

Preliminary Assessment
Site Inspection Report
for the
Independence Mine and Mill Site,
Old Triumph (Shaft),
Triumph Tunnel and Millsite, and
North Star Mine and Millsite

Bruce A. Schuld

Idaho Department of Environmental Quality

August 4, 2009





STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, ID 83706 • (208) 373-0502

C. L. "Butch" Otter, Governor
Toni Hardesty, Director

October 28, 2008

Richard Vorpahl
Denovo Independence, LLC
1300 Randolph Street
Chicago, Illinois 60607

Re: Voluntary Cleanup Program Application and Remediation Agreement for the Former Triumph Mine Site at Triumph, Idaho.

Dear Mr. Vorpahl:

On October 8, 2008 Denovo Independence LLC ("Denovo") submitted to the Idaho Department of Environmental Quality ("Department") an application to participate in Idaho's Voluntary Cleanup Program ("VCP"), Idaho Code §§ 39-7201, with respect to the above-referenced property.

Upon receiving a VCP application, Department rules provide that the Department must review the application contents for completeness and applicant eligibility. *See Section 020 of the Idaho Land Remediation Rules.* Department staff conducted the Section 020 review and this letter constitutes written notice that the Department determined the application is complete and Denovo is eligible to participate in the VCP.

Next, Denovo and the Department must negotiate and enter into a Voluntary Remediation Agreement ("Agreement"). The VRA outlines the roles and responsibilities of the signing parties (you and IDEQ). Please find enclosed a copy of the Agreement for your review. If the terms in the Agreement are acceptable to you please sign and date as provided in section XXVII of the Agreement. Please note that section XIX paragraph 40 part (a) in the Agreement calls for submittal of \$2,500 to the Department by the applicant for oversight costs associated with this project. Please remit this payment with the signed Agreement. As specified in IDAPA 58.01.18.021.d the Department estimates oversight costs will be approximately \$10,000.

After an Agreement is reached, the first milestone called for in the agreement is the development of a Voluntary Remediation Workplan ("Workplan") that is acceptable to yourself and the Department. The Workplan must go through a public comment period of at least thirty (30) days. It may also be advantageous, given the nature and location of the project, to schedule a public hearing to take public testimony on the Workplan.

The Department congratulates you for choosing to cleanup this property through the VCP process and we look forward to working with you and your contractor.

If you have any other questions regarding the VCP process and requirements don't hesitate to contact me at (208) 373-0246 or by email at bruce.wicherski@deq.idaho.gov.

Thanks.

Bruce Wicherski

Bruce Wicherski, P.G.
Voluntary Cleanup Program Manager

cc: Bruce Schuld, DEQ - Waste Management and Remediation
Aaron Scheff, DEQ - Waste Management and Remediation
Susan Hamlin, Deputy Attorney General
Tom Bergin, Blaine County Planning & Zoning Department

File(s)
COF

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

In the matter of:) VOLUNTARY REMEDIATION AGREEMENT
)
 DeNovo Independence, LLC) Idaho Code § 39-7205
)

I. INTRODUCTION

1. This Voluntary Remediation Agreement (Agreement) is entered into voluntarily by the Idaho Department of Environmental Quality (Department), and DeNovo Independence LLC (DeNovo), for the purpose of remediating contamination at and from Triumph Property (Site). See Exhibit A attached for legal description and map of the Site. The Department and DeNovo are collectively referred to as "the Parties." DeNovo is voluntarily conducting this cleanup.

II. AUTHORITY

2. The Parties enter this Agreement pursuant to the Idaho Land Remediation Act, Idaho Code §§ 39-7201 through 39-7210, and the Idaho Land Remediation Rules, IDAPA 58.01.18 *et seq.*
3. The Department has determined that the application submitted by DeNovo is complete and that DeNovo is eligible to participate in the voluntary remediation program established under Idaho Code § 39-7201 *et seq.*

III. PARTIES BOUND

4. This Agreement shall apply to and be binding upon DeNovo, its successors and assigns, and upon the Department, its successors and assigns. The signatories to this Agreement certify that they are fully authorized to execute and legally bind the Parties they represent.
5. DeNovo shall provide a copy of this Agreement to any subsequent owners or successors of the Site or any portion of the Site before DeNovo transfers ownership of the Site or any portion of the Site. DeNovo shall provide a copy of this Agreement to all contractors, laboratories and consultants DeNovo retains to conduct work performed under this Agreement, within fourteen (14) days after the effective date of this Agreement or within fourteen (14) days of the date of retaining their services.

IV. DEFINITIONS

6. "Site" shall be used in the manner as defined by Idaho Code § 39-7203(8) and shall refer to the property identified in Paragraph 1 of this Agreement.

The Site may include portions or subparts of the real property for the Site that have been designated and approved by the Department in the Workplan as requiring remediation of contamination.

7. All other terms contained in this Agreement shall be used in the same manner as defined by Idaho Code § 39-7203 and IDAPA 58.01.18.010.

V. PURPOSE

8. This Agreement sets forth the terms and conditions of evaluation and implementation of a Voluntary Remediation Work Plan (Work Plan) to be proposed by DeNovo for the remediation of contaminants originating at the Site as a result of historic mining operations.
9. The Department understands that DeNovo is taking efforts to qualify as a Bona Fide Prospective Purchaser ("BFPP") as defined in 42 U.S.C. § 9601(40). The Department further understands that DeNovo has no familial, contractual, or corporate relationship with Hilltop Apartments LLC or its principal, Mr. Carl Massaro (excluding the instruments transferring title to the Site).
10. On October 10, 2008, DeNovo submitted to the Department a Phase I Environmental Site Assessment performed by Golder Associates Inc. ("Golder") pursuant to ASTM E 1527-05, which was dated October 8, 2008, and reported on Phase I work performed by Golder from July through September, 2008. The Department understands that DeNovo has performed the Phase I in an effort to satisfy "all appropriate inquiries" as defined by 42 U.S.C. § 9601(40), 42 U.S.C. §9601(35)(b)(1), and 40 C.F.R. Part 312, to meet the pre-purchase criteria necessary to qualify as a BFPP pursuant to 42 U.S.C. § 9601(40).
11. DeNovo shall provide all necessary information for a Work Plan for the Site. The activities of the Department and DeNovo shall be consistent with this Agreement, all applicable laws and regulations, and any appropriate guidance documents.

VI. SUBMISSION OF PROPOSED WORK PLAN

12. Within one hundred twenty (120) days of the effective date of this Agreement, DeNovo shall submit a proposed Work Plan to the Department. The Proposed Work Plan shall contain the elements specified by IDAPA 58.01.18.022.02 and shall be submitted with information supporting the proposed Work Plan as specified by IDAPA 58.01.18.022.03.
13. DeNovo intends that the remedial measures described in the Work Plan(s) to be submitted pursuant to this Agreement will set forth "reasonable steps" necessary for DeNovo to satisfy its post-purchase continuing obligations to maintain its BFPP status.

VII. REVIEW AND EVALUATION OF PROPOSED WORK PLAN

14. The Department shall review and evaluate the Site, the affected area surrounding the Site and the proposed Work Plan in accordance with Idaho Code § 39-7206(1).
15. The Department may, at any time during the evaluation of the proposed Work Plan, request the submission of additional or corrected information and a revision of the proposed Work Plan pursuant to Idaho Code § 39-7206(2). DeNovo may either comply with the request or withdraw the proposed Work Plan and terminate this Agreement.

VIII. PUBLIC REVIEW OF PROPOSED WORK PLAN

16. Within thirty (30) days of receiving the proposed Work Plan, or a final revised proposed Work Plan should the Department request additional or corrected information pursuant to Paragraph 12 above, the Department shall initiate the public notification and comment requirements of Idaho Code § 39-7206(3). No later than fifteen (15) days after the close of the public comment period, the Department may, in accordance with Idaho Code § 39-7206(4) and IDAPA 58.01.18.022.04.a, schedule a public hearing.

IX. PROPOSED WORK PLAN APPROVAL, APPROVAL WITH MODIFICATION OR REJECTION

17. Within thirty (30) days of the close of the public comment period or the public hearing, whichever is later, the Department shall, based on its review and evaluation and consideration of any written public comments and testimony, notify DeNovo, in writing, that the proposed Work Plan is approved, approved with modifications, or rejected. Department notification that the proposed Work Plan is rejected shall specify the reasons for rejection, provide DeNovo thirty (30) days to amend and resubmit the proposed Work Plan, and notify DeNovo of its rights to appeal the rejection pursuant to Idaho Code § 39-7206.
18. Within thirty (30) days of receiving notification that the proposed Work Plan has been approved with modifications, DeNovo shall notify the Department, in writing, that the modifications are accepted or rejected. If DeNovo accepts the modifications, the proposed Work Plan shall be deemed approved by the Department as modified. If DeNovo rejects the modifications, and the Parties are unable to negotiate acceptable modifications, the proposed Work Plan shall be deemed rejected by the Department.
19. Upon rejection of the proposed Work Plan by the Department, or upon failure to reach agreement pursuant to Paragraph 42 below, DeNovo may:
 - a. Amend and resubmit the proposed Work Plan;
 - b. Withdraw the proposed Work Plan and terminate this Agreement; or

- c. Appeal the Department's rejection pursuant to Idaho Code § 39-7206 and the Idaho Administrative Procedure Act, chapter 52, title 67, Idaho Code.

X. EFFECT OF APPROVED WORK PLAN

- 20. An approved Work Plan shall be deemed incorporated and is enforceable as part of this Agreement.

XI. IMPLEMENTATION OF WORK PLAN

- 21. DeNovo shall fully implement the approved Work Plan in accordance with the approved Work Plan, the terms and conditions of this Agreement, the Idaho Land Remediation Rules, and the Idaho Land Remediation Act.
- 22. The Work Plan must achieve health-based and environmental remediation standards according to IDAPA 58.01.18.023. Within thirty (30) days of the effective date of this Agreement, the Department shall identify and assist DeNovo in the timely issuance of Department permits or approvals required to initiate and complete implementation of the Work Plan.
- 23. DeNovo shall submit quarterly progress reports to the Department with respect to actions and activities undertaken pursuant to this Agreement. The progress reports shall, at a minimum:
 - a. Describe the actions which have been taken to comply with this Agreement during the prior quarter;
 - b. Describe all work planned for the next quarter with schedules relating such work to the overall project schedules; and
 - c. Describe all problems encountered and any anticipated problems, any actual or anticipated delays and any solutions developed and implemented to address any actual or anticipated problem or delay.

XII. WORK PLAN COMPLETION REPORT

- 24. When DeNovo believes the objectives of the Work Plan have been achieved and successfully implemented for the Site or for preapproved portions or subparts of the Site, DeNovo shall submit to the Department a Voluntary Remediation Work Plan Completion Report and request that the Department issue a Certificate of Completion for the Site. DeNovo may submit a completion report for portions or subparts of the Site that have been agreed upon by DEQ and DeNovo based on the work plan. DeNovo may request a Certificate of Completion for those portions or subparts of the Site as they are completed.

The Work Plan Completion Report shall contain information sufficient for the Department to determine whether DeNovo achieved the Work Plan objectives.

25. The Department shall, within thirty (30) days of the receipt of a Work Plan Completion Report and a request for a Certificate of Completion, notify DeNovo, in writing, whether or not the Work Plan has been successfully implemented.
26. If the Department notifies DeNovo that the Voluntary Remediation Work Plan has not been successfully implemented, DeNovo shall implement the Work Plan to the satisfaction of the Department and resubmit the Work Plan Completion Report.

XIII. CERTIFICATE OF COMPLETION

27. If the Work Plan Completion Report demonstrates that DeNovo has successfully implemented the Work Plan, the Department shall certify such facts by issuing a Certificate of Completion to DeNovo. DeNovo shall record the Certificate of Completion with the deed for the Site on which the remediation took place. The Certificate of Completion may be issued for preapproved portions or subparts of the Site. The Department may condition the Certificate of Completion upon continued monitoring, recordation or maintenance of institutional or engineering controls, or other continuing actions by DeNovo under the Work Plan.

XIV. COVENANT NOT TO SUE

28. DeNovo may, within thirty (30) days of receiving the Certificate of Completion from the Department, request the negotiation and provision of a Covenant Not to Sue for the Site, as provided by Idaho Code § 39-7207. Negotiation and provision of the Covenant Not to Sue shall occur within thirty (30) days of DeNovo's request unless extended upon written notice and reasonable cause by either Party. Such Covenant Not to Sue shall extend to any current or future owner or operator of the Site who did not cause, aggravate, or contribute to the release or threatened release. The request for the Covenant Not to Sue may be made for portions or subparts of the Site which have received a Certificate of Completion.
29. In addition to any Covenant Not to Sue provided pursuant to paragraph 26 above, the Department shall, upon request by DeNovo, discuss and as appropriate provide covenants not to sue, prospective purchaser agreements or other written assurances to third parties desiring to purchase or lease the Site or portions of the Site or to third parties owning or desiring to purchase or lease off-Site property where contamination addressed by the Work Plan may have migrated.
30. The Department shall, upon request by DeNovo, provide appropriate written assurances to lenders and other third parties protected under Idaho Code § 39-7209 and IDAPA 58.01.18.026.
31. Any Covenant Not to Sue shall not apply to claims for a condition or the extent of a condition that:

- a. Was present on the site involved in an approved and implemented voluntary remediation work plan; and
- b. Was not known to the Department at the time the Department issued the Certificate of Completion.

XV. RESCISSION

- 32. The Department may rescind the Agreement or the Covenant Not to Sue at any time, in accordance with Idaho Code § 39-7208 and IDAPA 58.01.18.025.02, if:
 - a. The person implementing the Work Plan fails substantially to comply with the terms and conditions of:
 - i. the Agreement; or
 - ii. the Covenant Not to Sue
 - b. The Department determines, due to a change in known conditions, the release that is the subject of this Agreement and Remediation Work Plan presents an imminent and substantial threat to human health and environment. The Department agrees to meet with the DeNovo before rescinding the Agreement or Covenant Not to Sue under this provision to discuss the basis of the Department's determination and whether the Department's concerns may be addressed absent termination of the Agreement or Covenant Not to Sue.

XVI. MODIFICATION OF AGREEMENT OR WORK PLAN

- 33. No modification of this Agreement or the Work Plan shall be effective except upon mutual agreement of the Parties and in writing. Modification of the Work Plan may be subject to public notice and comment in accordance with IDAPA 58.01.18.022.05.
- 34. The Parties recognize that modification of this Agreement or the Work Plan may be necessary at some point in the future. In such event, the Party that determines that additional work or other modification of the Agreement or Work Plan is necessary shall provide written notice of such determination to the other Party.

The other Party shall respond to such notice in writing within ten (10) days of receipt or such other time as may be agreed to by the Parties. If the Parties agree on the modification to the Agreement or Work Plan, the modification shall be in writing and the Agreement or Work Plan shall be deemed amended subject to public notice and comment in accordance with IDAPA 58.01.18.022.05.

XVII. SAMPLING AND DATA/DOCUMENT AVAILABILITY

35. DeNovo shall, upon request, make the results of all sampling, including raw data, and/or tests or other data generated by DeNovo or on DeNovo's behalf regarding the Site, available to the Department. The Department shall, upon request, make available to DeNovo the results of sampling and/or tests or other data similarly generated by the Department.

XVIII. ACCESS

36. DeNovo shall provide authorized representatives of the Department access to the Site and other areas where work is to be performed at all reasonable times. Such access shall be related solely to the work being performed on the Site and shall include, but not be limited to: inspecting records, operating logs and contracts related to the Site; reviewing the progress of DeNovo in carrying out the terms of this Agreement; conducting such tests, inspections and sampling as the Department may deem necessary; using a camera, sound recording or other documentary type equipment for field activities; and verifying the data submitted to the Department by DeNovo hereunder. DeNovo shall permit the Department's authorized representatives to inspect and copy all records, files, photographs, non-privileged documents and other writings, including all sampling and monitoring data, which reasonably pertain to this Agreement and over which DeNovo exercises control. All persons with access to the Site pursuant to this Agreement shall comply with approved health and safety plans.
37. Nothing herein shall be construed as restricting the inspection or access authority of the Department under any law or regulation.

XIX. OVERSIGHT COSTS

38. DeNovo shall pay reasonable oversight costs incurred by the Department in connection with DeNovo's application and participation in the voluntary remediation program.
39. The Department shall provide a quarterly accounting to DeNovo of actual oversight costs incurred by the Department.
40. Costs incurred by the Department for oversight of voluntary remediation actions will be reimbursed in the following manner:
 - a. DeNovo shall deposit two thousand five hundred dollars (\$2,500) with the Department.
 - b. The Department estimates the oversight of voluntary remediation actions at DeNovo with a rate of fifty dollars (\$50.00) per hour. Should funding be required for costs incurred in excess of the initial two thousand five hundred dollars (\$2,500) deposit, the Department will notify DeNovo of required successive deposits in the amount of two thousand five hundred dollars (\$2,500).

- c. The unused portion of the deposit(s) will be returned to DeNovo within sixty (60) days of the date the Department issues a Certificate of Completion.
- d. The Department's oversight costs shall include the Department's costs incurred after approval of DeNovo's application, including, but not limited to, the review, processing, and negotiation of the Agreement; the review, processing, and approval of the Work Plan; dissemination of public notices and any public hearings; oversight of work performed in accordance with the Work Plan; issuance of any Certificates of Completion; issuance of any Covenants Not to Sue; and administrative expenses associated with cost recovery activities or any other costs incurred pursuant to IDAPA 58.01.18.021.04.
- e. Oversight deposits to be submitted to the Department should be sent to:

Fiscal Office
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

XX. DESIGNATED PROJECT COORDINATOR/NOTICE

- 41. On or before the effective date of this Agreement, each Party shall designate its own Project Coordinator. Each Project Coordinator shall be responsible for overseeing the implementation of this Agreement. To the maximum extent possible, communications between DeNovo and the Department shall be directed to the Project Coordinator by mail, with copies to such other persons as the Department and DeNovo may respectively designate. Communications shall include, but are not limited to, all documents, reports, approvals, disapprovals, and other correspondence submitted under this Agreement.

All such documents shall be sent to the following addressees, or to any other addressees which DeNovo and the Department designate in writing:

- a. Documents to be submitted to the Department should be sent to:

Bruce Wicherski, Voluntary Cleanup Program Manager
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

- b. Documents to be submitted to DeNovo should be sent to:

Richard Vorpahl
1300 W. Randolph Street
Chicago IL 60607

XXI. DISPUTE RESOLUTION

42. If DeNovo objects to any Department notice or disapproval, addendum oversight, accounting or decision made pursuant to this Agreement, DeNovo may notify the Department's Project Coordinator, in writing, of its objections within fourteen (14) days after receipt of the decision. The Department and DeNovo then have an additional fourteen (14) days to reach agreement. If no agreement is reached after fourteen (14) days (or such other period of time to which all Parties mutually agree) the Department shall notify DeNovo in writing of the Department's decision on the matter. DeNovo may request a determination by the Director of the Department. The Director's determination is the Department's final decision on the matter. If DeNovo disagrees with the Director's determination, it may terminate this Agreement and/or pursue whatever legal rights it may then possess. Nothing in this Section precludes the Parties from agreeing to use other forms of alternative dispute resolution.

XXII. RESERVATION OF RIGHTS

43. The Department and DeNovo reserve all rights and defenses they may have pursuant to any available legal authority unless expressly waived herein.
44. Nothing herein is intended to release, discharge, or in any way affect any claims, causes of action or demands in law or equity which the Parties may have against any person, firm, partnership or corporation, not a Party to this Agreement, for any liability it may have arising out of, or relating in any way to, the generation, storage, treatment, handling, transportation, release or disposal of any materials, hazardous substances, hazardous waste, petroleum contaminants, or pollutants at, to or from the Site.

The Parties to this Agreement expressly reserve all rights, claims, demands and causes of action they have against any and all other persons and entities who are not Parties to this Agreement, and as to each other for matters not covered hereby.

45. DeNovo reserves the right to seek contribution, indemnity, or any other available remedy against any person, other than the Department, found to be responsible or liable for contributions, indemnity, or otherwise for any amounts which have been or will be expended by DeNovo in connection with this Site.
46. During implementation of the Work Plan, in accordance with this Agreement the Department shall not, as provided by Idaho Code § 39-7207(7) bring an action, including an administrative action, against DeNovo for any liability for remediation relating to the release or threatened release of any hazardous substance or petroleum that is the subject of the Work Plan.

XXIII. QUALITY ASSURANCE

47. DeNovo shall provide the Department Project Coordinator with reasonable advance notice of all sampling and analysis as detailed in the Work Plan.

XXIV. FORCE MAJEURE

48. DeNovo shall cause all work or required reporting to be performed within the time limits set forth herein, unless performance is delayed by events which constitute a force majeure. For purposes of this Agreement, a force majeure is an event the Parties agree arises from circumstances beyond the reasonable control of DeNovo which delays performance of any obligations required by this Agreement. Increases of costs shall not be considered an event of force majeure.
49. DeNovo shall notify the Department by calling within three (3) calendar days and by writing no later than seven (7) calendar days after any event which DeNovo contends is a force majeure. Such notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken or to be taken by DeNovo to minimize the delay, and the timetable by which these measures will be implemented. DeNovo shall have the burden of demonstrating that the event is a force majeure. The decision of whether an event is a force majeure shall be made by the Department. The Department shall notify DeNovo by calling of its decision within two (2) calendar days after receiving notice.
50. If a delay is attributable to a force majeure, the time period for performance under this Agreement shall be extended, in writing, by the amount of time that is attributable to the event constituting the force majeure.

XXV. COMPLIANCE WITH APPLICABLE LAWS

51. All work undertaken by DeNovo pursuant to this Agreement shall be performed in compliance with all applicable federal, state and local laws, ordinances and regulations.

XXVI. ENFORCEABILITY

52. This Agreement constitutes an enforceable contract between the Parties subject to the Department's right to rescind this Agreement as provided by Idaho Code § 39-7208 and IDAPA 58.01.18.025.02 and DeNovo's right to terminate this Agreement as provided by Idaho Code § 39-7206(2)(b) and IDAPA 58.01.18.021.06.

XXVII. EFFECTIVE DATE

53. The effective date of this Agreement shall be the date on which this Agreement is signed by the Director of the Department.

DATED this _____ day of _____, 2008.

By: _____

Toni Hardesty, Director
Idaho Department of Environmental Quality

DATED this _____ day of _____, 2008.

By: _____

(Name/Title)
DeNovo Independence, LLC

(Print Name/Title)
DeNovo Independence, LLC

Table of Contents

LIST OF ACRONYMS	4
FOREWORD	5
INTRODUCTION	6
LOCATION	7
Ownership, Contacts and Claims	9
CLIMATE	13
GEOLOGY	13
HISTORY	15
<i>INDEPENDENCE MINE AND MILLSITE</i>	15
<i>NORTH STAR MINE</i>	19
<i>OLD TRIUMPH and the TRIUMPH MINE AND MILL SITE(s)</i>	21
CURRENT SITE CONDITIONS	31
WASTE CHARACTERIZATION	31
BACKGROUND SOILS	32
INDEPENDENCE MILL TAILINGS	32
INDEPENDENCE WASTE DUMP #1	32
INDEPENDENCE WASTE DUMP #2	32
INDEPENDENCE WASTE DUMP #3	33
INDEPENDENCE WASTE DUMP #4	33
INDEPENDENCE WASTE DUMP #5	33
INDEPENDENCE WASTE DUMP #6	34
INDEPENDENCE JIG TAILINGS	34
NORTH STAR WASTE DUMP #1	36
NORTH STAR #1 ORE CHUTE	36
NORTH STAR #2 WASTE DUMP	36
NORTH STAR #3 WASTE DUMP	36
NORTH STAR GULCH	39
NORTH STAR GULCH ADJACENT HOMES	39
OLD TRIUMPH (SHAFT) WASTE DUMP #1	40
OLD TRIUMPH (SHAFT) WASTE DUMP #2	40
OLD TRIUMPH (SHAFT) CATCHMENT BASIN	40
OLD TRIUMPH (SHAFT) WASTE DUMP #4	41
OLD TRIUMPH (SHAFT) WASTE DUMP #5	41
TRIUMPH TUNNEL AREA WASTE DUMP #1	41
TRIUMPH WASTE DUMP #2	41
TRIUMPH WASTE DUMP #3	42
TRIUMPH WASTE DUMP #4	42
TRIUMPH WASTE DUMP #5	42
TRIUMPH WASTE DUMP #6	42
TRIUMPH WASTE DUMP #7	42
TRIUMPH WASTE DUMP #8	42
TRIUMPH WASTE DUMPS #9 and #10	45
TRIUMPH WASTE DUMP #11	45

TRIUMPH WASTE DUMP #12	45
TRIUMPH TUNNEL ORE BINS	45
PATHWAYS AND ENVIRONMENTAL HAZARD ASSESSMENT	45
AIR.....	45
GROUNDWATER	45
SURFACE WATER	49
SENSITIVE SPECIES.....	49
WETLANDS.....	50
CURRENT LAND USES	50
POTENTIAL FUTURE LAND USES	54
SCHOOLS, DAY-CARE FACILITIES AND PRIVATE RESIDENCES.....	54
CONCLUSIONS AND RECOMMENDATIONS	54
REFERENCES	55
APPENDICIES	57
APPENDIX A.....	58
Independence Mine and Mill Site	58
Old Triumph (Shaft) Mine Site.....	58
North Star Mine Site and	58
Triumph Tunnel Site Conditions	58
Appendix B	59
Triumph Area Chain of Custody/Sample Submittal Forms.....	59
Laboratory Analysis.....	59
Appendix C	60
Human Health and Ecological Risk Assessments	60

LIST OF ACRONYMS

AMSL	Above Mean Sea Level
BGS	Below Ground Surface
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
BLM	U.S. Department of the Interior Bureau of Land Management
USDA	U.S. Department of Agriculture – Forest Service
RAWP	Remedial Action Work Plan
gpm	Gallons per minute
IGS	Idaho Geological Survey
PA	Preliminary Assessment
SI	Site Investigation
ppb	Parts per billion
ppm	Parts per million
TDL	Target Distance Limit
USGS	US Geological Survey

FOREWORD

The Department of Environmental Quality (DEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines. In addition to the EPA Contract, the Site Assessment Program has also become funded, in part, by General Funds provided by the Idaho Department of Environmental Quality's budget.

The DEQ often receives complaints or information about sites that may be contaminated with hazardous waste. These sites can include abandoned mines, rural airfields that have served as bases for aerial spraying, old landfills, illegal dumps, and abandoned industrial facilities that have known or suspected releases.

In February 2002, DEQ initiated a Preliminary Assessment Program to evaluate and prioritize assessment of such potentially contaminated sites. Due to accessibility and funding considerations, priority is given to sites where potential contamination poses the most significant threat to human health or the environment. Sites in Blaine County have been prioritized because of the rapid conversion of mine sites from mining purposes to private properties for residential and commercial development. Furthermore, these rural areas are targeted for high use by recreational activities.

For additional information about the Preliminary Assessment Program, see the following:

http://www.deq.idaho.gov/waste/prog_issues/mining/pa_program.cfm

This document presents the supporting data and findings of a preliminary assessment (PA) and site investigation of the Independence mine and mill, Old Triumph (Shaft), North Star Triumph Tunnel sites, and in very small part a portion of the Baltimore-Victoria Mine.

Subsequent to the initial field work and partial analysis by IDEQ for this report, the patented mining claims that overlay the North Star, Triumph Tunnel and Mill, Old Triumph (Shaft), and Independence Mine and Mill sites have changed ownership twice. The first time they were consolidated under ownership of the Triumph Mining Company, and then the claims were purchased by DeNovo Independence LLC (DeNovo), who now owns the 848 acres of patented mining claims and historic workings. DeNovo contractor, Golder and Associates to complete the Site Investigation (SI), Human Health and Ecological Risk assessments, and development of a Remedial Action Work Plan (RAWP) for implementation in 2009.

Subsequent to the most recent purchase of these lands by DeNovo, the company entered into IDEQ's Voluntary Cleanup Program through agreement with the Idaho Department of Environmental Quality. For the purposes of EPA's processing of this PA/SI, IDEQ is recommending that these sites and properties status are designated as "Other Cleanup Actions" or OCAs. IDEQ does not warrant the ownership research or location of property boundaries contained in this report. The information regarding ownership and property boundaries was obtained from the Blaine

County Tax Assessor's Office in Hailey, Idaho. Although numerous mining claims are frequently listed by a single Parcel Number in the Blaine County Assessor's Office tax rolls, IDEQ discusses individual claims as distinctive properties because this is how they are referenced in the numerous inactive and abandoned mined lands data bases and historical references.

INTRODUCTION

The Big Wood River Basin was prioritized for site assessment work because of a rapid expansion of the communities onto patented mining claims and historic workings. Site assessment(s) of the Triumph Tunnel, Old Triumph (Shaft), North Star, and Independence mine and mill sites have and are being completed coincidentally because of these sites share a common history and ownership. The sites were interconnected and at times were operated as one mining and milling operation. Consequently, the bulk of the ore, mine and mill waste products were commingled, processed and disposed in numerous places by many different methods and are no longer distinguishable based on their sources.

As stated previously, the current private land owner DeNovo developed a comprehensive RAWP based on human health and ecological risk assessments. Implementation of the RAWP is currently being conducted under Idaho's Voluntary Cleanup Program, which should, for the purposes of EPA's evaluation of this site status, be considered "Other Cleanup Action".

The Baltimore Victoria Mining Company owns part of the Independence mine and mill site. Their properties include the patented mining claims Baltimore, Victoria, Minnie Mae, and Ida Harland. The Minnie Mae patented claim contains the lower portions and mill tailings impoundments of the Independence Mill Site. These properties are not included in the DeNovo RAWP. These private properties, specifically in the bottom of Independence Gulch contain mine wastes and mill tailings which, based on IDEQ's assessment, pose significant risks to human health and the environment.

Intermingled with private lands are fractions of public lands administered by the U.S. Department of Agriculture – Forest Service (USDA), and U.S. Department of Interior – Bureau of Land Management (BLM). Although it appears that the USDA Fraction spans an area with anomalously high concentrations of arsenic and lead that result from natural enrichment of the Milligen Formation, the fraction does not contain unacceptable risks to human health or the environment. On the other hand, there is a distinct probability that BLM fractions in North Star gulch contain several small (<500 cubic yards) waste dumps and open adits. Although the waste dumps do not pose significant risks to human health or the environment, the open adits should be evaluated. Although there was a potential to work with adjacent land owners to manage potential risk on public lands, no remedial actions are currently planned nor should they be prioritized. **However, if the open adits are on public lands they should be appropriately closed or managed.**

Total recorded production for the Triumph between 1884 and 1967 was 1,655,091 tons of ore and 34,013 tons of old tailings. This material yielded 60,896 ounces of gold; 12,051,752 ounces of silver; 3,526,845 pounds of copper; 139,229,827 pounds of lead; and 176,295,742 pounds of zinc.

Total recorded production for the Independence Mine between 1884 and 1963 was 163,663 tons of ore and 2,653 tons of old tailings. This material yielded 4,419 ounces of gold; 2,301,037 ounces of silver; 102,495 pounds of copper; 17,528,838 pounds of lead; and 23,775 pounds of zinc.

Total recorded production for the North Star between 1883 and 1942 was 338,918 tons of ore and 3,361 tons of old tailings. This material yielded 35,665 ounces of gold; 2,593,891 ounces of silver; 827,382 pounds of copper; 33,974,077 pounds of lead; and 50,385,871 pounds of zinc. Numerous mine adits, shafts, dumps and other facilities are described and discussed using identifications such as "North Star Dump #1". These identifications are more often than not designations provided by DEQ during the field work to distinguish each feature, and do not correspond to those names that were most likely give to the feature by operators such as "North Star 600' Level Adit".

LOCATION

The Triumph, Independence, and North Star mines and mill sites are in the Warm Springs mining district about 5 miles southeast of Ketchum. The sites are bounded to the south by the East Fork of the Wood River, to the north by Keystone Gulch, on the east by Courier Gulch, and on the west by Triumph Gulch. The original Triumph underground workings were located near the head of Triumph Gulch at an elevation of about 7,000 feet. Other facilities including the Triumph Tunnel, Triumph and North Star mills and tailings ponds, are on the south facing slopes and flood plains of the East Fork of the Big Wood River. The Independence Mine is located in Independence Gulch, about a mile north of the Old Triumph (Shaft) workings. The North Star Mine is in the head of North Star Gulch, an ephemeral drain into the East Fork. The Baltimore-Victoria underground workings are located in the southern spur of Keystone Gulch approximately ½ mile north of the Independence Mill site.

According to Google Earth the centers of the four mine sites are located approximately:

Independence Mine and Mill	Latitude 43 40' 19.27" N	Longitude 114 16' 44.64" W
Old Triumph (Shaft) Mine	Latitude 43 39' 33.47"N	Longitude 114 16' 42.48" W
North Star Mine	Latitude 43 39' 16.64" N	Longitude 114 16' 06.09" W
Triumph Tunnel Site	Latitude 43 38' 40.88" N	Longitude 114 15' 39.5" W

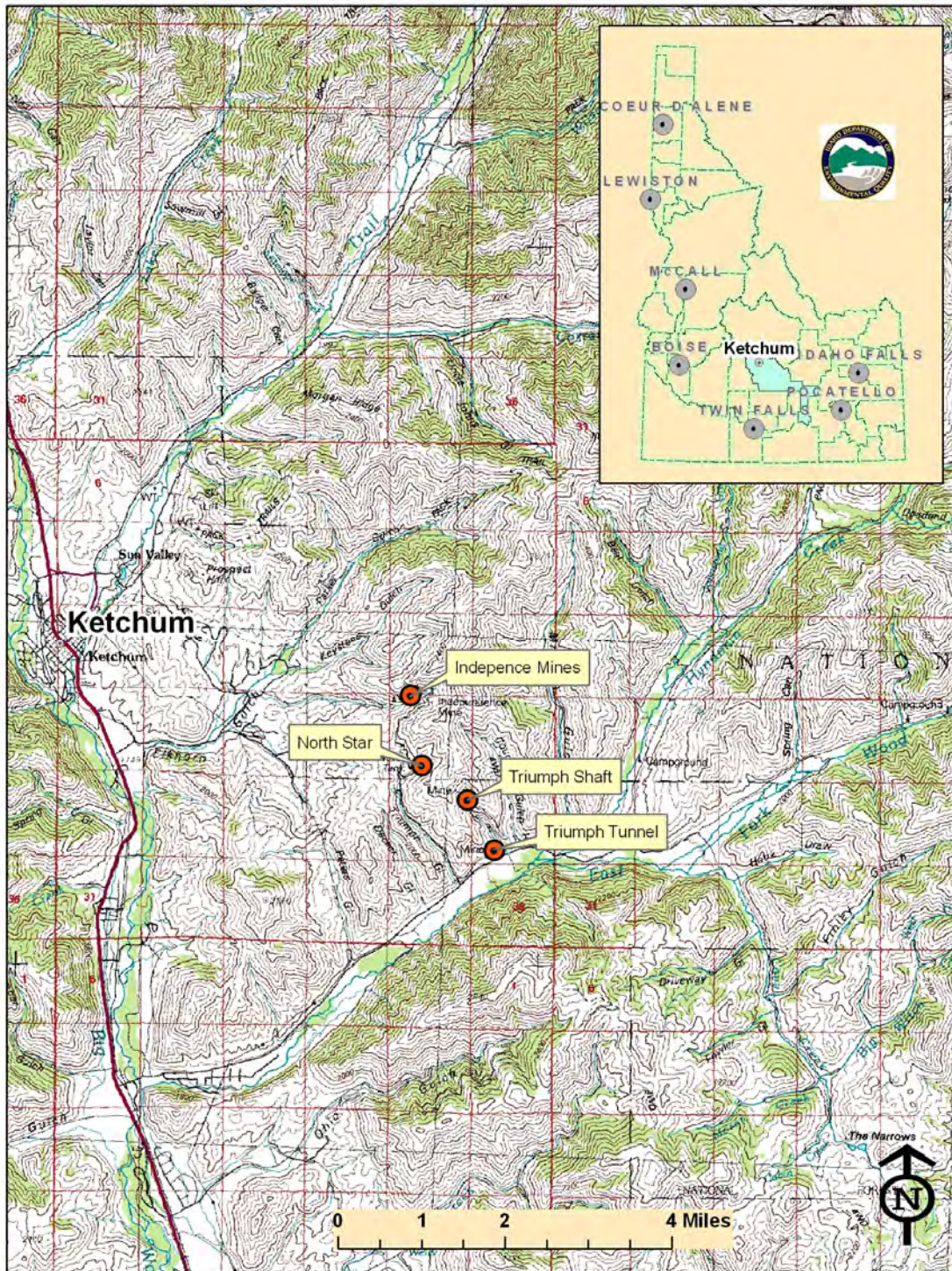


Figure 1. Triumph Area Location Map

Ownership, Contacts and Claims

The sites and adjoining lands are of mixed ownership with private, federal and state entities in control. These include numerous citizens in the village of Triumph, the U.S. Department of Interior – Bureau of Land Management (BLM), the U.S. Department of Agriculture – Forest Service (USDA), and the State of Idaho – Department of Lands. Some of the facilities, specifically the Triumph Mill Tailings Impoundment are administered by the State of Idaho under various remedial agreements between the State of Idaho, U.S. Environmental Protection Agency and local homeowners.

The implied connection of claims with individual mine or mill sites is not based on historic references. IDEQ has attempted to draw a connection between the patented claim and each industrial site based on their mutual locations within sub-watersheds or drainages, which will likely be the basis for their inclusion into remedial packages.

In the following list of properties and owners, IDEQ has presented a “**Recommendation**” that is meant to convey a very brief summary of IDEQ’s assessment of individual claims and parcels relative to human health and ecological risk factors associated with toxicological responses to mine wastes. These “**Recommendations**” will be entered into IDEQ’s Wastesite Data Inventory as our determined **Status** for these properties. The status of each of the claims may be changed upon completion of DeNovo’s Risk Assessment and Remedial Action Plan is approved by IDEQ.

A “**Recommendation**” of No Remedial Action Planned (Proposed) or “**NRAP**” means that based on current conditions at the site IDEQ did not find any significant evidence that would indicate the potential of adverse effects to human or ecological receptors on the parcel of land. This “**Recommendation**” says nothing about risks associated with physical hazards such as open adits, open shafts, high walls, or unstable ground. A “**Recommendation**” of “**calculate HRS**” indicates that IDEQ has determined that there is sufficient evidence to warrant calculation of a Hazard Ranking Score (HRS) by EPA’s contractors. It also indicates that IDEQ has come to the conclusion that additional site assessment and/or remedial actions may be necessary to prevent adverse affects to human or ecological receptors. These conclusions and recommendations are contained in the final section of this report.

<u>Owner</u>	<u>Parcel #</u> <u>Patented Claim</u> <u>(Mine Name)</u>	<u>Recommend</u>
Baltimore Victoria Mining Company	RP1M0000000090	
Carol Meyers	Baltimore (Baltimore Victoria)	NRAP
c/o Terra Haute 1 st National Bank	Victoria (Baltimore Victoria)	NRAP
P.O. Box 540-Trust	Minnie Mae (Indep. Millsite)	Calculate HRS
Terra Haute, Indiana 47808	Ida Harland (Indep. Mine)	NRAP

DeNovo Independence LLC owns most of the Independence Mine and Mill site and all of the North Star, Triumph Tunnel, and Triumph Shaft (Area).

<u>Owner</u>	<u>Parcel # Patented Claim (Mine Name)</u>	<u>Recommend</u>
DeNovo Independence LLC Richard G. Vorpahl Senior Vice President 1300 W. Randolph Street Chicago, Illinois 60607 Phone: 888-633-6686 Cell Phone: 312-282-6429 Fax: 312-733-2092	RP1M0000000840	
	Venus (Triumph Tunnel)	Vol. Cleanup
	Silver Key (Triumph Tunnel)	Vol. Cleanup
	RP1M0000001760	
	Thursday (North Star)	NRAP
	Eclipse (North Star)	NRAP
	Wednesday (North Star)	NRAP
	Baby Ethel (North Star)	NRAP
	Morning Star (North Star)	Vol. Cleanup
	RP1M000000176A	
	Malta #1 (Indep. Mine)	NRAP
	Chicago (Indep. Mine)	NRAP
	Malta #2 (Indep. Mine)	NRAP
	Midland (Indep. Mine)	NRAP
	Union (Indep. Mine)	NRAP
	Malta #3 (Indep. Mine)	NRAP

<u>Owner</u>	<u>Parcel # Patented Claim (Mine Name)</u>	<u>Recommend</u>
DeNovo Independence LLC Richard G. Vorpahl Senior Vice President 1300 W. Randolph Street Chicago, Illinois 60607 Phone: 888-633-6686 Cell Phone: 312-282-6429 Fax: 312-733-2092	RP1M0000001770	
	Independence (Indep. Mine)	Vol. Cleanup
	West Shore (Triumph Sft)	NRAP
	Little Giant (Indep. Mine)	Vol. Cleanup
	Harper (Indep. Mine)	NRAP
	Harper Fraction (Indep. Mine)	NRAP
	Eula (Indep. Mine)	NRAP
	RP1M000000177A	
	American Eagle (Triumph Sft)	NRAP
	La Barge (Triumph Sft)	NRAP
	RP1M000000177A	
	Helen Fraction (Triumph Sft)	NRAP
	Haimdal (Triumph Sft)	NRAP
	Smolenski (Triumph Sft)	NRAP
	Edem Pasha (Triumph Sft)	Vol. Cleanup
	Teller (Triumph Shaft)	Vol. Cleanup
	Oro (Triumph Shaft)	Vol. Cleanup
	GE (Triumph Shaft)	Vol. Cleanup
	True Friend (Koeniger)	NRAP
	RP1M000000177B	
	Minerva (Triumph Sft)	NRAP
	Triumph (Triumph Shaft)	Vol. Cleanup
	Mary (Koeniger)	NRAP
	Redemption No. 2 (Koeniger)	NRAP
	Koeniger (Koeniger)	NRAP
	Neighbor (Indep. Millsite)	Vol. Cleanup
	Neighbor Frac. (Indep. Millsite)	Vol. Cleanup
	May Leaf (Triumph Shaft)	Vol. Cleanup
	True Friend (Koeniger)	NRAP
	RP1M0000001780	
	Crescent (Triumph Tunnel)	Vol. Cleanup
	Dipper (North Star)	NRAP
	Domski (Triumph Sft)	NRAP
	Woodrow (North Star)	Vol. Cleanup
	Bryan (North Star)	Vol. Cleanup
	North Star (North Star)	Vol. Cleanup

<u>Owner</u>	<u>Parcel # Patented Claim (Mine Name)</u>	<u>Recommend</u>
DeNovo Independence LLC Richard G. Vorpahl Senior Vice President 1300 W. Randolph Street Chicago, Illinois 60607 Phone: 888-633-6686 Cell Phone: 312-282-6429 Fax: 312-733-2092	RP1M000000178B Ketchum (North Star)	Vol. Cleanup
	RP1M000000178C Silver Crown (Triumph Tunnel)	Vol. Cleanup
	RP1M000000178B Maria (Koeninger Mine) Monday (North Star) Tuesday (Triumph Tunnel)	NRAP Vol. Cleanup Vol. Cleanup
U.S.DOI – Bureau of Land Management Attn: Steve Moore 1387 S. Vinnell Way Boise, Idaho 83709 Phone: 208-373-3864	BLM Lot 19 BLM Lot 20 BLM Lot 24 BLM Lot 23	NRAP NRAP NRAP Cont. RA
USDA Sawtooth National Forest Jeff Gabardi 2647 Kimberly Road East Twin Falls, Idaho 83301 Phone: 208-737-3205	USDA Lot 10 USDA Lot 11 USDA Lot 14 USDA Lot 16 USDA Lot 17	NRAP NRAP NRAP NRAP NRAP

The State of Idaho owns a portion of the Triumph Tailings Impoundment and adjoining Lands. State Lands are administered by:

Idaho Department of Lands
 c/o Eric Wilson
 954 West Jefferson
 P.O. Box 83720
 Boise, Idaho 83720
 Phone 208-334-0261

CLIMATE

Climate information provided in this section is based on a climatological summary for Hailey, Idaho which was obtained from the National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center. The climatological data was collected at the Hailey Airport (elevation 5,328 amsl), and is for the period of 1951 through 1980. Each site for which this data is used is subject to more localized meteorological conditions that result from difference in elevation, orientation of slopes in watershed, vegetation and other factors.

The area around the site is characterized by short cool dry summers and very cold winters. The total annual precipitation measured at the Hailey Airport averages 16.2 inches. The majority of precipitation occurs as snow. Total annual snowfall averages 78.2 inches with most snowfall occurring in December and January. The driest months are July, August and September.

Based on records from 1951 to 1980, the average annual temperature measured at the Hailey Airport is 43 degrees Fahrenheit (F). The lowest temperature recorded for this period was – 28 degrees F in 1962. The highest temperature for this period of record was 100 degrees F in 1953. January is the coldest month with an average temperature of 19.5 degrees F. July is the hottest month with an average temperature of 67 degrees F.

GEOLOGY

All three mines are hosted by rocks of the Devonian Milligen Formation (Figure 3). Ore occurs as mineralized fissures or shear zones, most of which strike west-northwest and dip to the southwest at moderate angles, and as replacement deposits at the intersection of mineralized shear zones and susceptible limestone beds. There are numerous outcrops of the Milligen Formation that have anomalously high concentrations of metals, that although were probably not considered as ore grade, they significantly affect the variability in background concentrations of metals in soils throughout the site(s). There are three main types of ore in the Triumph and North Star mines. The fissure ores occur in pods and lenses ranging from a few inches to many feet in width; the ore minerals are galena, sphalerite, arsenopyrite and sulphantimonides (tetrahedrite and boulangerite) in a gangue of siderite and quartz. The bedded siliceous ores, which generally occur as replacement of limestone beds in the host rock, consist of galena and sphalerite in a gangue of quartz, siderite, and unmineralized country rock. The “complex” ores consist largely of sphalerite and galena in a pyrite gangue (the term “complex” referred to the metallurgical problems initially found in processing this ore). There is almost a complete replacement of the limestone beds by sulfides in the complex ore. This type of ore constituted the major production from the Triumph. The Independence ores were primarily in mineralized shear zones (Kiilsgaard, (1950).

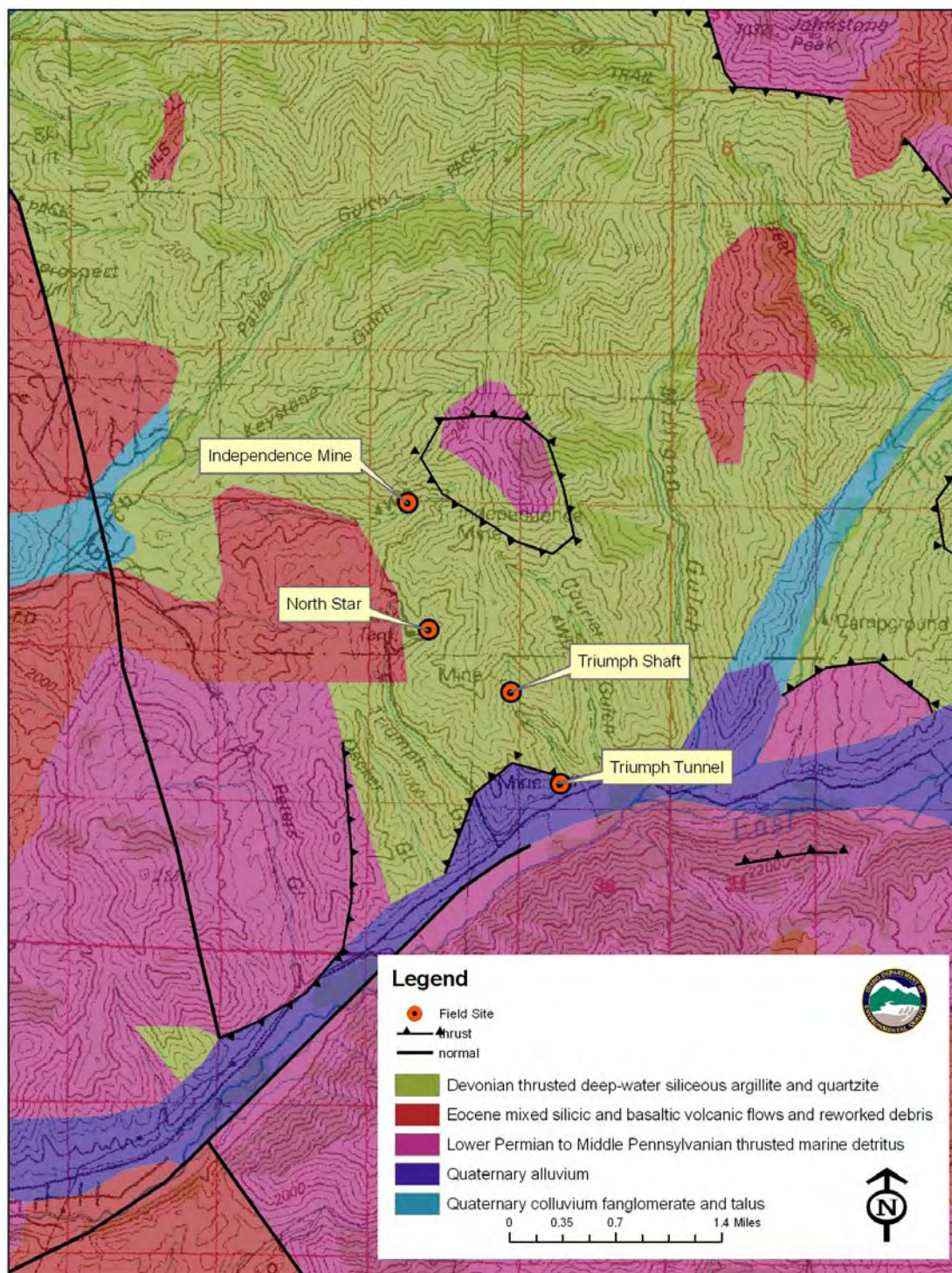


Figure 2: Triumph Area Geology

HISTORY

Because IDEQ could not improve upon the historical report completed by the Idaho Geological Survey, the following History (*italicized*) was excerpted in its entirety from “History of Triumph Independence and North Star Mines, Blaine County, Idaho (1997)” by Victoria E. Mitchell of the Idaho Geological Survey (IGS)”. That historical report was completed under federal contract with the USDA Sawtooth National Forest. IDEQ has, however, added to the history as it pertains to the most recent developments at the site(s)

INDEPENDENCE MINE AND MILLSITE

The Independence Mine was worked intermittently from 1883 until the mine was taken over by Snyder Mines, Inc in the late 1930s and operated as part of the Triumph Mine.

Independence installed a new 100-tpd mill in 1908 (Later reports rated the mill variously at 80 to 100 tpd.). The mill was powered by electricity, and a transmission line was run 14 miles to the property from the Cramer Electric Co. plant at Hailey. The Independence had ore reserves of 60,000 tons.

Despite the new mill, the Independence remained idle for most of 1909 because the company was involved in litigation over apex rights. The court battles continued through 1910, 1911, and 1912, with the company resuming production in 1912. The mill equipment consisted of rolls, jigs, and tables, which produced a rich lead sulfide concentrate. In 1912 the Independence veins had been explored to a depth of 300 feet through several long tunnels. The IMIR proposed driving a cross-cut tunnel from the East Fork of the Wood River through the Triumph property to link up with the Independence.

By 1913, the company’s legal battles were resolved. In the past, carload shipments from Independence had averaged 70 percent lead with 1.5 ounces of silver to each unit of lead and \$10.00 of gold (about half an ounce) per ton. During 1913 the company mined 1,000 tons of ore and shipped 114 tons. The average value of the ore was \$60.00 per ton. Total mining costs were \$2.00 per ton, and transportation and treatment costs were \$8.25 per ton. The company listed its milling setup as “Concentration with Gravity. Tramway, Rock Crushers, 3 Sets of Rolls, 4 sets of Trommel Screens, 4 Jigs, 3 Card Concentrating Tables.” Cost of treating ore through the mill was \$1.00 per ton, and the company estimated an 88 percent rate of recovery. The workings totaled 10,000 feet, and the mine was developed through four tunnels. Daily wages were \$3.50 for miners, \$4.00 for millmen, and \$5.00 for mechanics.

In 1914, the company reported mining 200 tons of ore but only shipping 22 tons. According to the 1914 IMIR, the remainder of the ore was held in storage to wait for higher metal prices. The USBM records show the entire amount was shipped. Most of the 1914 output for the Warm Springs district was from the Independence. The mine shipped concentrated lead ore and high-grade silver-lead ore.

Independence made its best year's shipping record to date in 1915. The ore averaged 45 percent lead, 95 ounces of silver, and one-fifth ounce of gold per ton. The company operated its mill for only 80 days during the year because water was unavailable. The Independence was the main producer in the district.

Independence Mining Co. continued to work the property during 1916 and most of 1917. The company shipped a good grade of concentrate during 1916. During 1917, the concentrates, which contained high percentages of both lead and silver and about 20 percent iron, went to the United States Smelter at Midvale, Utah. On November 15, 1917, Federal Mining and Smelting Co. acquired the Independence Mine under lease and bond with an option to purchase. Federal's initial payment on the property was \$25,000.

In 1918, the Independence was producing 25 tpd of high-grade ore and concentrates that contained 30 to 50 percent lead with over 2 ounces of silver per unit of lead. The ore was easy to treat, consisting of coarsely crystalline galena, shattered quartz, and a little pyrite. In contrast to the neighboring North Star and Triumph mines, the ore contained almost no zinc. The main discovery for the year was an 80-foot-long ore shoot which had a maximum width of 30 feet. At the end of the year, the Independence Mine had reserves of 51,600 tons of milling ore (equal to about 7,950 tons of concentrates) and 4,120 tons of first-class ore. The mill was remodeled to produce a high-grade lead concentrate. During the year, Federal exercised its option to purchase the Independence and the adjoining Malta Group. The purchase price for the Independence was \$135,841.

The Independence Mine was the most important mining operation in Blaine County in 1919. The mine was developed to a depth of 600 feet by adits and a winze. The mill was rebuilt and operated from March to November; it was shut down the rest of the year due to deep snow. Most of the water used in the mill came from a series of small springs, which at times were so muddy that the company had trouble separating out the finer lead ore. The mill handled about 100 tpd; between the mill output and hand-sorted crude ore, the mine yielded a small carload of shipping ore per day while the mill was in operation. The 13,386 tons of ore produced during the year yielded \$82,952 to the company before taxes and deductions for ore depletion, according to Federal's annual report for 1920. Reserves at the Independence on January 1, 1920, were 53,000 tons of ore, which was equivalent to about 7,000 tons of lead concentrates and 4,000 tons of first-class ore. According to the 1919 IMIR, Federal did no "extensive new development" at the Independence during the year, but the company "materially expanded" its reserves with its stoping operations. In addition, the company was driving a long cross-cut from the lower (Plummer) level of the North Star Mine on the opposite slope of the mountain. The tunnel was expected to intercept the Independence vein at a distance of 3,600 feet. Work on the tunnel was done on contract, working 10 men in two shifts and making progress of up to 300 feet a month. By the end of the year, the Plummer tunnel was approaching the Independence vein, and plans were made to connect with the 600 level of the Independence. On the work being done on the Plummer tunnel, the Federal annual report (1919, p. 2) stated, "The lower tunnel to the Independence is nearing completion and will (a) permit steady operation of the mine the year round, instead of a shutdown, as heretofore, during the period of danger from snow slides, and (b) will permit the use of the North Star mill, thus increasing output and reducing cost."

In 1920, Federal completed work on the Plummer tunnel and connected it to the main Independence workings by a 530-foot raise. This increased the depth of the Independence workings to over 1,200 feet. Federal's expenditures on the Plummer tunnel during 1920 were \$127,126.40, which included driving the tunnel and the connecting raises, and equipping the tunnel for electric haulage. Federal operated the mine all year. The Independence mill was operated for only six months, and the North Star mill (idle since September 1918) was reconditioned to handle 200 tpd of silver-lead ore from the Independence. The ore was hauled 6,200 feet through the Plummer tunnel using electric trains and then sent to the North Star mill over a 4,400-foot Riblet aerial tramway, which had a capacity of 20 tons an hour. Ore and concentrates were hauled to the railroad by truck in the summer, which cost about \$2.00 per ton, and by horse-drawn sleds in the winter, which cost about \$4.00 per ton. Operations for the year resulted in a loss of \$40,059, due to the deduction of the costs of driving the Plummer tunnel. At the end of the year, ore reserves were given at 40,000 tons, which was equivalent to 5,185 tons of concentrate and 2,700 tons of first-class lead ore.

Federal maintained capacity production throughout 1921, operating the mine and the 125-tpd mill continuously. The ore came from the Independence Mine, which was the largest producer in the county. The mine showed satisfactory earnings after writing off the costs of the Plummer tunnel and "other expensive developments." Total workings of the combined Independence and North Star Mines were over 5 miles in length. Reserves at the end of the year were 28,000 tons of ore, equal to about 3,600 tons of lead concentrate and 1,800 tons of shipping ore. Ore minerals included galena, tetrahedrite, chalcopyrite, sphalerite, jamesonite, siderite, and pyrite.

The Independence continued to produce at capacity during 1922 and was the largest producer of lead in the county. During the later part of the year, the company exposed new ore which greatly increased the mine's reserves. Underground workings measured almost 6 miles in length. Mine equipment included an English Iron Works 202 single drum hoist, one Lidgerwood 8x10 air hoist, an I-R 420-cubic-foot compressor, and a C-P 765-cubic-foot compressor. Mill equipment included a 350-ton concentrator, jaw and gyratory crushers, rolls, Marcy ball mills, Hancock jigs, Drag classifiers, Wilfley tables, Dorr thickeners, and an Oliver filter. The company mined 43,046 tons of ore, which averaged 6.85 percent lead, 17.28 ounces of silver per ton, and 0.055 ounce of gold per ton (reported to the Idaho Inspector of Mines; numbers given by the USGS are: 44,748 tons of ore averaging 0.036 ounce of gold and 16 ounces of silver to the ton and containing 5.9 percent lead). Mining costs were \$5.10 per ton and milling costs were \$1.55. The company estimated that it recovered 44.5 percent of the gold, 81.8 percent of the silver, and 83.9 percent of the lead. Net profits for the year were \$96,932. The ore was hauled 6,600 feet through the Plummer tunnel to the tramway, which carried it to the North Star mill. Federal's annual report for 1922 (p. 10) stated, "The Independence mine has been somewhat disappointing. The ore is of excellent grade, carrying about 2½ ounces of silver per ton for each unit of lead, but its occurrence is very irregular, and we have found the east end of the mine to be much faulted and broken up, and the ore shoots are smaller and more broken up than ever."

Federal continued to operate the Independence at capacity until August 1, 1923, when the property was shut down and the mine turned over to lessees. The mill and surface plant were mothballed to allow immediately resuming operations. However, the company reported removing all equipment

from the mine in August, and the USGS noted that the deposit was nearly worked out. The Independence produced 146,642 tons of ore between 1917 and 1923; the ore contained gold, silver, and lead. Before closing in August 1923, the mine shipped several thousand tons of concentrate and crude ore containing gold and silver, as well as lead, to a smelter at Murray, Utah. The company gave the year's production as 25,706 tons of ore, which assayed 0.035 ounce of gold and 10.2 ounces of silver per ton, and 3.8 percent lead. This ore grade was much lower than in previous years, and Federal's operations resulted in a \$33,772.05 operating loss for the Independence in 1923. Leasing operations in the latter half of the year yielded \$8,469 in royalties to the company. The Independence accounted for most of the production from Blaine County for the year. The total development for the mine was approximately 35,430 feet of workings, with 725 feet of shafts, 11,349 feet of raises, and 23,356 feet of tunnels, cross-cuts, and drifts (excluding the Plummer tunnel). Daily wages were \$4.25-5.25 for miners and muckers, \$5.25-6.00 for blacksmiths, and \$4.50-5.50 for hoistmen.

Lessees continued to operate the mine from 1924 to 1938. According to Federal, the mine was leased in blocks, with different individuals working in different areas. Very little development work was done. The lessees made a number of "substantial" shipments in 1924, totaling several hundred tons of silver-rich lead ore. In 1925 lessees at the Independence made the largest shipments of ore in the county and discovered "important new disclosures "of ore (IMIR). The ore was shipped to Murray, Utah. Lessees paid Federal \$20,182 in royalties.

Despite the reported ore discoveries in 1925, shipments in 1926 were about half what they had been the previous year. However, shipments from the Independence leases still accounted for most of the first-class silver-lead ore produced in the district, and the lessees paid Federal \$6,835 in royalties. In 1927, the Independence was operated throughout the year by lessees who marketed "a large tonnage of high-grade hand-sorted ore." (IMIR).

Production decreased in 1928 and again in 1929, despite the company's reports of substantial production by lessees. A few carloads of first-class lead sulfide ore for smelting were shipped by lessees in 1928, and several carloads of ore were produced in 1929. Production in 1930 and 1931 was small, but greater than 1929 levels. The ore produced in 1930 was described by the USBM as "first-class ore of smelting grade." Most of the output for the Warm Springs district in 1931 came from lead-silver ore produced from the Independence Mine by lessees. In 1932, a year marked by all-time record low metal prices, lessees performed a little development work on the Independence and North Star mines, and stockpiled a small amount of ore to wait for higher metal prices. Lessees apparently did minor amounts of work during 1933, 1934, and 1935, although the USBM production records show no ore was shipped after 1933. The USBM Yearbook reported that lead ore from the Independence was shipped to a smelter in 1933, and that a lessee shipped a small lot of silver-lead ore in 1934.

In 1936, Snyder Mines, Inc., (operator of the adjacent Triumph Mine) took over the North Star Mine from Federal and connected it with the Triumph through the Plummer tunnel. Lessees continued to work parts of the Independence and North Star for the rest of 1936 and 1937. In 1938, Federal leased both the Independence and North Star to the Triumph Development Co. By 1939, Snyder was

developing the Independence, North Star, and Triumph mines as a single operating unit. From then on, the Independence workings were integrated with those of the Triumph. Triumph Mining Co. acquired control of the property in 1940. By the late 1940s, most of the workings were inaccessible.

Total recorded production for the Independence Mine between 1884 and 1963 was 163,663 tons of ore and 2,653 tons of old tailings. This material yielded 4,419 ounces of gold; 2,301,037 ounces of silver; 102,495 pounds of copper; 17,528,838 pounds of lead; and 23,775 pounds of zinc.

NORTH STAR MINE

The North Star was actively worked during the decade following 1883, and much of the ore that could be treated by the methods then available was removed at that time. Lindgren (1900) credited the mine with producing \$800,000 worth of ore between 1883 and 1894. In October 1885, J.W. Ballentine moved a tram and mining equipment to the North Star from an unsuccessful mining venture at Muldoon (Wells, 1983). Lessees operated the mine in 1898. Total development at that time was an 1,800-foot tunnel and a shaft sunk 200 feet below the tunnel level.

Umpleby and others (1930) noted that the mine contained over 20,000 tons of refractory ore that could be mined when a suitable method was developed to treat it. The ore was a complex mixture of minerals whose distribution varied widely in different parts of the mine. The ores that were mined first were rich in silver-lead and contained variable amounts of gold; the ore was generally found in elongated lenses. The refractory ores mined after 1915 were high in zinc and, in some places, antimony.

The North Star was active in 1905, 1907, 1909, and 1910. In 1909, the North Star produced lead and zinc ore. However, the 1909 IMIR stated that the North Star was inactive, despite large reserves. (The USBM production records show 44 tons of ore was produced during the year.) The North Star ore was “an intimate mixture of iron, zinc, and lead sulphide in such close association that a commercial product can not be made” (IMIR).

In 1912, the Mine Inspector suggested the idea of consolidating the idle Triumph and North Star groups to form a mine with “a million ton resource of 15 to 20 dollar ore” (p. 81). He described the North Star ore as consisting of “an amorphous mass of arsenical pyrite, carrying 6 to 8 per cent lead and 6 to 8 ounces per ton in silver, together with 10 to 15 percent zinc and a little gold” (p. 81) and suggested some of the “present” methods of flotation could be used to separate the various ore minerals. The main tunnel of the North Star was 1,500 feet in length and passed through a body of ore 200 feet long and over 10 feet wide. The face of the tunnel extended into a second large ore body whose length was unknown at the time. The Mine Inspector’s report for 1913 credited the Triumph and North Star veins with a combined output of high-grade lead-silver ore worth \$750,000.

According to the 1915 IMIR, the Triumph and North Star mines were under consideration by “one of the ablest mining engineers of the country” and work was being done to solve the “knotty” metallurgical problem of separating the zinc from the lead. Bell mentioned recent advances in electro-chemical treatment of zinc values that showed promise of allowing these ores to be treated profitably.

On May 1, 1916, Federal Mining & Smelting acquired a bond and option on the North Star Mine. The total purchase price was to be \$150,000, of which \$29,000 was paid in 1916. The mine had been idle for over 25 years and the lower levels were flooded. Past production of the mine was given at \$600,000 of lead-zinc ore. Between May and December, Federal spent \$314,924 on new equipment, construction, and development work at the mine. The company erected a 150-tpd mill, equipped the mine with air compressors and "other mechanical devices for deeper development," and drove a deeper level tunnel to drain the lower levels of the mine. A vein of very rich lead-zinc sulfide ore was discovered after the lower levels were drained. This ore was less complex than most of the ore in the mine, and the ore body was large enough to keep the mill operating at capacity. The reserves of the North Star and the adjoining Triumph were estimated at a million tons of proven and probable ore containing between 15 and 20 percent zinc, 8 percent lead, and 8 ounces of silver per ton. Excess iron in the ore caused difficulties in treatment by standard concentration methods; the IMIR again speculated that an electro-chemical process would be required for complete separation of the ore. The North Star mill began operating on an experimental basis in October, and testing continued for the rest of the year. The mill was equipped with a crusher, Marcy mill, Wilfley tables, flotation cells, magnetic separator, and Dorr thickener. According to the USGS Yearbook, it was heavily damaged by a snow slide in December. Federal's annual report gives the date of the snow slide as February 1917. Eleven men were killed and several others were injured. Several lawsuits, totaling about \$485,000, were filed against the company, but they were settled the following year for \$55,000.

The North Star was the most important lead producer in Blaine County during 1917. Both lead-zinc ore and old tailings were processed to make a lead concentrate and a lead-zinc concentrate. The mill was operated for nine months out of the year, with many interruptions to readjust the equipment and improve the separation of the ore. The plant's capacity was 120 tpd; the ore was concentrated on Wilfley tables, followed by oil flotation. Sulfides of iron, arsenic, and antimony, mixed with the zinc, lead, and silver minerals, made separating the silver-lead and the zinc concentrates an ongoing problem for Federal. The arsenic content of the North Star ores was high enough to provide a potential source of by-product arsenic for war use. In addition, considerable carbon associated with the lead and zinc minerals made it impossible to achieve a clean separation of the minerals by flotation. The USBM production records show development work during the year of 3,565 feet on four tunnels and 3,255 feet of drifts. Federal's operating costs on the property for 1917 was \$96,858.30. The money was spent on development work, on the mill, and on construction. Federal employed 88 men on the North Star and the Independence and produced 7,360 tons of ore.

During 1918, the North Star mill was "working to a favorable point" and producing zinc concentrates with up to 40 percent zinc. The ore contained around 14 percent zinc, 8 percent lead, and 8 ounces of silver per ton. However, a decline in metal prices (particularly zinc) forced Federal to suspend operations at the North Star in September. According to Federal's annual report for 1918, "The operations on this property disclosed a considerable body of ore, but the metallurgical difficulties are so great at present costs and prices that a satisfactory profit could not be made." Federal operated the North Star only during May, June, July, and August, producing 9,700 tons of ore. The company spent considerable effort rearranging the mill during the year.

The North Star Mine was idle during 1919 because the ore could not be mined profitably, but contract workers were driving the Plummer tunnel from the North Star workings through the mountain to connect with the Independence Mine. When the Plummer tunnel reached the Independence vein in 1920, the North Star mill was readjusted to handle 200 tpd of silver-lead ore from the Independence.

During 1921 and 1922, Federal concentrated its efforts on the Independence workings, although the USBM included minor production from the North Star in the ore credited to the Independence. The property was shut down in August 1923, and the workings (mostly in the Independence) were leased in blocks to various individuals. Minor amounts of ore were removed from the mine for most years during the next decade. In 1928, lessees shipped several carloads of lead-zinc ore to the flotation mill at Midvale, Utah. Lessees also worked the mine in 1929. In 1930, lessees shipped one carload of ore to a smelter and two carloads of lead-zinc ore to Midvale.

In 1936, Snyder Mines, Inc., took over operation of the North Star and connected the North Star workings with those of the Triumph. Lessees continued to operate parts of the North Star and Independence at least through 1937. Snyder's operation in the Triumph and North Star workings accounted for most of the production from the Warm Springs district during 1937 and 1938; 1939 production was credited entirely to the Triumph. The Triumph Mining Company acquired ownership of the property in 1940. Development work for 1941 included 300 feet of shafts, 2,900 feet of drifts, and 2,300 feet of tunnels. After 1942, production from the North Star workings was not reported separately from ore mined from the Triumph Mine.

Total recorded production for the North Star between 1883 and 1942 was 338,918 tons of ore and 3,361 tons of old tailings. This material yielded 35,665 ounces of gold; 2,593,891 ounces of silver; 827,382 pounds of copper; 33,974,077 pounds of lead; and 50,385,871 pounds of zinc.

OLD TRIUMPH and the TRIUMPH MINE AND MILL SITE(s)

The Triumph, Independence, and North Star mines were all discovered in the 1880s and operated intermittently for many years. In 1916, Federal Mining & Smelting purchased the North Star Mine. Federal acquired the Independence Mine in late 1917 and connected the two mines through the 6,200-foot Plummer tunnel in 1920. Both the Independence and the North Star were closed down in 1923, except for work by lessees. Snyder Mines, Inc. began operating the Triumph Mine in 1936. In addition, Snyder leased the North Star and connected the workings with the Triumph through the Plummer tunnel. The Independence was leased to Snyder in 1938, and from 1939 on, the three mines were worked as a single operating unit.

Between 1884 and 1967, the Triumph produced \$39,719,400 worth of metals; the North Star produced \$8,685,100 between 1883 and 1942; and the Independence produced \$3,335,800 between 1884 and 1933.

The Triumph Mine was discovered in June 1884. Considerable development work was done then and in the 1880s and 1890s. The Triumph produced \$40,000 of ore through 1912 (Umpleby et al, 1930).

In 1909, the Ivanhoe Mining Company was organized to consolidate the separate holdings of the company's founders. Among these properties was the Triumph Group. The company never conducted any mining operations of its own.

By 1912, the Triumph shaft was flooded. The 1912 IMIR said that the mine "has several extensive levels disclosing a body of massive sulphide ore carrying 8 to 10 per cent lead and an ounce of silver to each unit of lead with very little zinc. This ore resource is from 5 to 8 feet thick and proven to be several hundred feet in length" (p. 81). In 1913, the main shaft of the Triumph was 300 feet deep and the estimated resources of the mine were about 50,000 tons of a grade similar to the adjoining North Star (about 14 percent zinc and 6 percent lead). The Idaho Mine Inspector proposed that a cross-cut tunnel be driven from the East Fork of the Wood River to intersect the Triumph ores at depths between 100 and 1,000 feet and at a distance of about 2,000 feet from the portal. He speculated that such a tunnel would discover "important" additional reserves of ore. The 1913 IMIR (p. 141) placed the gross production of North Star and Triumph Mines at \$75,000.

The 1915 IMIR noted the Triumph and North Star properties were "the subject of serious consideration . . . by one of the ablest mining engineers in the country"; part of the problem lay in finding a suitable method for treating the complex ore at both mines. The report described the ore and the problems associated with its treatment (IMIR, p. 74):

At the North Star and Triumph Mines, . . . an extensive resource of base zinc-lead-silver ore that it is believed will aggregate a hundred thousand tons of mineral above its bottom development levels and carrying about 15 per cent zinc with 8 per cent lead and 8 ounces of silver, is the subject of serious consideration at the present time by one of the ablest mining engineers of the country, Mr. Ralph Nichols, whose worldwide experience as a practical operator of large properties guarantees possible maximum results in working out the problem involved, which is admittedly a knotty one in this instance, as the ore is extremely base by a complication of massive arsenical pyrite association, but, it is believed that the recent advance in the electro-chemical treatments on zinc values will solve the problem of this deposit and transform its idle resources into a mining and milling enterprise of very considerable capacity and profit.

In 1919, Silver Triumph Mining Co. leased, with an option to purchase, the Triumph and Imperial Groups and began cleaning out the old workings. The company planned to install a 100-ton-per-day (tpd) concentrating plant. The Triumph Mine had 5,000 feet of drifts, 2,335 feet of cross-cuts, and a 300-foot shaft. That year, the Mine Inspector credited the Triumph with \$40,000 of lead-silver production "in the early days of Wood River" and reported that the property contained "extensive" resources of ore containing good lead-silver and zinc values. In 1920, Silver Triumph reopened, cleaned, timbered, and laid track in about 2,400 feet of tunnels. The mine had approximately 10,000 feet of tunnels, drifts, crosscuts, raises, and shafts.

According to the 1926 IMIR, Combined Metals & Reduction Co., a subsidiary of the National Lead Co., was working at the Triumph Mine. The report gives no details, and the company did not pursue its interest. However, future production from the mine was processed at Combined Metals' custom flotation plant in Bauer, Utah, for most of the time the mine was operating.

In 1927, the Triumph Development Co. leased the Triumph Group from the Ivanhoe Mining Co. Triumph constructed a head frame and new buildings, and installed mining equipment, including an electrically driven double-drum hoist and a 700-cubic-foot compressor. After dewatering and repairing the shaft, production was started at 50 tpd (later increased to 75 tpd). The ore was shipped to a custom milling plant at Salt Lake City, which produced both lead-silver and zinc concentrates. The Mine Inspector noted (IMIR, p. 75), "The reopening and subsequent profitable operation of this mine were made possible by selective flotation, whereby mixed lead-zinc ores can now be treated which could not be separated by gravity concentration methods." The total workings in 1927 were about 7,000 feet, with development on three levels from a 300-foot deep shaft. The following year, Triumph Development Co. produced 75 tpd until September. The Triumph produced over 17,000 tons of ore in 1928. The ore consisted chiefly of sphalerite and galena, and was separated into lead and zinc concentrates at the Combined Metals Reduction Co. plant. In 1928, the Triumph ranked fourth in the state as a producer of zinc, tenth as a producer of silver, and thirteenth as a producer of lead. In September, production was suspended while the company sunk the winze on the No. 3 level to a greater depth and constructed a mill near the railroad siding of the Oregon Short Line Railroad. The company also surveyed the route and made plans to construct a 4.1-mile-long tramway from the mine to a point adjacent to the railway.

The aerial wire rope tramway was built by the Broderick & Bascom Rope Co. of St. Louis and had a capacity of 20-32 tons per hour (150 tons per 8 hours). It was operated by the Hailey Tramway Co., which was incorporated on August 28, 1929, and had the same officers as the Hailey Development Co. The tramway was completed in January 1930. The company hauled ore under contract from the Triumph Mine to the railroad. The Hailey Tramway Co. owned a block of mining claims along the tramway's right-of-way. These claims apparently were to be developed for the company by Hailey Triumph Mines Co., but little work was ever done. The Hailey Tramway Co. forfeited its corporate charter on November 30, 1937.

The Triumph Development Co. forfeited its charter on November 30, 1928, and operations were taken over by the Hailey Triumph Mines Co., which was incorporated on August 23, 1929. According to the company, principal development work consisted of extending the winze on the No. 3 level 400 feet, which was equal to 200 feet below the bottom of the shaft. (The USBM gives the development as 300 feet of inclined winze and 1,000 feet of drifts.) This work opened up a "substantial tonnage" of ore containing galena and sphalerite; some of the new reserves were close to the adjoining North Star property. The Warm Springs district produced 26,647 tons of lead-zinc ore during 1929, mostly from the Triumph; the mine was the sixth largest producer of zinc in the state. A large bunk and boarding house and a number of new homes were built during the year; considerable mining equipment was added as well. Total development of the mine was given as approximately 13,000 feet.

Production and development continued until June 20, 1930. At that time, production was suspended, but development continued with a crew of 20-30 men until September, when all operations ceased due to decreases in metal prices. Lead and zinc prices decreased from 1925 to 1932, and zinc, lead, and silver all reached historic lows in 1932 (zinc, 2.9 cents per pound; lead, 3.2 cents per pound; and silver, about 28 cents per pound). The crude ore, containing mostly sphalerite and galena, was

shipped to Combined Metals Reduction Co. in Bauer, Utah. Even with the reduced operations, the Triumph was the second largest zinc producer in Idaho and ranked eleventh in the state in the production of both silver and lead. Additions to the mine and plant in 1930 included doubling the capacity of the sorting plant and bins. The mine had 17,775 lineal feet of workings, consisting of 425 feet of vertical shafts, 650 feet of inclined shafts, 4,100 feet of raises, and 12,650 feet of tunnels, crosscuts, and drifts. Daily wages were \$4.75-\$5.25 for miners, \$4.25-\$4.75 for muckers, and \$5.00 to \$6.00 for blacksmiths and hoistmen.

Although company reports show some development work took place during 1931, the mine was idle most of the year. It remained idle through 1935, although one lessee removed some ore. One carload of lead-zinc ore was shipped to Bauer, Utah, in 1933.

In 1934, the Silver Purchase Act became law. Under this act, the federal government bought all domestically mined silver at a substantial premium over the world market price from 1934 to 1964. Many mines throughout the West made preparations to re-open after closing early in the Great Depression.

A little lead-zinc ore was shipped from the Triumph waste dumps in 1935. The company began dewatering the Triumph Mine on December 15, 1935. Mining operations began on April 15, 1936, by Snyder Mines, Inc. The company was also working the West Shore claims between the Triumph and North Star shafts. The West Shore claim was listed as part of the original Triumph Group, but the ownership of this claim was given at different times as the Triumph, the North Star, and an independent unit. During 1936, Snyder took over the North Star from Federal Mining and Smelting Company and connected it with the Triumph Mine. Federal received a 9 percent interest in future production but would not operate the property. The Triumph shipped about 215 tons of ore a day to the railroad over its tramway, making it the largest mine in Blaine County. The mine operated continuously from 1936 to 1957, and for most of that period, the Triumph was the largest producing mine in Idaho outside the Coeur d'Alene district.

In 1937, Snyder continued to operate the Triumph, while work on the North Star and Independence was carried out by lessees. The ore was shipped to Utah for treatment. The Triumph was the second largest producer of zinc in Idaho in 1938, as well as ranking fourth in lead production and sixth in silver. Hailey Triumph Mines forfeited its charter on November 30, 1937. Snyder Mines carried on an extensive development program during 1938.

During 1938, the Challenger Mines Co. began work on the adjoining Snider Group (Pete Snider Claims). (There is no connection between the Pete Snider who owned these claims and lived in Hailey, and the Snyders from Salt Lake City, Utah, who controlled Snyder Mines, Inc.) The company did 1,000 feet of development work in 1940. On December 11, 1943, Challenger Mines signed a joint working agreement with the Triumph Mining Co. (incorporated in 1940) for Triumph to develop the property. World War II delayed work under this agreement, but by July 1947, Triumph Mining Co. was driving two drifts toward the Snider claims and had reached the property line. Some ore was shipped in 1949, but according to Challenger Mines Co., not enough for Triumph Mining Co. to recover the costs of developing the property. Challenger Mines reported that Triumph Mining continued working on its property through 1956.

Snyder built a hoist house and did about 7,000 feet of development work during 1939 on the Triumph, North Star, and Independence mines. The property was worked through the Plummer tunnel and the Triumph shaft. Approximately 10,000 tons of complex silver-lead-zinc sulfide ore, with a fair gold content, was produced every month. About 65,000 tons of zinc-lead ore was shipped to Combined Metals Reduction Co.'s flotation plant at Bauer, Utah, while 41,461 tons of gold-silver ore and 682 tons of lead ore were shipped to a smelter at Tooele, Utah. The mine was the largest producer of gold in Idaho in 1939, and it ranked third in zinc production, fourth in silver, and fifth in lead. In September, fire destroyed the boarding house which held the general and engineering offices. Snyder Mines, Inc., forfeited its charter on December 1, 1939.

Snyder Mines continued to operate the mines until March 16, 1940, when the property was formally transferred to the newly incorporated Triumph Mining Co. Even then, Snyder managed the property almost until the end of the war. Additions to the mine and plant during 1939-1940 included a new hoist house (the hoist was a 48-inch double drum Ottumwa), head frame, change house, general office, and time keeper's office. Other mining equipment included 100 ore cars, 3 underground hoists, 3 mucking machines, 45 air drills, and 14 slusher hoists. A partially dismantled 150 ton mill was on the property, but (in the company's words) was "not in use." Total combined workings of the three mines were given as about 50,450 feet; 20,750 feet of the workings were on intermediate levels of the Triumph Mine. Daily wages were \$5.80 for miners, \$5.30 for muckers, and \$6.30 for hoistmen and blacksmiths. The Triumph was the fourth largest producer of gold in Idaho in 1940. It was also among the top five zinc producers for the year and was a significant producer of lead and copper.

A new compressor house was built at the Triumph tunnel in 1941; it housed a Worthington 2,600-cubic-foot compressor with a 400-horsepower motor. A new change house and a new blower house were also added, and plans were made for a concentrating plant. The 300-tpd gravity concentration and flotation plant at the old North Star mill was reconditioned and put into operation in 1942. The mill treated 32,512 tons of low-grade zinc-lead-silver ore that could not be profitably mined in 1941.

The ore grade mined in 1942 was lower than that mined in 1941. During World War II, the U.S. government assigned production quotas to base metal mines based on 1941 production, with premiums to be paid on production in excess of the quotas. Triumph Mining Co. was granted a basic quota of about 550 tons of lead and 900 tons of zinc per month; at the company's request, this quota was revised several times. Although production remained at capacity throughout the war, the mining of lower grade ores kept the amount of metals recovered below 1941 levels for most years.

In 1943, the Triumph Mine was on the list of the top ten producing mines in Idaho for each of the following commodities: gold, silver, copper, lead, and zinc. The Triumph tunnel was driven for several thousand feet along the strike of the North Star vein, and several new ore shoots were discovered. The mine shipped 74,889 tons of zinc-lead ore to custom flotation mills at Bauer and Tooele, Utah, for treatment. The concentrating plant at Triumph treated 33,505 tons of marginal zinc-lead ore, which yielded 9,431 tons of zinc-lead middlings. The middlings were shipped to Utah, and 778 tons of old tailings (lead-silver) were sent from the Independence dump.

In 1944, the company completed work on the 8,000-foot Triumph tunnel, and transferred operations from the Triumph shaft. The Triumph tunnel was a lower-level haulage tunnel intended to bypass the bottleneck of the Triumph shaft; it was driven from near the North Star mill to intersect with the 700 level of the Triumph workings. New change rooms, ore bins, a timber framing shed, and a blacksmith and car repair shop were built at the Triumph tunnel portal. The company processed 52,060 tons of low-grade lead-zinc-silver ore through its concentrator, recovering 13,349 tons of zinc-lead middlings and 2,893 tons of lead-silver concentrates. The middlings and 57,667 tons of higher grade zinc-lead-silver ore were shipped to Bauer and Tooele. The concentrates were shipped directly to a lead smelter. An additional 888 tons of old (silver) tailings was shipped to a copper smelter.

The company added a new 40-foot Dorr thickener to the old North Star mill in 1945. Total mine workings were 76,000 feet. There were 7 tunnels, 4 shafts, and 20 intermediate levels. The principal shaft was 700 feet deep. Daily wages were \$7.65 for miners, \$7.18 for muckers, \$8.63 for blacksmiths, and \$8.12 for hoistmen. During 1945, the company treated 61,695 tons of low-grade zinc-lead-silver ore at its gravity flotation plant and recovered 1,593 tons of lead-silver concentrates and 17,722 tons of zinc-lead middlings. The middlings were shipped to Bauer, Utah, along with 30,372 tons of higher grade zinc-lead-silver ore. The lead-silver concentrate was shipped directly to a lead smelter.

Although lead, zinc, and silver prices increased in 1946, production from the Triumph decreased from 92,067 tons in 1945 to 69,836 tons in 1946. Part of the reason was a strike that started on April 12 after two employees were discharged for allegedly blasting timbers in the mine. Miners went back to work on June 3. Terms of the agreement with the union included an 18.5-cent-an-hour raise, effective April 1; half of the increase was made retroactive to September 15, 1945. The company treated 56,799 tons of ore in its mill and produced 15,036 tons of zinc-lead middlings and 2,474 tons of lead-silver concentrate. The concentrates were shipped to a lead smelter; the middlings, plus 13,037 tons of zinc-lead-silver ore, were shipped to the Combined Metals mill in Utah.

Fire destroyed the old North Star mill on January 18, 1947. The mill was valued at over \$300,000 (Mining World, 1951). In spite of this, the company treated 3,790 tons of ore in its own mill and shipped 48,379 tons to Utah for processing. In addition, 1,063 tons of zinc-lead ore and 175 tons of silver ore from the Triumph dumps were shipped during the year by lessees. An extensive development campaign was started to develop sufficient reserves to justify building a new mill (Mining World, 1951).

The Triumph Mine remained the largest producer in southern Idaho in 1948 despite substantial decreases in production. Triumph Mining Co. shipped 35,552 tons of ore to milling plants in Utah, while lessees shipped 744 tons of zinc-lead ore from the Triumph dumps.

Production from the Triumph increased in 1949. The company shipped 49,014 tons of ore to milling plants in Utah, where it was reduced to 4,446 tons of lead concentrate, 4,180 tons of iron concentrate, and 3,044 tons of zinc concentrate. Lessees shipped 102 tons of zinc-lead ore and 40 tons of silver ore from the Triumph dumps. In 1949, the total development for the mine was 100,563

feet. The mine had 7 tunnels, 4 shafts, 20 raises, 20 cross-cuts, and 27 drifts. The principal shaft was 700 feet deep, and the lengths of the tunnels were as follows: No. 1, 13,000 feet; No. 2, 5,000 feet; No. 3, 800 feet; No. 4, 350 feet; No. 5, 1,800 feet; No. 6, 250 feet; and No. 7, 200 feet. Daily wages in 1949 were \$11.05 for miners, \$10.58 for muckers, and \$11.40 for blacksmiths and hoistmen.

The 1950 production declined from that of 1949, and all the ore was shipped to Utah for processing. In 1951, Triumph Mining Co. installed a new 300-ton selective flotation mill to replace the mill destroyed in 1947. The new mill was touted as a model of efficiency, with a layout that made it possible to operate at capacity with a minimum of personnel. It had been designed to process at 175 to 200 tpd, but was operated at rates up to 350 tpd (Engineering and Mining Journal, 1952). Mining World (1951, p. 24-26) described the operation of the new mill:

Primary crushing:

A 30-inch Stevens-Adamson apron feeder transfers the ore from the bins to a 30-inch belt conveyor. A grizzly at the end of the conveyor separates the ore into two fractions — plus and minus two inches. The coarse fraction is crushed to minus two inches by a 15- by 24-inch Blake-type, Traylor jaw crusher which the finer fraction bypasses.

An 18-inch belt conveyor then transfers the ore to a 300-ton steel bin at the head of the main mill building. From this bin the ore is taken by a 24-inch van-speed feeder conveyor to the 48-inch Wemco Special Helix classifier that removes as slime the troublesome carbon, bypassing it around the secondary crushing and grinding sections.

Secondary crushing & grinding

The sands from the classifier are transferred by an 18-inch conveyor to a three by eight foot Allis-Chalmers Ripl-Flo screen where the ore is again separated into two fractions — plus and minus ½ inch. The coarser material is crushed to minus ½ inch by a Symons cone crusher. The fine fraction and the crushed coarse fraction are then joined and fed to a seven by six foot Allis-Chalmers ball mill operating in closed circuit with a 36-inch Wemco Special Helix classifier that receives the overflow from the primary classifier in the crushing circuit.

Flotation

Overflow from the second classifier is pumped to the lead flotation circuit made up of 44-inch Fagregren-type Wemco cells. Six cells are used in the rougher circuit, two in the primary cleaner, and one in the secondary cleaner. The lead concentrate, after being dewatered by a 20-foot Wemco thickener and a six-foot, two-leaf Eimco filter, is temporarily stored in a 75-ton steel concentrate bin.

Tailing from the lead circuit flows by gravity to a five-by-six foot Wemco conditioner in preparation for zinc flotation. After flotation in a circuit similar to that for lead and dewatering by a 20-foot

Wemco thickener and a six-foot, three-leaf Eimco filter, the zinc concentrate is temporarily stored in a second 75-ton steel bin to await shipment. Both the lead and zinc concentrates are trucked six miles over a paved highway from the mill to the transfer docks on the Union Pacific railroad near Gimlet, Idaho. Tailing from the mill is carried by a trestled flume to a pond in the valley below the mine and mill.

The new mill began operation in February 1951 and substantially contributed to increased production. For much of the year, the mine was producing about 200 tpd; dump material was mixed with the ore before running it through the mill. According to Mining World

(1951), the addition of the dump material was needed because the mine was not producing ore as fast as the mill was processing it. Mine equipment on site was sufficient to produce a maximum of 300 tons per day, and plans were made to increase the mine's production in 1952. Tailings from the North Star dump were milled by the United States Smelting, Refining & Milling Co. in Utah.

During 1952, Triumph Mining Co. operated its mill three shifts a day, seven days a week. The mill processed 93,653 tons of ore and produced 4,961 tons of lead concentrates and 3,668 tons of zinc concentrates. T.V. Williams produced 2,402 tons of ore from his lease on the Triumph property, and another lessee shipped a small amount of zinc-lead ore from the Triumph dump. By 1952, daily wages had risen to \$13.87 for miners, \$12.42 for muckers, \$14.37 for blacksmiths, and \$14.65 for hoistmen.

Disaster struck late in 1952 when blasting broke into a zone saturated with ground water. The four lower levels of the mine flooded quickly. Fortunately, the flood occurred at shift change, so no lives were lost.

Production in the early part of 1953 was reduced due to the flooding. The mine was pumped out by early February. After the flood damage was repaired, a large sump was dug below the 1000 level and a permanent pumping station was installed. The Triumph Mining Co.'s flotation plant milled 93,132 tons of ore, which yielded 3,871 tons of lead concentrates and 5,636 tons of zinc concentrates.

A Defense Minerals Exploration Administration (DMEA) exploration contract for \$143,354 was awarded to the Triumph Mining Co. on August 9, 1954. U.S. government participation was 50 percent. During the year, the mill produced 3,686 tons of lead concentrate and 4,960 tons of zinc concentrates from 77,624 tons of ore. Development work in 1954 included exploration of the adjacent Challenger Mines property.

The Challenger ground was actively explored during 1955 in accordance with the joint working agreement signed between the two companies in 1943. The company's DMEA contract was on the government's active list for the year. Production was at about the same level as 1954; lead production decreased slightly, while zinc output increased substantially.

Triumph Mining Co.'s DMEA contract remained active during 1956, and over 5,000 feet of development work took place during the year. This included 1,406 feet of drifting, 1,144 feet of cross-cuts, 756 feet of slusher drifts, and 1,618 feet of raise. Production dropped substantially from 1955 levels.

Higher costs and lower prices forced the company to restrict activities early in 1957 and to completely suspend operations on July 15. The company shipped its lead concentrates to the East Helena, Montana, smelter and its zinc concentrates to the smelter at Anaconda, Montana. At the time of the closure, the mine had seven main tunnels and seven shafts. The principal vertical shaft was still 700 feet deep. The lengths of the tunnels were as follows:

No. 1, 13,000; No. 2, 5,000 feet; No. 3, 800 feet; No. 4, 3,500 feet; No. 5, 3,200 feet; No. 6, 3,600 feet; and No. 7, 3,200 feet (Triumph Mining Co.). The Triumph tunnel was 11,000 feet long and the Plummer tunnel was 3,500 feet (USBM). (For this entire period, the companies' reporting practices for the lengths of their haulage tunnels were not consistent. It is not known if the company's 1957 list included the Plummer and Triumph tunnels, or if those tunnels were excluded.) Daily wages workmen were \$16.79 for miners, \$15.34 for muckers, \$17.57 for blacksmiths, and \$17.57 for hoistmen.

In 1958, the company removed the underground equipment from the mine and allowed the lower levels to flood. The mill was dismantled, and the equipment was sold and removed from the property. Some lead-zinc ore was shipped from the Triumph by a lessee.

The Idaho-Pacific Mining Co. processed material from the Independence dump in 1963. In 1964, Idaho-Pacific milled the Triumph dumps using a 700-tpd Wemco #2 heavy media separation plant. Federal Resources optioned the Triumph dump from Idaho-Pacific, and Idaho-Pacific terminated all operations in the area at mid-year.

Bear Creek Mining Company did exploration and development work at the Triumph during 1978 and 1979. In 1981, Ventures West drilled five holes at the mine. The target was apparently below the 800-foot level. Getty Oil Company ran a drilling program in 1984 and 1985. Getty's option was picked up by Peregrine Mining Company in 1986.

Peregrine evaluated the data from Getty's project and from Bear Creek's drilling, it then dropped its option late in the year. Very little ore was discovered by these ventures, and the mine is believed to be worked out.

Total recorded production for the Triumph between 1884 and 1967 was 1,655,091 tons of ore and 34,013 tons of old tailings. This material yielded 60,896 ounces of gold; 12,051,752 ounces of silver; 3,526,845 pounds of copper; 139,229,827 pounds of lead; and 176,295,742 pounds of zinc.

In 1988, DEQ performed a Preliminary Assessment of the Site. DEQ found elevated concentrations, above background, of arsenic, manganese, and zinc, in surface water in the Triumph Tunnel drainage ditches near the LTP and the East Fork of the Big Wood River. EPA completed a Site Inspection in

September of 1991. EPA continued with additional site assessment work in 1992 and 1993. In May of 1993, EPA proposed to add the Site to the federal National Priorities List (NPL), commonly known as Superfund. General Notice letters were sent out in June of 1993 to Triumph Minerals, Asarco, and the Idaho Department of Lands (IDL). Snyder Mines, Inc. and the Bureau of Land Management were also notified of potential liability.

Significant community opposition to the potential listing of Triumph on the NPL resulted in a Memorandum of Agreement (MOA) between EPA and DEQ. This 1994 agreement defers remediation responsibility from EPA to DEQ regulatory authorities. The agreement states that DEQ response activities will be conducted consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, the National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan (NCP), and Idaho State laws and regulations. DEQ entered into a Consent Order with Asarco and IDL in January 1994, to perform a Remedial Investigation/Feasibility Study for the Site. The Remedial Investigation was completed in January 1997. DEQ completed the Baseline Ecological Risk Assessment in May 1997 and the Baseline Human Health Risk Assessment in August 1997. The final Feasibility Study was completed March 1998 at about the same time the Site ROD was issued on March 19, 1998. A second Consent Order was entered into with Asarco and IDL for remedial design and action in August 1999. In this consent order, the Site was broken into two operable units: the soils and mine water components. On April 30, 2003, EPA de-proposed the Triumph Site from the National Priorities List. EPA de-proposed the Site based on the MOA and DEQ fulfilling its obligations under the agreement. During the course of remediation, Asarco found itself in a difficult financial situation and was unable to meet remedial obligations at Triumph and other sites around the country. In 2003, money was made available from Asarco through a settlement the company made with the federal government. In 2003, \$300,000 of Asarco money was provided to the Site for mine plug installation to cut off the uncontrolled flow from the Triumph Tunnel. The amount of money, if any, that will be available for the monitoring and contingency implementation, if needed, is not known. However, funds have been requested through the Asarco settlement trust fund process.

Since the last five-year review, Asarco formally entered into bankruptcy. DEQ has entered into a bankruptcy settlement with Asarco and is awaiting final disposition based on final bankruptcy rulings.

Remedial Action Implementation History. Phase I of the remedial action began October 19, 1998, and ended November 25, 1998, prior to finalizing the second consent order. Phase II construction began May 1999 and was completed December of that same year. Mine plug installation work was initiated in the summer of 2001, beginning with rehabilitation of the Triumph Tunnel. A new tunnel was drilled to connect with the old tunnel after the old tunnel was found to be too unstable to be re-opened safely and cost-effectively. The new tunnel intersected with the old tunnel in a location identified to be appropriate for plug installation. The plug construction was initiated in the summer of 2003 and water from the mine was shut off on August 28, 2003.

From 2003 through 2006 the “site” has been in a monitoring mode.

In 2006 the owner of the numerous patented mining claims, Carl Masaro, began to make major landscaping modifications on historic mine and mill workings in North Star and Triumph gulches and the ridgelines in between. Because these landscaping efforts were perceived to threaten the previous remedial actions, and there was a significant potential of release of contaminated mine wastes to other private properties in the Village of Triumph, Blaine County Planning and Zoning Code Enforcement and DEQ collaboratively intervened and stopped work by Mr. Masaro. Through an informal agreement reached by the three parties (Blaine County, DEQ and Carl Masaro), Carl Masaro was directed to complete repair work to Karst Drive in Lower North star Gulch. At the same time, all other work was suspended while Mr. Masaro applied for acceptance into DEQ's Voluntary Cleanup Program (VCP).

During the processing of Mr. Massaro's VCP application, he granted legal access to DEQ for the completion of the field work leading to this PA/SI. IDEQ completed desk top reviews and field work during 2006 and 2007.

In 2008 DeNovo Independence LLC (DeNovo) completed the purchase of the patented lands (listed above) from Mr. Massaro. Because DeNovo decided to continue with the processing of the VCP application for the properties, and indicated that DeNovo would complete a comprehensive site investigation, human health and ecological risk analysis, and proposed a Remedial Action Work Plan, IDEQ suspended completion of a final Preliminary Assessment.

In 2009 DeNovo has been working to implement the RAWP in accordance with its Voluntary Cleanup Agreement with DEQ and a Categorical Exclusion issued by Blaine County Planning and Zoning.

CURRENT SITE CONDITIONS

Current site conditions have been in a very dynamic flux since 2006 when DEQ and Blaine County Planning and Zoning began working with Mr. Carl Massaro and more recently DeNovo. A fairly comprehensive photo documentation and description of site conditions for the Independence Mine and mill site, Old Triumph (Shaft), the North Star Mine, and the Triumph Tunnel site is contained in its entirety in Appendix A.

WASTE CHARACTERIZATION

Background soils conditions and waste characterization at these mine and mill sites has been conducted at both a reconnaissance level of effort for this report by IDEQ, and in a much more quantitative effort by DeNovo. The data (Appendix B) from these efforts was used to evaluate human health and ecological risk (Appendix C). Subsequently, a residential risk based scenario was used to develop DeNovo's approved RAWP.

Waste characterization for this report, both quantitative and qualitative, was conducted using geological reports, field observations and comparisons of laboratory analysis of waste samples with analysis of background soil samples, Idaho's Initial Default Target Levels (IDTLs) and BLM's Risk

Management Criteria (RMC). The IDTLs are prescribed in the "Risk Evaluation Manual" - or REM. This manual presents a roadmap for evaluating risk, from discovery through clean up. It is a manual to determine whether ground water, surface water, or soil at a particular location is contaminated to the extent it poses a human health risk. This manual guides DEQ employees and others in responding when chemicals are released to the environment. It helps evaluate whether an investigation or cleanup is needed and, if so, what its scope and nature should be.

BACKGROUND SOILS

DeNovo's Human Health Risk Evaluation (Appendix C) contains all of the discussion pertinent to background metals concentrations in the project area, and how wastes derived by mining and milling are, in places, significantly higher than background levels. However, two key points can be derived by DeNovo's analysis; background concentrations of metals in soils in the Triumph area are extremely variable and high relative to other geologic terrains, however these concentrations and their occurrence is not inconsistent with those that are routinely found in a geologic terrain that contains economic ores. The reader is directed to the full discussion of background conditions in DeNovo's risk assessments.

INDEPENDENCE MILL TAILINGS

Cumulatively, the Independence Mill tailings cover an area of approximately 2 acres, and total approximately 100,000 yd³. The tailings are mostly (+90%) fines (<100 mesh).

Two of the Independence Tailings Impoundments were sampled (IMSS01 and IMSS02) and analyzed (TABLE 1). Concentrations of total arsenic, cadmium, lead, mercury selenium, and silver exceeded IDTLs. Arsenic concentrations of 483 and 347 ppm exceed IDTLs by 1235 and 887 times respectively. Cadmium concentrations of 11.0 and 22.3 ppm exceed IDTLs by 8.8 and 16.5 times. Lead concentrations of 11,700 and 9730 ppm exceed IDTLs by 236 and 196 times respectively. Mercury concentrations of 0.578 and 0.203 ppm exceed IDTLs by 113 and 40 times respectively. Selenium concentrations of 26 and 20 ppm exceed IDTLs by 13 and 10 times respectively. Silver concentrations of 156 and 96.2 ppm exceed IDTLs by 825 and 508 times respectively.

INDEPENDENCE WASTE DUMP #1

Independence Adit #1 is caved. It was apparently developed along the strike length of a major ore body. Development of the adit resulted in Independence Waste Dump #1 which contains approximately 500 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was not sampled.

INDEPENDENCE WASTE DUMP #2

Independence Adit #2 is caved. It was apparently developed along the strike length of the same ore body. Along the west side of the workings there is a large caved structure, presumably a stope,

which outlines the Independence Waste Dump #2, and which contains approximately 1,500 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was sampled at its toe (IMWD2SS1) and analyzed (TABLE 1). Concentrations of Arsenic (733 ppm), Chromium (13.9 ppm), Lead (5750 ppm), Mercury (0.37 ppm), Selenium (12.0 ppm), and Silver (47.1 ppm) exceed IDTLs. Only concentrations of Arsenic, Lead, Mercury, Selenium, and Silver exceed background levels by three times or greater.

INDEPENDENCE WASTE DUMP #3

Independence Adit #3 is caved. It was apparently extensively developed along the strike length of the same ore body. Along the west side of the workings there is a large caved structure, presumably a stope, which outlines the Independence Waste Dump #3, and which contains approximately 30,000 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was sampled at its toe (IMWD3SS1) and analyzed (TABLE 1). Concentrations of Arsenic (845 ppm), Chromium (28.1 ppm), Lead (4230 ppm), Mercury (0.403 ppm), Selenium (7.0 ppm), and Silver (37.2 ppm) exceed IDTLs. Only concentrations of Arsenic, Lead, Mercury, Selenium, and Silver exceed background levels by three times or greater.

INDEPENDENCE WASTE DUMP #4

Independence Adit #4 is caved. It was apparently extensively developed along the strike length of the same ore body. Along the west side of the workings there is a large caved structure, presumably a stope, which outlines the Independence Waste Dump #4, and which contains approximately 20,000 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was sampled on its brow (IMWD4SS1) and analyzed (TABLE 1). Concentrations of Arsenic (698 ppm), Cadmium (2.26 ppm), Chromium (20.3 ppm), Lead (799 ppm), Mercury (0.368 ppm), Selenium (12.0 ppm), and Silver (3.49 ppm) exceed IDTLs. Only concentrations of Arsenic, Lead, Mercury, Selenium, and Silver exceed background levels by three times or greater.

INDEPENDENCE WASTE DUMP #5

Independence Adit #5 is caved. It was (apparently) extensively developed. Independence Waste Dump #5, contains approximately 100,000 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was sampled on its brow (IMWD5SS1) and analyzed (TABLE 1). Concentrations of Arsenic (577 ppm), Cadmium (2.81 ppm), Chromium (21.2 ppm), Lead (4710 ppm), Mercury (0.503 ppm), Selenium (8.0 ppm), and Silver (38.1 ppm) exceed IDTLs. Only concentrations of Arsenic, Lead, Mercury, Selenium, and Silver exceed background levels by three times or greater.

INDEPENDENCE WASTE DUMP #6

Independence Adit #6 is caved. It was apparently extensively developed. Independence Waste Dump #6 contains approximately 15,000 yd³ of waste. This waste appears to be comprised mostly of country rock although there are obvious massive sulfides disseminated throughout the waste rock. The waste dump was sampled on its brow (IMWD6SS1) and analyzed (TABLE 1). Concentrations of Arsenic (56.9 ppm), Cadmium (6.86 ppm), Chromium (33.1 ppm), Lead (174 ppm), and Mercury (0.128 ppm) exceed IDTLs. Only concentrations of Arsenic, Cadmium and Mercury exceed background levels by three times or greater.

INDEPENDENCE JIG TAILINGS

Approximately 500 yd³ of what appears to be jig tailings were placed on a bench immediately beneath the mill buildings. This bench has been used as a foundation for office buildings and house trailers. The jig tailings were sampled (IMMSS-1) and analyzed (TABLE 1). Concentrations of Arsenic (635 ppm), Cadmium (8 ppm), Chromium (10.6 ppm), Lead (11200 ppm), and Mercury (0.3 ppm) and Selenium (40 ppm) were the highest concentrations found on the site and exceed IDTLs. Only concentrations of Arsenic, Cadmium, Copper, Lead, Mercury Selenium, Silver and Zinc exceed background levels by three times or greater.

Table 1 Independence Mine and Mill Site (IDEQ) Sample Results

	Idaho's Initial Default Levels	EPA Region 9 PRGs	Independence Gulch Background	Independence Gulch Tailings Impoundment	Independence Gulch Tailings Impoundment	Independence Mine Waste Dump 2	Independence Mine Waste Dump 3	Independence Mine Waste Dump 4	Independence Mine Waste Dump 5	Independence Mine Waste Dump 6	Independence Mine Jig Tailings
Description			IMBGSS1	IMSS01	IMSS02	IMWD2SS1	IMWD3SS1	IMWD4SS1	IMWD5SS1	IMWD6SS1	IMMSS1
Aluminum											
Antimony	4.77	76000									
Arsenic	0.391	31	12.6	483	347	733	845	698	577	56.9	635
Barium	896	0.39	351	204	188	482	478	237	349	74.4	114
Beryllium	1.63	5400									
Cadmium	1.35	1500	1.84	11.9	22.3	1.95	1.33	2.26	2.81	6.86	8.00
Calcium		37									
Chromium	7.9	NA	55	6.9	9.94	13.9	28.1	20.3	21.2	33.1	10.6
Cobalt		210									
Copper	921	900	30.9			230	65.9	26.9	87.4	48.4	108
Iron		3100									
Lead	49.6	23000	97.7	11700	9730	5750	4230	799	4710	174	11200
Magnesium		400									
Manganese	223	NA									
Mercury	0.00509	1800	0.045	0.578	0.203	0.37	0.403	0.368	0.503	0.128	0.3
Nickel	59.1	23									
Potassium		NA									
Selenium	2.03	NA	< 4	26.0	20.0	12.0	7	12.0	8.0	< 4	40.0
Silver	0.189	390	< 0.50	156	96.2	47.1	37.2	3.49	38.1	< 0.50	94.6
Vanadium		390									
Zinc	886	550	161			291.0	187	162	231	629	858.0

NORTH STAR WASTE DUMP #1

The North Star Waste Dump #1 covers approximately 1.7 acres and contains in excess of 41,000 yd³ of mine wastes. North Star Waste Dump #1 was sampled near its toe in North Star Gulch on October 3, 2006) and analyzed (TABLE 2). Total arsenic, lead, mercury and zinc all exceed both IDTLs and background metals concentrations. Arsenic concentrations of 1470 ppm exceed IDTLs and background concentrations by 3700 and 50 times respectively. Lead concentrations of 2260 ppm exceed IDTLs and background concentrations by 45 and 37 times respectively. Mercury concentrations of 0.659 ppm exceed IDTLs and background concentrations by 129 and 14 times respectively. Zinc concentrations of 10,300 ppm exceed IDTLs and background concentrations by 11 and 12 times respectively.

NORTH STAR #1 ORE CHUTE

A sample of the North Star #1 Ore Chute was collected in April 2007 and analyzed. It was not included in TABLE 2 because the volume of waste it represents is di minus relative to the mine waste dumps. The sulfide minerals present include galena, sphalerite, arsenopyrite and sulphantimonides (tetrahedrite and boulangerite) in a gangue of siderite and quartz. This type of ore constituted the major production from the Triumph, North Star and Independence mines. The sample of North Star #1 Ore Chute contained total arsenic, cadmium, lead, mercury, selenium, and silver concentrations that exceed the IDTLs. Arsenic concentrations of 2070 ppm exceed IDTLs by 5,000 times. Cadmium concentrations of 369 ppm exceed IDTLs by 270 times. Lead concentrations of 5490 exceed IDTLs by 110 times. Mercury concentrations of 0.743 ppm exceed IDTLs by 146 times. Selenium concentrations of 7 ppm exceeded IDTLs by 3 times. Silver concentrations of 34.3 ppm exceed IDTLs by 181 times.

NORTH STAR #2 WASTE DUMP

The North Star Waste Dump #2 covers approximately 0.25 acres and contains approximately 1,600 yd³ of waste rock. The waste rock is similar in composition to that found on North Star Waste Dump #1 and throughout North Star Gulch in that it resembles country rock with large amounts of massive sulfides. It was not sampled.

NORTH STAR #3 WASTE DUMP

The North Star #3 Dump appears to be comprised mostly of shale from the Milligen Formation that was generated when one of the many adits and tunnels were being driven to the ore chutes in the North Star mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock.

Table 2 North Star Mine Sample Results

Description	Idaho's		North Star Gulch	North Star Gulch	North Star Mine	North Star Gulch Upper Sediment Basin NSWDS-2	North Star Gulch Lower Sediment Basin NSWDS-3	North Star Gulch Above Turnoff to TR Tunnel NSWDS-4	North Star Gulch On Turn to TR Tunnel NSWDS-5	North Star Mine Waste Dump #7 NSWDS7
	Initial Default Threshold Limits	EPA Region 9 PRGs	Background Sample NSBGSS-1	Background Sample NSBGSS 2	Waste Dump #1 NSWDS-1					
Aluminum										
Antimony	4.77	76000								
Arsenic	0.391	31	29.3	34	1470	673	626	1510	351	195
Barium	896	0.39		94.4						
Beryllium	1.63	5400								
Cadmium	1.35	1500		10.1						
Calcium		37								
Chromium	7.9	NA		58.8						
Cobalt		210								
Copper	921	900		72.2						
Iron		3100								
Lead	49.6	23000	60.8	51	2260	2010	1700	482	902	256
Magnesium		400								
Manganese	223	NA								
Mercury	0.00509	1800	0.047	0.052	0.659	0.34	0.377	0.778	0.51	0.049
Nickel	59.1	23								
Potassium		NA								
Selenium	2.03	NA		< 4						
Silver	0.189	390		< 0.5						
Vanadium		390								
Zinc	886	550	834	716	10300	8210	6860	2480	3680.0	808

Table 3 Disturbed Material in North Star Gulch

	Idaho's Initial Default Target Limits	EPA Region 9 PRGs	North Star Gulch	North Star Gulch	North Star Gulch	North Star Gulch	North Star Gulch	North Star Gulch
Description	IDLs		Background Sample NSBGSS-1	Background Sample NSBGSS-2	Massaro Road Fill #1TVNGSS-1	Massaro Road Fill TVNGSS-2	Massaro Road Fill TVNGSS-3	Massaro Road Fill TVNGSS-4
Arsenic	0.391	31	29.3	34	1190	1040	396	651
Barium	896	0.39		94.4	112	108	137	122
Beryllium	1.63	5400						
Cadmium	1.35	1500		10.1	12.9	10.8	6.35	10.3
Calcium		37						
Chromium	7.9	NA		58.8	36.4	40.8	38.2	41.4
Cobalt		210						
Copper	921	900		72.2	57	62	50	58
Iron		3100			23800	24500	24000	21600
Lead	49.6	23000	60.8	51	741	748	391	552
Magnesium		400						
Mercury	0.00509	1800	0.047	0.052	0.128	0.145	0.095	0.125
Nickel	59.1	23						
Potassium		NA						
Selenium	2.03	NA		< 4	< 4	< 4	< 4	< 4
Silver	0.189	390		< 0.5	5.82	5.14	4.02	4.08
Vanadium		390						
Zinc	886	550	834	716				

The North Star #3 covers approximately .15 acres and contains approximately 2,500 yd³. A sample of the North Star #3 Waste Dump was collected in April 2007. Total arsenic, cadmium, chromium, lead, mercury selenium and silver all exceed both IDTLs. Arsenic concentrations of 2300 ppm exceed IDTLs concentrations by 5900 times. Cadmium concentrations of 103 exceed IDTLs by 76 times. Lead concentrations of 6510 ppm exceed IDTLs by 131 times. Mercury concentrations of 1.93 ppm exceed IDTLs by 379 times respectively. Selenium concentrations of 15 ppm exceed IDTLs by 7 times and silver concentrations of 48 ppm exceed IDTLs by 253 times. Concentrations of Arsenic, Lead, Mercury and Zinc all exceed background concentrations by greater than three times.

NORTH STAR GULCH

Mine waste rock has been displaced throughout North Star Gulch by erosion and numerous earth moving operations over one hundred years. This waste rock has been disturbed over an area of at least 5 acres, which contains at least 40,000 yd³ of wastes.

As in most of the waste rock dumps, most of the waste rock dispersed throughout the gulch appears to be comprised of country rock that was generated when one of the many adits and tunnels were being driven to the ore chutes in the North Star mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock.

IDEQ sampled four (4) random locations in the gulch. In all four (4) samples total arsenic, lead, mercury and zinc exceed both IDTLs and background metals concentrations. Arsenic concentrations of 673, 626, 1510 and 351 ppm exceed IDTLs and background concentrations by as much as 3800 and 51 times respectively. Lead concentrations of 2010 ppm, 1700 ppm, 482 ppm, and 902 ppm exceed IDTLs and background concentrations by as much as 40 and 33 times respectively. Mercury concentrations of 0.034, 0.377, 0.778, and 0.51 ppm exceed IDTLs and background concentrations by as much as 196 and 16 times respectively. Zinc concentrations of 8210, 6860, 2480 and 3680 ppm exceed IDTLs and background concentrations by 9 and 10 times respectively.

NORTH STAR GULCH ADJACENT HOMES

Some of the wastes from both the North Star and Triumph mines have migrated downhill and are currently located adjacent the Morgan and Bradford properties. This waste also appears to be comprised mostly of country rock that was generated when one of the many adits and tunnels were being driven to the ore chutes in the North Star mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock.

IDEQ sampled two (2) random locations in the gulch. In both samples total arsenic, lead, and mercury are close to, but still exceed both IDTLs and background metals concentrations. Arsenic concentrations of 12.4 and 195 ppm exceed IDTLs and background concentrations by as much as 2 and 7 times respectively. Lead concentrations of 62 and 256 ppm exceed IDTLs and background concentrations by as much as 5 and 4 times respectively. Mercury concentrations of

0.029 and 0.0049 ppm exceed IDTLs and background concentrations by 9 and 1 times respectively. Zinc concentrations do not exceed IDTLs or background concentrations.

OLD TRIUMPH (SHAFT) WASTE DUMP #1

This waste also appears to be comprised mostly of country rock that was generated when the Old Triumph #1 Adit was driven to the ore chutes in the mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock.

The Old Triumph Waste Dump #1 contains approximately 2000 yd³ of waste rock. A sample (TSWDSS1) of the Old Triumph Waste Dump #1 was collected on October 3, 2006. Total arsenic, lead, mercury and zinc all exceed both IDTLs. Arsenic concentrations of 31.6 ppm exceed IDTLs by 80 times. Lead concentrations of 210 ppm exceed IDTLs by 4 times. Mercury concentrations of 0.136 ppm exceed IDTLs by 26 times. Zinc concentrations of 1040 ppm barely exceed IDTLs.

OLD TRIUMPH (SHAFT) WASTE DUMP #2

This waste also appears to be comprised mostly of country rock that was generated when the Old Triumph #2 Adit was driven to the ore chutes in the mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock. Old Triumph Waste Dump #2 was sampled twice.

The Old Triumph Waste Dump #2 contains approximately 2000 yd³ of waste rock. A sample (OTWD#2) of the Old Triumph Waste Dump #2 was collected on October 3, 2006. Total arsenic, cadmium, chromium, lead, mercury selenium, silver and zinc all exceed IDTLs. Arsenic concentrations of 860 and 2600 ppm exceed IDTLs by 2200 and 6600 times. Cadmium concentrations of 60.3 exceed IDTLs by 44 times. Chromium concentrations of 15.3 exceed IDTLs by 2 times. Lead concentrations of 1250 and 4970 ppm exceed IDTLs by 25 and 100 times. Mercury concentrations of 0.7 and 0.701 ppm exceed IDTLs by 130 and 137 times. Selenium concentrations exceed IDTLs by 4 times. Silver concentrations of 16.9 exceed IDTLs by 90 times. Zinc concentrations of 8140 ppm exceed IDTLs by 9 times.

OLD TRIUMPH (SHAFT) CATCHMENT BASIN

Mine waste rock has been displaced throughout this spur of Triumph Gulch by erosion and numerous earth moving operations over one hundred years. Consequently, mine wastes have been distributed over an area in excess of fifty acres. This waste appears to be comprised mostly of country rock that was generated when various mine projects were advanced towards the ore chutes in the mine. Although country rock, there are obvious massive sulfides disseminated throughout the waste rock.

The Old Triumph Catchment Basin is a sediment retention structure that was constructed in September of 2006 to prevent releases of mine wastes from disturbed ground around the Old

Triumph (Shaft). The basin contains approximately 100yd³ of waste rock. A sample (TSWDSS3) taken from the basin was collected on October 3, 2006. Total arsenic, lead, mercury and zinc all exceed IDTLs (Collection of Background Samples Pending). Arsenic concentrations of 3230 ppm exceed IDTLs by 8260 times. Lead concentrations of 4380 ppm exceed IDTLs by 88 times. Mercury concentrations of 0.902 ppm exceed IDTLs by 177 times. Zinc concentrations of 12600 ppm exceed IDTLs by 14 times.

OLD TRIUMPH (SHAFT) WASTE DUMP #4

The Old Triumph Waste Dump #4 contains approximately 2000yd³ of waste rock. A sample (OTWDSS04) of the Old Triumph Waste Dump #4 was collected in April 2007. Total arsenic, cadmium, chromium, lead, mercury selenium, and silver exceed IDTLs. Comparison with background concentrations will occur upon receipt of laboratory results from samples collected in May. Arsenic concentrations of 2570 ppm exceed IDTLs by 6600 times. Cadmium concentrations of 291 exceed IDTLs by 215 times. Chromium concentrations of 16.9 exceed IDTLs by 2 times. Lead concentrations of 12,300 ppm exceed IDTLs by 247 times. Mercury concentrations of 0.7 exceed IDTLs by 490 times. Selenium concentrations of 4 ppm exceed IDTLs by 2 times. Silver concentrations of 70 exceed IDTLs by 370 times.

OLD TRIUMPH (SHAFT) WASTE DUMP #5

The Old Triumph Waste Dump #5 contains approximately 2000yd³ of waste rock. A sample (OTWDSS05) of the Old Triumph Waste Dump #5 was collected in April 2007. Total arsenic, cadmium, chromium, lead, mercury selenium, and silver exceed IDTLs.

Comparison with background concentrations will occur upon receipt of laboratory results from samples collected in May. Arsenic concentrations of 107 ppm exceed IDTLs by 273 times. Cadmium concentrations of 14.2 exceed IDTLs by 9 times. Chromium concentrations of 23.3 exceed IDTLs by 3 times. Lead concentrations of 2,830 ppm exceed IDTLs by 57 times. Mercury concentrations of 0.603 exceed IDTLs by 118 times. Selenium concentrations of 5 ppm exceed IDTLs by 2 times. Silver concentrations of 8.45 exceeds IDTLs by 45 times.

TRIUMPH TUNNEL AREA WASTE DUMP #1

Triumph Adit #1 is a completely caved adit that appears to have produced less than 50 yd³ of waste. Triumph Waste Dump #1 (TRWD #1) was located but not sampled.

TRIUMPH WASTE DUMP #2

Triumph Adit #2 was caved, built it appears to have been developed to a greater degree than Adit #1. Triumph Waste Dump #2 contains less than 500 yd³ of waste. Triumph Waste Dump #2 was located but not sampled.

TRIUMPH WASTE DUMP #3

Triumph Adit #3 was one of the most extensively developed explorations in lower North Star Gulch. It is partially caved, but has a large enough opening to represent a physical hazard. TRWD#3 contains greater than 1,500 yd³ of waste bearing massive oxides and sulfides most notably chalcopyrite, malachite, and arseno-pyrite. It was sampled (TRWD-3) and analyzed (TABLE 5). The Triumph Waste Dump #3 covers approximately 0.15 acres.

A sample of the Triumph Waste Dump #3 was collected in April 2007. Concentrations of total arsenic, chromium, lead, mercury selenium and silver exceed IDTLs. Arsenic concentrations of 13,300 ppm exceed IDTLs by 34,000 times. Chromium concentrations of 23.8 exceed IDTLs by 3 times. Lead concentrations of 550 ppm exceed IDTLs by 11 times. Mercury concentrations of 0.69 ppm exceed IDTLs by 135 times. Selenium concentrations of 10 ppm exceed IDTLs by 5 times. Silver concentrations of 47.3 ppm exceed IDTLs by 250 times.

TRIUMPH WASTE DUMP #4

Although partially closed, open Triumph Adit #4 does pose a significant physical hazard. (April 2007). TRWD#4 contained less than 1,500 yd³ of waste and was not sampled.

TRIUMPH WASTE DUMP #5

Triumph Adit #5 was caved, and does not appear to have been extensively developed. TRWD#5 contains less than 100 yd³ of waste, and was not sampled.

TRIUMPH WASTE DUMP #6

Triumph Adit #6 is an open adit that is a significant physical hazard. The adit was extensively developed and resulted in approximately 500 yd³ of waste, which was dumped on TRWD#6. The dump was not sampled.

TRIUMPH WASTE DUMP #7

Triumph Adit #7 is a series of small caved adits or excavations, which do not make much sense regarding what the purpose and objectives of the work was. Very little (less than 50 yd³ of waste) was generated, consequently TRWD#7 was not sampled.

TRIUMPH WASTE DUMP #8

Triumph Adit #8 is a caved adit. The adit was not extensively developed and resulted in less than 500 yd³ of waste, which was dumped on TRWD#8. The dump was not sampled.

Table 4 Old Triumph (Shaft) Sample Results

Description	Idaho Initial Default Threshold Levels	EPA Region 9 PRGs	Triumph Gulch Background	Old Triumph (Shaft) Area WD #1	Old Triumph (Shaft) Area WD#2	Catchment Basin Below Shaft	Old Triumph (Shaft) Area WD #2	Old Triumph WD#4 SS	Old Triumph WD#5 SS
			TGBGSS-1	TSWDSS-1	TSWDSS-2	TSWDSS-3	OTWD-2	OTWDSS-4	OTWDSS-5
Antimony	4.77	76000							
Arsenic	0.391	31	19.6	31.6	2600	3230	860	2570	107
Barium	896	0.39	142				59.5	210	850
Cadmium	1.35	1500	4.44				60.3	291	14.2
Calcium		37							
Chromium	7.9	NA	39.2				15.3	16.9	23.3
Cobalt		210							
Copper	921	900	37.8						
Iron		3100							
Lead	49.6	23000	49.3	210	4970	4380	1250	12300	2830
Magnesium		400							
Manganese	223	NA							
Mercury	0.00509	1800	< 0.033	0.136	0.701	0.902	0.7	2.5	0.603
Nickel	59.1	23							
Selenium	2.03	NA	< 4				9	4.0	5.0
Silver	0.189	390	< 0.5				16.9	70	8.45
Vanadium		390							
Zinc	886	550	296	1040	8140	12600.0			

Table 5 Triumph Tunnel and Mill Site Sample Results

	IDEQ IDTL values IDTLs		Triumph Tunnel Background	Triumph Tunnel Background	Triumph Tunnel Waste Dump Below Ore Bin	Triumph Tunnel Waste Dump 3	Triumph Tunnel Waste Dump 9	Triumph Tunnel Waste Dump 11
Description			TRBGSS1	TRBGSS-1	TTWDSS1	TRWD3SS1	TRWDSS9	TRWDSS11
Aluminum								
Antimony	4.77							
Arsenic	0.391		19.6	17.2	10700	13300	2590	665
Barium	896		142	141	56.1	179	162	66.1
Beryllium	1.63							
Cadmium	1.35		4.44	3.91	71.00	<0.20	23.60	8.93
Calcium								
Chromium	7.9		39.2	8.55	25.1	23.8	40.1	37.7
Cobalt								
Copper	921		37.8	17.9	2040		557	74.7
Iron								
Lead	49.6		49.3	245	11300	550	2110	277
Magnesium								
Manganese	223							
Mercury	0.00509		< 0.033	0.153	22	0.69	0.67	0.687
Nickel	59.1							
Potassium								
Selenium	2.03		< 4	<4		10.0	< 4	< 4
Silver	0.189		< 0.50	0.8	31.9	47.3	104	< 0.50
Vanadium								
Zinc	886		296	355	11400.0		3000.0	939

TRIUMPH WASTE DUMPS #9 and #10

Triumph Waste Dumps #9 and #10 are the result of relatively insignificant exploration work, and contain less than 50 yd³ of waste. They were not sampled.

TRIUMPH WASTE DUMP #11

The Triumph Adit/Waste Dump #11 had greater than 1500 yd³ of waste massive sulfides. It was sampled (TRWDSS11).

TRIUMPH WASTE DUMP #12

Although partially collapsed, Triumph Adit #12 poses a significant physical hazard. (May 2007). The adit was extensively developed and resulted in approximately 500 yd³ of waste, which was dumped on TRWD#12. The dump was not sampled.

TRIUMPH TUNNEL ORE BINS

Ore bins and trestle beneath the Triumph Tunnel bench (May 2007). The Ore Bins at the tunnel site contained less than 100 cubic yards of ore, but because of the massive build up of metallic salts and other precipitates, waste sample TTWDSS-1 was collected.

PATHWAYS AND ENVIRONMENTAL HAZARD ASSESSMENT

AIR

Concentrations of metals in wind borne fugitive dust have been the driving force behind cleanups in the former mining properties of the Wood River area, particularly at the Triumph Mine Site and Minnie Moore Tailings Impoundment. In DeNovo's RAWP it was assumed that fugitive dust may pose some level of cancer and non-cancer risks due to inhalation by site workers, recreationists and potential future residents. The RAWP provide for removal of mine wastes susceptible to wind erosion and dispersal. The removed materials will be placed in capped and covered repositories. Areas from which mine wastes are removed will be treated with soil amendments and revegetated to stabilize them from wind and water erosion.

GROUNDWATER

During the cleanup activities of the nearby Triumph Village and Mill site(s), one of the first concerns was related to potential human health risks as a result of contamination of public and private drinking water supplies. Generally speaking, contamination of drinking water systems was thought likely to occur from two types of sources (ore bodies and waste dumps) and along three pathways, as illustrated by the following three scenarios. Through the first pathway, heavy metals are leached from mine waste dumps, enter ephemeral or perennial drains and then contaminate the area's shallow ground water system. Through the second pathway, heavy metals

leach from the local ore bodies and are transported through the geologic structure to the shallow ground water. Through the third pathway, heavy metals could leach out of the ore bodies, and be discharged from the underground workings as adit water, that is then conveyed through ephemeral and perennial drains to the shallow ground water systems.

For the purposes of completing Preliminary Assessments, Source Water Assessments (completed for local public drinking water supplies) were used to identify any known affects to those systems. Although IDEQ's Source Water Assessments were used to evaluate potential affects of this mine on public drinking water supplies, no inferences can be made about the affects that this and adjoining mines have on local private wells.

Source water assessments provide information on the potential contaminant threats to public drinking water sources. In the Big Wood River Valley Idaho, most of those sources (>95%) are ground water (IDEQ 2000). Each source water assessment:

- Defines the zone of contribution, which is that portion of the watershed or subsurface area contributing water to the well or surface water intake (**source area delineation**).
- Identifies the significant potential sources of drinking water contamination in those areas (**contaminant source inventory**).
- Determines the likelihood that the water supply will become contaminated (**susceptibility analysis**).

Each assessment is summarized in a report that describes the above information and provides maps of the location of the public water system, the source area delineation, and the locations of potential contaminant sources. Idaho began developing source water assessments in 1999, and in May 2003 met its obligation under the amendments of the Safe Drinking Water Act by completing delineations for all 2100+ public water systems that were active in Idaho as of August 1999 (IDEQ 2000). Source water assessments for new public drinking water systems are being developed as those systems come online. Each public water system is provided with two copies of its final assessment report. Four source water assessments for drinking water supplies have been used in this Preliminary Assessment process to evaluate the potential impacts to both public and private drinking water supplies in and around Sun Valley, Ketchum, Hailey and Bellevue.

The information extrapolated from these reports is based on data that existed at the time of their writing, and the professional judgment of IDEQ staff. Although reasonable efforts were made to present accurate information, no guarantees, including expressed or implied warranties of any kind are made with respect to these reports or this Preliminary Assessment by the State of Idaho, or any of its agents. Who also assume no legal responsibility for accuracy of presentation, comments or other information in these publications or this Preliminary Assessment report. The results should not be used as an absolute measure of risk, and they should not be used to undermine public confidence in public drinking water systems.

The Source Area delineation process establishes the physical area around a well or surface water intake that becomes the focal point of the source water assessment. The process includes mapping the boundaries of the zone of contribution (the area contributing water to the well or to the surface water intake) into time of travel zones (TOT) indicating the number of years

necessary for a particle of water to reach a well or surface water intake (IDEQ 2000). The size and shape of the source water assessment area depend on the delineation method used, local hydrogeology, and volume of water pumped from the well or surface water intake.

IDEQ used a refined computer model approved by EPA to determine the 3-year (Zone 1B), 6-year (Zone 2), and 10 year (Zone 3) time of travel associated with the Big Wood River Aquifer and its sources (IDEQ 2000).

This process involves collecting, recording, and mapping existing data and geographical information system (GIS) coverage to determine potential contaminant sources (e.g., gas stations) within the delineated source water assessment area. The potential contaminant source inventory is one of three factors used in the susceptibility analysis to evaluate the overall potential risk to the drinking water supply (IDEQ 2000). The inventory process goal is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water or surface water contamination.

This susceptibility analytical process determines the susceptibility of each public water system well or surface water intake to potential contamination within the delineated source water assessment area. It considers hydrogeologic characteristics, land use characteristics, potentially significant contaminant sources, and the physical integrity of the well or surface water intake. The outcome of the process is a relative ranking into one of three susceptibility categories: high, moderate, and low. The rankings can be used to set priorities for **drinking water protection** efforts (IDEQ 2000).

There are numerous public and private drinking water supplies in the Big Wood River Basin. The Sun Valley Water and Sewer District operates and maintains nine wells in two groupings (IDEQ 2000). The City of Ketchum drinking water system consists of seven wells in two groupings. The City of Hailey's drinking water system consists of six wells and a spring (IDEQ 2000). The City of Bellevue drinking water system consists of two wells and three springs (IDEQ 2000).

Generally speaking, public drinking waters systems in the Big Wood River Valley are rated as moderate to high (IDEQ 2000). Multiple factors affect the likelihood of movement of contaminants from the sources to the aquifer, which lead to this moderate to high score. Soils in the area are poorly to moderately drained. The vadose zone is predominantly gravel, which increases the score. On the valley floors the average depth to ground water is twenty to fifty feet.

To date, routine water quality monitoring of public drinking water indicates that there are no significant volumes of heavy metals migrating through the regional or localized ground water systems. More specifically, there are not any long-term or recurring water chemistry problems in the Sun Valley Water and Sewer District drinking water sources. One well in the Sun Valley

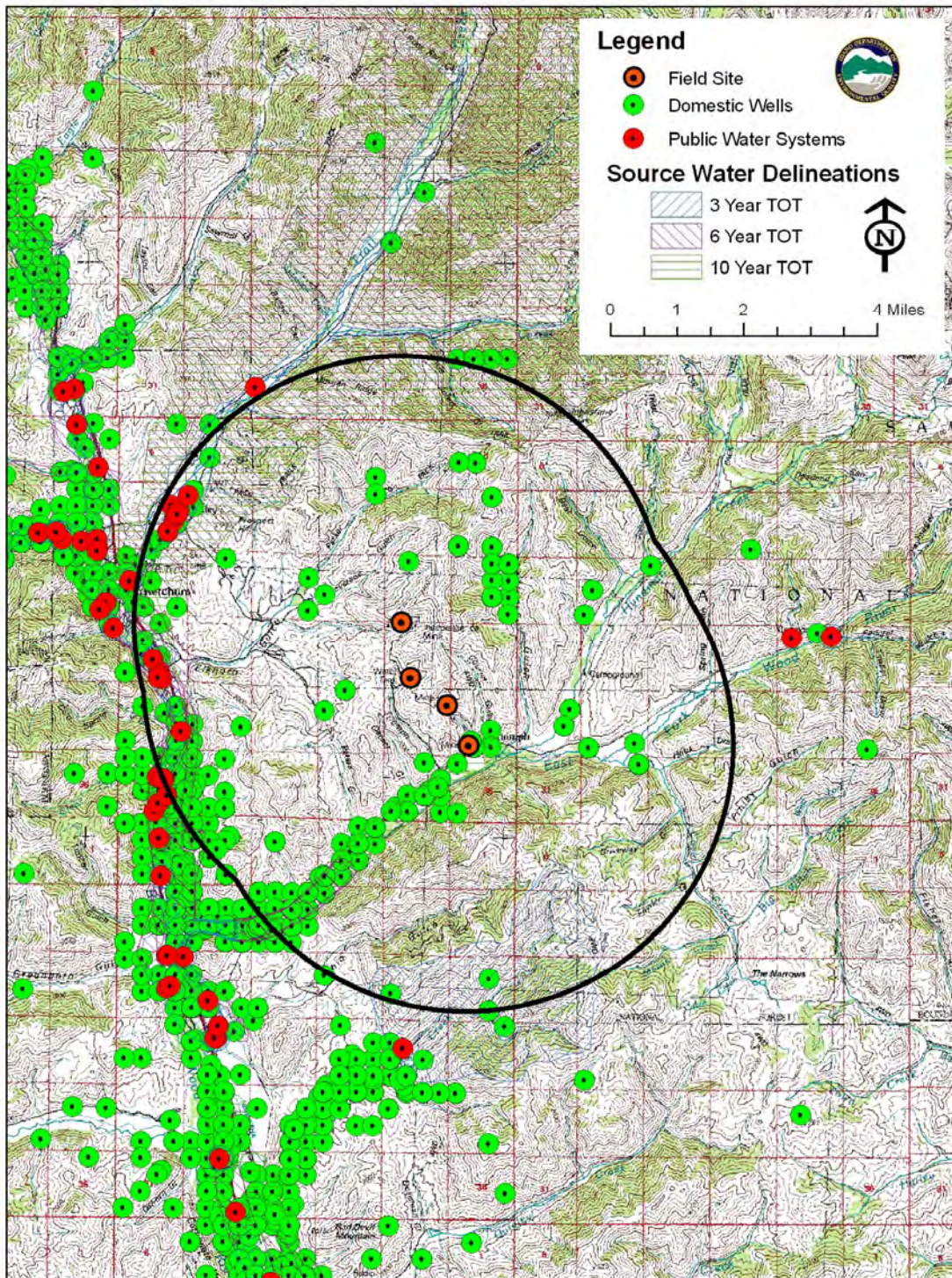


Figure 3: Locations for Source Water Systems

system has had one instance (August 1991) when cadmium exceeded the MCLs (IDEQ 2000). There is no current, long term or recurring water chemistry problems in the City of Ketchum's drinking water sources. Arsenic, nickel, antimony, barium, selenium, chromium, cyanide and nitrate have been detected in Ketchum's wells, but all were well below MCLs (IDEQ 2000). There is no long term or recurring water chemistry problems in the City of Hailey's drinking water sources. Manganese, zinc, chromium, and mercury have been detected in Hailey's wells, but all were well below MCLs (IDEQ 2001). Currently, there are no data that indicate that any metal concentrations have exceeded MCLs in the Bellevue drinking water systems (IDEQ 2000).

SURFACE WATER

Generally speaking, none of the mine/mill sites are connected to perennial flows by surface water flow. However, it is intuitive that runoff and/or drainage from the sites are connected with surface waters in Independence Gulch and the East Fork of the Big Wood River through near surface ground water systems in the valley fill or colluvium. The Independence, Old Triumph (shaft), and North Star are high (>500 feet) above the perennial flows in Independence Gulch and the East Fork of the Big Wood River. The Triumph Tunnel portal, which has significant drainage and the toe of the mine waste dump, is less than 100' from a side channel and riparian area linked to the East Fork of the Big Wood River. However, the pathway for mine and mill wastes to perennial flow does not appear to be complete.

There are no CWA 303(d) listed streams within a four mile radius of any of the mine/mill sites.

SENSITIVE SPECIES

According to the Endangered Species Act (ESA), and the subsequent biological surveys conducted subsequent to the ESA's enactment there are no candidate, listed endangered, or listed threatened species known to exist within a 2.5 mile radius of the four major mine sites (Independence, North Star, Triumph Tunnel and Old Triumph).

The sites are surrounded by valuable winter range for deer and elk, and the sites are within the wolf home range.

Several species of bats are frequently found in openings and structures of inactive and abandoned mine sites similar to those of the Triumph and lower North Star Gulch. Bats use the mine openings for roosting and hibernation. **For those mines where bat use is possible, surveys should be completed to determine occupation by bats and management recommendations.** This is especially true in areas where sensitive species of bats like the Townsend's big-eared bat (*Corynorhinus townsendii*) were found. For those mine workings, the steel grates will provide for continued bat use and eliminate the interaction with humans trespassing underground. Where bats are not present and biologists have made a recommendation to "close by any means", bat grates may be installed due to other factors and logistical concerns. Examples would be where renewed exploration or development work is anticipated in the near future; where water is flowing from the mine working and completely plugging the portal may cause nearby springs to

be affected; there is not enough waste rock to backfill the workings, the open mine working provides ventilation to other mine workings, etc.

Although not a sensitive species, it is interesting to note that a specimen Rubber Boa was observed at the Independence Mill site. Rubber Boa (*Charina bottae*), Rubber boas are one of the smallest members of the boa family, and one of the northern most ranging. Adults are generally a uniform color dorsally, ranging from tanned leather brown (southern population are almost always light tan), olive brown, medium brown, to a dark chocolate brown. Their ventral surface (belly) is most often a light yellow with brown mottling in some adults. Babies are born pink and slightly transparent, and gradually darken with age. Color variations occur between AND within each locality. In the Pacific Northwest, adult males generally reach an average length of about 21 inches, with the females slightly longer - on average 26 inches. Adults from different regions may vary slightly, such as the Southern Rubber Boa (*C. b. umbratica*), the smallest subspecies, where males typically max out at 18 inches, and females at 22 inches.

WETLANDS

There are extensive wetlands (greater than 100 acres) and riparian habitat along the East Fork of the Big Wood River down gradient from the Triumph Tunnel and Mill site. Wetlands in this coverage are taken from USGS maps and from a list of priority wetlands maintained by EPA, Idaho Department of Fish and Game, and the Conservation Data Center. There are also some minor wetlands approximately 1.5 miles down gradient from the Independence mill site.

None of the other gulches or ephemeral drains contain wetlands habitat in excess of 0.01 acres in size.

CURRENT LAND USES

Generally speaking level private land for residential and commercial development in Blaine County is at a premium. Expansion of these types of developments has, as stated previously, caused a rapid encroachment onto patented mining and mill site claims. The Village of Triumph is a typical example of how historic mining claims were converted to residential development. Typically residential and commercial development in the East Fork of the Big Wood River, North Star Gulch, Independence Gulch and Keystone Gulch has been restricted to lower lying areas just above the 100 year flood plains. Currently, it is the intent of DeNovo to remediate the mine lands to conservative risk target goals so that some limited residential development may occur at dispersed locations throughout the site(s).

At the present the site(s) are used regularly by recreationists for mountain biking, hiking ATV travel, site seeing, hunting, and sport shooting.

Table 6 Triumph (Tunnel) & Independence Water Sample Results

	IDEQ Ground Water Standard	IDEQ Drinking Water Standard	Triumph (Adit) Discharge	Triumph (Adit) Discharge	Triumph (Adit) Discharge	Triumph (Adit) Discharge	Independence Mine Cistern below Tailings Ponds	Independence Mine Cistern below Tailings Ponds	Independence Mine waste Dump 4	Independence Mine Waste Dump 6
			TTSW01	TTSW01	TTADSW04	TTADSW04	IMSW01	IMSW01	IMWD4SW1	IMWD6SW1
Description			TOTALS	Dissolved	TOTALS	Dissolved	TOTALS	Dissolved		
Aluminum	0.05									
Antimony										
Arsenic	0.05	0.00002 (D)	0.0276	0.0171	0.037	<0.025	0.0058	0.0045	< 0.025	< 0.025
Barium					0.0128	0.0109			0.02	0.0173
Beryllium										
Cadmium	0.01		< 0.002	<0.0020	<0.002	<0.002	<0.0020	<0.0020	0.0022	<0.0020
Calcium										
Chromium	0.05				<0.006	<0.006			0.006	<0.0060
Cobalt				-	-	-			-	
Copper	1		<0.010	<0.010	<0.010	<0.010	<0.01	<0.010		
Iron	0.3				5.91	4.32				
Lead	0.05		<0.0030	<0.0030	<0.0075	<0.014	0.0111	0.0087		
Magnesium										
Manganese	0.05									
Mercury	0.002	0.00014 (D)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020		
Nickel		0.61 (D)		-	-	-				
Potassium										
Selenium	0.01			-	-	-				
Silver	0.05			-	<0.0050	<0.0050			< 0.005	< 0.005
Vanadium				-	-	-				-
Zinc	5		2.91	2.77	1.53	1.32	0.03400	0.038		

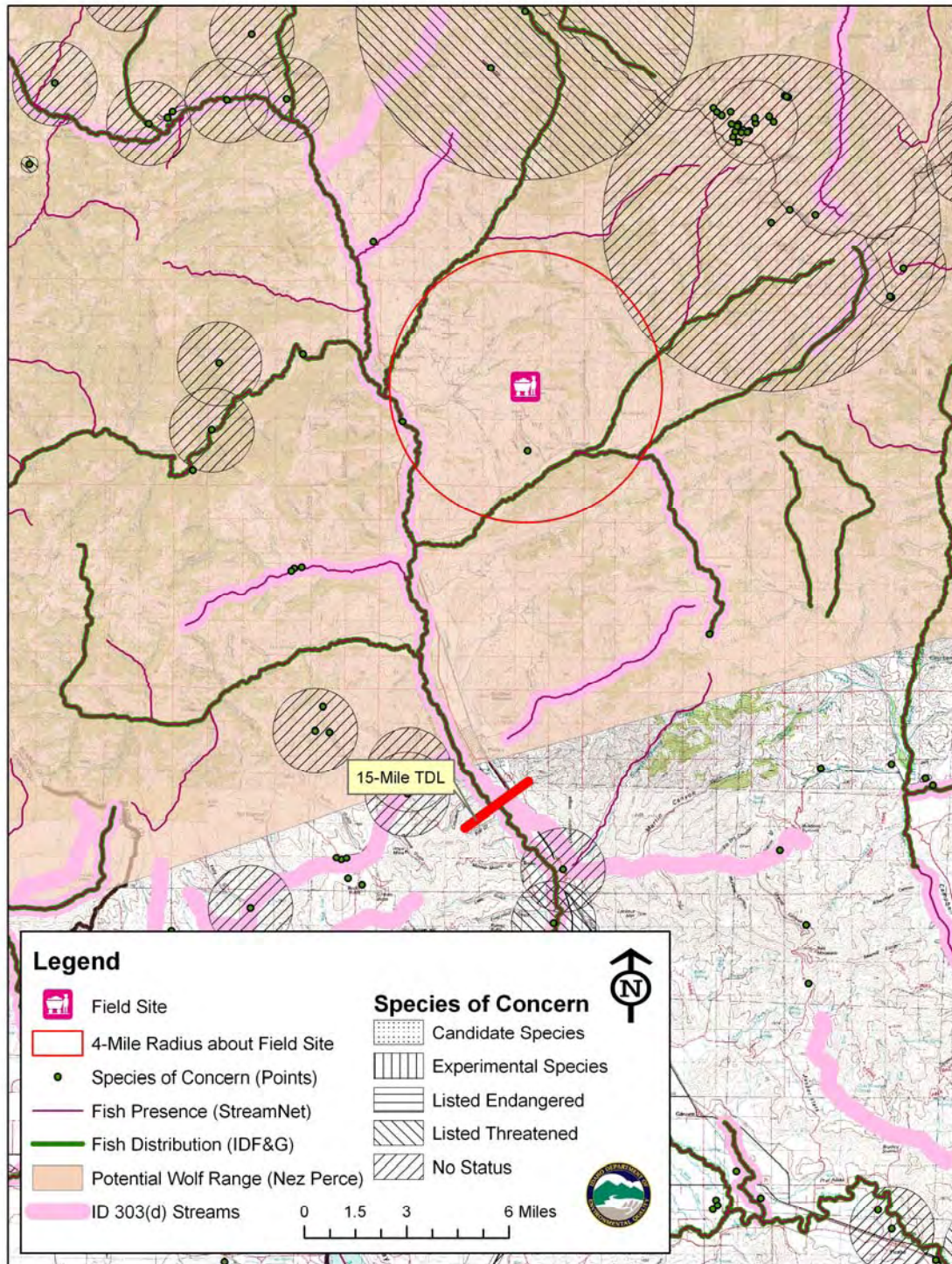


Figure 4: Locations of Species of Concern

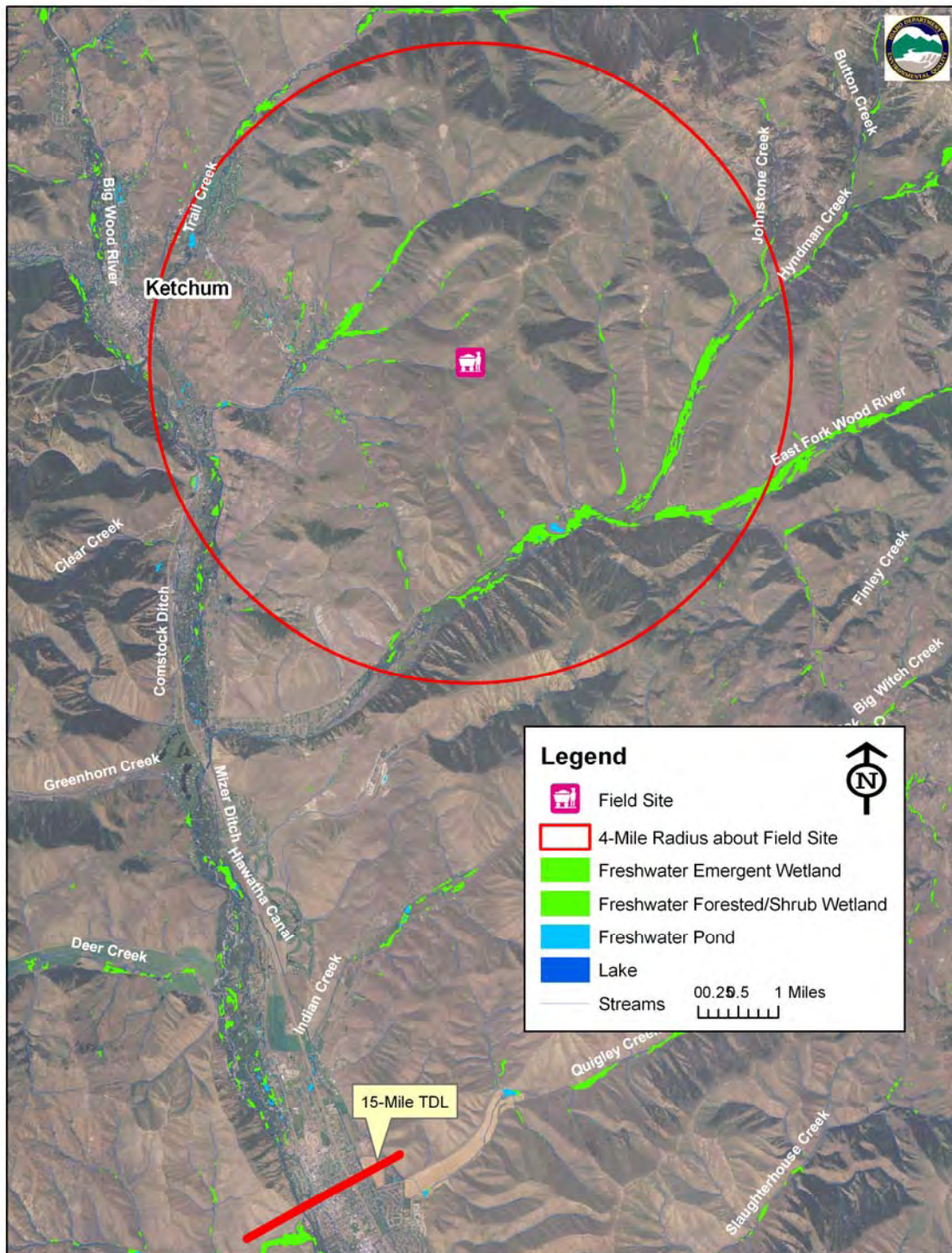


Figure 5: Locations for Jurisdictional Wetlands

Observations and studies indicate that the site(s) are also quality winter and summer range for wildlife.

POTENTIAL FUTURE LAND USES

DeNovo Independence LLC (DeNovo) has entered into IDEQ's Voluntary Cleanup Program in order to remediate historic mine workings, dumps and milling areas to significantly reduce human health concerns that would otherwise prevent development for residential and commercial purposes. In addition, DeNovo has incorporated ecological risk analysis in its risk management plans to ensure that development might also be conducive to reducing risks to valuable wildlife and their habitat. Although there will be some areas modified to site construction of residential and commercial real estate, in excess of 800 acres of land has been considered to remain as open space managed for recreational use such as hiking, biking and skiing, and wildlife habitat.

SCHOOLS, DAY-CARE FACILITIES AND PRIVATE RESIDENCES

There are no schools or day care facilities within 200 feet of any of the claims or remedial action sites.

There are residential properties on historic patented mining and Millsite claims immediately adjacent to the Silver Crown, Crescent and Tuesday patented mining claims in lower North Star Gulch.

CONCLUSIONS AND RECOMMENDATIONS

Waste characterization of these mine and mill sites has been conducted as both a reconnaissance level of effort for this report, and in a much more quantitative effort by DeNovo to evaluate risk and potential remedial designs. Only the reconnaissance level data has been evaluated for this report. However, should the voluntary relationship between DeNovo and IDEQ break down, the more quantitative waste data will be considered in re-evaluating IDEQ's recommendations to the land owners and EPA.

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