Mine workings (Wagner, 1949, Plate VI). Adit No. 3 of Wagner’s map was not found during this site examination.
Figure 3.10-4. Sketch map of the Franklin Mine.
Figure 3.10-5. Caved Adit 1 of the Franklin Mine, looking east. Forest Service Road 225 crosses above the caved entrance at the top of the sloughed material at the upper right of the photograph (Roll K1, frame #8).
Figure 3.10-6. Waste dump for Adit 1 of the Franklin Mine, looking southwest. This portion of the dump has been modified by bulldozer work (Roll K1, frame #9).

Figure 3.10-7. Inside view of open Adit 2 on the west side of Slate Creek. This is the adit shown on the Lucky Trail claim on Figure 3.10-2 and as Adit 2 on Figure 3.10-3. The adit floor is strewn with rock debris collapsed from the roof. Several supporting timbers, about 15 feet inside the adit, are still intact (Roll K1, frame #6).
3.11 **FISHHOOK CREEK PROSPECT (Site No. WL-533)**

An unnamed prospect (Site No. K7209802) is included with this property because of its close proximity to the other workings.

3.11.1 **Site Location and Access** (Figure 2.1-1b)

The Fishhook Creek Prospect is along Fishhook Creek about 2 miles south of the St. Joe River in the SE1/4, section 20, T. 45 N., R. 5 E., on the Fishhook Creek 7.5-minute quadrangle (Figure 3.11-1). The word “Mine” and an adit symbol are marked on the topographic map, but only a possible caved adit (or adits) was found at that location. Another probable caved adit is located on the east side of Fishhook Creek across from the adit symbol, and an open adit is on the east side of the creek about 750 feet south of the adit symbol. All of section 20, including this portion of Fishhook Creek, is on Forest Service land. The sections north (17), west (19), east (21), and south (29) of section 20 are part of the Plum Creek Timber Corporation’s holdings.

3.11.2 **Geologic Features** (Figure 2.2-1b)

The Fishhook Creek Prospect is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation (Harrison and others, 1986).

3.11.3 **Site History**

The Fishhook Mining Company was incorporated in 1919. By the following year, the prospect had 115 feet of workings. In 1922, Fishhook reported that the property had one tunnel, but then listed one 213-foot tunnel and four additional 10-foot adits. The total workings in 1923 were 253 feet. The company forfeited its corporate charter in 1926.

3.11.4 **Environmental Conditions**

3.11.4.1 **Site Features**

The Fishhook Creek Prospect was visited on July 7, and the site identified in the field as Site No. K7209802 on July 20, 1998. A video segment is on the Avery and St. Maries Districts Videotape (Tape 1, index 00:55:05-01:04:30). Documenting photographs are Roll K1, frame 10; Roll K5, frame 26; and Roll K6, frames 1-2.

One or two possible caved adits are at the location identified on the map with an adit symbol. Two shallow, trough-like depressions at the base of the cliff just above creek level are the only indications of these possible workings. No waste dumps were found, although they may have been washed away by the stream. Directly across the creek on the east side, another possible caved adit was found about 40 feet above the road. Some old boards are propped beside a shallow trough that has the appearance of a caved adit. Offset about 15 feet to the north is an
apparent waste dump 60 feet long, 30 feet wide and 20 feet thick, although this material may be some leveled rock debris washed down the gully.

About 750 feet south of these suspected workings is an open adit along the east side of the road (Figure 3.11-2). The adit is nearly covered by a berm along the edge of the road (Figure 3.11-3), but an opening behind the berm (Figure 3.11-4) leads into the adit. The waste dump no longer exists; it has either been washed away by the creek or removed during road construction.

3.11.4.2 Sample Locations

3.11.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.11.4.2.2 Water Samples
   No water samples were collected at this site.

3.11.5 Structures
   No structures were found at this site.

3.11.6 Safety

Although somewhat difficult to see, the open adit is readily accessible and is along a well-traveled gravel road.
Figure 3.11-1. Location map of the Fishhook Creek Prospect, Shoshone County, Idaho (U.S. Geological Survey Fishhook Creek 7.5-minute topographic map).
Figure 3.11-2. View to the north along Fishhook Creek and Forest Service Road 301.
The open adit is beside the road at the center of the right edge of the photograph. Flagging (difficult to see on the photograph) marks the adit (Roll K6, frame #2).

Figure 3.11-3. Opening of the Fishhook Creek Prospect adit behind the berm along the edge of Forest Service Road 301, looking east. Flagging is on the left edge of the opening (Roll K5, frame #26).
Figure 3.11-4. View into the adit of the Fishhook Creek Prospect (Roll K6, frame #1).
3.12 MILLER MINE (Site No. WL-510)

3.12.1 Site Location and Access (Figure 2.1-1b)

The Miller Mine is on Kelly Creek, just north of Loop Creek, in the SW¼ of the SW¼, section 7, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.12-1). A short access road leads to the site from Forest Service Road 326. The mine is on Forest Service land.

3.12.2 Geologic Features (Figure 2.2-1b)

The Miller Mine is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation. It is near a northwest-trending fault that is parallel to the Placer Creek fault (Harrison and others, 1986).

3.12.3 Site History

Sims (1998) notes that the Miller was recently active. The mine was shown on the U.S. Geological Survey's 1956 Saltese 15-minute topographic quadrangle. Nothing else is known about the history of this mine.

3.12.4 Environmental Conditions

3.12.4.1 Site Features

The Miller Mine was visited by John Kauffman on July 8, 1998. A video segment describing the property is on the Avery and St. Mariés Districts Videotape (Tape 1, index 01:04:33-01:13:54). Documenting photographs are Roll K1, frames 11-19.

Three adits were found at the Miller Mine (Figure 3.12-2). Adit 1, located on the east side of Kelly Creek, is open and timbered at the portal (Figures 3.12-3 and 3.12-4). Adit 2, about 15 feet north of Adit 1, is caved. There is one waste dump for these two adits, measuring 90 feet long parallel to Kelly Creek and about 15 feet thick. The dump is 25 feet wide in front of Adit 1 but tapers to a point at the south tip. Kelly Creek is actively eroding the edge of the dump (Figure 3.12-5) where a foot bridge crosses the creek.

Adit 3, on the west side of the creek, is nearly caved, but has a small opening about 2 feet long by 1 foot high (Figure 3.12-6). The waste dump (Figures 3.12-7 and 3.12-8) is 40-50 feet long but only 4-5 feet wide on top. It tapers in thickness from 10 feet near the adit to about 3 feet at the toe along the access road.

The disturbed area at this site covers about 1 acre.
3.12.4.2 Sample Locations

3.12.4.2.1 Solid Samples

A waste dump sample (K7089801) was collected at the foot bridge leading to Adit 1.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089801</td>
<td>Miller Mine, Adits 1 and 2, dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.12.4.2.2 Water Samples

No water samples were collected at this site.

3.12.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

Sample K7089801 exceeds background and environmental levels for arsenic, cadmium, copper, iron, nickel, and lead in the element screen. In the TCLP for metals screen, no elements show evidence of leaching.

3.12.5 Structures

A log cabin, intact though in disrepair (Figure 3.12-9), is about 100 yards north of the Loop Creek road. A partly collapsed, metal-sided outhouse (Figure 3.12-10), which was built on top of an old cedar stump, is about 75 feet south of the cabin.

3.12.6 Safety

Adit 1 is open, but the roof timbers for the portal are leaning and beginning to collapse. The site is easily accessible from Forest Service Road 326. The area receives moderate to heavy recreational use, particularly since a new bike trail has opened on the old railway. Fire rings near the cabin indicate that the site has been used for camping.
Figure 3.12-1. Location map of the Miller Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.12-2. Sketch map of the Miller Mine.
Figure 3.12-3. Open portal of Adit 1 at the Miller Mine (center of photograph), looking east (Roll K1, frame #11).

Figure 3.12-4. Inside view of Adit 1 at the Miller Mine. Note the collapsing roof supports at the upper left of the photograph (Roll K1, frame #12).
Figure 3.12-5. Looking east at the waste dump for Adits 1 and 2, with the footbridge in the lower foreground. Note the worn path up the face of the dump and the eroded lower edge of the dump at the bridge (Roll K1, frame #14).

Figure 3.12-6. Small opening of Adit 3 at the Miller Mine (center of photograph), looking west (Roll K1, frame #15).
Figure 3.12-7. Looking north at a portion of Adit 3 waste dump (Roll K1, frame #17).

Figure 3.12-8. Looking east from Adit 3 across the surface of the waste dump (Roll K11, frame #16).
Figure 3.12-9. Looking northwest at the old log cabin at the Miller Mine. The cabin is in a clearing about 100 yards north of Forest Service Road 326 (Roll K1, frame #18).

Figure 3.12-10. Partly collapsed, metal-sided outhouse constructed on top of a cedar stump. The outhouse is about 75 feet south of the cabin (Roll K1, frame #19).
3.13 IDAHO STAR MINE (Site No. WL-517)

3.13.1 Site Location and Access (Figure 2.1-1b)

The Idaho Star workings are along Loop Creek, just north of the mouth of Ward Creek, along the eastern edge of the SW¼, section 20, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.13-1). The section of the old road along Loop Creek past the Idaho Star has been reclaimed, but the two adits can easily be reached on foot from the junction of Forest Service Roads 327 and 326. This prospect is on Forest Service land.

3.13.2 Geologic Features (Figure 2.2-1b)

The Idaho Star Mine is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation (Harrison and others, 1986).

3.13.3 Site History

The Idaho Star Mining Company was incorporated in 1924. In December of that year, the property's main tunnel was 85 feet long. The company more than doubled its claim block in 1925 (from six to fifteen), but concentrated its development efforts on the main tunnel. By 1928, more claims had been added to the property, the No. 1 tunnel was 537 feet long, and a second tunnel (35 feet long) had been started. The following year, the No. 1 tunnel was 630 feet long and a third tunnel was underway. Tunnels No. 2 and No. 3 were 90 feet and 35 feet long, respectively. The company did 135 feet of tunnel work in 1930 and 92 feet the following year. The property had 1,170 feet of development in three tunnels (915 feet, 140 feet, and 35 feet).

In 1932, no underground work was done, but the company loaned its buildings to Forest Service road crews, helped clear the right-of-way for the road, and provided timber to cover the bridges. The property was idle until 1937, when a small amount of work was done. The company dropped twenty-two of its thirty-two claims in late 1940 or early 1941, but kept the remainder of the property until around 1949. Idaho Star forfeited its corporate charter in 1951.

3.13.4 Environmental Conditions

3.13.4.1 Site Features

The Idaho Star Mine was visited by John Kauffman on July 8, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 1, index 01:14:00-01:21:58). Documenting photographs are Roll K1, frame 26 and Roll K2, frames 1-6.

The Idaho Star Mine consists of two adits about 1,000 feet apart along Loop Creek (Figure 3.13-2). Adit 1, the northern of the two, is about ¼ mile north of the mouth of Ward Creek on the west side of Loop Creek. The portal timbers are leaning, but the adit is open (Figures 3.13-3 and
3.13-4). Water is flowing from the adit at about 1 gallon per minute (Figure 3.13-5). The waste dump is built out onto a large, open, grassy, flat area (Figure 3.13-6) and measures 75 feet long, 25 feet wide, and about 10 feet thick. A collapsed cabin, a tall, partly collapsed structure, and an outhouse are on the grassy flat. The disturbed area, including the cabin site, covers about 1 acre.

Adit 2, located several hundred feet north of the mouth of Ward Creek on the east side of Loop Creek, is also open (Figure 3.13-7). The adit splits just inside the portal (Figure 3.13-8). The right branch is 6-8 feet in length and the left branch is at least 30-40 feet long. The waste dump extends out to, and is truncated by, Loop Creek (Figure 3.13-9). It measures about 30 feet long, 20 feet wide, and 10 feet thick. The disturbed area is less than 0.25 acre.

3.13.4.2 Sample Locations

3.13.4.2.1 Solid Samples

Sample K7089807 was collected from the eroded face of the waste dump for Adit 2.

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089807</td>
<td>Idaho Star, Adit 2 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.13.4.2.2 Water Samples

Sample K7089806 was collected in front of the portal of Adit 1. A reference sample (K7299801) was collected near the mouth of Ward Creek just above the bridge on Forest Service Road 327.

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089806</td>
<td>Idaho Star, Adit 1</td>
<td>119</td>
<td>43</td>
<td>8.03</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>K7299801</td>
<td>Reference, Ward Creek</td>
<td>73</td>
<td>50</td>
<td>7.88</td>
<td>6 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.13.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

The waste dump sample (K7089807) from Adit 1 exceeds background and environmental levels for arsenic, cadmium, lead, nickel, and copper in the element screen. In the TCLP for metals screen, there is no leaching for any elements of interest.
Water Samples (Tables 2.5-1, 2.5-2, 2.4-1, and 2.4-2)

The water sample (K7089806) from Adit 1 equals or exceeds both Aquatic Life standards for cadmium in the dissolved metals screen and exceeds all standards for cadmium in the total recoverable metals screen. Reference sample K7299801 does not exceed any water quality standards.

3.13.5 Structures

The remains of a collapsed cabin and an outhouse are on the grassy flat south of Adit 1. There is also a partly collapsed structure (12 feet on each side and 12 feet tall) south of the collapsed cabin on the edge of Loop Creek. An old stove (Figure 3.13-6) is lying near the collapsed cabin.

3.13.6 Safety

The open adits are a potential safety hazard. Rock rubble on the floor of Adit 1 indicates unstable rock conditions.
Figure 3.13-1. Location map of the Idaho Star Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.13-2. Sketch map of the Idaho Star Mine.
Figure 3.13-3. Open portal of Adit 1 at the Idaho Star Mine, looking west. Note the leaning timbers (Roll K1, frame #26).
Figure 3.13-4. Inside view of Adit 1 at the Idaho Star Mine. The adit appears to have no supporting timbers beyond 15-20 feet (Roll K2, frame #1).
Figure 3.13-5. Trickle of water flowing from Adit 1 at the Idaho Star Mine, looking east (Roll K2, frame #2).
Figure 3.13-6. View to the southeast across the grassy flat from the dump of Adit 1 (lower right) at the Idaho Star Mine. Two wood stoves protrude above the grass, and the tall wooden structure can be seen in the distance (upper right edge of the grassy flat). Loop Creek is between the grassy flat and the trees in the distance (Roll K2, frame #3).

Figure 3.13-7. Open Adit 2 at the Idaho Star Mine, looking northeast (Roll K2, frame #4).
Figure 3.13-8. Inside view of open Adit 2 at the Idaho Star Mine. Note the two branches of the adit. The right branch is only 6-8 feet long; the left branch is 30-40 feet long (Roll K2, frame #5).

Figure 3.13-9. Looking east at the waste dump for Adit 2 at the Idaho Star Mine. The dump is being eroded by Loop Creek. The open adit is just left of the center of the photograph, behind the clumps of brush on the dump (Roll K2, frame #6).
3.14 HANSY MINE (Site No. WL-516)
Alternate name—Hansey Mine.

3.14.1 Site Location and Access (Figure 2.1-1b)

The Hansy Mine is about 1 mile up Olentange Creek from Loop Creek. The main workings are in the NE¼, section 20, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.14-1). These are shown by adit and prospect symbols on the topographic map. In addition, several prospect symbols are shown on the topographic map in the SE¼, section 17, T. 46 N., R. 7 E. Access to the property is on Forest Service Road 326 to Olentange Creek, where a road follows the west side of the creek northward about ½ mile to the lowermost adit. Although not shown on the National Forest map, this property is on a block of patented claims that may be owned by one of the timber companies. The claims are surrounded by Forest Service land.

3.14.2 Geologic Features (Figure 2.2-1b)

The Hansy Mine is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation (Harrison and others, 1986). The deposit consists of sparsely distributed copper minerals in gash fractures that are probably associated with shearing caused by the Placer Creek fault, which is about a mile north of the property (Reed, 1943).

3.14.3 Site History

Hansy Copper and Gold Mines, Inc, was organized in January 1942. By mid-July, the company owned two patented and sixteen unpatented claims. Total development on the property was about 100 feet of workings, 60 feet of which had been driven since April. In addition, the company was building roads, a bridge, a cookhouse, and other buildings. A small amount of copper ore was shipped, either during 1941 (USBM) or during 1943; according to Reed (1943), the ore was a 5-ton, hand-sorted test shipment. In 1943, the workings included a 110-foot adit with a 50-foot, two-compartment winze that started about 40 feet from the portal, a tunnel that was being driven from near the road to intersect the structure at depth, and an old tunnel or cut midway between the other two adits (Reed, 1943). By 1945, the property had 418 feet of workings, and work on the lower tunnel was being financed by an R.F.C. (Reconstruction Finance Corporation) loan. In 1946, the No. 1 tunnel was 138 feet long and the No. 2 tunnel was 400 feet long. Company manager Sam Petersen noted that the Tacoma smelter “gave very satisfactory returns on ore samples,” but did not provide details. Work continued the following year, when the company reported a total of 732 feet of development on the property. However, in 1948, the company had hired a “geologist and engineer” to study the property, and operations had been suspended awaiting the results of this work. Minor amounts of work were reported in some (but not all) of the next fifteen years, but the company probably did little more than assessment work. A small amount of copper ore was shipped from the mine in 1960.

Sims (1998, Appendix B) includes a 1983 interview with Sam Peterson, the owner of the Hansy Mine. Mr. Peterson describes various aspects of life and mining activity in the Adair area, including some sketchy information about the Hansy property.
3.14.4 Environmental Conditions

3.14.4.1 Site Features

The Hansy Mine was visited by John Kauffman on July 8-9, 1998. A video segment describing the property is on the Avery and St. Marias Districts Videotape (Tape 1, index 01:22:02-01:42:34). Documenting photographs are Roll K2, frames 7-23.

Six adits and five prospect cuts were described at the Hansy property (Figure 3.14-2). Five additional prospects shown on the topographic map were not visited. The adits and prospect cuts discussed below are numbered in the order in which they were examined.

Adit 1, the first opening encountered on the road, was driven N. 50° W. into the hill. It has a timbered portal (Figure 3.14-3) and a gate about 10-12 feet beyond the opening (Figure 3.14-4). Water seeps from the adit at about 2 gallons per minute, flows across the dump surface and down the face, and enters Olentange Creek. The waste dump is roughly triangular in shape (Figure 3.14-5) and measures about 100 feet long, 60 feet wide, and 20 feet thick. The access road crosses the surface of the dump about 30 feet east of the portal. Olentange Creek flows along the toe of the dump (Figure 3.14-6) and, in places, is actively eroding it. A log ore bin is just above creek level on the southern face of the dump (Figure 3.14-7). The disturbed area at Adit 1 is about 0.5 acre.

The road continues north past Adit 1 about ¼ mile, then switches back up the hill. Halfway up the straight section, a short spur road leads to Adit 2, which is about 50 feet directly uphill from Adit 1. Adit 2 is caved but has a few portal timbers still standing (Figure 3.14-8). The waste dump is about 30 feet long, 25 feet wide, and extends about 50 feet down the slope to the road at Adit 1. Several large trees, up to 16 inches in diameter, are growing on the dump (Figure 3.14-9). Ore car rails protrude from the end of the dump. The disturbed area is less than 0.25 acre.

Just before the next switchback, the road passes a slump on the slope (Figure 3.14-10) that has buried Adit 3. This location is slightly uphill from, and north of, Adit 2. No timbers or other evidence of the adit were found, but a small dump extends down to the spur road that leads to Adit 2. The dump is estimated at about 30 feet long, 20 feet wide, and 30 feet down the face. However, the slope here is fairly steep and the material forms only a thin veneer. Prospect cut 1 is directly above Adit 3 at the end of a short spur road off the main road. The trench was cut along contour and is about 75 feet long and 15 feet wide. The disturbed area for these workings is less than 0.5 acre.

Adit 4 is also at the end of a short spur road off the main road (Figure 3.14-11). It is uphill from, and southwest of, Adit 3 and prospect cut 1. The timbered slope above Adit 4 has recently been logged in strips, probably by high-line from above (a logging road was later found on the west side of the ridge between Olentange Creek and Mineral Creek). Adit 4 is nearly caved, with rock debris filling most of the adit (Figure 3.14-12), but it has an eye-shaped opening 4 feet long by 2
feet high (Figure 3.14-13). Rails extend from the adit to beyond the end of the dump. Beneath the rails is the remnant of a wooden trestle. The waste dump is 75 feet long, 30 feet wide, and about 50 feet down the face. A stack of railroad ties and some pieces of 4-inch PVC drain pipe are piled on the dump surface (Figure 3.14-14). The disturbed area at Adit 4 covers about 0.25 acre.

Adit 5 is slightly above and to the north of Adit 4. It is also at the end of a spur road off the main access road. This open adit (Figure 3.14-15) has a few collapsed timbers visible inside, and pipes of both 1-inch and 2-inch diameters extend from the adit (Figure 3.14-16). The pipes bend to the north and follow the spur road for a short distance. The waste dump is 40 feet long, 20 feet wide, and 25 feet down the face. It extends downslope to the spur road to Adit 4. Two rusted 55-gallon drums are lying on the dump surface (Figure 3.14-17). The disturbed area at Adit 5 covers about 0.25 acre.

Prospect cut 2 is about 40 feet above Adit 5. This is a large bulldozer cut along contour (Figure 3.14-18) that has exposed a limonitic outcrop. The cut is 180-200 feet long and 30 feet wide, tapering on both ends. A few fir and spruce saplings are growing on the surface of the cut (Figure 3.14-19). Behind the limonitic outcrop on the north side are some collapsed timbers (Figure 3.14-20) and a narrow opening that appears to be a decline, herein designated as Adit 6. If there was a waste dump at this site, it has been completely reworked by the bulldozer. The disturbed area covers about 0.5 acre.

Prospect cuts 3, 4, and 5 are all east of the main road that leads north-northwest up the slope from Adit 3. Cut 3, near the ridge top, is about 100 feet long, 8 feet wide, and 10 feet deep. The sides and floor are brush-covered. Numerous hand-dug, shallow pits are located in the timber off the north end of the trench. Cut 4 is roughly 300 feet southeast of cut 3 along an overgrown spur road. Cut 5, about 600 feet south of cut 4, is a large excavation. From below, the material pushed out of the cut resembles a waste dump. However, no adit was found, and if one was present, it has been covered or destroyed by the bulldozer work. As with the previous two cuts, the surface of cut 5 is covered with saplings and brush (Figure 3.14-21). The disturbed area at these three cuts covers roughly 1.0 acre.

3.14.4.2 Sample Locations

3.14.4.2.1 Solid Samples

A waste dump sample (K7089809) was collected from the oxidized material of Adit 1 dump. A stream sediment sample (K7099802) was collected from Olentange Creek just south of the switchback on the new portion of Forest Service Road 326 about ¾ mile below Adit 1.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089809</td>
<td>Hansy Mine, Adit 1 dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K7099802</td>
<td>Hansy Mine, stream sediment from Olentange Creek</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.14.4.2.2 Water Samples

A water sample (K7089808) was collected in front of the portal to Adit 1. An upstream sample (K7099801) was collected about ¼ mile above Adit 1 on Olentange Creek, just north of the switchback on the access road. A downstream sample (K7089810) was taken about 700 feet south of Adit 1 on Olentange Creek along the access road.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089808</td>
<td>Hansy Mine, Adit 1</td>
<td>120</td>
<td>43</td>
<td>8.0</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>K7089810</td>
<td>Hansy Mine, downstream</td>
<td>49</td>
<td>50</td>
<td>8.06</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>K7099801</td>
<td>Hansy Mine, upstream</td>
<td>41</td>
<td>47</td>
<td>8.2</td>
<td>5 ft. wide, 0.5-1 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.14.4.2.3 Analytical Results

#### Solid Samples (Tables 2.5-3 and 2.5-4)

Sample K7089809 from the dump for Adit 1 exceeds background and environmental levels for arsenic, cadmium, copper, iron, nickel, and lead in the element screen. The stream sediment sample from Olentange Creek (K7099802) exceeds background and environmental levels for arsenic, cadmium, and copper in the element screen. In the TCLP for metals screen, no elements of interest are leaching from either sample.

#### Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, the water sample from Adit 1 (K7089808) equals or exceeds both Aquatic Life standards for cadmium, the upstream (K7099801) and the downstream samples (K7089810) equal or exceed all standards for cadmium, and all three samples are within the range of the Aquatic Life Chronic standard for copper. In the total recoverable metals screen, all three samples exceed all standards for cadmium.
3.14.5 Structures

The ore bin near the creek at Adit 1 is the only structure that was found at this site.

3.14.6 Safety

The open adits are the only potential safety hazard identified.
Figure 3.14-1. Location map of the Hansy Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.14-2. Sketch map of the Hansy Mine workings examined for this study.
Figure 3.14-3. Looking west at the timbered portal of Adit 1 at the Hansy Mine. Moss is growing along the trickle of water flowing from the adit (Roll K2, frame #7).
Figure 3.14-4. Inside view of Adit 1, showing the locked wooden gate and timber supports (Roll K2, frame #8).
Figure 3.14-5. Sketch map of Adit 1 at the Hansy Mine.
Figure 3.14-6. Looking southeast along the east edge of the north part of the waste dump for Adit 1 at the Hansy Mine. Olentange Creek is on the left (Roll K2, frame #9).

Figure 3.14-7. Looking south along the east edge of the south part of the waste dump for Adit 1, with the log ore bin along Olentange Creek. The creek is actively eroding the toe of the dump (Roll K2, frame #10).
Figure 3.14-8. Looking west-northwest at caved Adit 2 at the Hansy Mine. The portal timbers are still upright and protrude through the caved rock rubble (Roll K2, frame #11).
Figure 3.14-9. Looking east-southeast down the face of the waste dump for Adit 2 at the Hansy Mine. The dump extends down the slope to the road at Adit 1. Note the large trees growing through the face of the dump (Roll K2, frame #12).
Figure 3.14-10. Looking west at the sloughed slope at caved Adit 3 of the Hansy Mine (Roll K2, frame #13).
Figure 3.14-11. Sketch map of Adit 4 at the Hansy Mine.
Figure 3.14-12. Slumped debris in front of Adit 4 at the Hansy Mine, looking west (Roll K2, frame #14).

Figure 3.14-13. Eye-shaped opening into Adit 4 above the slumped debris (Roll K2, frame #15).
Figure 3.14-14. Looking south across the waste dump of Adit 4 at the stack of railroad ties and a few sections of 4-inch PVC drain pipe. Rails coming from the adit extend out over the edge of the dump surface (above and to the left of the railroad ties) (Roll K2, frame #16).

Figure 3.14-15. Looking west at open Adit 5 of the Hansy Mine. Sections of metal pipe can be seen at the lower right edge of the opening (Roll K2, frame #18).
Figure 3.14-16. Inside view of Adit 5 at the Hansy Mine. Note the pile of debris in the foreground, the collapsed support timbers, and the two different sizes of metal pipe extending through the pile of debris (Roll K2, frame #19).
Figure 3.14-17. Looking northward across the surface of the waste dump for Adit 5 at the Hansy Mine. The adit is to the left. One 55-gallon barrel is lying on its side and a second is leaning against a small pile of rock (behind the small clump of brush to right of the first barrel) (Roll K2, frame #17).
Figure 3.14-18. Sketch map of prospect cut 2 and Adit 6 (decline ?) at the Hansy Mine.
Figure 3.14-19. Looking north along the axis of prospect cut 2 at the Hansy Mine. The limonitic outcrop is just left of the center of the photograph. Adit 6, possibly a decline, is behind the limonitic pod (Roll K2, frame #20).

Figure 3.14-20. Pile of collapsed timbers of Adit 6 at the Hansy Mine. This opening may be a decline. The limonitic outcrop seen in the previous figure is to the left of this photograph (Roll K2, frame #21).
Figure 3.14-21. Prospect cut 5 at the Hansy Mine. Although differing in size and length, all of the prospect cuts appear similar to this and are covered with small saplings and brush (Roll K2, frame #23).
3.15 MASTODON (Site No. WL-515) AND MACEDONIA (Site No. WL-505) PROSPECTS

Alternate name—Rochester Group (Mastodon Mine).

3.15.1 Site Location and Access (Figure 2.1-1b)

These prospects are in the drainage of the upper West Fork of Slate Creek in sections 8 and 9, T. 46 N., R. 4 E., on the Mastodon Mountain 7.5-minute quadrangle (Figure 3.15-1). The properties were not visited but were videotaped and photographed from the ridge top west of the West Fork of Slate Creek. No access roads or trails to the property were found, although it is probable that an old trail does exist. Forest Service Trail 165 follows the ridge top east of the West Fork of Slate Creek and circles around the head of the West Fork to Mastodon Mountain, connecting with Forest Service Trail 226 that follows the ridge top west of the West Fork. Forest Service Road 1907 is the nearest vehicle access route. This road splits from Forest Service Road 347 (which follows the St. Joe River) at Big Creek, then heads northeastward toward Cemetery Ridge. About 12 miles from the start of Forest Service 1907, an old spur road (now blocked with a dirt berm) heads east and connects with Trail 165. The distance from the berm to Mastodon Mountain is about 2.5 miles. The Mastodon Prospect is approximately 1 mile south of Mastodon Mountain along the West Fork. The Macedonia is at the head of the West Fork of Slate Creek. The area is entirely within Forest Service land.

3.15.2 Geologic Features (Figure 2.2-1b)

On the Mastodon, four tunnels were driven into blue and light-gray slates and shales that dipped 8° N. Some fine-grained quartzite beds contained veins of siderite, pyrite, galena, sphalerite, and calcite (Pardee, 1911). These properties are in the middle or upper Wallace Formation, with westerly or northwest-trending faults nearby (Harrison and others, 1986).

3.15.3 Site History

In 1910, the Mastodon had four tunnels ranging in length from 75 to 200 feet (Pardee, 1911). A company with the suggestive name of the Mastodon Coeur d'Alene Mining Company was incorporated in 1905 and forfeited its corporate charter in 1912. However, the location of this company's property is not known.

The first claims in the Macedonia Group were located in 1912, and additional claims were added in 1919 and 1920. It is not known if any of these claims overlap those of the Mastodon Group. The Macedonia Mining Company was incorporated in 1921, and the driving force behind the company appears to have been its president, A.M. Mundell (who, judging from his handwriting, was already quite elderly when the company was formed). In 1922, the Macedonia workings consisted of two tunnels (35 feet and 90 feet long) and two shafts (21 feet and 33 feet deep). Mundell continued to develop the property until 1933. At that time, the mine had 300 feet of development, including 68 feet of shafts and 232 feet of tunnels. Macedonia forfeited its corporate charter in 1934, and it was noted that company president Mundell had died.
3.15.4 Environmental Conditions

3.15.4.1 Site Features

An attempt to visit these properties was made by John Kauffman on July 13, 1998. By the time Mastodon Mountain was reached, it was too late in the day to hike down into the West Fork drainage. A video segment describing the area and the workings that could be seen is on the Avery and St. Marys Districts Videotape (Tape 1, index 01:42:40-01:48:25). Documenting photographs are Roll K3, frame 1 (Macedonia) and frames 2-3 (Mastodon).

According to Pardee (1911), the Mastodon consists of 4 tunnels (during the video segment, it is erroneously stated that he reported two adits), the longest of which is 200 feet. Two or three waste dumps were visible from the ridge at Mastodon Mountain, all of which probably belong to the Mastodon, although the northernmost working is near the area where Campbell (1924) reports the Macedonia claims are located. One opening (Adit 1), shown as a prospect symbol on the topographic map about 1 mile south of Mastodon Mountain, could be seen on the west side the West Fork in the southeast corner of section 8 (Figure 3.15-2). This waste dump is estimated to be about 40 feet long, 20 feet wide, and 10 feet thick.

A second probable adit could be seen on the east side of the West Fork, about due east of Adit 1, in the southwest corner of section 9. The size of this waste dump could not be estimated.

A third dump is about ½ mile northeast of the other two on the east side of a tributary to the West Fork (Figure and 3.15-3). This waste dump is estimated to be 30 feet long, 15 feet wide, and 20 feet down the face. A trough in the slope behind the dump indicates the presence of an adit that is probably caved, at least in the portal area. On the video segment, this prospect is identified as probably belonging to the Macedonia Prospect, but it is more likely one of the four adits reported by Pardee (1911) for the Mastodon.

Two prospect cuts, probably on the Macedonia claims, were found about 100 feet below the ridge crest at the saddle east of Mastodon Mountain (Figure 3.15-4). These are shallow cuts that are probably bulldozer trenches. One is about 30 feet and the other about 50 feet in length.

The total disturbed area for all these workings probably does not exceed 0.5-1 acre.

3.15.4.2 Sample Locations

No samples were taken at this site. However, water sample K7289802 was taken at the mouth of Slate Creek, just above the highway bridge, about 10 miles below the Mastodon workings. This sample does not exceed any water quality standards.
3.15.5 Structures

No structures could be seen at this site and none are indicated on the topographic map, although it is likely that cabins were built on both properties.

3.15.6 Safety

Although the adits were not visited, they should not be a safety hazard even if they remain open. (Wagner (1949) lists the Mastodon workings as either caved or too short to provide useful geologic information about the deposit.) This area is relatively inaccessible, at least to the general public.
Figure 3.15-1. Location map of the Mastodon and Macedonia prospects, Shoshone County, Idaho (U.S. Geological Survey Mastodon Mountain 7.5-minute topographic map).
Figure 3.15-2. View southward down the West Fork of Slate Creek drainage. Although not easily visible in the photograph, two prospects of the Mastodon Prospect were seen from this vantage point. One waste dump is in the clearing along the bottom of the West Fork near the center of the photograph. The other is on the slope east of the drainage and appears as a light speck on the photograph (Roll K3, frame #3).
Figure 3.15-3. View southeastward across the upper reaches of the West Fork of Slate Creek. The small, light-colored speck near the center of the photograph is Adit 3 of the Mastodon Prospect, as seen from the east slope of Mastodon Mountain (Roll K3, frame #2).

Figure 3.15-4. Looking north at the shallow trenches of the Macedonia Prospect (light-colored patches near the center of the photograph). Mastodon Mountain is just left of this photograph. Forest Service Trail 165 follows the crest of the ridge (Roll K3, frame #1).
3.16 BULLION MINE, UPPER WORKINGS (Site No. WL-489)

These workings were identified in the field as either the Iron Spar (WL-482) or the Copper Chief (WL-486). However, this site is actually the upper workings of the Bullion Mine (Site No. WL-489). The Copper Chief claims joined the Bullion Group to the west, and most of the work on that property (except a few prospect cuts) was done through the lower tunnel of the Bullion Mine (discussed in section 3.17). In addition, the Taylor Copper Mine (WL-480) may be a synonym for either the Bullion Mine or the Copper Chief Prospect. There was a Taylor claim in the Copper Chief Group, and James H. Taylor was the manager, statutory agent, secretary, and/or major stockholder for both the Bullion Mining Company and the Copper Chief Mining Company until about 1945. However, the source document for the Taylor Mine was a U.S. Bureau of Mines property file which is not currently available.

3.16.1 Site Location and Access (Figure 2.1-1b)

The upper workings for the Bullion Mine are about 1 mile west of Bullion Pass on the north side of Forest Service Road 507 along a tributary drainage of Bullion Creek. The workings are in the SE¼ of the NE¼, section 21, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.16-1). Two adits and the shaft are on the west side of the drainage, and the other adit is on the east side. All of the workings are on a block of patented claims surrounded by Forest Service land.

3.16.2 Geologic Features (Figure 2.2-1b)

These workings are in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.16.3 Site History

The Bullion claims were located between 1900 and 1903 (Sims, 1998). Development started when eight men agreed to sink a 100-foot shaft in exchange for an interest in the property (Taylor, 1942a). The Bullion Mining Company, Ltd., was incorporated in 1902. (The “Ltd.” was officially dropped from the company’s name in 1952.) The eight men started digging the shaft, but work was soon halted because of the amount of water in the workings. The company purchased a boiler, a hoist, and a pump, but delivery of this equipment was delayed when the Northern Pacific “S” bridge was destroyed by a snow slide. From the east portal of the Borax Railway tunnel, the equipment had to be moved across the Idaho-Montana divide in an area with no roads. Using the boiler and hoist to power a sled, it took thirteen days to move the equipment five miles from the railroad to the mine. The following summer, the company began work on a road (Taylor, 1942a). A ton of ore was shipped for testing in 1909 (Sims, 1998).

The 1910 forest fire destroyed all the equipment and buildings at the mine. Eight miners were also killed (Sims, 1998). New equipment was brought in after the road was completed. The
No. 2 tunnel was driven 350 feet to help drain the water from the workings and a new shaft was started. (Maps in the IGS's mineral property files suggest that this second shaft was internal and offset slightly from the original shaft.) Work on the No. 2 shaft was discontinued at a depth of about 50 feet, when it again became impossible to keep the water pumped out of the shaft. A carload of ore, which ran about 5.2 percent copper (Sims, 1998), was shipped from the No. 2 tunnel in 1912 (Taylor, 1942b).

By 1913, three of the claims at the Bullion were patented and the company was drifting westward on the vein. Soon afterward, operations on the upper workings (described below) were discontinued, and work was started on a crosscut tunnel 440 feet below the upper workings (section 3.17). About 650 feet were driven on the lower (No. 3) tunnel by June 1915, and 1,000 feet were added in the next year. In 1918, the mine had 4,700 feet of workings, and the No. 3 tunnel reached the vein during the year. According to Taylor (1942a), the ore was 4,100 feet from the portal of the No. 3 tunnel. The company was unable to ship any of this ore because there was no road to the lower workings (Taylor, 1942a). Underground work continued until about 1922, when the three tunnels were 600 feet, 1,200 feet, and 4,400 feet long, and the shaft was 100 feet deep. An additional thirteen claims were patented in late 1922 or early 1923. The company seems to have concentrated on road work for the next few years, but from 1926 to 1929, operations included raising from the No. 3 tunnel toward the upper workings. When work was discontinued, the raise was about 66 feet from connecting with the No. 2 tunnel (Taylor, 1942b).

In 1940, after the property had been idle for several years, the company noted that most of its (portable) equipment had been stolen. Bullion Mining applied to the government for assistance in reopening the mine during World War II (Taylor, 1942b), but this effort does not seem to have met with any success. In 1949, the mine was said to have 12,080 feet of workings, including three tunnels (500 feet, 2,000 feet, and 4,800 feet long), two shafts, and one raise. Despite later changes reported in the length of the workings, the Bullion appears to have been inactive since about 1930.

3.16.4 Environmental Conditions

3.16.4.1 Site Features

This property was visited by John Kauffman on July 14, 1998. A video segment describing the site, which was identified as the Iron Spar, is on the Avery and St. Maries Districts Videotape (Tape 2, index 00:00:46-00:14:12). Documenting photographs are Roll K3, frames 1-11.

The workings consist of an open adit, two caved adits, and an open shaft (Figure 3.16-2). Adit 1 (probably the Bullion No. 2 tunnel) is located in dense brush along the west side of the gully about 100 feet north of the road and is hard to see because of the vegetation (Figure 3.16-3). Inside, the adit is timbered but has some piles of rock debris on the floor (Figure 3.16-4). Water, flowing from the portal at about 10 gallons per minute, enters the drainage immediately in front of
the adit. The stream, a tributary to Bullion Creek, has eroded a channel through the waste dump, which extends down to Forest Service Road 507. Part of the dump has been modified by road construction (Figure 3.16-5). Because of this construction, the size of the dump is difficult to estimate, but it is probably 100 feet long, 60 feet wide, and 15-20 feet thick.

Adit 2 (probably the Bullion No. 1 tunnel) and the shaft are about 300 feet north of the road and are also on the west side of the gully, although about 40 feet above the drainage. The shaft dump is visible from Forest Service Road 507. Seen from the east side of the drainage (Figure 3.16-6), Adit 2 has a smaller dump than the shaft, although the two dumps overlap slightly. The shaft dump extends down the slope to the drainage. The combined dumps are about 60 feet long, 10 feet wide, and 20-40 feet down the face. Adit 2 is caved and dry. The shaft, completely hidden from view behind some brush (Figure 3.16-7), is open and probably 75 feet or more deep. It presents a very dangerous situation.

Adit 3 (identified as the Thornton tunnel on maps in the IGS mineral property files) is on the east side of the gully and about 50 feet above the drainage. This caved adit forms a shallow trough on the slope and has a minor trickle of water flowing from it (probably less than 1 gallon per minute). The small, brush-covered dump measures about 10 feet long and 8 feet wide. It extends 15 feet down on the face, but forms only a thin veneer on the slope.

The total disturbed area is less than 1.0 acre.

3.16.4.2 Sample Locations

3.16.4.2.1 Solid Samples

Waste dump samples were collected from the waste dump for the shaft and Adit 2 (K7149801) and from the waste dump for Adit 1 (K7149805).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149801</td>
<td>Bullion Mine, upper workings, shaft/Adit 2 dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149805</td>
<td>Bullion Mine, upper workings, Adit 1 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.16.4.2.2 Water Samples

Water samples were collected from Adit 1 (K7149804), Adit 3 (K7149803), upstream on the tributary to Bullion Creek above the dump for the shaft and Adit 2 (K7149802), and downstream about 75 feet below Forest Service Road 507 (K7149806).
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149802</td>
<td>Bullion Mine, upper workings, upstream</td>
<td>44</td>
<td>43</td>
<td>7.2</td>
<td>2 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149803</td>
<td>Bullion Mine, upper workings, Adit 3</td>
<td>41</td>
<td>44</td>
<td>7.3</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149804</td>
<td>Bullion Mine, upper workings, Adit 1</td>
<td>78</td>
<td>42</td>
<td>7.7</td>
<td>10</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149806</td>
<td>Bullion Mine, upper workings, downstream</td>
<td>53</td>
<td>44</td>
<td>7.2</td>
<td>8 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.16.4.2.3 Analytical Results

**Solid Samples (Tables 2.5-3 and 2.5-4)**

The sample from the dump for Adit 1 (K7149805) exceeds background and environmental levels for arsenic, cadmium, copper, iron, manganese, nickel, and lead in the element screen. The sample from the dump for the shaft and Adit 2 (K7149801) exceeds background and environmental levels for arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc in the element screen. Neither sample shows leaching of any element of interest in the TCLP for metals screen.

**Water Samples (Tables 2.5-1 and 2.5-2)**

In the dissolved metals screen for all samples (Adit 1, K7149804; Adit 3, K7149803; upstream, K7149802; and downstream, K7149806), no water quality standards are exceeded. In the total recoverable metals screen, sample K7149803 exceeds the Secondary MCL for iron.

### 3.16.5 Structures

No structures were found at this site.

### 3.16.6 Safety

The open shaft is a serious safety hazard. The opening is completely hidden by the brush that is growing on the waste dump around the shaft. A rock tossed into the opening fell at least 1.5 seconds before an impact was heard, indicating a depth of 50-75 feet.
Figure 3.16-1. Location map of the upper workings of the Bullion Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.16-2. Sketch map of the upper workings of the Bullion Mine.
Figure 3.16-3. Open and timbered Adit 1 at the upper workings of the Bullion Mine. The view is to the west and the adit is nearly hidden in the brush (Roll K3, frame #9).
Figure 3.16-4. Inside view of the timbered entrance into Adit 1. Note the pile of rock rubble on the floor of the adit (Roll K3, frame #10).
Figure 3.16-5. Looking south along the erosion channel through the waste dump for Adit 1. The part of the dump on the east side of the creek has been modified by construction of Forest Service Road 507, seen in front of the pickup (Roll K3, frame #11).

Figure 3.16-6. Looking west across the Bullion Creek tributary at the waste dumps of the open shaft and caved Adit 2. The larger dump on the left is at the shaft (Roll K3, frame #7).
Figure 3.16-7. Close-up of the hidden open shaft at the upper workings of the Bullion Mine. The opening is in the thick brush on the left half of the photograph. The rock at the bottom left is part of the waste dump immediately in front of the opening (Roll K3, frame #4).
3.17 BULLION MINE, LOWER WORKINGS (Site No. WL-489)

3.17.1 Site Location and Access (Figure 2.1-1b)

The lower workings of the Bullion Mine are on the north side of Bullion Creek and south of Forest Service Road 507 in the SW¼ of the SE¼, section 21, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.17-1). An overgrown and obscure access road about ¼ mile west of the mine leads to the site from the south side of Forest Service Road 507. The mine is on a block of patented claims surrounded by Forest Service land. The patented claims may have been acquired by the Forest Service.

3.17.2 Geologic Features (Figure 2.2-1b)

These workings are in interlaminated dolomitic argillite and siltite of the lower Wallace Formation. The main adit was started to the south of the Placer Creek fault (Harrison and others, 1986), but it may cross through the fault zone.

3.17.3 Site History

The history of the Bullion Mine is given in section 3.16.3. The main adit at this site is the Bullion No. 3 tunnel. This tunnel was also intended to explore the adjacent Copper Chief claims.

The Copper Chief Mining Company was incorporated in 1907 and held a group of claims adjacent to the Bullion on the west. Many of the officers of the Copper Chief were also involved with the Bullion Mine, and for much of its history, the Copper Chief was developed in conjunction with the Bullion. The Copper Chief Mining Company held an interest in the Bullion Mining Company's equipment and helped drive Bullion's lower (No. 3) tunnel. Copper Chief planned to develop its claims through this lower tunnel. The only workings on the Copper Chief were a few prospect cuts and, possibly, one short tunnel. Only assessment work was done after about 1920. Copper Chief forfeited its corporate charter in 1942.

3.17.4 Environmental Conditions

3.17.4.1 Site Features

The lower workings of the Bullion Mine were visited by John Kauffinan on July 14, 1998. A video segment describing the property, which is identified as all the workings of the Bullion Mine, is on the Avery and St. Maries Districts Videotape (Tape 2, index 00:14:18-00:25:18). Documenting photographs are Roll K3, frames 12-18.

Two caved adits were found at this site (Figure 3.17-2). The hillside is covered with extremely dense brush which could easily conceal other workings.
Adit 1, probably the No. 3 tunnel at the Bullion Mine, is caved (Figure 3.17-3) and has water flowing from it at about 7 gallons per minute. The waste dump, which presumably originally extended continuously across Bullion Creek, is now dissected by the creek. The part of the dump on the north side of the creek is roughly 100 feet long parallel to the creek, 40 feet wide in front of the adit, and about 10-15 feet thick. The part of the dump south of the creek (Figure 3.17-4) is arcuate in shape and 250 feet long. Near the creek, the dump is 20 feet wide but it tapers to only a few feet wide at the west end. Maximum thickness is about 25 feet. The entire dump is reddish brown due to the high iron content of the rock.

Adit 2, also caved, is about 200 feet east of Adit 1 and slightly higher on the slope. The top of the waste dump is about 15 feet long and 10 feet wide. It extends down the steep slope at least 25 feet.

A 6-foot square, cement-sided pit (Figure 3.17-5) was found in some trees west of the dump for Adit 1 and about 15 feet north of the log cabin described in section 3.17.5. Collapsed lumber and metal siding suggest a covering over the opening. At first, this pit was thought to be a caved shaft (as indicated on the video), but more likely it was a storage facility of some type.

The disturbed area covers about 2-3 acres.

3.17.4.2 Sample Locations

3.17.4.2.1 Solid Samples

A sample was collected on the south side of Bullion Creek from the dump for Adit 1 (K7149808). A stream sediment sample (K7149813) was taken from Bullion Creek about 3 miles downstream from the Bullion Mine (and also downstream from the Fourth of July Mine).

<table>
<thead>
<tr>
<th>Sample No</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149808</td>
<td>Bullion Mine, lower workings, Adit 1 dump</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149813</td>
<td>Bullion Mine, stream sediment, 3 miles downstream from mine</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.17.4.2.2 Water Samples

A sample was collected from the water flowing from Adit 1 (K7149807). An upstream sample (K7149809) was taken about ½ mile east of the mine on Bullion Creek above the beaver ponds near the head of the creek. A downstream sample (K7149810) was taken about 2 miles downstream from the mine above the bridge where Forest Service Road 507 crosses Bullion Creek.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149807</td>
<td>Bullion Mine, lower workings, Adit 1</td>
<td>118</td>
<td>46</td>
<td>7.6</td>
<td>7</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149809</td>
<td>Bullion Mine, upstream on Bullion Creek</td>
<td>41</td>
<td>46</td>
<td>7.8</td>
<td>5 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K7149810</td>
<td>Bullion Mine, downstream</td>
<td>55</td>
<td>53</td>
<td>8.04</td>
<td>10 ft. wide, 1 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.17.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

The sample from the dump for Adit 1 (K7149808) exceeds background and environmental levels for arsenic, cadmium, copper, iron, manganese, nickel, and lead in the element screen. The stream sediment sample (K7149813) exceeds background and environmental levels for arsenic, cadmium, copper, and lead in the element screen. In the TCLP for metals test, neither sample shows significant leaching of any element of interest.

Water Samples (Tables 2.5-1 and 2.5-2)

The water sample from Adit 1 at the lower workings of the Bullion Mine (K7149807) and the sample from downstream on Bullion Creek (K7109810) do not exceed any water quality standards in either the dissolved metals or the total recoverable metals screens. Upstream sample K7149809 is at the upper limit of the Aquatic Life Chronic standard for cadmium in the total recoverable metals screen.

3.17.5 Structures

Two collapsed structures are present at the site. A large log cabin is just west of the Adit 1 dump. The roof has fallen in, but the wall logs are mostly intact (Figure 3.17-6). The remains of another structure (see Figure 3.17-3) were found in the notch where Bullion Creek cuts through the dump for Adit 1. This may have been an ore chute or loading platform (although it is at an unusual location for either of these), or possibly a storage shed.

3.17.6 Safety

No safety hazards were found at the lower workings of the Bullion Mine.
Figure 3.17-1. Location map of the lower workings of the Bullion Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.17-2. Sketch map of the lower workings of the Bullion Mine.
Figure 3.17-3. Looking north across Bullion Creek at caved Adit 1 of the lower workings of the Bullion Mine. The creek, visible in the lower third of the photograph, dissects the waste dump. A pile of boards near the creek is the collapsed remains of a structure (Roll K3, frame #15).
Figure 3.17-4. Looking southwest along the south side of Bullion Creek at the southern part of the waste dump for Adit 1 at the lower workings of the Bullion Mine. A gully has been eroded through the dump diagonally from the center of the photograph toward the upper left corner (Roll K3, frame #16).

Figure 3.17-5. Collapsed boards and metal siding over a concrete-lined pit. The function of the pit, located to the right of the cabin shown in Figure 3.17-6, is unknown (Roll K3, frame #18).
Figure 3.17-6. Looking west at the collapsed remains of a large log cabin located west of Adit 1 at the lower workings of the Bullion Mine. This cabin is on the north side of Bullion Creek (Roll K3, frame #17).
3.18 SHIRLEY PROSPECT (Site No. K7149811)

3.18.1 Site Location and Access (Figure 2.1-1b)

The Shirley Prospect is on the south side of Bullion Creek in the NE¼ of the SW¼, section 29, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.18-1). There is no longer any direct access to this site. An old road, densely overgrown with brush, drops off the south side of Forest Service Road 507 and may lead to the adit. This road has been washed out where it presumably crossed Bullion Creek. The prospect (on Forest Service land) was not visited, but was photographed and videotaped from the Forest Service Road 507 on the north side of Bullion Creek.

3.18.2 Geologic Features (Figure 2.2-1b)

The Shirley Prospect is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation near a diabase sill of Precambrian age (Harrison and others, 1986).

3.18.3 Site History

This adit appears to be on a claim held by Fourth of July Silver, Inc., in the early 1970s (Springer, 1972). Nothing else is known about the history of this site.

3.18.4 Environmental Conditions

3.18.4.1 Site Features

The Shirley Prospect was photographed and videotaped by John Kauffman on July 14, 1998. The video segment is on the Avery and St. Marys Districts Videotape (Tape 2, index 00:25:23-00:27:44). Documenting photograph is Roll K3, frame 19.

The Shirley consists of an open adit that is visible from one or two vantage points on Forest Service Road 507 about ¼ mile northeast of where the road crosses Bullion Creek. The opening has a timbered portal and is about 75 feet above the creek on a fairly steep slope (Figure 3.18-2). The area around the portal is extremely brushy. No obvious waste dump was seen. It is probably small and brush covered, and it probably does not extend to Bullion Creek. The disturbed area covers less than 0.1 acre.

3.18.4.2 Sample Locations

No samples were collected at this site, although the downstream water sample (K7149810) for the Bullion Mine was taken ¼ mile below the Shirley on Bullion Creek where Forest Service Road 507 crosses the creek. In addition, a stream sediment sample (K7149813) for the Bullion Mine was taken another 1.5 miles farther downstream on Bullion Creek. These are both discussed in connection with the Bullion Mine (section 3.17.4.2).
3.18.5 Structures
   No structures were noted at this site.

3.18.6 Safety

The open adit is a potential hazard. However, it cannot easily be seen, especially in summer, and access is relatively difficult.
Figure 3.18-1. Location map of the Shirley Prospect, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.18-2. Looking south across Bullion Creek from Forest Service Road 507 at the open adit of the Shirley Prospect (the small dark spot near the center of the photograph) (Roll K3, frame #19).
3.19 FOURTH OF JULY SILVER PROSPECT (Site No. WL-493)

3.19.1 Site Location and Access (Figure 2.1-1b)

The Fourth of July Silver Prospect is along Bullion Creek, about 1¼ miles up Forest Service Road 507 from its junction with Forest Service Road 456 at the North Fork of the St. Joe River, in the NE¼ of the NW¼, section 31, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.19-1). Some prospect cuts on the slope north of Bullion Creek extend into section 30. This prospect is on Forest Service land.

3.19.2 Geologic Features (Figure 2.2-1b)

The Fourth of July Silver Prospect is in the black argillite and slightly dolomitic, fine-grained quartzite of the middle Wallace Formation near a diabase sill of Precambrian age (Harrison and others, 1986).

3.19.3 Site History

Fourth of July Silver, Inc., was organized in 1968. The company explored a group of twenty-five claims in the early 1970s. The results of soil sampling studies indicated that there were no extensive near-surface ore deposits on the property (Springer, 1972). Nothing else is known about the history of this site.

3.19.4 Environmental Conditions

3.19.4.1 Site Features

The Fourth of July Prospect was visited by John Kauffman on July 14, 1998. A video segment describing the property is on the Avery and St. Marys Districts Videotape (Tape 2, index 00:27:51-00:34:37). Documenting photographs are Roll K3, frames 20-25.

Two adits and a series of prospect cuts were found at the Fourth of July Prospect. A third adit shown on Figure 3.19-2 was not found.

Adit 1 is on the south side of Bullion Creek at the end of a road that branches off the north side of Forest Service Road 507. A sign on the ground near the portal labels this as “Drift 1.” The portal is framed with square timbers (Figure 3.19-3), but the back has collapsed. Only a small opening remains at the top of the fallen debris (Figure 3.19-4). Rails extend out of the portal and curve to the west across the waste dump (Figures 3.19-5 and 3.19-6). The dump measures 135 feet long, 30 feet wide, and 5-7 feet thick. Bullion Creek flows along the edge of the dump and has eroded it in places.

Adit 2 is located on the north side of Bullion Creek a few hundred feet west of Adit 1 and about 30 feet above creek level. A sign on a tree beside the caved adit labels this as “Drift 3” (Figure
3.19-7). Water seeping from the adit did not have enough volume to sample. The waste dump is about 20 feet long, 10 feet wide, and 15 feet thick. It appears to have been disrupted somewhat by bulldozer work.

A series of prospect cuts connected by bulldozer roads crosses the open, south-facing slope above Adit 2 on the north side of Bullion Creek (Figure 3.19-8). The cuts expose several quartz veins, but little mineralization was noted.

The total disturbed area at this site, including the adit dumps, prospect cuts and connecting roads, covers several acres. The adits and waste dumps account for less than 1 acre.

3.19.4.2 Sample Locations

3.19.4.2.1 Solid Samples

A sample (K7149812) was collected along the north edge of the waste dump for Adit 1 where it has been eroded by Bullion Creek.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7149812</td>
<td>Fourth of July Prospect, Adit 1 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.19.4.2.2 Water Samples

No water samples were collected at this site.

3.19.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

Sample K7149812 exceeds background and environmental levels for arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc in the element screen. In the TCLP for metals screen, there is significant leaching of lead (8.0 ppm) from the sample. It should be noted that lead was not detected in the TCLP for metals screen of the stream sediment sample (K7149813) collected for the Bullion Mine, which was taken about ¼ mile downstream from the Fourth of July Prospect.

3.19.5 Structures

No structures were found at this property.

3.19.6 Safety

Adit 1 would be difficult to enter without some effort to enlarge the small opening. This area receives a significant amount of recreational use, so it is likely that some people will visit the site.
Figure 3.19-1. Location map of the Fourth of July Prospect, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.19-2. Claim map of the Fourth of July Prospect showing the locations of three adits (Springer, 1972).
Figure 3.19-3. Looking southwest at the timbered portal of Adit 1 at the Fourth of July Prospect. The roof of the adit is caved behind the boarded-up portal (Roll K3, frame #21).

Figure 3.19-4. Small opening into Adit 1 at the top of the caved debris behind the portal. One of the square cross timbers is visible above the opening (Roll K3, frame #23).
Figure 3.19-5. View to the west across the surface of the waste dump for Adit 1 at the Fourth of July Prospect. The portal is at the center left edge. Ore car rails extend from the portal and curve to the west across the dump. Bullion Creek is just to the right of this picture (Roll K3, frame #22).

Figure 3.19-6. Looking north across the surface of waste dump for Adit 1. The portal is to the right of this picture. Bullion Creek crosses the top portion of the photograph just beyond the rails (Roll K3, frame #24).
Figure 3.19-7. Caved Adit 2 of the Fourth of July Prospect, looking northwest. The sign identifies this as “Drift 3.” Adit 2 is on the north side of Bullion Creek (Roll K3, frame #20).

Figure 3.19-8. Looking north across Bullion Creek at the bulldozer road and cuts on the open slope. One cut crosses the slope near the center of the picture. A second cut is slightly higher and near the right edge of the open slope (Roll K3, frame #25).
3.20 WONDERFUL MINE (Site No. WL-484)
Alternate name—Wonderful Creek Prospect.

3.20.1 Site Location and Access (Figure 2.1-1b)

The Wonderful Mine is on the east side of Wonderful Creek about 2 miles north of Bullion Creek, in the central part of the NW¼, section 20, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.20-1). The adit is accurately located on the topographic map. A jeep trail follows the slope east of Wonderful Creek and leads to the mine. This property is on a block of patented claims surrounded by Forest Service land. According to Sims (1998), these claims were acquired by the Forest Service through a third-party land exchange.

3.20.2 Geologic Features (Figure 2.2-1b)

These workings are in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.20.3 Site History

The Wonderful Mining Company, Ltd., was incorporated in 1906. By 1913, all four of the company's claims were patented. In 1914, the property had two tunnels and 1,400 feet of workings. The last work on the property was apparently done before (or during) World War I, although the company reported in 1923 that its No. 1 tunnel was 1,500 feet long. By 1938, the lengths of the tunnels were listed as 500 feet and 400 feet, and in 1940, the company noted its buildings had been burnt in a forest fire (presumably this was the 1910 fire, although it could have been a smaller fire that occurred at some other time).

Sims (1998) states that the property was bought by Luther T. Tallent in the late 1930s, when the property was sold by Shoshone County for delinquent taxes. However, Wonderful Mining continued to file reports on the property until the late 1940s, and the company did not forfeit its corporate charter until 1957. According to a letter by Irene Tallent that is appended to Sims (1998), her father-in-law (L.T. Tallent) worked the prospect from the late 1940s until about 1955. At the time Tallent acquired the mine, it had two tunnels (200 feet and 50 feet long). Tallent reported extending the longer tunnel to about 300 feet. Tallent sold the compressor around 1960, and the rest of the equipment was stolen in the 1970s. The property was apparently sold to a real estate company around 1990 and traded to the Forest Service sometime after 1993.

In the early 1980s, the Helena Silver Company held 30 claims in the Wonderful Creek area. Some of these claims probably adjoined the Wonderful Mine, but it is not known if Helena Silver had an option on the patented claims. In 1981, Helena Silver leased its property to Bear Creek Mining Company (a subsidiary of Kennecott Copper). Bear Creek conducted detailed geologic and geochemical work on the claims. In 1985, a deep diamond drill hole on the property bottomed at
4,500 feet when a series of faults interfered with locating the target vein. The exploration program was discontinued soon after.

3.20.4 Environmental Conditions

3.20.4.1 Site Features

The Wonderful Mine was visited by John Kauffman on July 15, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 2, index 00:34:41-00:41:05). Documenting photographs are Roll K4, frames 1-5 and frame 8.

Although two tunnels are reported in the literature, only one was found during the site visit (Figure 3.20-2). The adit, on the slope east of and about 100 feet in elevation above a north-trending branch of Wonderful Creek, is nearly caved but has a 2.5-foot by 2.5-foot opening (Figure 3.20-3). A few timbers are visible inside the opening. The hillside above the portal is sloughed and the adit is nearly hidden by brush (Figure 3.20-4). A trickle of water, possibly 2 gallons per minute, flows out of the adit and onto the dump surface, where it seeps into the rock and disappears. The dump is 50-60 feet long, 40-50 feet wide, and 30-40 feet down the face. Most of the dump is bare or covered with low weeds (Figure 3.20-5). The disturbed area covers about 0.5 acre.

Weed (1922, p. 819) reports 2 tunnels, 200 feet apart and about 2,000 feet long. A traverse was made up the slope above the adit described in the previous paragraph in an attempt to locate the second tunnel, but no evidence of an adit or waste dump was found. Although the exact length of the second adit is uncertain (with lengths of between 50 and 400 feet reported), its dump should be visible. An inspection of this site from the air might identify the location of the second adit.

3.20.4.2 Sample Locations

3.20.4.2.1 Solid Samples

No waste dump or stream sediment samples were collected at this site.

3.20.4.2.2 Water Samples

A water sample (K7159801) from the adit was taken about 30 feet from the adit where the water flows across the dump.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7159801</td>
<td>Wonderful Mine adit</td>
<td>134</td>
<td>45</td>
<td>7.9</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.20.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

Adit water sample K7159801 is below all water quality standards in both the dissolved metals and the total recoverable metals screens.

3.20.5 Structures

A well-built log cabin (Figure 3.20-6) is located about 200 feet west of the base of the dump (Figure 3.20-7) along a branch of Wonderful Creek.

3.20.6 Safety

The opening into the adit is large enough to permit entry, although the adit may be caved further inside. Fire rings near the dump indicate the area is used for camping.
Figure 3.20-1. Location map of the Wonderful Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.20-2. Sketch map of the Wonderful Mine.
Figure 3.20-3. Looking east into the small opening of the Wonderful Mine adit. A cross timber is visible above the opening. The piece of sheet metal propped in front of the opening was probably used to cover it (Roll K4, frame #2).

Figure 3.20-4. Looking east toward the portal of the Wonderful Mine adit. The opening shown in Figure 3.20-3 is behind the brush and small trees just left of the center of the picture, and the trickle of water from the adit is marked by the moss-covered area crossing to the lower right. The hillside above the adit is sloughed (Roll K4, frame #1).
Figure 3.20-5. Looking south across the face of the waste dump at the Wonderful Mine. Part of the dump is bare (center) and part is covered with weeds (lower left foreground) (Roll K4, frame #3).

Figure 3.20-6. Old log cabin below the waste dump and near the creek. The view is to the south (Roll K4, frame #5).
Figure 3.20-7. Looking east at the log cabin (lower right) and the waste dump (upper center) at the Wonderful Mine. A foot trail leads from the waste dump to the cabin (Roll K4, frame #8).
3.21 WONDERFUL MINE, Prospect Cut (Site No. WL-484)

In the field, this prospect was tentatively identified as the Eagle Prospect (WL-488). However, this site is nearly due east of the Wonderful Mine, which suggests that it is probably on the Wonderful claim block, which ran approximately east-west through the northern part of section 20.

3.21.1 Site Location and Access (Figure 2.1-1b)

This site is at the end of a jeep road on a tributary to Wonderful Creek in the NE¼ of the NW¼, section 20, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.21-1). Access from Bullion Creek is north on the jeep road to the Wonderful Mine, south about ½ mile around the nose of the ridge, and then northeast to the end of the road. This prospect appears to be on the narrow strip of patented claims associated with the Wonderful Mine. The claims are surrounded by Forest Service land and, according to Sims (1998), now owned by the Forest Service.

3.21.2 Geologic Features (Figure 2.2-1b)

This site is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.21.3 Site History

See section 3.20.3 for the history of the Wonderful Mine.

3.21.4 Environmental Conditions

3.21.4.1 Site Features

The prospect was visited by John Kauffman on July 15, 1998. No video was taken at this site. Documenting photographs are Roll K4, frames 6-7.

On the east side of the gully is a cut into the hillside (Figure 3.21-2) about 8 feet wide and originally about 6-10 feet into the hill. The excavated material has been removed by the creek. Less than 0.1 acre is disturbed at this site.

3.21.4.2 Sample Locations

3.21.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.21.4.2.2 Water Samples
No water samples were collected at this site.

3.21.5 Structures
The remains of a collapsed log cabin (Figure 3.21-3) were found about 50 feet below the road and less than 200 yards from the end of the road.

3.21.6 Safety
There are no safety hazards at this site.
Figure 3.21-1. Location map of the prospect cut at the Wonderful Mine, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
Figure 3.21-2. Prospect cut into a rock outcrop at the Wonderful Mine. The sides of the cut are on the left and right sides of the picture. Sloughed debris in the center of the cut (center of photograph) is covered with sparse grass clumps and weeds (Roll K4, frame #6).

Figure 3.21-3. Collapsed remains of log cabin near the prospect cut at the Wonderful Mine. The cabin is about 50 feet below the road that ends at the prospect (Roll K4, frame #7).
3.22 PEACOCK COPPER PROSPECT (Site No. WL-487)

3.22.1 Site Location and Access (Figure 2.1-1b)

The Peacock Prospect is on the west side of Wonderful Creek about ¼ mile south of the Wonderful Mine near the center of the west edge, section 20, T. 47 N., R. 6 E., on the Lookout Pass 7.5-minute quadrangle (Figure 3.22-1). No access roads were found to this site; the prospect was videotaped from the road to the Wonderful Mine and was not visited.

3.22.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the Wallace Formation near the Placer Creek fault (Harrison and others, 1986).

3.22.3 Site History

The Peacock Copper claim block is shown on Calloway's (1928) claim map of the Coeur d'Alene mining area. Nothing else is known about the history of this property.

3.22.4 Environmental Conditions

3.22.4.1 Site Features

The prospect was videotaped from the road to the Wonderful Mine by John Kauffman on July 15, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 2, index 00:41:29-00:45:11). No photographs were taken at this site.

A small waste dump is visible about 100 feet above the valley floor on the west side of Wonderful Creek. The dump is estimated to be 25 feet long, 15 feet wide, and about 20 feet down the face. The slope is fairly steep, so the actual thickness of the material on the slope is probably a maximum of 5-8 feet. No opening could be seen in the vicinity of the dump, and no water was apparent. The disturbed area is less than 0.25 acre.

3.22.4.2 Sample Locations

3.22.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.22.4.2.2 Water Samples

No water samples were collected at this site.

3.22.5 Structures

No structures were seen at this site.
3.22.6 Safety

Unless there is an open adit, there are no safety hazards at this site. Even if an open adit is present, the site is relatively inaccessible and, judging from the small size of the waste dump, the adit is probably not extensive.
Figure 3.22-1. Location map of the Peacock Copper Prospect, Shoshone County, Idaho (U.S. Geological Survey Lookout Pass 7.5-minute topographic map).
3.23 UNNAMED PROSPECT (Site No. K7159802)

3.23.1 Site Location and Access (Figure 2.1-1b)

This prospect is on the north side of Loop Creek about ¼ mile west of Cliff Creek in the NW¼ of the NE¼, section 10, T. 46 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle (Figure 3.23-1). The toe of the waste dump is about 200 feet north of Forest Service Road 326 at the base of the slope. This site is on Forest Service land and the location was flagged by Steve Nelson of the USFS Avery District office.

3.23.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the middle Wallace Formation, which consist of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite. The prospect is south of a northwest-trending fault that parallels the Placer Creek fault (Harrison and others, 1986).

3.23.3 Site History

Nothing is known about the history of this site.

3.23.4 Environmental Conditions

3.23.4.1 Site Features

The site was visited by John Kauffman on July 15, 1998. A video segment describing the property is on the Avery and St. Marys Districts Videotape (Tape 2, index 00:45:17-00:48:07). Documenting photograph is Roll K4, frame 9.

The prospect consists of a caved adit and waste dump (Figure 3.23-2). There is a slump on the hillside above the caved adit. The dump is 20 feet long, 10-15 feet wide, and 30-40 feet down the face (Figure 3.23-3). No mineralization was noted on the dump. The disturbed area covers less than 0.25 acre.

3.23.4.2 Sample Locations

3.23.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.23.4.2.2 Water Samples

No water samples were collected at this site.

3.23.5 Structures

No structures were found at this site.
3.23.6 Safety

There are no safety hazards at this site.
Figure 3.23-1. Location map of the Unnamed Prospect, Site No. K7159802, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map).
Figure 3.23-2. Sketch map of Unnamed Prospect, Site No. K7159802.
Figure 3.23-3. Looking north up the slope at the waste dump of Site No. K7159802 (Roll K4, frame #9).
3.24 UNNAMED PROSPECT (Site No. K7159803)

3.24.1 Site Location and Access (Figure 2.1-1b)

This prospect is along Loop Creek on the north side of Forest Service Road 326 in the SW¼ of the NW¼, section 11, T. 46 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle (Figure 3.24-1). The adit is about 4 feet above the level of the road and is on Forest Service land. The location of this prospect was flagged by Steve Nelson of the USFS Avery District office.

3.24.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the middle Wallace Formation, which consist of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite. The prospect is south of a northwest-trending fault that parallels the Placer Creek fault (Harrison and others, 1986).

3.24.3 Site History
Nothing is known about the history of this site.

3.24.4 Environmental Conditions

3.24.4.1 Site Features

This prospect was visited by John Kauffman on July 15, 1998. A video segment describing the prospect is on the Avery and St. Marys Districts Videotape (Tape 2, index 00:48:12-00:50:17). Documenting photographs are Roll K4, frames 10-11.

The prospect consists of a short, open adit (about 15 feet in length) beside the road (Figures 3.24-2 and 3.24-3). The waste dump has been destroyed by road construction. The disturbed area is minimal.

3.24.4.2 Sample Locations

3.24.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.24.4.2.2 Water Samples
No water samples were collected at this site.

3.24.5 Structures
There are no structures at this site.
3.24.6 Safety

The open adit is short and only a minor safety hazard.
Figure 3.24-1. Location map of the Unnamed Prospect, Site No. K7159803, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map).
Figure 3.24-2. Looking north at the open adit at Site No. K7159803, with Forest Service Road 326 (Loop Creek road) in the foreground (Roll K4, frame #10).
Figure 3.24-3. Inside view of the adit at Site No. K7159803. The adit is about 15 feet long (Roll K4, frame #11).
3.25 ALPINA PROSPECT (Site No. WL-500) and ALICE PROSPECT (Site No. WL-501)
Alternate names for Alpina Prospect—Alpena; Bald Mountain Ledge.

3.25.1 Site Location and Access (Figure 2.1-1b)

These two prospects are near the head of Kelly Creek in the SE¼ of the SE¼, section 31, T. 47 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.25-1). The Alpina Prospect can be reached via a jeep trail off Forest Service Road 391. This trail, which can be driven to the mine site, continues south along Kelly Creek beyond the mine, but becomes brushy and impassable by vehicle 500-700 feet south of the Alpina. The trail formerly terminated at the Alice Prospect. A new logging road (Forest Service Road 3472) passes across the waste dump for the Alice. This prospect is about 1,000-1,300 feet south of the Alpina on the east side of Kelly Creek. Both prospects are on Forest Service land, and both are active claims under the same operator, according to Forest Service personnel. However, the activity appears to be limited to annual assessment work.

3.25.2 Geologic Features (Figure 2.2-1b)

These prospects are in rocks of the middle Wallace Formation, which consist of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite (Harrison and others, 1986). Calkins and Jones (1914, p. 197) described the Alpina workings as follows:

The Alpina property . . . taps a vein about 500 yards farther north than those of the Alice prospect. The adit is a crosscut about 300 feet long, and runs northward to a drift about 1,200 feet long. The vein strikes N. 85° E., dips 65° N., and is about 2 feet thick. The copper mineral is chalcopyrite, which is apparently more abundant than in the other prospects visited. The ore is said to assay well in gold.

About the Alice prospect, Calkins and Jones (1914, p. 197) stated:

The Alice prospect, on Kelly Creek, is developed by about 650 feet of drifts. The workings show two apparently distinct veins about 25 feet apart, which strike about N. 85° E. and dip 70° N. The north vein is the larger and attains a width of 6 feet in places. The veins show the usual character for this locality, the ore being pyrite and chalcopyrite, in a gangue of siderite, quartz, and calcite. It is mostly unoxidized. The tenor is rather low.

3.25.3 Site History

The Alpena Copper Mining Company, Ltd., was organized in 1900. By 1914, the property had 1,300 feet of development, mostly through one tunnel. After that, the company kept one man at the mine to look after the property and do the annual assessment work. In 1933, the mine supposedly had two tunnels and one shaft, but no details were provided about these workings. In 1947, the company noted that one of its two tunnels was 1,000 feet long. Alpina forfeited its corporate charter in 1957.
The Eagan Copper Mining Company (organized in 1916) owned a property believed to be the Alice. This claim group was purchased from the original owners for 500,000 shares of stock. In 1918, the property was reported to have about 1,200 feet of workings. In 1922 or 1923, the prospect was sold to satisfy a judgement made against the company for failure to repay a loan. Eagan forfeited its corporate charter in 1923.

3.25.4 Environmental Conditions

3.25.4.1 Site Features

Both of these prospects were visited by John Kauffman on July 15, 1998. Video segments of the Alpina and Alice prospects are on the Avery and St. Maries Districts Videotape (Tape 2, index 00:50:20-01:00:11). Documenting photographs for the Alpina are Roll K4, frames 15-18, and for the Alice, Roll 4, frames 12-14.

The Alpina Prospect consists of an adit at creek level just below the road, a long, narrow waste dump built out from the adit into the Kelly Creek drainage, and a bulldozer cut in the west slope above the road (Figure 3.25-2). The adit is partially blocked by rock rubble, but a narrow diagonal slit (about 4 feet long and 1-1.5 feet wide) provides access into the adit (Figure 3.25-3). Water from the adit (about 5 gallons per minute) flows into Kelly Creek a few feet in front of the portal. Most of Kelly Creek then flows across the surface of the waste dump (Figures 3.25-4 and 3.25-5), although the stream splits and part of it flows along the west edge of the dump. Scrap metal, pieces of pipe, and old boards are scattered on the dump surface. North of the road is a recent bulldozer cut into the bank on the west side of Kelly Creek. This cut may be a prospect or the material may have been excavated for use in construction or repair of the road. The disturbed area covers about 1.0 acre.

The Alice Prospect (Figure 3.25-2) consists of a caved adit (Figure 3.25-6) and a small waste dump. The adit is on the east side of Forest Service Road 3472, and the road crosses the dump just in front of the adit (Figure 3.25-7). The dump is 45 feet long (including the road width), 20 feet wide, and about 20 feet thick down the face (Figure 3.25-8). It does not extend into Kelly Creek. The disturbed area covers less than 0.25 acre.

At both sites, galvanized pipe, painted white, has been used to hold claim notices. These are visible in Figures 3.25-4 and 3.25-6.

3.25.4.2 Sample Locations

3.25.4.2.1 Solid Samples

A waste dump sample (K7159806) was collected from the face of the Alpina dump.
### 3.25.4.2.2 Water Samples

A sample (K7159805) was collected at the portal of the Alpina adit. A downstream sample (K7159804) was taken on Kelly Creek just above Forest Service Road 3472, about 1,000 feet below the lower end of the Alpina dump. An upstream sample (K7159807) was taken on Kelly Creek above the road.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μs)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7159804</td>
<td>Alpina Prospect, downstream</td>
<td>42</td>
<td>50</td>
<td>7.8</td>
<td>8 ft. wide, 0.5 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K7159805</td>
<td>Alpina Prospect adit</td>
<td>55</td>
<td>40</td>
<td>7.95</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>K7159807</td>
<td>Alpina Prospect, upstream</td>
<td>28</td>
<td>47</td>
<td>7.75</td>
<td>---</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.25.4.2.3 Analytical Results

**Solid Samples (Tables 2.5-3 and 2.5-4)**

The Alpina Prospect dump sample (K7159806) exceeds background and environmental levels for arsenic, cadmium, copper, nickel, and lead in the element screen. In the TCLP for metals screen, the sample shows no leaching for any metals of interest.

**Water Samples (Tables 2.5-1 and 2.5-2)**

In both the dissolved metals and the total recoverable metals screens, the Alpina adit water sample (K7159805) and the upstream sample (K7159807) do not exceed any water quality standards. The downstream sample (K7159804) exceeds the Aquatic Life Chronic standard for cadmium in the dissolved metals screen.

### 3.25.5 Structures

No structures were found at either prospect, although a shelter with corrugated metal siding, possibly a recreational campsite or hunting camp, is located along the creek just above Forest Service Road 3472. It is not known if this shelter was related to prospecting activities.
3.25.6 Safety

The narrow slit at the portal of the Alpina Prospect is wide enough to allow entry. This area receives a moderate amount of recreational use by hikers and campers in the summer and, probably, by hunters in the early fall.
Figure 3.25-1. Location map of the Alpina and Alice prospects, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.25-2. Sketch map of the Alpina and Alice prospects.
Figure 3.25-3. Narrow opening into the adit at the Alpina Prospect, looking north. The quartzite beds are dipping about 45° to the west (Roll K4, frame #16).

Figure 3.25-4. Looking north toward the Alpina adit (located at the base of the slump) from the center of the dump. Most of the water in the foreground is from Kelly Creek, which flows across the dump surface. The white post to the left of the creek holds a claim notice (Roll K4, frame #15).
Figure 3.25-5. Looking south along the length of the Alpina waste dump. Most of the creek and adit water crosses the dump, but some of the water flows down to the right (at the logs piled in the creek) and follows the west edge of the dump. The adit is just off the bottom of the photograph (Roll K4, frame #18).

Figure 3.25-6. Caved adit of the Alice Prospect, looking east. The adit forms a trough in the slope about 20 feet from the road, which is just off the bottom of the picture. A metal claim notice is nailed to the tree to the right of the trough and a white post with another claim notice is to the left. This post is identical to the one on the Alpina Prospect (Roll K4, frame #12).
Figure 3.25-7. Looking west from Forest Service Road 3472 (bottom of picture) across the surface of the waste dump at the Alice Prospect. Kelly Creek is in the gully just past the edge of the dump (Roll K4, frame #13).

Figure 3.25-8. Looking west down the face of the waste dump at the Alice Prospect. Kelly Creek, hidden in the thick brush, is well below the lower edge of the dump (Roll K4, frame #14).
3.26 CONRAD'S CROSSING PROSPECT (Site No. WL-541)

3.26.1 Site Location and Access (Figure 2.1-1b)

Conrad’s Crossing Prospect is along the north side of the St. Joe River highway (Forest Service Road 218) at Conrad Crossing Campground in the SW¼ of the NE¼, section 14, T. 44 N., R. 8 E., on the Conrad Peak 7.5-minute quadrangle (Figure 2.26-1). The prospect is on Forest Service land.

3.26.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 56) reports:

In the vicinity of Conrad's crossing on St. Joe River a few short adits and trenches have been made on small veins that are numerous in the diabase. The country rock is severely sheared and more or less mineralized in many places. The mineralization consists in the introduction of minute crystals of chalcopyrite and pyrite along shear planes, and the development of seams and irregular bunches up to 3 feet or more wide of calcite, quartz, and siderite carrying chalcopyrite and pyrite. The green stain of copper carbonate may be seen at many places on weathered surfaces of the diabase.

The country rock is the middle Wallace Formation, which consists of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite. The diabase intrusive rocks in this area are mostly of Tertiary age (Harrison and others, 1986).

3.26.3 Site History

Other than the work reported by Pardee (1911), nothing is known about the history of this prospect.

3.26.4 Environmental Conditions

3.26.4.1 Site Features

Conrad's Crossing Prospect was visited by John Kauffman on July 16, 1998. A video segment describing the prospect is on the Avery and St. Marias Districts Videotape (Tape 2, index 01:00:17-01:01:56). Documenting photograph is Roll K4, frame 19.

Pardee (1911) reports “a few short adits and trenches” in the vicinity of Conrad’s Crossing. The only evidence found of this prospect was one probable adit, which was short and caved. A shallow trough, hidden in the brush, is located beside the turnout to Upper Conrad Crossing campground (Figure 3.26-2). What little dump that existed has been destroyed by highway construction. The disturbed area is minimal.
3.26.4.2 Sample Locations

3.26.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.26.4.2.2 Water Samples
   No water samples were collected at this site.

3.26.5 Structures
   No structures were found at this site.

3.26.6 Safety
   There are no safety hazards at this site.
Figure 3.26-1. Location map of the Conrad’s Crossing Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map).
Figure 3.26-2. Sketch map of the Conrad’s Crossing Prospect.
3.27 BLUFF CREEK COPPER CLAIMS (Site No. WL-540)
Alternate name—Lintz and Stafford Prospect.

3.27.1 Site Location and Access (Figure 2.1-1b)

The Bluff Creek Copper Prospect is along the west slope above Bluff Creek in the SE¼ of the SE¼, section 6, T. 44 N., R. 8 E., on the Conrad Peak 7.5-minute quadrangle (Figure 3.27-1). The prospect is about 75 feet up on the slope and consists of a series of cuts into the slope along a bulldozer road parallel to Forest Service Road 509 (Bluff Creek Road). The bulldozer road extends from about ¼ mile up Bluff Creek to the quarry at the first U-shaped corner, a distance of several hundred yards (Figure 3.27-2). This prospect is on Forest Service land.

3.27.2 Geologic Features (Figure 2.2-1b)

This prospect is in schist adjacent to a diabase or gabbro sill of probable Tertiary age. The country rock is the middle Wallace Formation, which consists of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite (Harrison and others, 1986; IGS mineral property files).

3.27.3 Site History

This prospect was explored for copper in the 1950s (IGS mineral property files).

3.27.4 Environmental Conditions

3.27.4.1 Site Features

The prospect was visited by John Kauffman on July 16, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:02:00-01:09:34). Documenting photographs are Roll K4, frames 20-24.

This is the same property as the Lintz and Stafford Prospect (formerly WL-534), as is shown by the maps in the source documents (Figures 3.27-3 and 3.27-4). Ownership of the Bluff Creek property is listed as Lintz and Stanley (Dotson, 1955), while Buel (1952) notes that operator Lintz implied that he and Stanley owned the property. It is not known whether the “Stafford” is an error or the name of a previous owner or operator. The cuts found at the property do not correlate exactly with the 1950s maps of the property (Figures 3.27-3 and 3.27-4).

The Bluff Creek Copper Prospect consists of several cuts along an old bulldozer road on the slope above Bluff Creek Road (Figures 3.27-5 and 3.27-6). The northernmost cut exposes a quartz vein with minor copper staining. Some of the vein is brecciated (Figure 3.27-7). At the southern end of the bulldozer road, next to the U-shaped corner on Bluff Creek Road, is a quarry (Figures 3.27-8 and 3.27-9). The excavated material is being used for road construction. No
mineralization was seen in the quarry, and it probably was not part of the original prospect. The disturbed area covers about 0.75 acre.

3.27.4.2 Sample Locations

3.27.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.27.4.2.2 Water Samples
No water samples were collected at this site.

3.27.5 Structures
No structures were found at this site.

3.27.6 Safety
There are no safety hazards at this site.
Figure 3.27-1. Location map of the Bluff Creek Copper Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map).
Figure 3.27-2. Sketch map of the Bluff Creek Copper Prospect.
Figure 3.27-3. Geologic map of the Bluff Creek Copper Prospect (Dotson, 1955).
Figure 3.27-4. Geologic map of the Lintz and Stafford Prospect (Buel, 1952). Compare this map to Figure 3.27-3. The elevations are different on the two maps, but the contours may be relative elevations only. Neither sketch map agrees with the elevations shown on the topographic map (Figure 3.27-1).
Figure 3.27-5. Looking south along the bulldozer road at the Bluff Creek Copper Prospect. Bare areas on the embankment are bulldozer cuts into the slope. Forest Service Road 509 (Bluff Creek Road) can be seen near the center of the left edge of the picture (Roll K4, frame #20).

Figure 3.27-6. Prospect cut into the slope at the north end of the bulldozer road, looking west (Roll K4, frame #23).
Figure 3.27-7. Brecciated quartz vein fragments from the cut at the north end of the bulldozer road. Some fragments have a minor amount of copper staining (malachite) (Roll K4, frame #24).

Figure 3.27-8. Looking south along the face of the quarry at the south end of the Bluff Creek Copper Prospect. Rock from this quarry is used for road metal. Crushed rock, piled along Forest Service Road 509, can be seen in the lower left corner of the picture (Roll K4, frame #21).
Figure 3.27-9. Looking west at the face of the quarry. The bulldozer road and prospect cuts are to the left of this photograph (Roll K4, frame #22).
3.28 ST. JOE QUARTZ PROSPECT (Site No. WL-536)

3.28.1 Site Location and Access (Figure 2.1-1b)

The St. Joe Quartz Prospect is beside the St. Joe River in the NE¼, section 6, T. 44 N., R. 8 E., on the Conrad Peak 7.5-minute quadrangle (Figure 3.28-1). The prospect, on Forest Service land, is on the south side of the river across from the highway. There is no vehicle access to the property; the river must be waded or floated to reach the prospect.

3.28.2 Geologic Features (Figure 2.2-1b)

This prospect is along an east-west-trending mineralized shear zone in one of the Wishard sills, a diabase intrusive. The shear contains irregular seams and bunches up to 3 feet wide of quartz, calcite, and chalcopyrite (Pardee, 1911). The sill intruded rocks of the middle Wallace Formation (Harrison and others, 1986).

3.28.3 Site History

In 1910, this property was held by the St. Joe Quartz Mining Co. The mine had a 400-foot tunnel, and a few tons of ore were bagged and stockpiled along the St. Joe River (Pardee, 1911). Several years later, Umpleby and Jones (1923) noted that no ore shoot had been developed in this shear zone.

3.28.4 Environmental Conditions

3.28.4.1 Site Features

The St. Joe Quartz Prospect was videotaped and photographed from the north side of the river by John Kauffman on July 16, 1998. A video segment is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:09:41-01:11:37). Documenting photograph is Roll K4, frame 25.

This prospect, at the site known as Goddards (probably a settler's cabin and/or a stopover on the trail up the St. Joe River), consists of an open adit just above river level about 100 feet east of an old cabin (Figures 3.28-2 and 3.28-3). Pardee (1911) reports an adit 400 feet long. The waste rock was dumped into the river and has been completely washed away. The adit is probably below the high water level for the river. The disturbed area is less than 0.1 acre.

3.28.4.2 Sample Locations

3.28.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.28.4.2.2 Water Samples
   No water samples were collected at this site.

3.28.5 Structures

   The old cabin is in remarkably good condition, although it is tilted about 15-20° toward the river.

3.28.6 Safety

   The St. Joe River is a popular recreational stream for rafters, fisherman, and other river enthusiasts. The open adit is easily accessible by raft or boat, or by wading the river.
Figure 3.28-1. Location map of the St. Joe Quartz Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map).
Figure 3.28-2. Sketch map of the St. Joe Quartz Prospect.
Figure 3.28-3. Looking south across the St. Joe River at the St. Joe Quartz Prospect. The open adit is the triangular dark spot just above river level near the left edge of the photograph. The tilted log cabin is near the right edge of the picture. Forest Service Highway 50 (St. Joe River Road) is along the bottom edge of the photograph (Roll K4, frame #25).
3.29 UNNAMED PROSPECT (Site No. K7169801)

3.29.1 Site Location and Access (Figure 2.1-1b)

This prospect is located beside the St. Joe River highway (Forest Service Highway 50) about ½ mile west of Bird Creek, in the E½ of the SW¼, section 13, T. 45 N., R. 6 E., on the Three Sisters 7.5-minute quadrangle (Figure 3.29-1). The site is on Forest Service land and the location was flagged by Steve Nelson of the USFS Avery District office.

3.29.2 Geologic Features (Figure 2.2-1b)

This prospect is in the middle Wallace Formation, which consists of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite, and is just north of the St. Joe fault (Harrison and others, 1986).

3.29.3 Site History

Nothing is known of the history about this site.

3.29.4 Environmental Conditions

3.29.4.1 Site Features

The prospect was visited by John Kauffman on July 16, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:11:40-01:13:41). Documenting photographs are Roll K5, frames 1-2.

This minor prospect consists of a short, open adit beside the highway (Figure 3.29-2). The view inside (Figure 3.29-3) shows the adit to be 15 feet or less in length. The highway has obliterated the waste dump, which would have been small. The disturbed area is minimal.

3.29.4.2 Sample Locations

3.29.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.29.4.2.2 Water Samples

No water samples were collected at this site.

3.29.5 Structures

There are no structures at this site.
3.29.6 Safety

Although very short, the open adit is a potential hazard. Rocks falling from the back could cause injury.
Figure 3.29-1. Location map of Unnamed Prospect, Site No. K7169801, Shoshone County, Idaho (U.S. Geological Survey Three Sisters 7.5-minute topographic map).
Figure 3.29-2. Open adit at Site No. K7169801 along Forest Service Highway 50 (St. Joe River Road), looking north. The adit is the dark area at the center of the picture, just above the road level (Roll K5, frame #1).

Figure 3.29-3. Inside view of the short adit at Site No. K7169801. The adit is about 3-4 feet high and less than 15 feet long (Roll K5, frame #2).
3.30 UNNAMED PROSPECT (Site No. K7169802)

3.30.1 Site Location and Access (Figure 2.1-1b)

A possible prospect is located about ½ mile up Bird Creek on the west side of the creek in the NE¼ of the SE¼, section 13, T. 45 N., R. 6 E., on the Three Sisters 7.5-minute quadrangle (Figure 3.30-1). Forest Service Road 338 follows the east side of Bird Creek, which can easily be waded to reach the prospect. This site is on Forest Service land.

3.30.2 Geologic Features (Figure 2.2-1b)

This prospect is north of the St. Joe fault in the middle Wallace Formation, which consists of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite (Harrison and others, 1986).

3.30.3 Site History

Nothing is known about the history of this site.

3.30.4 Environmental Conditions

3.30.4.1 Site Features

This possible prospect was visited by John Kauffman on July 16, 1998. No video was taken at this site. Documenting photograph is Roll K4, frame 26.

This site may or may not be a prospect. There appears to be a small waste dump on the slope above Bird Creek, although no evidence of an adit was found. The apparent dump (Figure 3.30-2) could just be a talus slope, but it does have some oxidized rock, an indication of possible mineralization, mixed in with the gray slate, and the material has a small flat area on top measuring 25 feet long and 15 feet wide. The rock debris extends down the slope about 40 feet, forming a thin veneer on the slope surface, but does not quite reach Bird Creek. The disturbed area is less than 0.25 acre.

3.30.4.2 Sample Locations

3.30.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.30.4.2.2 Water Samples

No water samples were collected at this site.

3.30.5 Structures

There are no structures at this site.
3.30.6 Safety

There are no safety hazards at this site.
Figure 3.30-1. Location map of Unnamed Prospect, Site No. K7169802, Shoshone County, Idaho (U.S. Geological Survey Three Sisters 7.5-minute topographic map).
Figure 3.30-2. Looking west across Bird Creek at Site No. K7169802. The bare rock rubble near the center of the photograph may be the small waste dump of a caved adit (Roll K4, frame #26).
3.31 BALD MOUNTAIN PROSPECT (Site No. K7209801)
Alternate name—North Fork Copper.

3.31.1 Site Location and Access (Figure 2.1-b)

This prospect is near the top of Bald Mountain along the Idaho-Montana border in the NW¼, section 31, T. 47 N., R. 7 E., on the Saltese 7.5-minute quadrangle (Figure 3.31-1). Access is via Forest Service Road 391 to the south flank of Bald Mountain, where a spur road leads around the west side of the mountain to a radio tower. The words “North Fork Copper” were all that was still readable on a old claim notice (a 4-inch, square, aluminum marker with plastic punch lettering) that was found on a tree along the spur road about 700 feet northwest of FS Road 391. The prospect is just south of the top of Bald Mountain and is about 250-275 feet above the road. It is noted by a prospect symbol on the topographic map and is on Forest Service land.

3.31.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the middle Wallace Formation, which consist of black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite. A diabase sill cuts across the top of Bald Mountain (Harrison and others, 1986). The geology of the Bald Mountain Prospect is described in Calkins and Jones (1914, p. 197):

Banded shales and quartzites of the middle part of the Newland [Wallace] formation comprise the sedimentary rocks. The average strike is N. 34° W. and the dip 55° SW. From an excellent section in the adit the thickness of the Wishards sill was found to be 350 feet. The shales are metamorphosed to hornstones for 200 feet or more on either side of the sill. Several narrow fissures are exposed in the workings. In general they follow bedding planes, but one in the rocks, northwest of the sill, strikes east and west with apparently vertical dip, and this is occupied by a vein which carries chalcopyrite, sparsely disseminated, in a quartz-siderite gangue. The vein is several feet wide in the drift, but is apparently of no great persistence, as the extension of the strike of the vein in the adit shows only a few narrow siderite veins in a crush zone.

According to Calloway (1928), the Bald Mountain property was on the north side of Bald Mountain, on the other side of the Idaho-Montana border in the headwaters of Dominion Creek

3.31.3 Site History

This prospect is described in Calkins and Jones (1914) and Collier (1906). Since the major workings appear to have been in Montana, no other information is available in the IGS's files.
3.31.4 Environmental Conditions

3.31.4.1 Site Features

The Bald Mountain Prospect was visited by John Kauffman on July 20, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:14:07-01:19:40). Documenting photographs are Roll K5, frames 3-9.

This property consists of a caved shaft, several shallow pits, and two trenches (Figure 3.31-2) on the mostly open, south-facing, upper slope of Bald Mountain. The slope is covered with bear grass and lupine, some huckleberry bushes, and spruce, fir, pine, and hemlock trees scattered around the open area. The workings were dug along brecciated zones in banded, brown and gray, calcareous quartzite and argillite (Figure 3.31-3). Some minor copper staining was noted on some of the rocks on the dumps.

The shaft is the easternmost feature. For the first few feet, the sides of the shaft are badly sloughed, steep, and undercut. About 10 feet from the top, the cribbing is visible. Below that, the shaft appears to be caved. However, because of the way the sides have sloughed, climbing out of the pit would be difficult. West of the shaft is a trench about 75 feet long. The floor of the trench is covered with saplings (Figure 3.31-4). The dump for the shaft, combined with material from the trench, forms a pile about 25 feet long, 20 feet wide, and 6 feet thick (Figure 3.31-5).

West of the trench are two shallow, conical pits and a second trench. The pits are about 10 feet in diameter and 4-5 feet deep. The trench, which is west of the pits, is about 50 feet long and 5 feet deep. Excavated material is piled in mounds around the south edge of the pits and trench (Figures 3.31-6 and 3.31-7) over a combined length of about 40 feet. The width of the mounds varies but averages roughly 6 feet, and the maximum thickness is 6 feet. A third, very small, shallow pit was found in the trees about 100 feet north of the pits and the west trench.

The total disturbed area covers about 0.25 acre.

3.31.4.2 Sample Locations

3.31.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.31.4.2.2 Water Samples
No water samples were collected at this site.

3.31.5 Structures
No structures were found at this site.
3.31.6 Safety

Although the shaft appears to be caved, the pit is 10-12 feet deep and has the potential to trap someone because the sloughed sides are steep and undercut.
Figure 3.31-1. Location map of the Bald Mountain Prospect, Shoshone County, Idaho (U.S. Geological Survey Salteese 7.5-minute topographic map).
Figure 3.31-2. Sketch map of the Bald Mountain Prospect, Site No. K7209801.
Figure 3.31-3. Rock fragments from a breccia zone at the Bald Mountain Prospect. Minor copper staining is visible on some of the rocks (Roll K5, frame #8).

Figure 3.31-4. Looking south along the east trench, which is filled with pine and fir saplings. The backpack in the upper left part of the photograph is lying on the shaft waste dump (Roll K5, frame #5).
Figure 3.31-5. Looking northwest at the combined waste dumps for the caved shaft and the east trench of the Bald Mountain Prospect (Roll K5, frame #3).

Figure 3.31-6. Looking west at the excavated material from the shallow pits between the east and west trenches. The fir tree on the right is growing from one of the pits (Roll K5, frame #6).
Figure 3.31-7. Looking west across the west trench (crossing the picture just above center). One of the shallow pits is in the center foreground (Roll K5, frame #7).
3.32 BIG ELK MINE (Site No. WL-503)
Alternate name—Idaho Copper and Gold, Inc.; Brushy Creek Claims.

3.32.1 Site Location and Access (Figure 2.1-1b)

The Big Elk Mine is on the slope south of Kelly Pinnacle in the SE1/4, section 1, T. 46 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle (Figure 3.32-1). The property can be reached from Forest Service Road 391 by following Forest Service Road 3472 (gated) to Forest Service Road 3472K (bermed) (Figure 3.32-2). This road becomes a jeep trail, shown on the topographic map, that leads to the workings. The property is on Forest Service land.

3.32.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 55) noted the following about the geology of the Big Elk Mine:
This is a replacement along a shear zone that can be traced for half a mile or more, trending N. 40° to 70° W. in the lower part of the sandy shales regarded as belonging to the Newland [Wallace] formation. It is developed by a 40-foot shaft, a 15-foot winze, and some short adits. The shear zone has been mineralized up to 6 feet in width by the introduction of chalcopyrite, pyrite, calcite, and quartz. Within this mineralized portion are found irregular bunches up to 2 or 3 feet thick of chalcopyrite with a calcite and quartz gangue. This ore is said to assay $10 in gold and 2 or 3 ounces of silver to the ton and 30 per cent of copper.

3.32.3 Site History

The Big Elk Mining Company, Ltd., was organized in 1909. As noted above, the mine had a 40-foot shaft, a 15-foot winze, and some short adits by the following year (Pardee, 1911). The mine made small shipments of ore in 1910 and 1911. In 1913, development totaled approximately 900 feet. A small shipment of oxidized copper ore was made in 1914. Only assessment work appears to have been done after about 1913. In 1937, the company noted that the mine had three tunnels and two shafts; a 1947 report listed two tunnels and one 40-foot vertical shaft. Big Elk forfeited its corporate charter in 1957. In 1977, Idaho Copper and Gold Mines, Inc., did some development at the mine.

3.32.4 Environmental Conditions

3.32.4.1 Site Features

The Big Elk Mine was visited by John Kauffman on July 20, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:19:44-01:34:03). Documenting photographs are Roll K5, frames 10-25.

Three adits, a shaft, and a prospect cut beside the shaft were found at the Big Elk Mine. All of these workings are along the access road.
Adit 1 (Figure 3.32-3), which is highest on the hill, is at an elevation of about 5,100 feet on the southwest side of Kelly Pinnacle. The adit has a large opening and is untimbered (Figures 3.32-4 and 3.32-5). The small waste dump measures 20 feet long parallel to the road, 12 feet wide, and about 35 feet down the face (Figure 3.32-6). The slope here is moderately steep, and the waste rock forms only a thin veneer. The disturbed area is less than 0.25 acre.

Adit 2 (Figure 3.32-7) is ¼ mile to the south at an elevation of about 4,900 feet. The adit is nearly invisible in the thick brush (Figure 3.32-8), but has an opening about 4 feet wide by 3 feet high (Figure 3.32-9). A pile of rock debris fills part of the opening. The waste dump is small (only 14 feet long, 10 feet wide, and about 10 feet thick) and is covered with weeds and low brush. The toe is cut by the road (Figure 3.32-10).

The shaft and prospect cut (Figure 3.32-11) are about 500 feet west of Adit 2 at an elevation of 4,820 feet. The location of these two features is shown by the upper of the two prospects noted on the topographic map. A spur off the access road leads to the shaft, while the main road follows the toe of the dump. The shaft is caved and filled with timbers and rock debris (Figure 3.32-12). The waste dump is large and has two lobes. The south lobe is 60 feet long, 30 feet wide, and 15 feet thick. The north lobe is 40 feet long, 20 feet wide, and 15 feet thick. Rails extend out onto the west end of the south lobe (Figure 3.32-13). The dump has been considerably modified by bulldozer work at the prospect cut. The cut (Figures 3.32-14, 3.32-15, and 3.32-16) is east of the shaft and forms a scarp 10-12 feet high on the slope. Material removed from the cut has been pushed onto the old dump, where it has been piled in some places and ramped in others. The disturbed area covers about 0.5 acre.

After a switchback, the access road terminates at Adit 3, about 50-60 feet directly below the shaft (Figure 3.32-17). The portal has log timbers and the slope above the adit is sloughed (Figure 3.32-18). Inside, rock rubble nearly fills the adit except for a V-shaped opening 4-5 feet wide and 2.5 feet high in the center (Figure 3.32-19). The waste dump extends out 45 feet from the portal, has a width of 30 feet, and is about 50 feet thick down the face (Figure 3.32-20). A very minor seep forms a damp area in front of the portal. A dried, narrow, bare area on the dump surface, barely noticeable on Figure 3.32-21, indicates that there is probably a seasonal flow of water from the adit. A claim notice on a tree near the west side of the dump had the words “Brushy Creek” and “Idaho Copper and Gold Mines, Inc.” still visible. A few scrap rails are on the dump. They are just west of the portal and near where the access road merges with the dump. The disturbed area at Adit 3 covers about 0.5 acre.

3.32.4.2 Sample Locations

3.32.4.2.1 Solid Samples
No waste dump samples were collected at any of the Big Elk workings.

3.32.4.2.2 Water Samples
No water samples were collected at the Big Elk property.
3.32.5 Structures
No structures were found at this site

3.32.6 Safety

The open adits are the only safety hazard identified at this site. The Forest Service Gate on Forest Service 3472 restricts vehicle travel whenever it is locked. The berm on Forest Service Road 3472K further limits travel to all-terrain vehicle, trail bike, mountain bike, or foot.
Figure 3.32-1. Location map of the Big Elk Mine, Shoshone County, Idaho (U.S. Geological Survey Shesfoot Mountain 7.5-minute topographic map).
Figure 3.32-2. Sketch map of the Big Elk Mine workings.
Figure 3.32-3. Sketch map of Adit 1 at the Big Elk Mine.
Figure 3.32-4. Opening of Adit 1 at the Big Elk Mine along the jeep access road, looking northeast (Roll K5, frame #10).
Figure 3.32-5. View inside Adit 1 at the Big Elk Mine (Roll K5, frame #11).

Figure 3.32-6. Looking southwest down the face of the waste dump for Adit 1 at the Big Elk Mine (Roll K5, frame #12).
Figure 3.32-7. Sketch map of Adit 2 at the Big Elk Mine.
Figure 3.32-8. Adit 2 of the Big Elk Mine, looking north. The open adit is hidden in the brush below the tree trunk in the upper center of the photograph (Roll K5, frame #13).
Figure 3.32-9. Looking north at the opening into Adit 2 of the Big Elk Mine. Even this close, the adit is difficult to see because of the brush (Roll K5, frame #14).

Figure 3.32-10. Looking west at the toe of the waste dump for Adit 2 of the Big Elk Mine. The road (bottom center to left center of the picture) cuts the toe of the dump (Roll K5, frame #15).
Figure 3.32-11. Sketch map of the caved shaft and prospect cut of the Big Elk Mine.
Figure 3.32-12. Old logs, timbers, and rock debris in the caved shaft of the Big Elk Mine (Roll K5, frame #18).

Figure 3.32-13. Looking west across part of the south lobe of the waste dump for the Big Elk shaft. The rails extend to the edge of the west tip of the dump (Roll K5, frame #21).
Figure 3.32-14. Looking north at the headwall of the prospect cut at the Big Elk Mine. The caved shaft is to the left of the cut (Roll K5, frame #16).

Figure 3.32-15. Looking northeast along the prospect cut (Roll K5, frame #17).
Figure 3.32-16. Looking south from the recent prospect cut across the surface of the waste dump for the older shaft (Roll K5, frame #19).
Figure 3.32-17. Sketch of Adit 3 of the Big Elk Mine.
Figure 3.32-18. Looking north at the timbered portal of Adit 3 at the Big Elk Mine (Roll K5, frame #22).
Figure 3.32-19. View inside Adit 3 at the Big Elk Mine. Rock debris fallen from both sides forms a V-shaped opening into the adit (Roll K5, frame #23).

Figure 3.32-20. Looking south down the face of the waste dump for Adit 3 at the Big Elk Mine (Roll K5, frame #25).
Figure 3.32-21. Looking south from the portal of Adit 3 across the surface of the waste dump. The narrow, bare strip that extends onto the dump indicates a minor seasonal flow of water from the adit (Roll K5, frame #24).
3.33 MANHATTAN PROSPECT (Site No. K7219801)

This site is probably part of the Manhattan Prospect of Calkins and Jones (1914), although no adit was found. The opening may be on the Montana side of the divide or it may be caved too completely to be seen.

3.33.1 Site Location and Access (Figure 2.1-1b)

This prospect is about \( \frac{1}{2} \) mile south of Dominion Peak and a few feet from the Idaho-Montana border in the NE\( \frac{1}{4} \) of the SW\( \frac{1}{4} \), section 4, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.33-1). Access is on Forest Service Road 391. The prospect is 100-200 feet east of the road in scrub timber and brush, and is on Forest Service land.

3.33.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the Wallace Formation near a diabase sill (Harrison and others, 1986). There was a large vein of siderite and quartz visible in the adit, but no commercial ore (Calkins and Jones, 1914). Pyrite and chalcopyrite were the main sulfide minerals (Umpleby and Jones, 1923).

3.33.3 Site History

In 1912, the development on the Manhattan Prospect included an adit and drifts totaling 700 feet (Calkins and Jones, 1914).

3.33.4 Environmental Conditions

3.33.4.1 Site Features

The Manhattan Prospect was visited by John Kauffman on July 21, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:34:07-01:38:06). Documenting photographs are Roll K6, frames 3-5.

Two pits, marked as prospects on the topographic map, were found at this site (Figure 3.33-2). The south pit is 10-12 feet deep with relatively steep side walls (Figure 3.33-3). The excavated rock forms a crescent-shaped rim around the north half of the pit (Figure 3.33-4).

The northern pit is roughly 10 feet in diameter and 5-7 feet deep. Weeds and flowers are growing from the pit floor (Figure 3.33-5). Again the excavated material forms a crescent-shaped rim around the north half of the pit.

The disturbed area covers less than 0.25 acre.
3.33.4.2 Sample Locations

3.33.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.33.4.2.2 Water Samples
No water samples were collected at this site.

3.33.5 Structures
No structures were found at this site.

3.33.6 Safety

The south pit has fairly steep walls and is deep enough to cause injury if someone falls into it.
Figure 3.33-1. Location map of the Manhattan Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.33-2. Sketch map of the Manhattan Prospect, Site No. K7219801.
Figure 3.33-3. Looking down into the south prospect pit of the Manhattan Prospect (Roll K6, frame #3).
Figure 3.33-4. Rim of excavated material around the north side of the south pit at the Manhattan Prospect. The open grassy slope in the center distance is Dominion Peak (Roll K6, frame #4).
Figure 3.33-5. Weeds and wildflowers growing in the bottom of the shallow north pit of the Manhattan Prospect. The backpack at the top center of the photograph is on the rim of the pit (Roll K6, frame #5).
3.34 COPPER KOPJE PROSPECT (Site No. K7219802)

3.34.1 Site Location and Access (Figure 2.1-1b)

The Copper Kopje Prospect is on the top of the ridge between Mineral Creek and Olentange Creek in the SE¼ of the SW¼, section 9, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.34-1). A foot trail from the Monitor Mine, about ½ mile to the northeast, passes within a few feet of the open shaft at this property (Figure 3.34-2). The Monitor Mine is reached via a narrow jeep trail that turns southwest off Forest Service Road 391 along the Idaho-Montana border. According to Forest Service personnel, the property was originally on a patented claim but is now Forest Service land.

3.34.2 Geologic Features (Figure 2.2-1b)

This prospect is in rocks of the middle Wallace Formation, which is black argillite interbedded with slightly dolomitic white siltite or very fine grained quartzite. A west-northwest-trending fault cuts very near the Copper Kopje shaft (Harrison and others, 1986).

3.34.3 Site History

This prospect was part of the Adair Group of patented claims held by Day Mines, Inc., from around 1949 until at least 1960. Although the Adair Group also included the claims belonging to the Richmond Mine, it is believed that the Copper Kopje and associated claims were a separate property until Day Mines grouped it with the Richmond.

3.34.4 Environmental Conditions

3.34.4.1 Site Features

The Copper Kopje Prospect was visited by John Kauffman, along with Forest Service personnel, on July 21, 1998. A video segment describing the property is on the Avery and St. Marys Districts Videotape (Tape 2, index 01:38:10-01:40:56). Documenting photographs are Roll K6, frames 6-8.

This property consists of an open shaft found by Forest Service personnel. The shaft is about 5 feet long, 40 inches wide, and has a depth measured at 100 feet. The sides are cribbed with logs as far down as can be seen (Figure 3.34-3). The Forest Service has posted warning signs and placed a temporary orange plastic fence around the opening (Figure 3.34-4). The waste dump is 30 feet long, 15 feet wide, and about 40 feet down the face (Figure 3.34-5). Several shallow prospect pits are on the ridge top just north of the shaft. The disturbed area is about 0.25 acre.

3.34.4.2 Sample Locations

3.34.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.34.4.2.2 Water Samples
   No water samples were collected at this site.

3.34.5 Structures
   No structures were found at this site.

3.34.6 Safety

Since the site inspection, the open shaft (which was an obvious danger) has been covered with a steel grate by the Forest Service.
Figure 3.34-1. Location map of the Copper Kopje Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.34-2. Sketch map of the Copper Kopje Prospect.
Figure 3.34-3. Looking down into the open shaft of the Copper Kopje Prospect. The walls are cribbed with logs as far down as can be seen (Roll K6, frame #7).

Figure 3.34-4. Looking northwest at the orange plastic fencing and warning signs around the open Copper Kopje shaft (Roll K6, frame #6).
Figure 3.34-5. Looking east at the face of the waste dump for the Copper Kopje shaft (Roll K6, frame #8).
3.35 MONITOR MINE (Site No. WL-507)
Alternate name—Montana-Idaho Copper Company.

Note: on the field cards and on the video segment, the Monitor tunnel site was reported as the Le Roy Mine (WL-511). It was later determined that the site was actually the Monitor tunnel. The Le Roy property, consisting of several claims reported to be within one mile of Adair (Annual Reports to Idaho Mine Inspector) and on the Monitor vein just west of the Monitor Mine (Sims, 1998), was never found. Day Mines places the five patented claims of the Le Roy Group in T. 46 N., R. 7 E., section 8 (IGS mineral property files). This is consistent with all the other information about the property, but does not pinpoint its location.

3.35.1 Site Location and Access (Figure 2.1-1b)

The Monitor Mine is near the Idaho-Montana border. The shaft is located near the center of the north edge of the SE¼, section 9, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.35-1). Access is via Forest Service Road 391 southeast from Roland Summit along the Idaho-Montana border for about 7 miles, then about ¼ mile to the southwest on a narrow jeep trail to the mine, which is on the ridge between Mineral and Olentange creeks. The Monitor tunnel is east of Manhattan Creek and about ¼ mile northeast of the site of Adair in the SW¼ of the SW¼, section 8, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.35-1). The site is along a poorly maintained pack trail and is shown as a prospect on the topographic map. An overgrown road, obscure in places, also leads up to what was most likely a loading chute or platform at the base of the dump. Both sites are on Forest Service land.

3.35.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 55) described the geology of the Monitor and nearby mines as follows: These deposits are all in limy and shaly sandstones representing the lower part of the Newland ("Wallace") formation, near the horizon of the Wishards sill. From the mine dumps it appears that the upper workings are in oxidized material, carrying large percentages of iron and some copper carbonates. In depth this is succeeded by chalcopyrite and pyrite in a gangue consisting mainly of calcite and siderite.

The principal vein exposed at the surface at the Monitor Mine was 15 feet thick and nearly vertical (Calkins and Jones, 1914)

3.35.3 Site History

The first claim at the Monitor was located on July 31, 1897, and the original owners were L.B. Hill, Otis Hill, and Louis Kuhn (Sims, 1998). The first shipment from the mine was in 1900 (Collier, 1906). In 1905, the mine shipped 360 tons of ore containing 18 percent copper, several dollars per ton in gold, and some silver (1905 Idaho Mine Inspector's Report). The ore was
shipped by wagon to Saltese, Montana (Sims, 1998), and then to the Tacoma smelter. The property had a 300-foot vertical shaft, which had been deepened to 400 feet by the following year. The mine shipped 600 tons of ore in 1906 and 500 tons in 1907. The Monitor Consolidated Copper Mining Company was organized in 1908 (IGS mineral property files), and that same year the property was bonded to the Success Mining Company, which developed the mine. By 1909, the shaft had reached 700 feet, and a drift was being run approximately 300 feet to the vein (Sims, 1998). In 1910, the property produced some ore (USGS Mineral Yearbook) before the hoist, buildings and other improvements were completely destroyed by fire (Pardee, 1911; Calkins and Jones, 1914).

The Montana-Idaho Copper Company was organized in 1914. (Based on news articles quoted by Sims (1998), many of the same people were involved with the Montana-Idaho Copper Company as with Monitor Consolidated Copper Company.) Montana-Idaho started work on a 7,500-foot tunnel from Adair, targeting an area 1,000 feet below the lowest workings of the 700-foot deep Monitor shaft. Plans called for other mines in the area to also use this tunnel for development. By late 1916, the long crosscut was 2,250 feet long. A stock exchange the following year completed the transfer of the Monitor Mine to Montana-Idaho (Sims, 1998). About 2,000 feet of work was done during the year ending in June 1917, and 1,142 feet of work in the next year brought the length of the crosscut up to 4,800 feet. The tunnel was reported to have cut the Monitor vein 3,865 feet from the portal. In 1923, the company shipped several lots of copper ore that had been produced during development.

In 1924, the company reorganized as the Montana-Idaho Copper Company of Idaho. The main purpose of the reorganization was to make the company's stock assessable. The mine was apparently idle while the company was trying to raise funds, but work resumed in 1925. The crosscut was 9,400 feet long, and total development on the property was about 12,900 feet. The mine was closed in 1925. By the middle of the following year, the company had dismantled its equipment and transferred its operations to a property in Montana. Montana-Idaho forfeited its corporate charter in 1929.

In 1941, a little copper ore was produced from the Monitor. The Monitor claims were part of the Adair Group held by Day Mines, Inc., from around 1949 until at least 1960. (The Idaho Mine Inspector's Reports focused on Day's active operations after 1960). Day Mines, Inc., merged with Hecla Mining Company in 1981. Based on information in Sims (1998), the Forest Service apparently acquired the Monitor in a land exchange with Hecla, probably in the late 1980s.

3.35.4 Environmental Conditions

3.35.4.1 Site Features

The Monitor Mine shaft was visited by John Kauffman on July 21, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 2, index 01:41:00-01:53:27). Documenting photographs are Roll K6, frames 9-12. The Monitor Mine
tunnel was visited by John Kauffman on July 8, 1998. The video segment for this site (identified as the Le Roy Mine, WL-511) follows the segment for the Monitor shaft. Documenting photographs are Roll K1, frames 20-25.

The upper part of the Monitor Mine consists of a caved shaft and a large waste dump (Figure 3.35-2). The lower site, about two miles to the west, has a caved adit and a large waste dump (Figure 3.35-3).

The shaft, which was 700 feet deep, is caved at the surface and is now expressed as a cone-shaped pit about 30 feet deep. Some of the shaft timbers are visible at the bottom (Figure 3.35-4). A large concrete slab, probably part of the headframe foundation, is also at the bottom of the pit. Another part of the headframe foundation and the hoist slab are on the northeast edge of the pit. The waste dump (Figure 3.35-5) extends from the pit to the northwest. It measures about 150 feet long, 10-12 feet wide on top and at least 50 feet across at the base, and about 100 feet down the face. The face has several mounds (Figure 3.35-6), possibly from different times of operation, and the northeast side has been modified by bulldozer work. The collapsed remains of a building or buildings are north of the shaft in the trees north of the access road. Recent claim notices were found at the Monitor shaft during the site visit, although these are probably invalid because of the Acquired Lands status of the site. The disturbed area covers about 1 acre.

The Monitor tunnel is caved and has a very large waste dump (Figure 3.35-3). Water is flowing from the adit at about 15 gallons per minute (Figure 3.35-7). The water follows the east edge of the dump and eventually disappears beneath the edge. The dump (Figures 3.35-8, 3.35-9, and 3.35-10) is 270 feet long, 15-45 feet wide, and at least 80 feet thick down the west side. Some fire brick was found west of the caved adit near the north end of the dump.

Several shallow cuts or short, caved adits and a possible shallow, caved shaft were found along the base of the dump. Immediately south of the possible shaft is a long, collapsed structure (Figure 3.35-11) that may have been a loading chute or platform. The disturbed area at this site covers about 2 acres.

3.35.4.2 Sample Locations

3.35.4.2.1 Solid Samples

No dump or stream sediment samples were collected at this site.

3.35.4.2.2 Water Samples

A sample was collected from the water flowing from the caved Monitor tunnel (K7089802). A sample (K7089803) was collected from a water seep on the overgrown road below the dump for the tunnel. An upstream sample (K7089804) was taken on Manhattan Creek above where the seep enters the creek. A downstream sample (K7089805) was collected on Manhattan Creek above the bridge over the creek at the old railroad grade.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7089802</td>
<td>Monitor tunnel, adit</td>
<td>130</td>
<td>46</td>
<td>7.98</td>
<td>15</td>
<td>Yes</td>
</tr>
<tr>
<td>K7089803</td>
<td>Monitor tunnel, seep below dump</td>
<td>118</td>
<td>47</td>
<td>7.85</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>K7089804</td>
<td>Monitor tunnel, upstream</td>
<td>54</td>
<td>45</td>
<td>7.98</td>
<td>4-8 ft. wide, 1-2 ft. deep</td>
<td>Yes</td>
</tr>
<tr>
<td>K7089805</td>
<td>Monitor tunnel, downstream</td>
<td>63</td>
<td>48</td>
<td>8.0</td>
<td>6 ft. wide, 0.5-2 ft. deep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.35.4.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

The adit water sample (K7089802) exceeds the Aquatic Life Chronic standard for cadmium in the dissolved metals screen and equals or exceeds all standards for cadmium in the total recoverable metals screen. The seep sample (K7089803) equals or exceeds both Aquatic Life standards for cadmium and is at the lower limit of the Aquatic Life Chronic standard for copper in the dissolved metals screen. This sample also equals or exceeds all standards for cadmium in the total recoverable metals screen. The upstream (K7089804) and downstream (K7089805) samples on Manhattan Creek do not exceed any water quality standards.

3.35.5 Structures

At the upper site, the remains of a collapsed building (or buildings) were found north of the access road about 100 feet north and slightly east of the Monitor shaft. At the Monitor tunnel, the only structure found was the collapsed loading chute or platform. Old cabins at the site of Adair probably served as a base for work at the mine.

3.35.6 Safety

Although the pit at the Monitor shaft is fairly deep, it does not present a safety hazard. The shaft appears to be completely caved and the sides of the pit are not excessively steep. No safety hazards were found at the Monitor tunnel site.
Figure 3.35-2. Sketch map of the Monitor Mine shaft.
Figure 3.35-3. Sketch map of the Monitor Mine adit.
Figure 3.35-4. Looking southeast into the caved Monitor shaft. Some of the support timbers can be seen near the bottom of the pit. The large concrete slab next to the shaft is one of the footings for the headframe that has sloughed into the pit (Roll K6, frame #9).
Figure 3.35-5. Looking northwest over the surface of the waste dump for the Monitor shaft (Roll K6, frame #10).

Figure 3.35-6. Looking northwest down the northwest end of the waste dump for the Monitor shaft. The mounds may represent different periods of operation (Roll K6, frame #12).
Figure 3.35-7. Moss growing in the water flowing from the Monitor tunnel. The caved adit is behind the brush at the top of the photograph (Roll K1, frame #20).
Figure 3.35-8. Looking south across the surface of the waste dump for the Monitor tunnel (Roll K1, frame #21).

Figure 3.35-9. Looking southwest down the west side of the waste dump for the Monitor tunnel. Manhattan Creek is in the valley below the dump on the left side of the picture (Roll K1, frame #22).
Figure 3.35-10. Looking southeast up the west side of the waste dump for the Monitor tunnel. A thin cover of grass and weeds is growing on part of the dump (Roll K1, frame #25).

Figure 3.35-11. Collapsed boards and timbers of a structure at the base of the waste dump, possibly a loading platform (Roll K1, frame #24).
3.36 RICHMOND MINE (Site No. WL-504)
Alternate name—Adair Group.

The Richmond Mine was connected by a tunnel to the St. Lawrence Mine, an adjoining property on the Montana side of the divide. However, the St. Lawrence was developed as a separate property from the Richmond.

3.36.1 Site Location and Access (Figure 2.1-1b)

The Richmond Mine is on the Idaho-Montana border in the NE¼, section 9, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.36-1). The upper workings are in the N½ of the NE¼, section 9, along Forest Service Road 391. The Richmond adit, the lowermost of the workings, is in the SW¼ of the NE¼, section 9. It can be reached from Forest Service 391 by taking the jeep trail to the Monitor Mine (about ¼ mile), then driving north another ½ mile to the adit. All workings are on Forest Service land.

3.36.2 Geologic Features (Figure 2.2-1b)

Pardee (1911) notes that the Richmond is in limy and shaly sandstone of the lower Wallace Formation. Calkins and Jones (1914, p. 196) describe the vein as follows:

The vein is of the same general character as that of the Monitor mine and is thoroughly oxidized to the base of the present workings. The greater part consists of a paste of limonite derived from the decomposition of siderite. This is traversed by veins of quartz, mostly parallel to the walls, which enwrap pseudomorphs after siderite crystals. Joints and small cavities in the gossan are lined with malachite, but the copper content of the material seen is evidently small. The vein is from 5 to 10 feet wide, dips very steeply to the north, and strikes N. 75° E.

3.36.3 Site History

The Richmond Mine was located in 1894, and the Richmond Mining, Milling, and Reduction Company was incorporated in 1897 (IGS mineral property files). According to Sims (1998), the mine shipped ore to Saltese, Montana, between 1905 and 1910. Like most of the other mines in the area, the Richmond was burned out by the 1910 forest fire. The mine had one tunnel and four shafts, and the 40-horsepower steam hoisting plant was among the equipment destroyed by the fire (IGS mineral property files). In 1912, the principal shaft at the Richmond was 175 feet deep, with a 350-foot drift at the bottom. The adit was being driven from lower on the slope to intersect the vein several hundred feet below the shaft (Calkins and Jones, 1914). The mine made some ore shipments in 1913. At that time, the property consisted of two patented claims. Considerable development was carried out in 1914. In 1915, the Richmond made several shipments of oxidized copper ore, containing gold and silver, and additional ore was shipped the following year. In 1916, work started on an 8,800-foot-long aerial tramway between the mine and Adair. The tramway, which cost the company $22,400, was completed the following year.
In 1917, the Richmond shipped 7,766 tons of oxidized copper ore assaying 6.17 percent copper and 0.156 ounce of gold. The mine produced nearly a million pounds of copper. The company's receipts were $292,117 and the net profit, $97,235. The crosscut tunnel was 600 feet long.

In 1918, the mine shipped 3,912 tons of ore, which averaged 8.4 percent copper, 0.189 ounce of gold, and 0.64 ounce of silver per ton. This ore had a net value of $23 per ton, after deducting freight and smelter charges. Total development for the year was 1,685 feet, including 1,220 feet of drifting and cross-cutting and 465 feet of raising. More than 1,000 tons of oxidized copper ore was shipped the following year. The shaft was sunk 200 feet, and drifts were run at the 450-foot and 500-foot levels. Sulphide ore was found at these levels. The Company forfeited its corporate charter in 1920.

The mine was idle for the next two years. The Richmond Consolidated Mining Company was organized in 1923. The new company began work on a 1,600-foot crosscut, which started from a point about 2 miles inside the Idaho-Montana tunnel. About 1,000 feet of work was done at the mine in 1923. Several lots of copper ore were produced from this work. Total development at the time was about 8,000 feet, including one 200-foot vertical shaft, 1,600 feet of raises, and 6,200 feet of crosscuts, tunnels, and drifts. In 1924, the crosscut tunnel was driven 1,200 feet to the vein, and 900 feet of drifting was done on the vein. Development continued into 1925 or early 1926, after which the mine was closed. Total development at the Richmond was about 12,000 feet, including three vertical shafts totaling 1,200 feet, and 9,800 feet of tunnels, crosscuts, and drifts. Richmond Consolidated forfeited its corporate charter in 1932.

The Monitor claims were part of the Adair Group held by Day Mines, Inc., from around 1949 until at least 1960. (The Idaho Mine Inspector's Reports focused on Day's active operations after 1960).

3.36.4 Environmental Conditions

3.36.4.1 Site Features

The Richmond Mine was visited by John Kauffman on July 21, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:00:47-00:25:41). Documenting photographs are Roll K6, frames 13-25, and Roll K7, frames 1-7.

The Richmond property consists of a lower adit and dump (Figure 3.36-2) at the head of Mineral Creek and a series of upper shafts, pits, and trenches (Figure 3.36-3) on the Idaho-Montana border. The adit is caved and has water flowing from beneath the caved debris at about 10 gallons per minute (Figure 3.36-4). The water flows across the surface of the waste dump and seeps into the rock on the dump face. The dump (Figures 3.36-5 and 3.36-6) measures about 110 feet long, 20-70 feet wide, and about 100 feet down the face. It has a large west lobe that merges with a smaller east lobe. Two trenches have been bulldozed into the nose of each lobe (Figure 3.36-2). The toe of the dump barely reaches Mineral Creek. Some waste rock appears to have
been used to create a level pad next to the west end of the dump. This pad is the foundation of the tram station, which is now a pile of collapsed timbers (Figure 3.36-7). Concrete footings east of the adit and north of the road (Figure 3.36-8) probably supported compressors or other equipment. The disturbed area covers about 2 acres.

The upper workings consist of a series of caved shafts, pits, and trenches on both sides of Forest Service Road 391. Most of these workings are aligned in a northeast-southwest direction (Figure 3.36-3). Seven workings appeared to be caved shafts, although some may have been deep prospect pits. The shafts are numbered in the order they were found. Three trenches (one of which is possibly a short, caved adit) were also found, as well as two shallow pits.

Shaft 1 is about 20 feet north of Forest Service Road 391. The shaft is caved and forms a conical depression 15 feet across and 10 feet deep (Figure 3.36-9). A narrow rim of waste rock encircles the pit and extends outward about 20 feet on the south side. Fifty to seventy-five feet south of the road are two piles of waste rock that are not directly associated with any of the shafts. Pile 1 (Figure 3.36-10), nearest to the road, is about 40 feet long, 8-10 feet wide on top, and about 10 feet high. Pile 2 (Figure 3.36-11), near the southeast end of pile 1, is about 30-40 feet long, 6-10 feet wide, and about 10 feet high. Two shallow pits (Figure 3.36-12) are just north of pile 1.

Shaft 2 (Figure 3.36-13), about 30 feet southwest of the north end of pile 1, is 20 feet across and 15 feet deep. It does not have a rim of waste material. Conifer saplings are growing in the conical depression.

Shaft 3, 20-30 feet southwest of Shaft 2, is about 30 feet in diameter and 15 feet deep (Figure 3.36-14). A low rim of waste rock extends around % of the pit (Figure 3.36-15).

Shaft 4, about 50 feet southwest of Shaft 3, is shaped like an hour-glass. The pit is 50 feet long, about 20 feet across, and 15 feet deep. The sides have slumped, carrying a number of small trees into the pit (Figure 3.36-16).

Shaft 5 is located 200-300 feet north of Shaft 1 in a cluster of trees. This shaft is caved and filled with debris about 10-12 feet down (Figure 3.36-17). It is about 5 feet long and 4 feet wide, and has log cribbing similar to that at the Copper Kopje (section 3.34). Two trenches are about 75 feet north of Shaft 5 in an open area on the ridge. The trenches are about 100 feet apart, parallel to each other, and very similar in appearance (Figures 3.36-18 and 3.36-19). Both are about 50-70 feet long, 10 feet wide, and a maximum of 6-10 feet deep. Excavated material has been pushed out the south ends into piles that appear to be waste dumps when seen from Forest Service Road 391 (Figure 3.36-20).

Further reconnaissance of the area revealed two more shafts and a trench or caved adit along the northeast-southwest trend, all southwest of Shaft 4. Shafts 6 and 7 are side by side (Figure 3.36-21). Both are about 15 feet in diameter and 12-15 feet deep. Shaft 6, on the southeast, has some sheets of corrugated metal siding in the pit (Figure 3.36-22). A small rim of waste rock is on the
southeast side of Shaft 6. About 50 feet farther to the southwest is a northwest-trending trough on the slope that is either a trench or a short, caved adit. Saplings and small trees up to 8 feet tall are growing on the floor of the trough (Figure 3.36-23). The waste dump at the southeast end is small and covered with a thick stand of small trees.

No other workings were found, but other trenches and pits probably exist along the northeast-southwest trend. It should be noted that it is unclear which of the seven shafts described in this report correspond to the shafts mentioned in published reports and IGS's mineral property files.

Total area disturbed at the upper workings covers at least 5 acres.

3.36.4.2 Sample Locations

3.36.4.2.1 Solid Samples

A sample (K7219804) was collected from the face of the larger lobe of the waste dump at the Richmond adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7219804</td>
<td>Richmond Mine, adit waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.36.4.2.2 Water Samples

A sample (K7219803) was taken from the water flowing from the Richmond adit.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (μS)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7219803</td>
<td>Richmond Mine, adit</td>
<td>68</td>
<td>47</td>
<td>7.6</td>
<td>10</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.36.4.2.3 Analytical Results

Solid Samples (Tables 2.5-3 and 2.5-4)

The sample from the waste dump for the Richmond adit (K7219804) exceeds background and environmental levels for arsenic, cadmium, copper, iron, nickel, and lead in the element screen. In the TCLP for metals screen, no metals of interest are leaching from the sample.
Water Samples (Tables 2.5-1 and 2.5-2)

Adit water sample K7219803 does not exceed any water quality standards.

3.36.5 Structures

At the Richmond adit, the timbers and boards from the collapsed tram station are near the west end of the waste dump. East of the dump and south of the access road are the remains of three sheds or small cabins (Figure 3.36-5). These were built on small flat areas stepped down the slope east of the dump. At the upper workings, there is a leveled site with old boards, fire brick, and scrap metal, indicating the remains of a shop building. This site is north of Shaft 2 and on the north side of a spur road that splits from Forest Service Road 391.

3.36.6 Safety

No serious safety hazards were found at this site. Although falling down the steep side slopes of the caved shafts could result in injury, the slopes are sufficiently shallow to prevent entrapment.
Figure 3.36-1. Location map of the Richmond Mine, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
Figure 3.36-2. Sketch map of the adit at the Richmond Mine.
Figure 3.36-3. Sketch map of the upper shafts and trenches at the Richmond Mine.
Figure 3.36-4. Looking north at the caved adit at the Richmond Mine. A steady stream of water flows from the adit across the dump (Roll K6, frame #13).
Figure 3.36-5. Looking west at the east end of the waste dump for the Richmond adit. The boards and scrap metal in the lower foreground are the remains of several small cabins or sheds (Roll K6, frame #16).

Figure 3.36-6. Looking west at the western part of the waste dump for the Richmond adit. Mineral Creek is in the trees at the base of the dump (Roll K6, frame #17).
Figure 3.36-7. Looking west at the collapsed tram station off the west end of the waste dump for the Richmond adit. Ore was trammed from here to Adair, about 2 miles to the southwest (Roll K6, frame #14).

Figure 3.36-8. Looking east from the surface of the waste dump for the Richmond adit. Several concrete footings (center and left of picture) probably supported compressors and other equipment. The road on the right comes from the Monitor shaft (Roll K6, frame #15).
Figure 3.36-9. Looking north at caved Shaft 1 at the upper Richmond workings. The circular pit has a low rim of fine rock debris and a small waste dump on the south side (Roll K6, frame #18).

Figure 3.36-10. Looking southwest at waste rock pile 1, just south of Forest Service Road 391 (Roll K6, frame #19).
Figure 3.36-11. Looking southwest at waste rock pile 2 from pile 1. Neither of the two piles appear to be directly associated with any of the workings (Roll K6, frame #20).

Figure 3.36-12. Looking north at two shallow prospect pits from waste rock pile 1 (Roll K6, frame #21).
Figure 3.36-13. Caved Shaft 2 at the upper Richmond workings. The pit is about 15 feet deep. It has numerous small trees and saplings growing on the floor and sides (Roll K6, frame #22).

Figure 3.36-14. Caved Shaft 3 at the upper Richmond workings. This circular pit is about 15 feet deep and 30 feet in diameter (Roll K6, frame #24).
Figure 3.36-15. Low rim of waste rock around part of caved Shaft 3 of the upper Richmond workings, looking west (Roll K6, frame #23).
Figure 3.36-16. Looking south into the west end of caved Shaft 4 of the upper Richmond workings. This part of the pit is about 15 feet deep (Roll K6, frame #25).
Figure 3.36-17. Looking down into caved Shaft 5 of the upper Richmond workings. The white mass in the lower right corner of the pit is snow. Several moss-covered timbers can be seen on the other side of the pit wall. This cribbing is similar to that at the Copper Kopje Prospect (section 3.34) (Roll K7, frame #4).
Figure 3.36-18. Looking north up the axis of the west trench at the upper Richmond workings (Roll K7, frame #6).
Figure 3.36-19. Looking north up the axis of the east trench at the upper Richmond workings (Roll K7, frame #7).
Figure 3.36-20. Looking northeast at the “waste dumps” of the east trench (on the right) and west trench (on the left) (Roll K7, frame #5).

Figure 3.36-21. Looking north across caved Shafts 6 and 7 at the upper Richmond workings. The pit of Shaft 6 is off the bottom of the picture. The pit of Shaft 7 is in the center of the photograph (Roll K7, frame #2).
Figure 3.36-22. Looking north into caved Shaft 6. Several sheets of corrugated metal and a few old boards are sloughed into the pit (Roll K7, frame #1).
Figure 3.36-23. Looking south down the trough of either a caved adit or long prospect trench at the southwest end of the upper Richmond workings. The trough is barely discernible because of the thick stand of fir saplings and small trees (Roll K7, frame #3).
3.37 COPPER AGE(?) PROSPECT (Site No. WL-509)
Alternate name—Copper Edge.

Calkins and Jones (1914, p. 196) report that this prospect is "developed by a tunnel just east of the divide and a short distance south of the Monitor mine." Presumably, the Idaho-Montana divide is the one referred to in this description, which would place the Copper Age in Montana. Calloway (1928) shows a "Copper Age & Edison" group south of the St. Lawrence claims. Therefore, this prospect may not be the Copper Age or it may be a part of the Copper Age that was developed after 1914.

3.37.1 Site Location and Access (Figure 2.1-1b)

A prospect presumed to be the Copper Age is just east of the Idaho-Montana border along the west side of Forest Service Road 391, in the NW¼ of the SE¼, section 10, T. 46 N., R. 7 E., on the Adair 7.5-minute quadrangle (Figure 3.37-1). The prospect is on Forest Service land and is shown on the topographic map by a prospect symbol next to Forest Service Road 391.

3.37.2 Geologic Features (Figure 2.2-1b)

The Copper Age Prospect is in rocks of the Wallace Formation near a large diabase sill (Harrison and others, 1986). The vein, probably on the Montana side of the divide, is 10 feet thick, nearly vertical, and strikes N. 65° W. Minor chalcopyrite and chalcocite occur in a gangue of siderite (Calkins and Jones, 1914).

3.37.3 Site History

In 1912, the Copper Age had one tunnel on the east side of the divide (Calkins and Jones, 1914).

3.37.4 Environmental Conditions

3.37.4.1 Site Features

This prospect was visited by John Kauffman on July 21, 1998. A video segment describing the site is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:25:45-00:31:46). Documenting photographs are Roll K7, frames 8-11.

The prospect at this site consists of what appears to be a caved adit and a caved shaft with overlapping waste dumps (Figure 3.37-2). The shaft (Figure 3.37-3) was dug later than the adit, and the pit is about where the portal of the adit would have been located. The waste dump for the shaft forms a low rim around the west side of the pit and extends down about 10 feet to the dump for the adit (Figure 3.37-4). The caved adit forms a shallow trough (Figure 3.37-5) that extends up the slope about 30 feet, almost to the road. The waste dump for the adit (Figure 3.37-4) is 30 feet long, 15 feet wide on top, and about 10 feet thick. A flat, rectangular area north of the caved
adit may have been a building site, although no signs of a structure were found on its surface. The collapsed remains of a structure are in the trough formed by the caved adit to the east of the shaft pit. The disturbed area is less than 0.25 acre.

A second prospect is shown on the topographic map to the north and west of this adit and shaft. All that was found at this location is a very small pit about 8 feet long, 6 feet wide, and 4 feet deep (Figure 3.37-6). It is doubtful, however, that such a small pit would be shown on the map as a prospect, so it is likely other workings are in the area. The forest cover on this slope is relatively thick, and brush limits visibility.

3.37.4.2 Sample Locations

3.37.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.37.4.2.2 Water Samples
No water samples were collected at this site.

3.37.5 Structures

The collapsed remains of an unidentified structure are lying across the trough of the caved adit just east of the pit formed by the caved shaft.

3.37.6 Safety

The shaft and adit appear to be completely caved and are not safety hazards.
Figure 3.37-1. Location map of the Copper Age (?) Prospect, Shoshone County, Idaho (U.S. Geological Survey Adair 7.5-minute topographic map).
very small prospect pit

dry gully

400-500 ft elevation

flat area, possible cabin site

shaft dump

adit dump

caved shaft

collapsed structure over caved adit

Figure 3.37-2. Sketch of the Copper Age Prospect.
Figure 3.37-3. Looking down into the caved shaft of the Copper Age Prospect. The logs leaning against the side of the pit may have been support timbers. A small opening (to right of the post in the center of the photograph) did not appear to continue into the shaft (Roll K7, frame #9).
Figure 3.37-4. Looking west at the side of the waste dumps for the Copper Age shaft (foreground) and adit (upper left) (Roll K7, frame #10).
Figure 3.37-5. Shallow trough of the caved adit above the pit of the caved shaft (at the lower right corner of the picture). Logs from a collapsed structure are lying across the trough to the right of the backpack (Roll K7, frame #8).
Figure 3.37-6. Looking east at a small, shallow prospect. This site is a considerable distance down slope and northwest of the Copper Age shaft and adit (Roll K7, frame #11).
3.38 WARD PROSPECT (Site No. WL-526)
Alternate name—Gold Mountain Lode; Ward Peak Prospect.

3.38.1 Site Location and Access (Figure 2.1-1b)

The Ward Prospect is on the southeast flank of Ward Peak in the NE⁴, unsurveyed section 12, T. 45 N., R. 8 E., on the McGee Peak 7.5-minute quadrangle (Figure 3.38-1). The prospect pits and adit are 400-600 feet above Forest Service Road 391 on the mostly open hillside at the base of the talus slope below Ward Peak. A pack trail (Forest Service Trail 250) crosses the slope just below the waste dump for the adit, which is shown on the topographic map by a prospect symbol. This site is on Forest Service land.

3.38.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 54) described the Ward Prospect as follows:

The Ward mine is situated on the southeast spur of Wards Peak, near milepost 161 of the Idaho-Montana boundary, and lies within the two States. It is one of a group of claims lying mostly in Montana, the others of which were not visited. It is developed by adit level and drifts aggregating 1,200 feet in length, a shaft 80 feet deep, and some minor openings. The country rock is pale greenish banded shale with thin quartzite beds, representing the lower part of the Newland ("Wallace") formation. A vertical diabase dike of irregular width trending about N. 75° W. cuts the shales. A mineralized shear zone 50 feet or more wide trending west-northwest affects the diabase principally. Within it are numerous seams and veins of quartz, calcite, and siderite, carrying small amounts of chalcopyrite, pyrite, and chalcocite. Specks of the chalcopyrite and pyrite have been also introduced along the innumerable shearing planes of the zone, and the whole mass is said to assay $4 and more to the ton in gold. At the time of the visit a few tons of this ore was being shipped to a smelter as a test sample.

3.38.3 Site History

In 1905, there was a shaft on this property (Collier, 1906). By 1910, the mine had an 80-foot shaft, an adit and drifts totaling 1,200 feet of workings, and some minor openings (Pardee, 1911). According to Sims (1998), this property was located by J. F. Ward, Ira Petty, and George M. Bourguin in 1909.

3.38.4 Environmental Condition

3.38.4.1 Site Features

The Ward Prospect was visited by John Kauffman on July 22 and July 29, 1998. A video segment describing the property is on the Avery and St. Maries Districts Videotape (Tape 3, index
00:31:50-00:41:02). Documenting photographs are Roll K7, frames 12-14, and Roll K7, frames 22-26.

This prospect consists of a nearly caved adit and two groups of prospect pits and trenches. One set of pits and trenches is north of the adit and the other is to the east (Figure 3.38-2). The adit is caved for at least 15-20 feet from the portal (Figure 3.38-3). However, there is a small opening (Figure 3.38-4) at the end of the caved zone, hidden by the overhanging limbs of a tree, that appears to go down into the adit. The waste dump (Figure 3.38-5) is relatively small, measuring 20 feet long, 18 feet wide, and 20 feet down the face. On the east edge of the dump, adjacent to the portal area of the adit, are the remains of a rock wall 6 feet square that may have served as a small shelter or a storage building.

Three small, shallow prospect pits and one larger pit are at the base of the talus slope below Ward Peak. These pits are 200 feet in elevation above, and slightly northwest of, the adit. The larger pit is 12 feet long, 10 feet wide, and about 8 feet deep.

About 700 feet east of these pits and at about the same elevation are a group of at least ten shallow pits and two trenches (see Figure 3.38-2, above). The largest pit is about 10 feet in diameter and 8 feet deep, with the excavated material piled around the edge (Figure 3.38-6). This pit is also at the bottom edge of the talus slope. The other pits and trenches (Figure 3.38-7) extend down the slope 150-200 feet. White quartz vein fragments are present around each of the pits.

The adit, pits, and trenches extend over an area of several acres, although the actual disturbed area is less than 0.5 acre.

3.38.4.2 Sample Locations

3.38.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.38.4.2.2 Water Samples
No water samples were collected at this site.

3.38.5 Structures
No structures were found at this site.

3.38.6 Safety

The opening into the adit is small and hidden from view by tree limbs, so it is probably not a serious hazard. However, the pack trail does appear to be fairly well used by hikers, and some may be bold enough to attempt to crawl into the opening. All of the pits and trenches are shallow and have gentle to moderately steep sides. They should not be a hazard.
Figure 3.38-1. Location map of the Ward Prospect, Shoshone County, Idaho (U.S. Geological Survey McGee Peak 7.5-minute topographic map).
Figure 3.38-3. Looking north along the trough of the caved adit at the Ward Prospect. A small opening that appears to go down into the adit is hidden beneath the fir tree at the top of the photograph (Roll K7, frame #13).
Figure 3.38-4. Close-up of the small opening into the Ward adit. From here, a small crawl space appeared to continue into the adit (Roll K7, frame #14).

Figure 3.38-5. Looking southwest down the south slope of Ward Peak over the small waste dump of the adit at the Ward Prospect. The pile of larger rocks at the upper edge of the dump are the remnants of a rock wall. The Quartz Creek drainage is in the distance (Roll K7, frame #12).
Figure 3.38-6. Looking south at the largest of the eastern group of prospect pits (lower right) and several other pits and trenches (background) at the Ward Prospect (Roll K7, frame #23).

Figure 3.38-7. Looking east at several of the shallow pits (foreground) and a trench (background) at the eastern group of prospects at the Ward Prospect. The trench is the same one seen in the middle left of Figure 3.38-6 (Roll K7, frame #24).
3.39 BLACK BEAR CLAIM PROSPECT (Site No. WL-538)

3.39.1 Site Location and Access (Figure 2.1-1b)

The Black Bear Claim Prospect is on the west side of the St. Joe River about ¼ mile north of the mouth of Bluff Creek in the SW¼ of the NW¼, section 5, T. 44 N., R. 8 E., on the Conrad Peak 7.5-minute quadrangle (Figure 3.39-1). The prospect is across the river from Forest Service Highway 50 (Figure 3.39-2) and can only be reached by boat, by wading the river, or by hiking along the cliffs from Bluff Creek, although there is no path and the route is precipitous in places. The site is on Forest Service land.

3.39.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 56) gives the following description of the Black Bear Prospect:

[A] short adit on the Black Bear claim exposes a 4-foot vein striking N. 85º W.
and consisting chiefly of scapolite with relatively small amounts of sodic
plagioclase, calcite, epidote, and garnet. It contains an irregular streak of partly
oxidized pyrite a few inches thick and is separated into two unequal layers by a 6-
inch parting of diabase. The vein is vertical and has one slickensided gouge-lined
wall upon which post-mineral faulting has occurred. The diabase is well exposed
here and contains many shear zones. These are more or less mineralized, usually
showing veinlets of quartz and calcite and the green stain of copper carbonates.

3.39.3 Site History

In 1910, there was a short adit on this prospect (Pardee, 1911).

3.39.4 Environmental Conditions

3.39.4.1 Site Features

The prospect was videotaped and photographed from the north side of the St. Joe River along the highway by John Kauffman on July 22, 1998. A video sequence describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:41:05-00:44:12). Documenting photograph is Roll K7, frame 15.

An open adit with a timbered portal can be seen from the highway. The adit is at the base of the cliffs and about 15 feet above river level (Figure 3.39-3). Ferns growing in front of the portal indicate a possible seep, although no water is flowing from the adit to the river. Very little of the waste dump remains. Less than 0.1 acre is disturbed at this prospect.
3.39.4.2 Sample Locations

3.39.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.39.4.2.2 Water Samples
No water samples were collected at this site.

3.39.5 Structures
There are no structures at this site.

3.39.6 Safety
The open adit is the only potential safety hazard at this site, although it is not easily seen. Rafters and other water enthusiasts who travel the river might notice and explore the adit. The lack of direct access will limit significantly the number of potential visitors.
Figure 3.39-1. Location map of the Black Bear Claim Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map).
Figure 3.39-2. Sketch map of the Black Bear Claim Prospect.
Figure 3.39-3. Open adit (just above the center of the picture) at the Black Bear Claim Prospect. The cliffs above the adit consist of a diabase intrusive. The adit is about 15 feet above the edge of the St. Joe River. Forest Service Highway 50 is at the lower edge of the photograph (Roll K7, frame #15).
3.40 EUREKA PROSPECT (Site No. WL-535)

3.40.1 Site Location and Access (Figure 2.1-1b)

The Eureka Prospect is on the east side of the St. Joe River across from the mouth of Bluff Creek near the center of the W½, section 5, T. 44 N., R. 8 E., on the Conrad Peak 7.5-minute quadrangle (Figure 3.40-1). Access from the highway is via Forest Service Trail 5 at Haggerty Creek. The trail crosses the creek and heads south along contour. At the first switchback, a very old foot or horse trail continues south along contour. This prospect is about 400 feet south of the switchback (Figure 3.40-2) and 200 feet above the river on Forest Service land.

3.40.2 Geologic Features (Figure 2.2-1b)

The Eureka Prospect is “on a persistent quartz outcrop trending N. 68° W. This lode is in metamorphosed sandstones representing the lower part of the Newland (“Wallace”) formation and is apparently a replacement along a crushed zone. It varies from 1 to 10 feet in width and consists of massive white quartz together with heavily ferruginous porous quartz and some undecomposed siderite and pyrite” (Pardee, 1911, p. 56).

3.40.3 Site History

The Eureka claims were staked by Isaac Hegarty (Pardee, 1911). “Hegarty” is probably a variant spelling of “Haggerty”, which is how the name for nearby Haggerty Creek is spelled on the topographic map.

3.40.4 Environmental Conditions

3.40.4.1 Site Features

The Eureka Prospect was visited by John Kauffman on July 22, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:44:16-00:48:32). Documenting photographs are Roll K7, frames 16-18.

This prospect consists of an open adit driven eastward into the hillside (Figures 3.40-3 and 3.40-4). The adit may be relatively short, because there is very little waste rock. Some of the dump may have been removed by seasonal erosion in the shallow gully beside the adit. The remaining material forms a small dump about 10 feet long parallel to the slope, 6 feet wide, and about 6 feet thick. A damp area and a narrow, scoured channel in front of the adit indicates a very minor seep, which may flow early in the year. The disturbed area at the site is minimal.

3.40.4.2 Sample Locations

3.40.4.2.1 Solid Samples

No waste dump samples were collected at this site.
3.40.4.2.2 **Water Samples**
No water samples were collected at this site.

3.40.5 **Structures**
No structures were found at this site.

3.40.6 **Safety**

The open adit is the only safety hazard. However, beyond the switchback on Forest Service Trail 5, the path to the adit becomes inconspicuous and is difficult to follow in places. It is unlikely that many people will find this prospect.
Figure 3.40-1. Location map of the Eureka Prospect, Shoshone County, Idaho (U.S. Geological Survey Conrad Peak 7.5-minute topographic map).
Figure 3.40-2. Sketch map of the Eureka Prospect.
Figure 3.40-3. Looking east at the open portal of the Eureka Prospect. The portal timbers are rotten but still upright (Roll K7, frame #16).
Figure 3.40-4. Inside view of the adit at the Eureka Prospect. The tunnel was driven along a vertical quartz vein two feet wide (Roll K7, frame #17).
3.4.1 SETSER PROSPECT (Site No. WL-523)
Alternate name—Nelson Peak Prospect.

3.4.1.1 Site Location and Access (Figure 2.1-1b)

The Setser Prospect is on the north side of the ridge east of Nelson Peak in the SE¼, section 5, T. 45 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle (Figure 3.41-1). Access is by foot (or possibly trail bike) from Packsaddle Campground along the St. Joe River. From the campground, Forest Service Trail 26 heads north for 3.5 miles, where it connects with Forest Service Trail 186 (Nelson Ridge Trail). About 1 mile northeast on Forest Service Trail 186, the Nelson Peak trail heads northwest to the saddle east of Nelson Peak. The trail gains about 3,000 feet in elevation between the trail head at Packsaddle Campground and Nelson Peak. The prospect is on Forest Service land.

3.4.1.2 Geologic Features (Figure 2.2-1b)

Pardee (1911, p. 61) reported:
A shear zone is exposed, the planes of which bear irregular “knife-blade” seams of ore consisting of galena and sphalerite, with some chalcopyrite and pyrite. Fairly large pieces of “float” galena, said to have been found in the vicinity, indicate a possible occurrence of larger ore bodies. The shear zone trends apparently east and west. The country rock is bluish and greenish shale representing the upper part of the Newland (“Wallace”) formation.

3.4.1.3 Site History

In 1910, there was an adit and several open cuts on the Setser claim (Pardee, 1911). This prospect is near the summit of Nelson Peak, which was formerly known as Packsaddle Mountain.

3.4.1.4 Environmental Conditions

3.4.1.4.1 Site Features

The Setser Prospect was visited by John Kauffman on July 23, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:48:36-00:54:50). Documenting photographs are Roll K7, frames 19-20.

The adit mentioned by Pardee was not found, but there are over a dozen shallow pits just below the north side of the ridge crest (Figure 3.41-2). In general, these were all about 4-6 feet in length or in diameter and 3-4 feet in depth. All were sloughed in, with brush and grass growing on the floor and sides (Figures 3.41-3 and 3.41-4). The hillside is brush- and tree-covered, so an adit could easily have been overlooked. It does not appear that there has been any recent activity on the claims, and probably none has occurred since the early part of the century. The pits are scattered over an area of several acres, but the actual disturbance is minimal.
3.41.4.2 Sample Locations

3.41.4.2.1 Solid Samples
No waste dump samples were collected at this site.

3.41.4.2.2 Water Samples
No water samples were collected at this site.

3.41.5 Structures
No structures were found at this site.

3.41.6 Safety
No safety hazards were found at this site.
Figure 3.41-1. Location map of the Setser Prospect, Shoshone County, Idaho (U.S. Geological Survey Shefoot Mountain 7.5-minute topographic map).
Figure 3.41-2. Sketch map of the Setser Prospect.
Figure 3.41-3. One of the numerous shallow prospect pits at the Setser Prospect near Nelson Peak. The Nelson Peak trail passes a few feet above this pit (Roll K7, frame #20).
Figure 3.41-4. Another of the shallow, brush- and grass-filled pits at the Setser Prospect (Roll K7, frame #19).
3.42 MARBLE CREEK PEGMATITE (Site No. SP-358)

3.42.1 Site Location and Access (Figure 2.1-1a)

The Marble Creek Pegmatite Prospect is on the Marble Creek road in the NE¼ of the NW¼, section 35, T. 45 N., R. 3 E., on the Marble Mountain 7.5-minute quadrangle (Figure 3.42-1). The prospect is on an east-facing slope beside Forest Service Road 321. The site, at the 5-mile marker on the road, is probably on land owned by the Potlatch Corporation. Forest Service land is just to the north in section 26.

3.42.2 Geologic Features (Figure 2.2-1a)

The rocks in the area around this site are Prichard Formation (Griggs, 1972). The pit is in bedded quartzite and schist with thin pegmatite layers and lenses.

3.42.3 Site History

Mr. Jim Northrup (US Forest Service, Panhandle National Forest Regional Office, personal communication, 1999) indicated that material from the quarry was used during the 1960s for road construction. However, the mica in the schistose rock made the road extremely slick, and the material was eventually scraped off the edge of the road.

3.42.4 Environmental Conditions

3.42.4.1 Site Features

The Marble Creek Pegmatite Prospect was visited by John Kauffman on July 27, 1998. A video segment describing the prospect is on the Avery and St. Maries Districts Videotape (Tape 3, index 00:54:55-00:57:19). Documenting photograph is Roll K7, frame 21.

This prospect consists of a cut into the slope (Figure 3.42-2) on the west side of the road. The cut is about 100-125 feet long and about 60-75 feet high, with mounds of rock rubble piled along the edge of the road. The disturbed area covers about 0.25 acres.

3.42.4.2 Sample Locations

3.42.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.42.4.2.2 Water Samples

No water samples were collected at this site.
3.42.5 Structures
There are no structures at this site.

3.42.6 Safety
No safety hazards were identified at this site.
Figure 3.42-1. Location map of the Marble Creek Pegmatite Prospect, Shoshone County, Idaho (U.S. Geological Survey Marble Mountain 7.5-minute topographic map).
Figure 3.42-2. Looking northwest at the quarry face of the Marble Creek Pegmatite Prospect. Forest Service Road 321 is in the lower foreground (Roll K7, frame #21).
3.43 TRI-STATE CEDAR CORPORATION (Site No. SP-354)

3.43.1 Site Location and Access (Figure 2.1-1a)

A site that is probably the Tri-State Cedar Corporation Prospect is on the west side of Marble Creek Road (Forest Service Road 321) about 1.8-2 miles south of the St. Joe River, near the center of the W½, section 24, T. 45 N., R. 3 E., on the Marble Mountain 7.5-minute quadrangle (Figure 3.43-1). The site is on Forest Service land.

3.43.2 Geologic Features (Figure 2.2-1a)

This prospect is in rocks of the Revett or Burke formations (Griggs, 1973). Pattee and others (1968, p. 62) described the deposit as follows:

Country rock is a grey to brown colored quartzite of the Precambrian Belt series with varying strike and dip because of folding. A granitic stock, probably granodiorite, occurs 2 miles to the north. The quartzite has axial-plane cleavage which permits it to be split into thin slabs for building stone.

A dike-like pegmatite body, a maximum of 2.5 feet wide, is exposed to a depth of 20 feet and for a length of 20 feet in the highwall at the south end of the pit. The pegmatite body was uncovered in the late 1950’s during mining of building stone. The shape of the body is irregular but roughly conformable to an overturned fold. The axis of the fold trends east-west. The pegmatite is medium grained and is composed of 40 to 60 percent feldspar and 40 to 60 percent quartz. Muscovite books ½ inch thick with sheets 1 inch in diameter occur sparsely through the dike.

3.43.3 Site History

Building stone was quarried from this site in the late 1950s (Pattee and others, 1968).

3.43.4 Environmental Conditions

3.43.4.1 Site Features

The prospect was visited by John Kauffman on July 9, 1998. No video or photographs were taken.

This site is a flat area at the end of a short spur road off the Marble Creek Road. The area is about 150 feet long and roughly 60 feet wide, and is now used as a campsite. Piles of quartzite and schistose quartzite are on the west edge of the flat area, but no pegmatite was found. No highwall or pit face was obvious. The area covers about 0.25 acre.
3.43.4.2 Sample Locations

3.43.4.2.1 Solid Samples
   No waste dump samples were collected at this site.

3.43.4.2.2 Water Samples
   No water samples were collected at this site.

3.43.5 Structures
   No structures were found at this site.

3.43.6 Safety
   There are no safety hazards at this site.
Figure 3.43-1. Location map of the Tri-State Cedar Corporation Prospect, Shoshone County, Idaho (U.S. Geological Survey Marble Mountain 7.5-minute topographic map).
3.44 TILLICUM NICKEL PROSPECT (Site No. WL-558)
Alternative names—Tilicum Nickel Prospect; Granite Peak Prospect; GP claim group; Elk Prairie Copper Prospect; Abe claim group.

3.44.1 Site Location and Access

The Tilicum Nickel Prospect is at the head of Copper Creek near Granite Peak in the NW¼, section 3, T. 42 N., R. 8 E., on the Peggy Peak 7.5-minute quadrangle (Figure 3.44-1). Access from Forest Service Road 50 is via Forest Service Road 218 up the St. Joe River to Beaver Creek. Proceed eight miles west on Forest Service Road 303 up Beaver Creek to Forest Service Road 201, which heads south. The turnoff to Granite Peak is about 3.5 miles on Forest Service Road 201, and Granite Peak is about 1 mile beyond the turnoff. The workings are in the cirque basin north of Granite Peak.

3.44.2 Geologic Features

Causey and Marks (1993, p. 20) described the geology of the area as follows:
The dominant rock types are fine- to coarse-grained, garnet-bearing muscovite schist on the ridge top, underlain by thin-bedded siltstone/quartzite (fig. 4, p. 21 [Figure 3.44-3]). Both foliation in the schist and bedding in the siltstone/quartzite strike northeasterly and dip at low angles to the northwest. Crosscutting these structures is a steeply- to vertically-dipping shear zone containing pockets of massive sulfides (pyrrhotite, and very small amounts of chalcopyrite and pentlandite). The zone contains massive carbonates (calcite and siderite/ankerite), large green tremolite crystals, and minor quartz, talc, sercite, chlorite, magnetite, and biotite. Cobalt and nickel are associated with the pyrrhotite. At the surface, these minerals are in a red-orange iron oxide zone (fig. 5 [omitted]). Also present are subparallel massive quartz veins that are up to 10 ft thick, strike N. 65° W., and dip near vertical.

3.44.3 Site History

Causey and Marks (1993, p. 19) described the history of this prospect as follows:
Collier (1906, p. 136) mentions, “A rather promising copper prospect in which the ore consists for the most part of carbonates...” that may be this locality. In 1951, the USBM examined this property (called the Tilicum prospect) for nickel [Hundhausen, 1951]. It consisted of eight claims (Elk Prairie, Granite Peak, Tilicum, Copper Flat, Copper Point, Copper Head, Copper Creek, and Copper Ridge). A claim corner with the name Abe was found on top of Granite Peak. The most recent claims were located by Cominco American, Inc., in 1986 as the GP claim group, and included 152 claims. All of the GP claims were abandoned in 1989 and 1990 according to BLM records.
Cominco drilled the property in 1987. Judging from the condition of the workings and trails at the time of the present site visit, no work has been done on the claims since 1990.

3.44.4 Environmental Conditions

3.44.4.1 Site Features

The Tillicum Nickel Prospect was visited by John Kauffman on September 2 and 11, 1999. A video segment describing the workings is on Avery and St. Maries Districts Videotape (Tape 3, index 00:57:47-01:16:35). Documenting photos are 1999 series Roll K21, frames 23-26, and Roll K22, frames 1-9.

Five adits and several trenches were found at this prospect (Figure 3.44-2). Most of these are shown on Figure 4 of Causey and Marks (1993; Figure 3.44-3). Much of the trail shown on their map is now obscured by thick underbrush.

Adit 1 is high on the steep slope north of Granite Peak (Figure 3.44-4) at an elevation of about 6,140 feet. A trough on the slope marks the caved adit (Figure 3.44-5). The waste dump is 35 feet long, 8-20 feet wide, and about 30 feet down the face (Figure 3.44-6). Slightly higher on the slope and to the west of the adit are two trenches. One is cut along the slope and one runs down it (Figure 3.44-7). Both are in highly oxidized zones that weather to a deep brick red to red-brown color. Both trenches and the adit are shown on Causey and Marks’ (1993) map (Figure 3.44-3). The disturbed area, including the waste dump and trenches, covers about 0.5 acre.

Adit 2, which is at an elevation of about 5,700 feet, is the “Lower Adit” of Causey and Marks (1993). On the video segment, it was initially identified as the main adit, but this was corrected in later portions of the video. Adit 2 is open, although there is a pile of rock debris in front of the timbered portal (Figure 3.44-8). About 2-2½ feet of water, dammed behind the caved debris, covers the adit floor (Figure 3.44-9). Although no water was flowing from the mine at the time the property was visited, an eroded channel below the portal indicates seasonal discharge. Rails extend from the adit and an ore car is lying on its side on the small waste dump. The adit is located along the face of a long, curvilinear scarp, either a cut into the oxidized outcrop or a slump on the oxidized zone (Figure 3.44-10). This scarp extends along the slope west of the adit, then curves northward and down along the east side of the small drainage for several hundred feet. The waste dump is irregular and includes large blocks of rock from the scarp along and below an old access trail, as well as a small mound of finer material from the adit. Overall, the “dump” (including material fallen from the scarp) is about 100 feet long, 25 feet wide, and 10-20 feet thick. The dump for the adit, however, is only about 25 feet long, 15 feet wide, and 10 feet thick. This corresponds well with a length of about 30 feet, as described by Causey and Marks (1993). Black PVC water pipe was found in the brush to the north and east (downslope) of the adit and cut, but no other workings in that area were found. The disturbed area, including the cut or slump, covers several acres along the drainage.
Adit 3 is the main tunnel. It is at an elevation of about 5,775 feet and is about 500 feet long (Causey and Marks, 1993); Hundhausen (1951) reported a length of 520 feet. Although nearly caved at the portal (Figure 3.44-11), a narrow opening about 4 feet long and 10-12 inches high leads down into the adit (Figure 3.44-12). The waste dump (Figure 3.44-13) is 65 feet long, about 30 feet wide, and 50 feet down the face. The collapsed blacksmith shop (shown on Figure 3.44-3) has several rusted engines, tanks, and other metal debris among the collapsed timbers (Figure 3.44-14). The disturbed area covers about 0.5 acre.

Adit 4, shown as a caved adit on Causey and Marks’ (1993) map (Figure 3.44-3) to the south and east of the main adit, is probably one of the workings found during the first visit on September 2. A small opening was found near the top of a cut or slump in a highly oxidized zone at about the elevation shown for the adit. The length of the opening could not be estimated because no specific waste dump was found. Numerous large oxidized blocks and smaller fragments are on the slope below the opening. However, this portion of the slope is slumped and eroded, and it could not be determined what material came from the adit and what came from the cut or slump. To the west of this adit is another trench cut down the slope, again across the oxidized zone. The disturbed area at the adit and trench covers about 0.5 acre.

Adit 5 is a minor caved tunnel with a small dump overgrown with low brush. This adit, at an elevation of about 6,160 feet, is near the base of the steepest slope north of Granite Peak. The dump is only about 12 feet long, 8 feet wide, and 5 feet thick. This adit is not shown on Causey and Marks’ (1993) map. The disturbed area is minimal.

3.44.4.2 Sample Locations

3.44.4.2.1 Solid Samples
No waste dump samples were taken at this prospect.

3.44.4.2.2 Water Samples
Water sample K9119901 was taken from inside Adit 2. The conductivity meter was not functioning.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Specific Conductivity (µs)</th>
<th>Temperature (°F)</th>
<th>pH</th>
<th>Flow (gpm)</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K9119901</td>
<td>Tillicum Nickel Prospect, Adit 2</td>
<td>---</td>
<td>40</td>
<td>7.2</td>
<td>not flowing</td>
<td>Yes</td>
</tr>
</tbody>
</table>

351
3.44.2.3 Analytical Results

Water Samples (Tables 2.5-1 and 2.5-2)

In the dissolved metals screen, sample K9119901 exceeds the Secondary MCL and the Aquatic Life Chronic standards for aluminum, the Secondary MCLs for iron and manganese, both Aquatic Life standards for zinc, and is within the range of both Aquatic Life standards for copper. In the total recoverable metals screen, manganese exceeds the Secondary MCL, iron exceeds the Secondary MCL and Aquatic Life Acute standards, copper exceeds both Aquatic Life standards, and mercury exceeds the Aquatic Life Chronic standard.

3.44.5 Structures

In addition to the collapsed blacksmith shop on the dump of Adit 3, an old collapsed cabin (Figure 3.44-15) and an outhouse (Figure 3.44-16) were found on a flat area above Adit 4 at an elevation of about 6,060 feet. The cabin is about 200 feet east of a low knoll, and the outhouse is on the east flank of the knoll along the obscure trail to the main adit. The trail crosses behind the knoll in this area. Old bedsprings, rusted pieces of a stove, and other scrap metal are near the outhouse.

3.44.6 Safety

Adit 2 is open and could easily be entered, although several feet of water covering the floor would need to be drained. Adit 3 has a narrow opening that would have to be enlarged to enter. Adit 4 has a small opening, although the condition and length of the workings inside were not determined. None of the workings are shown on the topographic map and none are obvious, although the dump for Adit 1 can be seen from several vantage points on surrounding ridge tops. Even with Causey and Marks' (1993) map of the workings, these prospects were not easy to find. Except for hunters, few people would stumble across this prospect.
Figure 3.44-1. Location map of the Tillicum Nickel Prospect, Shoshone County, Idaho (U.S. Geological Survey Peggy Peak 7.5-minute topographic map).
Figure 3.44-2. Sketch of the Tillicum Nickel Prospect workings.
Figure 3.44-3. Map of the property, identified as the Granite Peak Prospect, in 1990 (Causey and Marks, 1993, Figure 4).
Figure 3.44-4. View to the northwest, looking at the waste dump for Adit 1 at the Tillicum Nickel Prospect, which is on the steep north slope of Granite Peak (1999 Roll K21, frame #24).
Figure 3.44-5. Trough on the slope above caved Adit 1 at the Tillicum Nickel Prospect, looking west (1999 Roll K21, frame #26).
Figure 3.44-6. One of two trenches cutting the oxidized zone above Adit 1 at the Tillicum Nickel Prospect (1999 Roll K22, frame #1).

Figure 3.44-7. View to the east down the face of the waste dump for Adit 1 at the Tillicum Nickel Prospect (1999 Roll K21, frame #25).
Figure 3.44-8. Looking south at Adit 2 at the Tillicum Nickel Prospect. An ore car is in the foreground (1999 Roll K22, frame #3).
Figure 3.44-9. View inside Adit 2 at the Tillicum Nickel Prospect. Standing water covers the floor to a depth of 2-2½ feet (1999 Roll K22, frame #4).
Figure 3.44-10. Scarp west of Adit 2 at the Tillicum Nickel Prospect. This is either a cut or a slump along the oxidized zone. The ore car in front of the adit is in the foreground (1999 Roll K22, frame #5).
Figure 3.44-11. Looking south at the portal of nearly caved Adit 3, the main tunnel at the Tillicum Prospect (1999 Roll K22, frame #6).
Figure 3.44-12. View of the narrow opening into Adit 3 at the Tillicum Nickel Prospect (1999 Roll K22, frame #7).

Figure 3.44-13. Looking west over the waste dump for Adit 3 at the Tillicum Nickel Prospect (1999 Roll K22, frame #8).
Figure 3.44-14. Looking south at the collapsed blacksmith on the dump for Adit 3 at the Tillicum Nickel Prospect. Several rusted engines and other scrap metal are among the ruins (Roll K22, frame #9).

Figure 3.44-15. Collapsed cabin on the flat above Adit 4 at the Tillicum Nickel Prospect. The cabin was about 25 feet long and 20 feet wide (Roll K21, frame #23).
Figure 3.44-16. Leaning outhouse on east side of the low knoll, about 200 feet west of the cabin (Roll K22, frame #2).
BIBLIOGRAPHY


Campbell, Stewart, 1924, Twenty-fifth annual report of the mining industry of Idaho for the year 1923: Mine Inspector of Idaho, p. 165.


Stenz, J.C., and Philip Ruff, 1971, Stanley Boys and Stanley Boys No. 1 Millsite lode claims, St. Joe National Forest: U.S. Forest Service internal report, 19 p. [The copy of this report in IGS's files does not include most of the attachments that accompanied the original report.]


Appendix A
Field Questionnaire
PART A
(To be completed for all identified sites)

LOCATION AND IDENTIFICATION

ID# __________________ Site Name(s) __________________
FS Tract # _______________ FS Watershed Code _______________
Forest __________________ District _______________
Location based on: GPS ____ Field Map ____ Existing Info ____ Other ______
Lat _______ Long _______ xutm _______ yutm _______ zutm _______
Quad Name _______________ Principal Meridian _______________
Township _______________ Range ________ Section ______ 1/4 ______ 1/4 ______ 1/4
State ______ County ___________ Mining District ________________

Ownership of all disturbances:
____ National Forest (NF)
____ Mixed private and National Forest (or unknown)
____ Private.
   If private only, impacts from the site on National Forest Resources are
   ____ Visually apparent ____ Likely to be significant ____ Unlikely or minimal

If all disturbances are private and impacts to National Forest Resources are unlikely or
minimal - STOP

PART B
(To be completed for all sites on or likely effecting National Forest lands)

SCREENING CRITERIA

Yes No

____ 1. Mill site or Tailings present
____ 2. Adits with discharge or evidence of a discharge
____ 3. Evidence of or strong likelihood for metal leaching, or AMD (water stains,
   stressed or lack of vegetation, waste below water table, etc.)
____ 4. Mine waste in floodplain or shows signs of water erosion
____ 5. Residences, high public use area, or environmentally sensitive area (as listed in
   HRS) within 200 feet of disturbance
____ 6. Hazardous wastes/materials (chemical containers, explosives, etc)
____ 7. Open adits/shafts, highwalls, or hazardous structures/debris
____ 8. Site visit (If yes, take picture of site), Film number(s)
    if yes, provide name of person who visited site and date of visit
    Name: __________________ Date: _______________
    if no, list source(s) of information (If based on personal knowledge,
    provide name of person interviewed and date):

If the answers to questions 1 through 6 are all No - STOP
PART C
(To be completed for all sites not screened out in Parts A or B)

Investigator ___________________________ Date ___________
Weather _______________________________

1. GENERAL SITE INFORMATION

Take panoramic picture(s) of site, Film Number(s) ___________________________
Size of disturbed area(s) ______ acres Average Elevation ______ feet
Access: _____ No trail _____ Trail _____ 4wd only _____ Improved road
____ Paved road
Name of nearest town (by road): _______________________________________
Site/Local Terrain: _____ Rolling or flat _____ Foothills _____ Mesa _____ Mountains
____ Steep/narrow canyon
Local undisturbed vegetation (Check all that apply): _____ Barren or sparsely vegetated
____ weeds/grasses _____ Brush _____ Riparian/marsh
____ Deciduous trees _____ Pine/spruce/fir
Nearest wetland/bog: __ On site, ____ 0-200 feet, ____ 200 feet-2 miles, ____ > 2 miles
Acid Producers or Indicator Minerals: _____ Arsenopyrite, _____ Chalcopyrite, _____ Galena,
_____ Iron Oxide, _____ Limonite, _____ Marcasite, _____ Pyrite, _____
Pyrrhotite,
_____ Sphalerite, _____ Other Sulfide
Neutralizing Host Rock: ____ Dolomite, ____ Limestone, ____ Marble, ____ Other Carbonate

2. OPERATIONAL HISTORY

Dates of significant mining activity ___________________________

<table>
<thead>
<tr>
<th>MINE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity (s)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Years that Mill Operated _______________________
Mill Process: _____ Amalgamation, _____ Arraste, _____ CIP (Carbon-in-Pulp), _____ Crusher
only,
_____ Cyanidation, _____ Flotation, _____ Gravity, _____ Heap Leach, _____ Jig Plant,
_____ Leach, _____ Retort, _____ Stamp, _____ No Mill, _____ Unknown

<table>
<thead>
<tr>
<th>MILL PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity(s)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
3. HYDROLOGY

Name of nearest Stream ________________________ which flows into ________________________
Springs (in and around mine site): _____ Numerous _____ Several _____ None
Depth to Groundwater ___ ft, Measured at: ___ shaft/pit/hole ___ well ___ wetland
Any waste(s) in contact with active stream _____ Yes _____ No

4. TARGETS (Answer the following based on general observations only)

Surface Water
Nearest surface water intake ____ miles, Probable use ________________________
Describe number and uses of surface water intakes observed for 15 miles downstream of site:

______________________________________________________________________________

Wells
Nearest well ____ miles, Probable use ________________________
Describe number and use of wells observed within 4 miles of site:

______________________________________________________________________________

Population
Nearest dwelling ____ miles, Number of months/year occupied _______ months
Estimate number of houses within 2 miles of the site (Provide estimates for 0-200ft, 200ft-1mile, 1-2miles, if possible)

______________________________________________________________________________

Recreational Usage
Recreational use on site: _____ High (Visitors observed or evidence such as tire tracks, trash, graffiti, fire rings, etc.; and good access to site), _____ Moderate (Some evidence of visitors and site is accessible from a poor road or trail), _____ Low (Little, if any, evidence of visitors and site is not easily accessible)
Nearest recreational area ____ miles, Name or type of area: ________________________

5. SAFETY RISKS

____ Open adit/shaft, ____ Highwall or unstable slopes, ____ Unstable structures,
____ Chemicals, ____ Solid waste including sharp rusted items, ____ Explosives
6. MINE OPENINGS

Include in the following chart all mine openings located on or partially on National Forest lands. Also, include mine openings located entirely on private land if a point discharge from the opening crosses onto National Forest land. In this case, enter data for the point at which the discharge flows onto National Forest land; you do not need to enter information about the opening itself.

<table>
<thead>
<tr>
<th>TABLE 1 - ADITS, SHAFTS, PITS, AND OTHER OPENINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Number</td>
</tr>
<tr>
<td>Type of Opening</td>
</tr>
<tr>
<td>Ownership</td>
</tr>
<tr>
<td>Opening Length (ft)</td>
</tr>
<tr>
<td>Opening Width (ft)</td>
</tr>
<tr>
<td>Latitude (GPS)</td>
</tr>
<tr>
<td>Longitude (GPS)</td>
</tr>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>Ground water</td>
</tr>
<tr>
<td>Water Sample #</td>
</tr>
<tr>
<td>Photo Number</td>
</tr>
</tbody>
</table>

Comments (When commenting on a specific mine opening, reference opening number used in Table 1):

____________________________________________________

Codes Applicable for all entries: NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none
Type of opening: ADIT=Adit, SHAFT=Shaft, Pit=Open Pit/Trench, HOLE=Prospect Hole, WELL=Well
Ownership: NF=National Forest, MIX=National Forest and Private (Also, for unknown), PRV=Private
Condition (Enter all that apply): INTACT=Intact, PART=Partially collapsed or filled, COLP=Filled or collapsed, SEAL=Adit plug, GATE=Gated barrier,
Ground water (Water or evidence of water discharging from opening): NO= No water or indicators of water, FLOW=Water flowing, INTER=Indicators of intermittent flow, STAND= Standing water only (In this case, enter an estimate of depth below grade)

373
7. MINE/MILL WASTE

Include in the following chart all mine/mill wastes located on or partially on National Forest lands. Also, include mine/mill wastes located entirely on private land if it is visually effecting or is very likely to be effecting National Forest resources. In this case enter data for the point at which a discharge from the waste flows onto National Forest land, or where wastes have migrated onto National forest land; only enter as much information about the waste as relevant and practicable.

<table>
<thead>
<tr>
<th>TABLE 2 - DUMPS, TAILINGS, AND SPOIL PILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Number</td>
</tr>
<tr>
<td>Waste Type</td>
</tr>
<tr>
<td>Ownership</td>
</tr>
<tr>
<td>Area (acres)</td>
</tr>
<tr>
<td>Volume (cu yds)</td>
</tr>
<tr>
<td>Size of Material</td>
</tr>
<tr>
<td>Wind Erosion</td>
</tr>
<tr>
<td>Vegetation</td>
</tr>
<tr>
<td>Surface Drainage</td>
</tr>
<tr>
<td>Indicators of Metals</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Location with respect to Floodplain</td>
</tr>
<tr>
<td>Distance to Stream</td>
</tr>
<tr>
<td>Water Sample #</td>
</tr>
<tr>
<td>Waste Sample #</td>
</tr>
<tr>
<td>Soil Sample #</td>
</tr>
<tr>
<td>Photo Number</td>
</tr>
</tbody>
</table>

Codes Applicable for all entries: NA= Not applicable, UNK= Unknown, OTHER= Explain in comments, NO=NO or none
Waste Type: WASTE=Waste rock dump, MILL=Mill tailings SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon, ORE=Ore Stockpile, HEAP=Heap Leach
Ownership: NF=National Forest, MIX=National Forest and Private (Also, for unknown), PRV=Private
Size of material (if composed of different size fractions, enter the sizes that are present in significant amounts): FINE=Finer than sand, SAND=sand, GRAVEL=sand and <2", COBBLE=2"-6", BOULD>=6"
Wind Erosion, Potential for: HIGH=Fine, dry material that could easily become airborne, airborne dust, or windblown deposits, MOD= Moderate, Some fine material, or fine material that is usually wet or partially cemented; LOW=Little it any fines, or fines that are wet year-round or well cemented.
Vegetation (density on waste): DENSE=Ground cover >75%, MOD=Ground cover 25% - 75%, SPARSE=Ground cover <25%, BARREN=Barren
Surface Drainage (Include all that apply): RILL-Surface flow channels mostly <1' deep, GULLY=Flow channels >1' deep, SEEP=Intermittent or continuous discharge from waste deposit, POND=Seasonal or permanent ponds on feature, BREACH=Breached, NO=No indicators of surface flow observe
Indicators of Metals (Enter as many as exist): NO= None, VEG= Absence of or stressed vegetation, STAIN= yellow, orange, or red precipitate, SALT=Salt deposits, SULF=Sulfides present
Stability: EMER-imminent mass failure, LIKE=Potential for mass failure, LOW=mass failure unlikely
Location w/respect to Stream: IN=In contact with normal stream, NEAR=In riparian zone or floodplain, OUT=Out of floodplain

374
8. SAMPLES

Take samples only on National Forest lands.

TABLE 3 - WATER SAMPLES FROM MINE SITE DISCHARGES

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Date sample taken</th>
<th>Sampler (Initials)</th>
<th>Discharging From</th>
<th>Feature Number</th>
<th>Indicators of Metal Release</th>
<th>Indicators of Sedimentation</th>
<th>Distance to stream (ft)</th>
<th>Sample Latitude</th>
<th>Sample Longitude</th>
<th>Field pH</th>
<th>Field SC</th>
<th>Flow (gpm)</th>
<th>Method of measurement</th>
<th>Photo Number</th>
</tr>
</thead>
</table>

Comments: (When commenting on a specific water sample, reference sample number used in Table 3):

Codes Applicable for all entries: NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none

Discharging From: ADIT=Adit, SHAFT=Shaft, PIT=Pit/Trench, HOLE=Prospect Hole, WASTE=Waste rock dump, MILL=Mill tailings, SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon, WELL=Well

Feature Number: Corresponding number from Table 1 or Table 2 (Opening Number or Waste Number)

Indicators of Metal Release (Enter as many as exist): NO=None, YEG=Absence of, or stressed vegetation/organisms in and along drainage path, STAIN=yellow, orange, or red precipitate, SALT=Salt deposits, SUU=Sulfides present, TURB=Discolored or turbid discharge

Indicators of Sedimentation (enter as many as exist): NO=None, SLIGHT=Some sedimentation in channel, banks and channel largely intact, MOD=Sediment deposits in channel, affecting flow patterns, banks largely intact, SIGN=Sediment deposits in channel and/or along stream banks extending to nearest stream

Method of Measurement: EST=Estimate, BUCK=Bucket and time, METER=Flow meter
<table>
<thead>
<tr>
<th>Location relative to mine site/features</th>
<th>Upstream (Background)</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date sample taken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampler (Initials)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stream Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indicators of Metal Release</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indicators of Sedimentation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Latitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field pH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow (gpm)Method of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** *(When commenting on a specific water sample, reference sample number used in Table 4)*:

---

**Codes Applicable for all entries:** NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none

**Indicators of Metal Release** *(Enter as many as exist)*: NO=None, VEG=Absence of, or stressed streamside vegetation/organisms in and along drainage path, STAIN=yellow, orange, or red precipitate, SALT=Salt deposits, SULF=Sulfides present, TURB=Discolored or turbid discharge

**Indicators of Sedimentation** *(Enter as many as exist)*: NO=None, SLIGHT=Some sedimentation in channel, natural banks and channel largely intact, MOD=Sediment deposits in channel, affecting stream flow patterns, natural banks largely intact, SIGN=Sediment deposits in channel and/or along stream banks extending 1/2 a mile or more downstream

**Method of Measurement:** EST=Estimate, BUCK=Bucket and time, METER=Flow meter
<table>
<thead>
<tr>
<th>Sample Number</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampler (Initials)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Latitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: *(When commenting on a specific waste or soil sample, reference sample number used in Table 5):*

**Codes Applicable for all entries:** NA=Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none

**Sample Type:** SING=Single sample, COMP=composite sample (enter length)

**Waste Type:** WASTE=Waste rock dump, MILL=Mill tailings, SPOIL=Overburden or spoil pile, HIGH=Highwall, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon sludge, ORE=Ore Stockpile, HEAP=Heap Leach

**Feature Number:** Corresponding number from Table 2 (Waste Number)
### TABLE 6 - SOIL SAMPLES

<table>
<thead>
<tr>
<th>Sample Number</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampler (Initials)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Latitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely Source of Contamination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators of Contamination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** *(When commenting on a specific waste or soil sample, reference sample number used in Table 6):*

**Codes Applicable for all entries:** NA= Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none  
**Sample Type:** SING=Single sample, COMP=Composite sample (enter length)  
**Likely Source of Contamination:** ADIT=Adit, SHAFT=Shaft, PIT=Open Pit, HOLE=Prospect Hole, WASTE=Waste rock dump, MILL=Mill tailings, SPOIL=Overburden or spoil pile, PLACER=Placer or hydraulic deposit, POND=Settling pond or lagoon, ORE=Ore Stockpile, HEAP=Heap Leach  
**Feature Number:** Corresponding number from Table 1 or 2 (Beginning or Waste Number)  
**Indicators of Contamination** *(Enter as many as exist):* NO=None, VEG=Absence of vegetation, PATH=Visible sediment path, COLOR=Different color of soil than surrounding soil, SALT=Salt crystals

---

378
9. HAZARDOUS WASTES/MATERIALS

<table>
<thead>
<tr>
<th>TABLE 7 - HAZARDOUS WASTES/MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Number</td>
</tr>
<tr>
<td>Type of Containment</td>
</tr>
<tr>
<td>Condition of Containment</td>
</tr>
<tr>
<td>Contents</td>
</tr>
<tr>
<td>Estimated Quantity of Waste</td>
</tr>
</tbody>
</table>

Comments: *(When commenting on a specific hazardous waste or site condition, reference waste number used in Table 7):*

---

**Codes Applicable for all entries:**
- NA = Not applicable
- UNK = Unknown
- OTHER = Explain in comments
- NO = NO or none

**Type of Containment:**
- NO = None
- LID = drum/barrel/vat with lid
- AIR = drum/barrel/vat without lid
- CAN = cans/jars
- LINE = lined impoundment
- EARTH = unlined impoundment

**Condition of Containment:**
- GOOD = Container in good condition, leaks unlikely
- FAIR = Container has some signs of rust, cracks, damage but looks sound, leaks possible
- POOR = Container has visible holes, cracks or damage, leaks likely
- BAD = Pieces of containers on site, could not contain waste

**Contents:**
- From label if available, or guess the type of waste, e.g., petroleum product, solvent, processing chemical

**Estimated Quantity of Waste:**
- Quantity still contained and quantity released
10. STRUCTURES

For structures on or partially on National forest lands.

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></td>
</tr>
</tbody>
</table>

Comments:

Codes Applicable for all entries: NA=Not applicable, UNK=Unknown, OTHER=Explain in comments, NO=NO or none
Type: CABIN=Cabin or community service (store, church, etc.), MILL=mill building, MINE=building related to mine operation, STOR=storage shed, FLUME=Ore Chute/flume or tracks for ore transport
Number: Number of particular type of structure all in similar condition or length in feet
Condition: GOOD=all components of structure intact and appears stable, FAIR=most components present but signs of deterioration, POOR=major component (roof, wall, etc) of structure has collapsed or is on the verge of collapsing, BAD=more than half of the structure has collapsed

11. MISCELLANEOUS

Are any of the following present? (Check all that apply): _____ Acrid Odor, _____ Drums, _____ Pipe, _____ Poles, _____ Scrap Metal, _____ Overhead wires, _____ Overhead cables, _____ Headframes, _____ Wooden Structures, _____ Towers, _____ Power Substations, _____ Antennae, _____ Trestles, _____ Powerlines, _____ Transformers, _____ Tramways, _____ Flumes, _____ Tram Buckets, _____ Fences, _____ Machinery, _____ Garbage

Describe any obvious removal actions that are needed at this site:

_____________________

General Comments/Observations (not otherwise covered)

_____________________

380
12. SITE MAP

Prepare a sketch of the site. Indicate all pertinent features of the site and nearby environment. Include all significant mine and surface water features, access roads, structures, etc. Number each important feature at the mine site and use these numbers throughout this form when referring to a particular feature (Tables 1 and 2). Sketch the drainage routes off the site into the nearest stream.
13. RECORDED INFORMATION

Owner(s) of patented land
Name: __________________________________________
Address: ________________________________________
Telephone Number: ________________________________

Claimant(s)
Name: __________________________________________
Address: ________________________________________
Telephone Number: ________________________________

Surface Water (From water rights)
Number of Surface Water Intakes within 15 miles downstream of site used for:
   ___ Domestic,  ___ Municipal,  ___ Irrigation,  ___ Stock,
   ___ Commercial/Industrial,  ___ Fish Pond,  ___ Mining,
   ___ Recreation,  ___ Other

Wells (From well logs)
Nearest well ___ miles
Number of wells within ___ 0-1/4 miles ___ 1/4-1/2 miles,  ___ 1/2-1 mile
   ___ 1-2 miles ___ 2-3 miles ___ 3-4 miles of site

Sensitive Environments
List any sensitive environments (as listed in the HRS) within 2 miles of the site or along receiving
stream for 15 miles downstream of site (wetlands, wilderness, national/state park, wildlife refuge,
wild and scenic river, T&E or T&E habitat, etc):
________________________________________________

Population (From census data)
Population within ___ 0-1/4 miles ___ 1/4-1/2 miles ___ 1/2-1 mile
   ___ 1-2 miles ___ 2-3 miles ___ 3-4 miles of site

Public Interest
Level of Public Interest:  ___ Low,  ___ Medium,  ___ High
Is the site under regulatory or legal action?  ___ Yes,  ___ No

Other sources of information (MILs #, MRDS #, other sampling data, etc):
________________________________________________

________________________________________________
Appendix B
Database Fields
NEWLOC
WA 1
ORANGENUM
  451
MAPLOC
  1
DEPOSIT
Eagle Creek Mine

MRDSREC
MILSREF
0160790528
PERIODPROD

ORE
COMMOD
Au
REFERENCE

LATITUDE
474325
LONGITUDE
1154916
HARDFILE
N
MLA
NAME
EAGLE CREEK MINE
SEC
33
SUBSEC
NESE
TWN
051 N
RNG
005 E
DDMMSS
474325
DDMMSS
1154904
OPTYP
SURFAC
STATUS
PAST PRO
COMMO1
GOLD
COMMO2
COMMO3
COMMO4
COMMO5
Appendix C
Geochemical Data
GEOCHEMICAL DATA

ACCURACY OF GEOCHEMICAL DATA

The following information was received on the subject of the accuracy and the detection limits for the geochemical data presented in this report:

Date: Fri, 24 Oct 1997 10:48:23 PST/PDT
From: Kim Anderson <kanderson@asl.fs.uidaho.edu>
To: Ruth E Vance <rvance@uidaho.edu>
Subject: Re: detection limit accuracy

That is something I put together some years ago for another client. Also Greg Moller [Technical Director, Analytical Sciences Laboratory] had input. Other than that, the refs are included in the discussions I sent [discussion titled “Practical Quantitation Limits”; see next page].

Good Luck
Kim,

Kim A. Anderson, Ph.D.
Asst. Prof. / Food Science and Toxicology Dept.
Chief Chemist / Analytical Sciences Laboratory
University of Idaho
Moscow, Idaho 83844-2201
208-885-7900/FAX 209-885-8937
Practical Quantitation Limits

Sensitivity of an analytical method is often based on its ability to reproducibly detect target analytes above the method noise level. Several similar definitions of this Minimum Detection Level or Limit (MDL) or Limit of Detection (LOD) are currently used. According to the American Chemical Society (ACS) (Principles of Environmental Analysis, p 9):

Limit of detection (LOD) "is defined as the lowest concentration level that can be determined as statistically different from the blank".

Instrument detection limit (IDL) "is the smallest signal above background noise that an instrument can detect reliably and is often equivalent to the LOD".

Method detection limit (MDL) "is the lowest concentration of analyte that can that a method can detect reliably in either a sample or a blank".

ACS recommends the value of LOD to be 3σ for a 99% confidence level, where σ is the standard deviation of the measurement.

Limit of Quantitation (LOQ) "is defined as the level above which quantitative results may be obtained with a specified degree of confidence".

ACS recommends an LOQ of 10σ and this imparts a quantitative measurement uncertainty of +/- 30% in the measured value at this 99% confidence level. ACS contends "quantitative interpretation, decision-making and regulatory actions should be limited to data at or above the limit of quantitation". In particular, ACS states: "Analytical chemists must always emphasize to the public that the single most important characteristic of any result obtained from one or more analytical measurements is an adequate statement of its uncertainty level. Lawyers usually attempt to dispense with uncertainty and try to obtain unequivocal statements; therefore, an uncertainty interval must be clearly defined in cases involving litigation and/or enforcement proceedings. Otherwise, a value of 1.001 without a specified uncertainty, for example, may be viewed as legally exceeding a permissible level of 1."

EPA Methods used for regulatory enforcement use the same definition of MDL. "The method detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero". Since performance of analytical methodology and therefore detection limits vary significantly with non-controllable laboratory to laboratory variables such as the exact type of analytical instrumentation, EPA promulgates the concept of Practical Quantitation Limits (PQL). A PQL is equal to the MDL multiplied by a factor of ten or greater and are published as a general guide to laboratory method performance. The factors can range from ten to ten thousand depending on sample matrix and are intended to allow the laboratory the flexibility to determine the relative performance of an analytical method in a more complex sample matrix. In confirmation of laboratory variability, EPA methods as well as
other published analytical methods often estimate detection limits and quantitation limits using a bench-level expert, performance estimate.

Recognition of the 'average performance' nature of the PQL guidelines, EPA states that PQL's "are the lowest concentrations of analytes in (samples) that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQL's listed are generally stated to one significant figure. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for the individual compounds; PQL's are not a part of the regulation (40 CFR Part 264 Appendix IX, Footnote 6)."
SEE

FOLDER:

Geochem_data

For data
Appendix D
Field Forms for Properties in the Study Area
SEE

FOLDER:

Field_forms

For data
Appendix E
Reports Completed for U.S. Forest Service, Region 1, Field Inspection Program
1997 Reports


1998 Reports


1999 Reports


Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle
National Forest: Volume V (Section A): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 250 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section B): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 211 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section C): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 225 p., 1 videotape.

Kauffman, John, E.H. Bennett, and V.E. Mitchell, 1999, Site inspection report for the abandoned and inactive mines in Idaho on U.S. Forest Service lands (Region 1), Idaho Panhandle National Forest: Volume V (Section D): Coeur d'Alene River drainage surrounding the Coeur d'Alene mining district (excluding the Prichard Creek and Eagle Creek drainages) [secondary properties]: Idaho Geological Survey unpublished report, 276 p., 1 videotape.


Appendix F
Properties That Could Not Be Located
PROPERTIES THAT COULD NOT BE LOCATED

Properties on the St. Joe River Drainage that were not found

KELLEY CREEK PROSPECT (Site No. WL-532)

John Kauffman attempted to find this prospect on July 7, 1998.

The topographic map (Fishhook Creek 7.5-minute quadrangle) shows a prospect symbol in T. 45 N., R. 5 E., section 22, and Wilson (1963) reported an adit that was caved about 10 feet inside the entrance. However, no evidence of this adit or any other prospect was found at the location noted on the topographic map or in the immediate vicinity. The road appears to have been widened to accommodate logging trucks, and it is possible the adit was destroyed at that time.

BEALS-PLOETZKE PROSPECT (Site No. WL-522)

John Kauffman attempted to find this prospect on July 7, 1998.

This prospect is supposed to be in the SE 1/4 of section 3, T. 45 N., R. 4 E., on the Mastodon Mountain 7.5-minute quadrangle. Our best location information places it in the vicinity of the power line along Slate Creek Road on the ridge east of Slate Creek. Most of this area on and near the top of the ridge has been clear-cut, possibly for power line construction, and much of the ridge is covered with thick brush. No evidence of a prospect was found in this area.

NORTH STAR MINE (Site No. WL-502)

John Kauffman attempted to find this mine on July 8, 1998.

The North Star, or Old North Star, is shown on the Forest Service map at the mouth of Frazier Creek where it joins Loop Creek in section 4, T. 46 N., R. 6 E., on the Shefoot Mountain 7.5-minute quadrangle. Annual reports filed with the Idaho Mine Inspector by the North Star Mining Company from the early 1920s through early 1960s indicate two tunnels. The main adit varied in reported length from 1,500 to over 1,800 feet. A second, short tunnel was at the mouth of Frazier Creek. One patented claim was reported and is shown on the Forest Service map. A Mineral Survey marker, M.S. 3151 (posted in 1985), was found on the slope east of Frazier Creek, not far north of the Loop Creek Road. However, no evidence of the adits or waste dumps was found. The slopes are steep, brushy, and timber-covered. A short adit may have been overlooked, although an 1,800-foot tunnel should have a large dump. It is possible the dump material was used as road metal since FS 326 passes close to the presumed location of these adits.
A short road off Loop Creek Road, along the west side of Frazier Creek, leads to a campsite and continues about 100 yards beyond the campsite. Piles of boulders along the creek did not appear to be placer workings, but could be old placers that have been reworked by flooding and overgrown with brush.

**ALICE PROSPECT (Site No. WL-531)**

John Kauffman attempted to find this prospect on July 27, 1998.

An old overgrown trail (unmaintained but still shown on the Forest Service map) heads east at the mouth of Bird Creek. Pardee (1911) described this prospect as being ½ mile east of the mouth of Bird Creek. After several switchbacks, the trail becomes too obscure to follow, so the north side of the tributary creek was followed. After more than ½ mile along which no evidence of workings was found, a return traverse was made down the south side of the drainage and again no workings were found. The old trail, if it could be followed, probably passes the prospect. The probable location is near the common corner of sections 13 and 24, T. 45 N., R. 6 E., and sections 18 and 19, T. 45 N., R. 7 E., on the Three Sisters 7.5-minute quadrangle. Pardee (1911) reported a 70-foot adit.

**BLUE BIRD CLAIM PROSPECT (Site No. WL-520)**

John Kauffman attempted to find this prospect on July 28, 1998.

Bluebird Creek was traversed from FS Road 1286 for over ½ mile, past where the property was estimated to be located. Pardee (1911) reported the claim as being near the SE corner of T. 46 N., R. 6 E., (Shefoot 7.5-minute quadrangle) so it could be in another part of the drainage, possibly below road 1286. Steve Nelson, USFS Avery District, said there was an old cabin along the creek, but neither it nor any remains of a cabin were found. Without a better location, this property does not merit further attention, especially since Pardee (1911) reported only a pit in the “bottom of the canyon at creek level.” Recent spring melt-off has brought extensive amounts of rock rubble into the drainage, and this has probably covered or obscured any old workings.

**SHIRLEY JEAN PROSPECT (Site No. WL-530)**

John Kauffman attempted to find this prospect on July 28, 1998.

Green (1969) gives conflicting location information for this prospect. He states it is on Eagle Creek but also indicates it is in section 16 (which he has queried), T. 45 N., R. 7 E. (on either the Thor Mountain or Adair 7.5-minute quadrangle). A location in section 16 would place it to the west of Eagle Creek in the Malin Creek area. Most likely, the section is wrong and the prospect is actually is on Eagle Creek. Green reports “several open cuts” at the prospect.
Eagle Creek was traversed but found no workings were found. At the 4-mile marker, there are several quartz-gossan veins and stringers. This is the only "mineralized" material seen. No cuts were found, other than those for construction of the road.