Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VII: Priest Lake Ranger District, Bonner and Boundary Counties, Idaho

John Kauffman
Earl H. Bennett
Victoria E. Mitchell
Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VII: Priest Lake Ranger District, Bonner and Boundary Counties, Idaho

John Kauffman
Earl H. Bennett
Victoria E. Mitchell

Staff Reports present timely information for public distribution. This publication may not conform to the agency's standards.
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 ................................
      1.5.3.1 Soil, Rock, Stream Sediment, 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 PRIEST LAKE RANGER DISTRICT ............................... 14
    2.1 INTRODUCTION ........................................... 14
      2.1.1 Summary of the Priest Lake Study Area ............ 14
    2.2 GEOLOGY .................................................. 14
    2.3 ECONOMIC GEOLOGY ....................................... 19
      2.3.1 General Characteristics of the Ore .................. 19
      2.3.2 Summary of Mill Development ....................... 22
    2.4 HYDROLOGY AND HYDROGEOLOGY ............................ 22
    2.5 SUMMARY OF THE PRIEST LAKE RANGER DISTRICT .......... 25
      2.5.1 Summary of Environmental Observations ............ 25
      2.5.2 Mine Waste Samples ................................ 25
  3.0 PRIEST LAKE DISTRICT MINE DESCRIPTIONS .................. 30
    3.1 MILWAUKEE MINE (Site No. SA-114) ...................... 30
      3.1.1 Site Location and Access ............................ 30
      3.1.2 Geologic Features .................................. 30
      3.1.3 Site History ....................................... 30
      3.1.4 Environmental Conditions ........................... 31
        3.1.4.1 Site Features .................................. 31
        3.1.4.2 Sample Locations ............................... 31
3.5.3 Site History .................................................. 70
3.5.4 Environmental Conditions .................................. 70
  3.5.4.1 Site Features ......................................... 70
  3.5.4.2 Sample Locations ...................................... 71
    3.5.4.2.1 Solid Samples .................................. 71
    3.5.4.2.2 Water Samples .................................. 71
    3.5.4.2.3 Analytical Results ................................. 71
3.5.5 Structures .................................................. 71
3.5.6 Safety ....................................................... 71

3.6 GEM COPPER MINING COMPANY PROSPECT (?) (Site No. SA-32) .......... 77
  3.6.1 Site Location and Access .................................. 77
  3.6.2 Geologic Features ........................................ 77
  3.6.3 Site History ............................................... 77
  3.6.4 Environmental Conditions ................................ 77
    3.6.4.1 Site Features ....................................... 77
    3.6.4.2 Sample Locations .................................... 78
      3.6.4.2.1 Solid Samples ................................ 78
      3.6.4.2.2 Water Samples .................................. 78
  3.6.5 Structures ................................................ 78
  3.6.6 Safety ..................................................... 78

3.7 UNNAMED PROSPECT (Site No. K8199802) ............................... 81
  3.7.1 Site Location and Access .................................. 81
  3.7.2 Geologic Features ........................................ 81
  3.7.3 Site History ............................................... 81
  3.7.4 Environmental Conditions ................................ 81
    3.7.4.1 Site Features ....................................... 81
    3.7.4.2 Sample Locations .................................... 81
      3.7.4.2.1 Solid Samples ................................ 81
      3.7.4.2.2 Water Samples .................................. 81
  3.7.5 Structures ................................................ 81
  3.7.6 Safety ..................................................... 82

3.8 PLOWBOY MINE (Site No. SA-29) .................................... 85
  3.8.1 Site Location and Access .................................. 85
  3.8.2 Geologic Features ........................................ 85
  3.8.3 Site History ............................................... 85
  3.8.4 Environmental Conditions ................................ 86
    3.8.4.1 Site Features ....................................... 86
    3.8.4.2 Sample Locations .................................... 86
      3.8.4.2.1 Solid Samples ................................ 86
      3.8.4.2.2 Water Samples .................................. 86
  3.8.5 Structures ................................................ 86
  3.8.6 Safety ..................................................... 86

3.9 KOOTENAI NO. 2 PROSPECT (Site No. SA-31) ............................ 90
3.12.5 Structures ............................................... 135
3.12.6 Safety ................................................... 135
3.13 UNNAMED PROSPECT (Site No. K8249802) ............. 142
  3.13.1 Site Location and Access ............................. 142
  3.13.2 Geologic Features .................................... 142
  3.13.3 Site History ......................................... 142
  3.13.4 Environmental Conditions ............................ 142
    3.13.4.1 Site Features ................................ 142
    3.13.4.2 Sample Locations ................................ 142
      3.13.4.2.1 Solid Samples ................................ 142
      3.13.4.2.2 Water Samples ............................... 142
  3.13.5 Structures .......................................... 143
  3.13.6 Safety .............................................. 143
3.14 WOODRAT MINE (Site No. SA-118) ....................... 147
  3.14.1 Site Location and Access ............................. 147
  3.14.2 Geologic Features .................................... 147
  3.14.3 Site History ......................................... 147
  3.14.4 Environmental Conditions ............................ 149
    3.14.4.1 Site Features ................................ 149
    3.14.4.2 Sample Locations ................................ 151
      3.14.4.2.1 Solid Samples ................................ 151
      3.14.4.2.2 Water Samples ............................... 152
      3.14.4.2.3 Analytical Results .......................... 152
  3.14.5 Structures .......................................... 152
  3.14.6 Safety .............................................. 152
3.15 UNNAMED PROSPECT (Site No. K8259803) ............... 178
  3.15.1 Site Location and Access ............................. 178
  3.15.2 Geologic Features .................................... 178
  3.15.3 Site History ......................................... 178
  3.15.4 Environmental Conditions ............................ 178
    3.15.4.1 Site Features ................................ 178
    3.15.4.2 Sample Locations ................................ 178
      3.15.4.2.1 Solid Samples ................................ 178
      3.15.4.2.2 Water Samples ............................... 178
  3.15.5 Structures .......................................... 178
  3.15.6 Safety .............................................. 178
3.16 LAST CHANCE MINE (Site No. K8259804) ................ 181
  3.16.1 Site Location and Access ............................. 181
  3.16.2 Geologic Features .................................... 181
  3.16.3 Site History ......................................... 181
  3.16.4 Environmental Conditions ............................ 181
    3.16.4.1 Site Features ................................ 181
    3.16.4.2 Sample Locations ............................... 181
ILLUSTRATIONS

Figure 2.1-1a. Location of properties in the northern part of the Priest Lake Ranger District (Idaho Transportation Department Bonners Ferry and U.S. Geological Survey Colville 1:100,000-scale maps). ......................................................... 15

Figure 2.1-1b. Location of properties in the southern part of the Priest Lake Ranger District (Idaho Transportation Department Sandpoint 1:100,000-scale map). ......................................................... 16

Figure 2.2-1. Geology of the Priest Lake Ranger District, Idaho (Aadland and Bennett, 1979). ......................................................................................................................... 20

Figure 3.1-1. Location map of the Milwaukee Mine, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map). ................ 33

Figure 3.1-2. Mineral Survey No. 3331 map, showing the Milwaukee Mines' Kalispell claims (Idaho Geological Survey mineral property files). ............... 34

Figure 3.1-3. Map of the claim groups north of the Milwaukee Mine along the west side of Priest Lake (Idaho Geological Survey mineral property files). .... 35

Figure 3.1-4. Sketch of the Milwaukee Mine. .............................................................................................................................. 36

Figure 3.1-5. Looking west-northwest up the sloughed hillside above the caved adit of the Milwaukee Mine (Roll K8, frame #1). ...................................................... 37

Figure 3.1-6. Trickle of water flowing from the caved adit of the Milwaukee Mine (Roll K8, frame #2). ................................................................. 37

Figure 3.1-7. Looking east across the brushy surface of the Milwaukee Mine waste dump. Priest Lake and Kalispell Island are in the distance (Roll K8, frame #3). .... 38

Figure 3.1-8. Looking northeast at the edge of the waste dump along Priest Lake (Roll K8, frame #4). ................................................................................................. 38

Figure 3.2-1. Location map of the McLean Mine, Boundary County, Idaho (U.S. Geological Survey Continental Mountain 7.5-minute topographic map). .... 41

Figure 3.2-2. Sketch of the McLean Mine. .............................................................................................................................. 42

Figure 3.2-3. Looking north at the caved adit of the McLean Mine (Roll K8, frame #5). ................................................................. 43

Figure 3.2-4. Iron-stained water flowing from the caved adit of the McLean Mine (Roll K8, frame #6). ................................................................. 44

Figure 3.2-5. Looking south down the face of the east side of the waste dump of the McLean Mine (Roll K8, frame #7). ................................................................. 45

Figure 3.3-1. Location map of Unnamed Prospect SA-25, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ... 48

Figure 3.3-2. Sketch of Unnamed Prospect SA-25. .............................................................................................................................. 49

Figure 3.3-3. Looking down the throat of the vertical shaft of Unnamed Prospect SA-25 (Roll K8, frame #11). ................................................................. 50

Figure 3.3-4. Looking north across the waste dump for the shaft at Unnamed Prospect SA-25 (Roll K8, frame #10). ................................................................. 50

Figure 3.3-5. Looking east at the short prospect cut in the outcrop just south of the shaft at Unnamed Prospect SA-25 (Roll K8, frame #8). ................................................................. 51

Figure 3.3-6. Looking south from the waste dump for the shaft toward the small waste rock pile associated with the short prospect cut at Unnamed Prospect SA-25 (Roll K8, frame #9). ................................................................. 52
Figure 3.4-1. Location map of the Idaho Copper Prospect, Bonner County, Idaho (U.S. Geological Survey Priest Lake NE 7.5-minute topographic map). ........................................ 56
Figure 3.4-2. Claim map of the area including the Idaho Copper Prospect on the west side of Priest Lake (Idaho Geological Survey mineral property files, Milwaukee Mines, Inc. (SA-114), file). .................................................. 57
Figure 3.4-3. Sketch of the Idaho Copper Prospect workings. ........................................ 58
Figure 3.4-4. Sketch of the shaft and associated features at the Idaho Copper Prospect. .......... 59
Figure 3.4-5. Debris-filled shaft at the Idaho Copper Prospect, looking northwest (Roll K8, frame #12). ........................................................ 60
Figure 3.4-6. Close-up of the rotted timbers and debris in the shaft (Roll K8, frame #13). .......... 60
Figure 3.4-7. Looking southeast across the surface of the narrow waste dump from the shaft at the Idaho Copper Prospect (Roll K8, frame #14). .......... 61
Figure 3.4-8. Looking south at part of an old compressor and the collapsed platform, possibly a loading platform, just south of the shaft at the Idaho Copper Prospect (Roll K8, frame #15). ........ 61
Figure 3.4-9. Looking west into the short Adit 1 of the Idaho Copper Prospect (Roll K8, frame #19). .................................................. 62
Figure 3.4-10. Sketch of caved Adit 2 at the Idaho Copper Prospect. .................................... 63
Figure 3.4-11. Looking north at the side of the waste dump for Adit 2 at the Idaho Copper Prospect, with Priest Lake at the right (Roll K9, frame #4). ........................................ 64
Figure 3.4-12. Looking west at the sloughed rock debris of caved Adit 3 at the Idaho Copper Prospect (Roll K9, frame #5). .................................................. 65
Figure 3.4-13. Sketch of caved Adit 3 at the Idaho Copper Prospect. .................................... 66
Figure 3.4-14. Looking east across the surface of the waste dump for Adit 3 at the Idaho Copper Prospect (Roll K9, frame #6). .................................................. 67
Figure 3.4-15. Looking north along the shore of Priest Lake at the toe of the waste dump for Adit 3 at the Idaho Copper Prospect (Roll K9, frame #7). ........................................ 67
Figure 3.4-16. Metal-sided shed southwest of the shaft at the Idaho Copper Prospect (Roll K8, frame #16). .................................................. 68
Figure 3.4-17. Small log storage shed built into the hillside just south of the metal-sided shed (Roll K8, frame #17). .................................................. 68
Figure 3.4-18. Collapsed remains of a log cabin near the small log storage shed and metal-sided shed at the Idaho Copper Prospect (Roll K8, frame #18). ........................................ 69
Figure 3.5-1. Location map of the Navigation Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ........................................ 72
Figure 3.5-2. Sketch of the Navigation Mine. .................................................. 73
Figure 3.5-3. Map of the Lone Ranger Group (IGS mineral property files). ........................................ 74
Figure 3.5-4. Looking west at the portal timbers of the caved adit at the Navigation Mine (Roll K8, frame #21). .................................................. 75
Figure 3.5-5. Looking northeast across the surface of the waste dump at the Navigation Mine (Roll K8, frame #22). .................................................. 75
Figure 3.5-6. Looking north along the toe of the waste dump at the Navigation Mine (Roll K8, frame #23). .................................................. 76
Figure 3.6-1. Location map of the Gem Copper Mining Company Prospect, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ................................................................. 79

Figure 3.6-2. Looking northeast down the face of the possible waste dump of the Gem Copper Mining Company Prospect (Roll K8, frame #24). ................................................................. 80

Figure 3.7-1. Location map of the Unnamed Prospect, Site No. K8199802, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ................................................................. 83

Figure 3.7-2. Looking northwest at the shallow cut or short caved adit at Site No. K8199802 (Roll K8, frame #25). ................................................................. 84

Figure 3.8-1. Location map of the Plowboy Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ................................................................. 87

Figure 3.8-2. Sketch of the Plowboy Mine. ................................................................. 88

Figure 3.8-3. Looking east at a shallow pit, possibly the backfilled shaft, of the Plowboy Mine (Roll K8, frame #26). ................................................................. 89

Figure 3.9-1. Location map of the Kootenai No. 2 Prospect, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ................................................................. 92

Figure 3.9-2. Looking northwest at the shallow depression of the short, caved adit at the Kootenai No. 2 Prospect (Roll K9, frame #1). ................................................................. 93

Figure 3.10-1. Location map of the Baldwin Group workings, Bonner County, Idaho (U.S. Geological Survey Priest Lake NW 7.5-minute topographic map). ................................................................. 99

Figure 3.10-2. Sketch map of the Baldwin Group workings (U.S. Bureau of Mines map in Idaho Geological Survey mineral property files). ................................................................. 100

Figure 3.10-3. Sketch of Shaft 1 and Adit 1 of the Baldwin Group. ................................................................. 101

Figure 3.10-4. Looking west into the opening of Shaft 1 of the Baldwin Group (Roll K9, frame #9). ................................................................. 102

Figure 3.10-5. Looking south across the waste dump for Shaft 1 at the Baldwin Group (Roll K9, frame #10). ................................................................. 102

Figure 3.10-6. Looking northwest toward Shaft 1 at the Baldwin Group (Roll K9, frame #8). ................................................................. 103

Figure 3.10-7. Looking west at the opening of Adit 1 of the Baldwin Group (Roll K9, frame #12). ................................................................. 104

Figure 3.10-8. View inside the opening of Adit 1 at the Baldwin Group (Roll K9, frame #13). ................................................................. 105

Figure 3.10-9. Looking south at the waste dump for Adit 1 at the Baldwin Group (Roll K9, frame #14). ................................................................. 105

Figure 3.10-10. Sketch of Adit 2 of the Baldwin Group. ................................................................. 106

Figure 3.10-11. Looking west at the opening of Adit 2 at the Baldwin Group (Roll K9, frame #15). ................................................................. 107

Figure 3.10-12. View inside Adit 2 at the Baldwin Group, showing several rotten, leaning support timbers (Roll K9, frame #16). ................................................................. 108

Figure 3.10-13. Looking north at the south flank of the waste dump for Adit 2 (Roll K9, frame #17). ................................................................. 109

xiii
Figure 3.10-14. Sketch of Adit 3 at the Baldwin Group. .................................................. 110
Figure 3.10-15. Looking north at the opening of Adit 3 at the Baldwin Group (Roll K9, 
frame #18). ......................................................................................................................... 111
Figure 3.10-16. View into Adit 3, which is actually a shallow decline (Roll K9, frame 
#19). ............................................................................................................................... 111
Figure 3.10-17. Looking south down the face of the iron-rich waste dump of Adit 3 (Roll 
K9, frame #20). .................................................................................................................. 112
Figure 3.10-18. Sketch of Adit 4, possible Adit 5, and possible Shaft 2 at the Baldwin 
Group. ................................................................................................................................ 113
Figure 3.10-19. Looking down into the narrow opening of Adit 4 at the Baldwin Group 
(Roll K10, frame #9). ........................................................................................................ 114
Figure 3.10-20. Looking southwest at the collapsed portal timbers of Adit 4 at the 
Baldwin Group (Roll K10, frame #8). .............................................................................. 115
Figure 3.10-21. Looking southeast across the moss-covered surface of the waste dump 
for Adit 4 at the Baldwin Group (Roll K10, frame #10). .................................................... 116
Figure 3.10-22. Looking southwest at the face of the waste dump for Adit 4 at the 
Baldwin Group (Roll K10, frame #5). ................................................................................. 116
Figure 3.10-23. One of several concrete footings on the flat below the waste dump for 
Adit 4 at the Baldwin Group (Roll K10, frame #7). ........................................................... 117
Figure 3.10-24. Small concrete structure near the footings on the flat below the waste 
dump for Adit 4, looking north (Roll K10, frame #6). ......................................................... 117
Figure 3.10-25. Sketch of Adit 6 at the Baldwin Group. ..................................................... 118
Figure 3.10-26. Looking south at caved Adit 6 of the Baldwin Group (Roll K10, frame 
#11). .................................................................................................................................. 119
Figure 3.10-27. Looking northwest at the toe of the waste dump for Adit 6, which 
extends into one of the small bodies of water that form Reeder Lake (Roll K10, 
frame #12). ......................................................................................................................... 120
Figure 3.10-28. Sketch of Adit 7 at the Baldwin Group ...................................................... 121
Figure 3.10-29. Looking north from the prospect cut below Adit 7 of the Baldwin Group 
(Roll K10, frame #13). ....................................................................................................... 122
Figure 3.10-30. Looking west into the opening of Adit 7 at the Baldwin Group (Roll 
K10, frame #14). ................................................................................................................ 123
Figure 3.10-31. Sketch of Adit 8 and Shaft 3 at the Baldwin Group. .................................. 124
Figure 3.10-32. Looking southwest up the trough of caved Shaft 3 of the Baldwin Group 
(Roll K10, frame #15). ....................................................................................................... 125
Figure 3.10-33. View from above into the pit of caved Shaft 3 at the Baldwin Group 
(Roll K10, frame #16). ....................................................................................................... 126
Figure 3.10-34. Looking northeast over the moss-covered waste dump of Shaft 3 at the 
Baldwin Group (Roll K10, frame #17). ............................................................................ 126
Figure 3.10-35. Looking south or southwest at open Adit 8 and the face of the waste 
dump for Shaft 3 at the Baldwin Group (Roll K10, frame #20). ......................................... 127
Figure 3.10-36. Looking northeast down the moss-covered face of the waste dump for 
Adit 8 at the Baldwin Group (Roll K10, frame #19). ......................................................... 127
Figure 3.10-37. Collapsed remains of a small log structure along an old foot trail southeast of Adit 4 at the Baldwin Group (Roll K10, frame #4) .................................................. 128

Figure 3.11-1. Location map of the Mountain Chief Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map) ................................................. 131

Figure 3.11-2. Looking south at the probable caved adit at the Mountain Chief Mine (Roll K9, frame #21) ............................................................... 132

Figure 3.11-3. Looking southwest at the face of the Mountain Chief waste dump, which was built across the head of the dry gully (Roll K9, frame #23) ................................................ 133

Figure 3.11-4. Collapsed remains of a cabin or shed on the north side of the waste dump at the Mountain Chief Mine (Roll K9, frame #22) ....................... 133

Figure 3.12-1. Location map of the Unnamed Prospect SA-28, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map) ............... 136

Figure 3.12-2. Sketch of Unnamed Prospect SA-28 ........................................... 137

Figure 3.12-3. Looking south at the open, timbered portal of the adit at Unnamed Prospect SA-28 (Roll K9, frame #24) ................................................. 138

Figure 3.12-4. View inside the adit at Unnamed Prospect SA-28 (Roll K9, frame #25) ........................................ 139

Figure 3.12-5. Looking north from the adit of Unnamed Prospect SA-28 along the narrow surface of the waste dump (Roll K9, frame #26) ......................... 139

Figure 3.12-6. Looking south, from the north side of the small grassy wetland, at the end of the adit waste dump that extends out into the wetland (Roll K10, frame #3) ......................... 140

Figure 3.12-7. Crescent-shaped waste dump around the prospect pit on the north side of the small wetland at Unnamed Prospect SA-28 (Roll K10, frame #2) .... 140

Figure 3.12-8. Remains of a collapsed structure west of the prospect pit at Unnamed Prospect SA-28 (Roll K10, frame #1) ................................................. 141

Figure 3.13-1. Location map of Unnamed Prospect, Site No. K8249802, Bonner County, Idaho (U.S. Geological Survey Priest Lake NW 7.5-minute topographic map) ........... 144

Figure 3.13-2. Shallow pit of Site No. K8249802 beside an old logging road (Roll K10, frame #21) ............................................................... 145

Figure 3.13-3. Log beams in the shallow pit at Site No. K8249802 (Roll K10, frame #22) ......................... 146

Figure 3.14-1. Location map of the Woodrat Mine, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map) ......................... 153

Figure 3.14-2. Claim map of the Wood Rat Group, Kaniksu Mining Company (Idaho Geological Survey's mineral property files) ............................................. 154

Figure 3.14-3. Sketch map of the Woodrat Mine workings (U.S. Bureau of Mines map in Idaho Geological Survey's mineral property files) ........................................ 155

Figure 3.14-4. Sketch of Shaft 1 and Adit 1 at the Woodrat Mine .................................................. 156

Figure 3.14-5. Rusted winch near the site of caved Shaft 1 at the Woodrat Mine (Roll K11, frame #14) ......................... 157

Figure 3.14-6. Looking west along the shore of Priest Lake (Roll K11, frame #1) .................................................. 157

Figure 3.14-7. Looking east at the face and toe of the waste dump for Shaft 1 at the Woodrat Mine (Roll K11, frame #15) ......................... 158

Figure 3.14-8. Looking east across the top of the waste dump for Shaft 1, showing several of the ridges on the surface (Roll K11, frame #16) ......................... 158
Figure 3.14-9. Looking south up the trough of caved Adit 1 at the Woodrat Mine (Roll K10, frame #23). ................................. 159

Figure 3.14-10. Leveled area, now used as a campsite, just east of Adit 1 at the Woodrat Mine (Roll K10, frame #24). ................................. 160

Figure 3.14-11. Sketch of Adits 2, 3, and 4, and Shaft 2 at the Woodrat Mine. ................................. 161

Figure 3.14-12. Looking south at the trough of caved Adit 2 at the Woodrat Mine (Roll K10, frame #25). ................................. 162

Figure 3.14-13. Looking north from the mouth of caved Adit 2, with Priest Lake in the background (Roll K10, frame #26). ................................. 162

Figure 3.14-14. Short trough of caved Adit 3 at the Woodrat Mine, looking south (Roll K11, frame #2). ................................. 163

Figure 3.14-15. Looking down into the shallow pit of caved Shaft 2 at the Woodrat Mine (Roll K11, frame #3). ................................. 164

Figure 3.14-16. Looking north at the low rim of waste rock around Shaft 2 at the Woodrat Mine (Roll K11, frame #4). ................................. 164

Figure 3.14-17. Looking south up the deep trough of caved Adit 4 at the Woodrat Mine (Roll K11, frame #5). ................................. 165

Figure 3.14-18. Seep of water flowing from caved Adit 4 at the Woodrat Mine, looking north (Roll K11, frame #6). ................................. 166

Figure 3.14-19. Looking northwest along the foot trail that follows the lakeshore (Roll K11, frame #7). ................................. 167

Figure 3.14-20. Sketch of Adits 5, 6, and 7 at the Woodrat Mine. ................................. 168

Figure 3.14-21. Looking south at caved Adit 5 of the Woodrat Mine (Roll K11, frame #8). ................................. 169

Figure 3.14-22. Broken tree on the east side of the waste dump for Adit 5 at the Woodrat Mine, looking east (Roll K11, frame #9). ................................. 170

Figure 3.14-23. Leaning portal timbers of caved Adit 6 at the Woodrat Mine, looking south (Roll K11, frame #10). ................................. 171

Figure 3.14-24. Looking south at Adit 7 of the Woodrat Mine (Roll K11, frame #11). ................................. 172

Figure 3.14-25. View into open Adit 7 at the Woodrat Mine (Roll K11, frame #12). ................................. 173

Figure 3.14-26. Looking west along the surface of the combined waste dumps of Adits 6 and 7 at the Woodrat Mine (Roll K11, frame #13). ................................. 174

Figure 3.14-27. Sketch of Adit 8 at the Woodrat Mine. ................................. 175

Figure 3.14-28. Saplings and fallen trees on the surface of the waste dump at Adit 8 of the Woodrat Mine, looking south (Roll K11, frame #18). ................................. 176

Figure 3.14-29. Small eye-shaped opening into Adit 8 at the Woodrat Mine (Roll K11, frame #20). ................................. 176

Figure 3.14-30. Looking west from the base of the waste dump of Adit 8 at the Woodrat Mine (K11, frame #21). ................................. 177

Figure 3.15-1. Location map of Unnamed Prospect, Site No. K8259803, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map). ................................. 179

Figure 3.15-2. Shallow prospect pit at Site No. K8259803 along Forest Service Road 237, looking east (Roll K11, frame #22). ................................. 180
Figure 3.15-3. Looking west at the small pile of excavated rock at Site No. K8259803 (Roll K11, frame #23). .............................................. 180
Figure 3.16-1. Location map of the Last Chance Mine, Pend Oreille County, Washington (U.S. Geological Survey Gleason Mountain 7.5-minute topographic map). .................. 183
Figure 3.16-2. Sketch of the Last Chance Mine, Site No. K8259804. ..................... 184
Figure 3.16-3. Small opening of the adit at the Last Chance Mine (Roll K11, frame #25). 185
Figure 3.16-4. Looking northwest across Forest Service Road 219 at the adit for the Last Chance Mine (Roll K11, frame #24). .......................... 186
Figure 3.17-1. Location map of Unnamed Prospect, Site No. K8269801, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map). ........... 190
Figure 3.17-2. Sketch of Unnamed Prospect, Site No. K8269801 .......................... 191
Figure 3.17-3. Looking northeast at open Adit 1 at Site No. K8269801 (Roll K12, frame #1) ................................................................. 192
Figure 3.17-4. View inside Adit 1 at Site No. K8269801 (Roll K12, frame #4). ............ 193
Figure 3.17-5. Looking southwest across the small waste dump of Adit 1 at Site No. K8269801 (Roll K12, frame #2). ...................................... 194
Figure 3.17-6. View of the waste dump for Adit 1 at Site No. K8269801 (Roll K12, frame #3). ................................................................. 195
Figure 3.17-7. Looking northwest along Forest Service Trail 302, with Upper Priest Lake to the left (Roll K12, frame #6). ....................................... 195
Figure 3.17-8. Looking east at the caved part of Adit 3 at Site No. K8269801 (Roll K12, frame #7). ................................................................. 196
Figure 3.17-9. Small opening into Adit 3 at Site No. K8269801 (Roll K12, frame #8). .......... 197
Figure 3.17-10. Looking west down the face of the waste dump for Adit 3 at Site No. K8269801 (Roll K12, frame #9). ................................................ 198
Figure 3.17-11. View to the west of the front of the collapsed log cabin along Forest Service Trail 302 (Roll K12, frame #10). ..................................... 199
Figure 3.17-12. Looking southeast at the rear of the log cabin along Forest Service Trail 302 (Roll K12, frame #12). ........................................ 199
Figure 3.17-13. View to the east of the collapsed outhouse and pit on the north side of the log cabin (Roll K12, frame #11). ................................. 200
Figure 3.18-1. Location map of the Pine Creek prospects, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map). ......................... 204
Figure 3.18-2. Sketch map of the Pine Creek prospects (modified from a U.S. Bureau of Mines map in the IGS mineral property files). ................................. 205
Figure 3.18-3. Looking east at the face of the waste dump of Adit 1 at the Pine Creek prospects (Roll K12, frame #13). ........................................ 206
Figure 3.18-4. Looking east at an outcrop of white quartz near Prospect Pit 2 at the Pine Creek prospects, on the slope above Adit 1 (Roll K12, frame #14). ............ 206
Figure 3.18-5. Looking west along the ridge north of Pine Creek (Roll K12, frame #15). .... 207
Figure 3.18-6. Looking north at the brushy entrance to open Adit 2 at the Pine Creek prospects (Roll K12, frame #18). ................................ 207
Figure 3.18-7. View inside Adit 2 at the Pine Creek prospects (Roll K12, frame #16). .... 208
Figure 3.18-8. Looking south down the thin veneer of waste rock on the slope below Adit 2 at the Pine Creek prospects (Roll K12, frame #17) .................. 208
Figure 3.18-9. Looking north at open Adit 3 at the Pine Creek prospects (Roll K12, frame #19) ................................................................. 209
Figure 3.18-10. View inside Adit 3 at the Pine Creek prospects (Roll K12, frame #20) .............................................................. 210
Figure 3.18-11. Looking south down the waste dump of Adit 3 at the Pine Creek prospects (Roll K12, frame #21) ................................. 211
Figure 3.18-12. Looking southeast at the waste dumps for Adits 4 and 5 (Roll K12, frame #23) ................................................................. 211
Figure 3.18-13. Looking west down the face of the waste dump for Adit 4 at the Pine Creek prospects (Roll K12, frame #25) ...................... 212
Figure 3.18-14. Looking west down the face of the waste dump for Adit 5 at the Pine Creek prospects (Roll K12, frame #26) ...................... 212
Figure 3.18-15. Looking northwest at the trough of caved Adit 7 at the Pine Creek prospects (Roll K13, frame #1) ........................................ 213
Figure 3.18-16. Looking southeast across the leaf-covered surface of the waste dump for Adit 7 at the Pine Creek prospects (Roll K13, frame #2) ................. 214
Figure 3.18-17. Looking northeast at prospect pit 3 of the Pine Creek prospects (Roll K12, frame #22) ....................................................... 214
Figure 3.18-18. Looking east at prospect pit 4 of the Pine Creek prospects (Roll K12, frame #24) ....................................................... 215
Figure 3.19-1. Location map of the Camp Bird Prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. and Priest River 7.5-minute topographic maps) .......... 219
Figure 3.19-2. Looking north at one of the workings on the Farmer Jones Prospect (Roll K13, frame #5) ....................................................... 220
Figure 3.19-3. Camp Bird Prospect claim map (modified from a U.S. Bureau of Mines map in IGS's mineral property files) ......................... 221
Figure 3.19-4. Sketch of the trenches and open cut at the Camp Bird Prospect ........ 222
Figure 3.19-5. Western of two pictures of the large open cut on the Camp Bird Prospect, looking north (Roll K13, frame #8) ...................... 223
Figure 3.19-6. Eastern of two pictures of the large open cut on the Camp Bird Prospect, showing the trench along the east edge of the cut (Roll K13, frame #7) .............. 223
Figure 3.19-7. Looking east along the axis of the largest of several trenches on the Camp Bird Prospect north of the large open cut (Roll K13, frame #6) .............. 224
Figure 3.20-1. Location map of the Binarch Creek Prospect, Bonner County, Idaho (U.S. Geological Survey Outlet Bay 7.5-minute topographic map) .................. 228
Figure 3.20-2. Claim map of the Binarch Creek Prospect and the Nevada Mines Prospect (Idaho Geological Survey mineral property files) ................. 229
Figure 3.20-3. Looking west at the trough of either a prospect cut or short adit at the Binarch Creek Prospect (Roll K13, frame #4) ...................... 230
Figure 3.21-1. Location map of the Lucky Lead Prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map) ................. 234
Figure 3.21-2. 1980 claim map of the Lucky Lead Prospect (IGS mineral property files) .... 235
Figure 3.21-3. Sketch of Shaft 1 and associated trenches at the Lucky Lead Prospect. 236
Figure 3.21-4. Looking north along the axis of the trench containing caved Shaft 1 at the
Lucky Lead Prospect (Roll K13, frame #10). 237
Figure 3.21-5. Collapsed boards and chicken wire in the pit of caved Shaft 1 at the Lucky
Lead Prospect (Roll K13, frame #9). 238
Figure 3.21-6. Looking northwest at the waste dump of Shaft 1 at the Lucky Lead
Prospect (Roll K13, frame #13). 238
Figure 3.21-7. Looking southeast at the dump for the second trench at the Lucky Lead
Prospect (Roll K13, frame #12). 239
Figure 3.21-8. Sketch of Shaft 2 and associated features at the Lucky Lead Prospect. 240
Figure 3.21-9. Timbers and corrugated metal sheets falling into Shaft 2 at the Lucky Lead
Prospect (Roll K13, frame #14). 241
Figure 3.21-10. Looking east up the axis of the trench containing Shaft 2 (Roll K13,
frame #15). 241
Figure 3.21-11. Looking west down the face of the waste dump of Shaft 2 and the
associated trench at the Lucky Lead Prospect (Roll K13, frame #16). 242
Figure 3.22-1. Location map of the Silver Mountain Prospect, Bonner County, Idaho
(U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map). 245
Figure 3.22-2. Shallow trench 2 at the Silver Mountain Prospect, looking southeast (Roll
K13, frame #17). 246
Figure 3.23-1. Location map of the Quartz Creek Quartz Deposit prospect, Bonner
County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map). 249
Figure 3.23-2. Massive white quartz vein exposed on the ridge above the prospect cuts at
the Quartz Creek Quartz Deposit, looking north (Roll K13, frame #21). 250
Figure 3.23-3. Sketch of the Quartz Creek Quartz Deposit. 251
Figure 3.23-4. Looking northwest along the bulldozer cut at the Quartz Creek Quartz
Deposit, with the massive quartz vein exposed at the upper right (Roll K13, frame
#18). 252
Figure 3.23-5. Pit cut into the slope at the southeast end of the bulldozer cut (Roll K13,
frame #19). 252
Figure 3.23-6. Old collapsed cabin along Quartz Creek Road (Roll K13, frame #22). 253

xix
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. List of properties visited in the Priest Lake District. .......................................... 17
Table 2.2-1. Generalized section of the Belt Supergroup (Hobbs and others, 1965, p. 14). ....... 21
Table 2.4-1. Dissolved metals in reference water sample from the Priest Lake Ranger District. ................................................................. 23
Table 2.4-2. Total recoverable metals in reference water sample from Priest Lake Ranger District. ...................................................................................... 24
Table 2.5-1. Dissolved metals in water samples from the properties in the Priest Lake Ranger District. ...................................................................................... 26
Table 2.5-2. Total recoverable metals in water samples from the properties in the Priest Lake Ranger District. ...................................................................................... 27
Table 2.5-3. Element screen for dump samples for properties in the Priest Lake Ranger District. ...................................................................................... 28
Table 2.5-4. Toxicity Characteristic Leaching Procedure for dump and stream sediment samples from properties in the Priest Lake Ranger District. ..................... 29
## VIDEOTAPE INDEX

<table>
<thead>
<tr>
<th>Topic</th>
<th>Tape Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>Tape 1, 00:00:00-00:10:55</td>
</tr>
<tr>
<td>3.1 Milwaukee Mine (Site No. SA-114)</td>
<td>Tape 1, 00:11:00-00:15:34</td>
</tr>
<tr>
<td>3.2 McLean Mine (Site No. SA-19)</td>
<td>Tape 1, 00:15:38-00:24:12</td>
</tr>
<tr>
<td>3.3 Unnamed Prospect (Site No. SA-25)</td>
<td>Tape 1, 00:24:15-00:28:10</td>
</tr>
<tr>
<td>3.4 Idaho Copper Prospect (Site No. SA-108)</td>
<td>Tape 1, 00:28:13-00:41:00</td>
</tr>
<tr>
<td>3.5 Navigation Mine (Site No. SA-33)</td>
<td>Tape 1, 00:41:03-00:45:33</td>
</tr>
<tr>
<td>3.6 Gem Copper Mining Company Prospect (?) (Site No. SA-32)</td>
<td>Tape 1, 00:45:37-00:48:01</td>
</tr>
<tr>
<td>3.7 Unnamed Prospect (Site No. K8199802)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.8 Plowboy Mine (Site No. SA-29)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.9 Kootenai No. 2 Prospect (Site No. SA-31)</td>
<td>Tape 1, 00:48:44-00:51:36</td>
</tr>
<tr>
<td>3.10 Baldwin Group (Site No. SA-105)</td>
<td>Tape 1, 00:51:40-01:29:14</td>
</tr>
<tr>
<td>3.11 Mountain Chief Mine (Site No. SA-30)</td>
<td>Tape 1, 01:29:18-01:39:50</td>
</tr>
<tr>
<td>3.12 Unnamed Prospect (Site No. SA-28)</td>
<td>Tape 1, 01:39:53-01:45:15</td>
</tr>
<tr>
<td>3.13 Unnamed Prospect (Site No. K8249802)</td>
<td>Tape 1, 01:45:18-01:48:21</td>
</tr>
<tr>
<td>Closing Statement</td>
<td>Tape 1, 01:48:23-01:48:55</td>
</tr>
<tr>
<td>3.14 Woodrat Mine (Site No. SA-118)</td>
<td>Tape 2, 00:00:55-00:26:18</td>
</tr>
<tr>
<td>3.15 Unnamed Prospect (Site No. K8259803)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.16 Last Chance Mine (Site No. K8259804)</td>
<td>Tape 2, 00:26:44-00:29:40</td>
</tr>
<tr>
<td>3.17 Unnamed Prospect (Site No. K8269801)</td>
<td>Tape 2, 00:29:44-00:41:30</td>
</tr>
<tr>
<td>3.18 Pine Creek Prospects (Site No. SA-144)</td>
<td>Tape 2, 00:41:35-01:03:32</td>
</tr>
<tr>
<td>3.19 Camp Bird Prospect (Site No. SA-149)</td>
<td>Tape 2, 01:03:35-01:12:17</td>
</tr>
<tr>
<td>3.20 Binarch Creek Prospect (Site No. SA-123)</td>
<td>Tape 2, 01:12:20-01:14:18</td>
</tr>
<tr>
<td>3.21 Lucky Lead Prospect (Site No. SA-134)</td>
<td>Tape 2, 01:14:22-01:21:40</td>
</tr>
<tr>
<td>3.22 Silver Mountain Prospect (Site No. SA-137)</td>
<td>No Video</td>
</tr>
<tr>
<td>3.23 Quartz Creek Quartz Deposit (Site No. SA-140)</td>
<td>Tape 2, 01:22:03-01:32:14</td>
</tr>
<tr>
<td>END OF TAPE ANNOUNCEMENT</td>
<td>Tape 2, 01:32:20-01:32:30</td>
</tr>
</tbody>
</table>

xxi
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 U.S. 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 Panhandle National Forest. This volume presents work that was done in the Priest Lake district. 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 north and south of the Coeur d'Alene River drainage were examined during the 1998 field season.

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 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 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 (FeS$_2$) and pyrrhotite (Fe$_{1-x}$S). Other sulfides play a minor role in acid generation. Oxidation of iron sulfides forms sulfuric acid (H$_2$SO$_4$), sulfate ions (SO$_4^{2-}$), and reduced iron (Fe$^{2+}$). 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 (FeS$_2$, 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, CuFeS$_2$; galena, PbS; tetrahedrite, (CuFe)$_{12}$Sb$_4$S$_{13}$; 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$_3$(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$_3$AsO$_4$. Arsenic is abundant in metallic mineral deposits as arsenopyrite [FeAsS], enargite [Cu$_3$AsS$_4$], tennantite [Cu$_{12}$As$_4$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$_3$], 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 \( \mu g/L \) 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 \( \mu g/L \) 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 \( \mu g/L \). Franklinite 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. 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></td>
<td>1. Mill site or tailings present.</td>
</tr>
<tr>
<td></td>
<td>2. Adits with discharge or evidence of discharge.</td>
</tr>
<tr>
<td></td>
<td>3. 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></td>
<td>4. Mine waste in floodplain or shows signs of water erosion.</td>
</tr>
<tr>
<td></td>
<td>5. Residences, high public use area, or environmentally sensitive area (as listed in HRS) within 200 feet of the disturbance.</td>
</tr>
<tr>
<td></td>
<td>6. Hazardous wastes/materials (chemical containers, explosives, etc.)</td>
</tr>
<tr>
<td></td>
<td>7. 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, Stream Sediment, 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 obviously impacting natural material. 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, stream sediment, 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—duplicates of selected composite samples (usually waste rock or mill tailings) for testing leachable metals.

The three types of samples were used to examine the 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 0.45 micron filter)—Dissolved Metal Screen (EPA Test 200.7).
Soil and Waste Material—Element Screen (EPA Test 3050/6010), Leachable Metals (TCLP for Metals) 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 are 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>Rock Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prichard Formation</td>
</tr>
<tr>
<td>Iron (percent)</td>
<td>3</td>
</tr>
<tr>
<td>Magnesium (percent)</td>
<td>0.4</td>
</tr>
<tr>
<td>Calcium (percent)</td>
<td>---</td>
</tr>
<tr>
<td>Titanium (percent)</td>
<td>0.3</td>
</tr>
<tr>
<td>Manganese (ppm)</td>
<td>224</td>
</tr>
<tr>
<td>Barium (ppm)</td>
<td>343</td>
</tr>
<tr>
<td>Beryllium (ppm)</td>
<td>1.3</td>
</tr>
<tr>
<td>Cobalt (ppm)</td>
<td>5</td>
</tr>
<tr>
<td>Chromium (ppm)</td>
<td>40</td>
</tr>
<tr>
<td>Molybdenum (ppm)</td>
<td>---</td>
</tr>
<tr>
<td>Nickel (ppm)</td>
<td>10</td>
</tr>
<tr>
<td>Strontium (ppm)</td>
<td>---</td>
</tr>
<tr>
<td>Vanadium (ppm)</td>
<td>54</td>
</tr>
<tr>
<td>Sulfur (percent)</td>
<td>.01</td>
</tr>
<tr>
<td>Mercury (ppm)</td>
<td>.03</td>
</tr>
<tr>
<td>Copper (ppm)</td>
<td>22</td>
</tr>
<tr>
<td>Lead (ppm)</td>
<td>34</td>
</tr>
<tr>
<td>Zinc (ppm)</td>
<td>60</td>
</tr>
<tr>
<td>Silver (ppm)</td>
<td>0.4</td>
</tr>
<tr>
<td>Cadmium (ppm)</td>
<td>0.5</td>
</tr>
<tr>
<td>Arsenic (ppm)</td>
<td>---</td>
</tr>
<tr>
<td>Antimony (ppm)</td>
<td>109</td>
</tr>
<tr>
<td>No. of Samples</td>
<td>727</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</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</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</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</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</td>
<td>647</td>
<td>647</td>
<td>616</td>
<td>684</td>
<td>586</td>
</tr>
<tr>
<td>Beryllium</td>
<td>1.4</td>
<td>1.1</td>
<td>1</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Cobalt</td>
<td>14</td>
<td>10</td>
<td>8.8</td>
<td>9.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Chromium</td>
<td>43</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Niobium</td>
<td>9</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Nickel</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Strontium</td>
<td>159</td>
<td>178</td>
<td>157</td>
<td>164</td>
<td>154</td>
</tr>
<tr>
<td>Vanadium</td>
<td>98</td>
<td>90</td>
<td>97</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>Mercury</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</td>
<td>21</td>
<td>20</td>
<td>29</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>Lead</td>
<td>54</td>
<td>35</td>
<td>41</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>Zinc</td>
<td>140</td>
<td>89</td>
<td>77</td>
<td>86</td>
<td>115</td>
</tr>
<tr>
<td>Silver</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</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</td>
<td>10</td>
<td>8.6</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Antimony</td>
<td>1</td>
<td>1</td>
<td>1.8</td>
<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Sulfur</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., "98," if the samples was taken in 1998); 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.
2.0 PRIEST LAKE RANGER DISTRICT, BONNER COUNTY, IDAHO

2.1 INTRODUCTION

This report describes twenty-six properties in the Priest Lake Ranger District of the Kaniksu National Forest, which includes the mining area west of Priest Lake in Bonner and Boundary counties, Idaho, and a small area in Pend Oreille County, Washington. Only three properties discussed in this volume reported any production, and all of these had less than 50 tons of total output. The study area extends from the district boundary, Priest Lake, and Priest River on the east to the Idaho state line on the west (although one property in easternmost Washington was included in the study). The northern edge of the study area is the Canadian border. The southern boundary coincides with the southern boundary of the Kaniksu Forest. Access to the area is by paved and unpaved roads from the State Highway 57, which heads north from the town of Priest River. Most of the secondary drainages have dirt roads, especially those with past mining activity.

The study area is in the Priest Lake District of the Kaniksu National Forest, and most of the land is administered by the U.S. Forest Service (USFS). There are enclaves of private land, mostly on patented mining claims.

The twenty-six mines and prospects described in this report are located on nine 7.5-minute topographic maps (U.S. Geological Survey). The locations of these properties are shown in Figure 2.1-1. Elevations in the study area range from about 2,100 feet on Priest River at the southern boundary of the study area to 5,696 feet at Little Grass Mountain near the Idaho-Washington border. The area is heavily forested with dense brush and conifers, and the topography is generally very steep.

2.1.1 Summary of the Priest Lake Study Area

There were twenty-six mining properties (Table 2.1.1-1) examined in the Priest Lake Ranger District. Of these mines, seven have the potential to have an environmental impact on or near USFS lands. Four of these properties have waste dumps in active waterways, two sites have water discharges that exceed one or more water quality standards, and one property has both water quality concerns and waste rock impinging on an active waterway. Of the twenty-six sites discussed in this report, nine have open adits or shafts. Several of these pose significant safety hazards.

2.2 GEOLOGY

The most recent general references on the geology of the Priest Lake area are Savage (1967), Aadland and Bennett (1979), and Miller (1982a, 1982b, 1982c). The geology and ore deposits of the area are discussed in Savage (1967). Additional references include Kirkham and Ellis (1926).
Figure 2.1-1a. Location of properties in the northern part of the Priest Lake Ranger District (Idaho Transportation Department Boisie U.S. Geological Survey Colorado 1:100,000-scale maps).
Figure 2.3-b. Location of properties in the southern part of the Priest Lake Ranger District (Idaho Transportation Department Sandpoint 1:100,000-scale map)
Table 2.1-1. List of properties visited in the Priest Lake District. The properties are arranged according to site number. All sites were visited in 1998.

Explanation:

Site Number: Idaho Geological Survey file number, or field designation number.
Surface Owner: FS = Forest Service; S = State; P = Private or Patented claims; M = mixed ownership ; ? where ownership uncertain.
Water/Solid Sample: numbers indicate the number of samples collected.
Environmental Concerns: W = 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 - dump samples that exceed background or environmental standards for one or more elements in the Element Screen, and/or tailings or dump samples that show significant leaching of one or more metals in the TCLP for Metals Screen.
Physical Conditions: AO = open adit; AC = caved or otherwise closed adit; SO = open shaft; SC = caved shaft; T = trench or bulldozer cut; P = prospect pit. Numbers indicate how many of each are at the site; queried when type or condition of workings is uncertain or unknown.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Samples</th>
<th>Solid Samples</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-19</td>
<td>McLean Mine</td>
<td>FS</td>
<td>1</td>
<td>W</td>
<td></td>
<td>2AC, several shallow P</td>
</tr>
<tr>
<td>SA-24</td>
<td>Alice Group</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-25</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1SO, 1 T</td>
</tr>
<tr>
<td>SA-26</td>
<td>L &amp; M</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-28</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td>1</td>
<td>D</td>
<td></td>
<td>1AO, 1SC or P</td>
</tr>
<tr>
<td>SA-29</td>
<td>Plowboy Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1SC</td>
</tr>
<tr>
<td>SA-30</td>
<td>Mountain Chief</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>SA-31</td>
<td>Kootenai No. 2</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>SA-32</td>
<td>Gem Copper Co. Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>SA-33</td>
<td>Navigation Mine</td>
<td>FS</td>
<td>1</td>
<td>D</td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>SA-103</td>
<td>Trustee Group</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-105</td>
<td>Baldwin Group (Nickelplate)</td>
<td>FS</td>
<td>2</td>
<td></td>
<td>W (Adit 2) W (Adit 4)</td>
<td>1SO, 6AO, 2AC, 2SC, several P</td>
</tr>
</tbody>
</table>

17
Table 2.1-1 (continued). List of properties visited in the Priest Lake District.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Samples</th>
<th>Solid Samples</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-107</td>
<td>Golden Eagle Claims</td>
<td>---</td>
<td></td>
<td>2</td>
<td>D (shaft) D (Adit 3)</td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-108</td>
<td>Idaho Copper Prospect</td>
<td>FS</td>
<td>2</td>
<td></td>
<td>1AO, 2AC, 1SO (water filled)</td>
<td></td>
</tr>
<tr>
<td>SA-111</td>
<td>Lakeview Prospect</td>
<td>FS</td>
<td></td>
<td>1</td>
<td>D</td>
<td>Possible bulldozer cuts only; may not be a prospect</td>
</tr>
<tr>
<td>SA-114</td>
<td>Milwaukee Mines Prospect</td>
<td>FS</td>
<td>1</td>
<td>1</td>
<td>D</td>
<td>1AC</td>
</tr>
<tr>
<td>SA-117, SA-118</td>
<td>Woodrat Mine</td>
<td>FS ?</td>
<td>1</td>
<td>1</td>
<td>W, D</td>
<td>2AO, 6AC, 3SC, several P and T</td>
</tr>
<tr>
<td>SA-123</td>
<td>Binarch Creek</td>
<td>FS</td>
<td></td>
<td>1</td>
<td></td>
<td>1AC; did not locate other reported short adits and shafts.</td>
</tr>
<tr>
<td>SA-124</td>
<td>Nevada Mines</td>
<td>---</td>
<td>1</td>
<td></td>
<td>D</td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-134</td>
<td>Lucky Lead</td>
<td>FS</td>
<td></td>
<td>1</td>
<td>1SC, 1SO?, several T</td>
<td></td>
</tr>
<tr>
<td>SA-135</td>
<td>Unnamed Prospect</td>
<td>---</td>
<td>1</td>
<td></td>
<td>D</td>
<td>Did not locate any workings</td>
</tr>
<tr>
<td>SA-137</td>
<td>Silver Mtn. Prospect</td>
<td>FS</td>
<td></td>
<td>2</td>
<td>T</td>
<td>2 T; did not find reported 1,050 ft. adit (Savage, 1967)</td>
</tr>
<tr>
<td>SA-140, SA-141</td>
<td>Quartz Creek Deposit</td>
<td>FS</td>
<td>1</td>
<td></td>
<td>T, P</td>
<td>several T, P; massive white quartz vein</td>
</tr>
<tr>
<td>SA-144</td>
<td>Pine Creek Prospects</td>
<td>FS</td>
<td></td>
<td>2</td>
<td></td>
<td>2AO, 5AC, 2A? (not visited), 4P</td>
</tr>
<tr>
<td>SA-146</td>
<td>Farmer Jones (Priest River Mining Co.)</td>
<td>P</td>
<td>1</td>
<td></td>
<td></td>
<td>1A; refused permission to visit.</td>
</tr>
<tr>
<td>SA-149</td>
<td>Camp Bird</td>
<td>FS ?, P ?</td>
<td></td>
<td>1</td>
<td></td>
<td>several T; permission to visit lower workings refused.</td>
</tr>
</tbody>
</table>
Table 2.1-1 (continued). List of properties visited in the Priest Lake District.

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Mine Name</th>
<th>Surface Owner</th>
<th>Water Samples</th>
<th>Solid Samples</th>
<th>Environmental Concerns</th>
<th>Physical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8199802</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AC</td>
</tr>
<tr>
<td>K8249802</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>ISC</td>
</tr>
<tr>
<td>K8259803</td>
<td>Unnamed Prospect</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>IP</td>
</tr>
<tr>
<td>K8259804</td>
<td>Last Chance Mine</td>
<td>FS</td>
<td></td>
<td></td>
<td></td>
<td>1AO</td>
</tr>
<tr>
<td></td>
<td>(in Washington)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8269801</td>
<td>Unnamed Prospect</td>
<td>S, FS ?</td>
<td>1</td>
<td>D</td>
<td></td>
<td>2AO, 1AC, several P</td>
</tr>
</tbody>
</table>

Reference sample K8219802 -- on Boulder Creek, above bridge on FS Trail 291

and a number of unpublished reports on individual deposits. Gott and Cathrall (1980) discuss the geochemistry of the Coeur d'Alene district, which is underlain by many of the same rock units as the Priest Lake area. A brief description of the geologic framework of the area follows.

The metal mines in the district are hosted by Cretaceous granitic rocks or 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. One large group of prospects in the study area are lead-zinc-silver deposits in the Prichard Formation, many of which are associated with Precambrian diabase dikes. Key references to the Prichard are Cressman (1982) and Cressman (1989).

Igneous rocks include Cretaceous and Tertiary granitic plutons that intrude the Belt Supergroup throughout most of the area (Savage, 1967; Aadland and Bennett, 1979; Miller, 1982a, 1982b, 1982c). Several of the mines in the area are associated with these granitic rocks.

The regional Newport fault passes along the eastern side of Priest Lake and Upper Priest Lake. In the southern part of the study area, the fault curves toward a more southwesterly trend (Aadland and Bennett, 1979; Miller, 1982a, 1982b, 1982c). Within the study area are a number of high-angle faults. Most of these faults show relatively minor displacement, although a few may have moved more than 1,000 meters. These faults do not cut Cretaceous granitic rocks (Miller, 1982a, 1982c).

2.3 ECONOMIC GEOLOGY

2.3.1 General Characteristics of the Ore

The metal mines in the district are hosted by metasedimentary rocks of the Belt Supergroup of Precambrian age or by Cretaceous granitic rocks (Figure 2.2-1). Most of the mines in the study
<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</td>
<td>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>Formation Upper part</td>
<td>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</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>Formation Lower part</td>
<td>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>Revett Quartzite</td>
<td></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>Burke</td>
<td>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</td>
<td>Formation 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>
</tbody>
</table>
area are lead-zinc-silver deposits, sometimes containing copper and gold. Many of the deposits in the Prichard Formation are associated with dioritic or diabasic dikes or sills. In addition, small deposits are found in most of the formations of the Belt Supergroup. Many of these prospects were worked in the early 1900s, and little good geological information is available. Quartz veins, fissure fillings, replacement deposits, and disseminated mineralization have been found in the district. Pyrite, chalcopyrite, and galena are the most widespread minerals (Savage, 1967). Only three of the properties discussed in this volume reported any production, and all of them produced less than 50 tons of ore.

2.3.2 Summary of Mill Development

All of the mines discussed in this volume were small operations, and none of them appear to have had associated mills. No mill tailings were observed during the field examination.

2.4 HYDROLOGY AND HYDROGEOLOGY

The study area includes the western half of the drainage of Priest Lake and Priest River west and south of the Priest Lake-Bonners Ferry district boundary. The major drainages in the area (Figures 2.1-1 and 2.1-2) are east-flowing streams that empty into Upper Priest Lake, Priest Lake, or Priest River. Priest River flows into the Pend Oreille River at the town of Priest River, about four miles south of the study area.

As noted, a number of the lead-zinc mines in the study area are hosted by rocks of the Prichard Formation. These rocks also contain significantly higher values of base metals than some of the other Belt rocks. Table 1.5-3 (based on 727 samples taken in the Coeur d'Alene mining district) shows that rocks in the Prichard Formation contain 60 ppm zinc, 34 ppm lead, 3 percent iron, 22 ppm copper, and 0.5 percent cadmium, and soils developed on the Prichard reflect this metal content (Table 1.5-4 based on 1,705 samples) with 140 ppm zinc, 54 ppm lead, 3.1 percent iron, 21 ppm copper, 1.3 ppm cadmium, and 10 ppm arsenic. Tables 1.5-3 and 1.5-4 show similar data for the other formations in the Belt Supergroup in the Coeur d'Alene mining district.

To test whether the high metal content from the Belt Supergroup, especially the Prichard Formation, was impacting stream waters, one reference water sample was collected. The chemical analysis for this sample is 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 sample was collected:

- K8219802 — Boulder Creek

This samples was below all EPA standards for all elements.
Table 2.4-1. Dissolved metals in reference water sample from the Priest Lake Ranger District. Numbers in bold-face type 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>KR219802</td>
<td>Boulder Creek above bridge on FS Trail 291</td>
<td>---</td>
<td>0.0015</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 ---

<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>0.050</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>0.0004-0.009</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>
<td></td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.360</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>Aquatic Life, Chronic</td>
<td>0.087</td>
<td>0.190</td>
<td>0.0060</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0049</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.0010</td>
<td>0.0011</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>0.0060</td>
<td>0.0028</td>
<td>0.0015</td>
<td>0.0049</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.0010</td>
<td>0.0011</td>
</tr>
</tbody>
</table>
Table 2.4-2. Total recoverable metals in reference water sample from Priest Lake Ranger District. Numbers in bold-face type 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>KR219802</td>
<td>Boulder Creek above bridge on FS Trail 291-</td>
<td>0.050</td>
<td>0.005</td>
<td>0.005</td>
<td>0.100</td>
<td>0.047</td>
<td>0.0025</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.0052</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></td>
<td>0.050</td>
<td></td>
<td></td>
<td></td>
<td>0.02</td>
<td>0.10</td>
<td>5.00</td>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.05</td>
<td>0.005</td>
<td>0.100</td>
<td>0.300</td>
<td>0.050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.00</td>
</tr>
<tr>
<td>Aquatic Life, Acute</td>
<td>0.750</td>
<td>0.3600</td>
<td>0.004</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</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>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 SUMMARY OF THE PRIEST LAKE RANGER DISTRICT

2.5.1 Summary of Environmental Observations

Most of the samples from properties with water discharge exceeded EPA water standards for one or more elements (Tables 2.5-1 and 2.5-2). Water quality variances include significant amounts of iron and manganese from the McLean Mine and the Baldwin Group; mercury was also noted at the McLean Mine. Cadmium in excess of one or more water quality standards is the most prevalent water quality variance in the Priest Lake area. In half of these samples, cadmium is the only element that exceeds any standard. The elements detected in the water samples are also found in the rock units underlying the drainages.

2.5.2 Mine Waste 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, copper, lead, and zinc, which exceed the Clark Fork Superfund Background Levels. No samples of mill tailings were collected from the mines examined in this volume because no mills were operated on these properties.
Table 2.5-1. Dissolved metals in water samples from the properties in the Priest Lake Ranger District. Numbers in bold-face type 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>K8109801</td>
<td>Milwaukee Mines Prospect (SA-114), adit water</td>
<td>--</td>
<td>0.0092</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0095</td>
<td>0.0088</td>
<td>--</td>
<td>0.0016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8119801</td>
<td>McLean Mine (SA-19), adit water</td>
<td>--</td>
<td>0.0071</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3.8000</td>
<td>0.1000</td>
<td>--</td>
<td>0.0025</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8209801</td>
<td>Baldwin Group (SA-105), Adit 2, water</td>
<td>--</td>
<td>0.0100</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8249801</td>
<td>Baldwin Group (SA-105), Adit 4, water</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0030</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K8259801</td>
<td>Woodrat Mine (SA-117), Adit 4, water</td>
<td>--</td>
<td>0.0039</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0028</td>
<td>0.0075</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EXPLANATION
Blank space equals no analysis
Below Detection Limit is --

mg/L = ppm

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>0.05-0.2</td>
<td>0.030</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>
</tr>
<tr>
<td>Secondary MCL</td>
<td>0.05-0.2</td>
<td>0.360</td>
<td>0.004-0.009</td>
<td>0.17-3.1</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, Acute</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>Aquatic Life, Chronic</td>
<td>0.015</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>0.0049</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.010</td>
<td>0.0011</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>0.0060</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 Priest Lake Ranger District. Numbers in bold-face type 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>K8109801</td>
<td>Milwaukee Mines Prospect (SA-114), adit water</td>
<td>—</td>
<td>0.012</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.081</td>
<td>—</td>
<td>0.0250</td>
<td>—</td>
<td>0.012</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K8119801</td>
<td>McLean Mine (SA-19), adit water</td>
<td>—</td>
<td>0.010</td>
<td>0.003</td>
<td>—</td>
<td>—</td>
<td>5.400</td>
<td>—</td>
<td>0.1300</td>
<td>0.00068</td>
<td>0.016</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>K8209801</td>
<td>Baldwin Group (SA-105), Adit 2, water</td>
<td>0.0012</td>
<td>0.014</td>
<td>0.003</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.0028</td>
<td>—</td>
<td>—</td>
<td>0.0066</td>
<td></td>
</tr>
<tr>
<td>K8249801</td>
<td>Baldwin Group (SA-105), Adit 4, water</td>
<td>—</td>
<td>0.002</td>
<td>0.002</td>
<td>0.0054</td>
<td>—</td>
<td>0.037</td>
<td>—</td>
<td>0.0018</td>
<td>—</td>
<td>—</td>
<td>0.0052</td>
<td></td>
</tr>
<tr>
<td>K8259801</td>
<td>Woodrat Mine (SA-117), Adit 4, water</td>
<td>—</td>
<td>0.018</td>
<td>0.003</td>
<td>0.0100</td>
<td>—</td>
<td>1.400</td>
<td>—</td>
<td>0.0550</td>
<td>—</td>
<td>—</td>
<td>0.0120</td>
<td></td>
</tr>
</tbody>
</table>

**EXPLANATION**

Blank space equals no analysis

Below Detection Limit is —

**WATER QUALITY STANDARDS**

<table>
<thead>
<tr>
<th>Field</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>0.10</td>
<td>0.0500</td>
<td>0.002</td>
<td>0.10</td>
<td>0.0500</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>0.0500</td>
<td>0.002</td>
<td>0.10</td>
<td>0.0500</td>
<td>0.002</td>
<td>0.10</td>
<td>0.0500</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>5.000</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>0.00012</td>
<td>0.16-0.28</td>
<td>0.11-0.19</td>
<td>0.028</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>
Table 2.5-3. Element screen for dump samples for properties in the Priest Lake Ranger District.

<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>K8109802</td>
<td>Milwaukee Mines Prospect (SA-114), dump</td>
<td>NA</td>
<td>150</td>
<td>140.0</td>
<td>2.90</td>
<td>11.0</td>
<td>26.00</td>
<td>30.000</td>
<td>280</td>
<td>740</td>
<td>NA</td>
<td>11.0</td>
<td>80.0</td>
</tr>
<tr>
<td>K8189801</td>
<td>Idaho Copper Prospect (SA-108), dump</td>
<td>NA</td>
<td>100</td>
<td>39.0</td>
<td>3.00</td>
<td>9.3</td>
<td>20.00</td>
<td>26.000</td>
<td>110</td>
<td>1,100</td>
<td>NA</td>
<td>9.6</td>
<td>310.0</td>
</tr>
<tr>
<td>K8199801</td>
<td>Navigation Mine (SA-33), dump</td>
<td>NA</td>
<td>120</td>
<td>91.0</td>
<td>2.80</td>
<td>24.0</td>
<td>45.00</td>
<td>33.000</td>
<td>84</td>
<td>690</td>
<td>NA</td>
<td>7.8</td>
<td>130.0</td>
</tr>
<tr>
<td>K8199803</td>
<td>Idaho Copper Prospect (SA-108), dump</td>
<td>NA</td>
<td>210</td>
<td>110.0</td>
<td>4.00</td>
<td>23.0</td>
<td>160.00</td>
<td>43.000</td>
<td>85</td>
<td>640</td>
<td>NA</td>
<td>47.0</td>
<td>100.0</td>
</tr>
<tr>
<td>K8219801</td>
<td>Unnamed Prospect (SA-28), dump</td>
<td>NA</td>
<td>140</td>
<td>67.0</td>
<td>3.30</td>
<td>32.0</td>
<td>80.00</td>
<td>53.000</td>
<td>62</td>
<td>280</td>
<td>NA</td>
<td>19.0</td>
<td>56.0</td>
</tr>
<tr>
<td>K8259802</td>
<td>Woodrat Mine (SA-117), Shaft 1, dump</td>
<td>NA</td>
<td>110</td>
<td>160.0</td>
<td>4.60</td>
<td>9.0</td>
<td>37.00</td>
<td>64.000</td>
<td>230</td>
<td>1,100</td>
<td>NA</td>
<td>16.0</td>
<td>300.0</td>
</tr>
<tr>
<td>K8269802</td>
<td>Unnamed Prospect K8269801, Adit 1, dump</td>
<td>NA</td>
<td>210</td>
<td>64.0</td>
<td>6.30</td>
<td>28.0</td>
<td>2,300.00</td>
<td>83.000</td>
<td>150</td>
<td>1,300</td>
<td>NA</td>
<td>110.0</td>
<td>220.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>As</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 Priest Lake Ranger District.

<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>
</tr>
</thead>
<tbody>
<tr>
<td>K8109802</td>
<td>Milwaukee Mines Prospect (SA-114), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.810</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.600</td>
</tr>
<tr>
<td>K8189801</td>
<td>Idaho Copper Prospect (SA-108), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.400</td>
</tr>
<tr>
<td>K8199801</td>
<td>Navigation Mine (SA-33), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.500</td>
</tr>
<tr>
<td>K8199803</td>
<td>Idaho Copper Prospect (SA-108), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.100</td>
</tr>
<tr>
<td>K8219801</td>
<td>Unnamed Prospect (SA-28), dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.580</td>
</tr>
<tr>
<td>K8259802</td>
<td>Woodrat Mine (SA-117), Shaft 1, dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.680</td>
</tr>
<tr>
<td>K8269802</td>
<td>Unnamed Prospect K8269801, Adit 1, dump</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.300</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>
</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>
</tr>
<tr>
<td>Secondary MCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1</td>
<td></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></td>
<td>0.0041 - 0.0134</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>0.003 - 0.008</td>
<td>0.000012</td>
<td></td>
<td>0.00012</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>
</tr>
</tbody>
</table>

mg/L = ppm
3.0 PRIEST LAKE DISTRICT MINE DESCRIPTIONS

3.1 MILWAUKEE MINE (Site No. SA-114)
Alternate names—Kalispel (also spelled Kalispell) Group; Milwaukee Camp No. 1; Calispel Group; York Group; Santa Fe Group; De Soto Group.

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

The Milwaukee Mine is on a small piece of Forest Service land along the west side of Priest Lake in the northwest corner of section 7, T. 60 N., R. 4 W., on the Priest Lake SW 7.5-minute quadrangle (Figure 3.1-1). Access is on the Kalispell Bay road to a Forest Service picnic area just below the road. The prospect is north of the picnic area about ¼ mile along a foot path.

3.1.2 Geologic Features (Figure 2.2-1)

In the vicinity of the Milwaukee Mine, most of the bedrock is covered by Quaternary glacial, fluvial, and alluvial deposits, but Cretaceous plutonic rocks are to the north of this site (Aadland and Bennett, 1979). The company report to the Idaho Inspector of Mines in 1935 stated the tunnel was in “pegmatite granite with greenstone appearing in varying amounts.” Savage (1967, p. 125) indicated that the deposit consisted of “Quartz veins reportedly carrying lead and silver.”

3.1.3 Site History

This is one of numerous prospects of Milwaukee Mines, Inc., of Spokane, Washington, in the Priest Lake area. Figure 3.1-2 shows a mineral survey map of the Kalispell claims, and Figure 3.1-3 shows Milwaukee Mines' holdings adjacent to, and north of, the Kalispell claims.

Milwaukee Mines was incorporated in 1928, and the name was officially changed to Milwaukee Mines, Inc., in 1930. From 1931 until 1961, Arthur L. Hooper was president of the company. The “Camp No. 1” claims were among the first to be developed by the company, and later reports by the company stated that work was started on the Kalispell Claims in 1927. By 1931, the main Kalispell tunnel was 130 feet long, and by 1935, the tunnel was 254 feet long and had a 116-foot drift. Development continued until 1942; after that, the company seems to have done only minor assessment work on its claims.

In 1938, the company's reports noted that some of its claims had been optioned, and in 1941 it was further noted that the company expected to sell the property “in the near future, after which it will be developed and operated.” However, this sale was never completed, and it wasn't until 1951 that Hooper finally disclosed that the property had been optioned to a representative of “Eastern Industrialists” from 1932 until 1939. In 1958, Mr. Hooper identifies these industrialists as the DuPonts. The option price for the properties was $5,000 per claim. In a 1956 letter to the Idaho Inspector of Mines, Mr. Hooper stated:
The claims... were all under option at the behest of Edward F. Rose, who represented an undisclosed Eastern principal, known to us but not revealed at his request, in 1930 and again in 1935, I believe, and were not taken up because of POLITICAL differences at Washington. This time there will be no such differences as the present Administration believes in PRIVATE ENTERPRISE, as do the powers that be at your Capital.

After World War II, Hooper again expected someone to purchase the property. However, despite Hooper's glowing descriptions of his property's potential, the claims remained unsold. Milwaukee Mines, Inc., forfeited its corporate charter in 1975.

3.1.4 Environmental Conditions

3.1.4.1 Site Features

The Milwaukee Mine was visited by John Kauffman on August 10, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 1, index 00:11:00-00:15:34). Documenting photographs are Roll K8, frames 1-4.

The Mineral Survey map shows the main tunnel on the Kalispell No. 2 claim and a short tunnel near the southwest corner of the Kalispell Tunnel claim. Only the main tunnel, now caved, was found.

The caved adit has a minor seep of water and a fan-shaped waste dump that extends out to the edge of the lake (Figure 3.1-4). The slope above the adit has sloughed back about 50 feet from the portal, almost to the edge of the road above (Figure 3.1-5). Water from the seep (Figure 3.1-6) trickles onto the dump surface, where it disappears. The fan-shaped dump measures 100 feet long, 60 feet wide at the lake end, 10-15 feet wide at the adit end, and about 8-12 feet thick. The surface is covered with low brush and a few small trees (Figure 3.1-7). The toe extends slightly into the lake (Figure 3.1-8) and has been eroded by wave action. The disturbed area covers less than 0.5 acre.

3.1.4.2 Sample Locations

3.1.4.2.1 Solid Samples

Sample K8109802 was collected from the eroded face of the dump.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8109802</td>
<td>Milwaukee Mine dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

31
3.1.4.2.2 Water Samples

An adit water sample (K8109801) was collected from one of the pools on the surface of the waste 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>K8109801</td>
<td>Milwaukee Mine adit</td>
<td>94</td>
<td>57</td>
<td>6.9</td>
<td>&lt;0.5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.1.4.2.3 Analytical Results

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

Sample K8109802 exceeds background and environmental levels for arsenic, cadmium, copper and lead in the element screen. In the TCLP for metals screen, lead shows a significant amount of leaching.

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

Sample K8109801 does not exceed any water quality standards.

3.1.5 Structures

Although the Mineral Survey map (Figure 3.1-2) shows a house, bunkhouse, woodshed, shop, and garage, no structures were found at this site. The area occupied by these buildings is now a Forest Service picnic area.

3.1.6 Safety

No safety hazards were identified at this site.
Figure 3.1-1. Location map of the Milwaukee Mine, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map).
Figure 3.1-2. Mineral Survey No. 3331 map, showing the Milwaukee Mines' Kalispell claims (Idaho Geological Survey mineral property files).
Figure 3.1-3. Map of the claim groups north of the Milwaukee Mine along the west side of Priest Lake. The Kalispell claims are near the bottom of the map (Idaho Geological Survey mineral property files). Map is reduced to about two-thirds the size of the original.
Figure 3.1-4. Sketch of the Milwaukee Mine.
Figure 3.1-5. Looking west-northwest up the sloughed hillside above the caved adit of the Milwaukee Mine (Roll K8, frame #1).

Figure 3.1-6. Trickle of water flowing from the caved adit of the Milwaukee Mine (Roll K8, frame #2).
Figure 3.1-7. Looking east across the brushy surface of the Milwaukee Mine waste dump. Priest Lake and Kalispell Island are in the distance (Roll K8, frame #3).

Figure 3.1-8. Looking northeast at the edge of the waste dump along Priest Lake. Kalispell Island is in the distance (Roll K8, frame #4).
3.2 McLEAN MINE (Site No. SA-19)

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

The McLean Mine is on the north side of Cedar Creek in the northeast corner of section 23, T. 64 N., R. 5 W., on the Continental Mountain 7.5-minute quadrangle (Figure 3.2-1). Several shallow pits are in the northwest corner of section 24. The adit did not appear to be as high on the slope as it is shown on the topographic map. Access (Figure 3.2-2) is on FS Road 1013 to Cedar Creek, where an old pack trail follows the north side of the creek a short distance before crossing to the south side and merging with a more recent trail. The newer trail then follows the south side of the creek for about ½ mile, where the old pack trail splits off and crosses back to the north side of Cedar Creek. This split in the trail, the creek crossing, and the continuation of the trail are difficult to detect. The newer trail continues along the south side of the creek. The mine is about ¼ mile further along the old pack trail on Forest Service land.

3.2.2 Geologic Features (Figure 2.2-1)

The McLean Mine is in rocks of the Wallace Formation (Aadland and Bennett, 1979).

3.2.3 Site History

Nothing is known of the history of this site.

3.2.4 Environmental Conditions

3.2.4.1 Site Features

The McLean Mine was visited by John Kauffman on August 11, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 1, index 00:15:38-00:24:12). Documenting photographs are Roll K8, frames 5-7.

The property consists of a caved adit, a possible second short caved adit, and some minor prospect pits (Figure 3.2-2). The portal of the main adit is blocked by collapsed rocks and fallen trees (Figure 3.2-3), although the adit may be open behind the debris. A seep of about 0.5 gallon per minute flows from the adit and disappears into the dump. The water channel across the dump surface is strongly iron stained (Figure 3.2-4). The waste dump (Figure 3.2-5) is about 30 feet long, 10 feet wide, and 30 feet down the face, but stops well above the creek. Much of the dump is covered with ferns, grasses, and moss. A few rails and an ore car remain on the dump.

The toe of what appears to be a small waste dump is west of the main adit. If this is a dump, there may have been a very short prospect adit above and to the west of the main adit. Along the old trail about 200 yards to the northeast of the main adit is a shallow, sloughed-in prospect pit about 12 feet long, 10 feet wide, and 5 feet deep. Just beyond this pit is a second, smaller pit,
which is now just a small mound with a shallow depression behind it. No other workings were found in this area.

The total disturbed area is less than 0.5 acres.

3.2.4.2 Sample Locations

3.2.4.2.1 Solid Samples
No dump samples were collected at this site.

3.2.4.2.2 Water Samples
A sample of the adit water (K8119801) was collected about 20 feet in front of the portal.

<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>K8119801</td>
<td>McLean Mine adit</td>
<td>120</td>
<td>45</td>
<td>6.87</td>
<td>0.5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.2.4.2.3 Analytical Results

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

Sample K9119801 exceeds the Secondary MCLs for iron and manganese and the Aquatic Life Acute standard for iron in the dissolved metals screen. In the total recoverable metals screen, the sample exceeds the Secondary MCLs for iron and manganese, the Aquatic Life Acute standard for iron, and the Aquatic Life Chronic standard for cadmium. In the ICP cold vapor test, mercury exceeds the Aquatic Life Chronic standard.

3.2.5 Structures

No buildings or other structures were found at the McLean Mine. Some moss-covered planks, about 4 feet long by 1-1.5 feet wide, are on the trail across a wet, soggy area about 100 yards southwest of the mine. These planks are probably part of the original foot path or wagon trail to the site.

3.2.6 Safety

The main adit is caved sufficiently to prevent entry, although it probably could be cleaned out with a bit of effort and may be open behind the portal. The prospect is along an old trail that is no longer maintained and that shows no signs of recent use.
Figure 3.2-1. Location map of the McLean Mine, Boundary County, Idaho (U.S. Geological Survey Continental Mountain 7.5-minute topographic map).
Figure 3.2-2. Sketch of the McLean Mine.
Figure 3.2-3. Looking north at the caved adit of the McLean Mine. The fallen trees and collapsed rock block the opening (Roll K8, frame #5).
Figure 3.2-4. Iron-stained water flowing from the caved adit of the McLean Mine. The water flows across the surface of the waste dump and passes beside an old ore car. The crossed fallen trees near the top of the picture are the same ones seen in the previous figure in front of the caved adit (Roll K8, frame #6).
Figure 3.2-5. Looking south down the face of the east side of the waste dump of the McLean Mine. The backpack at the lower right is near the edge of the upper surface of the dump (Roll K8, frame #7).
3.3 UNNAMED PROSPECT (Site No. SA-25)

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

This prospect is on Forest Service land on the east side of Ruby Creek in the southeast corner of the NE¼ of the NE¼, section 2, T. 63 N., R. 5 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.3-1). Access is via FS Road 1013 north to FS Road 655, then east on FS Road 655 about ¾ mile to where the road crosses Ruby Creek (Figure 3.3-2). The prospect is marked by an adit symbol on the topographic map and is about 50-75 feet above the bend in the road on the east side of the creek.

3.3.2 Geologic Features (Figure 2.2-1)

This prospect is in Tertiary granitic rocks. Nearby roof pendants consist of Proterozoic Y rocks of the Ravalli Group (Aadland and Bennett, 1979).

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

This unnamed prospect was visited by John Kauffman on August 11, 1998. A video segment describing the property is on the Priest Lake District Videotape (Tape 1, index 00:24:15-00:28:10). Documenting photographs are Roll K8, frames 8-11.

Although shown as an adit on the topographic map, this opening is actually a vertical shaft about 8 feet square (Figure 3.3-3) and 20-25 feet deep. A few old timbers can be seen near the bottom. The waste dump is small, about 15 feet long, 8 feet wide, and 10 feet thick (Figure 3.3-4). Just below and to the south of the shaft dump is a very short cut (4-6 feet long) into the rock that probably was the start of an adit along a vein structure (Figure 3.3-5). The small dump associated with this cut (Figure 3.3-6) contains vein material of massive sulfides and white quartz. The disturbed area is less than 0.25 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
   No structures were found at this site.

3.3.6 Safety

   The open shaft is a serious safety hazard. There is no fence around the vertical opening, and there are no warning signs at the site.
Figure 3.3-1. Location map of Unnamed Prospect SA-25, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.3-2. Sketch of Unnamed Prospect SA-25.
Figure 3.3-3. Looking down the throat of the vertical shaft of Unnamed Prospect SA-25. The shaft is about 20-25 feet deep (Roll K8, frame #11).

Figure 3.3-4. Looking north across the waste dump for the shaft at Unnamed Prospect SA-25. The shaft opening is near the center of the right edge of the picture (Roll K8, frame #10).
Figure 3.3-5. Looking east at the short prospect cut in the outcrop just south of the shaft at Unnamed Prospect SA-25. The quartz vein and associated oxidized material is near the center of the photograph (Roll K8, frame #8).
Figure 3.3-6. Looking south from the waste dump for the shaft toward the small waste rock pile associated with the short prospect cut at Unnamed Prospect SA-25 (Roll K8, frame #9).
3.4 IDAHO COPPER PROSPECT (Site No. SA-108)
Alternate names—Virginia-Lakeshore; Virginia Lakeshore; Virgina; Virginia-Old
Dominion Group; Lode Star Group; Milwaukee.

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

The Idaho Copper Prospect is along the west shore of Priest Lake north of Reeder Bay. The workings are spaced along the shoreline for about ½-¾ mile along or near the section line between sections 8 and 9, T. 61 N., R. 4 W., on the Priest Lake NE 7.5-minute quadrangle (Figure 3.4-1). A shaft and an adit symbol are shown on the topographic map. The shaft, which is the southernmost of the workings, is along the east edge of section 8 in the NE¼ of the SE¼; the other workings are along the western edge of the NW¼ of section 9. Access is on FS Road 2512 to FS Trail 294 (the Lakeshore Trail, shown as FS Trail 8294 on recent U.S. Forest Service 7.5-minute topographic maps) about 1 mile north of Reeder Bay. All of the workings are on Forest Service land.

3.4.2 Geologic Features (Figure 2.2-1)

The Idaho Copper Prospect is in an area where Precambrian diabase, diorite and quartz diorite sills and dikes have intruded rocks of the Prichard Formation (Aadland and Bennett, 1979; Savage, 1967). Savage (1967, p. 122) noted: “Reportedly copper and zinc minerals. Disseminated grains in granodiorite porphyry, some quartz veins.”

3.4.3 Site History

In 1919, the Idaho Copper Company had a 60-foot shaft with a crosscut at the bottom, which had recently opened a small showing of zinc ore (Lancaster, 1919). By 1928, Milwaukee Mines Inc. controlled the Virginia Group, which covered the area previously controlled by the Idaho Copper Company. Milwaukee reported that the Virginia Group had a 40-foot tunnel on the “Virginia Claim” and a 15-foot tunnel and a 90-foot shaft on the “Lakeshore No. 1” claim (see section 3.1.3 for more information on Milwaukee Mines, Inc.) In the next few years, the company added more claim groups to the west and north (Figure 3.4-2). The two tunnels shown on the map on the Virginia Lakeshore Nos. 3 and 4 claims are probably Adits 2 and 3 of this report. The shaft described in this report is probably on the Virginia Lakeshore Fraction claim or the Orphan Annie Lakeshore claim. By 1951, the main tunnel on the Virginia Group was “more or less caved,” and in 1954, the tunnels on the Virginia-Lakeshore Group were reported to have been 50 and 100 feet long.

All of Milwaukee Mines' claims were under option in the 1930s, but despite hopeful predictions from the company's president, no sale was ever completed. In the early 1960s, many of Milwaukee's claims apparently reverts to federal ownership. However, the Virginia Group apparently remained under the company's control until Milwaukee forfeited its charter in 1975.
3.4.4 Environmental Conditions

3.4.4.1 Site Features

The workings of the Idaho Copper Prospect were visited by John Kauffman on August 18 and 19, 1998. A video segment describing the workings is on the Priest Lake District Videotape (Tape 1, index 00:28:13-00:41:00). Documenting photographs are Roll K8, frames 12-20, and Roll K9, frames 3-7.

The Idaho Copper Prospect has a water-filled shaft, a very short open adit, and two caved adits, all along the shoreline near lake level (Figure 3.4-3). Of these, the shaft is the main opening; the adits are all minor prospects.

The shaft is about 200 feet east of the Lakeshore Trail and is near the shore of Priest Lake (Figure 3.4-4). Collapsed timbers and planks are crisscrossed in the shaft (Figures 3.4-5 and 3.4-6), which is filled with water to within 3-4 feet of the surface. Savage (1967, p. 122) reported the shaft as “60-ft?” deep and flooded. The shaft may still be open despite being covered with debris and filled with water. The waste dump (30 feet long, 4-7 feet wide on top, and 6-10 feet thick) extends out into the lake (Figure 3.4-7). Part of an old compressor is southwest of the shaft and the dump, and is beside a collapsed structure that may have been a loading platform (Figure 3.4-8). Other scrap metal, including an old boiler, is scattered around the site. Structures near the site are described in section 3.4.5, below. A pit in the woods west of the trail contains an abundance of old cans, bottles, and other material, as well as more recent garbage, and was probably used as a garbage dump. The disturbed area, including the structures, covers about 1.0 acre.

Adit 1 is about 800 feet north of the shaft and was driven only 10-12 feet into the outcrop (Figure 3.4-9). The opening, which is about 2 feet above lake level, is at the base of a small cliff face. Access to the adit is difficult from the trail, which is about 100 feet above the lake. However, the opening is easy to see from the lake. The small amount of waste rock taken from the adit has been removed by wave action. Aside from the adit opening, there is no disturbance at this site.

Adit 2, which is 100 feet below Lakeshore Trail and 5-8 feet above lake level, is about ½ mile north of the shaft (Figure 3.4-10). The adit is caved, and there is minor sloughing on the slope near the adit. The triangular waste dump is small (about 20 feet long, 20 feet wide, and 5 feet thick; Figure 3.4-11) and extends slightly into the lake. The dump consists of coarse waste rock fragments, most of which are quartzite. No video was taken of this adit. The disturbed area is less than 0.1 acre.

Adit 3 is about ½ mile north of the shaft and 40 feet below the trail. This adit, also caved (Figure 3.4-12), is about 8-10 feet above the lake and also has a triangular waste dump (Figure 3.4-13). The dump is 20 feet long, 20 feet wide, and about 8 feet thick, and it extends slightly into the lake.
(Figures 3.4-14 and 3.4-15). The toe has been partially eroded by the lake. The disturbed area is less than 0.1 acre.

### 3.4.4.2 Sample Locations

#### 3.4.4.2.1 Solid Samples

Waste dump samples were collected at the shaft (K8189801) and at Adit 3 (K8199803).

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8189801</td>
<td>Idaho Copper Prospect, shaft</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>dump</td>
<td></td>
</tr>
<tr>
<td>K8199803</td>
<td>Idaho Copper Prospect, Adit 3</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>dump</td>
<td></td>
</tr>
</tbody>
</table>

#### 3.4.4.2.2 Water Samples

No water samples were collected at this site.

#### 3.4.4.2.3 Analytical Results

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

Sample K8189801 exceeds background and environmental levels for arsenic, cadmium, lead, and zinc in the element screen. Sample K8199803 exceeds background and environmental levels for arsenic, cadmium, copper, iron, nickel, and lead in the element screen. In the TCLP for metals test, no elements of interest are leaching from either sample.

### 3.4.5 Structures

Next to the shaft is the collapsed remains of what may have been a loading platform. A metal-sided shed (Figure 3.4-16), a probable storage shed built into the hillside (Figure 3.4-17), and the collapsed remains of a log cabin (Figure 3.4-18) are along the trail several hundred feet southwest of the shaft. No structures were found at any of the adit sites.

### 3.4.6 Safety

Although the shaft is filled with water and collapsed timbers, it may still be open and could be a hazard, especially to small children. The Lakeshore Trail, a well-used recreational trail, passes within a few hundred feet of the shaft. In addition, the trail is only a few feet from the buildings. The site has several well used side trails that lead to the structures and the shaft. Adit 1, although open and easily accessible from the lake, is very short and presents only a minor safety hazard.
Figure 3.4-1. Location map of the Idaho Copper Prospect, Bonner County, Idaho (U.S. Geological Survey Priest Lake NE 7.5-minute topographic map).
Figure 3.4-2. Claim map of the area including the Idaho Copper Prospect on the west side of Priest Lake. The workings are on the Virginia Group of claims near the bottom of the map (Idaho Geological Survey mineral property files, Milwaukee Mines, Inc. (SA-114), file). Map is reduced to about two-thirds the size of the original.
Figure 3.4-3. Sketch of the Idaho Copper Prospect workings.
Figure 3.4-4. Sketch of the shaft and associated features at the Idaho Copper Prospect.
Figure 3.4-5. Debris-filled shaft at the Idaho Copper Prospect, looking northwest (Roll K8, frame #12).

Figure 3.4-6. Close-up of the rotted timbers and debris in the shaft. The dark areas between the timbers are water, which fills the shaft to within a few feet of the surface (Roll K8, frame #13).
Figure 3.4-7. Looking southeast across the surface of the narrow waste dump from the shaft at the Idaho Copper Prospect. The dump extends out into Priest Lake (Roll K8, frame #14).

Figure 3.4-8. Looking south at part of an old compressor and the collapsed platform, possibly a loading platform, just south of the shaft at the Idaho Copper Prospect (Roll K8, frame #15).
Figure 3.4-9. Looking west into the short Adit 1 of the Idaho Copper Prospect. The photo was taken from the shore of Priest Lake, a few feet in front of the adit (Roll K8, frame #19).
Figure 3.4-10. Sketch of caved Adit 2 at the Idaho Copper Prospect.
Figure 3.4-11. Looking north at the side of the waste dump for Adit 2 at the Idaho Copper Prospect, with Priest Lake at the right (Roll K9, frame #4).
Figure 3.4-12. Looking west at the sloughed rock debris of caved Adit 3 at the Idaho Copper Prospect (Roll K9, frame #5).
Figure 3.4-13. Sketch of caved Adit 3 at the Idaho Copper Prospect.
Figure 3.4-14. Looking east across the surface of the waste dump for Adit 3 at the Idaho Copper Prospect. The dump extends a short distance into Priest Lake (Roll K9, frame #6).

Figure 3.4-15. Looking north along the shore of Priest Lake at the toe of the waste dump for Adit 3 at the Idaho Copper Prospect. The western of the Twin Islands is in the distance (Roll K9, frame #7).
Figure 3.4-16. Metal-sided shed southwest of the shaft at the Idaho Copper Prospect. The shed is just east of FS Trail 294 (Roll K8, frame #16).

Figure 3.4-17. Small log storage shed built into the hillside just south of the metal-sided shed. FS Trail 294 passes over the top of this structure (Roll K8, frame #17).
Figure 3.4-18. Collapsed remains of a log cabin near the small log storage shed and metal-sided shed at the Idaho Copper Prospect. The sill plates of the foundation logs are the flat, parallel (convergent in the photograph) planks on the left and right sides of the picture (Roll K8, frame #18).
3.5 NAVIGATION MINE (Site No. SA-33)
Alternate names—Lone Ranger; Milwaukee Group; Centennial.

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

The Navigation Mine is along the west shore of Upper Priest Lake in the NW\(\frac{1}{4}\), section 32, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.5-1). The property is accessible by foot on FS Trail 291 from Beaver Creek Campground, a distance of about 3.5 miles, and can also be reached by boat from Upper Priest Lake. The mine, marked on the topographic map, is about ¼ mile north of Plowboy Campground (Figure 3.5-2) and is on Forest Service land.

3.5.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979).

3.5.3 Site History

The Navigation Mine was one of numerous properties in the Priest Lake area held by Milwaukee Mines, Inc. (see section 3.1.3 for the history of Milwaukee Mines, Inc.) The Navigation workings were part of the Lone Ranger Group, a large block of claims on the west side of Upper Priest Lake (Figure 3.5-3). The Navigation tunnel was apparently the only significant opening in this claim block.

From 1931 until 1942, the Lone Ranger Group was held by Centennial Claims, Inc. (incorporated in 1934; Arthur L. Hooper, secretary). In 1941, Milwaukee Mines, Inc., relocated the Lone Ranger Group and assumed control of the claims, noting that the title was being “held in trust for certain groups of stockholders.” By 1951, the Navigation tunnel was “more or less caved,” as were all the other workings on Milwaukee’s properties. Centennial forfeited its corporate charter in 1957. In 1959, the company noted that it was only doing assessment work on the Kalispell claims (Milwaukee Mine, SA-114) “because of lack of funds and action taken by the Forestry Department under the late amendment to the Federal Mining laws.” In 1962, the group was not listed as part of Milwaukee’s property, but the company’s annual report to the Idaho Inspector of Mines noted: “Due to U.S. Forestry land grab. actual number [of claims] not know[n] at this time.”

3.5.4 Environmental Conditions

3.5.4.1 Site Features

The Navigation Mine was visited by John Kauffman on August 19, 1998. A video segment describing the property is on the Priest Lake District Videotape (Tape 1, index 00:41:03-00:45:33). Documenting photographs are Roll K8, frames 21-23.

70
The adit at the Navigation Mine is beside FS Trail 291, which crosses the surface of the waste dump. A few timbers remain at the caved portal (Figure 3.5-4). A very minor seep forms a small stagnant pool in front of the caved portal on the east side of the trail. The waste dump extends out from the adit to the edge of the lake (Figure 3.5-5) and has been slightly eroded by wave action (Figure 3.4-6). The dump measures about 30 feet long and about 8 feet thick. It is 8 feet wide on top and 20 feet wide across the base. The disturbed area covers less than 0.25 acre.

3.5.4.2 Sample Locations

3.5.4.2.1 Solid Samples

Sample K8199801 was collected from the eroded 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>K8199801</td>
<td>Navigation Mine, waste dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.5.4.2.2 Water Samples

No water samples were collected at this site. The volume of the seep from the adit was too small to sample.

3.5.4.2.3 Analytical Results

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

Sample K8199801 exceeds background and environmental levels for arsenic, cadmium, copper, iron, and lead in the element screen. In the TCLP for metals test, no elements of interest are leaching from the sample.

3.5.5 Structures

No structures were found at this site.

3.5.6 Safety

No safety hazards were identified at this site.
Figure 3.5-1. Location map of the Navigation Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.5-2. Sketch of the Navigation Mine.
Figure 3.5-3. Map of the Lone Ranger Group. The Navigation tunnel is on the Lone Ranger #3 claim (IGS mineral property files).
Figure 3.5-4. Looking west at the portal timbers (center of photograph) of the caved adit at the Navigation Mine. The adit is beside Forest Service Trail 291 (Roll K8, frame #21).

Figure 3.5-5. Looking northeast across the surface of the waste dump at the Navigation Mine. Forest Service Trail 291 is in the lower left corner of the picture (Roll K8, frame #22).
Figure 3.5-6. Looking north along the toe of the waste dump at the Navigation Mine. The toe is being eroded by wave action of Upper Priest Lake (Roll K8, frame #23).
3.6 GEM COPPER MINING COMPANY PROSPECT(?) (Site No. SA-32)

The possible prospect described below was found in the vicinity of the IGS location for the Gem Copper Mining Company Prospect. The site described may not even be a prospect.

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

This possible prospect is along FS Trail 291 on the west side of Upper Priest Lake in the SW¼, section 29, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.6-1). The site is about 40 feet above lake level. Access is by vehicle on FS Road 2512 north from Reeder Bay to Beaver Creek Campground, then by foot on FS Trail 291 about 4 miles to Upper Priest Lake. Access is also possible by boat on Upper Priest Lake. The site is on Forest Service land.

3.6.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979). Savage (1967, p. 120) noted: “Siliceous gossan 40-ft wide veins in diorite and quartzite. Chalcopryite, silver and gold reported.”

3.6.3 Site History

According to Lancaster (1919, p. 100):

Situated on Floughberg [believed to be a typographical error for Ploughboy (Plowboy)] mountain, and to the west side of the lake, the above company [Gem Mining Co.] has a very promising group of claims, from a superficial point of view, and although low in values, the width of the vein is sufficient to encourage the owners to prosecute development work. The iron capping on the surface is about 40 ft. in width and carries a little copper associated with gold and silver.

Although the location information for this prospect given in Lancaster (1919) and Savage (1967) is not precise, the area between Plowboy Mountain and Upper Priest Lake became part of Milwaukee Mines' Lone Ranger Group in 1931. See section 3.5.3 for the history of that claim block.

3.6.4 Environmental Conditions

3.6.4.1 Site Features

This site was visited by John Kauffman on August 19, 1998. A video segment describing the site is on the Priest Lake District Videotape (Tape 1, index 00:45:37-00:48:01). Documenting photo is Roll K8, frame 24.
A shallow trough on the slope west of Trail 291 and what appears to be a small waste dump on the east side of the trail are the only indications that this site is a prospect. The trough may be a caved adit, although it also could be an erosional feature. The “dump” is an anomalous bare mound of rock debris (Figure 3.6-2), about 10 feet long and 10 feet wide on top, that extends down the slope for about 20 feet. The slope elsewhere in the vicinity is moss- or brush-covered. If this is a prospect, the disturbed area covers less than 0.1 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.

3.6.5 Structures
There are no structures at this site.

3.6.6 Safety
There are no safety hazards at this site.
Figure 3.6-1. Location map of the Gem Copper Mining Company Prospect, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.6-2. Looking northeast down the face of the possible waste dump of the Gem Copper Mining Company Prospect. Forest Service Trail 291 crosses the top of this possible dump (lower part of the photograph). Upper Priest Lake is in the distance (Roll K8, frame #24).
3.7 UNNAMED PROSPECT (Site No. K8199802)

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

This minor prospect is about ¼ mile south of Navigation Campground in the SE¼ of the SW¼, section 19, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.7-1). The site is about 50 feet from the shore of Upper Priest Lake. Access is by foot on FS Trail 291 from Beaver Creek Campground, a distance of about 5 miles. Beaver Creek Campground is at the end of FS Road 2512, which heads north from Reeder Bay. The prospect is about 100 feet below the trail and is on Forest Service land. No access trails were found from Trail 291 to the prospect. The site is also accessible by boat on Upper Priest Lake.

3.7.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979).

3.7.3 Site History

Nothing is known about the history of this site. However, the location appears to be on the northernmost claim of Milwaukee Mines' Lone Ranger Group (see section 3.5.3).

3.7.4 Environmental Conditions

3.7.4.1 Site Features

This unnamed prospect was visited by John Kauffman on August 19, 1998. No video was taken at this site. Documenting photo is Roll K8, frame 25.

The prospect consists of a small prospect pit or very short, caved adit and a small waste dump (Figure 3.7-2). The pit or adit is now a trough about 10 feet long. The waste dump is 6 feet long, 4 feet wide, and extends 8 feet down the face. Less than 0.1 acre is disturbed at this site.

3.7.4.2 Sample Locations

3.7.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.7.4.2.2 Water Samples

No water samples were collected at this site.

3.7.5 Structures

No structures were found at this site.
3.7.6 Safety

There are no safety hazards at this site.
Figure 3.7-1. Location map of the Unnamed Prospect, Site No. K8199802, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.7-2. Looking northwest at the shallow cut or short caved adit at Site No. K8199802. The backpack is lying on the waste dump of the small excavation (Roll K8, frame #25).
3.8 PLOWBOY MINE (Site No. SA-29)
Alternate names—Plowboy-Bluebell; Mountain Chief Prospect.

Although the Plowboy and the Mountain Chief mines are shown as separate locations on the 7.5-minute topographic map, information in the IGS's mineral property files indicates that both sets of workings are part of the same property. Originally known as the Mountain Chief, the mine was renamed the Plowboy in the late 1950s. See section 3.11 for a description of the Mountain Chief Mine (SA-30).

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

The Plowboy Mine is at the upper end of Upper Priest Lake along the west shore. The mine is at the center of the west edge of section 19, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.8-1). It is labeled and marked with a shaft symbol on the topographic map. Access is by foot via FS Trail 291 from the trail head at either Hughes Fork 2.5-3 miles to the northwest or at Beaver Creek Campground 5 miles to the southeast. The site is also accessible by boat. The mine is on Forest Service land within the Upper Priest Lake Scenic Area.

3.8.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979). Savage (1967, p. 127) noted: “Pinching and swelling veins, fissure filling and replacement ore. Disseminated and vuggy galena and tetrahedrite. Pyrite, pyrrohtite [sic], and chalcopyrite. Hydrothermal alteration.”

3.8.3 Site History

The New York Mountain Chief Consolidated Mining Co. was incorporated in 1903. By 1923, the mine had three tunnels and two shafts. The tunnels were 900 feet, 350 feet, and 150 feet long. One vertical shaft (probably at the site labeled “Plowboy Mine” on the Upper Priest Lake 7.5-minute topographic map) was 30 feet deep, and the depth of the other shaft (if it actually existed) is unknown. The company forfeited its corporate charter in 1924.

In the late 1950s, the property was acquired by Kenneth Bagdon and three partners. The mine was renamed the Plowboy, and most of the work apparently focused on the main adit of the old Mountain Chief (the site labeled “Mountain Chief Mine” on the topographic map). In 1960, Selkirk Mining Co: announced plans to construct a 750-foot tramway at the mine, and a small amount of ore was shipped from the property.
3.8.4 Environmental Conditions

3.8.4.1 Site Features

The Plowboy Mine was visited by John Kauffman on August 19, 1998. No video was taken at this site. Documenting photo is Roll K8, frame 26.

A shallow depression and a small waste dump, slightly southeast of the shaft location shown on the topographic map, were the only evidence of mining activity found at this site (Figures 3.8-2 and 3.8-3). Mr. Dale Schrempp of the USFS Priest Lake District Office indicated that the shaft had been backfilled. It was not determined if the shallow depression found is the backfilled shaft, a separate prospect pit, or another shallow, sloughed shaft. The pit found is only 10 feet in diameter and 5 feet deep, with a small dump measuring 20-30 feet long, 10 feet wide, and 15 feet thick. The pit is about 15 feet above the level of the lake, and the dump, consisting of coarse rock fragments, extends down to the lake. A few old boards and some scrap metal were found several hundred yards northwest of the pit at the edge of the lake along an old trail. Two flat, leveled areas connected by a path are just south of the pit and may be old cabin sites, although no structures were found. These flat areas are now used by campers. The disturbed area is less than 0.25 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 were found at this site.

3.8.6 Safety

The shaft has been backfilled by the Forest Service. No other safety hazards were found at this site.
Figure 3.8-1. Location map of the Plowboy Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.8-2. Sketch of the Plowboy Mine.
Figure 3.8-3. Looking east at a shallow pit, possibly the backfilled shaft, of the Plowboy Mine. The pit is about 15 feet above the shore of Upper Priest Lake (Roll K8, frame #26).
3.9 KOOTENAI NO. 2 PROSPECT (Site No. SA-31)

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

A prospect that may be the Kootenai No. 2 is just below FS Trail 291 in the NE¼, section 30, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.9-1). Access is by foot via FS Trail 291 from either Beaver Creek Campground to the southeast or from Hughes Creek to the northwest; the site is about 4 miles from either starting point. The prospect is about 200 feet above the lake on Forest Service land and is near where the trail levels off after ascending from the lake.

3.9.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979). Savage (1967, p. 123) described the prospect: “Quartz fissure veins. Diorite dike and siltite host rock. Galena and pyrite. Reportedly vein contains copper, lead, silver and gold.”

3.9.3 Site History

This property was owned and/or operated by J.W. Llloyd and the Kootenai Mining Co., but no dates were given for when this occurred. The mine had a 200-foot shaft from which some drifting had been done (Savage, 1967).

3.9.4 Environmental Conditions

3.9.4.1 Site Features

The Kootenai No. 2 Prospect was visited by John Kauffman on August 19, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 1, index 00:48:44-00:51:36). Documenting photo is Roll K9, frame 1.

This is a minor prospect, consisting of a caved adit and a very small waste dump. The caved adit is now a shallow depression on the slope (Figure 3.9-2) below the trail. The waste dump is 8 feet long, 6 feet wide, and about 12 feet down the face. A second, smaller “dump” and shallow pit are down the slope about 75 feet and slightly to the south. This may be a second prospect site or, possibly, a depression created by an uprooted tree that has now rotted away. The shaft reported by Savage (1967) was not found. The disturbed area is less than 0.1 acre.

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 are present at this site.

3.9.6 Safety
   There are no safety hazards at this site.
Figure 3.9-1. Location map of the Kootenai No. 2 Prospect, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.9-2. Looking northwest at the shallow depression of the short, caved adit at the Kootenai No. 2 Prospect. This adit is a few feet below Forest Service Trail 291 (Roll K9, frame #1).
3.10 BALDWIN GROUP (Site No. SA-105)
Alternate names—Firechief; Nickelplate; Nickel Plate Prospect; Fire Chief Mine; Opportunity)

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

The Baldwin Group includes a number of workings and prospects on and around Nickelplate Mountain in sections 10 and 11, T. 61 N., R. 5 W., on the Priest Lake NW 7.5-minute quadrangle (Figure 3.10-1). Although all are on Forest Service land and most are just west of State Highway 57, none are easily accessible. No roads or recent trails lead to any of the workings, and much of the land along the highway, which would provide the closest access to the workings, is privately owned.

3.10.2 Geologic Features (Figure 2.2-1)

Nickelplate Mountain is underlain by rocks of the Prichard Formation (Aadland and Bennett, 1979). The geology is described by Fryklund (1951, p. 1-2) as follows:

The country rock of the area is probably the Priest River Group (pre-Cambrian) which is found in the Metaline Falls Quadrangle to the west. The lithologic types seen on the property included sericite phyllite, fine-grained hornblende schists, fine-grained biotite quartzite, fine-grained chlorite schist, medium-grained garnet chlorite schist (which contains the sulphide and scheelite mineralization) and gneissose hornblende diorite. . . .

Exposed in the two southern prospect pits in the garnet chlorite schist are 2-3 feet wide zones containing sheared veins and masses of arsenopyrite, pyrite, pyrrhotite, chalcopryite, and magnetite. There is also a minor amount of scheelite present. In the prospect pit at the shaft [Shaft 1] the sulphide zone is bounded on the west by a fault which contains about 4 inches of gouge. This fault forms the footwall of the garnet chlorite schist at the foot of the shaft. Scheelite occurs in the sulphide zone and in the garnet chlorite schist for a total width of about 4 feet. The same scheelite zone is present at the bottom of the shaft where it has a width of about 8 feet. Unfortunately, the strike length of the exposed scheelite zone is only about 15 feet and the scheelite showings are restricted to the shaft pit.

3.10.3 Site History

The Nickel Plate Mining Company was incorporated in 1918. By 1923, the property had 1,214 feet of development, including three tunnels (65 feet, 600 feet, and 320 feet) and two shafts. The vertical shaft was 38 feet deep and the inclined shaft was 90 feet deep. The company forfeited its corporate charter in 1925, apparently after failing to pay the appropriate fees (IGS mineral property files).
The Fire Chief Mining Company (alternately reported as incorporated in the state of Washington and as not incorporated) took over the property in 1947. The company's report to the Idaho Inspector of Mines indicated the claims were "formerly known as the Nickel Plate Mining Co., and later the Opportunity Mining Co." No records have been found that substantiate Opportunity's involvement with this property.

Fire Chief attempted to develop this prospect as a tungsten mine and applied for a DMEA loan. As a result of this, the property was inspected twice by federal geologists. Fryklund (1951) noted that the tungsten ore shoot was short and of low grade. After its first DMEA application was turned down, the company spent the summer of 1953 trying to expose more of the scheelite vein. A second DMEA application was apparently no more successful than the first. Development in 1953 totaled 1,240 feet, including five tunnels (580 feet, 50 feet, 230 feet, 50 feet, and 30 feet), one vertical shaft (40 feet deep), one crosscut, and four drifts. By 1955, the company was trying to raise money to diamond drill the ore bodies in hopes of attracting one of the larger mining companies to develop the property. Fire Chief did not file any reports with the Idaho Inspector of Mines after 1955.

The property was relocated in 1968 as the Baldwin Group (USBM manuscript in IGS mineral property files). No significant activity has been reported at the property in recent years.

3.10.4 Environmental Conditions

3.10.4.1 Site Features

The Baldwin Group was visited by John Kauffman on August 20 and 24, 1998. A video segment describing the property is on the Priest Lake District Videotape (Tape 1, index 00:51:40-01:29:14). The audio portion of the videotape for Adit 7, Adit 8, and Shaft 3 (index 01:21:05-01:29:14) is defective. Documenting photographs are Roll K9, frames 8-20, and Roll K10, frames 15-20.

The Baldwin Group consists of eight adits and three shafts on or near Nickelplate Mountain (Figure 3.10-2). Most of the workings are on the northeast end of the mountain, although one adit is near the west end of the ridge, a second is on the northwest side of the mountain near its base, and a third is across the drainage to the north. A few minor prospect pits are associated with the property. The workings are described in the order in which they were visited.

Shaft 1, which is open, is on the east end of Nickelplate Mountain near the summit at an elevation of about 3,640 feet (Figure 3.10-3). The shaft (Figure 3.10-4) is about 6 feet square and at least 50 feet deep. The waste dump (Figure 3.10-5) measures 25 feet long, 8 feet wide on top, and 15 feet thick. Although the dump is obvious, the shaft opening cannot be seen from above or from the side (Figure 3.10-6). Slightly above and about 30 feet south of the shaft is a small prospect that cuts about 6 feet into the slope. The dump for this prospect is about 10 feet long, 10 feet wide, and 8-10 feet thick. The disturbed area is less than 0.25 acre.
Adit 1 is about 50 feet in elevation below the shaft. Some sloughed debris is mounded in front of the adit, but a 3-foot by 5-foot opening leads into the adit (Figures 3.10-7 and 3.10-8). This adit may connect with Shaft 1. The waste dump (Figure 3.10-9) is 25 feet long, 15 feet wide, and 15 feet down the face. The disturbed area covers less than 0.25 acre.

Adit 2 is several hundred feet below Adit 1 on the northeast slope of the mountain. An old, at places indistinct, foot trail connects the upper workings with Adit 2, and an overgrown, brushy access road from the north terminates just south of the adit (Figure 3.10-10). The open adit is hidden in a thicket of small fir and hemlock trees and larger fallen trees (Figure 3.10-11). A seep draining from the adit is dammed by sloughed debris at the portal, filling the adit with several feet of water (Figure 3.10-12). Several old timbers are visible inside the adit. The waste dump (Figure 3.10-13) is about 50 feet long, 30 feet wide at the widest portion, and about 50-60 feet down the face. The disturbed area covers about 0.25 acre.

Adit 3 is near the ridge top at the west end of Nickelplate Mountain (Figure 3.10-14) and is marked by an adit symbol on the topographic map. On the video segment, this adit is identified as Savage's (1967) Nickelplate Prospect, but upon further examination of his report, it was decided that he was referring to the workings on the northeast slope of the mountain. Adit 3 is open and appears to be a slight decline (Figures 3.10-15 and 3.10-16). Inside, it is filled with water to within 5 feet of the entrance. This adit was driven on a vein of massive sulfides, mostly pyrite. The small, iron-stained waste dump (Figure 3.10-17), which is visible from Highway 57 south of Nordman, measures 10 feet long and 6 feet wide. It extends down the slope for about 30 feet, where it fans out to 25-30 feet across. Four concrete footings, each about 2 feet square, were found on the ridge top slightly northwest of the adit. These appear to have been footings for a tower structure, possibly unrelated to mining activity.

Adit 4, possible Adit 5, and possible Shaft 2 are at the base of the northeast end of Nickelplate Mountain (Figure 3.10-18). Adit 4 is just above the break in slope at the base of the mountain. The adit is caved for the first 25 feet from the portal, but it has a small opening (about 3 feet long by 2 feet high) at the end of the caved zone (Figure 3.10-19). A few of the collapsed portal timbers protrude through the caved debris (Figure 3.10-20). Water seeps from the adit and pools in front of the portal, supporting a thick carpet of moss on the surface of the waste dump (Figure 3.10-21). The dump (Figure 3.10-22), which is 60 feet long, 20 feet wide, and 40 feet down the face, extends to the valley floor. There is a possible caved adit, which would be Adit 5, a few feet north of Adit 4. A small opening in the embankment of the access road, a few rotten timbers, and a slight depression on the slope above the opening are the only indications that this is an adit. If it is an adit, the waste dump is combined with that of Adit 4. A shallow pit at the base of the waste dump may be Shaft 2, although no dump is associated with this pit. However, a shaft symbol is shown at this location on the Baldwin Group map (Figure 3.10-2). Four square concrete footings (Figure 3.10-23), one Y-shaped footing, and a small concrete structure (Figure 3.10-24) are on the flat area east of the dump. An old foot trail off the southeast end of the dump leads to the remains of a collapsed cabin. The disturbed area covers 0.5 acre or less.
Northwest of Adit 4 about ¼ mile, where an old foot trail splits from an old access road near a probable cabin site, is a small prospect pit or very short caved adit with an equally small waste dump.

Adit 6 is at the base of the northwest side of Nickelplate Mountain at one of the smallest of several bodies of water comprising Reeder Lake (Figure 3.10-25). This prospect is along a foot trail that follows the drainage between Reeder Mountain and Nickelplate Mountain. A trough on the slope and a few portal timbers (Figure 3.10-26) mark the location of the caved adit. The moss-covered waste dump (Figure 3.10-27) extends slightly into the small lake. The dump measures 20 feet long, 10 feet wide, and about 12 feet thick. The disturbed area covers less than 0.1 acre.

Adit 7 is across the drainage from Nickelplate Mountain, northeast of the two elongated members of Reeder Lake, and at the base of the nose of a southeast-trending ridge (elevation 3,422 feet) that parallels Reeder Mountain (Figure 3.10-28). A quartz vein up to 1 foot wide is exposed in an outcrop (Figure 3.10-29). At the top of the outcrop is the triangular opening of the adit (Figure 3.10-30). Most of the waste dump has been bulldozed into a flat area at the base of the outcrop, which is about 12 feet below the opening. This pad is about 40 feet long, 30 feet wide, and 5 feet thick. The disturbed area covers less than 0.25 acre.

Shaft 3 and Adit 8 are located on the east end of Nickelplate Mountain at an elevation of about 3,100 feet. An extremely brushy old road crosses the slope above the workings and terminates a short distance to the south (Figure 3.10-31). The shaft looks like a caved adit, forming a trough on the slope (Figure 3.10-32). However, it seems to be inclined toward the adit 20 feet below, and there are what appear to be a few small openings in the sloughed debris (Figure 3.10-33). The waste dump for the shaft (Figure 3.10-34) is 8 feet long, 6 feet wide, and 20 feet down the face. Open Adit 8 is offset slightly to the north of the shaft at about the level of the base of the shaft dump (Figure 3.10-35). The dump for the adit is 10 feet long, 10 feet wide, and extends at least 40 feet down the slope (Figure 3.10-36). The dumps of both workings are moss covered. The disturbed area covers less than 0.25 acre.

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

Adit water samples were collected from Adits 2 (K8209801) and 4 (K8249801). At Adit 2, the sample was collected inside the portal from behind the dam of sloughed debris. At Adit 4, the sample was collected from the small pool in front of the caved portal.
<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>K8209801</td>
<td>Baldwin Group, Adit 2</td>
<td>167</td>
<td>45</td>
<td>6.88</td>
<td>seep</td>
<td>Yes</td>
</tr>
<tr>
<td>K8249801</td>
<td>Baldwin Group, Adit 4</td>
<td>156</td>
<td>43</td>
<td>6.93</td>
<td>seep</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 3.10.4.2.3 Analytical Results

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

Samples K8209801 and K8249801 do not exceed any water quality standards in the element screen, but both exceed the Aquatic Life Chronic standard for cadmium in the total recoverable metals screen.

### 3.10.5 Structures

The remains of a collapsed log cabin or storage structure (Figure 3.10-37) are located several hundred yards southeast of Adit 4 along an old foot trail. An old outhouse and a probable cabin site were found northwest of Adit 4 along an old road, and near a survey marker (labeled “NW 1/64 corner”). A foot trail leading southeast from this site has an old wooden bridge across a small boggy area. This trail switches back and forth across the slope and eventually leads to Adit 2. Long-time residents of the area have reported that a large bunkhouse and mill were built on the property (IGS mineral property files). The concrete footings near Adit 4 are probably remnants of the mill. No tailings were noted at the site.

### 3.10.6 Safety

The opening at Shaft 1 is not obvious and there is no indication of the vertical drop-off from the slope above the shaft. This creates a serious hazard. However, the lack of access to the site and the fact that the shaft is not shown on the topographic map mitigates the danger to some extent. Few people other than hunters, foresters, or surveyors are likely to stumble upon the workings; nonetheless, the shaft remains a hazard to those people. The open adits present the usual dangers from unauthorized entry.
Figure 3.10-1. Location map of the Baldwin Group workings, Bonner County, Idaho (U.S. Geological Survey Priest Lake NW 7.5-minute topographic map).
Figure 3.10-2. Sketch map of the Baldwin Group workings (U.S. Bureau of Mines map in Idaho Geological Survey mineral property files).
Figure 3.10-3. Sketch of Shaft 1 and Adit 1 of the Baldwin Group.
Figure 3.10-4. Looking west into the opening of Shaft 1 of the Baldwin Group (Roll K9, frame #9).

Figure 3.10-5. Looking south across the waste dump for Shaft 1 at the Baldwin Group. The waste dump of the short prospect cut south of the shaft is above and to the right of the backpack (Roll K9, frame #10).
Figure 3.10-6. Looking northwest toward Shaft 1 at the Baldwin Group. The shaft opening, to the left of the fallen tree, cannot be seen from even this short distance (Roll K9, frame #8).
Figure 3.10-7. Looking west at the opening of Adit 1 of the Baldwin Group. The waste dump for Shaft 1 is in the trees at the upper left of the photograph (Roll K9, frame #12).
Figure 3.10-8. View inside the opening of Adit 1 at the Baldwin Group (Roll K9, frame #13).

Figure 3.10-9. Looking south at the waste dump for Adit 1 at the Baldwin Group. The open adit is off the right side of the picture (Roll K9, frame #14).
Figure 3.10-10. Sketch of Adit 2 of the Baldwin Group.
Figure 3.10-11. Looking west at the opening of Adit 2 at the Baldwin Group (just above the center of the photograph). The adit is nearly hidden by saplings and fallen trees (Roll K9, frame #15).
Figure 3.10-12. View inside Adit 2 at the Baldwin Group, showing several rotten, leaning support timbers. The floor is covered with several feet of water, which is dammed behind the sloughed debris at the portal (Roll K9, frame #16).
Figure 3.10-13. Looking north at the south flank of the waste dump for Adit 2. The dump extends down the slope beyond the lower right edge of the photograph (Roll K9, frame #17).
Figure 3.10-14. Sketch of Adit 3 at the Baldwin Group.
Figure 3.10-15. Looking north at the opening of Adit 3 at the Baldwin Group. The top of the outcrop above the opening is the summit of Nickelplate Mountain (Roll K9, frame #18).

Figure 3.10-16. View into Adit 3, which is actually a shallow decline. The adit is filled with water to within about 5 feet of the opening (Roll K9, frame #19).
Figure 3.10-17. Looking south down the face of the iron-rich waste dump of Adit 3. The dump is visible from State Highway 57, which follows the edge of the meadows across the upper part of the photograph (Roll K9, frame #20).
Figure 3.10-18. Sketch of Adit 4, possible Adit 5, and possible Shaft 2 at the Baldwin Group.
Figure 3.10-19. Looking down into the narrow opening of Adit 4 at the Baldwin Group (Roll K10, frame #9).
Figure 3.10-20. Looking southwest at the collapsed portal timbers of Adit 4 at the Baldwin Group. Water seeping from the caved adit forms a dark pool in front of the timbers and supports the thick carpet of moss in the lower foreground (Roll K10, frame #8).
Figure 3.10-21. Looking southeast across the moss-covered surface of the waste dump for Adit 4 at the Baldwin Group. The caved adit is at the right center of the picture (Roll K10, frame #10).

Figure 3.10-22. Looking southwest at the face of the waste dump for Adit 4 at the Baldwin Group (Roll K10, frame #5).
Figure 3.10-23. One of several concrete footings on the flat below the waste dump for Adit 4 at the Baldwin Group. Several threaded bolts protrude from the top of the footing (Roll K10, frame #7).

Figure 3.10-24. Small concrete structure near the footings on the flat below the waste dump for Adit 4, looking north (Roll K10, frame #6).
Figure 3.10-25. Sketch of Adit 6 at the Baldwin Group.
Figure 3.10-26. Looking south at caved Adit 6 of the Baldwin Group. The trees have fallen along the trough of the caved adit. Several portal timbers (center of picture) are visible between the fallen trees (Roll K10, frame #11).
Figure 3.10-27. Looking northwest at the toe of the Adit 6 waste dump, which extends into one of the small bodies of water that form Reeder Lake (Roll K10, frame #12).
Figure 3.10-28. Sketch of Adit 7 at the Baldwin Group.
Figure 3.10-29. Looking north from the prospect cut below Adit 7 of the Baldwin Group. This prospect explores a steeply dipping quartz vein which is about 1 foot wide (seen cutting diagonally across the center of the photograph from lower left to upper right). The adit opening is the black triangular area at the top of the quartz vein (Roll K10, frame #13).
Figure 3.10-30. Looking west into the opening of Adit 7 at the Baldwin Group (Roll K10, frame #14).
Figure 3.10-31. Sketch of Adit 8 and Shaft 3 at the Baldwin Group.
Figure 3.10-32. Looking southwest up the trough of caved Shaft 3 of the Baldwin Group. This shaft was probably an incline connected with Adit 8 (Roll K10, frame #15).
Figure 3.10-33. View from above into the pit of caved Shaft 3 at the Baldwin Group (Roll K10, frame #16).

Figure 3.10-34. Looking northeast over the moss-covered waste dump of Shaft 3 at the Baldwin Group (Roll K10, frame #17).
Figure 3.10-35. Looking south or southwest at open Adit 8 (on the right) and the face of the waste dump for Shaft 3 (on the left) at the Baldwin Group (Roll K10, frame #20).

Figure 3.10-36. Looking northeast down the moss-covered face of the waste dump for Adit 8 at the Baldwin Group (Roll K10, frame #19).
Figure 3.10-37. Collapsed remains of a small log structure along an old foot trail southeast of Adit 4 at the Baldwin Group (Roll K10, frame #4).
3.11 MOUNTAIN CHIEF MINE (Site No. SA-30)
Alternate names—Bluebell Group; Plowboy Mine.

Although the Plowboy and the Mountain Chief mines are shown as separate locations in the U.S. Geological Survey topographic map, information in the IGS’s mineral property files indicates that both sets of workings are part of the same property. Originally known as the Mountain Chief, the mine was renamed the Plowboy in the late 1950s. See section 3.8 for a description of the Plowboy Mine (SA-29).

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

The Mountain Chief Mine is located about ½ mile west of the upper end of Upper Priest Lake in the NW¼ of the SE¼, section 24, T. 63 N., R. 5 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.11-1). The easiest access is via FS Trail 291 from the trail head at Hughes Fork. A portion of this trail follows a reclaimed logging road. About 1.5 miles southeast of the trail head, an access road splits to the left from the trail and crosses a clear cut. Past the clear cut, the road becomes exceedingly brushy and obscure, but it leads to the Mountain Chief in the saddle behind knoll 2970. This site is within the Upper Priest Lake Scenic Area on Forest Service land.

3.11.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation intruded by diorite or diabase dikes. Granitic rocks of the Kaniksu batholith are nearby (Savage, 1967; Aadland and Bennett, 1979). The country rock is argillite and siltite, and fissure-filling quartz veins up to 1 foot thick occur in the area (U.S. Bureau of Mines manuscript in IGS’s mineral property files).

3.11.3 Site History

See section 3.8.3.

3.11.4 Environmental Conditions

3.11.4.1 Site Features

The Mountain Chief was visited by John Kauffman on August 21, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 1, index 01:29:18-01:39:50). The property is misidentified as SA-28 at the beginning of the video segment. Documenting photographs are Roll K9, frames 21-23.

The topographic map has a prospect symbol and an adit symbol at this location. The only feature found was what appeared to be a caved adit at the site of the prospect symbol. Nothing was found at the site marked by the adit symbol.
The probable caved adit (Figure 3.11-2) is at the end of the access road on a north-facing slope at the head of the drainage behind knoll 2970. The relationship of this possible adit to the sizeable waste dump could not be determined because dense thickets of small trees covered the road and dump surface. It is assumed that the material came from the adit, but another opening in the vicinity is possible and may have supplied some or all of the waste rock. The dump, built across the head of the drainage (Figure 3.11-3) south of knoll 2970, measures 100 feet long, 30 feet wide, and about 40 feet thick. The drainage below the dump is filled with coarse talus from the outcrops on either side of the gully. This talus may have been mistaken for a waste dump on air photos and may account for the adit symbol on the topographic map. Old tin cans, a metal water cooler, a 55-gallon drum, and other scrap items are scattered around the site, both on the dump surface and in the gully below the dump. The disturbed area covers about 0.5 acre.

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

The remains of a collapsed cabin or shed (Figure 3.11-4) are on the north side of the dump on a pad about 4 feet higher than the surrounding surface.

3.11.6 Safety
No safety hazards were found at this site.
Figure 3.11-1. Location map of the Mountain Chief Mine, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.11-2. Looking south at the probable caved adit at the Mountain Chief Mine (Roll K9, frame #21).
Figure 3.11-3. Looking southwest at the face of the Mountain Chief waste dump, which was built across the head of the dry gully (Roll K9, frame #23).

Figure 3.11-4. Collapsed remains of a cabin or shed on the north side of the waste dump at the Mountain Chief Mine (Roll K9, frame #22).
3.12 UNNAMED PROSPECT (Site No. SA-28)

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

This prospect is about 1.5 miles southeast of the trail head at Hughes Fork for FS Trail 291. It is in the SW¼ of the SW¼, section 13, T. 63 N., R. 5 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.12-1). The prospect is marked on the topographic map by an adit symbol and a prospect symbol behind knoll 2820, just south of Trail 291, and is on Forest Service land.

3.12.2 Geologic Features (Figure 2.2-1)

The rocks in this area are Prichard Formation, with granitic rocks of the Kaniksu batholith nearby (Savage, 1967; Aadland and Bennett, 1979).

3.12.3 Site History

Nothing is known of the history of this site.

3.12.4 Environmental Conditions

3.12.4.1 Site Features

This prospect was visited by John Kauffman on August 21, 1998. A video segment describing the site is on the Priest Lake District Videotape (Tape 1, index 01:39:53-01:45:15). Documenting photographs are Roll K9, frames 24-26, and Roll K10, frames 1-3.

This prospect consists of an adit on the south side of a small wetland behind knoll 2820 and a prospect pit or shallow shaft on the north side of the wetland (Figure 3.12-2).

The portal timbers of the open adit have rotted (Figure 3.12-3), and a few supporting timbers inside (Figure 3.12-4) also appear to be in poor condition. The waste dump extends from the adit about 30 feet into the small wetland (Figures 3.12-5 and 3.12-6). The dump is about 4 feet wide on top and 18 feet across at the base, and is about 7 feet thick. Most of the material is oxidized and iron stained.

The prospect pit is 8 feet in diameter and has a cut extending 25-30 feet to the north from its edge (Figure 3.12-2). Rock and logs have sloughed into the pit, which now is only 6-7 feet deep. The crescent-shaped dump wraps around the south side of the pit and extends downward about 12-15 feet to the edge of the wetland (Figure 3.12-7).

The total disturbed area is less than 0.5 acre.
3.12.4.2 Sample Locations

3.12.4.2.1 Solid Samples

Sample K8219801 was collected from the oxidized part of the adit dump where it extends into the wetland.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8219801</td>
<td>Unnamed Prospect SA-28, adit</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>dump</td>
<td></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 K8219801 exceeds background and environmental levels for arsenic, cadmium, copper, iron, and lead in the element screen. In the TCLP for metals screen, no elements of interest are leaching from the sample.

3.12.5 Structures

The remains of a collapsed cabin are on a small flat area just west of the prospect pit (Figure 3.12-8).

3.12.6 Safety

The open adit is the only safety hazard found at this site. Piles of collapsed debris can be seen inside the open adit, indicating unstable rock conditions. The timbers are rotten and provide little or no support.
Figure 3.12-1. Location map of the Unnamed Prospect SA-28, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.12-2. Sketch of Unnamed Prospect SA-28.
Figure 3.12-3. Looking south at the open, timbered portal of the adit at Unnamed Prospect SA-28 (Roll K9, frame #24).
Figure 3.12-4. View inside the adit at Unnamed Prospect SA-28. The timbers are in very poor condition. Some are upright, but others are leaning or collapsed. Piles of caved debris on the adit floor can be seen in the lower foreground (Roll K9, frame #25).

Figure 3.12-5. Looking north from the adit of Unnamed Prospect SA-28 along the narrow surface of the waste dump (Roll K9, frame #26).
Figure 3.12-6. Looking south, from the north side of the small grassy wetland, at the end of the adit waste dump that extends out into the wetland (Roll K10, frame #3).

Figure 3.12-7. Crescent-shaped waste dump around the prospect pit on the north side of the small wetland at Unnamed Prospect SA-28. The waste dump for the adit can be seen in the upper right of the picture (Roll K10, frame #2).
Figure 3.12-8. Remains of a collapsed structure west of the prospect pit at Unnamed Prospect SA-28 (Roll K10, frame #1).
3.13 UNNAMED PROSPECT (Site No. K8249802)

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

This unnamed prospect is at the edge of an unnumbered logging road that splits from FS Road 1341 and heads north. The site is east of Boulder Mountain in the SE¼ of the SW¼, section 2, T. 62 N., R. 5 W., on the Priest Lake NW 7.5-minute quadrangle (Figure 3.13-1). Access to FS Road 1341 is from either FS Road 302 north of Nordman or from FS 2512 at the Beaver Creek Campground north of Reeder Bay. The unnumbered logging road, about 1 mile north of Beaver Pass, has a dirt berm at its junction with FS Road 1341 and is becoming overgrown in places. The prospect is along the west side of the road about ¼ mile north of FS Road 1341 and is on Forest Service land.

3.13.2 Geologic Features (Figure 2.2-1)

This prospect is in the Prichard Formation, with the Cretaceous biotite granodiorite of the Boulder Mountain granodiorite nearby. A northwest-trending fault passes near the prospect (Savage, 1967; Aadland and Bennett, 1979).

3.13.3 Site History

Nothing is known of the history of this site.

3.13.4 Environmental Conditions

3.13.4.1 Site Features

The prospect was visited by John Kauffman on August 24, 1998. A video segment describing the site is on the Priest Lake District Videotape (Tape 1, index 01:45:18-01:48:21). The audio portion of this segment is defective. Documenting photographs are Roll K10, frames 21-22.

This minor prospect, if it is one, consists of a shallow pit beside the road (Figure 3.13-2). A number of old log beams are lying across the bottom of the pit (Figure 3.13-3). The logs appear to be a covering over a possible caved shaft. The road has obliterated any dump that may have existed at the site. Disturbance at this site is minimal.

3.13.4.2 Sample Locations

3.13.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.13.4.2.2 Water Samples

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

3.13.6 Safety
There are no safety hazards at this site. If the pit is actually a shaft, it is completely caved.
Figure 3.13-1. Location map of Unnamed Prospect, Site No. K8249802, Bonner County, Idaho (U.S. Geological Survey Priest Lake NW 7.5-minute topographic map).
Figure 3.13-2. Shallow pit (center of photograph) of Site No. K8249802 beside an old logging road (Roll K10, frame #21).
Figure 3.13-3. Log beams in the shallow pit at Site No. K8249802. These beams may be a covering over a caved shaft (Roll K10, frame #22).
3.14 WOODRAT MINE (Site No. SA-118)
Alternate names—Rat Group; Wood Rat; Kaniksu; Golden Eagle Group; Burnt Cabin Group.

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

The Woodrat Mine is on the west shore of Priest Lake between Luby Bay to the north and Shoshone Bay to the south. It is in the central and southern parts of section 19, T. 60 N., R. 4 W., on the Priest Lake SW 7.5-minute quadrangle (Figure 3.14-1). Most of the workings are along the edge of the lake, between the shore and FS Road 237. One adit and a shallow pit were found on the slope to the south at an elevation of about 2,800 feet. Some of the lakeshore prospects are along the foot trail that follows the shoreline along this section of the lake. The workings all appear to be on Forest Service land, although this area may once have been private land or patented claims.

3.14.2 Geologic Features (Figure 2.2-1)

Savage (1967, p. 131) described the deposit as follows:
- Fissure and replacement veins. Some lead, silver and zinc values. Pinching and swelling ore. Galena, chalcopyrite, pyrite, quartz, and quartz breccia.
- Granodiorite and altered diorite intrusives, near contact with [undifferentiated]
- Belt rocks.

The mine is in Cretaceous hornblende-bearing plutonic rocks that have intruded the Prichard Formation (Aadland and Bennett, 1979).

3.14.3 Site History

The Wood Rat claim was located on November 7, 1905 (Stentz, 1965). This and several additional claims were held by the Panhandle Copper Mining and Smelting Company, Ltd. (incorporated in 1905). By 1913, the property had about 300 feet of workings.

The Kaniksu Mining Company (incorporated in 1922) purchased the property that same year (Stentz, 1965) at a sheriff’s sale. Kaniksu’s president, J.W. Lloyd, later became the first president of Milwaukee Mines, Inc. (organized in 1928), a company that owned a large number of claims in the Priest Lake area. Arthur L. Hooper became president of Milwaukee around 1930, at about the same time that he became the statutory agent for Kaniksu. Hooper became the president and manager of Kaniksu in late 1943 or early 1944. He held both positions until 1960, when secretary Richard T. Green replaced him as manager. Two years later, the company also had a new president. During most of this period, Hooper was also president and manager of Milwaukee Mines, Inc.

A test shipment of lead ore was made from the Woodrat in 1918. In 1922, the property had two shafts (a vertical shaft 50 feet deep, and an inclined shaft 150 feet long and 110 feet deep), two
raises, two crosscuts, and two drifts. By 1925, the property had 632 feet of development, including 240 feet of shafts and 392 feet of crosscuts and drifts. During the year, a car of lead-zinc ore was shipped to the Bunker Hill custom mill at Kellogg for testing. Development continued on the property until the early 1930s, although only surface work (road building) appears to have been done in some years. The mine had expanded to eleven claims by 1928. In 1930, buildings on the property included a cookhouse, a bunkhouse, an ice house, and a blacksmith shop. That same year, the company reported 2,121 feet of workings, including one 400-foot inclined shaft. However, the following year, total development was given as 1,621 feet. Between 1930 and 1939, the property was supposedly optioned to "Eastern Capitalists (reputedly the DuPonts)" for $1.5 million, but the sale was never completed.

The Woodrat was idle from 1933 through 1938, after which the company resumed its assessment work. By 1941, the Woodrat had 3,000 feet of total development. The company reported four tunnels on the property, but it is not known whether these included the underground levels from the shaft, which the company often described under the heading of "tunnels" in its reports to the Idaho Inspector of Mines. Equally inconsistent was the company's 1942 report, which listed that workings as six tunnels (225 feet, 105 feet, 98 feet, 100 feet, and 50 feet), one vertical shaft (400 feet deep), and six drifts. Total development was reported as 1,025 feet. Buildings on the property included a bunkhouse, an ice house, and two cabins.

The mine was idle throughout World War II, but company president Hooper resumed minor upkeep of the property in 1945. Additional claims were located in 1945, bringing the total up to twenty (Figure 3.14-2). In his 1945 report to the Idaho Inspector of Mines (IGS mineral property files), Hooper notes: "There is an old steam driven hoist and two steam boilers, a good pump (at one time) in bottom of shaft, and an old mill that turned out a small amount of ore at one time, all of which has been robbed by thieves until nothing is in shape for use." (Previous reports had stated there was no mill on the property, and the 1950 report noted that the mill had never been fully operational.)

For the next several years, Hooper tried to sell the Woodrat, but his efforts met with a notable lack of success. The company continued to perform its assessment work, which consisted of bulldozer work at the surface because the shaft was flooded. A 90- to 100-foot tunnel on the Burnt Cabin Group was also caved at the portal in 1954. In 1956, Hooper described the workings as follows (1956 Kaniksu Mining Company report to the Idaho Inspector of Mines):

- Has a 60 foot tunnel on Bulldog claim, with one foot lead of pyrite ore; and a tunnel about 45 feet long on Burnt Cabin No. 3 claim which id [is] driven in the greenstone containing about all of the rare metals.

The main workings are an incline shaft driven at lake edge on the Wood Rat claim to the 400 foot level, with drifts each way on each 100 foot level, one of which goes out under the lake for 150 to 200 feet. [The shaft was vertical for the first 60 feet, then inclined about 42° to the east (Stentz, 1965).] Values in silver, lead, zinc Etc. [In 1958, Hooper added "Tin, and other rare metals" to this list.] A second
vein 15 to 20 feet west of the one on which the shaft was sunk has never been drifted over to, but shows real values on the surface [surface].

All this work was done under the management of J. W. Lloyd, now deceased, after which the property was wished onto me and I have personally financed it sin[ce.]

In 1958, Hooper reported a discovery of boron and noted, "We are trying to exploit this material as it is used for booster in fuel of Rockets and Jet engines and in Richfield Company's gasoline." His description of the shaft was quoted from the previous year's annual report, but he then continued:

"A second vein 29 feet west shows on the surface high grade silver, lead and zinc but was never drifted over to in the shaft (as advised by an early Mine Inspector) because of a quarrel between Co-owners when the shaft was being sunk." This work was done by J. W. Lloyd, prior to option to DuPonts, he being now deceased and the work wished on to me with no one to help keep it going until a buyer can be found; Besides we have the new mining code that insists on sharing in the surface wrights altho the property was commenced back in 1906, before there ever was a Forestry Dept. [U.S. Forest Service] to meddle in the Company's affairs.

Most of Hooper's reports during the 1950s complained about destruction of the surface buildings and equipment by "unscrupulous 'Sportsmen'," "vandals and thieves," or "scrap men." Reports in the late 1950s attacked the USFS on the grounds that "under this new multiple use mining law the Foresters turned the place over to all comers." Hooper continued to promote the mine through 1961 (when he noted that he was 86 years old), but is not listed on subsequent company reports.

Kaniksu reported doing its assessment work on the property for the next two or three years. However, in 1965, the Forest Service contested the claims. This challenge was based on a lack of demonstrated mineral values, use of the property for recreational purposes, and questions concerning the validity of some of the claims (Stentz, 1965). The outcome of the Forest Service action is not known, but the company forfeited its corporate charter in 1968.

Bureau of Mines records indicate that 30 tons of ore were produced from the mine from 1918 to 1925. The ore contained 217 ounces silver, 189 pounds copper, 12,340 pounds lead, and 5,530 pounds zinc (Idaho Geological Survey mineral property files).

3.14.4 Environmental Conditions

3.14.4.1 Site Features

The Woodrat Mine was visited by John Kauffman on August 25, 1998. A video segment describing the property is on the Priest Lake District Videotape (Tape 2, index 00:00:55-00:26:18). The audio portion of this segment is defective. Documenting photographs are Roll K10, frames 23-26, and Roll K11, frames 1-21.
The workings consist of seven adits, a main shaft, and a possible shallow shaft along the lake edge. Another adit and a shallow pit identified as Shaft 3 are on the slope ½ mile south of the lake (Figure 3.14-3). All of these workings shown on Figure 3.14-3 were found except for the shaft shown on the slope south of the lake at an approximate elevation of 2,900 feet.

Shaft 1 (Figure 3.14-4), now caved, is the westernmost and most extensive of the workings. It is shown by an adit symbol on the topographic map. Little evidence of the shaft's exact location remains except for a rusted winch (Figure 3.14-5) and other scrap metal between the road and the waste dump. The dump extends into the lake and has a series of ridges or ribs on the top surface (Figures 3.14-6, 3.14-7, and 3.14-8). A small percentage of the dump material, generally that containing quartz vein material, is oxidized. Although slightly irregular in shape, the dump is about 100 feet long, 30 feet wide, and 20 feet thick. If there was an adit at this location, no evidence of it remains. The disturbed area covers about 0.5 acre.

Adit 1 is about ¼ mile east of Shaft 1 (Figure 3.14-3, above) on the north side of FS Road 237. It is caved, and no waste dump remains. Only a few cross timbers and a shallow trough mark its location (Figure 3.14-9). The dump material may have been used to create a level camping area just east of the adit (Figure 3.14-10). Recent garbage, associated with the campsite, is scattered around the site. The disturbed area is less than 0.1 acre (excluding the campsite).

Adits 2 and 3 are about ¼ mile east of Adit 1. They are along the south side of a foot trail that branches from FS Road 237 and follows the edge of the lake (Figure 3.14-11). These adits are also caved and are expressed as shallow troughs on the slope. The trough at Adit 2 extends about 20-30 feet up the slope (Figure 3.14-12) and has a few rotten timbers protruding through the rubble. There is a small cut into the rock beside the east edge of where the portal of Adit 2 was located. A small mound of material along the trail (Figure 3.14-13) may be the remains of the waste dump for Adit 2. Caved Adit 3 is about 150-200 yards east of Adit 2. Adit 3 has a very short trough (Figure 3.14-14) and essentially no waste dump. The disturbed area at these two caved adits is less than 0.1 acre.

Shaft 2, which may have been only a deep prospect pit, is about ¼ mile east of Adit 3. This site is in the timber below FS Road 237 and above the foot trail along the lake (Figure 3.14-10). The pit is about 7 feet in diameter and 4-5 feet deep. An old timber spans the pit, and other timbers have fallen into the bottom (Figure 3.14-15). The waste dump forms a crescent-shaped rim around the north half of the pit (Figure 3.14-16). The rim is 2-4 feet thick and 4-5 feet wide, indicating minimal work was done at this site. The disturbed area is less than 0.1 acre.

Adit 4 (Figure 3.14-10) is about 50 feet east of Shaft 2. It is caved, forming a trough about 6-10 feet deep and 30 feet long (Figure 3.14-17). A minor seep trickles from the portal area (Figure 3.14-18) and soaks into the ground along the foot trail, which crosses the dump surface (Figure 3.14-19). The dump is 30 feet long parallel to the lake, 15 feet wide, and 4 feet thick. The toe just reaches the lake edge.
Adits 5, 6 and 7 are approximately ½ mile east of Adit 4. Adit 5 is just above the foot trail and below FS Road 237. Adits 6 and 7 are 200 feet northeast of Adit 5 along the edge of the lake (Figure 3.14-20). Adit 5 is caved (Figure 3.14-21) and has a small waste dump that measures 8 feet long, 8 feet wide, and 12 feet down the face. A tree on the edge of the dump, broken off about 8 feet above the surface, has a blaze and an old tobacco can that once held a claim notice (Figure 3.14-22). Adits 6 and 7, the easternmost of the workings, are about 30 feet apart and have a combined waste dump. Adit 6 is caved. It has several leaning portal timbers protruding through the rubble (Figure 3.14-23) and a trough extending about 25 feet up the slope behind the portal timbers. Adit 7, although caved at the portal, has an opening 4 feet wide by 3 feet high behind the caved area (Figure 3.14-24). The rock inside the adit appears reasonably competent, but some fallen rubble can be seen on the floor (Figure 3.14-25). The combined waste dumps measure 25 feet long parallel to the lake edge, 10 feet wide, and 4 feet thick. A few trees are growing on the dump surface along the edge of the lake (Figure 3.14-26). The disturbed area for all three adits is less than 0.25 acre.

Adit 8 and a shallow pit (identified on the video as Shaft 3) are located 100-150 feet downhill from a pack trail or mountain bike trail that originates at Hill’s Resort (Figure 3.14-27). These workings are probably on what was the Pack Rat claim. An old bulldozer road, overgrown with saplings where it crosses a clear cut, also leads to the adit from FS Road 237 at Shaft 1. These workings are at an elevation of about 2,900 feet, almost due south of Shaft 1. The shallow pit is about 4 feet deep and has a small pile of waste rock 10 feet long, 4 feet wide, and 3 feet thick. This is probably not the shaft shown on the site map (Figure 3.14-3), and no other indications of a shaft were found in this vicinity. Adit 8 is about 150 feet below the pit at the end of the old access road. The adit is difficult to see because of saplings and fallen trees (Figure 3.14-28), but the waste dump is fairly obvious. The adit is nearly caved except for a narrow, eye-shaped opening 3 feet long by 1.5 feet high (Figure 3.14-29). The dump is 45 feet long, 30 feet wide, and 12 feet thick. It has numerous large trees growing on its surface and face (Figure 3.14-30). The disturbed area is about 0.25 acre.

3.14.4.2 Sample Locations

3.14.4.2.1 Solid Samples

Sample K8259802 was collected from the face of the waste dump for Shaft 1. This was a composite sample of oxidized and unoxidized material.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8259802</td>
<td>Woodrat Mine, Shaft 1 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3.14.4.2.2 Water Samples

Sample K8259801 was collected from the seep at Adit 4.

<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>K8259801</td>
<td>Woodrat Mine, Adit 4</td>
<td>172</td>
<td>55</td>
<td>6.72</td>
<td>seep</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 K8259802 exceeds background and environmental levels for arsenic, cadmium, copper, iron, lead, and zinc in the element screen. In the TCLP for metals screen, no elements of interest are leaching from the sample.

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

The water sample from Adit 4 (K8259801) exceeds the Secondary MCLs for manganese and iron, the Aquatic Life Acute standard for iron, and the Aquatic Life Chronic standard for cadmium in the total recoverable metals screen. It does not exceed any standards in the dissolved metals screen.

3.14.5 Structures

Although two structures are shown on Figure 3.14-3 and on the topographic map near Shaft 1, none were found at the site. They apparently have been removed, presumably during construction of the campsites along the lake.

3.14.6 Safety

Open Adit 7 is the only safety hazard at this site. It is easily accessible on foot or from the lake. Although Adit 8 does have a small opening that could be enlarged, the adit and dump cannot be seen from the pack trail and few people are likely to find it.
Figure 3.14-1. Location map of the Woodrat Mine, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map).
Figure 3.14-2. Claim map of the Wood Rat Group, Kaniksu Mining Company (Idaho Geological Survey's mineral property files). Map reduced to about 60 percent of the original.
Figure 3.14-3. Sketch map of the Woodrat Mine workings (U.S. Bureau of Mines map in Idaho Geological Survey's mineral property files).
Figure 3.14-4. Sketch of Shaft 1 and Adit 1 at the Woodrat Mine.
Figure 3.14-5. Rusted winch near the site of caved Shaft 1 at the Woodrat Mine. The winch is just below Forest Service Road 237 (Roll K11, frame #14).

Figure 3.14-6. Looking west along the shore of Priest Lake. The waste dump for Shaft 1 can be seen where it extends slightly into the lake (Roll K11, frame #1).
Figure 3.14-7. Looking east at the face and toe of the waste dump for Shaft 1 at the Woodrat Mine. The waves in Priest Lake are eroding the edge of the dump (Roll K11, frame #15).

Figure 3.14-8. Looking east across the top of the waste dump for Shaft 1, showing several of the ridges on the surface. Oxidized material can be seen near the center and lower right corner of the picture (Roll K11, frame #16).
Figure 3.14-9. Looking south up the trough of caved Adit 1 at the Woodrat Mine. Several cross beams for the adit timbers are lying across the trough (Roll K10, frame #23).
Figure 3.14-10. Leveled area, now used as a campsite, just east of Adit 1 at the Woodrat Mine. The view is to the west (Roll K10, frame #24).
Figure 3.14-11. Sketch of Adits 2, 3, and 4, and Shaft 2 at the Woodrat Mine.
Figure 3.14-12. Looking south at the trough of caved Adit 2 at the Woodrat Mine. The vertical red streak on the photograph is from accidentally opening the camera (Roll K10, frame #25).

Figure 3.14-13. Looking north from the mouth of caved Adit 2, with Priest Lake in the background. The backpack is on a small mound that may be a remnant of the waste dump. The foot trail along the shoreline is just below the backpack. The red wash at the right of the picture is from accidentally opening the camera (Roll K10, frame #26).
Figure 3.14-14. Short trough of caved Adit 3 at the Woodrat Mine, looking south. The low mound in the foreground is probably waste rock from the adit (Roll K11, frame #2).
Figure 3.14-15. Looking down into the shallow pit of caved Shaft 2 at the Woodrat Mine. An old timber is lying across the pit (Roll K11, frame #3).

Figure 3.14-16. Looking north at the low rim of waste rock around Shaft 2 at the Woodrat Mine (Roll K11, frame #4).
Figure 3.14-17. Looking south up the deep trough of caved Adit 4 at the Woodrat Mine. The trough is about 30 feet long and 6-10 feet deep (Roll K11, frame #5).
Figure 3.14-18. Seep of water flowing from caved Adit 4 at the Woodrat Mine, looking north (Roll K11, frame #6).
Figure 3.14-19. Looking northwest along the foot trail that follows the lakeshore. The planks on the trail at the center of the photograph span a muddy area where water from caved Adit 4 of the Woodrat Mine seeps into the dump. The adit is off the left edge of the picture, and Priest Lake is a few feet off the right edge (Roll K11, frame #7).
Figure 3.14-20. Sketch of Adits 5, 6 and 7 at the Woodrat Mine.
Figure 3.14-21. Looking south at caved Adit 5 of the Woodrat Mine. The rock outcrop is above the caved adit (Roll K11, frame #8).
Figure 3.14-22. Broken tree on the east side of the waste dump for Adit 5 at the Woodrat Mine, looking east. The tree served as a discovery marker. Note the painted blaze and the rusted tobacco can, which held the claim notice, protruding from the right side of the tree (Roll K11, frame #9).
Figure 3.14-23. Leaning portal timbers of caved Adit 6 at the Woodrat Mine, looking south. A shallow trough extends about 25 feet into the slope behind the timbers (Roll K11, frame #10).
Figure 3.14-24. Looking south at Adit 7 of the Woodrat Mine. The portal area has collapsed, but an opening into the adit can be seen behind the fallen rock rubble and the portal timbers (Roll K11, frame #11).
Figure 3.14-25. View into open Adit 7 at the Woodrat Mine. The sloping adit walls and roof follow bedding and fracture planes. Rock rubble can be seen on the adit floor (Roll K11, frame #12).
Figure 3.14-26. Looking west along the surface of the combined waste dumps of Adits 6 and 7 at the Woodrat Mine. Priest Lake is at the upper right edge of the photograph (Roll K11, frame #13).
Figure 3.14-27. Sketch of Adit 8 at the Woodrat Mine.
Figure 3.14-28. Saplings and fallen trees on the surface of the waste dump at Adit 8 of the Woodrat Mine, looking south. The adit is beneath the fallen trees near the upper right of the picture (Roll K11, frame #18).

Figure 3.14-29. Small eye-shaped opening into Adit 8 at the Woodrat Mine (Roll K11, frame #20).
Figure 3.14-30. Looking west from the base of the waste dump of Adit 8 at the Woodrat Mine. Note the numerous large trees growing on the face of the dump (K11, frame #21).
3.15 UNNAMED PROSPECT (Site No. K8259803)

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

This is a minor prospect located along the east side of FS Road 237 south of Osprey Campground and north of Outlet Bay in the NW¼ of the NW¼, section 5, T. 59 N., R. 4 W., on the Priest Lake SW 7.5-minute quadrangle (Figure 3.15-1). The prospect is a few feet from the edge of the road and is probably on Forest Service land.

3.15.2 Geologic Features (Figure 2.2-1)

This prospect is in an area covered by Quaternary glacial, fluvial, and alluvial deposits. The probable bedrock is hornblende-bearing plutonic rocks (Aadland and Bennett, 1979).

3.15.3 Site History

Nothing is known of the history of this site.

3.15.4 Environmental Conditions

3.15.4.1 Site Features

The prospect was visited by John Kauffman on August 25, 1998. No video was taken at this site. Documenting photographs are Roll K11, frames 22-23.

This is a small prospect cut into an outcrop (Figure 3.15-2) along the east side of the road and about 10-15 feet above the road level. The small dump (about 6 feet long, 4 feet wide and 4 feet thick) forms a low mound in the trees above the road (Figure 3.15-3). The disturbed area covers less than 0.1 acre.

3.15.4.2 Sample Locations

3.15.4.2.1 Solid Samples

No waste dump samples were collected at this site.

3.15.4.2.2 Water Samples

No water samples were collected at this site.

3.15.5 Structures

There are no structures at this site.

3.15.6 Safety

There are no safety hazards at this site.
Figure 3.15-1. Location map of Unnamed Prospect, Site No. K8259803, Bonner County, Idaho (U.S. Geological Survey Priest Lake SW 7.5-minute topographic map).
Figure 3.15-2. Shallow prospect pit at Site No. K8259803 along Forest Service Road 237, looking east (Roll K11, frame #22).

Figure 3.15-3. Looking west at the small pile of excavated rock at Site No. K8259803. Forest Service Road 237 crosses the upper part of the picture (Roll K11, frame #23).
3.16 LAST CHANCE MINE (Site No. K8259804)

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

The Last Chance Mine is located beside FS Road 219 in the NW¼ of the NE¼, section 24, T. 35 N., R. 45 E. (Willamette Meridian), on the Gleason Mountain 7.5-minute quadrangle (Figure 3.16-1). This site is in the State of Washington, about 1.5 road miles west of the Idaho border on FS Road 219. FS Road 219 can be reached from State Highway 57 on either FS Road 310 or 312. The prospect is about 2 miles from the junction of FS Roads 219 and 312, and about 5 miles from the junction of FS Roads 219 and 310. The site is on Forest Service land.

3.16.2 Geologic Features (Figure 2.2-1)

The Last Chance is in the muscovite-biotite quartz monzonite of the Hungry Mountain pluton (Aadland and Bennett, 1979).

3.16.3 Site History

Nothing is known of the history of this site.

3.16.4 Environmental Conditions

3.16.4.1 Site Features

The Last Chance Mine was visited by John Kauffman on August 25, 1998. A video segment describing the property is on the Priest Lake District Videotape (Tape 2, index 00:26:44-00:29:40). The audio portion of this segment is defective. Documenting photographs are Roll K11, frames 24-26.

The mine consists of a nearly caved adit beside the road, a waste dump that has been nearly obliterated by construction of the road, and at least one exploration drill hole (Figure 3.16-2). A small opening, about 2 feet long by 1.5 feet high (Figure 3.16-3), is barely noticeable from the road (Figure 3.16-4). Very little of the waste dump remains, although some vein quartz fragments strewn down the road embankment probably represent material taken from the adit. Several bulldozer roads cross the slope below the Forest Service road. At the west end of the uppermost of these roads is a pad with a drill-hole collar. Although no others were found, additional drill-hole sites probably exist in the area. The disturbed area is minimal, excluding the bulldozer roads leading to the drill pad.

3.16.4.2 Sample Locations

3.16.4.2.1 Solid Samples

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

3.16.5 Structures
No structures were found at this site.

3.16.6 Safety
The adit opening is small. However, minor excavation of the sloughed material would probably allow someone to enter the adit. Although not a main route, FS Road 219 is a well-traveled road. The mine location is shown on the USFS map and the topographic map, so even though the opening is relatively obscure, it can easily be found.
Figure 3.16-1. Location map of the Last Chance Mine, Pend Oreille County, Washington (U.S. Geological Survey Gleason Mountain 7.5-minute topographic map).
Figure 3.16-2. Sketch of the Last Chance Mine, Site No. K8259804.
Figure 3.16-3. Small opening of the adit at the Last Chance Mine (Roll K11, frame #25).
Figure 3.16-4. Looking northwest across Forest Service Road 219 at the adit for the Last Chance Mine. The small opening shown in the previous figure is behind the large rock with the rock hammer (Roll K11, frame #24).
3.17 UNNAMED PROSPECT (Site No. K8269801)

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

This prospect is along the east shore of Upper Priest Lake near the head of the lake. The main workings are in the NE¼, section 19, T. 63 N., R. 4 W., on the Upper Priest Lake 7.5-minute quadrangle (Figure 3.17-1). Some minor prospects and an old cabin are in the south part of section 18. Access is by foot on FS Trail 302 about 4-5 miles south from the north trail head on FS Road 655, or by boat on Upper Priest Lake. All of the workings are beside the trail and appear to be on State land, although one adit (Adit 1) may be on Forest Service land.

3.17.2 Geologic Features (Figure 2.2-1)

The main adits at this prospect are in rocks of the Prichard Formation which have been intruded by Precambrian diabase and quartz diorite dikes. The minor prospects, as well as the area surrounding the main adits, are in Cretaceous granitic rocks of the Selkirk Crest. A major northwest-trending fault passes near the prospect (Aadland and Bennett, 1979).

3.17.3 Site History

Nothing is known of the history of this site.

3.17.4 Environmental Conditions

3.17.4.1 Site Features

This prospect was visited by John Kauffman on August 26, 1998. A video segment describing the workings is on the Priest Lake District Videotape (Tape 2, index 00:29:44-00:41:30). The audio portion of this video segment is defective. Documenting photographs are Roll K12, frames 1-12.

The workings at this site consist of three adits and several minor prospect pits (Figure 3.17-2). A shaft reported to be at this location was not found. In a later conversation, Mr. Dale Schrempp of the USFS Priest Lake District office indicated that the shaft has been backfilled.

Adit 1, which may be within a small block of National Forest land, is about 20 feet east of Trail 302 and just north of the Trapper Creek campground. The adit is open (Figure 3.17-3) and has several upright timbers at the portal, but the interior has no supporting timbers (Figure 3.17-4). Approximately six inches to one foot of rock rubble covers the adit floor. Most of the waste rock is on the west side of Trail 302 (Figure 3.17-5). The dump extends into the lake about 10 feet (Figure 3.17-6) and measures about 20 feet long, 20 feet wide, and 6 feet thick.

Adit 2 is about 100 feet north of Adit 1 and is caved. A shallow trough extends 10-15 feet east of the trail to the base of an outcrop. Trail 302 crosses the top of the dump (Figure 3.17-7), which
extends down to, and slightly into, the lake. The dump measures 50 feet long, 15-18 feet wide, and 6-8 feet thick.

Adit 3 is about ¼ mile north of Adit 2 and 15-20 feet above Trail 302. The adit has caved back about 20 feet from the portal, forming a trough 4-6 feet deep on the slope (Figure 3.17-8). A few old timbers protrude through the caved debris. At the top of the caved portion is a narrow, diagonal opening 3 feet long by 1.5 feet wide (Figure 3.17-9). The dump is 15 feet long, 10 feet wide, and extends 15-20 feet down the face; the toe reaches the trail (Figure 3.17-10). Just north of this adit are several minor prospect pits in the slope along the east side of the trail. Additional very small pits were found along Trail 302 about ½ mile north of Adit 3 and slightly north of an old cabin.

The total disturbed area at this site, including the cabin site, covers about 1 acre.

3.17.4.2 Sample Locations

3.17.4.2.1 Solid Samples

A waste dump sample (K8269802) was collected at Adit 1.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location</th>
<th>Analyzed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8269802</td>
<td>Site No. K8269801, Adit 1 dump</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.17.4.2.2 Water Samples

No water samples were collected at this site.

3.17.4.2.3 Analytical Results

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

Sample K8269802 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, no metals of interest are leaching from the sample.

3.17.5 Structures

A collapsed log cabin (Figures 3.17-11 and 3.17-12) and an accompanying outhouse (Figure 3.17-13) are along Trail 302 a few hundred feet north of the head of Upper Priest Lake. Some scrap metal and other debris are at the cabin site. About ½ mile north of the cabin and 150 feet west of the trail is an old hunting stand, consisting of a 15-20 foot tall ladder with a seat on top, now in very poor condition.
3.17.6 Safety

Open Adit 1 appears to be at least 30 feet long and is a potential safety hazard. Trail 302 is well used and passes within 20-30 feet of the open adit. A worn path from the trail indicates frequent visits to the adit. Trapper Creek campground, also frequently used by hikers and boaters, is about ¼ mile south of Adit 1.
Figure 3.17-1. Location map of Unnamed Prospect, Site No. K8269801, Bonner County, Idaho (U.S. Geological Survey Upper Priest Lake 7.5-minute topographic map).
Figure 3.17-2. Sketch of Unnamed Prospect, Site No. K8269801.
Figure 3.17-3. Looking northeast at open Adit 1 at Site No. K8269801. The well-worn foot trail leads to the adit from Forest Service Trail 302 (Roll K12, frame #1).
Figure 3.17-4. View inside Adit 1 at Site No. K8269801. Several support timbers are near the entrance to the adit (Roll K12, frame #4).
Figure 3.17-5. Looking southwest across the small waste dump of Adit 1 at Site No. K8269801. Forest Service Trail 302 is at the lower edge of the photograph, and Upper Priest Lake is at the top of the picture (Roll K12, frame #2).
Figure 3.17-6. View of the waste dump for Adit 1 at Site No. K8269801. The dump extends into Upper Priest Lake (Roll K12, frame #3).

Figure 3.17-7. Looking northwest along Forest Service Trail 302, with Upper Priest Lake to the left. The waste dump for Adit 2 at Site No. K8269801 is the dark rock in the lower left part of the picture (Roll K12, frame #6).
Figure 3.17-8. Looking east at the caved part of Adit 3 at Site No. K8269801 (Roll K12, frame #7).
Figure 3.17-9. Small opening (at the top of the caved debris) into Adit 3 at Site No. K8269801 (Roll K12, frame #8).
Figure 3.17-10. Looking west down the face of the waste dump for Adit 3 at Site No. K8269801. Forest Service Trail 302 crosses the picture below the dump. Upper Priest Lake is at the top of the photograph (Roll K12, frame #9).
Figure 3.17-11. View to the west of the front of the collapsed log cabin along Forest Service Trail 302 (Roll K12, frame #10).

Figure 3.17-12. Looking southeast at the rear of the log cabin along Forest Service Trail 302 (Roll K12, frame #12).
Figure 3.17-13. View to the east of the collapsed outhouse and pit on the north side of the log cabin (Roll K12, frame #11).
3.18 PINE CREEK PROSPECTS (Site No. SA-144)

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

A series of adits and prospect pits are on the south-facing slope of the ridge north of Pine Creek, extending from the S½ of section 22, through the NW¼ of section 27, to the NE½ of section 28, T. 57 N., R. 5 W., on the Quartz Mtn. 7.5-minute quadrangle (Figure 3.18-1). There is no direct access to any of the workings. Although all are on Forest Service property, the land along the road up Pine Creek, which provides the easiest access to the workings, is privately owned. Forest Service land does extend to State Highway 57 about ½ mile northeast of the easternmost workings. From any direction, the prospects can only be reached on foot.

3.18.2 Geologic Features (Figure 2.2-1)

These prospects are in rocks of the Prichard Formation (Aadland and Bennett, 1979).

3.18.3 Site History

These prospects are probably on claims that were first located around 1900. The workings have been idle for many years (Idaho Geological Survey mineral property files).

3.18.4 Environmental Conditions

3.18.4.1 Site Features

The Pine Creek prospects were visited by John Kauffman on August 31, 1998. A video segment describing the workings is on the Priest Lake District Videotape (Tape 2, index 00:41:35-01:03:32). The beginning of the video segment for the Camp Bird Prospect (section 3.19) also briefly describes the Pine Creek workings as viewed from the ridge south of Pine Creek. Documenting photographs are Roll K12, frames 13-26, and Roll K13, frames 1-3.

The workings consist of 8 adits and numerous prospect pits (Figure 3.18-2). Six of the eight adits and five of the pits were visited; the two other adits were videotaped from a distance.

Adit 1 is at the east end of the ridge at an elevation of about 3,040 feet and is shown by an adit symbol on the topographic map. The adit is caved and dry. The waste dump is 30 feet long and 10 feet wide on top, but fans out to 40 or 50 feet across as it extends down the slope for a distance of 40 feet or more. The surface of the dump is mostly bare (Figure 3.18-3). Above the adit near the top of the ridge are two shallow prospect pits (Pits 1 and 2 on Figure 3.18-2) about 100 feet apart. Both were dug on massive white quartz veins (Figure 3.18-4). The waste dumps for these pits are small and of little significance. The disturbed area at Adit 1 and the pits is less than 0.25 acre.
Adits 2 and 3 are approximately ¼ mile west of and at about the same elevation as Adit 1, although Adit 3 is slightly higher on the slope than Adit 2. The waste dumps of these adits are on a fairly open slope (Figure 3.18-5) and can be seen from Highway 57. Adit 2 is open but obscured somewhat by brush (Figure 3.18-6). The adit appears to be about 30 feet long (Figure 3.18-7), although the end could not be seen with certainty. The dump is small on top, about 10 feet long and 6 feet wide, and forms only a very thin veneer for about 25 feet down the slope (Figure 3.18-8). Adit 3, about 100 feet west of Adit 2, is also open and partly obscured by brush (Figure 3.18-9). Inside, the adit has no timbers and the rock appears to be relatively competent (Figure 3.18-10). The waste dump is larger than that at Adit 2, but again forms a thin veneer about 50 feet downward from the adit. On top, the dump is 8-10 feet long and 3 feet wide, but expands to 25-30 feet across near its base (Figure 3.18-11). The disturbed area for these adits covers less than 0.25 acre.

Adits 4 and 5 are around the nose of a ridge and about ½ mile southwest of Adit 3, on the east slope of an intermittent tributary to Pine Creek. Adit 4 is at an elevation of about 2,900 feet. Adit 5 is about 100 feet downhill and slightly northwest of Adit 4 (Figure 3.18-12). Both adits are caved, and both have sizeable, nearly bare waste dumps (Figures 3.18-13 and 3.18-14). The dump for Adit 4 is 35 feet long, 20 feet wide, and 40 feet down the face. The dump for Adit 5 is slightly larger, measuring 50 feet long, 40 feet wide, and about 40 feet down the face. The disturbed area for these two adits covers about 0.5 acre.

Adits 6 and 7, and prospect pits 3, 4, and 5 are on the ridge between the intermittent creek and a dry gully west of Adits 4 and 5. Adits 6 and 7 are on the slope west of the intermittent creek at elevations of 2,900 and 2,600-2,640 feet, respectively. Pit 3 is above Adit 6 on the slope west of the intermittent creek. Pit 4 is on the nose of the ridge between the intermittent creek and the dry gully and is below Adit 6. Pit 5 is around the nose of the ridge on the slope east of the dry drainage.

Adit 6 was not visited but was videotaped from Adit 4. A small waste dump, at about the same elevation as Adit 4, forms a thin veneer on the slope. The amount of material on the dump indicates a short tunnel, although the condition of the adit could not be determined. The disturbed area covers less than 0.1 acre.

Adit 7 is about 50 feet above the intermittent drainage. This part of the slope is covered with brush and timber. The adit is caved and forms a shallow trough on the slope along the trace of the adit (Figure 3.18-15). The waste dump (about 50 feet long, 25 feet wide, and 15 feet thick down the face) is carpeted with a layer of fallen leaves from the deciduous trees growing on its surface (Figure 3.18-16). The disturbed area covers about 0.25 acre.

Prospect pit 3 (Figure 3.18-17), at an elevation of about 2,950-3,000 feet, is a short excavation that extends about 5 feet into an outcrop. The excavated material forms a small waste dump on the steep slope. Pit 4 (Figure 3.18-18) is also an excavation into the face of an outcrop, with about a three-foot overhang. Again, the excavated material forms a small dump on the slope.
below. Pit 5, on the nose of the ridge at about the same elevation as pit 4, is a small, roughly circular excavation about 3 feet in diameter and 3 feet deep. The excavated material forms a low rim around the excavation. Additional prospect pits are shown on the Pine Creek map (Figure 3.18-2), but only the five described were found.

Adit 8, on the slope west of the dry gully, was not visited. What appeared to be a small waste dump near the location of the adit shown on Figure 3.18-2 was videotaped from pit 4. If this is Adit 8, the amount of waste rock indicates a short tunnel of little significance.

3.18.4.2 Sample Locations

3.18.4.2.1 Solid Samples

No waste dump samples were collected at this site. None of the waste dumps impinge on the drainages.

3.18.4.2.2 Water Samples

No water samples were collected at this site. None of the workings had water flowing from the adit.

3.18.5 Structures

No structures were found at any of the workings.

3.18.6 Safety

The open adits are a minor safety hazard. None of the adits are easily accessible to the general public, although local residents and hunters may visit these sites occasionally. The rock at the portals is reasonably competent, and the adits are relatively short.
Figure 3.18-1. Location map of the Pine Creek prospects, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map).
Figure 3.18-2. Sketch map of the Pine Creek prospects (modified from a U.S. Bureau of Mines map in the IGS mineral property files).
Figure 3.18-3. Looking east at the face of the waste dump of Adit 1 at the Pine Creek prospects (Roll K12, frame #13).

Figure 3.18-4. Looking east at an outcrop of white quartz near Prospect Pit 2 at the Pine Creek prospects, on the slope above Adit 1 (Roll K12, frame #14).
Figure 3.18-5. Looking west along the ridge north of Pine Creek. The light-colored waste dumps of Adits 2 and 3 can be seen on the open slope near the center of the picture. The waste dump for Adit 2 is the smaller and nearer of the two (Roll K12, frame #15).

Figure 3.18-6. Looking north at the brushy entrance to open Adit 2 at the Pine Creek prospects (Roll K12, frame #18).
Figure 3.18-7. View inside Adit 2 at the Pine Creek prospects (Roll K12, frame #16).

Figure 3.18-8. Looking south down the thin veneer of waste rock on the slope below Adit 2 at the Pine Creek prospects (Roll K12, frame #17).
Figure 3.18-9. Looking north at open Adit 3 at the Pine Creek prospects (Roll K12, frame #19).
Figure 3.18-10. View inside Adit 3 at the Pine Creek prospects (Roll K12, frame #20).
Figure 3.18-11. Looking south down the waste dump of Adit 3 at the Pine Creek prospects. Although slightly larger than the dump for Adit 2, the waste rock forms only a thin veneer on the slope below the adit (Roll K12, frame #21).

Figure 3.18-12. Looking southeast at the waste dumps for Adits 4 (just above the center of the picture) and 5 (just below and right of center). Both adits are caved (Roll K12, frame #23).
Figure 3.18-13. Looking west down the face of the waste dump for Adit 4 at the Pine Creek prospects (Roll K12, frame #25).

Figure 3.18-14. Looking west down the face of the waste dump for Adit 5 at the Pine Creek prospects (Roll K12, frame #26).
Figure 3.18-15. Looking northwest at the trough of caved Adit 7 at the Pine Creek prospects (Roll K13, frame #1).
Figure 3.18-16. Looking southeast across the leaf-covered surface of the waste dump for Adit 7 at the Pine Creek prospects (Roll K13, frame #2).

Figure 3.18-17. Looking northeast at prospect pit 3 (on the left) of the Pine Creek prospects. The backpack is lying on the small pile of rock excavated from the pit (Roll K12, frame #22).
Figure 3.18-18. Looking east at prospect pit 4 of the Pine Creek prospects (Roll K12, frame #24).
3.19 CAMP BIRD PROSPECT (Site No. SA-149)

The video segment of this property includes distant views of one or two of the workings at the Farmer Jones Prospect (Site No. SA-136). The Farmer Jones is on private land and permission to visit the property was denied by the owners.

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

The Camp Bird Prospect is on a northwest-southeast trending ridge south of Pine Creek in the SE¼ of section 28, the NE¼ of section 33, and the NW¼ of section 34, T. 57 N., R. 5 W., on the Quartz Mtn. and Priest River 7.5-minute quadrangles (Figure 3.19-1). The lower workings of the Camp Bird along the south side of Pine Creek (and the Farmer Jones workings north of the creek) are on private land. Access to these workings was denied by the owners. The upper workings of the Camp Bird appear to be on Forest Service land and are accessible on foot from the Stone Johnny Mountain Road (FS Road 527). An old bulldozer trail heads north along the crest of the ridge from FS Road 527 to the workings.

3.19.2 Geologic Features (Figure 2.2-1)

These prospects are in rocks of the Prichard Formation (Aadland and Bennett, 1979). Mihelich (1944) noted: “Quartz outcrop in member of the Belt series. Little mineralization or sulfides, mainly galena.”

3.19.3 Site History

In 1904, the Idaho Mine Inspector noted that the Camp Bird had a fine vein of carbonate, and galena silver-lead ore. Two years later, the Mine Inspector examined the property, noting that the vein could be traced for 2,000 feet and was as much as 10 feet wide in places. The ore contained silver-rich lead, iron, and copper sulfides. At that time, the property had 750 feet of development, primarily in two tunnels. In 1908, the Camp Bird was being developed. The operating company was incorporated, but nothing is known about it.

The Camp Bird Mining and Development Company was incorporated in 1911. By 1913, the property consisted of seven claims and had about 1,000 feet of development, including a tunnel, an open cut, and a shaft. In 1917, the company reported 1,200 feet of total development, but this number dropped to 640 feet in 1920. In 1922, the mine had two tunnels, with lengths of 700 and 200 feet. The company appears to have done little more than assessment work after the early 1920s. In 1925, five of the claims were patented, and by 1929, the mine had three tunnels (750 feet, 150 feet, and 700 feet long) and one 25-foot vertical shaft.

By 1939, all the tunnels had caved (Mihelich, 1944). The property was examined in 1944 by the U. S. Bureau of Mines as part of its war minerals program, but the examiner found little evidence of mineralization. The company forfeited its corporate charter in 1949.
The trenches found during the recent site visit appear to be more recent than the last reported activity at the property. Savage (1967) lists the Camp Bird in the appendix, but gives no information on recent activity at the property.

3.19.4 Environmental Conditions

3.19.4.1 Site Features

The Camp Bird Prospect was visited by John Kauffman on September 1, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 2, index 01:03:35-01:12:17). The beginning portion of the video segment includes views of the Pine Creek prospects (Site No. SA-144) north of Pine Creek, as well as at least one opening at the Farmer Jones Prospect (Site No. SA-146). Documenting photographs for the Camp Bird are Roll K13, frames 5-8. Frame 5 (Figure 3.19-2) is a distant view of one of the Farmer Jones waste dumps on the slope north of Pine Creek.

A map of the Camp Bird claim group (Figure 3.19-3) shows an adit and discovery shaft near the base of the ridge along Pine Creek in section 28; a short adit, a shaft, several pits, and a cut on the Camp Bird claim in section 33; and discovery cuts on the remaining claims. The lower adit and shaft were not visited, but according to Mr. and Mrs. John Lacayo (the property owners), these workings are caved. On the Camp Bird claim, only the open cut and several trenches were found. The shaft and adit were not found, even though the adit should have been a short distance down the slope to the west of the open cut. No access roads or trails could be found, and the slope is extremely overgrown with brush. The adit and waste dump could easily have been overlooked.

A series of trenches and a large open cut are located along the crest of the ridge north of Stone Johnny Mountain Road (Figure 3.19-4). All of the excavations expose massive white quartz veins. The first cuts along the bulldozer trail are about 200 feet north of the road. These are two shallow cuts on either side of the ridge. About 100 feet further to the north is a large open cut (Figures 3.19-5 and 3.19-6), which is about 100 feet by 100 feet and has a trench along the east and north sides. Just north of this open cut are three trenches cut perpendicular to the ridge. The largest (and northernmost) of these (Figure 3.19-7) is about 40 feet long, 8 feet across on top, and 8-10 feet deep. The disturbed area for these prospects covers about 1 acre.

3.19.4.2 Sample Locations

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

3.19.4.2.2 Water Samples
No water samples were collected at this site.
3.19.5 Structures
   No structures were found at this site.

3.19.6 Safety
   No safety hazards were found at this site.
Figure 3.19-1. Location map of the Camp Bird Prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. and Priest River 7.5-minute topographic maps).
Figure 3.19-2. Looking north at one of the workings (the small light-colored spot near the center of the picture) on the Farmer Jones Prospect. The Farmer Jones Prospect is on private land on the north side of Pine Creek. The photo was taken from the ridge south of Pine Creek near the Camp Bird Prospect (Roll K13, frame #5).
Figure 3.19-3. Camp Bird Prospect claim map (modified from a U.S. Bureau of Mines map in IGS's mineral property files).
Figure 3.19-4. Sketch of the trenches and open cut at the Camp Bird Prospect.
Figure 3.19-5. Western of two pictures of the large open cut on the Camp Bird Prospect, looking north. Some of the white quartz vein material exposed by the cut is at the lower left corner (Roll K13, frame #8).

Figure 3.19-6. Eastern of two pictures of the large open cut on the Camp Bird Prospect, showing the trench along the east edge of the cut. View is to the north (Roll K13, frame #7).
Figure 3.19-7. Looking east along the axis of the largest of several trenches on the Camp Bird Prospect north of the large open cut. A white quartz vein several feet wide is exposed across the trench (Roll K13, frame #6).
3.20 BINARCH CREEK PROSPECT (Site No. SA-123) AND NEVADA MINES PROSPECT (Site No. SA-124)

Alternate names for Binarch Creek Prospect—Idaho-Washington; Washington & Idaho; Washington-Idaho; Idaho. Alternate names for Nevada Mines Prospect—Monterey; Del Monte.

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

The Binarch Creek Prospect is at the base of the slope south of the mouth of Binarch Creek in the NE¼, section 13, T. 59 N., R. 5 W., on the Outlet Bay 7.5-minute quadrangle (Figure 3.20-1). The prospect is about ¼ mile west of State Highway 57 and 100 feet south of FS Road 1611 (a gated logging road about ¼ mile south of Binarch Creek). The Nevada Mines Prospect is on a group of claims south of the Binarch Creek Prospect claims in the SE¼ of the NE¼, section 24, T. 59 N., R. 5 W., on the Outlet Bay 7.5-minute quadrangle. Figure 3.20-2 is a claim map showing the location of the two prospects, which are on Forest Service land.

3.20.2 Geologic Features (Figure 2.2-1)

The Binarch Creek Prospect is underlain by rocks of the Prichard Formation. Savage (1967, p. 116) notes: “200-ft wide gossan, 10-15-ft wide N-S vein. Massive pyrrhotite, some chalcopyrite and quartz in diorite. Au, Ag, and Zn reported.”

The Nevada Mines Prospect appears to be in or near a small body of Cretaceous biotite granodiorite that intrudes the Prichard Formation (Aadland and Bennett, 1979). Savage (1967, p. 126) notes: “Lead, silver, zinc, and gold values reported.”

3.20.3 Site History

The Binarch Creek Prospect was located in 1906 and plans were made to operate the property in conjunction with the Woodrat Mine. Little, if anything, seems to have come from these plans.

The Binarch Creek Mining Company (Arthur L. Hooper, president) was organized in 1928. As with all the properties with which Hooper was involved, the Binarch Creek Prospect was optioned in 1930 for a reported $450,000; however, the sale was never completed. Most of the work done on the property appears to have been assessment work, often road building and prospecting. By 1931, the mine was reported to have three tunnels and two shafts, although the extent of the workings was apparently small. The 1932 Idaho Mine Inspector's Report (p. 95) noted: “According to press reports this company is one of those interested in the 'Mystery Metal Belt' of the Priest River district.” In 1938, the company held twelve claims. Development on the property included two 25-foot shafts, one 20-foot tunnel, and one 50-foot open cut. Two additional claims were added in 1940 or 1941. By 1947, the property had two tunnels (90 feet and 20 feet) and a 20-foot shaft.
During the 1950s, Hooper made repeated claims that a major investor was expected to take over the claims soon. However, like the earlier options, no sale materialized. Hooper continued to promote the property while doing minimal assessment work. In 1956, development on the property included: "a shaft 30 feet deep on western vein with about 200 feet of stripping and a short tunnel where vein goes into the mountain at south end of property. Short tunnel and shaft on eastern vein" (1956 Minarch Mining Company's annual report to the Idaho Inspector of Mines). The following year, the workings on the eastern vein were described as a 20-foot shaft and a 30-foot tunnel. Logging on the property during 1957 or 1958 apparently ruined many of the access roads on the property. Hooper blamed the logging on the U.S. Forest Service and on changes in the mining law. In 1960, both tunnels on the property were caved, and in 1963, the property had one 80-foot tunnel and three shafts (one of which was 60 feet deep). The company continued to do assessment work on the property until at least 1979.

Nevada Mines (J. V. Campbell, president, and Arthur Hooper, secretary) was organized in 1928. By 1931, the company had two tunnels (138 feet and 10 feet long) on twenty-nine claims south of the Minarch Creek property. This property was another of the ones that Hooper claimed was optioned to eastern investors during the 1930s. By 1939, the tunnels were 130 and 100 feet long, and by 1946, the property's three tunnels were 130 feet, 100 feet, and "about 30" feet long. In 1955, Hooper noted under the "Mine Plant and Equipment" section of the Nevada Mines annual report to the Idaho Inspector of Mines: "Had two compartment bunkhouse and cook shack, but it was burned down a couple of years ago by hunters, who infest the forests, and appropriate every thing that suits them." Hooper's Milwaukee Mines, Inc., purchased the claims in 1956, and Nevada Mines forfeited its corporate charter the following year.

Milwaukee Mines established a camp on the Del Monte Group, which was adjacent to the Nevada property, in 1929. Del Monte Claims, Inc. was organized in 1934. By 1939, the property had two short tunnels and an open cut. In 1940 or 1941, the claims were absorbed by Milwaukee Mines, which apparently changed the name to the Monterey Group. Del Monte Claims was dissolved the following year.

3.20.4 Environmental Conditions

3.20.4.1 Site Features

The Binarch Creek Prospect was visited by John Kauffman on September 1, 1998. A video segment describing the site is on the Priest Lake District Videotape (Tape 2, index 01:12:20-01:14:18). Documenting photograph is Roll K13, frame 4. An attempt was made on September 2, 1998, to locate the Nevada Mines Prospect. However, the claim map (Figure 3.20-2) was not available at the time of the visit and the workings shown were not found.

Three tunnels and one shaft are shown on the claim map (Figure 3.20-2), and a second shaft is reported in some of the Annual Reports to the Idaho Mine Inspector. Savage (1967) notes three short drifts and two short shafts at the property, probably based on information in the Mine
Inspector's annual reports. The claim map was not available at the time of the site visit, so the actual location of the short workings was unknown. Only one very short, caved adit or prospect cut about 10 feet long (Figure 3.20-3) was found cut into the rock at the base of the slope about 150 feet south of FS Road 1611 and ½-½ mile from Highway 57. The dump is about 10 feet long, 10 feet wide, and 4 feet thick. This site does not correspond to any of the workings on the claim map. The disturbed area is minimal.

The claim map should make it easier to locate the workings for both of these properties, if they have not been destroyed by logging or road construction in the area.

3.20.4.2 Sample Locations

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

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

3.20.5 Structures
No structures were found at this site.

3.20.6 Safety

No safety hazards were found at the Binarch Creek site, although the short shafts noted in the Annual Reports to the Mine Inspector and in Savage (1967) were not found. Various depths are listed for the shafts, ranging from 20 feet to 60 feet.
Figure 3.20-1. Location map of the Binarch Creek Prospect, Bonner County, Idaho (U.S. Geological Survey Outlet Bay 7.5-minute topographic map).
Figure 3.20-2. Claim map of the Binarch Creek Prospect (Idaho claim group) and the Nevada Mines Prospect (Nevada claim group) (Idaho Geological Survey mineral property files).
Figure 3.20-3. Looking west at the trough of either a prospect cut or short adit at the Binarch Creek Prospect. The large tree has fallen across the small waste dump (foreground) and up the axis of the trough (Roll K13, frame #4).
3.21 LUCKY LEAD PROSPECT (Site No. SA-134)

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

The Lucky Lead Prospect is located along a north-northeast trending ridge north of the Quartz Creek Road in the SW¼, section 26, T. 58 N., R. 5 W., on the Quartz Mtn. 7.5-minute quadrangle (Figure 3.21-1). Access is on FS Road 416.2 (Quartz Creek Road) about 2 miles from State Highway 57. The prospect is about ½ mile north of FS Road 416.2 and just north of a fairly recent timber cut. FS Road 1301A follows the side of the ridge east of the prospect. An old, extremely brushy road splits from FS Road 1301A about ¼ mile north of the Quartz Creek Road and heads west to the prospect. However, this road has been destroyed where it crosses a corner of the timber cut. The easiest way to find the prospect is to follow the ridge top on foot across the timber cut from Quartz Creek Road. The southernmost workings are in the saddle of the ridge just north of the section line (section 26-35 boundary). The prospect is on National Forest land, which begins at this section line.

3.21.2 Geologic Features (Figure 2.2-1)

The prospect is in a 20-foot wide shear zone in granodiorite of the Kaniksu batholith. The zone, which strikes N. 20° E and dips steeply to the west, is oxidized and mineralized with goethite and minor pyromorphite. Rare galena is also present (Cook, 1980).

3.21.3 Site History

The original claims were staked in 1957. In 1980, the eleven claims were held by Mr. and Mrs. Don C. Wigen, Mr. and Mrs. Carl Wigen, and Mr. and Mrs. Eldon Myrbang. In 1980, the owners were trying to lease part of section 35, the adjoining section to the south, from Burlington Northern, Inc, and were also trying to sell the property to U. S. Borax for $3 million. The sale was not completed. The property had two trenches and a 10-foot shaft in 1980 (Cook, 1980).

Cook's Trench 1 probably corresponds to the northern trench and Shaft 2 found during this project. Trench 2, which Cook reports as 3 feet deep, appears to correspond to the shallow cut just north of the trench that contains Shaft 2, and Cook's 10-foot shaft is probably the site of Shaft 1 of this report.

3.21.4 Environmental Conditions

3.21.4.1 Site Features

The Lucky Lead Prospect was visited by John Kauffman on September 1, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 2, index 01:14:22-01:21:40). Documenting photographs are Roll K13, frames 14-16.
The workings found at this prospect consist of several trenches, two shafts, and a small prospect pit. There could be additional trenches at the site. A claim map from 1980 (Figure 3.21-2) shows two trenches at the site.

Shaft 1 is located at the south end of a 5-foot deep trench and forms a pit 4 feet deep below the bottom of the trench (Figure 3.21-3). The trench extends northward about 30 feet from the caved shaft (Figure 3.21-4). Collapsed boards and chicken wire are sloughed into the pit (Figure 3.21-5). The trench with the shaft is cut by a northeast-trending trench about 30 feet long and 8 feet deep. These two prospects have separate waste dumps. The dump for the shaft and its trench (Figure 3.21-6) is about 15 feet long, 15 feet wide, and about 20 feet down the face. The dump for the other trench (Figure 3.21-7) is 18 feet long, 12 feet wide, and also about 20 feet down the face. The upper end of the northeast-trending trench grades into a bulldozer trail that goes to a cabin site and to Shaft 2.

Shaft 2 is several hundred yards north of Shaft 1 and about 200 feet north-northwest of an old collapsed cabin along a brushy bulldozer trail (Figure 3.21-8). This shaft is also in the bottom of a trench. The opening was covered at one time by corrugated metal sheets supported by timbers, but some of the timbers have collapsed (Figure 3.21-9). It could not be determined if the shaft was open or caved beneath the metal sheets. The trench containing the shaft trends east-west and is about 80 feet long, 15 feet wide across the top, and 10 feet deep (Figure 3.21-10). The waste dump, at the west end of the trench, is roughly circular and about 15 feet in diameter. It extends 25 feet down the face (Figure 3.21-11).

About 150 feet north of Shaft 2 is a shallow trench on the northward continuation of the old bulldozer road. This trench is 15 feet long, 6 feet wide, and 4 feet deep. The material pushed out of the trench forms a low mound on the south end. In addition, a small prospect pit was found in the timber on the east side of the crest of the ridge. This pit is 8 feet long, 6 feet wide, and 3-5 feet deep.

The total disturbed area is about 1 acre.

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

A collapsed cabin and an outhouse were found on the ridge top between Shafts 1 and 2. The cabin appears to have been about 16 feet long by 12 feet wide. The bulldozer road from Shaft 1

232
passes the cabin. At the cabin site, the road splits, with one branch going to Shaft 2 and the other going northward around the east side of the ridge. About 75 feet south of the cabin is an outhouse. Several old 5-gallon containers, a metal chair, and other scrap are present at the site.

3.21.6 Safety

If Shaft 2 is open below the metal sheets, it could be a significant hazard, depending on its depth.
Figure 3.21-1. Location map of the Lucky Lead Prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map).
Figure 3.21-2. 1980 claim map of the Lucky Lead Prospect (IGS mineral property files).
Figure 3.21-3. Sketch of Shaft 1 and associated trenches at the Lucky Lead Prospect.
Figure 3.21-4. Looking north along the axis of the trench containing caved Shaft 1 at the Lucky Lead Prospect. The shaft is at the south end of the trench. Several planks are lying in the trench around the shaft (Roll K13, frame #10).
Figure 3.21-5.  Collapsed boards and chicken wire (the wire mesh is not visible in the photograph) in the pit of caved Shaft 1 at the Lucky Lead Prospect (Roll K13, frame #9).

Figure 3.21-6.  Looking northwest at the waste dump of Shaft 1 at the Lucky Lead Prospect (Roll K13, frame #13).
Figure 3.21-7. Looking southeast at the dump for the second trench at the Lucky Lead Prospect. This picture was taken from the waste dump for Shaft 1 (Roll K13, frame #12).
Figure 3.21-8. Sketch of Shaft 2 and associated features at the Lucky Lead Prospect.
Figure 3.21-9. Timbers and corrugated metal sheets falling into Shaft 2 at the Lucky Lead Prospect. The shaft is near the east end of a deep trench (Roll K13, frame #14).

Figure 3.21-10. Looking east up the axis of the trench containing Shaft 2. The shaft is at the center of the picture. Some rusted sheet metal is lying on the right slope of the trench near the bottom of the photograph (Roll K13, frame #15).
Figure 3.21-11. Looking west down the face of the waste dump of Shaft 2 and the associated trench at the Lucky Lead Prospect (Roll K13, frame #16).
3.22 SILVER MOUNTAIN PROSPECT (Site No. SA-137)

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

Two prospect trenches were found on the north end of Jasper Mountain. One is in the N½ of the NW¼, section 32, and the other in the N½ of the SW¼, section 29, T. 58 N., R. 4 W., on the Quartz Mtn. 7.5-minute quadrangle (Figure 3.22-1). Access is via the Quartz Creek Road (FS Road 416.2) to FS Road 239, then on FS Road 239 to FS Road 1300, then southeast on FS Road 1300 to FS Road 1330, which splits from FS Road 1300 and ends at the south end of Jasper Mountain. Both of the prospects are in thick timber west of the access roads, and both are on Forest Service land.

3.22.2 Geologic Features (Figure 2.2-1)

This area is underlain by rocks of the Prichard Formation (Aadland and Bennett, 1979), locally cut by massive quartz veins.

3.22.3 Site History

The Silver Mountain Mining Company was organized in 1909. By 1913, the company had five claims, and the property had about 400 feet of development. Four years later, the property had 926 feet of development and six claims. In 1921, the mine had 408-foot and 538-foot tunnels. The tunnels were 408 feet and 624 feet long in 1928, and the company noted that the main tunnel had required retimbering the previous year. Development in 1930 totaled 1,232 feet, and work for the year included repairing and retimbering a large cave-in near the mouth of the tunnel. In 1934, the property had about 1,500 feet of development and “lots of other surface work,” according to the company's report to the Idaho Inspector of Mines. Three additional claims were added in 1934 or 1935. Only assessment work was done on the property after 1934. The company forfeited its corporate charter in 1948.

Savage (1967) describes the development as a 1,025-foot tunnel. The source of this information is not known.

3.22.4 Environmental Conditions

3.22.4.1 Site Features

This prospect was visited by John Kauffman on September 2, 1998. No video was taken at this site. Documenting photograph is Roll K13, frame 17.

No evidence of the two tunnels described above (section 3.22.3) was found in the area, although several outcrops and numerous large blocks of quartz were noted. The two trenches that were found are associated with these quartz veins, although both trenches are relatively insignificant.
Trench 1 is located on the gentle slope at the north end of Jasper Mountain. This trench is 10 feet long, 4 feet wide, and 4 feet deep. Trench 2, about ½ mile north of Trench 1, is on a steep north-facing slope above the access road. This trench is 15-20 feet long, 4 feet wide, and 3 feet deep (Figure 3.22-2). The disturbed area is less than 0.1 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 found at this site.

3.22.6 Safety
No safety hazards were found at this site.
Figure 3.22-1. Location map of the Silver Mountain Prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map).
Figure 3.22-2. Shallow trench 2 at the Silver Mountain Prospect, looking southeast (Roll K13, frame #17).
3.23 QUARTZ CREEK QUARTZ DEPOSIT (Site No. SA-140)
Alternate names—Shannon Group; O'Brien Property.

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

The Quartz Creek Quartz Deposit is located on the east side of Quartz Creek near the center of the NW¼, section 1, T. 57 N., R. 5 W., on the Quartz Mtn. 7.5-minute quadrangle (Figure 3.23-1). Access is via FS Road 416.2 (Quartz Creek Road) to FS Road 416.3, then south on 416.3 about 2 miles along Quartz Creek. From the road, the deposit must be reached on foot via an obscure old road that is nearly impossible to follow in places. The prospect, which is on Forest Service land, is accurately shown on the topographic map at the point of a narrow north-south trending spur ridge along the east side of the valley floor.

3.23.2 Geologic Features (Figure 2.2-1)

The country rock near this prospect is schist and argillite of the Prichard Formation (Aadland and Bennett, 1979). The prospect is on a massive, white quartz vein (Figure 3.23-2) that is at least 50 feet wide and exposed for over 200 feet in length. A U.S. Bureau of Mines report in the IGS mineral property files indicates the vein is 80 feet wide and can be traced for about 700 feet. The vein is relatively pure quartz with minor limonite staining along fractures. No sulfides were noted. The vein was sampled as a potential silica resource by J. R. Simplot and the U.S. Bureau of Mines (Savage, 1967; IGS mineral property files).

3.23.3 Site History

According to the U.S. Bureau of Mines, “The property was probably discovered many years ago, but was located under the current name [Shannon Group] in 1958” (IGS mineral property files). It was sampled by J. R. Simplot geologists in 1959 (Savage, 1967).

3.23.4 Environmental Conditions

3.23.4.1 Site Features

The Quartz Creek Quartz Deposit was visited by John Kauffman on September 2, 1998. A video segment describing the prospect is on the Priest Lake District Videotape (Tape 2, index 01:22:03-01:32:14). Documenting photographs are Roll K13, frames 18-22.

The prospect consists of a bulldozer cut around the nose of the ridge, and several prospect pits into the quartz vein along the bulldozer cut and on the slope above the cut (Figures 3.23-3, 3.23-4 and 3.23-5). The disturbed area is less than 0.5 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

An old, collapsed cabin along FS Road 416.3 (Figure 3.23-6) may be related to prospecting activity at the site, although the cabin is ½ mile west of the prospect along the west side of Quartz Creek.

3.23.6 Safety
   There are no safety hazards at this site.
Figure 3.23-1. Location map of the Quartz Creek Quartz Deposit prospect, Bonner County, Idaho (U.S. Geological Survey Quartz Mtn. 7.5-minute topographic map).
Figure 3.23-2. Massive white quartz vein exposed on the ridge above the prospect cuts at the Quartz Creek Quartz Deposit, looking north (Roll K13, frame #21).
Figure 3.23-3. Sketch of the Quartz Creek Quartz Deposit.
Figure 3.23-4. Looking northwest along the bulldozer cut at the Quartz Creek Quartz Deposit, with the massive quartz vein exposed at the upper right (Roll K13, frame #18).

Figure 3.23-5. Pit cut into the slope at the southeast end of the bulldozer cut. The massive white quartz vein exposed in the cut can be seen at the upper right (Roll K13, frame #19).
Figure 3.23-6. Old collapsed cabin along Quartz Creek Road (bottom of photograph). The cabin is about ½ mile west of the Quartz Creek Quartz Deposit (Roll K13, frame #22).
BIBLIOGRAPHY


Fryklund, V.C., Jr., 1951, Fire Chief Mine, Bonner County, Idaho: Memorandum to A.E. Weissenborn, Executive Officer, DMA, Field Team, Region II, 3 p. (copy in Idaho Geological Survey's mineral property files).


254


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

257
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>Commodity (s)</th>
<th>Production (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<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>Commodity(s)</th>
<th>Production (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<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)
# 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

261
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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of Metal Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators of Sedimentation</td>
</tr>
<tr>
<td>Distance to stream (ft)</td>
</tr>
<tr>
<td>Sample Latitude</td>
</tr>
<tr>
<td>Sample Longitude</td>
</tr>
<tr>
<td>Field pH</td>
</tr>
<tr>
<td>Field SC</td>
</tr>
<tr>
<td>Flow (gpm)</td>
</tr>
<tr>
<td>Method of measurement</td>
</tr>
<tr>
<td>Photo Number</td>
</tr>
</tbody>
</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

262
TABLE 4 - WATER SAMPLES FROM STREAM(S)

<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>Indicators of Metal Release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators of Sedimentation</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
| Sample Number |  |  |  |
| Date of sample |  |  |  |
| Sampler (Initials) |  |  |  |
| Sample Type |  |  |  |
| Waste Type |  |  |  |
| Feature Number |  |  |  |
| Sample Latitude |  |  |  |
| Sample Longitude |  |  |  |
| Photo Number |  |  |  |

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>
<thead>
<tr>
<th>TABLE 6 - SOIL SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number</td>
</tr>
<tr>
<td>Date of sample</td>
</tr>
<tr>
<td>Sampler (Initials)</td>
</tr>
<tr>
<td>Sample Type</td>
</tr>
<tr>
<td>Sample Latitude</td>
</tr>
<tr>
<td>Sample Longitude</td>
</tr>
<tr>
<td>Likely Source of</td>
</tr>
<tr>
<td>Contamination</td>
</tr>
<tr>
<td>Feature Number</td>
</tr>
<tr>
<td>Indicators of</td>
</tr>
<tr>
<td>Contamination</td>
</tr>
<tr>
<td>Photo Number</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 (Opening 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

265
9. HAZARDOUS WASTES/MATERIALS

<table>
<thead>
<tr>
<th>Waste Number</th>
<th>Type of Containment</th>
<th>Condition of Containment</th>
<th>Contents</th>
<th>Estimated Quantity of Waste</th>
</tr>
</thead>
</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>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo Number</td>
<td></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)
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 number 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
<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWLOC</td>
<td>WA 1</td>
</tr>
<tr>
<td>ORANGENUM</td>
<td>451</td>
</tr>
<tr>
<td>MAPLOC</td>
<td>1</td>
</tr>
<tr>
<td>DEPOSIT</td>
<td>Eagle Creek Mine</td>
</tr>
<tr>
<td>MRDSREC</td>
<td></td>
</tr>
<tr>
<td>MILSREF</td>
<td>0160790528</td>
</tr>
<tr>
<td>PERIODPROD</td>
<td></td>
</tr>
<tr>
<td>ORE</td>
<td>Au</td>
</tr>
<tr>
<td>COMMOD</td>
<td></td>
</tr>
<tr>
<td>LATITUDE</td>
<td>474325</td>
</tr>
<tr>
<td>LONGITUDE</td>
<td>1154916</td>
</tr>
<tr>
<td>HARDFILE</td>
<td>N</td>
</tr>
<tr>
<td>MIA</td>
<td>NAME</td>
</tr>
<tr>
<td>SEC</td>
<td>33</td>
</tr>
<tr>
<td>SUBSEC</td>
<td>NESE</td>
</tr>
<tr>
<td>TWN</td>
<td>051 N</td>
</tr>
<tr>
<td>RNG</td>
<td>005 E</td>
</tr>
<tr>
<td>DDMSS</td>
<td>474325</td>
</tr>
<tr>
<td>DDDMSS</td>
<td>1154904</td>
</tr>
<tr>
<td>OPTYP</td>
<td>SURFAC</td>
</tr>
<tr>
<td>STATUS</td>
<td>PAST PRO</td>
</tr>
<tr>
<td>COMM01</td>
<td>GOLD</td>
</tr>
<tr>
<td>COMM02</td>
<td></td>
</tr>
<tr>
<td>COMM03</td>
<td></td>
</tr>
<tr>
<td>COMM04</td>
<td></td>
</tr>
<tr>
<td>COMM05</td>
<td></td>
</tr>
<tr>
<td>MAPNAME</td>
<td>BURKE</td>
</tr>
<tr>
<td>QUAD</td>
<td>WALLACE</td>
</tr>
<tr>
<td>POP</td>
<td>1KM</td>
</tr>
<tr>
<td>TOE</td>
<td>M</td>
</tr>
<tr>
<td>YFC</td>
<td></td>
</tr>
<tr>
<td>MPF</td>
<td></td>
</tr>
<tr>
<td>SITENAME</td>
<td></td>
</tr>
<tr>
<td>DISTRICT</td>
<td></td>
</tr>
<tr>
<td>COUNTY</td>
<td></td>
</tr>
<tr>
<td>SECQUAD</td>
<td></td>
</tr>
<tr>
<td>SECQUADSCCL</td>
<td></td>
</tr>
<tr>
<td>UTMNORTH</td>
<td></td>
</tr>
<tr>
<td>UTMEAST</td>
<td></td>
</tr>
<tr>
<td>UTMZONE</td>
<td></td>
</tr>
<tr>
<td>COMMODIT</td>
<td></td>
</tr>
<tr>
<td>LAT</td>
<td></td>
</tr>
<tr>
<td>LON</td>
<td></td>
</tr>
<tr>
<td>TOWN</td>
<td></td>
</tr>
<tr>
<td>SECTION</td>
<td></td>
</tr>
<tr>
<td>RANGE</td>
<td></td>
</tr>
</tbody>
</table>
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 PST8PDT
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 $3\sigma$ for a 99% confidence level, where $\sigma$ 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 $10\sigma$ 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.


2000 Reports

Appendix F
Properties That Could Not Be Located
PROPERTIES THAT COULD NOT BE LOCATED

Alice Group (Site No. SA-24)

This prospect was reported by Moore (1910, Eleventh Annual Report of the Mining Industry of Idaho for 1909) as being 5 miles north of Upper Priest Lake on Hughes Fork of Gold Creek. Checked along the road up Hughes Fork to the Hughes Meadow Fire Station, but saw no evidence of prospects. This may have been only a claim group with discovery pits.

L & M (Site No. SA-26)

Savage (1967) reports this site as having small beryl crystals in pegmatite dikes that are located in the NW¼ of section 16 and the E½ of section 17. FS Road 1013 transects these sections but no cuts or prospects were found along this portion of the road.

Trustee Group (SA-103)

The best location information for this prospect indicates that it is in the vicinity of Distillery Bay on the west side of Priest Lake. Checked along Lakeshore Trail at Distillery Bay but found no workings or prospects. Several shallow pits were found, all in glacial deposits. The pits were about 6 feet long, 4 feet wide, and 3 feet deep, but had no rim of excavated material as would be expected for prospects.

Golden Eagle Claims (SA-107)

This prospect had only very non-specific information as to its location. Source reference is USBM WFOC-MPF 99.999. From the USBM location information, the site should be off the southwest end of Watson Mountain in the vicinity of FS Road 1347 or 1347A. Checked along both 1347 and 1347A for several miles but found no evidence of prospects. Slopes are either densely timbered or recovering clear cuts.

Unnamed Prospect (Site No. SA-135)

This prospect is only mentioned in the 1979 Panhandle National Forest Quartz Mountain Planning Unit report, and no specific location is given. Checked Quartz Mountain road to where it was blocked by fallen trees, then walked ½-¾ mile further up the road (trail) to where it drops onto the north flank of the mountain. Found no workings or other evidence of prospecting activity.