MINE DEVELOPMENT ASSOCIATES
MINE ENGINEERING SERVICES

Updated Technical Report on the Long Canyon Project
Elko County, Nevada, USA

Prepared for

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1.0 SUMMARY

Mine Development Associates ("MDA") has prepared this technical report on the Long Canyon gold project, Nevada, USA at the request of Fronteer Gold and AuEx Ventures, Inc. ("AuEx"), joint venture partners at Long Canyon. The purpose of this report is to provide an update to the technical report entitled "Technical Report on the Long Canyon Project Elko County, Nevada, USA" (Gustin and Smith, April 2009). This updated technical report includes an update of the project mineral resources, as well as updates with respect to metallurgy, permitting, and drilling. This report was written in compliance with disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101, Companion Policy 43-101CP, and Form 43-101F1. The Long Canyon project has been previously described in a 2006 technical report (Griffith, 2006) prepared for NewWest Gold Corporation and a 2008 technical report issued by AuEx (Moran, 2008).

Fronteer Gold holds its interest in Long Canyon through its wholly owned subsidiary Fronteer Development (USA) Inc. Fronteer Development (USA) Inc.'s interests in the Long Canyon project are derived from the acquisition of NewWest Gold Corporation by Fronteer Gold in September 2007. Fronteer Gold, Fronteer Development (USA) Inc., and NewWest Gold Corporation are collectively referred to herein as "Fronteer".

Long Canyon, an advanced-stage exploration project, is located in Elko County in northeastern Nevada, on the east flank of the Pequop Mountains, approximately 37 kilometres southeast of the town of Wells. The project is controlled by a joint venture between Fronteer (51% interest) and AuEx (49% interest) (the "Joint Venture"). Fronteer is operator of the Joint Venture.

The main portion of the property consists of approximately 49 square kilometres of unpatented federal lode mining claims and private mineral lands; additional surface and water rights are also held by the Joint Venture. The mineral resources reported herein are subject to Fronteer and AuEx each retaining a 3% net smelter returns (NSR) royalty on their respective lands contributed to the Joint Venture, as well as the State of Nevada Net Proceeds of Mine Tax, which is limited to 5% of the production net proceeds (similar to a 5% net profits tax). This tax is levied by the State of Nevada on all mine production in the state.

The Effective Date of this report is March 1, 2010 unless otherwise noted.

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1.1 Geology and Mineralization

The Pequop Mountains comprise an uplifted block of regionally east-dipping Paleozoic carbonate and siliciclastic rocks. Rocks of particular interest to the project include limestone and dolomite of the Cambrian Notch Peak Formation and limestone of the overlying Ordovician Pogonip Group. At Long Canyon, the dolomite horizon at the top of the Notch Peak Formation has been dismembered into a series of northeast-elongated "megaboudins" that strongly control the distribution of gold at the project. Gold mineralization at Long Canyon occurs mainly within limestones along dolomite boudin margins and in boudin neck areas. Significant karsting, likely of both meteoric and hydrothermal origin, is localized along the boudin margins and boudin necks, resulting in large, solution-collapse cavities. Much of the higher-grade mineralization at Long Canyon is hosted within the hematitic matrix of these collapse breccias, as well as in adjacent zones of stratabound mineralization characterized by strong decalcification.

The alteration, mineralization, and geochemistry of the Long Canyon deposit are similar in nature to Carlin-type sediment-hosted gold deposits. The mineralization discovered to date is almost entirely oxidized.

1.2 Exploration and Mining History

Historic mining activities at Long Canyon appear to be limited to several small prospect pits.

Gold-bearing jasperoids were discovered at Long Canyon in 1999 by Pittston Nevada Gold Company ("Pittston") as a result of follow-up work on stream-sediment anomalies defined by Pittston earlier in the year. Pittston staked claims in the area and outlined a 1400 by 300 metres gold-in-soil anomaly, which led to the drilling of seven reverse circulation ("RC") holes in 2000; one of these holes returned a significant gold intercept. AuEx acquired the project in 2005 and drilled seven additional RC holes, six of which intersected significant mineralization. The Fronteer-AuEx Joint Venture was formed later in 2006 when it was discovered that some of the AuEx claims were actually located over private mineral rights held by Fronteer and therefore were invalid. The Joint Venture has subsequently completed an additional 469 drill holes from 2006 through to the Effective Date of this report.

1.3 Drilling and Sampling

A total of 234 drill holes (32,475 metres), including 52 RC holes and 182 diamond-core holes, were completed at Long Canyon in 2009; the results from these holes were used in the resource estimation discussed in this report. Down-hole drill depths range from 30 to 350 metres, with an average depth of 139 metres. The drilling was completed on a nominal 50-metre spaced grid, with the drill sections oriented northwest-southeast. Drilling is sparse in the northeastern part of the deposit, with drill holes spaced up to 200 metres apart.

Drilling at Long Canyon has been successful in defining potentially economic gold mineralization within at least six sub-parallel zones along a strike extent of approximately 2,200 metres. The mineralized zones at Long Canyon coalesce in various locations to form a continuous body of mineralization that plunges about ten degrees to the northeast. The mineralization has an apparent dip of five to ten degrees to the southeast in sections cut across the plunge direction, reflecting the control exerted by the upper and lower contacts of the dolomite boudin blocks. Internal to these deposit-scale geometries, boudin noses, joints, and normal faults form subvertical to moderately dipping controls to the mineralization that dip to the northwest or southeast. In addition, stratigraphic intervals immediately above and below the dolomite slab exert significant control on mineralization to a degree not recognized previously.

Drill-hole orientations vary somewhat at Long Canyon due to both the early-stage nature of some of the holes, which were drilled before the geometry of the mineralization was understood, and the varying orientations of the controls to the mineralization. Although there are a relatively small number of holes that are therefore poorly oriented with respect to the mineralization encountered, this is mitigated by the modeling techniques employed, which constrain all intercepts to lie within explicitly interpreted domains that appropriately respect the geologic controls.

An analysis of the Quality Control/Quality Assurance data collected during the AuEx and Joint Venture drilling programs did not identify any serious issues with the sample preparation and analyses of the drill samples. The drill data do indicate the presence of down-hole contamination in some portion of the pre-2009 RC sample database, however. This issue was mitigated to a large extent by removing suspect intervals from the resource modeling, but some uncertainty in the remaining RC data persists. Measures to mitigate down-hole contamination at the drilling stage were implemented in 2009.

1.4 Mineral Processing and Metallurgical Testing

Metallurgical testing at Long Canyon has been completed on four surface bulk samples and 21 composites of drill core. This work generally characterizes the Long Canyon mineralization as being amenable to extraction of gold by cyanidation *via* oxide milling or heap leaching methods.

1.5 Mineral Resource Estimate

The gold resources at Long Canyon were modeled and estimated by evaluating the drill data statistically, utilizing three-dimensional lithologic solids provided by Fronteer to interpret mineral domains on cross sections spaced at 50-metre intervals, rectifying the mineral domain interpretations on cross sections spaced at 10-metre intervals, analyzing the modeled mineralization statistically to establish estimation parameters, and estimating gold grades by inverse-distance methods into a block model with 5 metres (width) x 10 metres (length) x 3 metres (height) blocks that were coded to the mineral domains by the 10-metre mineral domain polygons. All modeling of the diluted resources was performed using Gemcom Surpac® software.

The Long Canyon Resources are presented in Table 1.1.

Table 1.1 Long Canyon Mineral Resources

	Measured Resources			Indicated Resources			Measured & Indicated Resources		
Cutoff (g Au/t)	Tonnes	g Au/t	oz Au	Tonnes	g Au/t	oz Au	Tonnes	g Au/t	oz Au
0.20	***587,000***	***2.50***	***47,000***	***11,653,000***	***1.67***	***625,000***	***12,240,000***	***1.71***	***672,000***
0.30	510,000	2.84	47,000	9,839,000	1.93	611,000	10,348,000	1.98	657,000
0.50	418,000	3.38	45,000	7,272,000	2.47	578,000	7,690,000	2.52	624,000
1.00	297,000	4.47	43,000	4,432,000	3.61	515,000	4,729,000	3.67	558,000
1.50	244,000	5.18	41,000	3,429,000	4.31	475,000	3,672,000	4.37	516,000
3.00	150,000	7.06	34,000	1,917,000	6.02	371,000	2,067,000	6.10	405,000
5.00	84,000	9.51	26,000	966,000	8.10	252,000	1,050,000	8.21	277,000
10.00	25,000	16.12	13,000	151,000	15.66	76,000	175,000	15.72	89,000

Long Canyon Inferred Resources			
Cutoff (g Au/t)	Tonnes	g Au/t	oz Au
0.20	***10,394,000***	***1.65***	***552,000***
0.30	8,292,000	2.01	536,000
0.50	5,807,000	2.71	505,000
1.00	3,571,000	3.97	456,000
1.50	2,851,000	4.66	427,000
3.00	1,791,000	6.17	355,000
5.00	1,043,000	7.73	259,000
10.00	116,000	13.35	50,000

A cutoff of 0.20 g Au/t was used to tabulate the gold resources. This cutoff was chosen to capture mineralization potentially available to open-pit extraction and heap-leach processing. The block-diluted resources are also tabulated at additional cutoffs in order to provide grade-distribution information, as well as to cover economic conditions other than envisioned by the 0.2 g Au/t cutoff.

1.6 Summary and Conclusions

MDA has reviewed the project data and has visited the project site. MDA believes that the data provided to MDA by Fronteer and AuEx are generally an accurate and reasonable representation of the Long Canyon project.

The limits of the gold mineralization are not fully delineated, as the resources remain open along strike and at depth within the presently defined zones. There is also excellent potential for the discovery of new, parallel zones of mineralization related to presently unidentified occurrences of dolomite boudins.

Rock chip and soil sample results have proven to be direct guides to the definition of shallow drill targets at Long Canyon. While several attractive geochemical anomalies within permissive geologic settings remain to be tested, the gold-in-soil anomaly does not reflect the down-plunge extensions of the known resources. In these areas, more indirect methods, such as subtle flexures in the strike and dip of the overlying Pogonip Group, have successfully led to new discoveries at depth, most notably the Shadow and Crevasse zones.

1.7 Recommendations

Significant, relatively shallow, oxide resources have been outlined at Long Canyon that show potential to be economically viable. These resources remain open, with substantial additions conceivable. Beyond the extensions of known zones of mineralization, there is excellent potential for the discovery of new mineralized zones. It is clear that the Long Canyon project warrants significant additional expenditures.

The Fronteer-AuEx Joint Venture approved a 2010 exploration program with a budget of US$19,800,000 for Long Canyon. The budget includes 45,500 metres of core and RC drilling, as well as a continuation of the ongoing geological mapping program, further rock, soil, and road cut sampling, continued efforts pursuant to refining the Long Canyon geological model and geological controls on mineralization, and the continuation of various engineering, metallurgical, and environmental investigations. MDA believes that this program is warranted at Long Canyon.

Upon completion of the 2010 program at Long Canyon, MDA recommends that the mineral resources be updated and used as the basis for updated economic studies.

2.0 INTRODUCTION

Mine Development Associates ("MDA") has prepared this technical report on the Long Canyon gold project, located in the state of Nevada, at the request of Fronteer Gold and AuEx Ventures, Inc. ("AuEx"), joint venture partners at Long Canyon. This report was written in compliance with disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101, Companion Policy 43-101CP, and Form 43-101F1 ("NI 43-101").

Fronteer Gold, listed on the Toronto Stock Exchange ("TSX") and the New York Stock Exchange (NYSE Amex), holds its interest in Long Canyon through its wholly owned subsidiary Fronteer Development (USA) Inc., a Delaware corporation. AuEx, a Nevada corporation, is also listed on the TSX.

The Long Canyon project has been previously described in technical reports by Griffith (2006), Moran (2008), Gustin and Smith (2009), which includes the first mineral resource estimate at Long Canyon, and Gustin *et al.* (2009), which includes a preliminary economic assessment (the "2009 PEA"). This technical report updates the Gustin and Smith (2009) and Gustin *et al.* (2009) report.

For the purposes of this report, Fronteer Gold, Fronteer Development (USA) Inc., and NewWest Gold Corporation ("NewWest"; acquired by Fronteer Gold in September 2007) will be referred to interchangeably as "Fronteer".

2.1 Project Scope and Terms of Reference

The purpose of this report is to provide an updated technical summary of the Long Canyon project, including an updated mineral resource estimate that incorporates 2009 drill data, for Fronteer and AuEx. The mineral resources were estimated and classified under the supervision of Michael M. Gustin, Senior Geologist for MDA, and the 2009 PEA, which is only summarized herein, was completed by Thomas L. Dyer, Senior Engineer for MDA. Gary L. Simmons of GL Simmons Consulting, LLC supervised the completion of Section 16.0 (Mineral Processing and Metallurgical Testing). Mr. Gustin, Mr. Dyer, and Mr. Simmons are qualified persons under NI 43-101 and have no affiliations with Fronteer or AuEx except that of independent consultant/client relationships. The mineral resources reported herein for the Long Canyon project are estimated to the standards and requirements stipulated in NI 43-101.

The scope of this study included a review of pertinent technical reports and data provided to MDA by Fronteer and AuEx relative to the general setting, geology, project history, exploration activities and results, methodology, quality assurance, interpretations, drilling programs, and metallurgy. MDA has relied on the data and information provided by Fronteer and AuEx for the completion of this report, including the supporting data for the estimation of the mineral resources. The background information for this report, including Section 4 through Section 10, was first compiled by Moira Smith, Fronteer's Senior Geoscientist, before review, editing, and additions by Mr. Gustin; other significant references are cited in the text and listed in Section 21.0.

Mr. Gustin visited the Long Canyon project on November 15, 2006, July 15, 2008, and November 5, 2009. These site visits included reviews of mineralized core and reverse-circulation drill chips, examination of drill-hole cross sections showing the geologic model, investigations of representative exposures in road cuts and outcrops, and the inspection of sampling and logging procedures at active reverse circulation and core drill sites and in the project field office. Ms. Smith has worked extensively at Long Canyon and provided most of the detailed geologic descriptions, as well as the geological model, described in the report. Mr. Simmons visited the Long Canyon project site and Fronteer's Elko office on June 23 and 24, 2009 and March 16, 2010 to review maps, inspect metallurgical drill core, observe drilling and core handling, and inspect site conditions in general.

MDA has made such independent investigations as deemed necessary in the professional judgment of Mr. Gustin to be able to reasonably present the conclusions discussed herein.

The Effective Date of this updated technical report is March 1, 2010, unless otherwise stated.

2.2 Definitions and frequently used acronyms and abbreviations

Measurements are generally reported in metric units in this report. Where information was originally reported in English units, conversions have been made according to the formulas shown below; discrepancies may result in slight variations from the original data in some cases.

Frequently used acronyms and abbreviations

AA	atomic absorption spectrometry
Ag	silver
AOI	Fronteer – AuEx Joint Venture area of interest
Au	gold
As	arsenic
BLM	United States Department of the Interior, Bureau of Land Management
BMRR	Nevada Bureau of Mining Regulation and Reclamation
˚C	centigrade degrees
cm	centimetre = 0.3937 inch
COG	cutoff grade
g/t	grams per tonne = 34.2857 ppm = 0.0292 oz/ton
ha	hectare = 2.471 acres
Hg	mercury
ICP	inductively coupled plasma
K	thousand
kg	kilogram = 2.205 pounds
km	kilometre = 0.6214 mile
l	liter = 1.057 US quarts
lpm	liters per minute
Ma	million years old
µm	micron = one millionth of a metre
m	metre = 3.2808 feet
Ma	million years
NDEP	Nevada Department of Environmental Protection
NSR	Net Smelter Royalty
oz	troy ounce (12 oz to 1 pound)

Frequently used acronyms and abbreviations, cont.

ppm	parts per million
ppb	parts per billion
R	range
RC	reverse-circulation drilling method
SEM	Scanning electron microscope
Sb	antimony
t, tonne	metric tonne = 1.1023 short tons
T	township
Tl	thallium
USGS	United States Geologic Survey

Currency Unless otherwise indicated, all references to dollars ($) in this report refer to currency of the United States.

3.0 RELIANCE ON OTHER EXPERTS

The authors are not experts in legal matters, such as the assessment of the legal validity of mining claims, private lands, mineral rights, and property agreements in the United States. The authors did not conduct any investigations of the environmental or social-economic issues associated with the Long Canyon project, and the authors are not experts with respect to these issues.

The authors rely on information provided by Fronteer as to the title of the unpatented mining claims, private mineral rights, and water rights comprising the Long Canyon project, the terms of property and joint venture agreements, and the existence of applicable royalty obligations, as well as all information concerning environmental issues and permitting. Section 4.0 in its entirety is based on information provided by Fronteer, and the authors offer no professional opinions regarding the provided information.

MDA has relied on Fronteer to provide full information concerning the legal status of Fronteer Gold and related companies, as well as current legal title, material terms of all agreements, and material environmental and permitting information that pertain to the Long Canyon property.

4.0 PROPERTY DESCRIPTION AND LOCATION

The authors are not experts in land, legal, environmental, and permitting matters. This Section 4.0 is based on information provided to the authors by Fronteer and AuEx. The authors present this information to fulfill reporting requirements of NI 43-101 and express no opinion regarding the legal or environmental status of Long Canyon.

4.1 Property Location

The Long Canyon project is located in the Pequop Mountains, Elko County, northeastern Nevada, approximately 37 kilometres by road southeast from the town of Wells, Nevada, and approximately 6 kilometres south of Interstate Highway 80. The main area of the Joint Venture consists of approximately 49 square kilometres of land that is located on the east side of the range (Figure 4.1); additional surface and water rights are also held by the Joint Venture (discussed below). The approximate geographic centre of the Long Canyon project resources is 40° 58′ 23.70″ N latitude and 114° 31′ 52.33″ W longitude.

4.2 Land Area

The Long Canyon project is controlled by a joint venture between AuEx (49% interest) and Fronteer (51% interest) (the "Fronteer-AuEx Joint Venture" or the "Joint Venture"). The Joint Venture Area of Interest ("AOI"; Figure 4.2) includes 477 unpatented mining claims (approximately 3,322 ha) and approximately 1,578 hectares of private mineral rights held by the Joint Venture that lie in portions or all of Sections 14, 17, 19 through 22, and 26 through 34, T36N, R66E and Sections 2, 4, 5 and 6, T35N, R66E, Mount Diablo Baseline and Meridian (Figure 4.2). These claims and mineral rights held by the Joint Venture form a contiguous block of ground. The AOI also includes a few blocks of third-party claims not controlled by the Joint Venture (identified as "Columbus" on Figure 4.2), as well as surface and mineral rights owned by the Big Spring Ranch. AuEx recently acquired 39 claims from Pittston Mineral Ventures located in Sections 20, 31, and 32, T36N, R66E, Mount Diablo Baseline and Meridian (Figure 4.2), all within the AOI. These claims are now part of the Long Canyon Joint Venture (shown as "Pittston MV" on Figure 4.2).

<u>Unpatented Claims</u>. The numbers of claims reported in this section are current as of March 1, 2010 and are listed in Appendix A.

A total of 343 unpatented lode-mining claims are held by Pittston Nevada Gold Company ("Pittston"), which explored Long Canyon prior to Fronteer and AuEx. Pittston is now a wholly owned subsidiary of AuEx subject to completion of a Members' Interest Purchase Agreement dated August 18, 2004. Fronteer holds 134 of the unpatented mining claims within the Long Canyon project. The Joint Venture controls a total of 477 claims inside the Joint Venture AOI.

The unpatented claims within the project are located in the field with wooden posts that meet Nevada regulations. The validity and location of unpatented mining claims staked prior to 2006 have not been independently verified in the field. A review is currently underway involving field examination and surveying of section corners and selected claims. Claims staked subsequent to 2006 were located using a differential GPS system accurate to within 10 centimetres. Fronteer represents that the list of unpatented claims in Appendix A is complete and accurate as of March 1, 2010 and that all claims are valid through August 31, 2010.

Figure 4.1 Long Canyon Project Location Map
(green = Fronteer mineral rights within Area of Interest; dark blue = Joint Venture unpatented claims within Area of Interest; light blue = other Fronteer-controlled lands; orange = M and N Ranch)

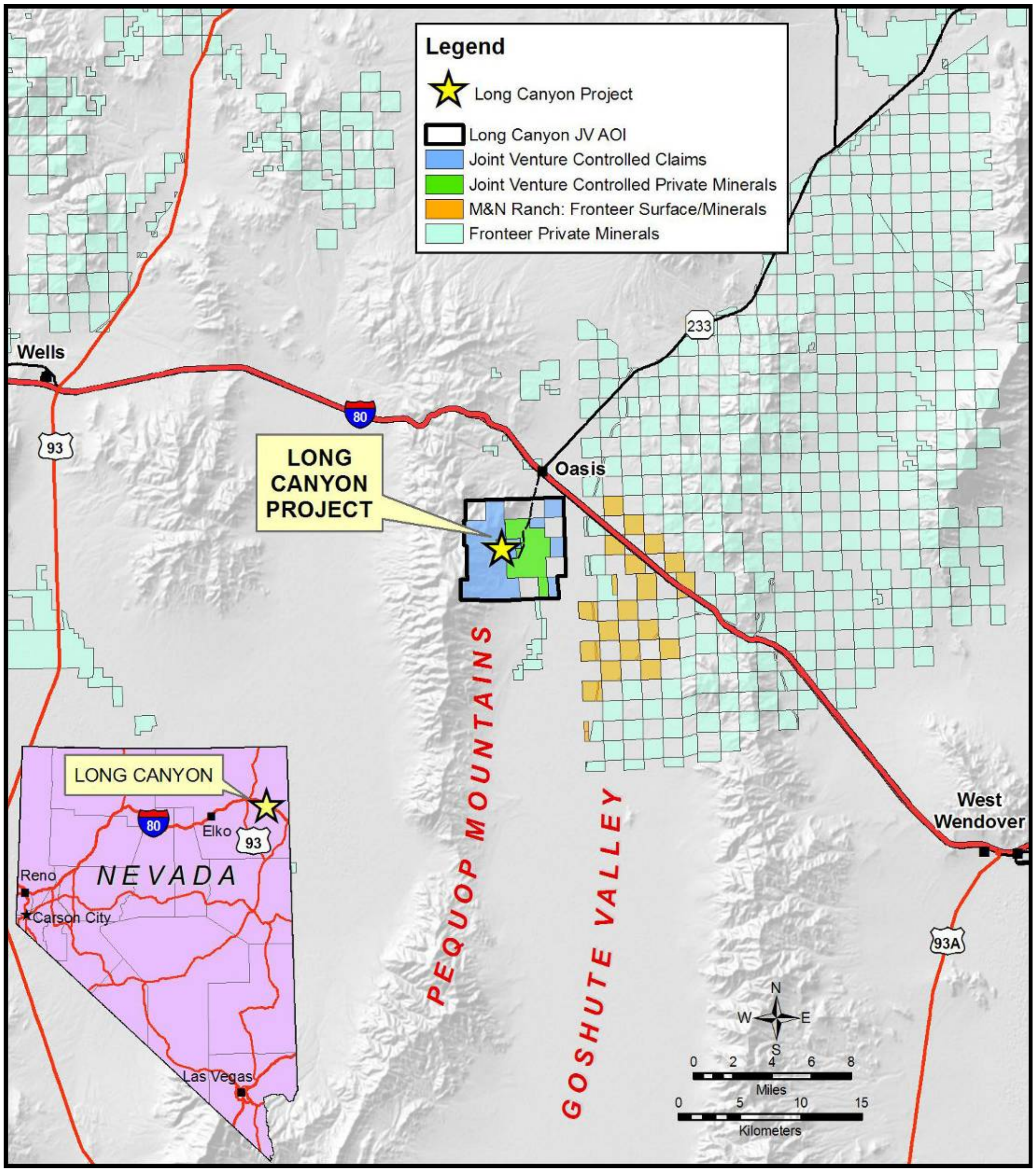
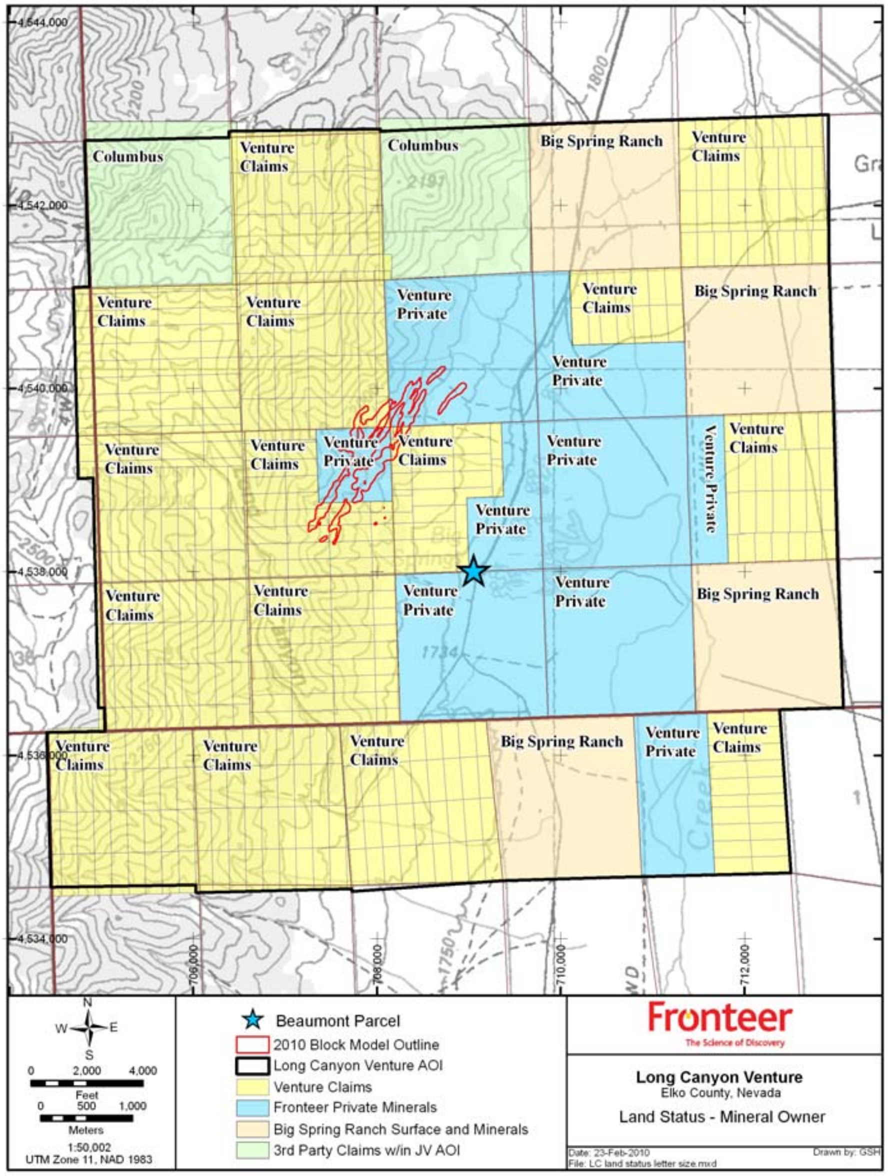


Figure 4.2 Long Canyon Project Property Map
(resource outline shown in red)



Ownership of unpatented mining claims is in the name of the holder (locator), subject to the paramount title of the United States of America, under the administration of the U.S. Bureau of Land Management ("BLM"). Under the Mining Law of 1872, which governs the location of unpatented mining claims on Federal lands, the locator has the right to explore, develop, and mine minerals on unpatented mining claims without payments of production royalties to the U.S. government, subject to the surface management regulation of the BLM. It should also be noted that in recent years there have been efforts in the U.S. Congress to change the 1872 Mining Law to include, among other items, a provision of production royalties to the U.S. government. Currently, annual claim maintenance fees are the only federal payments related to unpatented mining claims. Nevada BLM records of mining claims can be searched on-line at www.nv.blm.gov/lr2000/.

The holding costs of the unpatented mining claims in 2009 are estimated at about $165,000 (Table 4.1).

Table 4.1 Unpatented Mining Claims: 2010 Filing and Holding Costs

BLM Maintenance Fee Payment	$66,780.00
Elko County Annual Filing	5,012.50
Nevada new fee as per legislature[1]	93,015.00
Total Filing and Holding Cost	*$164,807.50*

[1]The Nevada legislature recently enacted a one-time fee of $195.00 per claim for companies holding more than 1,299 claims.

Private Mineral Rights. Fronteer owns the right to metalliferous minerals in the private mineral estate beneath portions of the Big Spring Ranch surface lands, including Sections 21, 28, and 33, T36N R66E, where the project access roads are located. Fronteer enjoys a broad right to use the surface of the land for exploration and mineral development purposes as successor in interest to the mineral estate reserved pursuant to the mineral reservation in the officially recorded Grant, Bargain, and Sale Deed to Joint Tenants dated October 18, 1946. This mineral reservation reserves to the owner of the mineral estate, (*i.e.*, Fronteer) "...all right, title and interest, to coal, oil, gas and other minerals of every kind and within said lands, including the right to the use of so much of the surface thereof as may be required in prospecting for, in locating, developing, producing and transporting said coal, oil, gas or minerals and any of their by products thereof."

Fronteer acquired these private mineral rights through a series of transactions. Western States Minerals Corporation acquired from its affiliate, Stampede Investments Inc., the private mineral interests of the Bernard H. Grube estate underlying a large part of northeastern Nevada, which Stampede acquired on May 3, 1994. This includes a 75% interest in the mineral rights underlying a portion of the Big Springs Ranch. The additional 25% was acquired from Mobil Exploration and Producing North America Inc. NewWest acquired the metalliferous mineral rights of Western States Minerals Corporation in August 2006 and contributed these mineral rights to the Joint Venture when it was formed in 2006. Fronteer acquired NewWest in 2007.

Private Surface Rights. Except for the NE ¼ of Section 29 and the W ½ of Section 21, T36N, R66E, Big Spring Ranch owns the surface rights overlying Fronteer's private minerals estate subject to Fronteer's use under the minerals reservation. The surface estate in the NE ¼ of Section 29 and the W ½ of Section 21, T36N, R66E is public land managed by BLM. This land, which was formerly part of the Big Spring Ranch, is now BLM-administered public land by virtue of a land exchange with the Big Spring Ranch that closed on May 20, 1999 and was recorded on May 26, 1999.

On July 15, 2009, Fronteer completed the purchase of 47.8 square kilometres of surface rights known as the M&N Ranch, located five to ten kilometres east of the Joint Venture AOI. This acquisition includes 1,657 acre-feet of water rights zoned quasi-municipal. This acquisition, including the water rights, has been assigned to the Fronteer-AuEx Venture. Fronteer owns the mineral rights under all of these acquired surface rights; these mineral rights are not included in the Fronteer-AuEx Joint Venture.

The surface estate on a small parcel of private land, totaling 4.5 acres, was purchased from the Beaumont Trust in February 2010 by the Joint Venture (Figure 4.2). Fronteer already owned the mineral rights to this parcel.

4.3 Agreements and Encumbrances

Gold production from Long Canyon is subject to the State of Nevada Net Proceeds of Mine Tax, which is limited to 5% of the production net proceeds (similar to a 5% net profits tax). This tax is levied by the State of Nevada on all mine production in the state.

Members' Interest Purchase Agreement. AuEx entered into a Members' Interest Purchase Agreement dated August 18, 2004, as amended (the "MIPA"), between MPI Gold (USA) Ltd. and PMV Gold Company, the owners of the outstanding membership interests in Pittston, and AuEx. AuEx completed the terms of the Members' Interest Purchase Agreement and acquired all of the outstanding ownership interests in Pittston. As of March 31, 2005, AuEx is the sole member.

AuEx is subject to the following obligations as per the Members' Interest Purchase Agreement:

- A contingent payment of 250,000 common shares of AuEx capital stock if AuEx defines at least 500,000 troy ounces of gold as measured and indicated resources by SME-1999 definitions on lands subject to the MIPA, which includes the AuEx unpatented claims within the Joint Venture Area of Interest. The resources are to be calculated based on holes drilled as of the fifth anniversary of the August 18, 2004 effective date of the MIPA.
- A contingent payment of an additional 250,000 common shares of AuEx capital stock if AuEx defines an additional 500,000 troy ounces of gold as measured and indicated resources by SME-1999 definitions on lands subject to the MIPA, which includes the AuEx unpatented claims within the Joint Venture Area of Interest. The resources are to be calculated based on holes drilled as of the fifth anniversary of the August 18, 2004 effective date of the MIPA.
- AuEx assumes the liability for the reclamation of existing surface disturbance, drill roads, and drill sites as of the August 18, 2004 effective date, as well as the cost of annual land holding fees. This liability was subsequently assumed by the Joint Venture.

The obligations listed above apply to unpatented mining claims originally held by Pittston both within and outside the limits of the Long Canyon Joint Venture Area of Interest. The obligation of AuEx to grant any shares under the terms of the MIPA had yet to be determined as of the Effective Date of this report.

Fronteer-AuEx Joint Venture Agreement. The Joint Venture agreement, which became effective May 23, 2006, has the following key provisions:

- each Party retains a 3% net smelter returns (NSR) royalty on their respective lands contributed to the Joint Venture;
- to maintain a 51% interest in the Long Canyon property, Fronteer was required to expend the first $5,000,000 on the joint properties, which was completed in September 2008; and

- the interests in the Joint Venture will remain at 51% Fronteer - 49% AuEx unless the interest of either party is diluted for failure to participate in funding an approved program.

Other Agreements. Pittston Mineral Ventures International Ltd. has reserved a 3% NSR on the 39 claims described above that were recently purchased by Pittston on behalf of the Joint Venture.
There is a 0.625% NSR royalty due to Mobil Exploration and Producing North America Inc. on the mineral rights obtained from them.

4.4 Location of Mineralization

The gold mineralization identified and drilled thus far on the Long Canyon project is located on both the land holdings of Fronteer and AuEx, as shown in Figure 4.3.

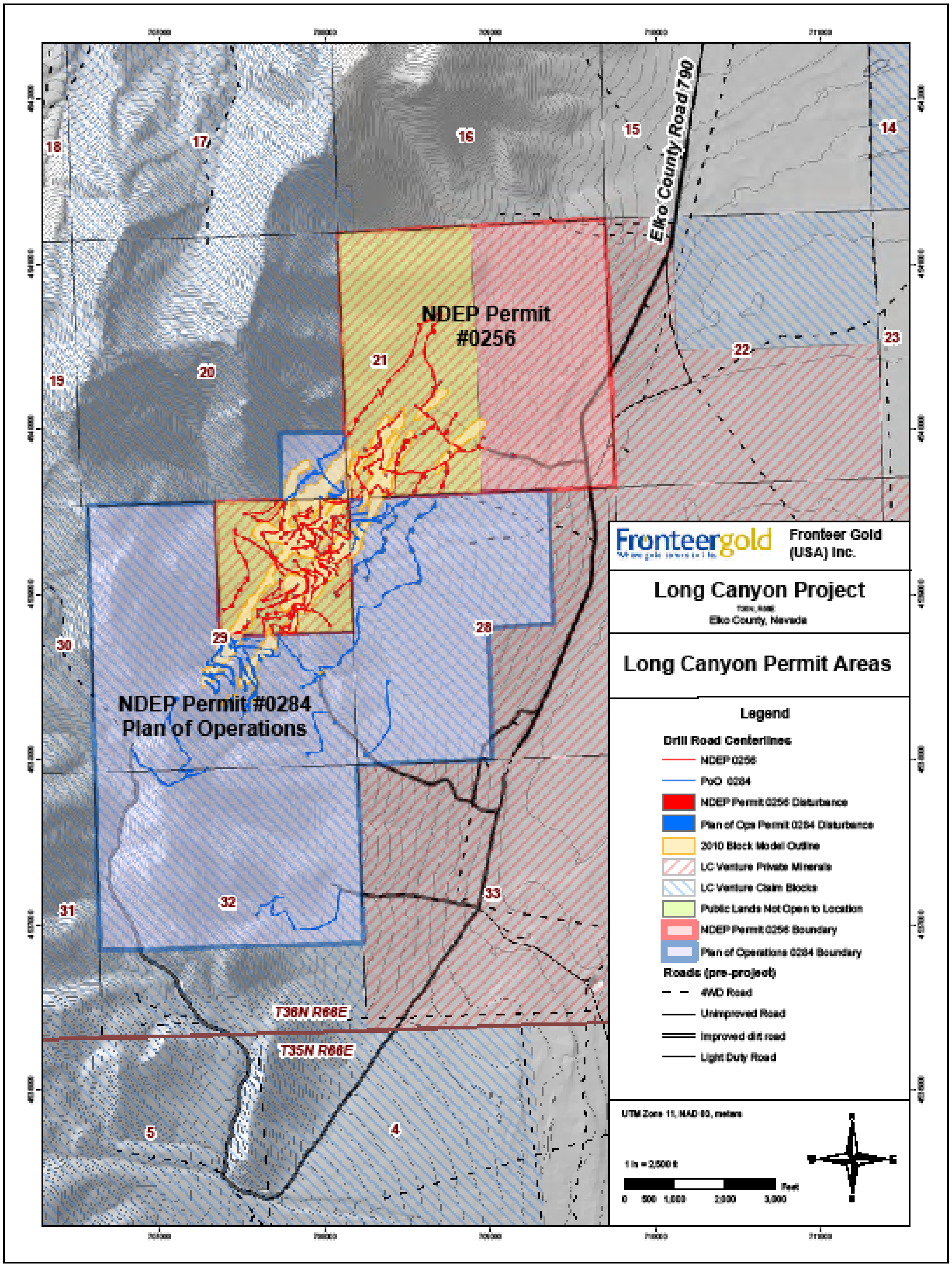
4.5 Environmental Permits and Licenses

Fronteer has acquired all of the state and federal regulatory approvals and permits required for the 2010 exploration program. Three permits currently govern exploration activity at Long Canyon: NDEP/BMRR Reclamation Permit No. 0256, NDEP/BMRR Reclamation Permit No. 0284, and BLM Plan of Operations NVN-82445 (Table 4.2).

Table 4.2 Permits Covering Operations at Long Canyon

Permit	Land Status	Land Areas	Approval Date	Bond Amount	Authorized Disturbance	Current Disturbance	Comment
NDEP/BMRR Reclamation Permit No. 0256 (amended)	Public and Private Surface & Private Mineral Lands	NE1/4 Section 29, Section 21, T36N, R66E	19-Mar-09	$228,200	54.93 acres (22.22 ha)	37.30 acres (15.10 ha)	Original Permit No. 0256 granted in 2006; amended to authorize additional disturbance in 2009
NDEP/BMRR Reclamation Permit No. 0284/BLM Plan of Operations NVN-82445 (amended)	Public Surface - Mining claims over Public Minerals	Sections 28, 29, and 32, SE1/4, SE1/4 Section 20, T36N, R66E,	Permit 0284: 8/28/08 Plan of Ops: 9/15/2008	$169,644; secured with $500,000 statewide bond	44.93 acres (18.02 ha)	27.31 acres (11.05 ha)	44.88 acres (18.00 ha) of disturbance currently bonded

Figure 4.3 AuEx Claims and Fronteer Private Mineral Rights Within Area Drilled
(not all project claims and mineral rights shown; AuEx claims outlined in blue, Fronteer mineral rights in red)



Disturbance on Unpatented Mining Claims on Public Lands. BLM Plan of Operations NVN-82445 and the corresponding BMRR/NDEP Reclamation Permit No. 0284 (the "Plan of Operations") authorizes 44.93 acres (18.18 ha) of surface disturbance in Sections 28, 29, and 32, T36N, R66E, which together form the eastern and central portion of the unpatented mining claims on Federal lands. This disturbance is associated with exploration work that will be conducted in two or more phases over a period of five years. Phase 1 authorized 19.60 acres (7.93 ha) of new surface disturbance, which required a bond of $131,964. Fronteer provided the BLM with a $500,000 Statewide bond to satisfy the $131,964 reclamation bond requirement. Fronteer applied for permission to commence Phase 2 disturbance on a total of 44.88 of the 44.93 acres authorized under the Plan of Operations in July 2009 and received permission on July 10, 2009. Prior to commencing Phase 2, Fronteer provided the BLM with additional financial assurance from the Statewide bond to secure the increased bonding obligation ($169,644). In June 2009, Fronteer USA filed for an amendment to expand the project boundary of the Plan of Operations to include 40 acres in the extreme southeast corner of Section 20. The BLM approved this amendment in July 2009. No additional bonding was needed, as the total amount of permitted disturbance remained unchanged at 40 acres. A total of 27.31 acres (11.05 ha) had been disturbed under Permit No. 0284 as of March 1, 2010.

Fronteer, on behalf of the Fronteer-AuEx Joint Venture, has received new permits to govern the drilling of nine hydrological holes within the AOI. These holes, along with the existing four monitoring wells, are designed to test and characterize the aquifer as to water depth, quality, and gradients. Additionally, these holes will give other information with respect to the structural and rock-permeability controls of the aquifer. These holes will also assist in the geotechnical engineering, site characterization, facilities layout, and future permitting activities for the project.

Disturbance on Private Mineral Lands. The Nevada Division of Environmental Protection/Bureau of Mining Regulation and Reclamation ("NDEP/BMRR") approved an amendment to Reclamation Permit No. 0256 on March 19, 2009, which increases the authorized surface disturbance for exploration activities on private mineral lands to 54.93 acres (22.22 ha). Reclamation Permit No. 0256 governs the exploration activities on the private mineral lands in the NE ¼ of Section 29 and all of Section 21, T36N, R66E, which together form the northwestern part of the area of private mineral rights owned by Fronteer (Figure 4.2). Fronteer provided a reclamation bond in the amount of $228,200 to NDEP/BMRR on April 16, 2009. With this permit in hand, Fronteer extended the road network and drilling effort to the northeast to allow for testing of extensions of the presently identified mineralized zones. As of March 1, 2010, a total of 37.30 acres (15.10 ha) had been disturbed on private mineral lands subject to NDEP/BMRR Permit No. 0256.

Hydrologic Investigations. In 2009, in order to satisfy a permit condition in the Plan of Operations, Fronteer drilled a supplemental water production well for the cities of Wendover, Utah and West Wendover, Nevada to address the cities' concerns about potential impacts from exploration drilling to the nearby Johnson Springs, one of the cities' water sources. Fronteer worked closely with the cities to identify three targets in the Northern Goshute Valley, roughly 16 kilometres southeast of Long Canyon, for the supplemental well. Three hydrologic test holes, each 305 metres in depth, were drilled in late March 2009. A hydrogeologic investigation was completed on one of these holes in June 2009 to evaluate its suitability for the supplemental well. The hole chosen is located in the NE/4 of Section 11, T35N, R67E, Elko County, Nevada. This well (know as Shafter # 6) has been completed and tested at 530 gallons per minute (33.5 liters per second) continual pumping for 48 hours. The water quality met all drinking water standards. A well house, pumping and piping facilities, and power were also constructed for this production well. All facilities were constructed, tested, and ready for use by April 2010.

Following initial completion and testing of the Shafter # 6 Well, the cities of West Wendover, Nevada and Wendover, Utah approved a request by Fronteer to allow Fronteer to drill below the level of the of the Johnson Springs water table (an elevation of 1,731 metres). A restriction was in place in the BLM Plan of Operations that would not allow Fronteer to drill below this elevation until Fronteer had completed a production well capable of replacing the 448 gallons per minute permitted water usage of the two cities from Johnson Springs. The cities sent letters to the BLM indicating that Fronteer had met its commitment to construct a replacement well for the cities and further requested the BLM to allow Fronteer to initiate drilling at Long Canyon below this elevation. Following discussions with Fronteer, the BLM approved drilling below the level of Johnson Springs, and Fronteer initiated drilling for targets below this elevation on September 23, 2009. This enables the Joint Venture to test mineral targets deeper than was possible previously and is providing additional information on mineralization and the groundwater characteristics of the deposit. In addition, permitting is underway for drilling and installation of an additional nine monitoring wells in and around the deposit.

In addition to working together on the supplemental well, Fronteer and the cities have entered into a conceptual Memorandum of Understanding ("MOU") establishing a mutually beneficial public-sector, private-sector working relationship to characterize and develop groundwater resources that will support future municipal growth and mineral development. Recognizing the importance of these key stakeholders, Fronteer is continuing to work closely with the cities to enhance all stakeholders' understanding of the hydrology of the area.

4.6 Environmental Considerations

Environmental liabilities at the Long Canyon project are limited to the reclamation of disturbed areas resulting from exploration work conducted by Pittston, AuEx, and Fronteer since 2000. Evidence of previous mineral exploration activity consists of several small, widely spaced, shallow prospect pits of unknown origin and age. Class III cultural resource surveys, providing sufficient detail to satisfy the regulatory agencies, were conducted in 2000, 2006, 2007, 2008, and 2009, primarily by ASM Affiliates of Reno, Nevada. These studies recorded some prehistoric and historic artifact sites within the project area. In accordance with applicable permits, exploration activities will avoid or mitigate cultural resources. Mitigation of some cultural sites in the Long Canyon deposit area will be carried out in 2010.

4.7 Meteorological and Air Monitor Stations

IML Air Science, a division of Inter-Mountain Laboratories, Inc, was contacted to procure, integrate, configure, install, and test a solar-powered meteorological monitoring system and provide third party monitoring of meteorological data for the project. The system measures wind speed, wind direction, standard deviation of horizontal wind direction, precipitation, relative humidity temperature at two and ten metres, solar radiation, and evaporation.

Air Sciences Inc. has been selected to install an air monitoring station for the project. Based on their previous experience with Nevada Department of Environmental Quality and the expected emission of the project, a station capable of monitoring both PM2.5 and PM10 will be installed. Air Sciences will get approvals for the siting and installation of the station, the preparation and submission of a Quality Assurance Project Plan, and annual operation of the station.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Access to Property

Access to the Long Canyon project is via Interstate Highway 80 to exit 378 (the Oasis exit), 42 kilometres east of Wells, Nevada, then proceeding 6.4 kilometres south on Elko County Road 790, which is an all-weather gravel road to the Big Spring Ranch. Access within the project area is through use of other roads and/or easements open to the public, and, as necessary, crossing some private land subject to Fronteer's dominant mineral reservation or that Fronteer has otherwise established the right to use.

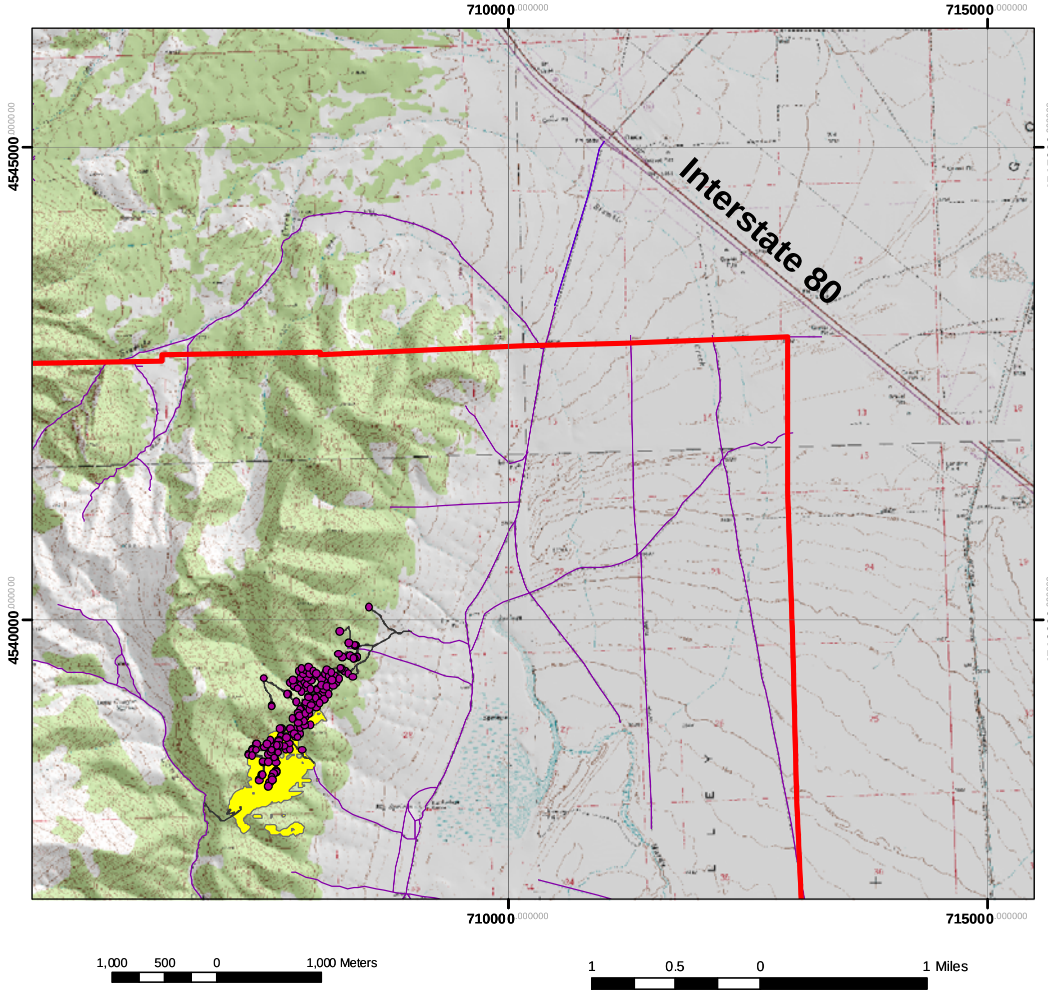
In April 2009, Fronteer entered into a five-year road maintenance agreement with Elko County. Under the terms of this agreement, Elko County and Fronteer now share the responsibility to maintain County Road 790. Although this road proceeds through the Big Spring Ranch and provides public access to points south of the Ranch, at the request of the lessee of the Ranch, exploration traffic uses a dirt by-pass road that AuEx constructed and improved in 2005. This bypass road is located on lands in Sections 28 and 33 where Fronteer owns the private mineral estate. The bypass road circumnavigates the Ranch headquarters on the uphill side. From the by-pass road, several short, unimproved dirt roads access the drill grid area. The drill grid area is located approximately 1.6 kilometres west of the Big Spring Ranch (Figure 5.1).

5.2 Climate

Climate is typical for the high-desert regions of northeastern Nevada with hot, dry summers and cold, snowy winters. Summer high temperatures range from 30˚ to 38˚C, with winter low temperatures typically -20˚ to -10˚C and winter high temperatures of 0˚ to 5˚C. Most of the precipitation in the region falls as snow in the winter months, with lesser precipitation as rain in the spring and thunderstorms during the late summer. Winter storms can deposit several metres of snow, with elevations above 2100 metres being continually snow covered from November through April.

In the absence of all-weather road access to drill sites, a typical exploration-operating season for the Long Canyon project is from mid-May through early November. Improved road access and road maintenance/snow removal equipment could extend the exploration operating season through the winter months if necessary, although winter operations must comply with winter mule deer habitat protection requirements.

Figure 5.1 Long Canyon Project Access



5.3 Physiography

The Long Canyon project lies in the Basin and Range physiographic province of Nevada and western Utah. The project site is located on the eastern side of the Pequop Mountains in northeastern Nevada (Figure 5.2), which has elevations ranging from 1675 metres in valley bottoms to over 2750 metres on the ridge tops. Elevations for Long Canyon exploration drill-hole collars range from 1900 to 2050 metres.

The lower slopes of the project area are covered by sagebrush, progressing up-slope to piñon and juniper woodlands typical of high-desert mountain vegetation in northeast Nevada. Locally scattered subalpine fir, limber pine, and mountain mahogany are present at higher slope elevations, giving way to sagebrush and grasses on ridge tops. The majority of the Long Canyon exploration activities to date have been in tree-covered (piñon and juniper) areas on the lowermost, eastern slopes of the range.

The resource area lies on moderate to steep slopes that require road construction to develop drill sites and access.

5.4 Local Resources and Infrastructure

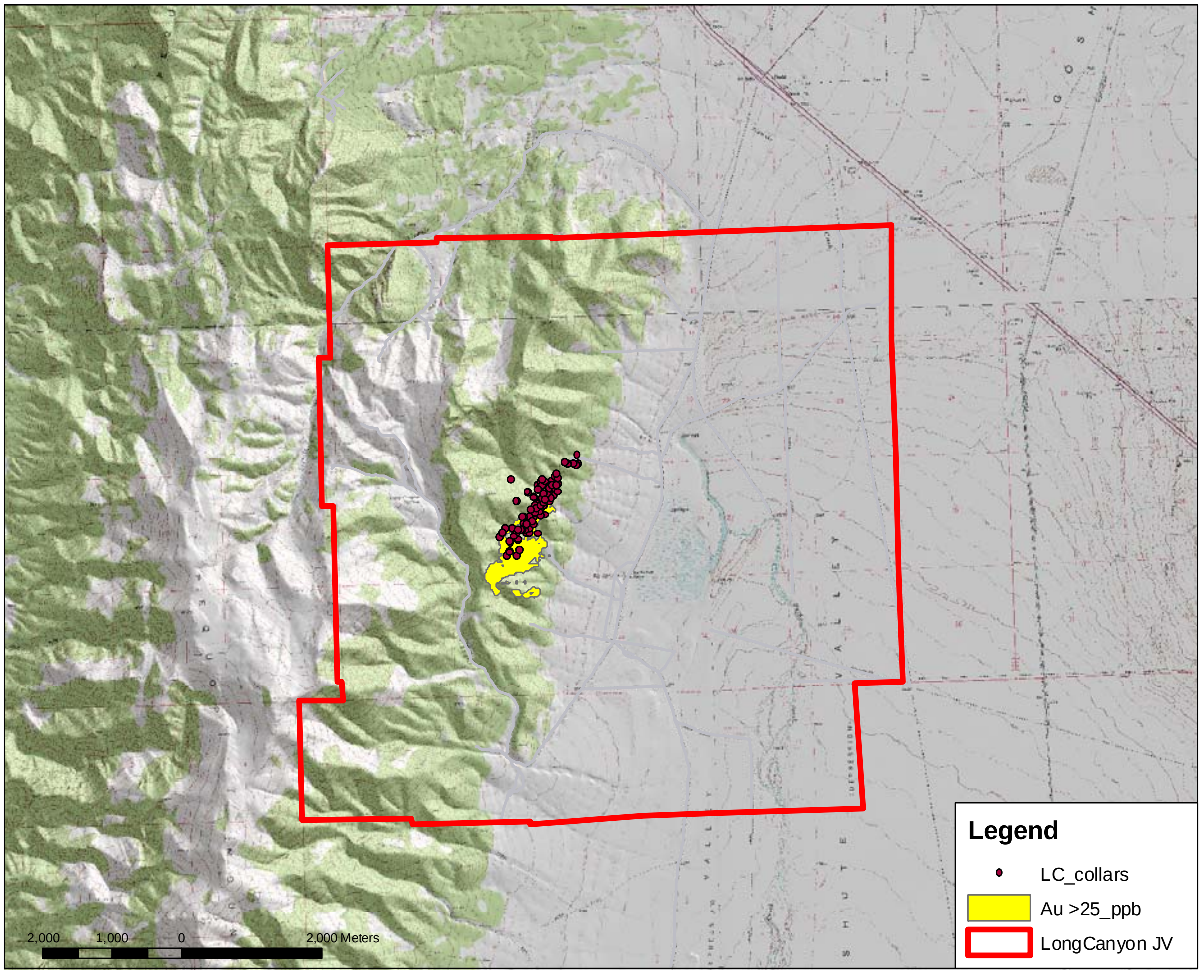
Reverse circulation ("RC") and diamond core drilling ("core") contractors, heavy equipment contractors, and field technical personnel to support continued exploration activities are all available from service companies and contractors in Elko, Nevada. Should an economic gold deposit be delineated on the Long Canyon project, experienced mining personnel and equipment suppliers are available in Elko as well as elsewhere in Nevada.

Electric power for domestic use extends to the Big Spring Ranch. The nearest major power grid is near an east-west rail line located approximately 15 kilometres north of the Long Canyon project, north of Interstate 80.

Water for drilling at Long Canyon is available from a well at the Oasis Truck Stop located 6.4 kilometres north of the project. Fronteer has a five-year lease with the owner of the truck stop to use water from the well to support the exploration activities. Fronteer has also obtained a temporary waiver from the Nevada Division of Water Resources authorizing the use of water from the Oasis well for mineral exploration drilling and dust control at the Long Canyon project. The agreement with Oasis also allows Fronteer to lease land for the purpose of establishing a field headquarters to support the Long Canyon project. Infrastructure at this location consists of a fenced yard with three trailers utilized for project activities, as well as access to water, power, electricity, phone, and high-speed internet.

Accommodations for field personnel are available in Wells, Nevada, the nearest town to provide food and lodging (Figure 4.1). The town of Wendover, located approximately 48 kilometres to the east on Interstate 80, is another alternative used by drilling contractors. There is no campsite or other housing facilities on the project.

Figure 5.2 Physiographic Map of Project Area
(Showing Drill-Hole Collars and Gold-In-Soil Anomalies)



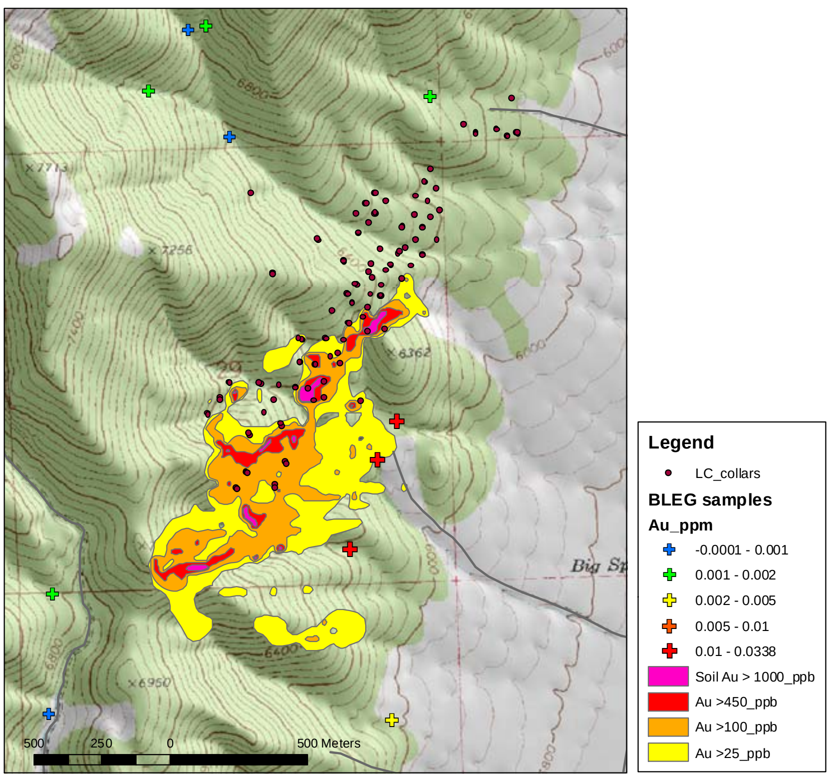
6.0 HISTORY

This section describes work conducted prior to formation of the Fronteer-AuEx Joint Venture in 2006. Work completed by the Joint Venture is described in subsequent sections of this report. Some specifics of the Pittston exploration program were provided by S. Green and S. Mason, former Pittston employees.

Aside from a few, small, historical lead-zinc prospect pits within the Long Canyon project area, there is no evidence of any historical mining production.

Pittston conducted the first known modern gold exploration within the Pequop Mountains in 1994 when it conducted a regional Bulk Leach Extractable Gold ("BLEG") sampling program. This program returned anomalous gold from dry washes draining the western flanks of the Pequop Mountains. Pittston expanded this program to include the Long Canyon project area on the east side of the range in 1999. A number of BLEG samples in the Long Canyon region yielded anomalous gold (Figure 6.1).

Figure 6.1 Pittston BLEG Anomalies, 2000 Soil Anomalies, and Drill-Hole Collars



The detailed BLEG sampling was followed by prospecting up drainage and the discovery of gold-bearing jasperoids. Ridge-and-spur soil sampling followed, as well as soil sampling on a 61 metres x 61 metres grid up drainage from anomalous BLEG samples and over areas that yielded gold-bearing jasperoids. Pittston staked the first claims of record at Long Canyon in 2000. The soil sampling yielded a >25ppb soil anomaly over 1.5-kilometre long, elongate in a northeast direction (Figure 6.1). In addition to gold, multi-element ICP geochemical analyses showed anomalous arsenic, antimony, and mercury to be present in areas of anomalous gold. Rock chip sampling and road cut sampling were also done in advance of drilling.

Later in 2000, Pittston drilled seven RC holes, for a total of 1148 metres, to test the far northeastern portion of the soil anomaly. Five holes encountered weak gold mineralization, but the discovery hole, LC-03, encountered 21 metres averaging 2.7 g Au/t, including 3 metres averaging 5 g Au/t.

Pittston terminated exploration activities in the U.S. in December 2000. AuEx acquired Pittston in August 2004 and renewed exploration at Long Canyon in 2005, including mapping, surface sampling, road-cut sampling, and drilling. The drill program consisted of seven RC holes for a total of 768 metres. Significant gold mineralization was encountered in six of the seven holes.

In November 2005, Fronteer recognized that some of the claims controlled by AuEx at Long Canyon covered public surface lands but were underlain by private mineral rights owned by Fronteer and therefore were not open to mineral entry and staking. As a result, a Joint Venture agreement for the Long Canyon project was drafted between Fronteer and AuEx, with Fronteer contributing private mineral lands and AuEx contributing federal lode claims.

Fronteer has operated the Joint Venture and conducted all exploration at Long Canyon property since May 23, 2006. Work completed by Fronteer for the Joint Venture is described in subsequent sections of this report.

6.1 Historic Mineral Resource and Reserve Estimates/Production

No historical resource or reserve estimations had been completed at Long Canyon prior to the mineral resource estimate reported in the 2009 Technical Report (Gustin and Smith, 2009), and there is no known historical mineral production from the project or immediately adjacent properties.

7.0 GEOLOGIC SETTING

7.1 Regional Geology

Most of northeast Nevada is underlain by carbonate and siliciclastic rocks that record a passive margin setting throughout most of the Lower Paleozoic, transitioning to a more active continental margin from the mid-Paleozoic onward. A major east-trending, crustal-scale fault known as the Wells Fault of unknown (post mid-Paleozoic) age, separates primarily platform and platform margin rocks on the south side of the fault (including most of the Pequop Mountains, shown in Figure 7.1) from platform margin and slope facies to the north. This separation suggests considerable (tens of kilometres) right-lateral offset across the fault (Thorman *et al*., 1992). In the Long Canyon project area, Cambrian and Ordovician rocks record many cycles of sea level rise and fall, with periods of low sea level marked by dolomite horizons and sheets of cross-bedded orthoquartzite.

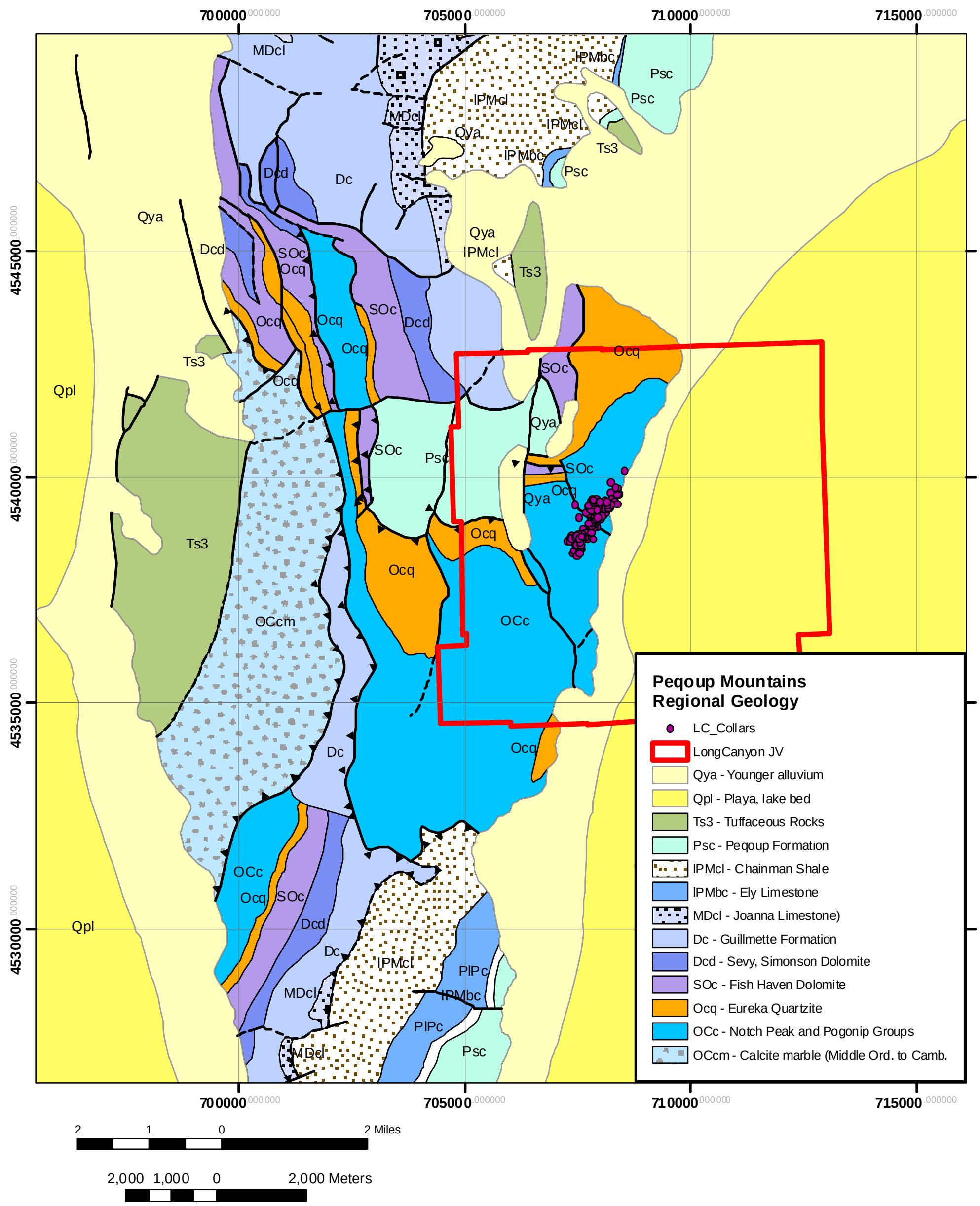
To the north of the Wells Fault, the Paleozoic section records the mid-Paleozoic Antler Orogeny in the form of the Roberts Mountains thrust fault and emplacement of deeper-water siliciclastic rocks of the Roberts Mountains allochthon over platform and slope facies rocks. To the south of the Wells Fault, the Antler Orogeny is manifested by thick accumulations of foreland-basin sediments of Early Mississippian age that were shed eastward off the Roberts Mountains allochthon.

In Jurassic time, rocks throughout northeastern Nevada and easternmost Utah were affected by the Elko Orogeny (Thorman *et al*., 1992). The Elko Orogeny resulted in metamorphism and plastic deformation of primarily Lower Paleozoic strata over a large area. Manifestations include weak to strong, near-bedding-parallel foliation, northeast-trending folds, east-southeast-trending stretching lineations, and older-over-younger and younger-over-older layer-parallel faults (attenuation faults). Metamorphic effects are strong in the Wood Hills to the west of the Pequop Mountains, weaker in the western Pequop Mountains, and weaker still in the Long Canyon project area. The Elko Orogeny is presumed to be approximately coeval with Jurassic plutonism in eastern Nevada.

The Tertiary Period includes a number of episodes of extension in the Great Basin, including Eocene volcanism and normal faulting and mid-Tertiary low-angle listric normal faulting. The latter includes periods of "hyperextension" from approximately 33 to 20 Ma, including the formation and unroofing of the Ruby Mountains Core Complex, located approximately 80 kilometres to the west. Rocks as young as 10 Ma in the eastern Great Basin are tilted up to 50° to the east, suggesting that low-angle normal faulting continued until fairly recently. High-angle basin and range faulting, resulting in the familiar pattern of mountain ranges and valleys, continues to the present. Most ranges, including the Pequop Mountains, are bounded by steep faults on one or both sides.

Gold occurrences in the eastern Great Basin are widely spaced and generally small, but most appear to be of the sediment-hosted type that is more prolific and well documented in the Carlin and Cortez Trends in the central Great Basin. Mineralization of this type was emplaced approximately 38 - 40 million years ago throughout the region, more or less coeval with two phases of felsic to intermediate volcanism in the region. Some examples are present in the vicinity of the Pequop Mountains, including the Tug and KB deposits, located to the northeast. Gold is also associated with mid-Jurassic intrusions in the region, including some or all of the mineralization at Bald Mountain, located to the southwest of Long Canyon.

Figure 7.1 Regional Geologic Map of Long Canyon Area



7.2 Property Geology

The following discussions are derived primarily from the mapping study completed by Smith (2009), which built upon earlier efforts by AuEx and Pittston. The reader is referred to unpublished company reports by consulting stratigrapher Jon Thorson (2007, 2008) for more details on the stratigraphy of the Notch Peak Formation and Pogonip Group. Previous mapping in the Long Canyon area was carried out by Thorman (1970), Camillari (1994), Coolbaugh (2006), and Pittston geologists, who provided a framework for subsequent work. Thompson (2009) mapped portions of the Long Canyon AOI in 2009.

7.2.1 Project-Scale Lithology

The Pequop Mountains are underlain primarily by Paleozoic carbonate rocks and lesser siliciclastic rocks representing a transition from slope through platform facies over time (Figure 7.2). The Long Canyon project is underlain primarily by the Notch Peak Formation and the Ordovician Pogonip Group and Eureka Quartzite, with younger rocks (Fish Haven Dolomite, Chainman Shale, and Pequop Formation) mapped on the northern boundary of the project area. On a property-wide scale, stratigraphic units presented in this report (Figure 7.3) reflect mappable subdivisions defined by Smith (2009) for regional mapping efforts. Additional stratigraphic detail at the top of the Notch Peak Formation and the base of the Pogonip Group is also described below, as these units appear to significantly influence the distribution of gold mineralization at Long Canyon.

Cambrian Candland Shale. Thinly bedded calcareous siltstone and silty limestone are exposed at the extreme south end of Long Canyon ridge. The strata, as well as the contact with the overlying Notch Peak Formation, are highly strained, but the contact appears to be depositional. These strata are tentatively assigned to the Candland Shale (Ccs) mapped elsewhere in the region based on discussions with Jon Thorson (pers. comm., 2008.)

Cambrian Notch Peak Formation. Cambrian carbonate rocks are widely distributed in the region, but are mostly referred to as “undifferentiated”. The name “Notch Peak Formation” is used to describe mainly massive limestone and/or dolomite in adjacent ranges to the east, and has been adopted here.

The lowest mappable unit in the Notch Peak (Cnp1) consists of a massive dolomite horizon approximately 20 to 30-metres thick exposed in the extreme south end of Long Canyon ridge. Overlying the massive dolomite unit in the southern part of the project area is a unit of unknown thickness (probably up to a few hundred metres thick) of fairly massive dolomite and limestone with 3 to 5-centimetres thick chert ribbons and nodules (Cnp2). Dolomite is suspected to be a secondary feature (late diagenetic, metamorphic, or possibly hydrothermal).

The Cnp2 unit grades upward into mainly limestone (Cnp3). This unit consists of an amalgamation of at least four shallowing-upward depositional cycles. Overall, however, the unit can be characterized by the predominance of fairly massive, medium- to thick-bedded, medium to pale grey, sparsely fossiliferous, finely crystalline limestone with areas of thinner, silty interbeds. Small-scale depositional features, including fossil hash, oolitic and oncolitic horizons, and rarely mudcracks, are noted locally. Several small dolomite lenses have also been mapped within the Cnp3 unit. Some appear to be derived from primary dolomitic deposits, while others appear to be related to alteration along fault zones or fold hinges.

The highest unit in the Notch Peak Formation consists of a thick (approximately 75 metres) sequence of massive dolomite (Cnp4). This unit ranges from light to dark grey in colour, from coarse to (rarely) fine grained, and from massive to (rarely) well bedded, probably reflecting varying degrees of secondary recrystallization.

Figure 7.2 Long Canyon Project Geologic Map

(after Smith, 2009)

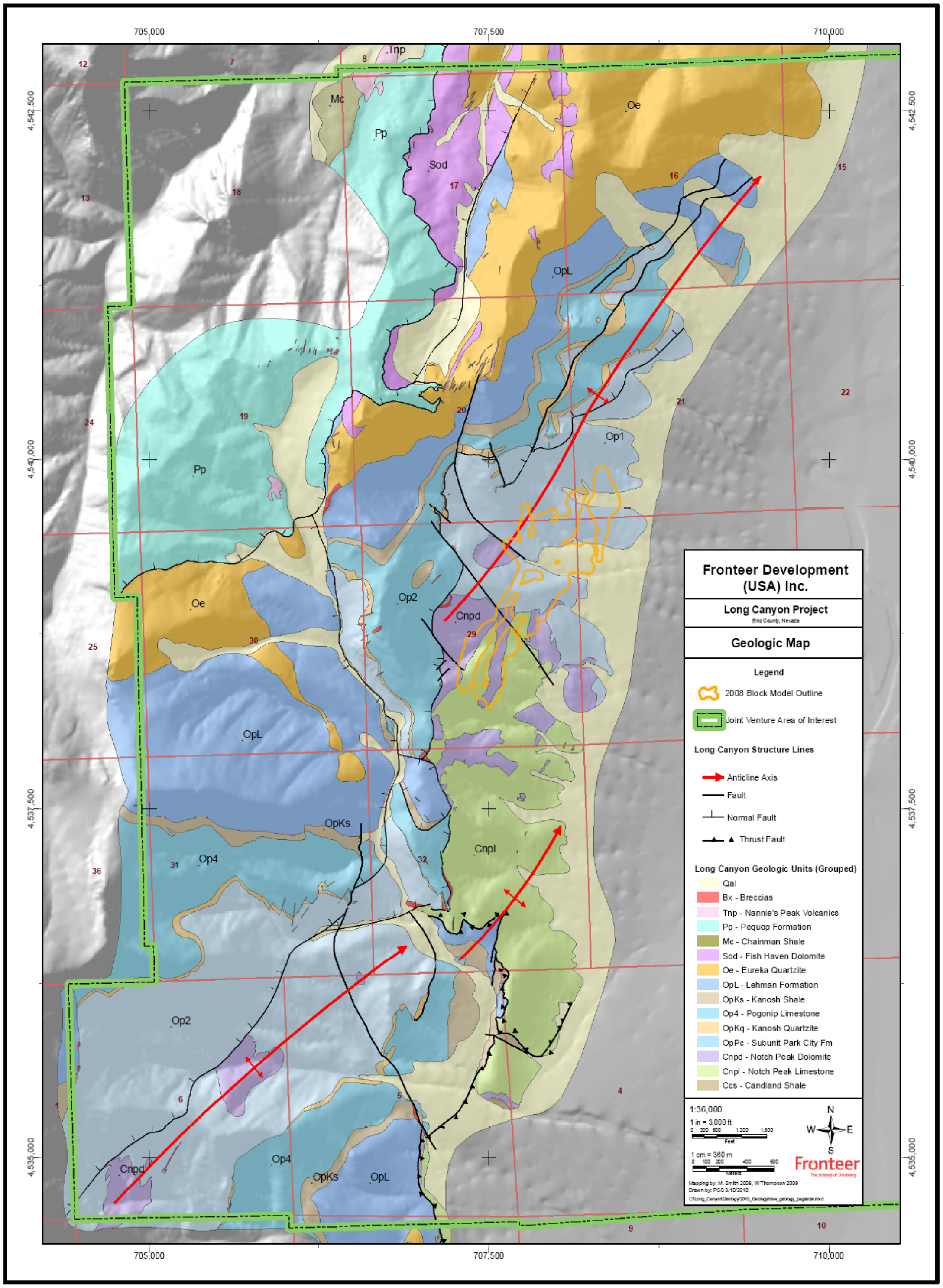
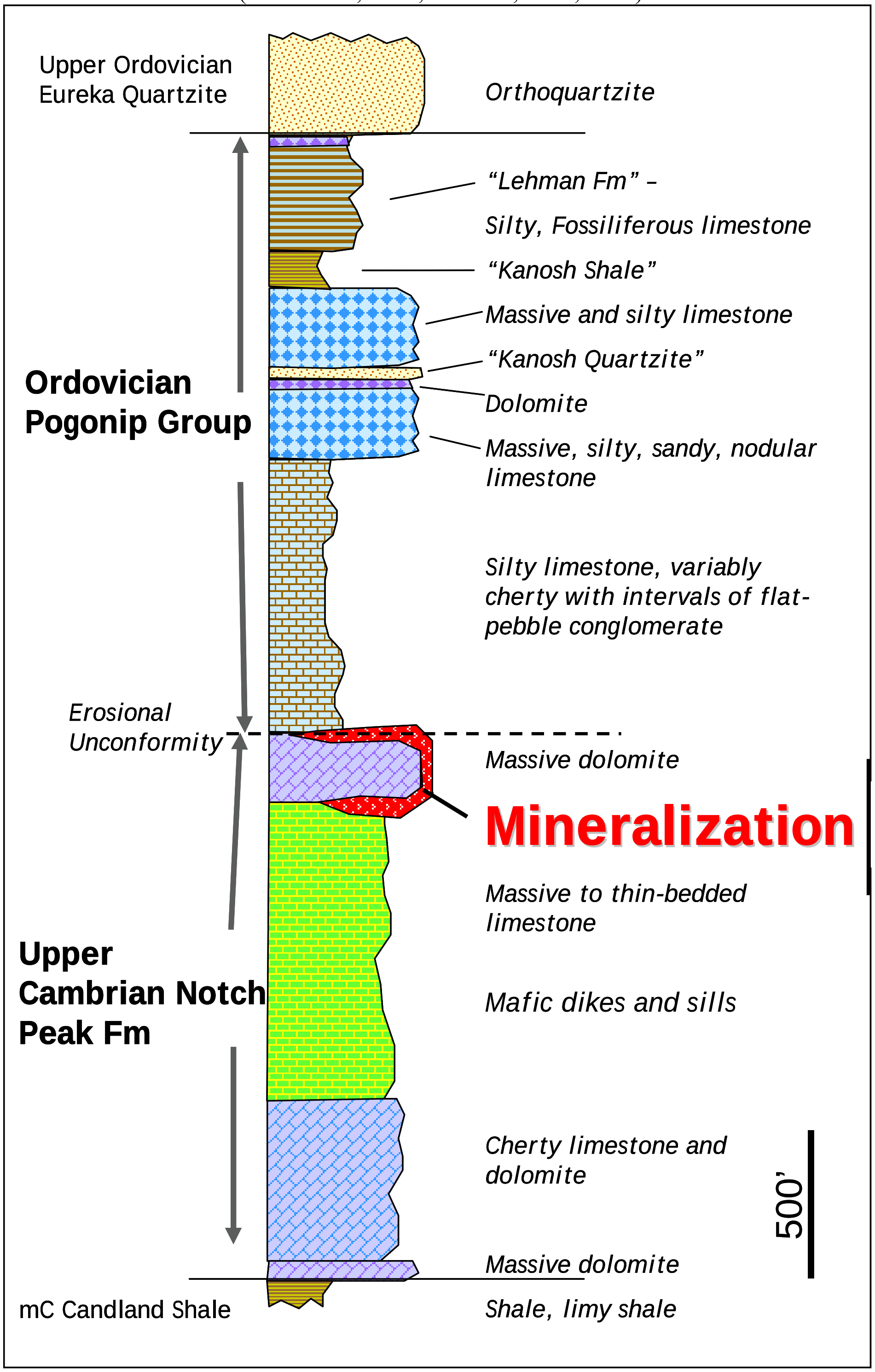


Figure 7.3 Stratigraphy of the Long Canyon Project Area
(after Smith, 2009; Thorson, 2007, 2008)



<u>Ordovician Pogonip Group</u>. Following the deposition of the Notch Peak Formation, there was likely an emergent period (global sea level low-stand) spanning up to several million years, represented by an erosional unconformity and local areas where a paleosol and/or breccias are present between the top of the Notch Peak Formation and the base of the Pogonip Group.

The Pogonip Group in the map area is suspected to be up to 600 metres thick, and on the scale of the mapping for this report, is comprised of six main units and several sub-units. Nomenclature varies considerably throughout the region, likely a result of facies changes and the formation's broad regional extents (from eastern California to western Utah). Thorman (1970), following Hintze (1951), divided the Pogonip Group in the Wood Hills and Pequop Range into four formations, which include (from lowest to highest) the Wahwah and Juab Limestone, Kanosh Shale, Lehman Formation and Crystal Peak Dolomite. The Wahwah and Juab Formations are also known as the Garden City Formation in the Toano Range. In the Toano Range, a quartzite referred to as the Swan Peak Quartzite occurs between the Lehman Formation and the Crystal Peak Dolomite. Smith (2009) used a numbering system based on units felt to be consistently and reliably applicable in the field at the scale of mapping (approximately 1:2400).

The basal unit of the Pogonip Group in the Long Canyon area (Op1) is the host for much of the mineralization in the Long Canyon deposit, and consists of recessive, thin-bedded, silty limestone (Figure 7.4) with thicker (up to one metre thick) interbeds and areas of more massive limestone. Limestone ranges from medium grey to buff and typically weathers in a platy, rounded habit. Chert (probably diagenetic) comprises approximately 5% of the lower part of this unit. Thicker beds are often conglomeratic, with tabular limestone clasts in a sandy (grainstone) matrix. Near the top of the section in the north, Op1 is very recessive and poorly exposed, covered by an apron of talus from the overlying, cliff forming unit Op2.

Figure 7.4 Silty, Thin-bedded to Laminated Limestone of Lower Pogonip Group (Op1)

Unit Op2 is a massive, cliff-forming unit exposed mainly in the northern part of the map area. The unit consists of massive beds of heavily burrowed limestone. Burrow fill consists of tan-weathering, partly dolomitic, silty, buff-coloured, partially silicified limestone, giving the rock a "net-textured" or nodular appearance.

Unit Op3 consists of approximately 15 metres of white, cross-bedded quartz arenite. In the Wood Hills, this quartzite is named the "Kanosh Quartzite" by Thorman (1970). This unit is flanked by dolomitic sandy limestone in some areas.

Unit Op4 is similar in nature to unit Op2, consisting of fairly massive, burrowed, "net textured" to nodular, silty limestone, as well as massively bedded limestone with minor wispy silt laminae, cherty limestone, and grainstone.

Unit Op5 consists of a very recessive weathering shale horizon, known regionally as the "Kanosh Shale". The Kanosh Shale is rarely exposed, and is usually defined by a zone of grey- to olive-weathering shale and thin-bedded silty limestone float with very minor outcrop of thin-bedded, silty limestone. Shale typically displays a slaty cleavage at low angles to bedding.

Unit Op6 consists mainly of massive grey limestone with 20% to 70% buff to red silt "wisps". Silt wisps were likely continuous silty beds, which have been deformed into a series of rootless isoclinal folds on a centimetre scale. In some areas, this unit is overlain by the Crystal Peak Dolomite, a thin, highly fossiliferous stratigraphic unit.

<u>*Ordovician Eureka Quartzite.*</u> The Ordovician Eureka Quartzite caps the higher ridges above and to the north and west of the Long Canyon deposit. The Eureka quartzite consists of white to pale grey, hard, massive, variably cross-bedded orthoquartzite, and exceeds 100 metres in thickness in this area. The contact with the underlying Pogonip Group is usually covered by thick talus. Where exposed, quartzite near the base of the unit is often brecciated and re-healed with silica, suggesting the bottom contact may be modified by low-angle, layer-parallel faulting.

Units present in the Long Canyon project area above the Eureka Quartzite include the Late Ordovician to Silurian Fish Haven Dolomite, Mississippian Chainman Shale, and the Permian Pequop Formation.

<u>*Lamprophyre Sills and Dikes*</u>. Thin lamprophyric sills and dikes are present throughout the map area, usually as rubble trains. Most of the sills and dikes are less than one-metre thick. The rock is fine to medium grained and variably porphyritic. Whole-rock data from variably altered samples shows silica content as low as 38% and elevated Ni, Cr, Co, K, V, Ba, and P. They are invariably altered, with alteration ranging from propylitic (chlorite-muscovite-phlogopite) to argillic and/or phyllic altered in mineralized zones. Secondary biotite is suspected in some areas. Sills range from nearly undeformed to strongly foliated. Examination of dikes and sills in road cuts suggests that they crosscut second-phase folds and are thus post-metamorphic. The foliation is largely internal to the dikes, which suggests that it is formed by squeezing the phyllosilicate-rich rocks between rigid buttresses of limestone. Lamprophyre dikes and sills may be found throughout the deposit, but appear to concentrate in linear, northeast-trending swarms that closely (but not exactly) parallel boudin margins.

Nannie's Peak Volcanic Rocks. Felsic volcanic and/or shallow intrusive rocks are noted in two locations on the property, one at the bottom of Long Canyon and a second near the northern property boundary. The rock most often is massive and crowded with quartz, feldspar, and biotite phenocrysts. The Nannie's Peak volcanic rocks have been dated as approximately 41 Ma.

Quaternary/Holocene Unconsolidated Deposits. Lower elevations of the map area are covered by alluvium, characterized by the presence of relatively rounded boulders (up to several metres in diameter) of Eureka Quartzite, as well as a diverse range of other lithologies. IP resistivity data suggest that the alluvial deposits thicken gradually basinward, and then thicken abruptly on the east side of a high-angle Basin and Range fault.

7.2.2 Deposit Scale Lithology

Additional core drilling in 2009 made it possible to break out distinct lithologic units above and below the Notch Peak Dolomite (Figure 7.5 and Figure 7.6). These units appear to control the distribution of mineralization to a degree not recognized in previous drilling. From approximately 100 metres below the top of the Cnp3 unit, progressing up section, the following units were broken out:

Cnplw: "Wispy Massive Limestone" A unit of variable thickness comprised of laminated to thin beds of limestone and silty limestone to siltstone or shale. This unit is variably bioturbated, with coarser, cleaner limestone filling burrows. This activity, as well as ductile strain, parsed the silty laminations into discontinuous small lenses or "wisps". In some areas, thin to medium beds of sand-sized bioclastic material is also present. This unit grades downward into bioclastic to oolitic limestone and upward into unit Cnplus.

Cnplus: "Upper Siltstone" The upper siltstone unit is made up of alternating 1 to 2 metre thick intervals of thin-bedded to laminated silty limestone, siltstone, and shaly limestone with 1 to 3 metre-thick intervals of massive oncolitic limestone (Figure 7.7). Silty intervals are dark grey fresh, but are very prone to alteration/oxidation and typically appear tan, orange, or red where mineralized (Figure 7.7 and Figure 7.8). Oncolitic horizons are typically medium grey. Oncolites often contain grainy brown dolomite rhombs. The unit as a whole ranges from a few metres to approximately 12 metres thick depending on degree of strain (which is quite variably close to the Notch Peak Dolomite), layer parallel attenuation faulting, and other factors.

Cnplonc: "Oncolitic Limestone" The upper siltstone is bounded on the top by a thick horizon of massive oncolitic limestone, which was originally identified in 2008 field mapping. It is identical to the oncolitic limestone interlayered with siltstone in the Cnplus unit, but lacks the siltstone horizons. It is of variable thickness, but typically 10 to 12-metres thick. It is notably thinned in areas of high ductile strain, such as near or within boudin neck areas. The Cnplonc unit is gradational upward into unit Cnplbu.

Figure 7.5 Stratigraphy Immediately Above and Below the Notch Peak Dolomite

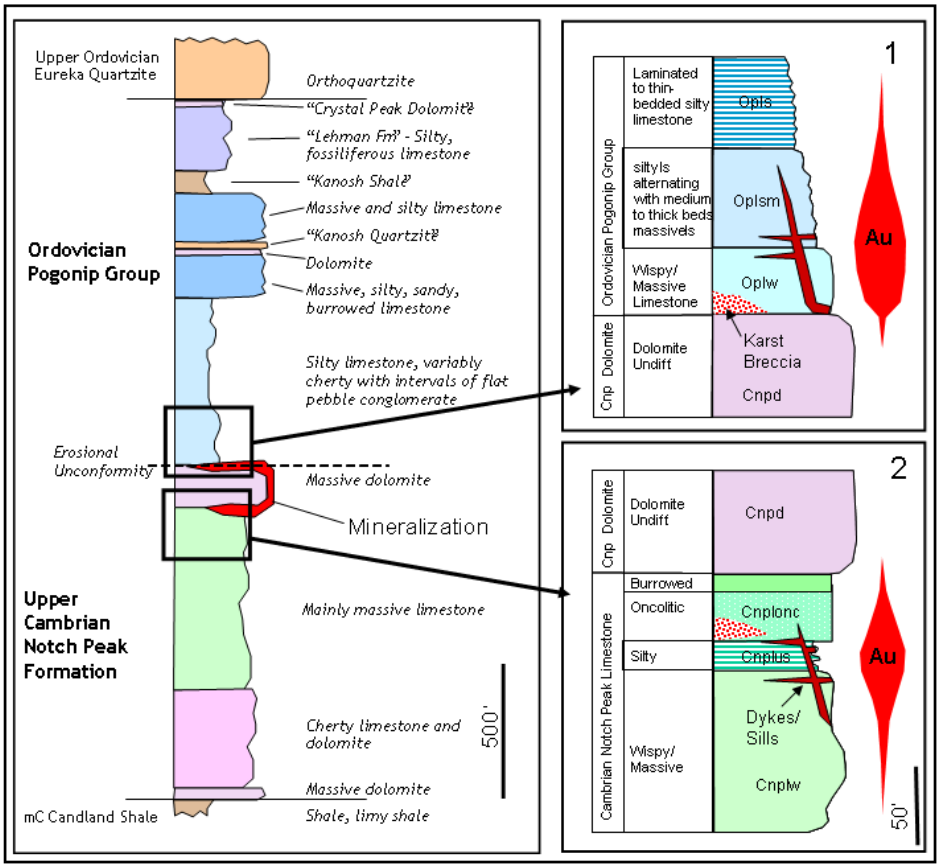


Figure 7.6 Altered Stratigraphic Equivalents Immediately Below the Notch Peak Dolomite

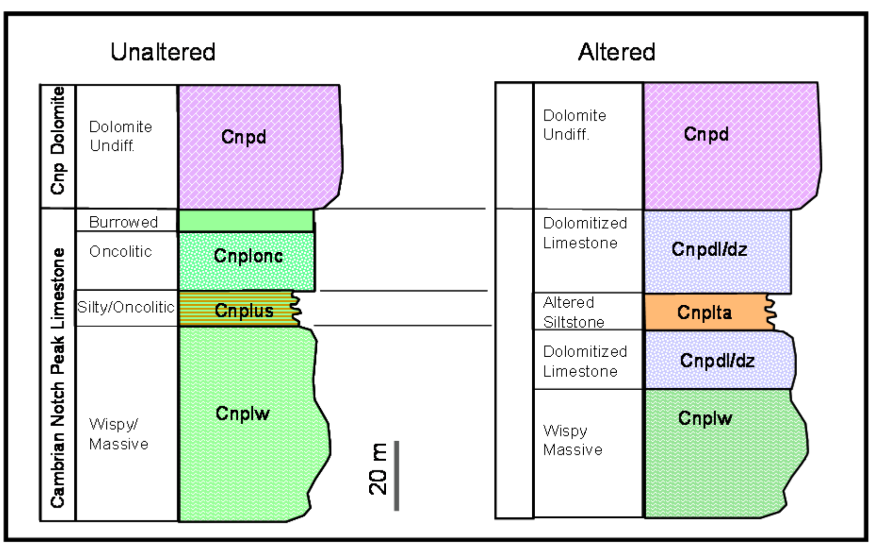


Figure 7.7 Relatively Unaltered Cnplus "Upper Siltstone" Unit

(Massive oncolitic limestone (pale grey) interlayered with intervals of silty limestone (dark grey)).

Figure 7.8 Dolomite-Altered Equivalent of the Cnplus "Upper Siltstone" Unit

(Tan areas (Cnplt) are after the silty limestone, grey areas are dolomitized oncolitic limestone (protolith textures are preserved).

Cnplbu: "Burrowed Limestone" A massive unit consisting of bioturbated/burrowed limestone lies above the Cnplonc. Overall, the unit is very massive, and has a distinctive mottled, light to medium grey appearance. Some oncolites may be present near the base of this unit. The unit is probably over 20-metres thick, but is only rarely seen in its entirety due to variable degrees of dolomitization at the base of the Notch Peak Dolomite.

Together, these newly defined units form a distinctive package that has proved useful in defining the structural setting and alteration in and around the base of the Notch Peak Dolomite. For example, the oncolitic limestone unit proves to be very robust in terms of recognizing protolith types despite profound dolomitization. The Cnplus unit is also a useful marker in dolomitized areas (see below). Finally, the Cnplus unit is the most important unit at the top of the Notch Peak Formation from an economic standpoint, as it appears to be the best conduit and host for gold mineralization.

The lowermost portion of the Pogonip Group (unit Op1 of Smith, 2009) was also examined in some detail during core logging. While not as precisely defined as the upper portion of the Notch Peak Limestone, there is still a crude stratigraphy that can be discerned in it.

Oplw: "Wispy Massive Limestone" This unit is very similar in nature to unit Cnplw, consisting of massive, pale to medium grey limestone with silt wisps defined by silt/shale laminations, dismembered by burrowing activity and ductile strain (Figure 7.9). This unit averages approximately 10 to 12 metres thick, and directly overlies the Notch Peak Dolomite on a sharp contact. This unit is where most of the solution breccia-hosted gold mineralization in the Pogonip Group is hosted (Figure 7.5).

Figure 7.9 Relatively Unaltered "Wispy Massive" Limestone (Oplw)

Figure 7.10 Mineralized Equivalent of the Oplw Unit

Opsm: "Silty/Massive Limestone" Above unit Oplw, there is a zone of alternating, approximately one metre thick beds of massive limestone, alternating with approximately one metre thick intervals of laminated to thin-bedded silty limestone, limy siltstone and shaly limestone (Figure 7.11). This unit is of variable thickness but probably averages approximately 10 to 20 metres thick. It bears a superficial resemblance to unit Cnplus, the upper siltstone unit in the Notch Peak Limestone, but lacks oncolites in the massive beds. This unit is gradational into gradually thinner, thick to medium beds of massive limestone alternating with intervals of laminated to thin bedded silty limestone, eventually giving way upwards into predominantly laminated to thin bedded silty limestone, limy siltstone, and shaly limestone.

Figure 7.11 Opsm Unit - Alternating Massive (grey) and Weakly-Altered Laminated/Thinly Bedded Limestone (orange)

7.2.3 Structure

The structural history of the Long Canyon area was elucidated primarily through geological mapping, examination of drill core, and research.

The structural history of the Long Canyon area is complex, with at least four deformational events. These events are generally not well described or dated in the eastern Great Basin, but some tentative correlations can be made between regional and local events. Strata throughout the area are characterized by a penetrative fabric at low angles to bedding, local areas of tight to isoclinal, intrafolial folds on a centimetre scale, development of a southeast-plunging stretching lineation, northeast-trending folds, and boudinage, on a regional scale, of brittle dolomite units. The ductile deformation event that created these structures is attributed to the Jurassic Elko Orogeny.

Northeast-trending folds include open to tight and upright to overturned folds. All fold the foliation, but some appear to be fairly ductile in nature, while others range from tight folds to kink folds. A northeast-plunging crenulation lineation is present locally. Two roughly coaxial phases of folding are suspected.

Faults range from early, ductile older-over-younger and younger-over-older low-angle faults, to more brittle low-angle to moderate-angle reverse and normal faults, to late brittle northwest- and northeast-striking faults.
The deformational history is described below in a spectrum from older, more ductile deformation to younger, more brittle deformation.

Jurassic(?) Ductile Deformation. The Jurassic Elko Orogeny was defined by Thorman *et al*. (1991), although the existence of ductilely deformed rocks in the eastern Great Basin has been documented for several decades by many different researchers. The lines of evidence that are most compelling in terms of documenting a mid-Mesozoic orogenic event in the eastern Great Basin are: 1) ductile folds and other fabrics in rocks as young as early Mesozoic are crosscut by approximately 155 Ma intrusive rocks in several mountain ranges; and 2) the presence of the Morrison Formation, comprising one thousand metres or more of terriginous sediment of mid- to Late Jurassic age, in Utah and Colorado, interpreted as foreland-basin sediments shed off the Elko orogenic highland.

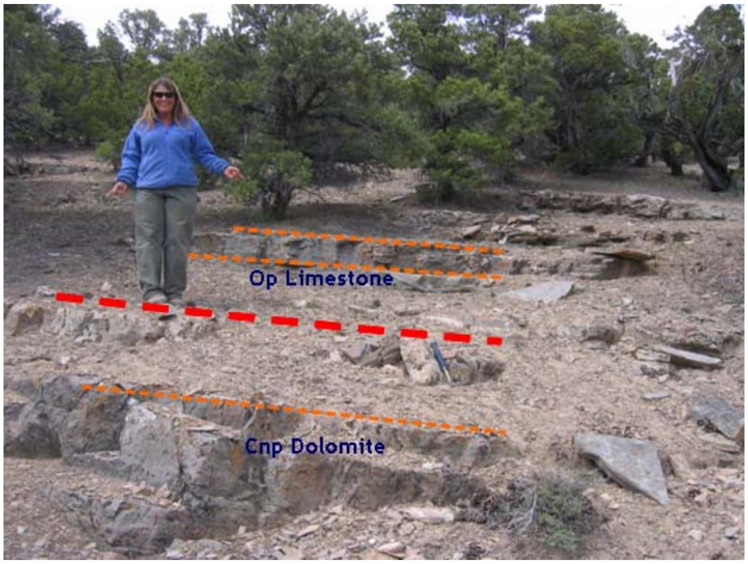
The earliest deformation documented in the Long Canyon area is manifested by variable development of a penetrative cleavage or foliation in all calcareous or dolomitic rocks. Foliation is defined by a slaty to phyllitic cleavage in silty or shaly rocks, or by recrystallization of calcite or dolomite in more massive rocks. The foliation typically is parallel to or slightly discordant to bedding in thin-bedded, shaly or silty units, and refracts and is more discordant in massive or thick-bedded units. It is only weakly developed in dolomite, and is absent in quartzite. Locally, such as along the lower contact of the dolomite unit (Cnp4), the foliation is particularly strongly developed. This deformation is locally accompanied by a NW-SE to WNW-ESE stretching lineation in the plane of the foliation.

The most profound manifestation of the Elko Orogeny in the Long Canyon area consists of boudinage of the thick, brittle dolomite horizon at the top of the Notch Peak Formation. The development of these dolomite boudins created structural/stratigraphic settings that were critical to the localization of the Long Canyon mineralization. The boudinage is interpreted by examination of mapped outcrops, drill intercepts, and observation of bedding and foliation directions both internal and external to the boudins. At the top or the bottom of a boudin, bedding in the dolomite and overlying or underlying limestone is parallel or subparallel, and generally dips gently to the southeast (Figure 7.12). Along a block nose (the terminated end of a boudin), the bedding/foliation in the enveloping limestone wraps around the nose and may be vertical or locally overturned, whereas the bedding in the dolomite remains unchanged (Figure 7.13 and Figure 7.14). Bedding in the dolomite unit is difficult to discern close to a block nose as the dolomite is typically recrystallized, strongly jointed, and locally brecciated.

Boudins are irregular in shape, although boudin necks (the area between adjacent boudins) generally trend north to northeast, perpendicular to the stretching lineations. The thin-bedded basal Pogonip limestones are often highly folded and contorted along the limestone-on-limestone contacts in the boudin neck areas. Where the boudins are covered by the Pogonip Group, boudin necks in the subsurface can be traced for some distance by mapping of north- to northeast-trending synclines in the lowermost Pogonip Group rocks.

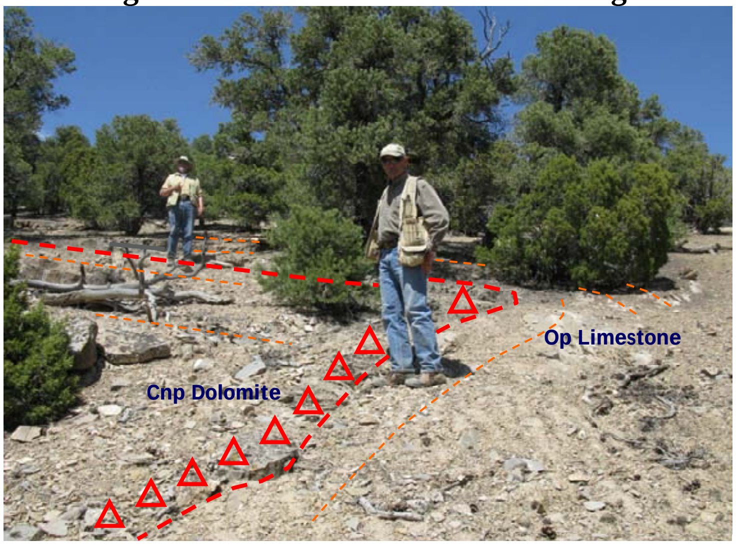
Folding associated with the Elko Orogeny in the Long Canyon area appears to be in large part controlled by the megaboudinage of the Notch Peak dolomite. The largest folds in the area occur in the Notch Peak Formation limestone, where boudin necks accommodate the limestone by formation of open, ductile, upright anticlines, and to a lesser extent in the overlying Pogonip Group, where boudin necks accommodate the limestone by formation of upright synclines. Hinge areas are rounded and tend to be massive. Bedding and foliation are difficult to discern, possibly due to recrystallization. The foliation is folded, suggesting that the folding event happened later than initial foliation of the rocks. No secondary axial planar cleavage is discernable in these folds.

Figure 7.12 Top of Dolomite Boudin Block



(Note that bedding and foliation (orange) are parallel to the contact between the Cnp dolomite and Op limestone).

Figure 7.13 Dolomite Boudin Nose/Edge



(Bedding in the Cnp dolomite is truncated, whereas bedding/foliation in the Op limestone is folded over the boudin nose.)

Figure 7.14 Dolomite Boudin-Nose Contact

(Op limestone is highly strained, with near-vertical orientation of foliation.)

The basal part of the Pogonip Group in the boudin necks and along boudin noses is characterized by tight folding on a centimetre scale, with the foliation axial planar to the folds.

Open upright folds and intrafolial folds described above are affected by a later, roughly coaxial phase of folding that is more brittle in nature. These folds, which occur primarily in units immediately above and below the Notch Peak dolomite, have more angular hinge areas than the early, open folds, and a weakly developed axial planar cleavage. These folds may in part represent "tightening" of the axial areas of earlier folds as deformation progressed. The late fold set is also manifested as a northeast-trending crenulation lineation locally visible in the plane of foliation where the foliation is developed in silty rocks.

Bedding-parallel thrust faults and attenuation faults have also been noted within the project area.

Post – Jurassic Deformation. Structures attributed to post-Jurassic tectonism are generally brittle in nature. These may be in part associated with the Late Cretaceous Sevier Orogeny. Structures noted in the project area include:

- Moderate-angle, west-northwest-dipping reverse faults;
- Low to moderate-angle, west-dipping normal faults;
- Tight folds with northeast-plunging axes and variously oriented axial planes;
- Northeast-trending, high-angle breccia zones.

Brittle structures noted within the drilled area are described below.

North- to northwest-trending high-angle faults are believed to be common in the map area, although they tend to occupy gullies and rarely outcrop. These faults can be observed primarily on ridges characterized by good exposure or where they cut either the Kanosh Quartzite or Eureka Quartzite, in which cases offsets can be mapped and the fault planes are silicified and/or contain quartzite clasts. Offset along the faults is variable, but rarely over a few tens of metres. The North Fault, mapped on surface and in drill holes, may be affiliated with other northwest- to north trending faults in the area. This fault exhibits down-to-the-east displacement of a few tens of metres as measured by offset of one of the dolomite blocks. It is believed to be post-mineralization.

The latest phase of faulting in the Long Canyon area is represented by a large, north-trending, range-bounding normal fault along the eastern edge of the project area. The existence of this fault is inferred by: 1) the presence of a large basin; 2) a linear trend of artesian springs; and 3) gravity and IP data suggesting a dramatic thickening of basinal sediments over a short distance.

Two major joint sets are evident in the region: northeast-trending and steep, approximately parallel to the axial planes of most folds in the region, and northwest-trending and steep, parallel to northwest-trending high-angle faults in the region. The former joint set is essentially parallel to weakly developed axial planar cleavage in second-phase folds, as well as northeast-trending faults/breccia zones.

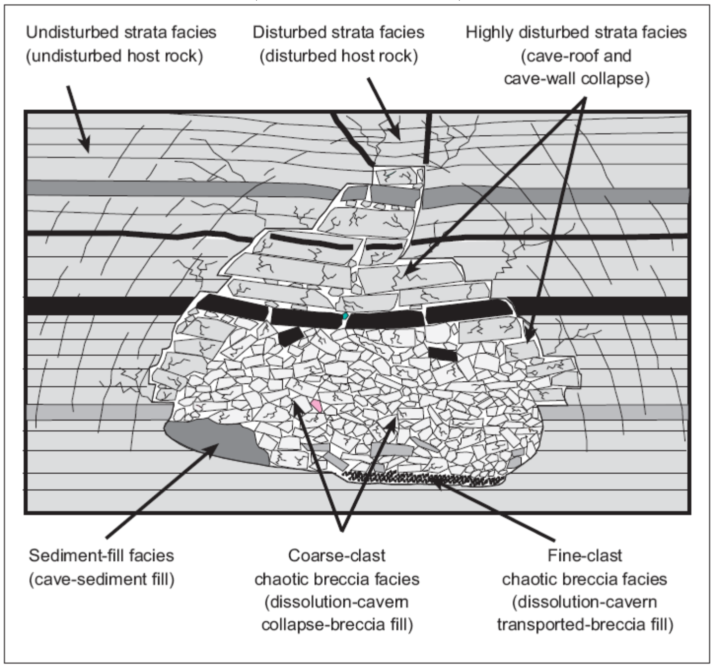
Pressure solution features (stylolites) are noted throughout the region. They are most noticeable in drill core from deformed areas in the Notch Peak Limestone, such as fold hinges. In these areas, stylolites concentrate hematitic silt and are very irregular in orientation. The presence of stylolites in otherwise fairly massive limestones suggests appreciable volume loss and deformation due to pressure solution. Multiple phases of stylolite formation are likely represented and could be of any age(s).

7.3 Karst Breccias

Evidence for control of mineralization in and around dissolution collapse features is substantial and deserves special mention. Karst is generated by chemical erosion of limestone by slightly to strongly acidic water that can be meteoric or hydrothermal in origin. It can result in the formation of extremely irregular topography, sink holes on a metre to kilometre scale, and elaborate cave systems that can stretch for tens of kilometres. Karst terrain and caves can be highly irregular in form, although most are at least partially controlled by structures (joints, faults, *etc*.) and/or stratigraphy.

Idealized dissolution collapse features, which are believed to be present at Long Canyon, are shown in Figure 7.15.

Figure 7.15 Idealized Cross Section of a Karst Cave with Dissolution Collapse Breccia
(after Loucks, 1999)



In the case of Long Canyon, the distribution of caves (or cave fill/dissolution breccias) appears to be largely controlled by the dolomite boudin margins, limestone-on-limestone contacts in the boudin necks, low to high-angle normal faults, joints (Figure 7.16), and kink fold axes. Evidence for meteoric and hydrothermal karsting and dissolution collapse breccias at Long Canyon is well documented. Karsted areas may have one or more of the following characteristics:

- Crackle breccias (monomictic, angular, usually calcite cemented, and “jigsaw fit” breccias).
- Dissolution collapse breccias.
- Polymictic to monomictic breccia types.
- Matrix supported breccias.
- Range from nearly 100% coarse calcite cement to nearly 100% matrix hematitic silt/clay material, rarely silicified.
- Clasts (particularly massive limestone) variably rounded and embayed, suggesting erosion by acidic fluids.
- Clasts ranging from virtually unaltered to strongly decalcified and hematitic.
- Matrix ranging from foliated and fairly well indurated (indicating that some karsting predated metamorphism) to unconsolidated mud.
- Fine-grained cave fill (clay to silt, hematitic, rare laminations or spelothems), ranges from uncemented (basically mud) to calcite or silica cemented.

Figure 7.16 Core Photo of Solution Breccia Developed Along Joint with Slight Offset

Figure 7.17 shows a cross section through a dissolution collapse-breccia system (karst) as illustrated with selected drill core from Long Canyon (different holes represented).

Figure 7.17 Core Representing Mineralized Dissolution Collapse-Breccia System

8.0 DEPOSIT TYPE

The gold mineralization at Long Canyon is best described as sediment-hosted, Carlin-type gold mineralization. Carlin-type gold deposits are a class of gold deposits that are not unique to Nevada, but exist in far greater numbers and total resource size in northern Nevada than elsewhere in the world. They are characterized by concentrations of very finely disseminated gold in silty, carbonaceous, calcareous rock. The gold is present as micron-size to sub-micron-size disseminated grains, often internal to iron-sulfide minerals (arsenical pyrite is most common) or with carbonaceous material in the host rock. Free particulate gold, and particularly visible free gold, is not a common characteristic of these deposits; significant placer alluvial concentrations of gold are therefore not commonly produced when Carlin-type gold deposits are eroded.

All the Carlin-type deposits in Nevada have some general characteristics in common, although there is a wide spectrum of variants. Anomalous concentrations of arsenic, antimony, and mercury are typically associated with the gold mineralization; thallium, tungsten, and molybdenum may also be present in trace amounts. Alteration of the gold-bearing host rocks of Carlin-type deposits is typically manifested by decalcification of the host, often with the addition of silica, addition of fine-grained disseminated sulfide minerals, remobilization and/or the addition of carbon to the rock, and late-stage barite and/or calcite veining. Small amounts of white clays (illite) can also be present. Decalcification of the host produces volume loss, with incipient collapse brecciation, which enhances the fluid channel ways of the mineralizing fluids. Due to the lack of free particulate gold, Carlin-type deposits generally do not have a coarse-gold assay problem common in many other types of gold deposits.

Deposit configurations and shapes are quite variable. Carlin-type deposits are typically somewhat stratiform, with mineralizing characteristics being best exhibited in specific stratigraphic units, although steeply dipping faults can host high-grade gold mineralization. Fault and solution breccias can also be primary hosts to mineralization.

The mineralization identified at Long Canyon shares many of the characteristics of Carlin-type gold mineralization, including:

- Stratigraphic control on mineralization - mineralization is hosted primarily in limestone, particularly in silty, thin-bedded units;
- Structural control on mineralization - mineralization occurs in karstic cavities, collapse breccias, and anticlinal fold hinges;
- Geochemical association - elevated arsenic, mercury, antimony, and thallium accompany the gold mineralization, while silver and base-metal concentrations are low; and
- Alteration - mineralization is associated with decalcification, silicification/jasperoid, oxidized variants of pyrite and arsenical pyrite or arsenopyrite, and clay alteration.

The Long Canyon project also displays some characteristics that are unlike typical Carlin-type gold deposits. The prevalent association of hematite with gold mineralization at Long Canyon is not a common characteristic among all Carlin-type deposits, although this phenomenon is associated with weathered/oxidized portions of some of the deposits. The general location of the project is outside the known major gold deposit trends in Nevada. Host rocks are Cambrian-Ordovician platform to platform-margin carbonates, whereas the majority of Nevada Carlin-type deposits are in Ordovician-Devonian platform margin and slope rocks. Finally, mineralization is hosted in plastically deformed rocks and is associated with boudinage structures.

9.0 MINERALIZATION

Six northeast-trending zones of mineralization have been identified to date at Long Canyon (Figure 9.1), each corresponding to a particular dolomite-boudin environment. These include the Discovery, West, Shadow, and Syncline zones, which are related to boudin necks. A broad area consisting of parallel, narrow, northeast-trending zones of mineralization in the northeast extension of the deposit area is apparently related to steep "cracks" in the dolomite horizon (as opposed to well-defined boudin necks) and consists of the In-between and Crevasse Zones.

The Discovery Zone (Figure 9.2 and Figure 9.3) outcrops in the southeastern limits of the resource area and extends 1,100 metres to the northeast. To the northeast, this zone narrows with the closing of a boudin neck, then is assigned to the Crevasse Zone, where the boudin neck closes. Mineralization remains open to the southwest. In the southern portion of the Discovery Zone, mineralization is spatially related to a thin, north-trending dolomite block, although there is some indication that the mineralization trends across the block in a more northeasterly fashion in two discrete zones. In the northern half of the Discovery Zone, mineralization is associated with the eastern nose area of a boudin neck and to some extent with the western nose area. As the boudin neck narrows to the northeast, mineralization completely spans the gap between the two noses in a continuous zone of mineralization. Secondary controls on high-grade mineralization include moderate- to high-angle, northwest-dipping normal faults and stratigraphy, with alternating massive limestone and siltstone in units Opsm and Cnplus providing the most favourable hosts.

The West Zone (Figure 9.2) has a strike length of up to 600 metres at present and consists of mineralization spatially associated with the east-facing nose of the westernmost boudin block encountered to date in surface mapping and drilling. The nose of the boudin block is associated with a southeast-dipping, northwest-vergent thrust fault at the base of the dolomite block (Figure 9.2). High-grade mineralization in this zone is primarily related to a northeast-trending zone of lamprophyric dikes and sills which form a favourable host environment. Low-grade mineralization is hosted in silty limestone, as well as dolomite-altered rocks at the base of the boudin block. The zone is presently defined by 50-metre fences of holes over a length of approximately 600 metres, but a few holes 400 metres further to the southwest have also encountered mineralization. Additional drilling will be needed to ascertain with certainty whether this mineralization is contiguous with the rest of the West Zone.

The north to northeast-trending Shadow Zone (Figure 9.3) is located west of the northern part of the Discovery Zone. A boudin neck starts abruptly at its southern end in a northwest-trending gully that appears to represent an old fault zone, trends northward for 300 metres, and then assumes a more northeasterly orientation for at least an additional 300 metres. The zone is open-ended to the northeast. Like the Discovery Zone, the Shadow Zone mineralization is related to a boudin neck and associated boudin noses. Secondary control appears to be related to a low- to moderate-angle west-dipping normal fault that trends from the upper portion of the east boudin nose to the lower portion of the west boudin nose.

Figure 9.1 Simplified Geological Map Showing Drill Holes and Mineralized Zones

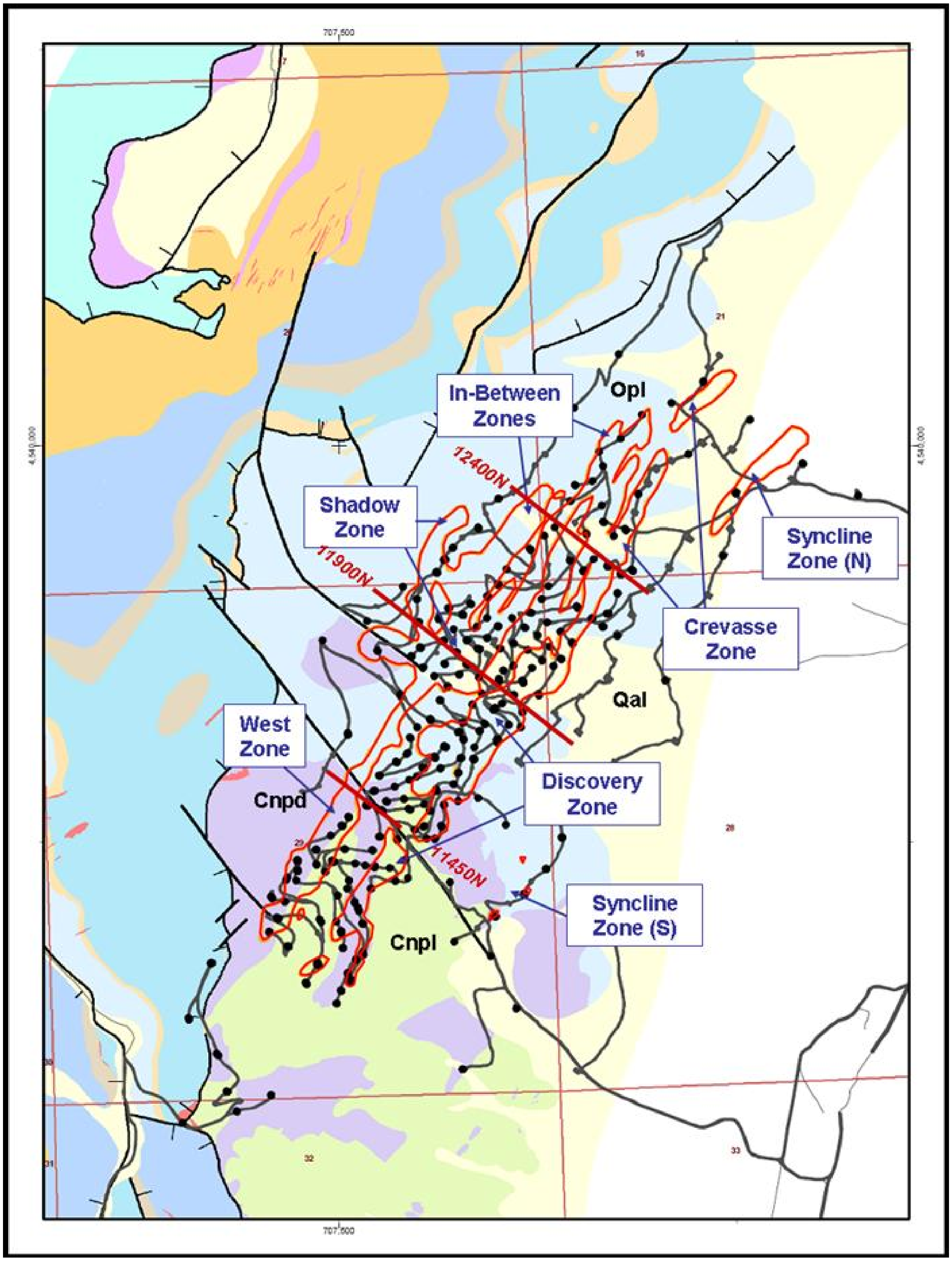


Figure 9.2 Section 11450 Showing the West Zone

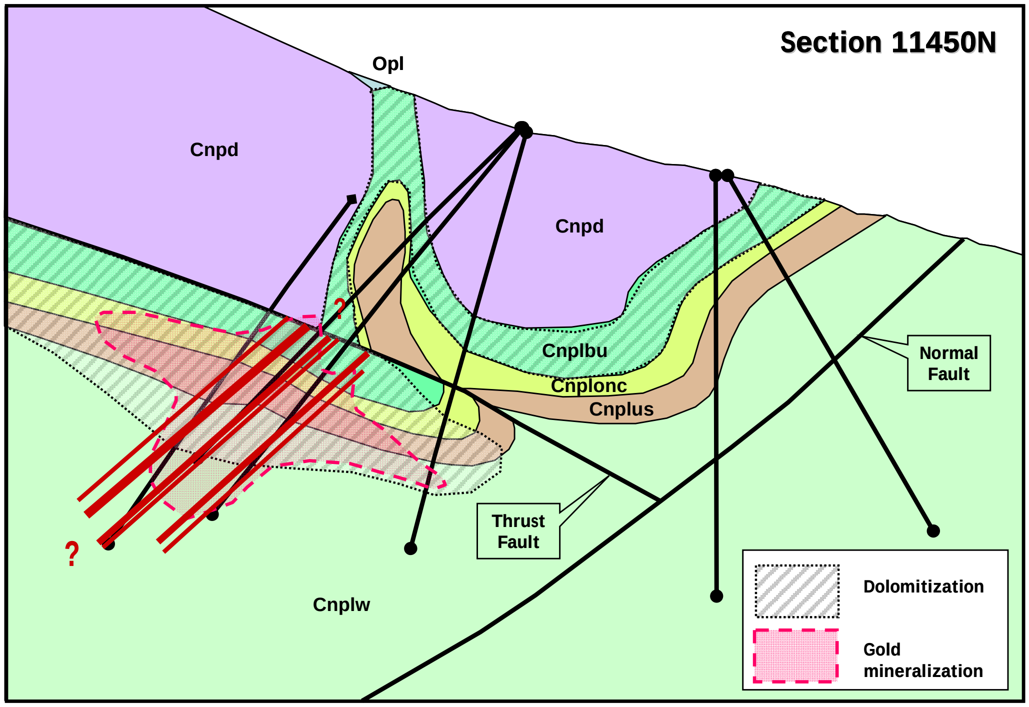
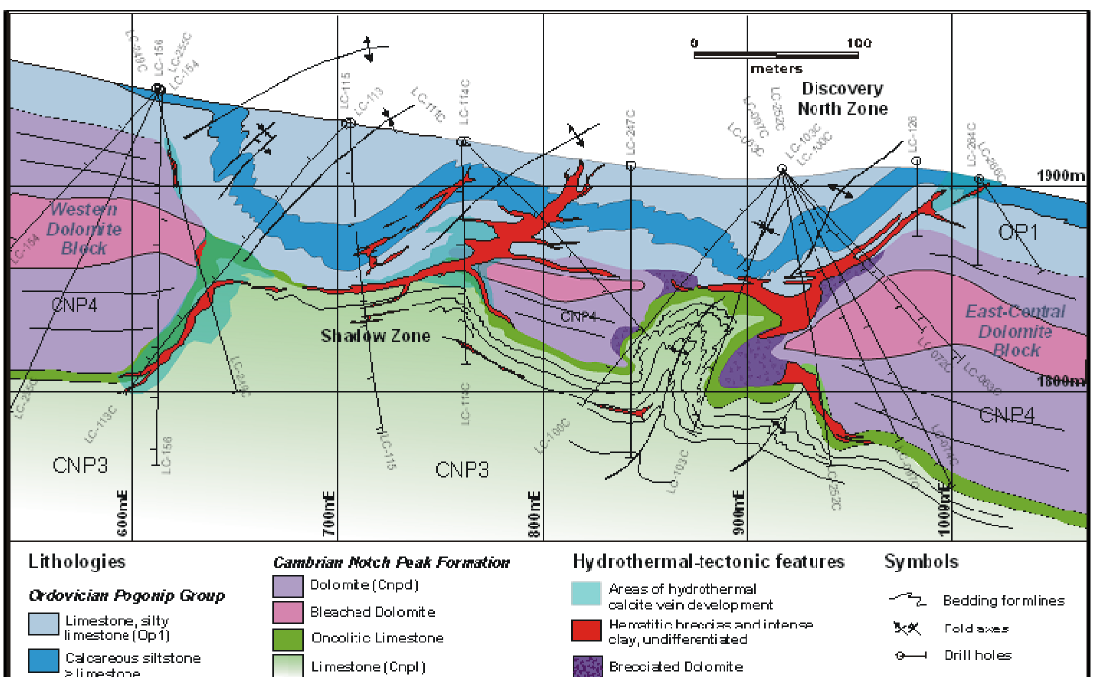
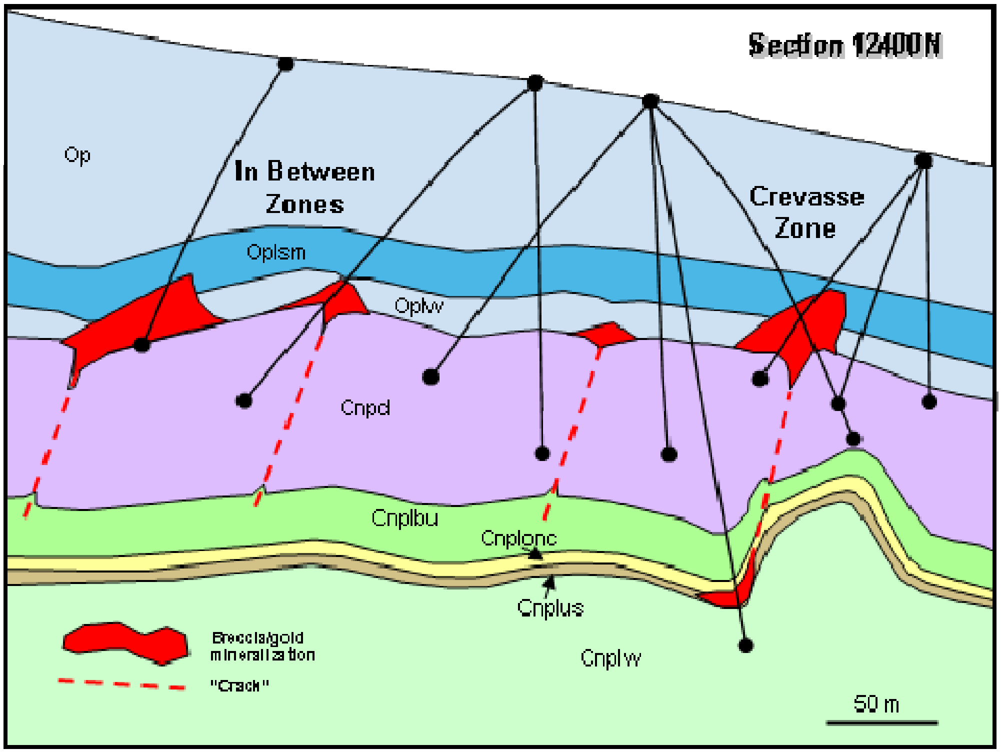


Figure 9.3 Section 11900 Showing the Shadow and Discovery Zones



Long Canyon cross section 11,900N geology, compiled from drill hole data. View north-northeast.

Figure 9.4 Section 12400 Showing the Crevasse and In-Between Zones



The northeast-trending Syncline Zone was mapped on surface in 2008 and tested with drill holes in 2009. This zone comprises a narrow boudin neck located approximately 300 metres to the southeast of, and parallel to, the Discovery Zone. An area approximately 300 metres long has been tested with 100-metre-spaced fences of RC holes. To date, most of the mineralization encountered has been relatively low grade, although some 2 to 6 g Au/t assays were returned from suspected lamprophyre dikes. On trend, 1400 m to the north, drilling encountered an incipient boudin neck with low-grade mineralization at the top of the dolomite and high-grade mineralization (7.6 metres at an average grade of 15.6 g Au/t in hole LC402) at the bottom of the dolomite. Other holes drilled to the southeast failed to return significant mineralization at the top of the dolomite horizon, although exceptionally strong goethite alteration, anomalous geochemistry, and decalcification were noted in chips. Drilling in 2010 will attempt to penetrate to the bottom of the dolomite in this area to ascertain whether mineralization extends to the southeast and joins the southern portion of the Syncline Zone.

The Crevasse Zone was discovered in 2009 and tested by a limited number of holes. Mineralization (Figure 9.3 and Figure 9.4) was interpreted to be related to a north-trending incipient boudin, where the dolomite block was broken but not completely separated. Additional drilling in 2010 suggests that the Crevasse Zone may consist of up to three northeast-trending zones of mineralization that partially coalesce in this area. At least two additional, parallel, northeast-trending zones of mineralization lying northwest of the Crevasse Zone were discovered in 2010, named the "In-Between" Zones (the zones lay between the northern Shadow and Crevasse zones). The various zones are tested with a limited number of holes that penetrate to the bottom of the dolomite slab; there is some indication that zones on the top of the slab correspond to mineralization at the bottom of the slab that is offset slightly to the northwest.

This, in turn, suggests that the zones correspond to a set of northeast-trending, vertical to steeply northwest-dipping joints or "cracks". This style of mineralization is a departure from the boudin-neck-controlled mineralization to the southwest. The Crevasse/In-Between zones are tested on 50- to 100-metre fences up to line 12600N, after which a very limited number of reconnaissance holes test for mineralization to the northeast. Thick high-grade intercepts on line 12700N (hole LC388; 9.29 g Au/t over 35.1 metres) and line 13100N (hole LC411; 4.23 g Au/t over 48.8 metres) suggest that the crack geometry and linear, northeast-trending zones persist for at least another 500 metres to the northeast. The set of linear zones that define the Crevasse and In-Between zones is open down plunge to the northeast, and significant potential exists for mineralization along the bottom of the dolomite slab.

Geological controls on Long Canyon mineralization are stratigraphic, structural, and alteration-related. The primary control on mineralization consists of the dolomite/limestone contacts at the margins of boudin blocks, especially at and near the noses of the boudins (see discussion of boudinage formation in Section 7.2.3). In addition, the contact between the thinly bedded silty limestone (Op1) of the lowermost Pogonip Group and thin-bedded limestone of the uppermost Notch Peak Formation, where these units have been brought into structural juxtaposition by removal of the dolomite unit along the boudin necks, is often well mineralized.

Secondary controls to the Long Canyon mineralization include:

- Stratigraphic: Stratabound mineralization localized within favourable silty limestone bed(s) in the upper Notch Peak Formation (unit Cnplus) and lowermost Pogonip Group (unit Opsm).
- Stratigraphic: Solution-breccia-hosted mineralization hosted in mainly massive limestone units adjacent to the dolomite contacts (units Cnplonc and Oplw)
- Stratigraphic: High-grade mineralization preferentially hosted in lamprophyre dikes.
- Alteration: Low-grade mineralization often hosted in dolomitized limestone.
- Structural: Mineralization in boudin neck areas concentrated along primarily northwest-dipping normal faults.
- Structural: Mineralization concentrated along northeast-trending cracks or joint sets where they intersect the top and bottom dolomite contacts.
- Structural: Solution breccias and associated mineralization localized along joints and faults (Figure 7.16)

Significant karsting, likely both meteoric and hydrothermal in origin, is localized primarily in the limey units at their contacts with dolomite at boudin margins, noses, and necks, in some areas resulting in large, silt-filled collapse cavities (see Section 7.3). Much of the higher-grade mineralization at Long Canyon is hosted in the hematitic matrix of dissolution collapse breccias associated with karst processes. Mineralization is often stratiform when not hosted within solution collapse breccias. Lamprophyric sills are commonly associated with mineralization in some areas, although they likely are older than the gold mineralization and act as receptive host rocks.

Thin sections of mineralized Notch Peak Formation show gold occurring as submicron particles at the margins of oxidized pyrite grains suspected to be authigenic in origin. Some gold grains were observed encapsulated in silica. Gold was also detected by an SEM (scanning electron microscope) analysis of an arsenical rim on one pyrite grain.

9.1 Alteration

Principal alteration minerals that are directly associated with gold mineralization include hematite, scorodite, silicification, dickite, and illite. Decalcification is also closely related to the mineralization and ranges from strong to weak. Rocks in the deposit area are essentially entirely oxidized, so inferences regarding the nature of primary alteration and mineralization must be made based on examination of oxidized rock.

9.1.1 Pre-Mineral Alteration

Regional metamorphic minerals include chlorite and sericite/muscovite.

Dolomitization. Medium-grained, dark-grey, massive dolomite after limestone has been noted along a number of fault zones. The dolomitization process frequently obliterates primary textures. Dolomitized rocks along fault zones often exhibit a distinctive "pebbly" texture, suggesting brecciation. Dolomite alteration is also manifested in primary (diagenetic) dolomites as areas of light grey, medium grey, and coarse white "zebra" dolomite. Regardless of appearance, no dolomite alteration appears to be temporally or genetically related to gold mineralization, although it does appear to share a spatial relationship suggesting that both dolomite alteration and mineralization shared similar conduits and structures at different times.

9.1.2 Syn-Mineral Alteration

Decalcification. Decalcification shares a strong spatial association with mineralization. Decalcification is preferentially developed in silty, thin-bedded to laminated strata in the lowermost Pogonip Group, but may also be present locally in the Notch Peak Formation. Decalcification imparts a buff colour and soft, chalky appearance to the rock. Some "sanding" observed in dolomite may represent decalcification of limy matrix to dolomite grains.

Silicification. Evidence from examination of a limited number of polished thin sections and whole-rock geochemical data suggest that weak, pervasive silicification is an important alteration type at the Long Canyon project, and is associated with gold mineralization. Silicification of this type is not obvious in hand sample. Silicification is present as small, ragged grains in limestones, with up to 50% of the rock replaced by silica.

Jasperoid. Jasperoid is relatively rare and largely restricted to the West Zone and the as yet untested South Zone. Jasperoid occurs in zones or lenses up to a few metres wide consisting of massive or "net-textured" silica after limestone, and ranges from pale- to medium-grey and very fine grained to dark-brown and grainy (Figure 9.5). The latter type may also contain vugs with linings of white drusy quartz. In a few drill holes, silica-cemented breccias with silica fragments (after limestone) have been noted. Silicified areas, particularly the brown jasperoids, contain unoxidized pods with very fine-grained disseminated pyrite, and most contain gold.

Figure 9.5 Jasperoid

(Weakly brecciated, dark brown, vuggy jasperoid with hematite and drusy quartz in breccia matrix.)

Calcite. Fine-grained calcite is ubiquitous with quartz and hematite within breccia matrices, as discrete, coarse-grained veins, and as coarse-grained fill in solution cavities.

Argillization. Study of mineralized and altered rock using a Terraspec hyper-spectral analyzer (Rhys and Ross, 2009) reveals the presence of a zoned suite of argillic and advanced argillic alteration associated with the Long Canyon deposit. Clays are zoned from dickite and rarely muscovite in core areas of high-grade mineralization through sericite, illite, and kaolinite in altered but generally unmineralized areas. Concentration of clays overall is generally low. Smectite was noted in weakly altered rocks peripheral to the deposit in Pogonip Group strata.

Iron Oxides. Iron oxides are common at Long Canyon and include limonite, hematite, and goethite.

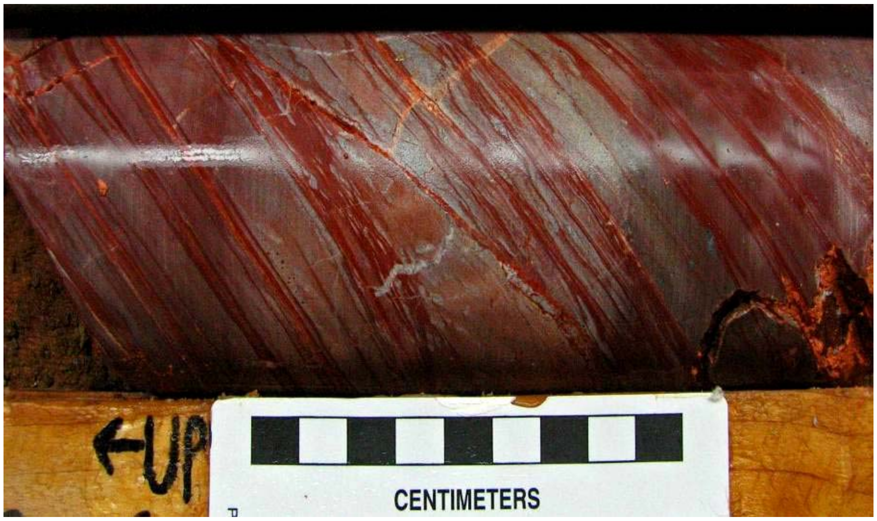
Yellow staining of decalcified or intact silty limestones, bedding planes, tectonic breccias, and (rarely) solution breccias is given the field name “limonite”. Yellow, limonitic rocks typically occur in a “halo” over hematite zones, as well as intermixed with goethite. Limonite-only stained rocks rarely contain gold, but are usually anomalous in arsenic, and thus are generally a good indicator of nearby gold mineralization.

Hematite and goethite are ubiquitous throughout mineralized areas of the deposit. Detailed analysis of orange to red iron oxides with a Terraspec analyzer suggests that goethite is distal to mineralization, whereas hematite is more often associated with significant gold mineralization. Empirical observations suggest that goethite is more orange in colour, whereas hematite is generally brick red in colour; this distinction may help differentiate gold-bearing strata in core and RC chips prior to assaying. Both iron-oxide types are present as orange or red staining of decalcified silty limestones (Figure 9.6), bedding planes, tectonic breccias, and solution breccias (particularly matrix material).

Hematite may have been derived from several sources, including:

- Oxidized wind-blown silt incorporated into shaly or silty limestone progenitors, particularly along bedding planes;
- Oxidized silt originating from the surface and deposited in karst caverns;
- Oxidized silt originating from weathering of silty limestones and ponding in surface karst areas ("*terra rosa*");
- Oxidized silt liberated from limestones through decalcification;
- Weathering of authigenic or hydrothermal pyrite; and
- Primarily hydrothermal processes (thought to be unlikely).

Figure 9.6 Hematite Alteration in Basal Pogonip Group



Scorodite. Yellowish-green staining is observed along some fractures and fracture selvages and sometimes coalesces into pervasive patchy alteration where fracture density is high. High concentrations of arsenic associated with this type of alteration, which overprints hematite alteration (Figure 9.7), suggests that it may be partly composed of scorodite ($FeAsO_4$-$2H_2O$). Scorodite is nearly always present in high-grade gold intervals.

Figure 9.7 Hematite Overprinted by Scorodite

9.2 Veins

Quartz Veins. Quartz veining is relatively common throughout the drill area. Hairline quartz veinlets are ubiquitous in the Notch Peak dolomite, particularly near the margins of boudin blocks, such that they are diagnostic of dolomite in the field. Larger quartz veins (rarely up to one-metre thick) are present in both limestone and dolomite in fold axes, along high-angle faults, and occasionally along dolomite block margins. These quartz veins are generally relatively coarse grained, white, and are barren of sulfides. Some large, coarse quartz veins in and around the central Discovery Zone contain minor galena, sphalerite, and copper oxides.

Calcite/Aragonite Veins. Coarse calcite veins are relatively common throughout the drill grid. They tend to be small and erratic in orientation and shape. Coarse calcite also commonly cements dissolution breccia zones. Calcite veins are thought to be syn, late, and post-mineralization, related to both decalcification and meteoric processes.

Aragonite veining is common locally, including an area approximately 1.5 kilometres southeast of the drill grid. Aragonite veins are white to pale yellow, comb-like, and range from 1 centimetre to (rarely) 20 centimetres in width. They appear to be relatively late and unrelated to mineralization.

10.0 EXPLORATION

Joint Venture exploration activities at Long Canyon include surface rock-chip sampling of road cuts, grid-based soil sampling, ridge-and-spur soil sampling, prospecting, a gravity survey, an IP/resistivity survey, geological mapping, and drilling. Exploration activities prior to the Joint Venture work (prior to May 2006) are described in Section 6.0. Joint Venture drilling is discussed in Section 11.0

10.1 Geologic Mapping

Geological mapping was conducted in 2006 by Coolbaugh (2006), primarily in the drill grid area. Mapping of contacts between the Notch Peak dolomite and overlying and underlying units was carried out using a sub-metre Trimble GPS unit with a base station. Mapping of road cuts in the drill grid area was carried out at a scale of 1 inch = 20 feet (1:240) and included the collection of bedding orientations, rock types, fracture orientations, and other data.

Geological mapping over a larger area in the central part of the Joint Venture AOI was carried out on a part-time basis over a four-month period from June to September 2008 by Moira Smith. Contacts and structures previously mapped by AuEx were verified, and mapping was extended to other areas of the property. Approximately 1500 structural measurements, including bedding, foliation, joints, lineations, *etc*., were collected. Results of this work are discussed in Section 7.2.

Geological mapping over the rest of the Joint Venture AOI, with the exception of an area in the extreme northwest corner, was carried out by consultant Warren Thompson in 2009. This map was merged with the 2008 mapping to produce a map of the Long Canyon property.

10.2 Surface Sampling

In 2005 through 2006, 580 samples were systematically collected as three-metre chip channels on all road-cut exposures, including both unaltered and altered rock. In 2006, a total of 61 rock grab samples were collected in the course of mapping by Coolbaugh (2006) and analyzed for gold by fire assay and trace elements by ICP. Gold values returned by these samples were generally low, with the exception of samples in and around the existing drill grid. In addition, 507 road-cut channel samples on approximately three-metre intervals were collected in 2006, targeting primarily areas with visible alteration. This sampling clearly outlined surface mineralization in both the West Zone and the southern portion of the Discovery Zone, with samples ranging up to 21 g Au/t and a discrete population of samples >8 g Au/t (Moran, 2008.)

A total of 187 rock grab samples were collected in 2007 during prospecting traverses within the Joint Venture AOI, and 198 road-cut channel samples were taken on approximately three-metre intervals from within the drill grid area. As with sampling in 2006, regional prospecting samples generally returned low values for gold, and road-cut channel sampling returned significant gold in hematite-altered road cuts.

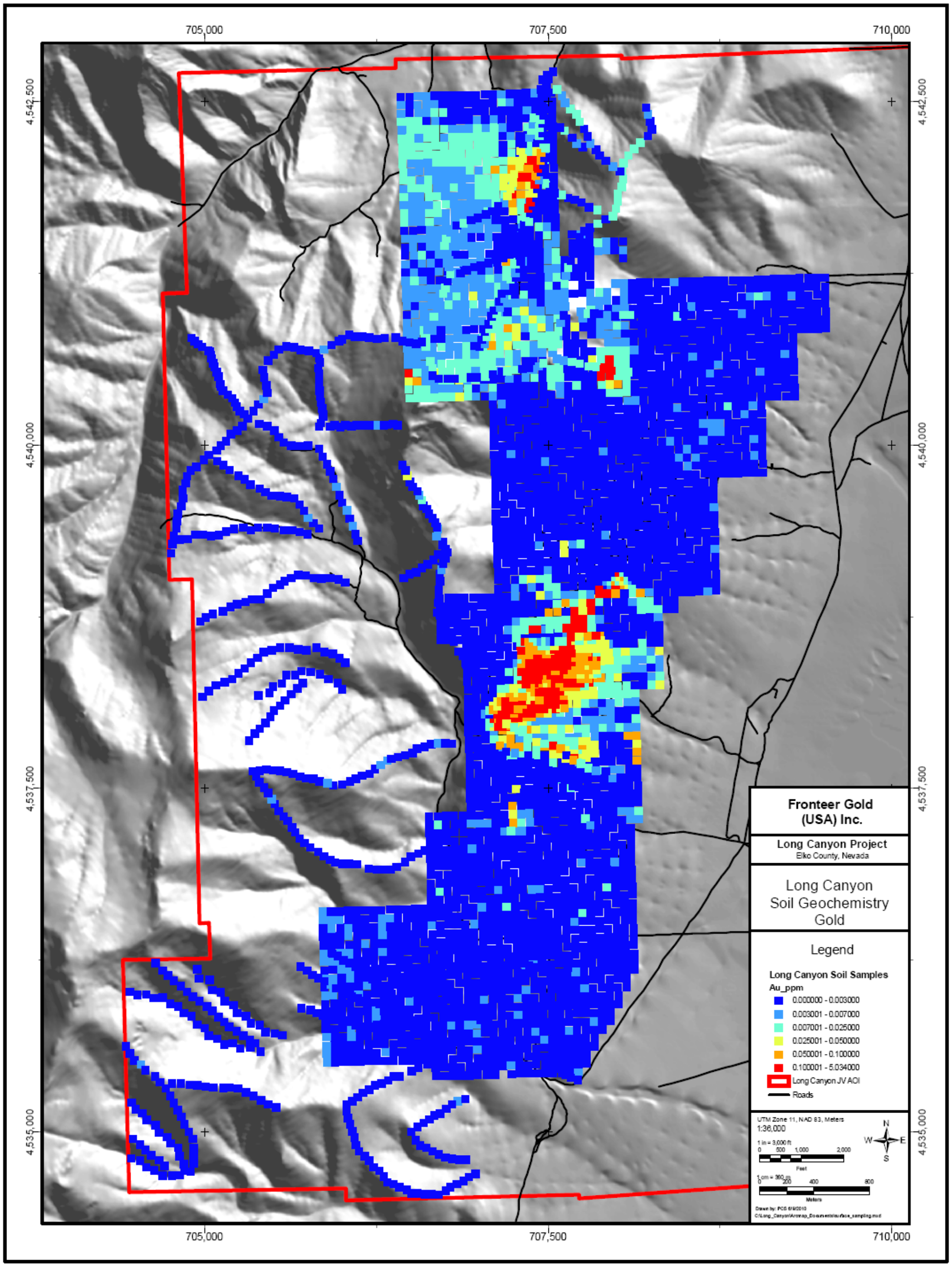
A total of 345 rock chip samples from road cuts were collected in 2008; results are discussed in Fronteer press releases and the Fronteer corporate website (www.fronteergold.com). The samples have variable lengths, most commonly three metres, and were collected as continuous chips across altered rock units in road-cut embankments. The visual guide to mineralization is oxidation of the rocks, exhibited as hematite staining and coatings on fractures. A total of 49 rock grab samples were collected in 2008, primarily during the course of a ridge-and-spur soil-sampling program.

Rock sampling in 2009 totaled 276 grab samples, including sampling in the course of geological mapping and soil sampling, as well as grab samples from selected road cuts. Above-detection gold was encountered in samples from new road cuts in the West Zone, Syncline Zone, and northern Discovery Zone. Most samples from the northernmost Au-in-soil anomaly in Section 17 (see below) returned detectable gold, with values up to several hundred ppb. Most of these samples were obtained from breccias and shear zones. Most of the samples obtained from the southwestern part of the AOI did not return detectable gold, although some samples were elevated in arsenic and antimony.

Two grid-based soil-sampling programs were carried out at Long Canyon in 2008 that extended the existing (2000) soil grid to the north (990 samples) and south (153 samples). Samples were collected from C-horizon soil (there is relatively little development of A and B soil horizons at Long Canyon) and analyzed for gold by fire assay with AA finish and for other elements by ICP. Samples were taken at 61 metre by 61-metre intervals. Five grid-based soil sampling programs were carried out at Long Canyon in 2009, including two programs contiguous with the existing grid to the south (609 samples) and west (247 samples), two to the north (163 and 394 samples), and one to the northwest (269 samples), for a total of 1682 soil samples. Samples were collected from C-horizon soil and analyzed for Au by FAA and for other elements by ICP-MS at ALS Chemex Laboratory in Reno, Nevada. Data were merged with previous soil surveys and Ridge and Spur traverses to produce a comprehensive map consisting of all soil data for the property.

The combined 2000, 2008, and 2009 soil data show that gold forms a tight cluster in the area where mineralization is exposed on surface over the south end of the Long Canyon deposit (Figure 10.1). New areas of anomalous gold geochemistry were generated by the 2009 program, including two broad areas in the northern part of the grid area in sections 17 and 20. These areas are underlain by the Fish Haven Dolomite, Eureka Quartzite, and Peqoup Formation, and present new targets for further exploration. These areas are open to the west, and to the extent that the property boundaries allow, will be followed up in 2010. A tight cluster of anomalous gold values is present in the northeast area of the grid, corresponding to an area underlain by Pogonip Group limestone and dolomite. Antimony highlights similar areas, as well as a large, low intensity anomaly over much of the southwestern extension of the soil grid. Mercury forms a very tight pattern over exposed areas of the Long Canyon deposit and it is not seen elsewhere, with the exception of a tight cluster of samples over the gold anomaly in the northeastern part of the grid. Arsenic has a distribution similar to antimony, with wide dispersion of low-level arsenic values observed around the deposit. Arsenic is also associated with the gold anomalies in the northern part of the soil grid and with the antimony anomaly in the southwestern extension of the grid. Zinc is anomalous in the northwestern part of the grid area, corresponding to the underlying Pequop Formation limestone. A band of anomalous samples trending northeasterly in the northeast portion of the grid may be structurally controlled, as it appears to track a west-dipping reverse fault. Another northeast-trending zone of anomalous zinc is present in the southwest part of the sampled area. Lead shows a similar, although more restricted, distribution pattern to zinc. Nickel and copper exhibit similar distributions.

Figure 10.1 Gold-in-Soil Results



Ridge-and-spur soil sampling and prospecting programs were carried out in 2008 and 2009. The purpose of the survey was to obtain baseline geochemical data for areas primarily in the western portion of the property that had not been sampled previously, to prospect some areas of interest identified during the 2008-mapping program, and to uncover new areas of alteration or mineralization. A total of 273 C-horizon samples were collected in 2008 and 266 samples in 2009. Some low-level arsenic and antimony anomalies are indicated, although gold is generally absent. A total of 30 grab and chip rock samples were collected concurrently with the soil samples in areas with hematite or other alteration; the samples contained only low levels of gold.

10.3 Geophysics

No geophysical surveys were carried out in 2006, 2007, or 2009. Three ground-based geophysical surveys were completed in 2008, including a gravity survey carried out by Zonge Geophysical ("Zonge") and two IP/resistivity surveys undertaken by Quantec Geoscience ("Quantec") and Zonge.

Gravity. A ground gravity survey was carried out by Zonge on a 100 metre by 100-metre grid that covered the northern half of the drill grid, as well as areas to the northeast. The reduced-to-pole total Bouguer anomaly map shows a gradient from relatively high gravity in the west to low in the east, consistent with the location of the survey on a mountain front adjacent to a gravel-filled, fault-bounded basin. Two roughly north-trending linear features evident on the horizontal gradient map are interpreted to be range-front faults. A first-vertical-derivative map delineates an additional steep gradient, as well as showing a northwest-trending fabric in the northern project area that may be evidence of northwest-trending faults.

Ground-based gravity surveys, at least on the scale carried out at Long Canyon, can identify large structures, but do not appear to be useful for identifying potential areas of mineralization.

IP/Resistivity. Two dipole/dipole IP/resistivity surveys were carried out by Quantec (5 lines) and Zonge (10 lines) over the drill grid and areas to the northeast and southwest. Lines were oriented northwest-southeast and spaced 200 metres apart for the twelve southern lines and 300 metres apart for the three northern lines. The southern lines used an A-spacing of 125 metres in order to collect high-resolution data down to approximately 250 metres. An A-spacing of 150 metres was used on the northern lines to attempt to see deeper into the section. The data were subjected to a 2D inversion and presented on sections, with corresponding pseudo-sections, and plotted as a series of approximate depth maps in plan at 50-metre intervals from 100 to 300 metres.

The resistivity data show an abrupt break in the resistivity from high in the west to low in the east at approximately the same location as the steep gradient modeled in the gravity. This likely corresponds to the abrupt thickening of the basin fill that corresponds to the interpreted Basin and Range fault. Lower resistivity response is also evident along the western edge of the grid, corresponding to middle and upper Pogonip Group strata in the hanging wall of the major low-angle normal fault and stratigraphically above and to the west of the lower Pogonip Group strata in the northern part of the survey area. The most resistive areas correspond to Notch Peak strata exposed on surface; this response is more subdued to the north where the lower Pogonip Group is exposed on surface.

Modeled IP (chargeability) data show a more varied response than the resistivity data, the latter of which can be clearly tied to surface geology. An anomaly was detected in the extreme northwest part of the survey area, corresponding to surface exposures of the upper part of the Pogonip Group. Other anomalous areas were also identified.

Although the source of the IP anomalies is uncertain, there is a good correlation between mineralization and anomalous IP, as evidenced by the distribution of anomalies relative to drill-tested areas.

11.0 DRILLING

11.1 Summary

The mineral resources discussed in this report were estimated using the data provided by core and reverse-circulation drilling completed by Pittston, AuEx, and the Fronteer-AuEx Joint Venture through 2009.

Drilling at Long Canyon has been successful in defining potentially economic gold mineralization in numerous drill holes that have delineated a minimum of five sub-parallel zones along a strike extent of approximately 2,600 metres. The limits of the gold mineralization are not fully outlined and they remain open along strike and at depth within the presently defined zones; there is also excellent potential for the discovery of new zones of mineralization.

A total of 469 drill holes were completed through 2009 and used in the Long Canyon resource estimation (Table 11.1); 238 of these holes were completed in 2009. Down-hole drill depths range from 8 to 366 metres, with an average depth of 143 metres. This drilling was completed on a nominal 50-metre-spaced grid, with the drill sections oriented northwest-southeast.

Table 11.1 Long Canyon Mineral Resource Database Summary

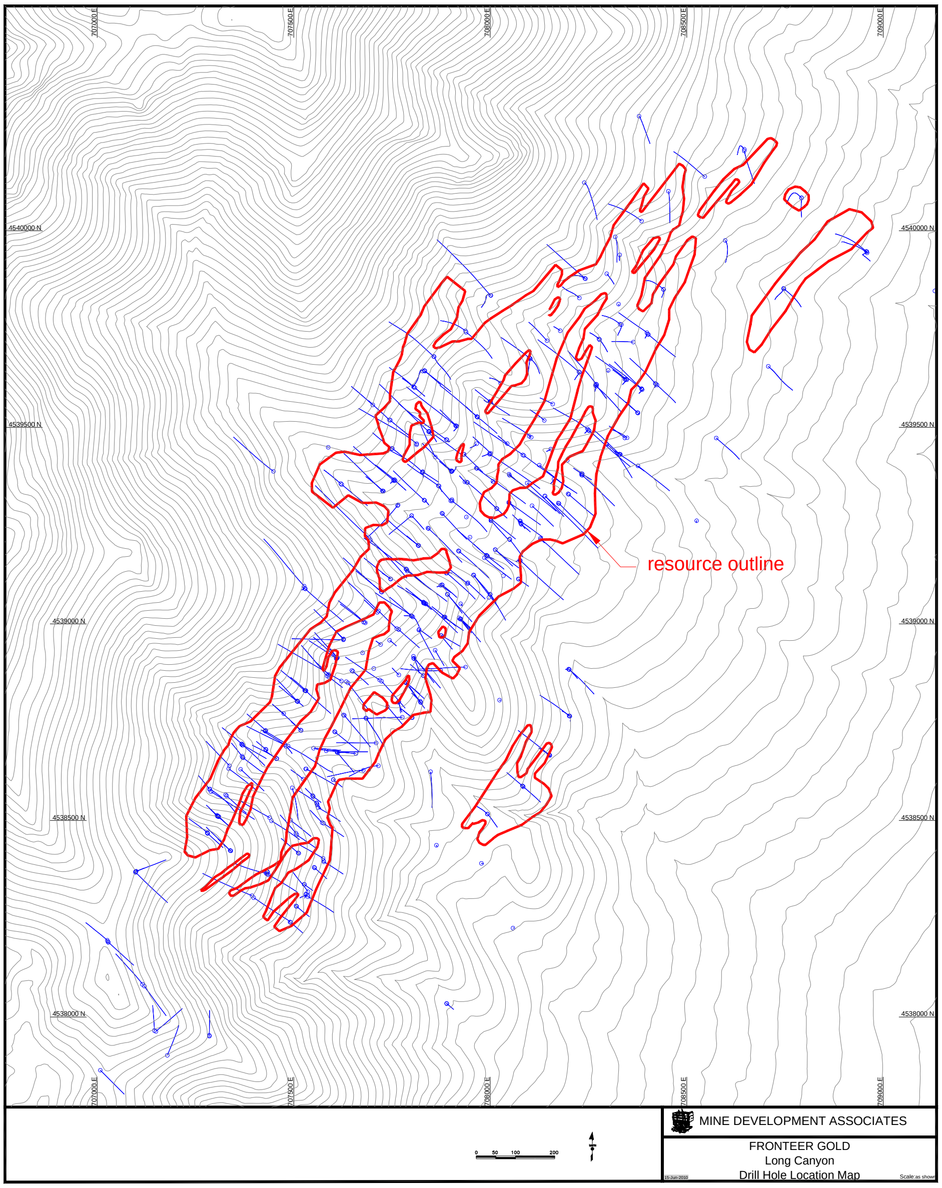
Company	Period	Hole Numbers	Core		RC		Total	
			No.	Metres	No.	Metres	No.	Metres
Pittston	2000	LC001 – LC007	-	-	7	1,147.6	7	1,147.6
AuEx	2005	LC008 – LC014	-	-	7	768.1	7	768.1
Fronteer-AuEx JV[1]	2006-2008	LC015 – LC229C LCMW3 & LCMW4	61	7,320.8	156	24,612.6	217	31,933.94
Fronteer-AuEx JV	2009	LC230 – LC417 LCG01 – LCG04 LCM1 – 37	185	22,550.9	53	10,864.6	238	33,415.5
Totals			*246*	29,871.7	*223*	*37,392.9*	*469*	*67,264.6*

1. AuEx operated the Joint Venture drilling of LC015 to LC030, while Fronteer was the operator for all subsequent drilling.

The six defined mineralized zones at Long Canyon coalesce in various locations to form a continuous body of mineralization that plunges about ten degrees to the northeast. The mineralization has an apparent dip of five to ten degrees to the southeast in sections cut across the plunge direction, reflecting the control exerted by the upper and lower contacts of the dolomite boudin blocks. Internal to these deposit-scale geometries, boudin noses form subvertical controls to the mineralization that dip to the northwest or southeast depending on the boudin-termination facing orientation.

Drill-hole orientations vary somewhat at Long Canyon (Figure 11.1), due to both the early-stage nature of some of the holes, which were drilled before the geometry of the mineralization was understood, and the varying orientations of the controls to the mineralization. There are a relatively small number of holes that are therefore poorly oriented with respect to the mineralization encountered, which leads to exaggerated lengths of the down-hole intercepts. This is mitigated by the resource modeling techniques employed, which constrain all intercepts to lie within explicitly interpreted domains that appropriately respect the geologic controls.

Figure 11.1 Location Map of Drill Holes Utilized in Resource Estimation



11.2 Pittston 2000 Drilling

Eklund Drilling Company, Inc. of Elko, Nevada ("Eklund"; recently acquired by Boart Longyear Drilling of Elko, Nevada) was the drill contractor and used a Drill Systems MPD 1500 track rig for the seven Pittston RC holes. The drill logs indicate that the hole diameters were 5 inches (13 centimetres).

11.3 AuEx 2005 Drilling

The RC drilling contractor used by AuEx in 2005 was Layne-Christensen Company ("Layne-Christensen"), who drilled 5 ¼-inch (13.3 centimetres) diameter holes using a Foremost Prospector W-750 buggy rig. Stratex six-inch (15 centimetres) surface casing was used for all of the holes to depths ranging from three to six metres.

11.4 Fronteer-AuEx Joint Venture 2006-2009 Drilling

The RC drilling contractor used by Fronteer in 2006 and 2007 was Layne-Christensen, while Eklund drilled the 2008 and 2009 RC holes. Small samples of the RC cuttings from each sample interval were washed and put into numbered chip trays for logging. The RC chips were logged on-site into a custom-designed Excel spreadsheet for the project. Logging was aided by use of a binocular microscope. Data recorded included dominant lithologies, colour, alteration characterization, dominant structural evidence (brecciated, fault gouge), veining type, and density.

The core-drilling contractor for the six core holes drilled in 2007 was DOSECC Inc of Salt Lake City, Utah. The 2008 and 2009 core holes were drilled by Major Drilling America, Inc. of Salt Lake City, Utah and Elko, Nevada. Most Long Canyon core holes were drilled with HQ-sized core (6.4-centimetre diameter). Three holes were drilled using NQ core, in an attempt to ascertain whether drilling the smaller-diameter core was feasible. While excellent recoveries were achieved, the AQ tools did not perform well in extremely broken rock and the use of NQ core was abandoned. Forty-four PQ holes were drilled for the primary purpose of obtaining larger samples for metallurgical column tests. The core was logged directly into digital files by Fronteer geologists. The digital logs included fields for rock type, colour, alteration, mineralization, and structural data, with a separate log for breccia descriptions. Rock Quality Designation ("RQD") was also captured in the logs. The logs capture data largely in numerical or letter code format. Completed logs were imported into an Access database.

The 2009 drilling program commenced on April 28, utilizing one diamond-core drill and one RC rig; two additional core drills were added in mid-May. The RC drill was in use through the end of May, and the program has continued with three core drills through the end of September, when two RC drills were put into service. The drilling program continued through the end of October with five drills, reducing to two RC drills through to when the program was completed in the end of November.

Holes drilled from April through the end of September 2009, prior to lifting of the drill-depth restriction (see Section 4.5), focused on: (1) infill and step-out drilling in the southwestern half of the resource area; (2) limited geotechnical drilling along the west side of the deposit; (3) drilling of large diameter (primarily PQ) core on three widely-spaced lines in order to obtain material for metallurgical testing; and (4) drilling of two hydrology-related holes. The emphasis shifted in October from infill and step-out drilling in the shallower, southwestern part of the deposit to exploratory drilling along the postulated deeper extensions of the deposit to the northeast. The 2009 drilling program is summarized in Table 11.2.

Table 11.2 2009 Long Canyon Drilling Program Summary

Purpose	Core		RC		Total	
	No.	Metres	No.	Metres	No.	Metres
Exploration – HQ/NQ	137	18,699.8	52	10,590.3	189	29,290.1
Metallurgical Holes – PQ/HQ	44	3,173.7	-	-	44	3173.7
Hydrologic Holes[1]	-	-	1	396.2	2	396.2
Geotechnical Holes – HQ	4	677.4	-	-	4	677.4
Totals	*185*	22,550.9	*54*	*10,986.5*	*240*	*33550.8*

1. One of the hydrologic holes lies outside of the resource area and is therefore not included in Table 11.1.

Core is examined and logged on site into a digital logging sheet, with lithology, alteration, mineralization, and structural characteristics recorded. The core is photographed both wet and dry for archival and geotechnical purposes. Approximately three samples per drill hole are collected for specific-gravity determinations; a range of rock types and both mineralized and unmineralized rock are selected for these measurements.

Results for the 2009 drilling can be found in press releases available at the Fronteer website (http://www.fronteergroup.com/).

11.5 Drill-Hole Collar Surveys

The drill-hole collars have been surveyed at different times by different contractors. In an effort to standardize the survey data, the collars from all holes, including those from the 2000 through 2007 programs that could be identified in the field were surveyed at the end of the 2008 drilling program by All Points North Surveying and Mapping of Elko, Nevada ("All Points North"). Although the collars are marked in the field after completion with a cement plug, wire, and metal tag, subsequent traffic on the drill pads destroyed the evidence of the collars in some cases. All Points North also surveyed 2009 drill holes at regular intervals throughout the 2009 season.

The 2008 and 2009 survey programs were completed using a geodetic survey-grade Trimble 4000-series GPS receiver with a base station for real-time correction. Accuracy of the measurements is ± 2 centimetres in the X and Y directions and ± 3 centimetres in the Z direction.

A total of 43 holes in the sequence LC001 through LC067C (representing holes drilled through the end of 2007) could not be located and surveyed by All Points North. With respect to these 43 holes, older survey data were utilized for 34 holes, including 27 holes surveyed by M. Coolbaugh (AuEx project geologist) in September 2007 using a Trimble backpack GPS unit with sub-metre accuracy. An additional five holes (LC031 through 036) were surveyed by Carlin Trend Surveying of Elko, Nevada using a Trimble GPS with differential correction (sub-metre accuracy), and two holes (LC063C and

067C) were surveyed by project geologists using a standard handheld GPS receiver (±15 metres accuracy). Drill collars for LC007, 010, 011, 013, 014, and 027 through 030 could not be found and therefore were approximately located, but locations are thought to be within 15 metres (the size of the pad) with higher accuracy in the vertical direction. All stated accuracies assume proper techniques employed in open areas with uninhibited access to satellites; accuracies were obtained from www.kowoma.de/en/gps/accuracy.htm. Accuracies in the z direction may be greater than stated.

With respect to holes drilled during the 2009 season, locations were based on the physical presence of a casing pipe or, lacking this, a cement plug. With five holes (LC394C, LC383C, LC396, LC390C, and LC399C) neither the casing nor the plug could be located. In these cases, hole locations were estimated using the following criteria: apparent location of the drill rig; location of the sump; angle and dip of the hole; and location of nearby holes on the same pad. The location of these holes, while approximate, is assumed to be within 2 to 3 metres of the actual location, with higher accuracy for elevation. One hole, LC355CA, was abandoned prior to the target depth and was not surveyed. Hole 355CB was located at the same collar and was surveyed.

11.6 Down-Hole Surveys

Down-hole surveys for the holes drilled by Pittston (LC001 through LC007) were completed by Silver State Surveys, Inc.; the survey equipment used is not known. No down-hole surveys were conducted on the AuEx holes (LC008 through LC014), although averaged deviations were added to the database. All subsequent holes, with the exception of LC032, 049, 052, 057, 062C, 066C, 085, 126, and 169C, have down-hole survey information in the database. Fronteer holes through 2008 and the first half of 2009 were surveyed using a Surface Reading Gyroscope by International Directional Services of Elko, Nevada. After noting that deviations in core holes were very small, and beginning roughly midway through the drilling program, a Reflex E-Z Shot electronic solid-state single-shot down-hole camera was employed for core holes. Readings were taken at the collar and at approximately 45-metre intervals down hole.

12.0 SAMPLING METHOD AND APPROACH

The Long Canyon database includes assay data from both RC and core drill holes. MDA believes that the RC and core sampling procedures provided samples that are sufficiently representative and of sufficient quality for use in the Mineral Resource estimation discussed in Section 17.0. While RC down-hole contamination does present a sample integrity issue in some holes, MDA believes techniques employed in the field since the start of the 2009 season, as well as the recognition and exclusion of contaminated intervals in pre-2009 holes during resource modeling, have adequately addressed the problem.

12.1 Surface Sampling Methods

Rock chip sampling was conducted as random chip sampling, random grab sampling of selective rock outcroppings, and continuous chip samples along the outcrop or road-cut exposures. Various sample intervals were used, although three-metre samples were standard for road cut chip sampling.

12.2 Drill Sampling Methods

Pittston. The following description of the Pittston RC sampling procedures is taken from the Long Canyon technical report prepared for AuEx (Moran, 2008).

According to the former Pittston drill project coordinator, RC drill samples were collected at five-foot (1.524 metres) intervals by Pittston staff as splits from a rotary wet splitter attached to the cyclone sample-collector discharge. Secondary splits of the RC samples were not collected.

AuEx. AuEx used sample collection procedures similar to those described above for Pittston (pers. comm., Eric Struhsacker, US Exploration Manager for AuEx, 2009).

Fronteer. The Fronteer RC drilling was completed with the injection of water to reduce dust at the drill site for health reasons. Samples of RC cuttings were collected every 1.524 metres after passing through a rotary wet splitter. The split samples weighed approximately 4.5 to 9 kilograms.

After logging of the drill core at the Fronteer field office at the Big Spring Ranch, the drill core was marked for cutting, photographed, and transported by Fronteer personnel to Elko. Visibly altered rock is sampled on nominal 1.52-metre intervals, unless geological contacts dictate otherwise; sampled intervals through 2008 vary from 0.15 to 3.048 metres and average 1.40 metres. The marked core was cut into halves with a diamond saw by American Assay Laboratories through to mid-2008, after which a core cutting facility at the Fronteer field office in Elko was put into service. Half-core samples were sent for assaying, with the remaining half stored in the Fronteer Elko warehouse. For large-diameter PQ core, quarter-core samples were utilized for assaying.

Long Canyon core holes have average core recovery and rock quality designation ("RQD") values of 97% and 42%, respectively. Including only those intervals coded to the mineral domains used in the resource estimation (Section 17.0), these averages change to 97% and 46%, respectively.

Gold grades composited over the core recovery and RQD intervals are compared to the geotechnical data within the modeled mineral domains in Figure 12.1 and Figure 12.2, respectively.

Figure 12.1 Core Recovery *vs.* Gold Grade

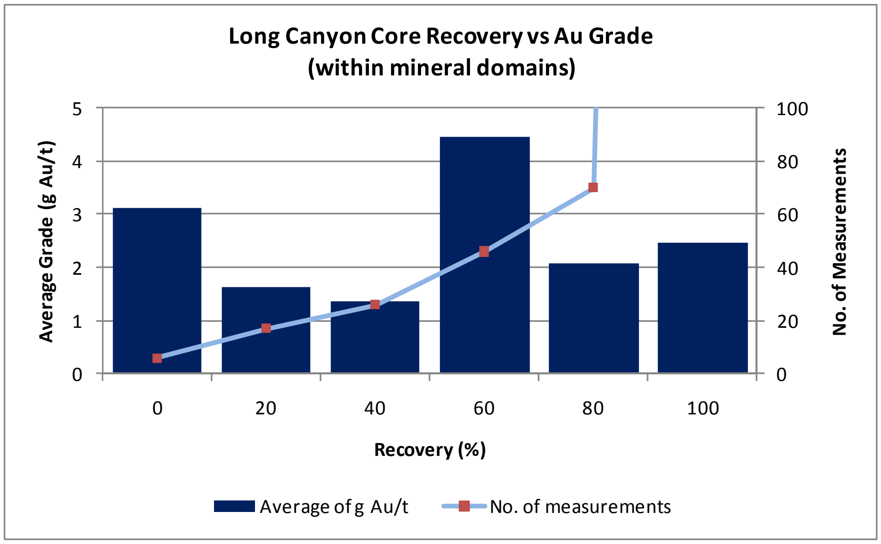
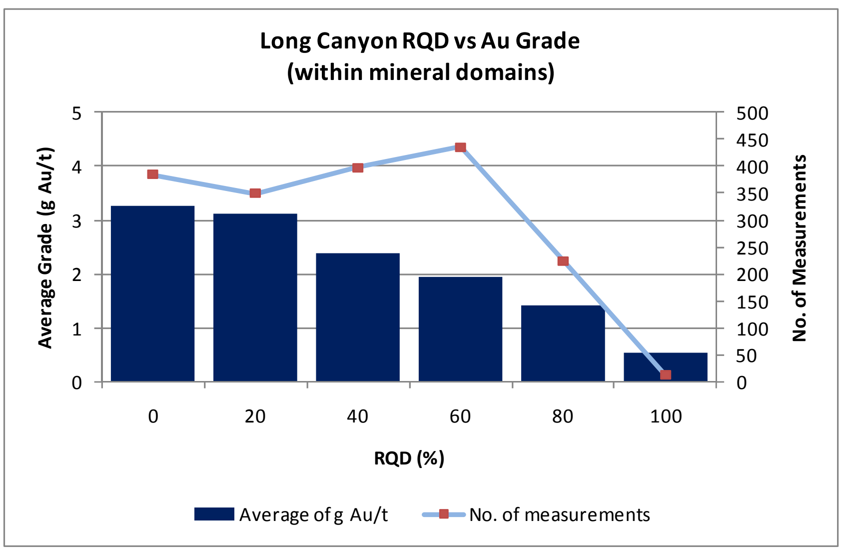


Figure 12.2 Core RQD *vs.* Gold Grade

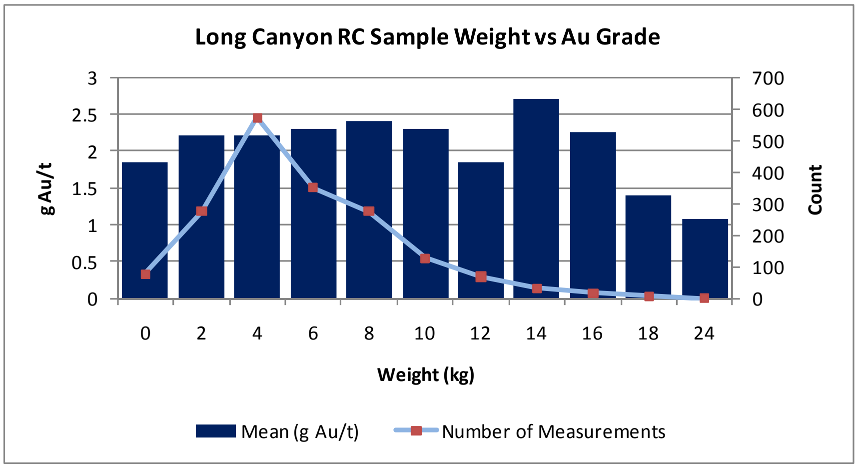


There is no direct correlation between core recovery and gold grade. The highest mean grade is found in the 60 to 80% core recovery interval, but too few of the 1,803 drill intervals within the mineral domains have recoveries lower than the 60% to form definitive conclusions.

There is a strong relationship between increasing gold grades and decreasing RQD values (Figure 12.2). This negative correlation is not surprising, as higher gold values at Long Canyon often occur within breccias formed from decalcification, which tend to be more broken than relatively weakly mineralized limy units.

The RC data are similarly compared in Figure 12.3. Although direct measurements of recovery are difficult with RC drilling, dry sample weights, as measured by the analytical laboratory, provide a qualitative measure of recovery, assuming the samples were split consistently at the RC rig.

Figure 12.3 RC Sample Weight *vs.* Gold Grade



Similar to the core recovery data, no relationship is evident between the gold grades and relative RC recoveries.

12.3 Reverse-Circulation Sample Contamination

Due to the nature of RC drilling, the possibility of contamination of drill cuttings from intervals higher in the hole is a concern, especially when groundwater is encountered or fluids are added during drilling. Only one hole intersected groundwater at Long Canyon, but water was injected during the drilling of all of the Fronteer RC holes and at least some of the AuEx and Pittston holes.

Down-hole contamination can sometimes be detected by careful inspection of the RC drill results in the context of the geology, by comparison with adjacent core holes, and by examining down-hole grade patterns.

A number of the Long Canyon RC holes drilled prior to 2009 clearly exhibit cyclic down-hole patterns in the gold assays. These are detected by examining the gold results of each set of four samples derived by the drilling of the same 20-foot (6.1 metres) drill rod. In a classic case, the first sample of the drill rod will have the highest grade, while the following three samples will gradually decrease in grade. This classic 'decay' pattern in grade is caused by the accumulation of mineralized material (present at some level higher in the hole) at the bottom of the hole as the drilling pauses and a new drill rod is added to the drill string. When drilling resumes, the first sample has the greatest amount of contamination, and the successive samples are gradually 'cleaner' as the accumulated contamination is removed and the continuing contamination experienced during the drilling is overwhelmed by the material being drilled.

This decay pattern is usually possible to detect only while drilling barren or very weakly mineralized rock. Even in cases where this cyclic gold contamination is of such low grade as to have minimal impact on resource estimation, its presence suggests that similar, and possibly more serious, contamination is occurring higher in the hole within mineralization, where the contamination is impossible to recognize.

The geologic context can also be used to detect contamination. The dolomite boudins themselves are only locally mineralized, with mineralization usually restricted to brecciation in and around the boudin noses. Core results indicate that even where mineralized, the mineralization in the dolomite boudins is quite thin and is typically restricted to the first metre or so at limestone/dolomite contacts. Highly mineralized intersections within the dolomite boudins that lie immediately down-hole of strong mineralization in the limestones in contact with the boudins must therefore be considered as possible candidates for contamination.

In 2009, particularly since the start of drilling below the water table in early October, a number of protocols were implemented in the RC drilling program to mitigate down-hole contamination, including:

- Use of a centre-return hammer bit on one RC rig to test its feasibility for continued use in the program. The centre-return hammer performed well and it will be used in the future on all rigs;
- Requesting the drillers to refrain from commencing drilling after a drill-rod change until virtually all loose material is removed from the hole and there is negligible material entering the cyclone splitter while full air pressure is employed; and
- Visually confirming that little or no mineralized material is being incorporated into otherwise unmineralized sample intervals below the mineralization.

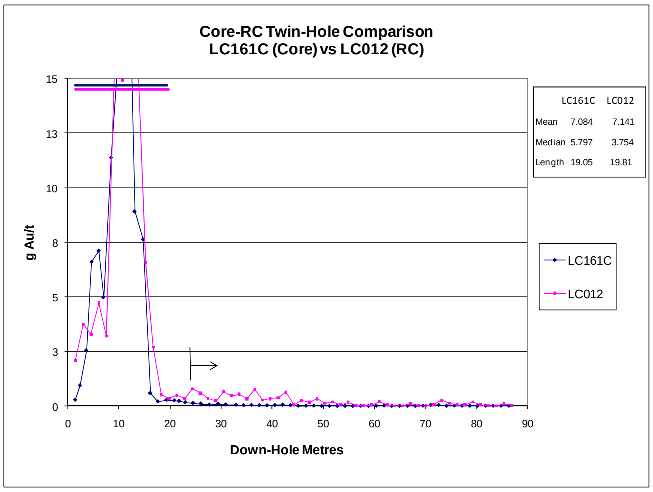
Table 12.1 lists holes that contribute assays to the mineral resource estimation described herein that MDA identified as having probable intervals of down-hole contamination. The mineral domains modeled by MDA as part of the resource estimation process exclude all zones of probable contamination identified in these holes. Note that no evidence of probable contamination was found in any of the 2009 holes.

Table 12.1 Contamination by Drilling Program

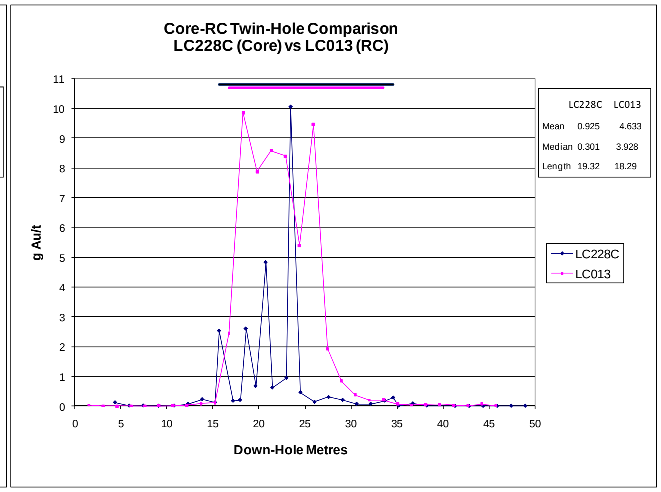
Year	No. Mineralized RC Holes	No. With Evidence of Contam.	Percent
2000	5	0	0%
2005	7	3	43%
2006	23	5	22%
2007	17	2	12%
2008	72	14	19%
2009	25	0	0%
pre-2009	*124*	*24*	*19%*

There are seven sets of RC-core holes at Long Canyon that are sufficiently close to be considered twin holes. Figure 12.4 compares each of these twin sets using down-hole gold plots for each hole and relevant statistics. The statistical data include mean and median grades and lengths of intervals included within MDA's mineral domains (these intervals contribute assay data to the resource estimation; lines at the top of the graphs depict the extents of the modeled mineral-domain intervals). The collar elevations of one of the holes in some of the twin sets were adjusted so that the geology of both holes matches.

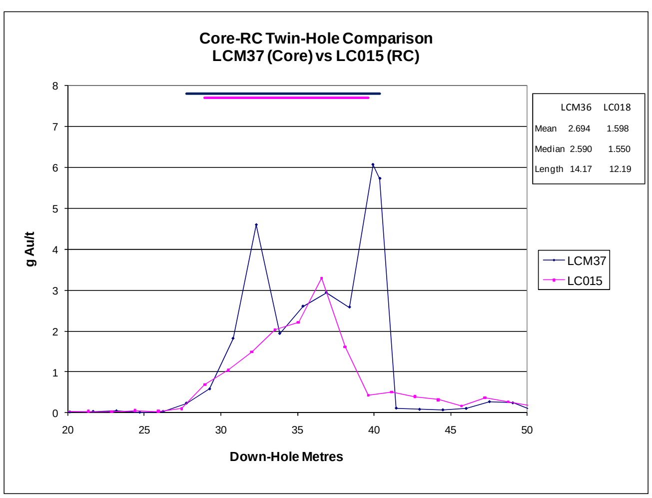
Figure 12.4 RC-Core Twin-Hole Comparisons



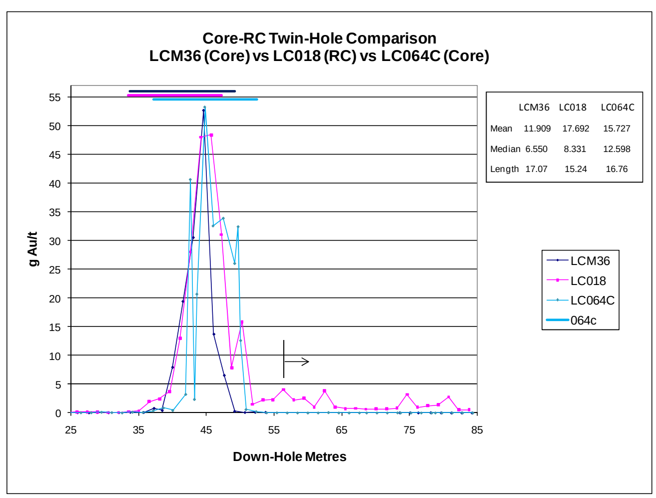
(a)



(b)

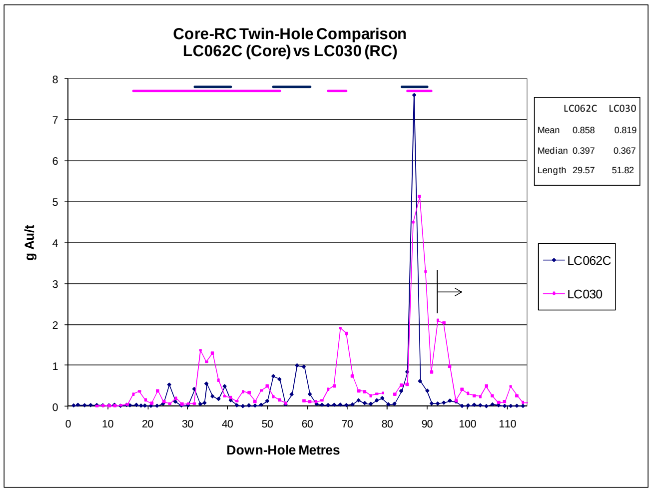


(c)

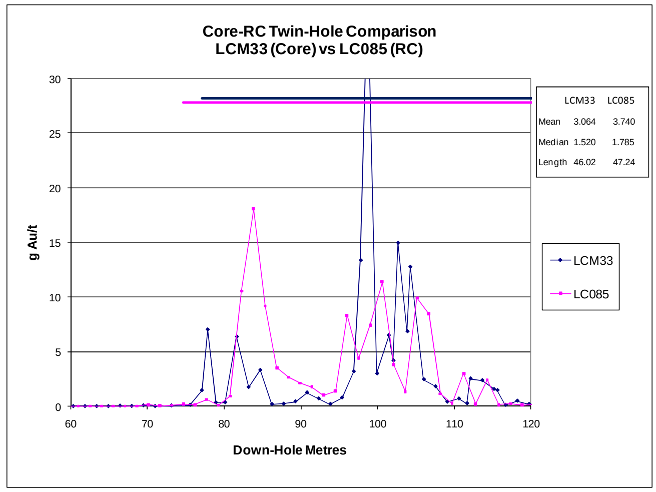


(d)

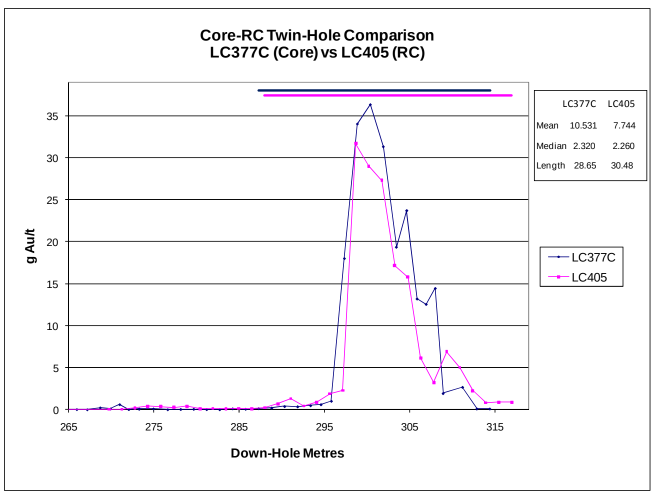
Figure 12.4 RC-Core Twin-Hole Comparisons, cont.



(e)



(f)



(f)

Three out of the seven twin sets have clear down-hole cyclic patterns of spikes in RC gold values that correlate with rod changes, without corresponding patterns in the core holes (Figure 12.3 a, d, and e; the beginning of the cyclic down-hole contamination patterns are shown on the graphs with lines and arrows). In each case, these patterns initiate immediately down-hole of significant gold mineralization, which is the obvious candidate as the source of the contamination. The suspect gold values within the cyclic patterns spike significantly above the resource cutoff of 0.2 g Au/t in each of the three cases, with the values in LC018 spiking to 4 g Au/t (in this case, the down-hole contamination occurs within dolomite that is presumed to be unmineralized). The modeled mineral domains exclude these intervals of clear down-hole contamination, as shown by the lines at the top of the graphs.

The down-hole plots on Figure 12.4 b and c suggest that the RC and core holes sampled different geology, and are therefore poor choices for statistical comparisons. For example, in the case of Figure 12.4 c, the RC hole penetrates the edge of a high-grade zone, while the core hole lies solidly within the mineralized zone. Similarly, the morphologies of the plots in Figure 12.4 e suggest that the holes are not a good match until the deep high-grade zone is intersected. The two holes are 12 metres apart within this high-grade zone, which negates these intervals for use as twin data.

Excluding the three twin sets that are unlikely to sample comparable geology, the modeled mineralization in the twinned core and RC holes are compared in Table 12.2. The data compare reasonably well, although they are not of sufficient quantity to make definitive conclusions.

Table 12.2 Statistical Comparison of RC-Core Twin Holes

Twin Sets	Type	Length (m)	Difference	Mean (g Au/t)	Difference
LC161C	Core	19.05	4.0%	7.084	0.8%
LC012	RC	19.81		7.141	
LCM36	Core	17.07	-9.9%	11.824	28.6%[1]
LC064C	Core	16.76		15.727	
LC018	RC	15.24		17.692	
LCM33	Core	46.02	2.6%	3.064	22.1%
LC085	RC	47.24		3.740	
LC377C	Core	28.65	6.4%	10.416	-25.7%
LC405	RC	30.48		7.744	
All	*Core*	*110.64*	*1.9%*	*7.016*	*4.1%*
All	*RC*	*112.78*		*7.305*	

[1] Mean difference calculated by weight averaging two core holes to compare with the RC hole

The twin-hole data, in addition to careful inspection of all of the RC gold data, have clearly identified down-hole contamination of gold in a portion of the Long Canyon RC drill samples, and the potentially suspect data are material to the resource estimation. In recognition of this, the mineral domain modeling used in the resource estimation described in Section 17.0 has excluded the mineralized samples suspected of being contaminated. It should be noted, however, that the identification of suspect assays is interpretational; MDA believes it is possible that some relatively small amount of the excluded mineralization is 'real', and also believes it is likely that some mineralized samples included in the resource estimation are affected by contamination.

13.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

The analytical laboratories used by Pittston, AuEx, and Fronteer (American Assay Laboratories, ALS Chemex and Inspectorate Laboratories), as well as the analytical procedures used by the laboratories to obtain the gold assays for Long Canyon, are well recognized and widely used in the minerals industry. After an audit of all preparatory laboratories in Nevada by Barry Smee in March 2009, Chemex was selected as the primary assay lab and Inspectorate Laboratories of Sparks, Nevada as the secondary lab.

13.1 Sample security

The Pittston RC samples were transported by Pittston personnel to a staging area at the project site. AuEx and the Fronteer-AuEx Joint Venture left their RC drill samples at the drill-site locations. In all cases up to November 2008, American Assay Laboratories of Sparks, Nevada ("AAL") picked up the drill samples and transported them to their sample preparation facility in Elko, Nevada. Joint Venture RC samples generated after November 2008 were picked up by either AAL or ALS Chemex of Reno, Nevada ("Chemex"). All samples generated after March, 2009 were picked up by Chemex. Some of the coarse rejects from the Pittston drill samples were retained by Pittston and are now in the possession of Fronteer. Fronteer has retrieved all rejects from the laboratories and placed them in marked barrels at Fronteer's Elko and Oasis storage sites.

Prior to 2009, Joint Venture drill-core samples were collected at the drill site by Fronteer personnel and transported to a secure trailer at Big Spring Ranch. Beginning in 2009, the core samples were taken to a secure trailer in a fenced yard at the Oasis office and logging facility. In either case, the core was then logged, marked for sampling, and photographed. When these tasks were completed, the core was transported by Fronteer to the AAL preparation facility in Elko for sawing, sampling, and sample preparation until mid-2008. Core boxes with the remaining half core were transported by Fronteer from the AAL facility to Fronteer's secure warehouse in Elko. In the latter half of 2008, Fronteer brought the core from the on-site trailer to their secure office in Elko, where the core was cut and sampled before transport by Fronteer personnel to the Elko sample preparation facilities of either AAL or Chemex. The remaining half core is retained by Fronteer in Elko.

Following preparation of the drill samples in the Elko labs, AAL and Chemex shipped the sample splits to their facilities in Sparks and Reno, respectively, for assaying.

Joint Venture coarse rejects from drill samples analyzed by AAL or Chemex currently reside at Fronteer's Elko warehouse. Pulps are stored at Fronteer's Elko warehouse.

13.2 Sample Preparation and Analysis

Until November 2008, all samples generated from surface sampling and drilling programs at Long Canyon were prepared and analyzed by AAL. Beginning in November 2008, core samples and some RC samples were sent to Chemex for sample preparation and analysis due to a significant backlog at AAL's Elko sample preparation laboratory. Holes assayed in part by both Chemex and AAL include LC139C, 142C, 143C, 146C, 148C, 155C, 157C, 160C, 161C, and 164C. Holes assayed entirely by Chemex include LC180C, 182C, 187C, 190C, 192C, 195C, 196C, 201C, 202C, 203C, 206C, 208C, 223, 224, 225, 226, 227, 228C, 229C, MW3, and MW4. All 2009 drill holes were analyzed by Chemex.

All samples submitted for assaying were analyzed for gold, and the majority of holes have samples with multi-element ICP analyses (30, 69, or 72 elements; ICP-MS employed in 2009). AAL and Chemex employed standard sample preparation procedures that included crushing the entire sample to 8 to 10 mesh and splitting the material to 1/8 to 1/16 volume in a riffle splitter. The splits were pulverized to nominal 150 mesh. The standard gold assay for the Long Canyon drill samples used a 30-gram charge fire assay with an atomic absorption spectroscopy ("AAS") finish. AAL and Chemex standard assays that returned values of 10 g Au/t or higher were re-analyzed by fire assay with a gravimetric finish on all samples. At the suggestion of consultant Barry Smee, all samples that returned values of 5 g Au/t or higher were re-analyzed by gravimetric methods commencing in 2009.

AAL and Chemex also completed cyanide-soluble analyses on most samples with reported values of 0.3 g Au/t or higher. AAL placed 30.0 ± 0.1 grams of sample pulp into a 150-millilitre bottle with 60.0 ± 0.1 millilitres of 0.30% NaCN. The bottles were tumbled end over end for 60 minutes at room temperature. After allowing it to settle for two hours, the solution was analyzed for gold by AAS with a background correction. Chemex used their "Au-AA13" analytical method. A nominal 30 grams of sample pulp was continually rolled and leached for one hour at room temperature in a 60-millilitres solution of 0.25% NaCN, maintained at a pH of 11 to 12. Gold was analyzed by AAS.

Select pulps from 25 sample intervals from the 2008 drilling were analyzed by AAL by standard fire-assay methods on +150 mesh and -150 mesh screen-size fractions (known as "metallic sieve" or "screen-fire" analyses).

All data from logging and assaying are verified on site and uploaded to a database maintained at the Fronteer Reno server. The data are then imported into GEMS® for generation of sections and three-dimensional modeling.

14.0 DATA VERIFICATION

14.1 Fronteer-AuEx Joint Venture Quality Assurance/Quality Control Results

The Joint Venture Quality Assurance/Quality Control ("QA/QC") program included analyses of standard reference materials ("standards"), blanks, field duplicates, and duplicate pulps, as well as check assays by umpire laboratories. The program was designed to ensure that at least one standard, blank, or field duplicate was inserted into the drill-sample stream for every 44 drill samples, which are the number of samples in each AAL analytical batch. In practice, the insertion rates for the QA/QC samples were somewhat higher.

Certified Standards – 2006 through 2008 Drilling Programs. Standards are used to evaluate the analytical accuracy and precision of the assay laboratory during the time the drill samples were analyzed.

Fronteer acquired four certified reference standards from Rocklabs of Aukland, New Zealand, and one from Minerals Exploration and Environmental Geochemistry of Reno, Nevada ("MEG") for use in their 2006-2008 Long Canyon drilling programs (Table 14.1). These standards have a range of certified gold values that is representative of the deposit. Three standards created by Pittston were also used early in the project (Table 14.2). Pittston contracted AAL to prepare standards from RC rejects from holes drilled at a project on the western side of the Pequop range. These standards did not undergo round robin testing by multiple laboratories, and the accepted values are not certified.

The standards were assigned sample numbers in-sequence with their accompanying drill samples and were inserted into the drill-sample stream of most holes from LC042 through to LC417, the last hole drilled as of the Effective Date of this report. MDA compiled 986 analyses of these standards, which were inserted into the sample sequence of all except four of the holes drilled by the Joint Venture, which equates to an insertion rate of one standard for every 38 drill samples (there are a total of 37,609 drill-sample assays in the resource database). Analyses were completed by AAL and Chemex.

Table 14.1 Certified Standards – 2006 through 2008 Joint Venture Drilling Programs

Standard	Standard Source	Certified Value (g Au/t)	Standard Deviation
OxE56	Rocklabs	0.611	0.015
OxJ64	Rocklabs	2.366	0.079
OxN62	Rocklabs	7.706	0.117
OxP61	Rocklabs	14.92	0.35
SRM 0.55	MEG	0.524	0.026

Table 14.2 Uncertified Standards – Joint Venture Program

Standard	Standard Source	Accepted Value (g Au/t)	Standard Deviation
PQ-2	Pittston	3.07	0.16
PQ-4	Pittston	3.64	0.43
PQ-10	Pittston	10.1	0.96

The following discussion of the standard results includes graphical representations of the data. These graphs show the dates of the assay certificates ordered along the x-axis, the gold grade of the standard assays on the y-axis, the certified or expected values of the standards as red lines, and ± two and ± three standard-deviation limits of the standards as blue and green lines, respectively. AAL analyses are shown as blue dots, while Chemex analyses are yellow dots.

In the case of normally distributed data (note that most assay datasets from metal deposits are positively skewed), 95% of the standard analyses should lie within the two standard deviation limits of the certified/accepted value, while only 0.3% of the analyses should lie outside of the three standard deviation limits. As it is statistically unlikely that two consecutive samples would lie outside of the two standard deviation limits, such samples are considered failures unless further investigation proves otherwise. All samples outside of the three standard deviation limits are considered to be failures. Failures should trigger laboratory notification of potential problems and a re-run of all samples included with the failed standard result.

The 448 assays from the Rocklabs standards are presented in Figure 14.1. These standards were submitted with samples from all holes in the sequence LC068 through LC229C, as well as LCMW3 and LCMW4.

Figure 14.1 Rocklabs Standard Results

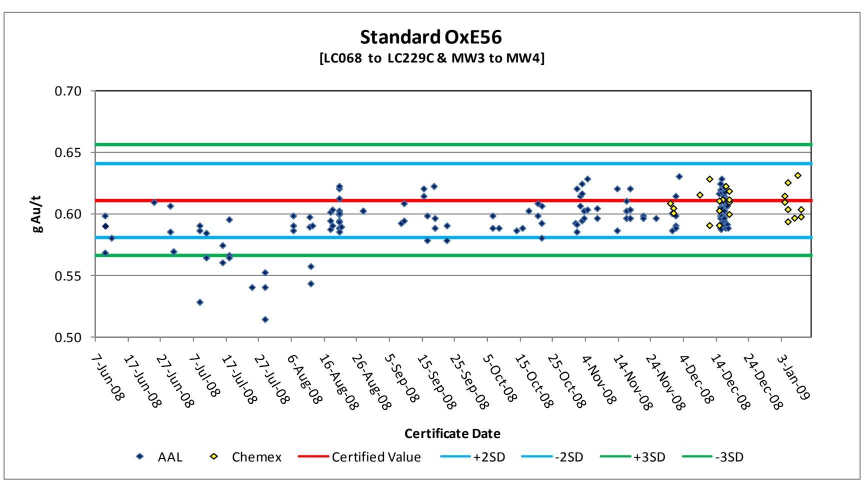
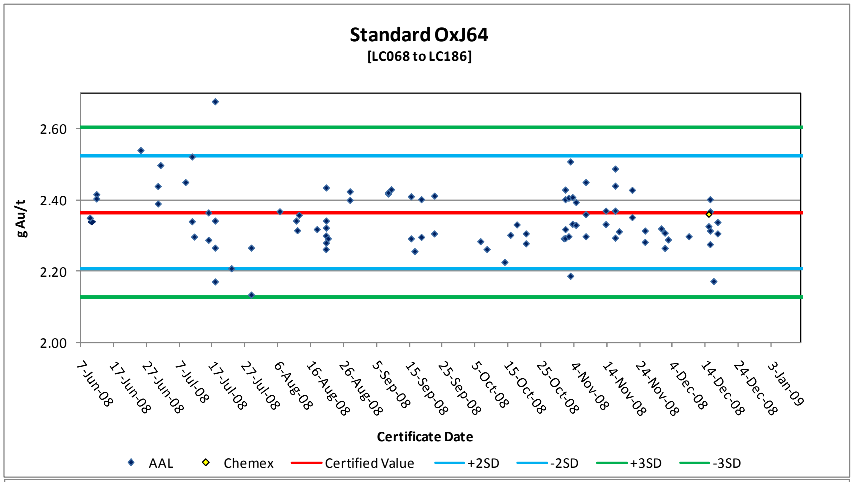
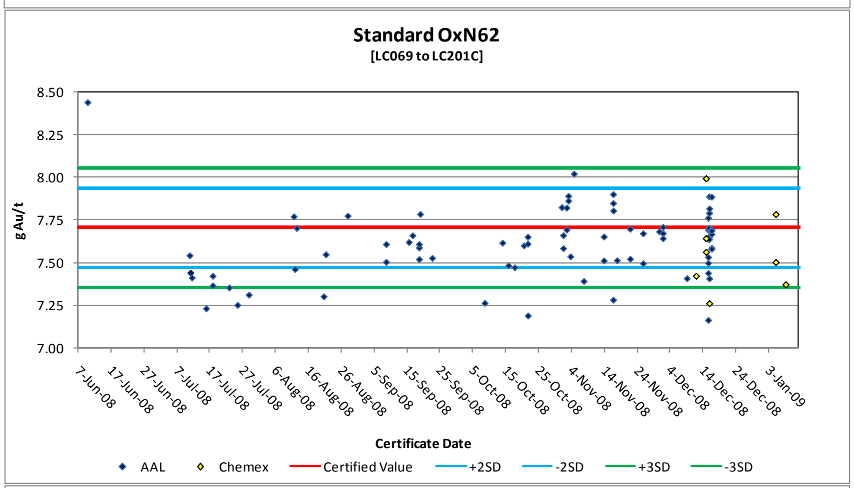


Figure 14.1 Rocklabs Standard Results, cont.





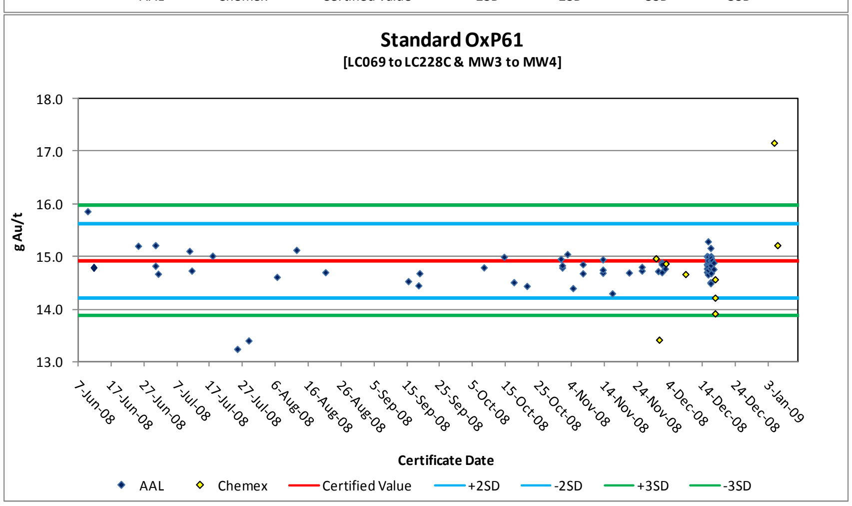
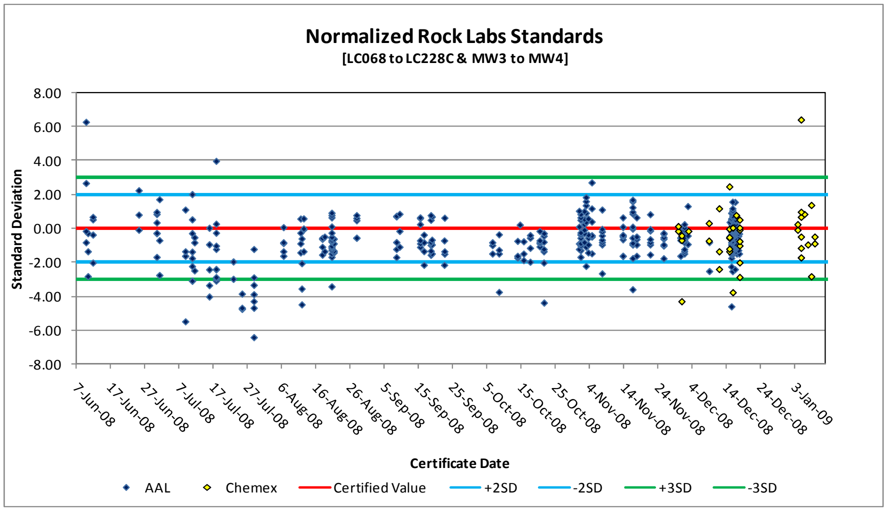


Figure 14.1 Rocklabs Standard Results, cont.



The AAL results for standard OxE56 have a clear low bias with respect to the certified value from the initiation of its use through to October 2008, while a slight low bias is evident after October 2008. The overall mean of the AAL analyses is 2.5% lower than the certified value. Twelve results lie outside of the three standard deviation limits, although four lie just outside of the three standard-deviation limits; all of these failures occurred in the period of July through August 2008. All of the jobs including these failures were rerun. The mean of the Chemex analyses of the OxE56 standard is 0.5% lower than the certified value, with no failures.

Although the mean of the AAL analyses of standard OxJ64 is only 0.9% lower than the certified value, a pattern can be discerned in the plot (Figure 14.1), whereby the data points define a serpentine relationship with respect to the certified value. Although the certified values of OxE56 and OxJ64 are quite different, the variations between the AAL analyses and the certified values over time are very similar. One AAL analysis of OxJ64 is a failure, and the job was rerun. One Chemex sample (7.49 g Au/t) is removed from the graph due to a presumed misidentification problem (likely OxN62). The single remaining Chemex analysis of this standard is almost identical to the certified value.

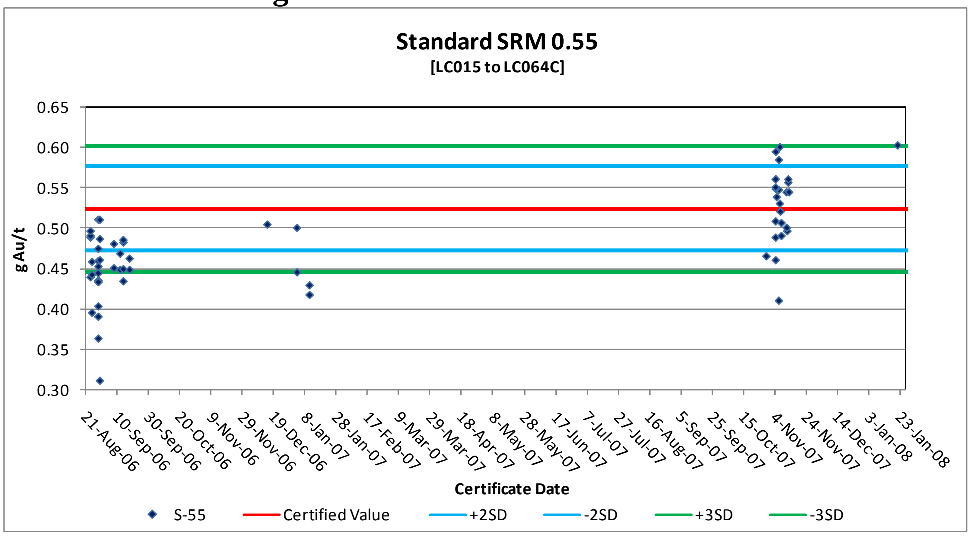
There are ten AAL failures for standard OxN62. Six of the failed assay jobs were rerun; the job for one of the other failures was not rerun due to low grades in the drill samples. The mean of the AAL analyses is 1.3% lower than the certified value. There are only eight Chemex analyses of the standard, one of which was a failure (the job was not rerun).

The AAL analyses of standard OxP61 average 1% lower than the certified value. The nine Chemex analyses also average about 1% lower than the certified value. There are two failures each for the Chemex and AAL standards; two of the jobs that include the failures were rerun.

In order to examine all of the data simultaneously, the AAL and Chemex analyses were normalized based on their position relative to the certified values, expressed in standard deviation units (see final graph of Figure 14.1). The standard analyses have a suggestion of a serpentine pattern, which evidences some analytical drift in the AAL analyses over the time period of the Joint Venture analyses. The 405 AAL analyses of the standards exhibit a slight low bias overall; the standard assays average 0.7 standard deviation units below the normalized certified value. The analyses were particularly low, with many failures, mid-July to the end of the month (six holes within the sequence of LC071 through LC094). The 42 Chemex analyses (excluding the one analysis that was likely mislabeled) average 0.4 standard deviations below the normalized certified value.

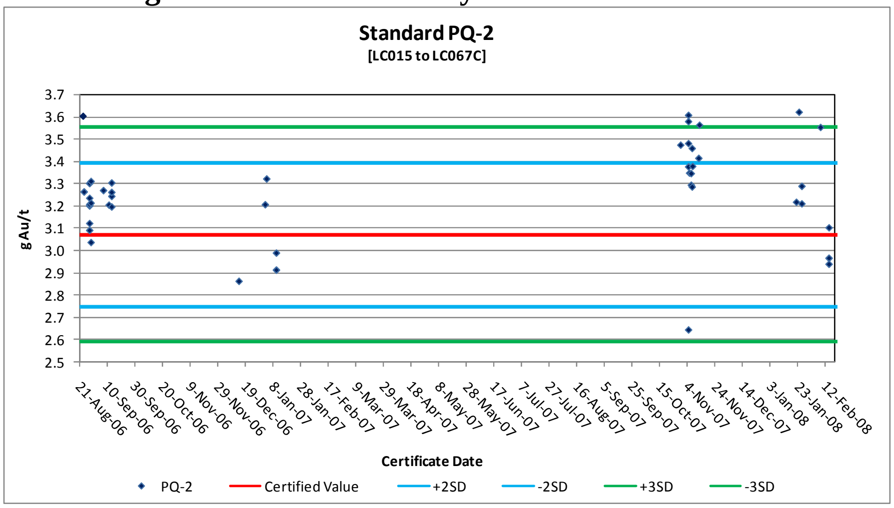
There are 64 analyses of the MEG standard, which was inserted with the drill samples from 40 holes within the sequence LC015 through LC064C (Figure 14.2). Excluding one 3 g Au/t analysis, which is likely a misidentified standard, the mean of the AAL standard assays is 0.5% lower than the certified value. This is entirely due to analyses of standards submitted with holes LC015 through LC037 (August 2006 through January 2007), however, as all of these analyses are lower than the certified value, with numerous failures. MDA has no evidence that any of the failures triggered re-assaying of the accompanying drill samples.

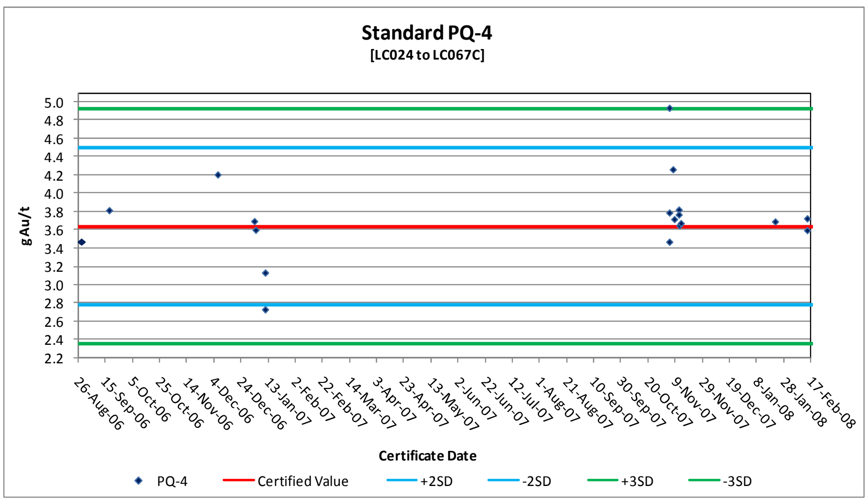
Figure 14.2 MEG Standard Results

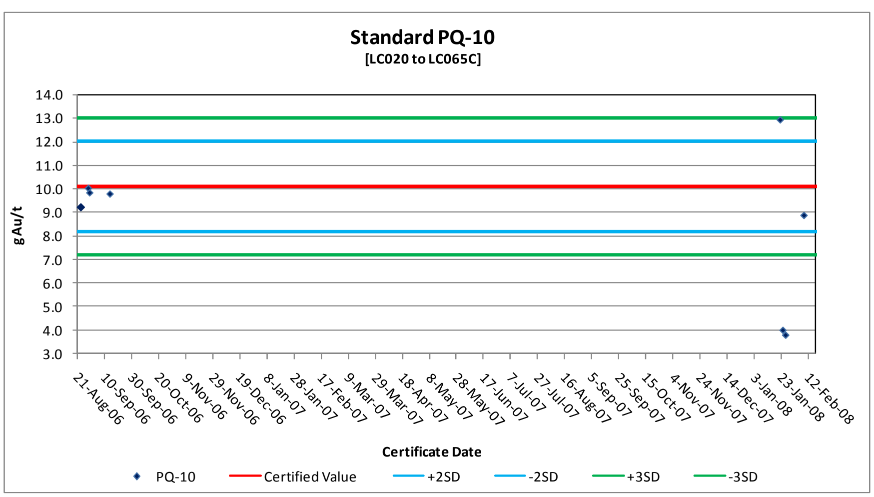


<u>*Uncertified Standards*</u>. A total of 73 AAL analyses of the three Pittston standards accompany drill samples from holes 47 holes in the sequence LC015 through LC067C (Figure 14.3). Seven of the analyses are failures, one of which triggered re-assaying of the associated drill samples. The results for standards PQ-2 and PQ-4 average 6% and 2% higher than the certified values, respectively. There are insufficient analyses of PQ-10 for meaningful comparisons. When considering the results of the Pittston standards, it is important to remember the standards did not undergo round-robin testing and are not certified.

Figure 14.3 Pittston Analytical Standard Results







Certified Standards – 2009 Drilling Program. During the 2009 season, results for standards inserted into the sample stream were reviewed by Fronteer immediately upon receipt. Individual standards falling beyond three standard deviations from the expected value triggered a rerun of the assay batch, with two successive standards falling beyond two standard deviations from the expected value also considered to constitute a failure. Some discretion was used in application of these criteria, as failures from standard analyses that fall entirely within an unmineralized batch did not trigger a reanalysis. Standards were also graphed in order to chart systematic drift or bias in the results. On a number of occasions, the laboratory was contacted when repeated failures appeared to signal a low or high bias in the analyses. These concerns were usually addressed promptly by the lab.

Five standards were prepared by MEG and certified by consultant Barry Smee for use in the 2009 drilling program, utilizing both high and low-grade mineralized material from the Long Canyon deposit (Table 14.3).

Table 14.3 Certified Standards Prepared from Long Canyon Mineralized Material

Standard	Standard Source	Certified Value (g Au/t)	Standard Deviation
FGS010	MEG	14.52	0.22
FGS020	MEG	6.86	0.18
FGS030	MEG	2.23	0.05
FGS040	MEG	1.80	0.06
FGS050	MEG	0.32	0.01

MDA examined the results of 401 assays of Long Canyon custom standards (Figure 14.4). These standards were inserted with samples from 215 of the 239 holes drilled in 2009 and submitted to Chemex (19 out of the 24 holes lacking standard data contributed holes to the resource estimation).

Figure 14.4 Long Canyon Custom Standard Results

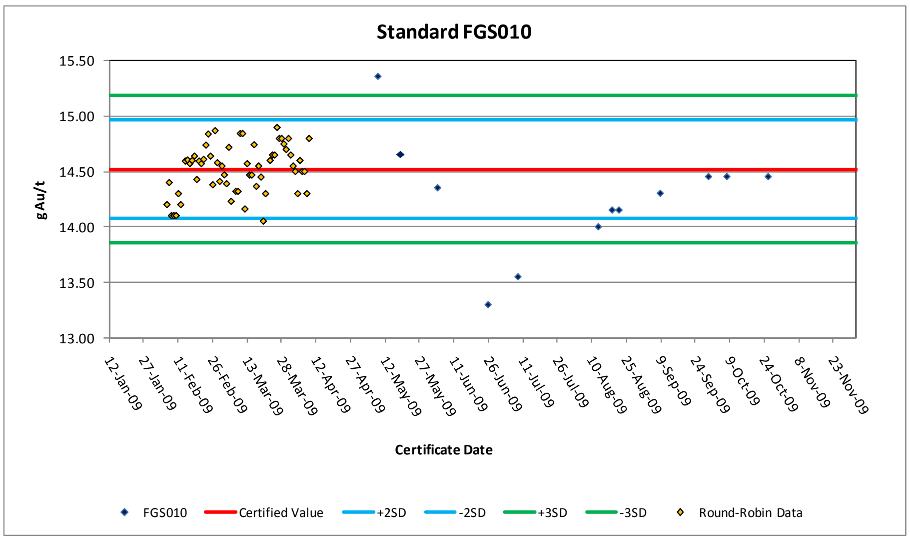


Figure 14.4 Long Canyon Custom Standard Results, cont.

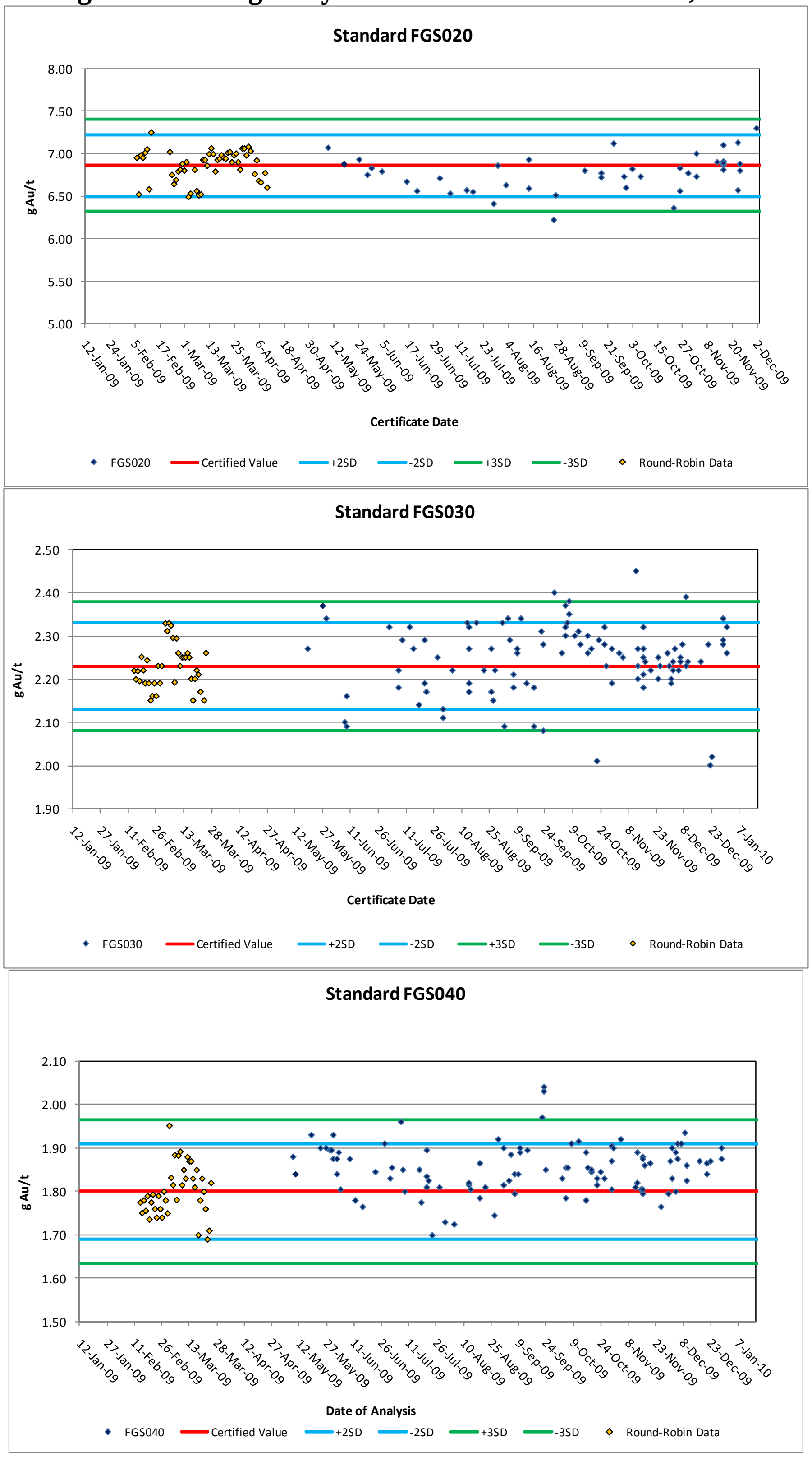
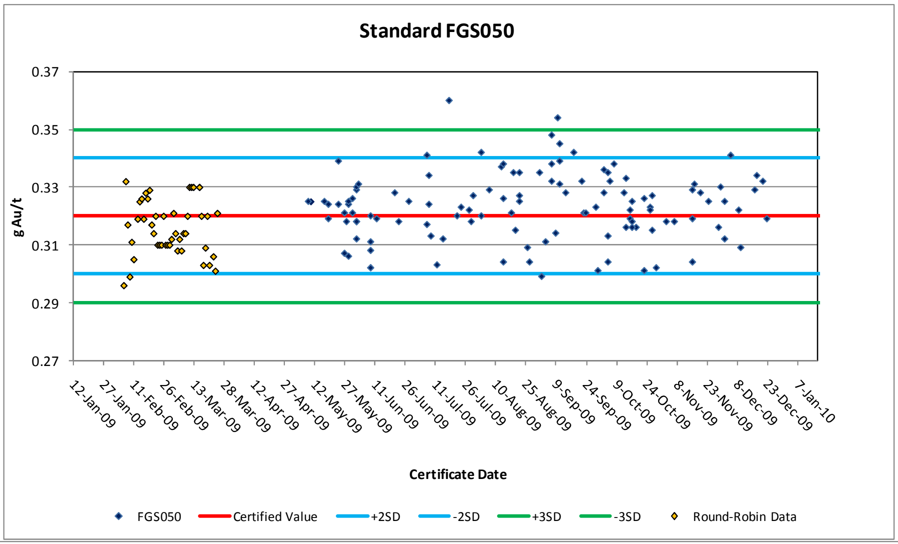
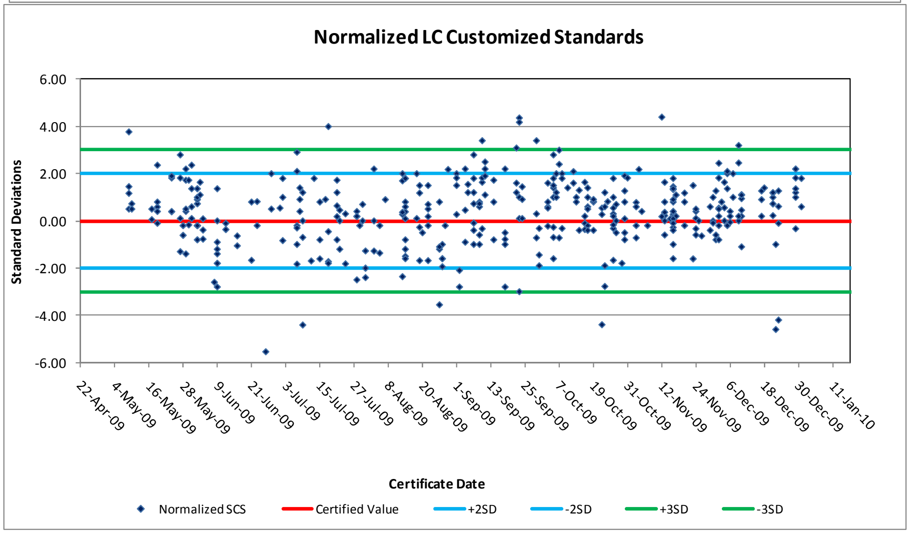


Figure 14.4 Long Canyon Custom Standard Results, cont.





In addition to the analytical results of the standards inserted with the drill samples, the graphs in Figure 14.4 also show the results from the round robin analyses (yellow markers) used in the certification process of each standard.

While there are relatively few analyses of the two higher-grade standards (FGS010 and FGS020), a slight low bias from about June through October is apparent. The means of the analyses of these two standards are one to two percent lower than the expected values.

The graphs of the two mid-grade standards show some high bias, as evident in October with FGS030 and throughout the entire time period for FGS040 (May through December). The means of the FGS030 FGS040 analyses are one and three percent higher than the expected values, respectively.

The graph of the single low-grade standard (FGS050) shows a slight but consistent high bias in the analyses from about August through December; the mean of the standard analyses is three percent higher than the expected value.

The final graph in Figure 14.4 shows the normalized results for all standards, which indicates a slight but consistent high bias in the standard analyses from about September through the end of 2009. The standard assays average 0.45 standard deviation units above the normalized certified value. There are 10 high-side failures (analyses greater than three standard deviations from the mean), including one extreme failure (beyond the limit of the graph), and six low-side failures.

Fire-Assay Pulp Checks. A total of 393 original AAL pulps from the 2006 through 2008 drilling programs were sent to Chemex for check assaying of the fire-assay gold determinations. The pulps were derived from drill samples from 113 of the holes in the sequence LC031 through LC220.

Figure 14.5 is a graph that shows the difference, plotted on the y-axis, of each check assay relative to the original assay. The x-axis of the graph plots the means of the paired data, with each pair consisting of an original-assay and the corresponding check assays. The red line is a moving average and provides a visual guide to the trend of the relative differences. The graph shows high variability in the data up to about 0.09 g Au/t, which is expected due to the lack of analytical precision at lower gold concentrations. The check assays compare well with the original assays at higher grades.

Descriptive statistics of the paired data are summarized in Table 14.4. The check assays compare very well with the original assays throughout a range of cutoffs.

Figure 14.5 Chemex Checks Relative to Original AAL Assays – 2006-2008

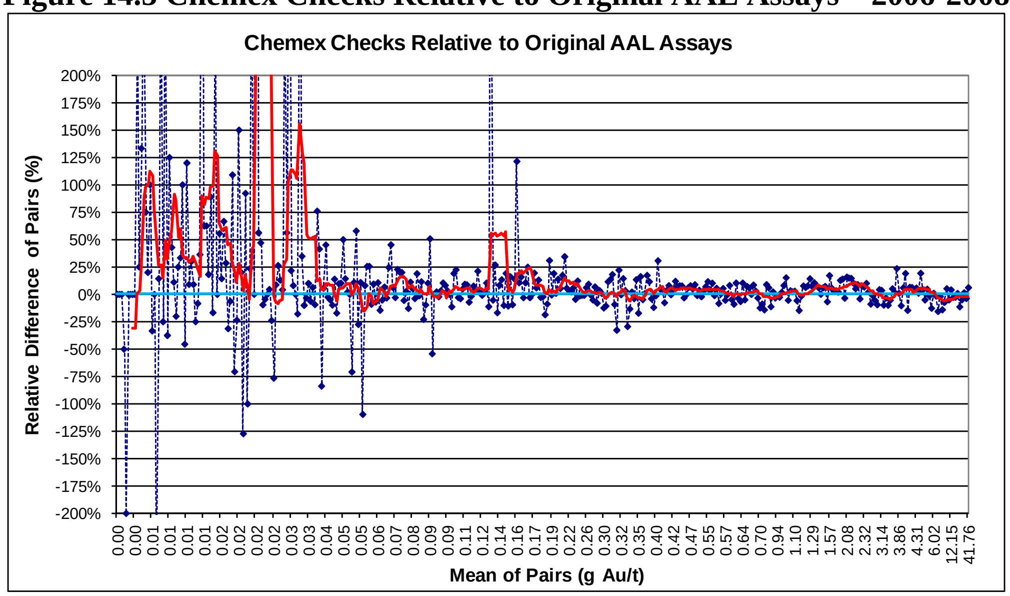


Table 14.4 Chemex Checks *vs.* AAL Original Assays – 2006-2008

All Pairs	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	393	393	393		393	393
Mean	1.189	1.192	1.198	1%	19%	31%
Std. Dev.	3.324	3.332	3.358			
CV	2.795	2.796	2.802			
Min.	0.002	0.002	0.002	0%		0%
Max.	41.765	40.529	43.000	6%		1850%

Mean ≥0.2	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	192	192	192		192	192
Mean	2.371	2.379	2.388	0%	2%	7%
Std. Dev.	4.464	4.474	4.512			
CV	1.883	1.881	1.889			
Min.	0.206	0.173	0.206	19%		0%
Max.	41.765	40.529	43.000	6%		34%

Mean ≥0.5	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	125	125	125		125	125
Mean	3.464	3.479	3.488	0%	2%	7%
Std. Dev.	5.219	5.228	5.278			
CV	1.507	1.503	1.513			
Min.	0.514	0.498	0.523	5%		0%
Max.	41.765	40.529	43.000	6%		24%

Mean ≥1.0	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	86	86	86		86	86
Mean	4.735	4.757	4.770	0%	2%	7%
Std. Dev.	5.872	5.879	5.941			
CV	1.240	1.236	1.246			
Min.	1.016	0.955	1.055	10%		0%
Max.	41.765	40.529	43.000	6%		24%

Mean ≥2.0	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	58	58	58		58	58
Mean	6.345	6.398	6.383	0%	1%	7%
Std. Dev.	6.578	6.564	6.667			
CV	1.037	1.026	1.045			
Min.	2.045	1.926	2.010	4%		1%
Max.	41.765	40.529	43.000	6%		24%

CV = coefficient of variation = (Std Dev/Mean); A.V. = absolute value

Chemex assayed the primary drill samples from some of the late-2008 holes. A total of 69 of the original Chemex pulps were sent to AAL for check assaying (Figure 14.6 and Table 14.5).

The mean of AAL check assays is 7% higher than the mean of the original Chemex analyses, although the difference drops to 1% higher if the two highest-grade sample pairs are removed. There are insufficient pairs at grades of interest (>0.2 g Au/t) for definitive conclusions to be drawn, however.

Figure 14.6 AAL Checks Relative to Chemex Original Assays – 2006-2008

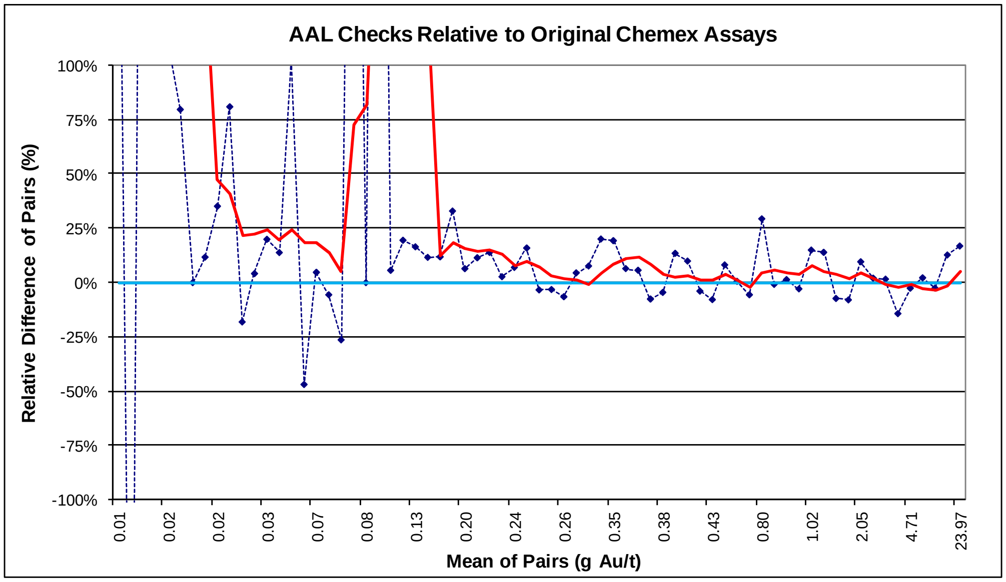


Table 14.5 AAL Checks *vs.* Original Chemex Assays – 2006-2008

All Pairs	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	69	69	69		69	69
Mean	1.374	1.330	1.417	7%	37%	51%
Std. Dev.	3.744	3.544	3.948			
CV	2.726	2.665	2.786			
Min.	0.005	0.002	0.002	0%		0%
Max.	22.235	20.500	23.970	17%		600%

Mean ≥0.2	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	39	39	39		39	39
Mean	2.379	2.308	2.451	6%	4%	8%
Std. Dev.	4.764	4.497	5.037			
CV	2.002	1.948	2.056			
Min.	0.223	0.208	0.226	9%		1%
Max.	22.235	20.500	20.500	0%		29%

A total of 369 original Chemex pulps from the 2009 drill program were sent to AAL for check assaying (Figure 14.7 and Table 14.6; eleven outlier pairs are removed, with no material impact to the statistics). While the means of the original and check assays compare very well at various cutoff grades, a systematic high bias is evident from about 0.1 to 1.5 g Au/t. The mean of the AAL check assays is six percent higher than the mean of the original Chemex assays in this grade range.

Figure 14.7 AAL Checks Relative to Original Chemex Assays – 2009

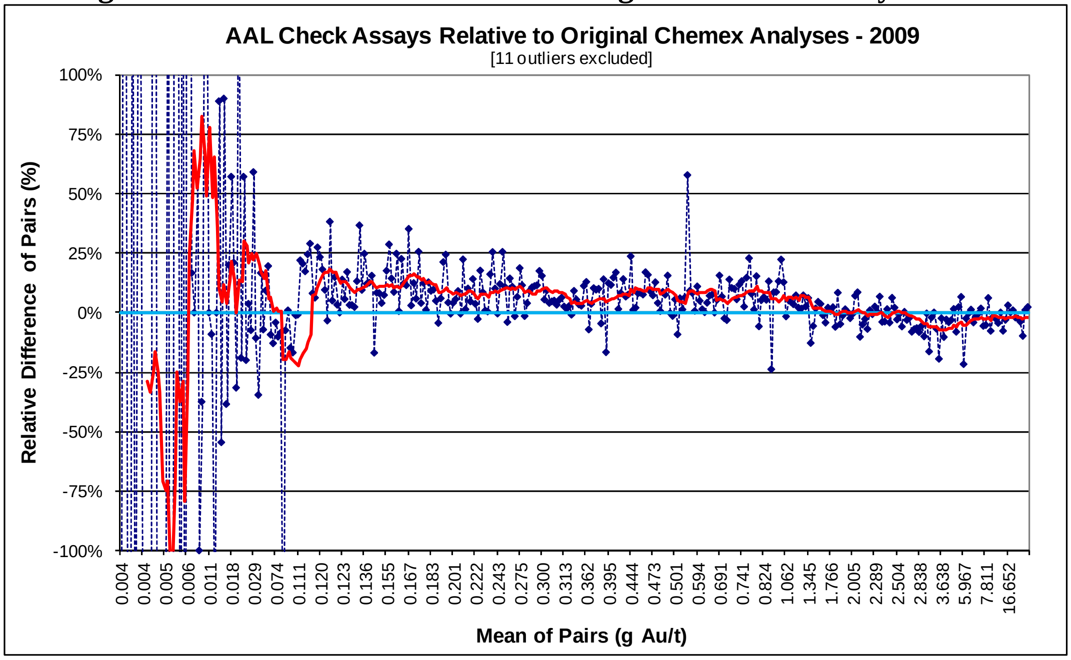


Table 14.6 AAL Checks *vs.* Original Chemex Assays – 2009

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	369	369	369		369	369
Mean	1.773	1.781	1.765	-1%	4%	30%
Median	0.343	0.334	0.352	5%		
Std. Dev.	4.718	4.752	4.687			
CV	2.661	2.668	2.656			
Min.	0.004	0.002	0.002			
Max.	46.638	46.100	47.176			

Mean ≥0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	234	234	234		234	234
Mean	2.748	2.763	2.734	-1%	4%	7%
Median	0.741	0.716	0.778	9%		
Std. Dev.	5.705	5.746	5.667			
CV	2.076	2.080	2.073			
Min.	0.201	0.192	0.205			
Max.	46.638	46.100	47.176			

Mean ≥0.5	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	146	146	146		146	146
Mean	4.205	4.235	4.174	-1%	1%	6%
Median	1.972	1.955	1.959	0%		
Std. Dev.	6.828	6.873	6.786			
CV	1.624	1.623	1.626			
Min.	0.500	0.422	0.480			
Max.	46.638	46.100	47.176			

Mean ≥2.5	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	54	54	54		54	54
Mean	9.247	9.354	9.141	-2%	-4%	5%
Median	5.525	5.735	5.315	-7%		
Std. Dev.	9.259	9.283	9.243			
CV	1.001	0.992	1.011			
Min.	2.504	2.520	2.446			
Max.	46.638	46.100	47.176			

Cyanide-Soluble Pulp Checks. As part of the fire-assay pulp-check program for the 2006 to 2008 drill samples, Chemex also performed cyanide-soluble check analyses on 147 samples (Figure 14.8 and Table 14.7). The Chemex check analyses are systematically higher (~7%) than the original AAL cyanide-soluble assays. The determination methods of the two laboratories are not identical, which is the likely cause of at least part of the discrepancy.

Figure 14.8 Chemex Cyanide-Soluble Checks Relative to Original AAL Assays – 2006-2008

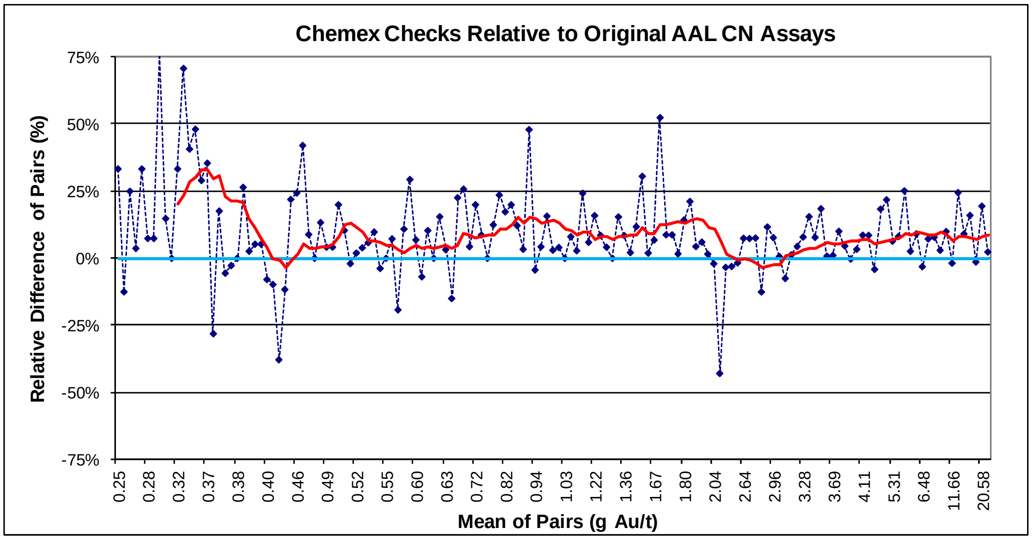


Table 14.7 Chemex Cyanide-Soluble Checks *vs.* AAL Original Assays – 2006-2008

All Pairs	Mean	Original	Check	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	147	147	147		147	147
Mean	2.631	2.536	2.725	7%	9%	13%
Std. Dev.	4.690	4.548	4.841			
CV	1.783	1.793	1.776			
Min.	0.245	0.210	0.240			
Max.	40.525	40.050	41.000			

There are 192 original Chemex cyanide-soluble – AAL check pairs from the 2009 drill data (Table 14.8 and Figure 14.9). The AAL check analyses are systematically lower, with the average relative difference being 12% lower. This systematic difference is consistent with the pre-2009 data discussed above, and strongly suggests there are differences in the cyanide-soluble methodologies between the two laboratories.

Figure 14.9 AAL Cyanide-Soluble Checks Relative to Original Chemex Assays – 2009

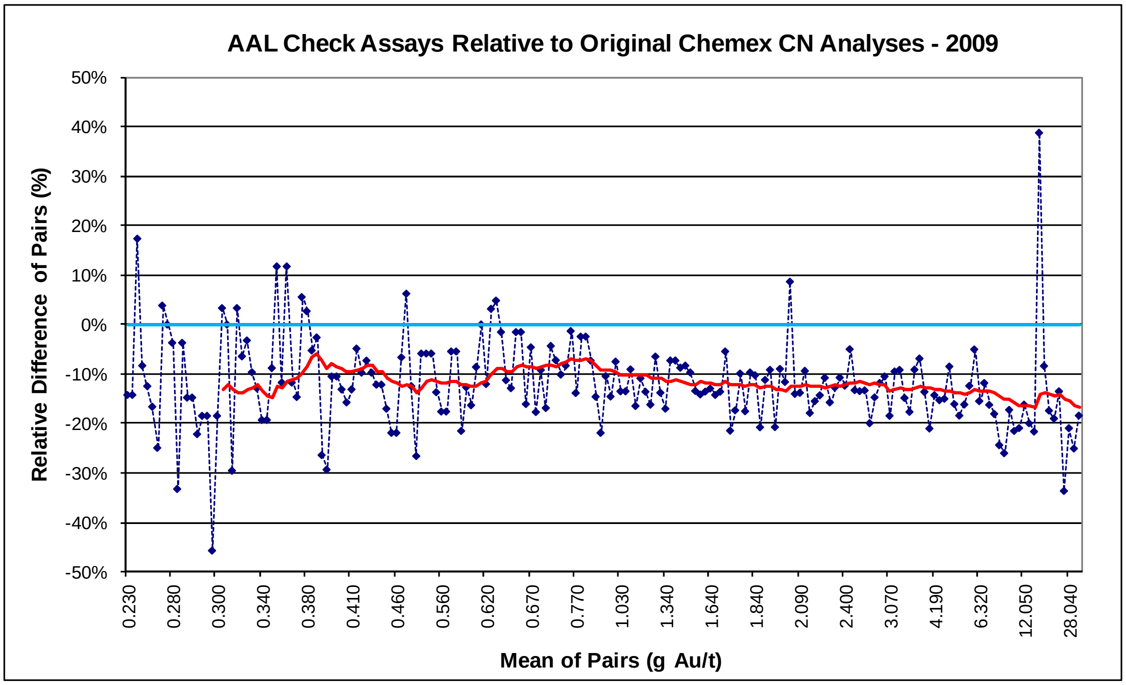


Table 14.8 AAL Cyanide-Soluble Checks *vs.* Chemex Original Assays – 2009

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	192	192	192		192	192
Mean	2.896	3.096	2.690	-13%	-12%	13%
Median	0.910	0.975	0.840	-14%		
Std. Dev.	5.562	6.050	5.090			
CV	1.921	1.954	1.892			
Min.	0.230	0.230	0.210			
Max.	41.130	44.600	37.650			

Duplicate Pulps. Duplicate pulps, also referred to as preparation duplicates, are new pulps prepared from splits of the original coarse rejects created during the first crushing and splitting stage of the primary drill samples. Duplicate-pulp data provide information about the sub-sampling variance introduced during this stage of sample preparation.

The duplicate-pulp samples from the 2006 to 2008 drill programs are derived from the coarse rejects of samples from 44 holes in the sequence LC037 to LC118. Comparisons of the AAL analyses of these duplicate pulps relative to the original AAL assays are shown in Figure 14.10 and Table 14.9.

Figure 14.10 AAL Duplicate Pulps Relative to Original AAL Assays – 2006-2008

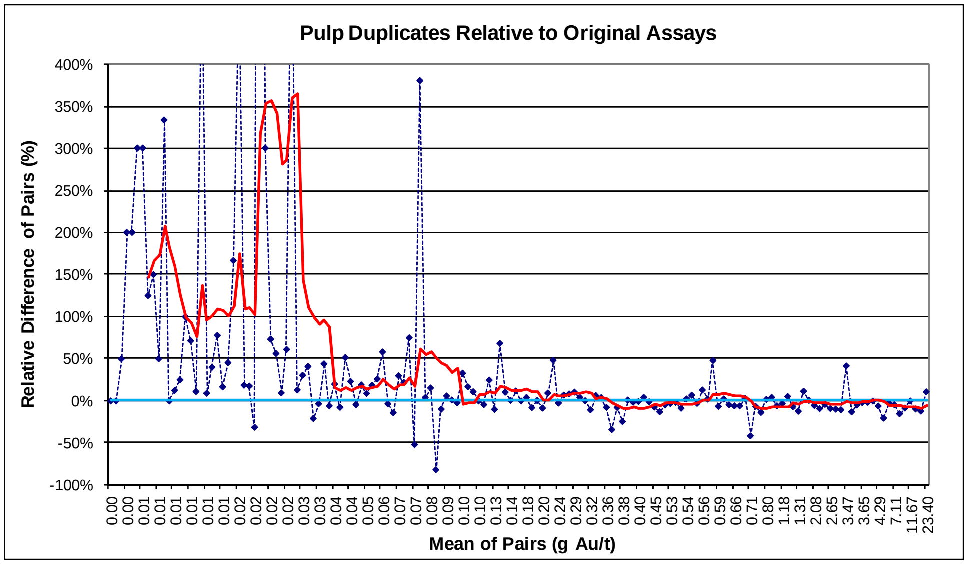


Table 14.9 AAL Duplicate Pulps *vs.* AAL Original Assays – 2006-2008

All Pairs	Mean	Original	Dup. Pulp	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	154	154	154		154	154
Mean	1.137	1.152	1.122	-3%	45%	53%
Std. Dev.	2.992	3.010	2.982			
CV	2.632	2.613	2.659			
Min.	0.002	0.002	0.002	0%		0%
Max.	23.397	22.197	24.597	11%		1800%

Mean ≥0.2	Mean	Original	Dup. Pulp	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	72	72	72		72	72
Mean	2.371	2.408	2.334	-3%	-2%	9%
Std. Dev.	4.048	4.065	4.044			
CV	1.707	1.688	1.733			
Min.	0.213	0.178	0.222	25%		0%
Max.	23.397	22.197	24.597	11%		48%

Mean ≥0.5	Mean	Original	Dup. Pulp	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	49	49	49		49	49
Mean	3.320	3.373	3.268	-3%	-2%	9%
Std. Dev.	4.621	4.633	4.627			
CV	1.392	1.374	1.416			
Min.	0.528	0.458	0.512	12%		0%
Max.	23.397	22.197	24.597	11%		48%

The descriptive statistics indicate that the duplicate-pulp assays are slightly lower than the assays of the original pulps, with the relative difference plot showing that this discrepancy is due to a low bias that is prevalent at grades greater than about 0.35 g Au/t.

The 2009 duplicate-pulp data were generated by Chemex. A total of 222 duplicate pulp – original pulp pairs are compared in Figure 14.11 and Table 14.10. A total of 87 pairs are excluded where both the duplicate and original analyses returned values less than the detection limit, and four additional outlier pairs are also excluded.

Figure 14.11 Chemex Duplicate Pulps Relative to Original Chemex Assays – 2009

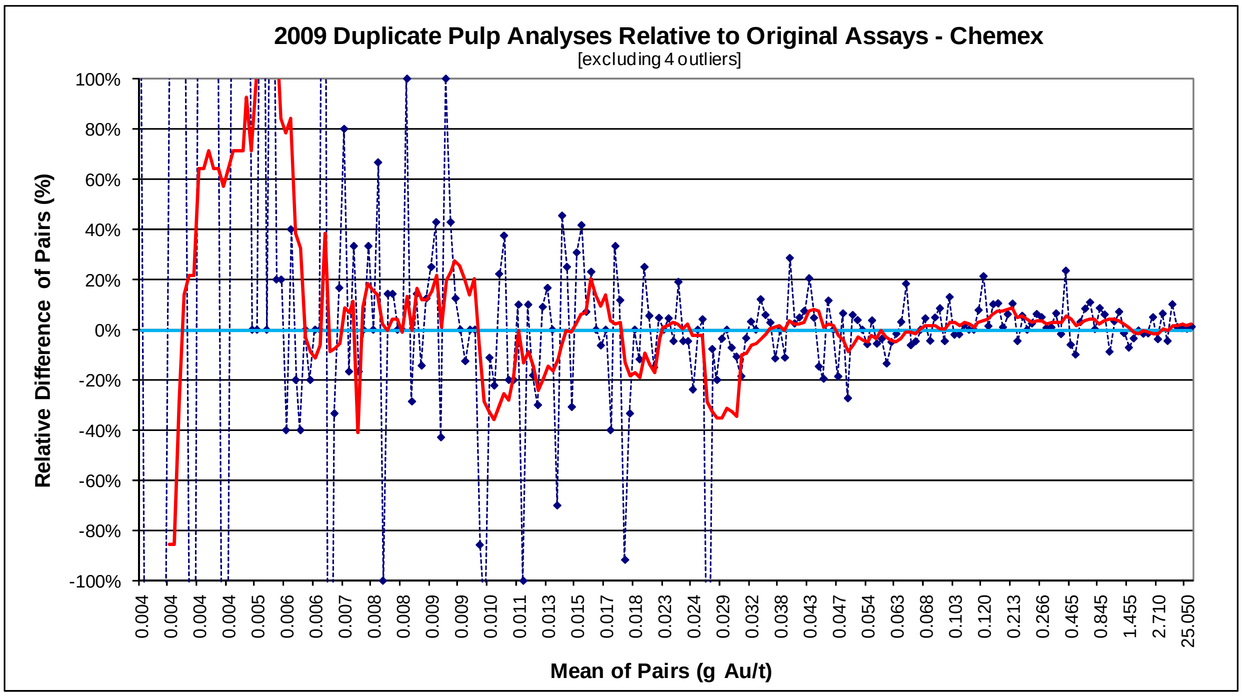


Table 14.10 Chemex Duplicate Pulps *vs.* Original Chemex Assays – 2009

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	218	218	218		218	218
Mean	0.543	0.540	0.546	1%	6%	38%
Median	0.023	0.023	0.022	-7%		
Std. Dev.	2.779	2.767	2.792			
CV	5.119	5.129	5.113			
Min.	0.004	0.002	0.002			
Max.	25.750	25.600	25.900			

Mean ≥0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	39	39	39		39	39
Mean	2.903	2.885	2.920	1%	2%	5%
Median	0.845	0.827	0.880	6%		
Std. Dev.	6.095	6.070	6.120			
CV	2.100	2.104	2.096			
Min.	0.200	0.194	0.206			
Max.	25.750	25.600	25.900			

While there are insufficient data at meaningful grades to formulate definitive conclusions, the 2009 duplicate pulp analyses compare reasonably well with the original pulp assays.

Field Duplicates. Field duplicates are secondary splits of drill samples. In the case of core drilling, field duplicates are obtained by re-splitting the core remaining after the primary samples have been taken. The RC field duplicates are splits of the cuttings collected at the drill rig at the same time as the primary samples. Field duplicates are mainly used to assess inherent geologic variability and sampling variance.

RC duplicate data analyzed by AAL are available for holes drilled in the 2007 through 2008 programs. These data are compared to the original AAL analyses in Figure 14.12 and Table 14.11 after the removal of 17 outlier pairs and 62 cases where both the original and duplicate analyses are less than the detection limit. The exclusion of the outlier pairs does not affect the statistical comparisons.

The mean of the RC field duplicates is 4% lower than the mean of the original analyses, although more data at meaningful grades are needed to establish statistically meaningful conclusions.

Figure 14.12 2007-2008 RC Field Duplicates Relative to Original Assays – AAL

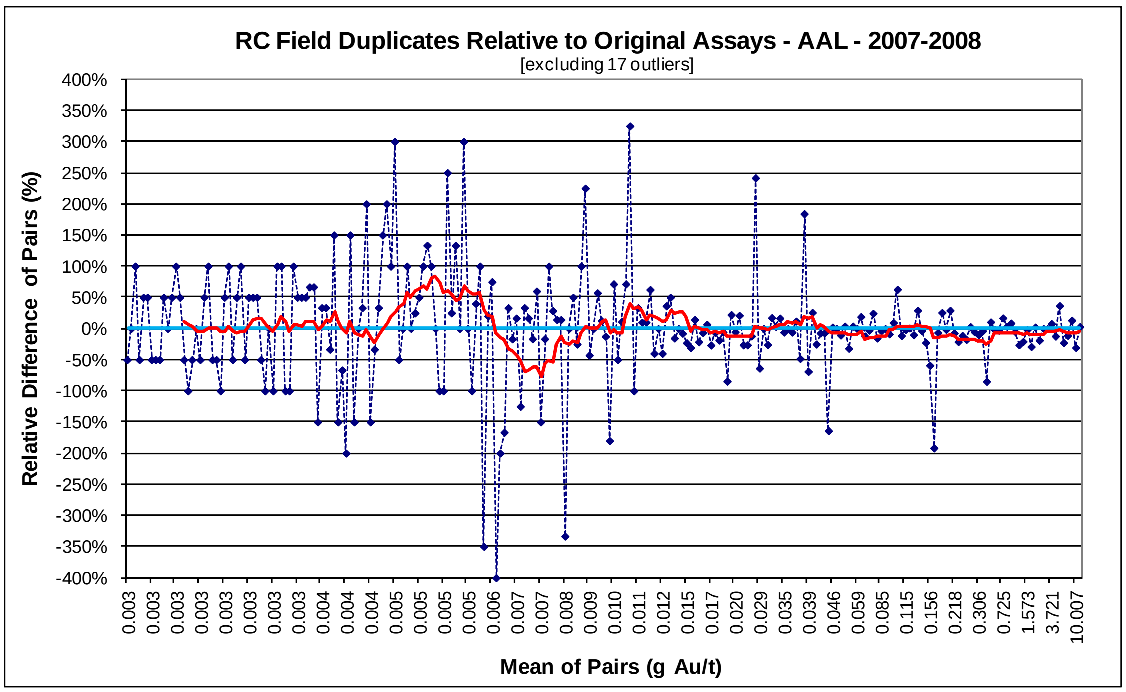


Table 14.11 2007-2008 RC Field Duplicates *vs.* Original Assays – AAL

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	236	236	236		236	236
Mean	0.383	0.391	0.374	-4%	2%	55%
Median	0.009	0.009	0.010	6%		
Std. Dev.	1.471	1.508	1.445			
CV	3.846	3.860	3.864			
Min.	0.003	0.002	0.002			
Max.	12.848	12.665	13.030			

Mean ≥0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	33	33	33		33	33
Mean	2.590	2.647	2.533	-4%	-6%	14%
Median	1.067	1.092	1.097	0%		
Std. Dev.	3.170	3.254	3.120			
CV	1.224	1.230	1.232			
Min.	0.205	0.179	0.210			
Max.	12.848	12.665	13.030			

The AAL analyses of core duplicates are compared to the original AAL assays in Figure 14.13 and Table 14.12 after the removal of two outlier pairs and 14 pairs where both analyses are less than the detection limit.

Figure 14.13 2007-2008 Core Field Duplicates Relative to Original Assays - AAL

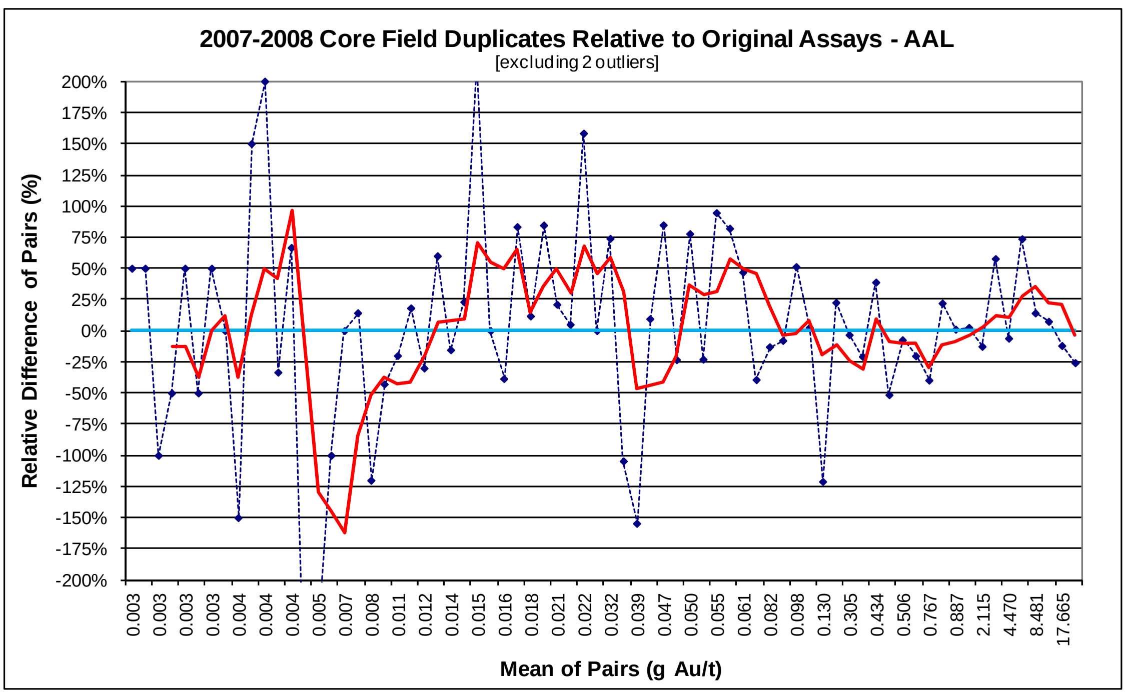


Table 14.12 2007-2008 Core Field Duplicates *vs.* Original Assays – AAL

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	72	72	72		72	72
Mean	1.236	1.260	1.211	-4%	1%	56%
Median	0.029	0.025	0.025			
Std. Dev.	4.367	4.714	4.047			
CV	3.534	3.740	3.342			
Min.	0.003	0.002	0.002			
Max.	30.402	33.863	26.940			

Mean ≥0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	18	18	18		18	18
Mean	4.854	4.954	4.753	-4%	1%	23%
Median	0.931	0.928	0.940			
Std. Dev.	7.822	8.576	7.119			
CV	1.611	1.731	1.498			
Min.	0.305	0.310	0.300			
Max.	30.402	33.863	26.940			

The mean of the duplicate core analyses is 4% lower than the mean of the original assays of the primary core samples, but there are far too few samples at meaningful grades to make firm conclusions. To illustrate this point, if the highest-grade pair is removed, the duplicate-core mean becomes 6% *higher* than the mean of the analyses of the primary sample split.

There are 65 Chemex analyses of field duplicates from 2008 and 2009 RC drill holes in which analyses of both the duplicate and primary sample splits are over the detection limit (Figure 14.14 and Table 14.13).

Figure 14.14 2008-2009 RC Field Duplicates Relative to Original Assays – Chemex

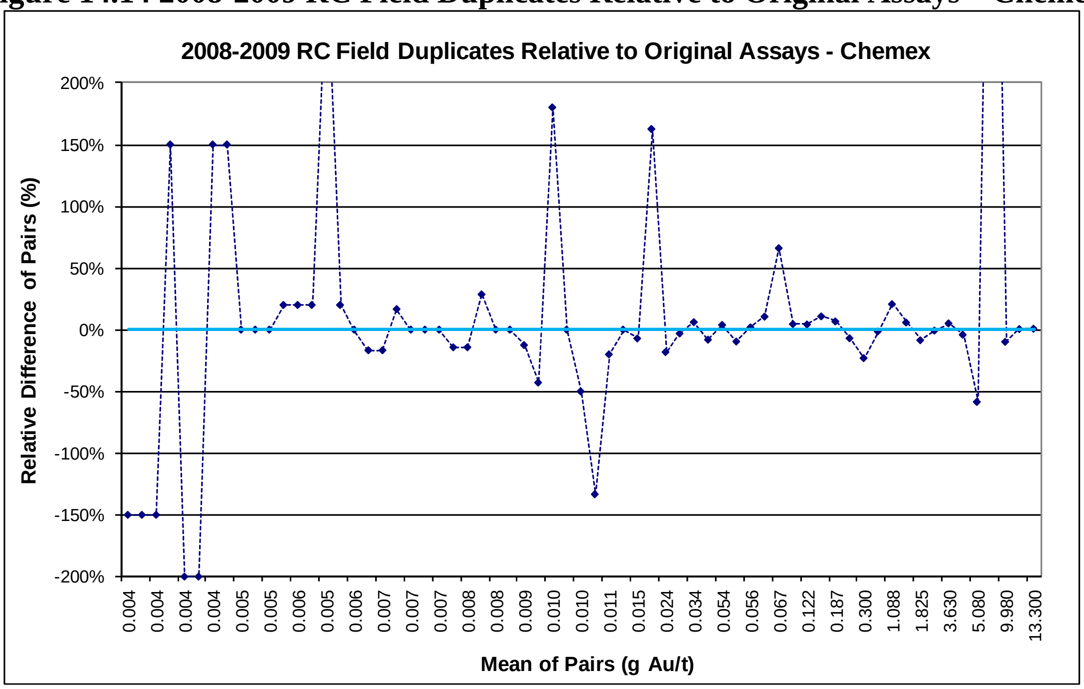


Table 14.13 2008-2009 RC Field Duplicates *vs.* Original Assays – Chemex

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	65	65	65		65	65
Mean	1.012	0.919	1.105	20%	11%	52%
Median	0.010	0.010	0.010	0%		
Std. Dev.	2.757	2.585	3.216			
CV	2.724	2.812	2.909			
Min.	0.004	0.002	0.002			
Max.	13.300	13.250	17.400			

Mean >0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	13	13	13		13	13
Mean	4.952	4.488	5.416	21%	45%	62%
Median	3.630	2.770	3.720	34%		
Std. Dev.	4.417	4.286	5.475			
CV	0.892	0.955	1.011			
Min.	0.300	0.331	0.269			
Max.	13.300	13.250	17.400			

While the mean of the RC field duplicates is much higher than the mean of the original samples, the data are not sufficient for statistically meaningful conclusions at meaningful grades. If the two most extreme outlier pairs are removed (one is a high-grade pair and the other a very low-grade pair), the mean of the RC field duplicates is 5% *lower* than the analyses of the primary sample splits. Exclusive of the pairs with relative differences in excess of about ±50%, the duplicate and original data compare well.

After removal of 95 pairs where both analyses are less than the detection limit and five outlier pairs, there are 194 duplicate – original core-split pairs (Figure 14.15 and Table 14.14).

Figure 14.15 2008-2009 Core Field Duplicates Relative to Original Assays – Chemex

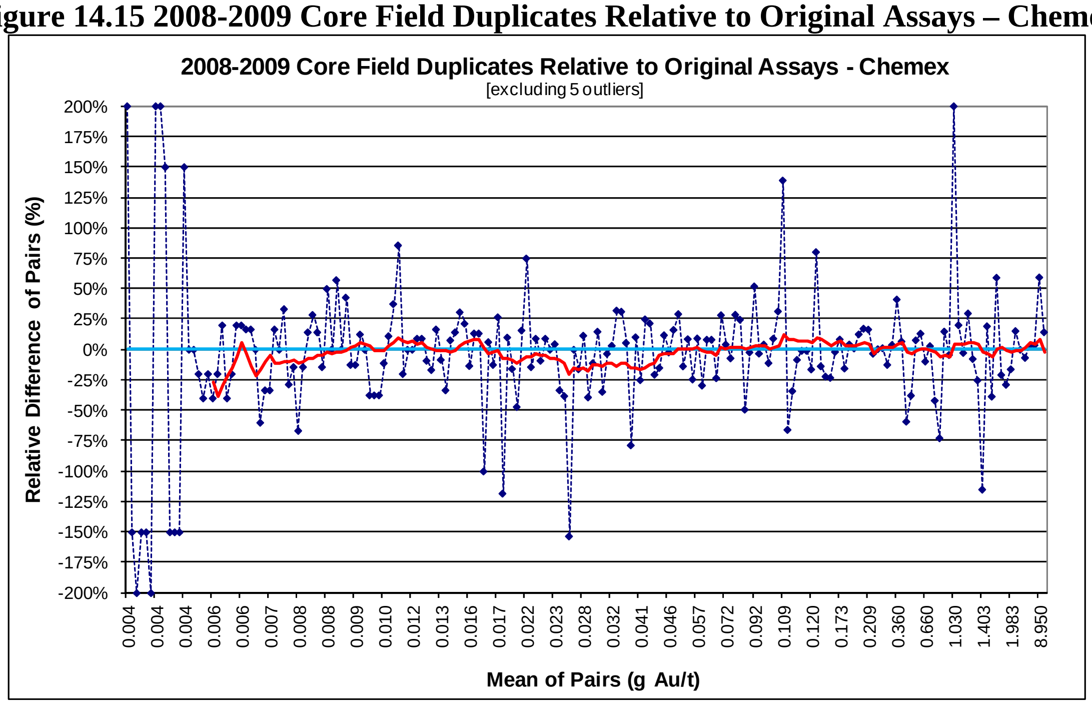


Table 14.14 2008-2009 Core Field Duplicates *vs.* Original Assays – Chemex

All Pairs	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	194	194	194		194	194
Mean	0.377	0.363	0.390	7%	-4%	34%
Median	0.028	0.029	0.027			
Std. Dev.	1.321	1.211	1.445			
CV	3.509	3.336	3.709			
Min.	0.004	0.002	0.002			
Max.	13.775	12.850	14.700			

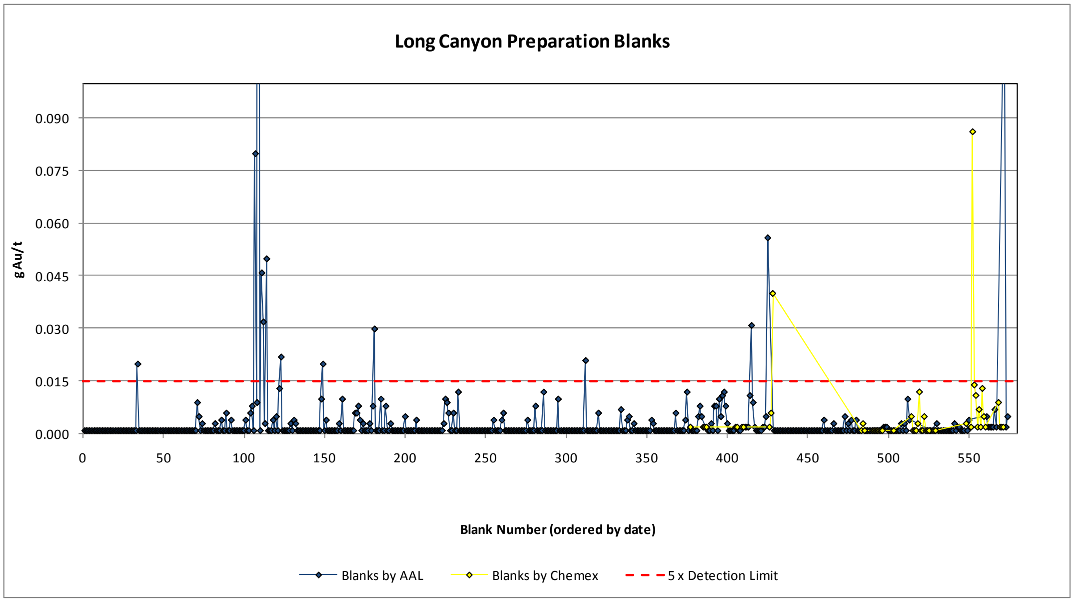
Mean ≥0.2	Mean	Original	Duplicate	Diff.	Rel. Diff.	A.V. Rel. Diff.
Count	39	39	39		39	39
Mean	1.721	1.654	1.787	8%	1%	27%
Median	1.030	1.040	0.997			
Std. Dev.	2.556	2.301	2.844			
CV	1.485	1.391	1.591			
Min.	0.208	0.191	0.215			
Max.	13.775	12.850	14.700			

Once again, there are insufficient pairs at meaningful grades to draw conclusions (the mean of the core duplicates becomes 2% lower than the mean of the originals if the two highest-grade pairs are removed). However, the relative difference plot does not suggest there are major issues.

Preparation Blanks. Preparation blanks are coarse samples of barren material that are used to detect possible laboratory contamination, which is most common during sample-preparation stages. In order for analyses of blanks to be meaningful, therefore, they must be sufficiently coarse to require the same crushing stages as the drill samples. It is also important for blanks to be placed in the sample stream immediately after mineralized samples (which would be the source of most cross-contamination issues). Blank results that are greater than five times the detection limit (.025 g Au/t based on a .005 g Au/t ppb detection limit, or .015 g Au/t based on a .003 g Au/t detection limit) are typically considered failures that require further investigation and possible re-assay of associated drill samples.

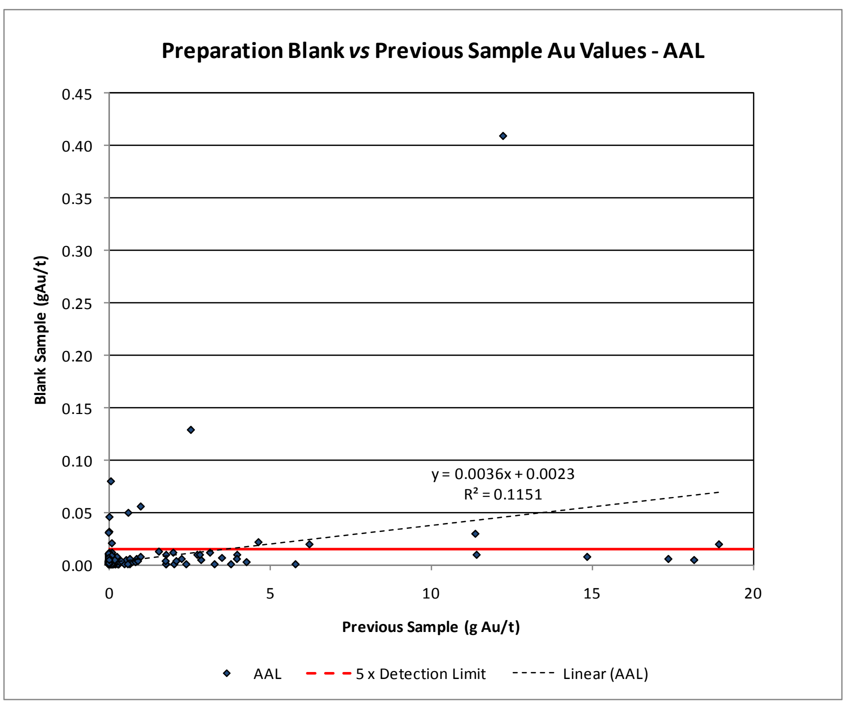
The Joint Venture has used coarse blank material from a bulk sample of barren rhyolite originally acquired by AuEx from MEG. Figure 14.16 displays the 574 analyses of preparation blank samples submitted with the drill samples from all Joint Venture holes drilled through 2008 except for LC164C. The blanks are coloured to identify the assay laboratory and are ordered by date of analysis on the x-axis. There are 13 failures out of 523 AAL analyses and two Chemex failures out of 51 analyses.

Figure 14.16 Blank Analyses – 2006-2008



Correlations between anomalously high blank assays and the assays of drill samples that preceded the anomalous blanks provide good evidence of cross contamination. This relationship is not evident with the AAL analyses (Figure 14.17; note low R^2 value).

Figure 14.17 AAL Blank Analyses *vs.* Grade of Previous Sample

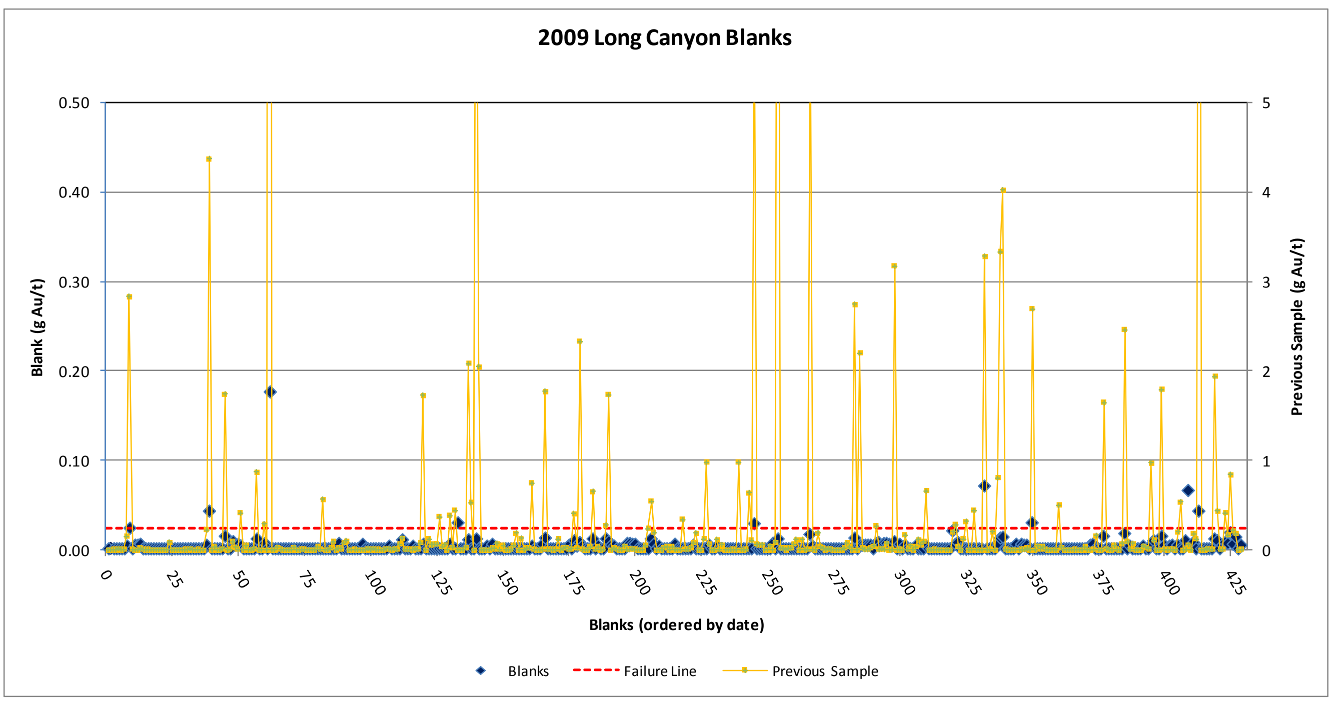


The 2009 coarse blank and previous sample results from Chemex are shown in Figure 14.18. Nine blank analyses exceed the threshold and therefore qualify as failures; seven of these samples were preceded by strongly mineralized samples. There are only 24 samples that preceded blanks that returned gold values in excess of 1 g Au/t, and the blanks following seven of these samples returned anomalously high gold values.

In the 2009 drilling program, blanks that returned greater than 0.015 g Au/t within mineralized intervals triggered a re-run of the associated drill samples. In some cases, blanks inserted after a well-mineralized interval, particularly if the material contained a significant amount of red hematitic residual material, returned repeated failures, indicating that the contamination occurred in the initial crushing stage. This problem could not be rectified without quartering the remaining core in the core library and submitting this new core sample for analysis. Recognition of this problem led to the establishment of a protocol that requires insertion of clean sand into the crusher between every sample in suspected high grade/high hematite residua samples. This step alleviated most of the blank contamination problems.

It is important to note that only one of the seven blank failures returned a gold value of significance (greater than 0.1 g Au/t).

Figure 14.18 Chemex Blank Analyses *vs.* Grade of Previous Sample – 2009



Analytical Blanks. Analytical blanks are similar to preparation blanks, with the important difference being that analytical blanks are submitted to the laboratories as pulps, and therefore require no sample preparation. Analytical blanks can only be used to check laboratory accuracy of analyses of material that has gold concentrations less than the detection limit.

AuEx purchased analytical blank material from MEG. MDA has reviewed AAL analyses of 57 analytical blanks that were inserted into the drill-sample stream of 38 holes in the sequence LC015 to LC061. Three of the analyses exceeded the detection limit (0.004, 0.005, and 0.012 g Au/t).

14.2 Pittston and AuEx QA/QC Programs

MDA does not have any QA/QC data derived from the drilling programs completed prior to the Fronteer-AuEx Joint Venture.

14.3 Discussion of QA/QC Results

The 2006-2008 AAL analyses of the various certified reference standards inserted by the Joint Venture are generally 1 to 3% lower than the certified values. The late-2008 Chemex analyses of the same standards are also lower, although slightly less so than AAL, but there are insufficient data to form definitive conclusions. Chemex check analyses of the pulps from the 2006-2008 drilling programs agree well with the original AAL fire assays.

Chemex analyses of the custom Long Canyon standards inserted into the 2009 drill-sample stream often show a slight high bias with respect to the certified values, but AAL check assays of original 2009 Chemex pulps are approximately 7% higher than the Chemex analyses in the analytical range of about 0.1 to 1.5 g Au/t.

Other than the strong suggestion of analytical drift in the 2006-2008 AAL analyses, there is no evidence of significant problems with the Long Canyon gold fire-assay database.

While no serious issues are indicated by the duplicate pulp and field-duplicate data, these should continue to be routinely collected. The field-duplicate data require additional sample pairs to allow for meaningful statistical analyses. The 2006-2008 duplicate-pulp analyses are slightly, but systematically, lower than assays of the original pulps, while no problems are evident in the 2009 duplicate-pulp analyses. Additional data at meaningful grades should help in identifying any issues.

The preparation blank dataset has identified a cross contamination issue with the Chemex analyses. While no contamination of gold of significant magnitude has been identified, Fronteer has changed the sample preparation protocols in an attempt to address the issue.

There are limited QA/QC data available from the Pittston and AuEx drilling programs. A check-assaying program using available pulps and coarse rejects from these programs should be considered.

14.4 Assay Database Audit

MDA obtained original digital assay certificates directly from AAL and Chemex for all Joint Venture and AuEx holes drilled at Long Canyon, and these data were imported into the project database using non-manual methods. MDA used paper copies of the original assay certificates from the seven Pittston holes to manually enter the data, as digital assay certificates were not available. The manually entered data were then compared against the Pittston assays in Fronteer's project database, in which the data were also entered by hand, and the resulting discrepancies were resolved.

14.5 Independent Verification of Mineralization

MDA. On May 23, 2006 Paul Tietz of Mine Development Associates ("MDA") collected 10 samples from road cuts previously sampled by AuEx at the Long Canyon project site. MDA maintained custody of the samples and delivered them directly to the facility of AAL in Sparks, Nevada for assaying. Gold was determined by 30-gram fire assaying with both AA and gravimetric finishes. Descriptions of the MDA samples, as well as a comparison of the assay results from the MDA and AuEx assays are described in Table 14.15.

The dataset is only sufficient to confirm the presence of gold mineralization in concentrations similar to those in the project drill-hole database.

Michael Gustin also visited the Long Canyon project on November 15, 2006, July 15, 2008, and November 5, 2009. The site visits included reviews of (1) mineralized core and RC chips; (2) drill-hole cross sections showing the geologic model; (3) representative exposures in road cuts and outcrops; and (4) inspection of sampling and logging procedures at active RC and core drill sites and in the project field office.

Table 14.15 Long Canyon Independent Sampling – MDA

Sample ID	UTM Easting	UTM Northing	Description	AuEx Au Results (ppm)	MDA Au FA30 (ppm)	MDA Au FAG (ppm)
LC-PT-1	4,538,739	707,941	Select 7.5-metre grab from road cut	1.3 to 7.54	4.90	5.01
LC-PT-2	4,538,707	707,951	6-metre chip sample	9.70 to 13.20	9.85	10.49
LC-PT-3	4,538,709	707,957	3-metre chip sample	7.60 to 9.39	8.44	8.81
LC-PT-4	4,538,611	707,853	Select 3-metre grab from road cut	0.32 to 2.74	0.72	0.62
LC-PT-5	4,538,581	707,833	Select 7.5-metre grab from road cut	0.68 to 1.39	0.84	0.75
LC-PT-6	4,538,570	707,826	4.5-metre chip sample	1.52 to 2.77	2.75	2.91
LC-PT-7	4,538,515	707,789	3-metre chip sample	2.09 to 4.84	1.88	1.75
LC-PT-8	4,538,471	707,712	4.5-metre chip sample	4.18 to 18.00	16.75	17.14
LC-PT-9	4,538,471	707,712	Select grab of excavated cobbles	4.18 to 18.00	15.88	16.66
LC-PT-10	4,538,442	707,787	Select grab from altered fracture zone	No data	0.19	0.21

SRK. As described in Moran (2008), SRK confirmed the presence of gold by collecting and analyzing six samples (Table 14.16). The following description of Allan Moran's independent sampling is taken from the 2008 Technical Report:

"The author collected 7 [sic] *surface rock samples in 2004 to verify gold mineralization in outcrops and road cuts. These samples are not exact replicates of previous Pittston samples, so direct assay comparison is not presented. The samples verify the presence of gold and the associated trace elements reported for Long Canyon."*

Table 14.16 Long Canyon 2004 Independent Sampling - SRK
(from Moran, 2008)

Sample	UTM N	UTM E (11)	Au ppm	As ppm	Sb ppm	Hg ppm	Tl ppm	W ppm	Comments
AMP-09	4538708	0707954	12.34	436	30	11.00	7.24	4	L.C., Rd-cut, hem limestone
AMP-10	4538698	0707951	6.00	244	5	5.51	9.40	3	L.C., Rd-cut, hem limestone
AMP-11	4538699	0707946	26.33	321	43	13.60	4.51	5	L.C., Rd-cut, hem limestone
AMP-12	4538574	0707838	0.87	89	6	3.21	1.06	2	L.C., Rd-cut, hem limestone
AMP-13	4538507	0707787	3.02	81	10	1.42	2.19	7	L.C., Rd-cut, hem limestone
AMP-14	4538474	0707709	6.03	67	304	8.98	1.48	9	L.C., Jasperoid, silic. flt-bx

15.0 ADJACENT PROPERTIES

The West Pequop project is immediately adjacent to and contiguous with the Long Canyon project. West Pequop is controlled by a joint venture between AuEx and Agnico-Eagle Mines Limited. The West Pequop project, which is described in an NI 43-101 technical report (Moran, 2005), is relevant to the Long Canyon due to the presence of gold mineralization of potential economic interest, similar geochemical signature, and in similar host rocks and structural settings as at Long Canyon.

A number of public sections to the north and south of the Long Canyon Joint Venture area are controlled by a joint venture between Agnico-Eagle and Columbus Gold. Of note is Section 16, located immediately north of Section 21 in the Joint Venture AOI (Figure 4.2), which is on trend with mineralization at Long Canyon. Agnico-Eagle drilled three holes in the southern portion of Section 16 in late 2008, and reported low but anomalous gold values in a recent press release.

16.0 MINERAL PROCESSING AND METALLURGICAL TESTING

16.1 Summary

Metallurgical work completed or in progress includes testing of four surface bulk samples and 52 core composites from three NQ holes and 44 large diameter (PQ) core holes drilled on six widely-spaced lines in the southern two-thirds of the deposit in 2009. The core was composited on the basis of location, rock type, and assay ranges. Composites were submitted in two batches for metallurgical testing at McClelland Laboratories, Inc. ("McClelland"), with a report of results on the first batch scheduled to be finalized in May 2010. A large dataset of drill samples with fire assay and cyanide-soluble gold analyses is also available. Metallurgical work is being conducted under the supervision of consulting metallurgist Gary Simmons.

Data from the bulk-sampling program are summarized below, as well as the results from "Phase 1" of two phases of testing of the core samples.

Results from test data presently available suggest that Long Canyon mineralized material tested to date is amenable to extraction of gold by cyanidation via oxide milling or heap leaching methods. This conclusion is used to support the Mineral Resource cutoff grade.

16.2 Bulk Sampling Program

Four bulk samples of surficial mineralized material were collected in twenty 55-gallon drums from road cuts. These samples, representing both breccia and stratiform mineralization that is hosted in limestone and dolomite, were sent to McClelland for preliminary metallurgical testing in early 2009.

16.2.1 Head Assays

Sample splits from the four bulk samples were submitted to ALS Chemex for assay using conventional fire-assay fusion procedures to determine gold and silver content. Composite head samples were submitted for cyanide (CN) soluble gold, total sulfur (S), sulfide sulfur, arsenic, organic carbon (C), carbonate, mercury, ICP, and whole rock analyses. Select analyses are presented in Table 16.1.

Table 16.1 Head Assay Results on Long Canyon Bulk Samples

Bulk Sample #	Sample Description	Au (g/t)	AuCN (g/t)	AuCN Solubility[1] (%)	Ag (g/t)	S (total) (%)	C (organic) (%)
#1	**Cnpl(bx) -** Notch Peak Limestone (Breccia)	18.55	17.70	95.4	0.60	<0.01	0.07
#2	**Cnpl(bx) -** Notch Peak Limestone (Breccia)	2.42	2.36	97.5	0.12	<0.01	0.05
#3	**Cnpl -** Notch Peak Limestone (Stratiform)	14.80	14.50	98.0	0.14	<0.01	0.09
#4	**Opl -** Pogonip Limestone (Stratiform)	1.82	1.84	100.0	0.05	<0.01	0.06

1. AuCN Solubility = AuCN/Au, expressed as percent.

Based on data available as of the Effective Date of this report, the Long Canyon deposit can be generally characterized as:

1. highly oxidized, as exhibited by the absence of sulfur;
2. non preg-robbing, as exhibited by the very low levels of organic carbon;
3. having high gold cyanide solubility, as exhibited by the AuCN solubility percent values; and
4. very low in silver.

These general comments take into account additional information reviewed from the resource drill database, and therefore are not solely based upon data and results obtained from the four bulk samples. High gold cyanide solubility, low total sulfur, and low silver content are characteristic of the mineralization, in general, including samples analyzed from significant depths in the drill holes.

16.2.2 Bottle-Roll Tests

Direct agitated cyanidation (bottle roll) tests were conducted on the Long Canyon bulk samples at feed sizes of 80% -180 and -106-micron feed sizes to determine gold recovery, recovery rate, and reagent requirements. Sample charges were stage ground to the desired feed sizes using laboratory steel ball mills. Milled feeds were settled in grinding water to achieve 40 weight percent solids, and natural pulp pH was measured on each sample. Lime was added to adjust the pH of the pulps to between 10.5 and 11.0, and sodium cyanide, equivalent to 0.5 g NaCN/l of solution, was then added to the alkaline pulps. Leaching was conducted by rolling the pulps in bottles on the laboratory rolls for 72 hours. Overall metallurgical results from the direct agitated bottle roll tests are provided in Table 16.2 and Table 16.3. Corresponding gold leach-rate profiles are shown graphically in Figure 16.1 and Figure 16.2.

Table 16.2 Overall Bottle-Roll Test Results - Bulk Samples #1 and #2

Metallurgical Result	**Bulk Sample #1**		**Bulk Sample #2**	
	P_{80} = 180µm	**P_{80} = 106µm**	**P_{80} = 180µm**	**P_{80} = 106µm**
Extraction: % of total Au				
In 24 hours	81.1	87.9	89.0	92.0
In 36 hours	85.0	89.9	89.5	92.1
In 48 hours	88.8	91.7	90.9	93.0
In 72 hours	87.1	91.9	90.0	93.2
Calculated Head (g Au/t)	17.58	17.83	2.51	2.51
Assay Head (g Au/t)	18.55	18.55	2.42	2.42
NaCN Consumed (kg/t)	<0.07	<0.07	<0.07	<0.07
Lime Added (kg/t)	1.3	1.1	1.1	1.2

Figure 16.1 Bottle Roll Leach-Rate Profiles - Bulk Samples #1 and #2

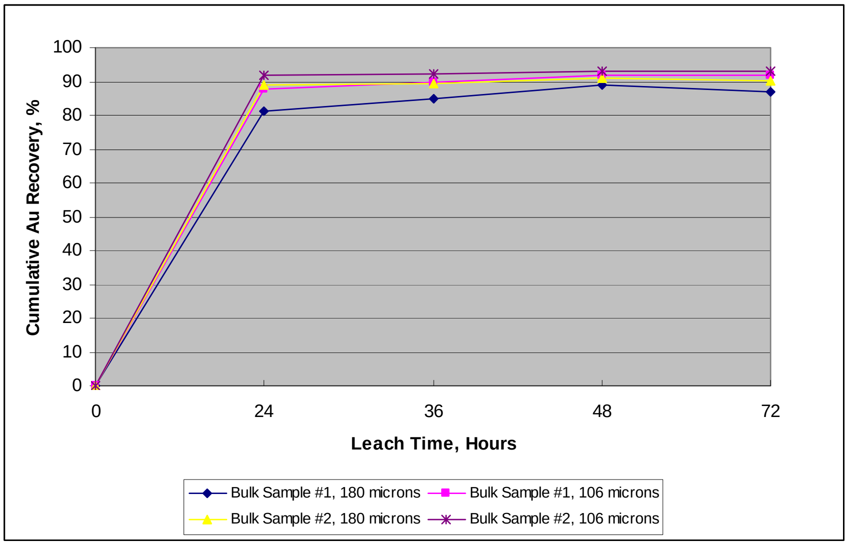
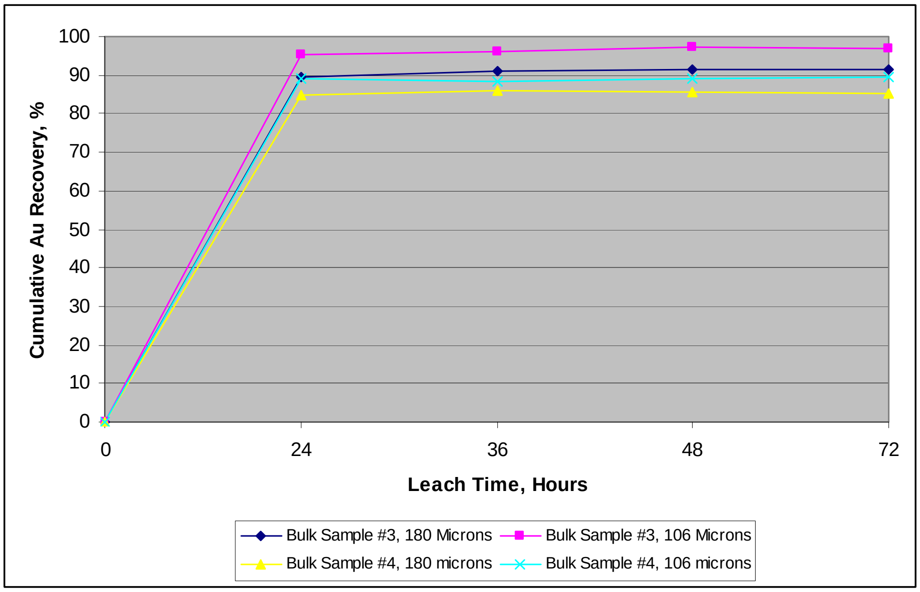


Table 16.3 Overall Bottle-Roll Test Results - Bulk Samples #3 and #4

Metallurgical Result	**Bulk Sample #3**		**Bulk Sample #4**	
	P_{80} = 180µm	**P_{80} = 106µm**	**P_{80} = 180µm**	**P_{80} = 106µm**
Extraction: % of total Au				
In 24 hours	89.4	95.2	84.8	89.0
In 36 hours	91.0	96.3	85.8	88.5
In 48 hours	91.4	97.1	85.7	89.1
In 72 hours	91.4	97.0	85.3	89.6
Calculated Head (g Au/t)	15.44	14.34	1.91	1.82
Assay Head (g Au/t)	14.80	14.80	1.82	1.82
NaCN Consumed (kg/t)	<0.07	<0.07	<0.07	<0.07
Lime Added (kg/t)	1.2	1.1	1.5	0.7

Figure 16.2 Bottle Roll Leach-Rate Profiles - Bulk Samples #3 and #4



Overall metallurgical results show that the Long Canyon bulk samples are readily amenable to direct agitated cyanidation treatment at the 80% -180 and -106-micron feed sizes. Gold recoveries obtained from the Long Canyon bulk samples at the -180-micron feeds range from 85.3% to 91.4%, and average 88.5%, in 72 hours of leaching. Gold recoveries obtained from the -106-micron feeds ranged from 89.6% to 97.0%, and averaged 92.9%, in 72 hours of leaching. Gold recovery rates were very rapid for all samples.

Cyanide consumptions were very low for all samples (<0.07 kg NaCN/t). Lime requirements were low, ranging from 0.7 kg/t to 1.5 kg/t.

16.2.3 Agglomerate Strength Testing

Prior to column-leach testing, agglomerate strength and stability tests were conducted on Bulk Sample #1 at the -25 millimetre feed size to optimize agglomerating conditions for the Long Canyon bulk samples. Bulk Sample #1 was selected as a "worst-case" sample for agglomeration testing, because it had higher fines content (22.9% -150 microns) than the other samples.

Agglomeration test results showed that, of the binder additions evaluated, addition of 3.0 kg/t of cement to Bulk Sample #1 was optimum for agglomeration; agglomerates produced using lower cement or lime additions lacked sufficient strength to bind the fines in the mineralized sample. All four bulk samples were agglomerated with 3.0 kg/t cement, as a precautionary measure, to insure that no complications with solution percolation or compaction would be encountered during column leaching.

Even though the bulk sample column-leach test program employed agglomeration ahead of column leaching, there is no indication that commercially mined mineralization at Long Canyon will require agglomeration pre-treatment. Preliminary results from the current column-leach program, on-going at

McClelland using large-diameter core, show that the fines content in the new column charges are much lower than for the surface bulk samples, and the columns are being loaded without any need for agglomeration.

16.2.4 Column Leach Testing

Column percolation-leach tests were conducted on the four surficial Long Canyon bulk samples at 100% -75 and -25-millimetre feed sizes to determine gold recovery, recovery rate, and reagent consumptions under simulated heap leaching conditions.

Column charges were agglomerated with 3.0 kg/t of cement. Leaching was conducted by applying cyanide solution (0.5 gNaCN/l) over the charges at a rate of 0.20 lpm/m^2 of column cross sectional area. Pregnant solutions were collected at 24-hour intervals, weighed, and assayed for gold and silver. Pregnant solutions were pumped through a three-stage carbon circuit for adsorption of precious metal values. Barren solutions, with appropriate make-up reagents, were recycled to the columns.

After leaching, fresh water rinsing was conducted to remove residual cyanide. Moisture required to saturate the column charges and retain moistures were determined. After rinsing, leached residues were air dried, blended, and split to obtain samples for triplicate tail assay.

Results of the column leach testing are summarized in Table 16.4, Table 16.5, Figure 16.3, and Figure 16.4.

Table 16.4 Overall Column Leach Test Results - Bulk Samples #1 and #2

Metallurgical Result	Bulk Sample #1		Bulk Sample #2	
	-75mm	-25mm	-75mm	-25mm
Extraction: % of total Au				
1st Effluent	10.3	2.0	18.9	5.8
In 5 days	76.3	84.3	75.4	86.0
In 10 days	86.2	87.5	84.7	88.4
In 15 days	87.7	87.9	86.2	88.8
In 20 days	88.4	88.1	87.2	89.1
In 30 days	89.1	88.3	88.0	89.3
In 40 days	89.2	88.5	88.2	89.4
In 50 days	89.2	88.6	88.2	89.6
In 60 days	89.4	88.6	88.4	89.6
End of Leach/Rinse	89.4	88.7	88.4	89.8
Calculated Head (g Au/t)	19.69	18.39	2.51	2.54
Assay Head (g Au/t)	18.55	18.55	2.42	2.42
NaCN Consumed (kg/t)	0.45	0.67	0.47	0.45
Cement Added (kg/t)	3.00	3.00	3.00	3.00
Leach/Rinse Cycle (days)	62	69	67	61

Figure 16.3 Column Leach-Rate Profiles - Bulk Samples #1 and #2

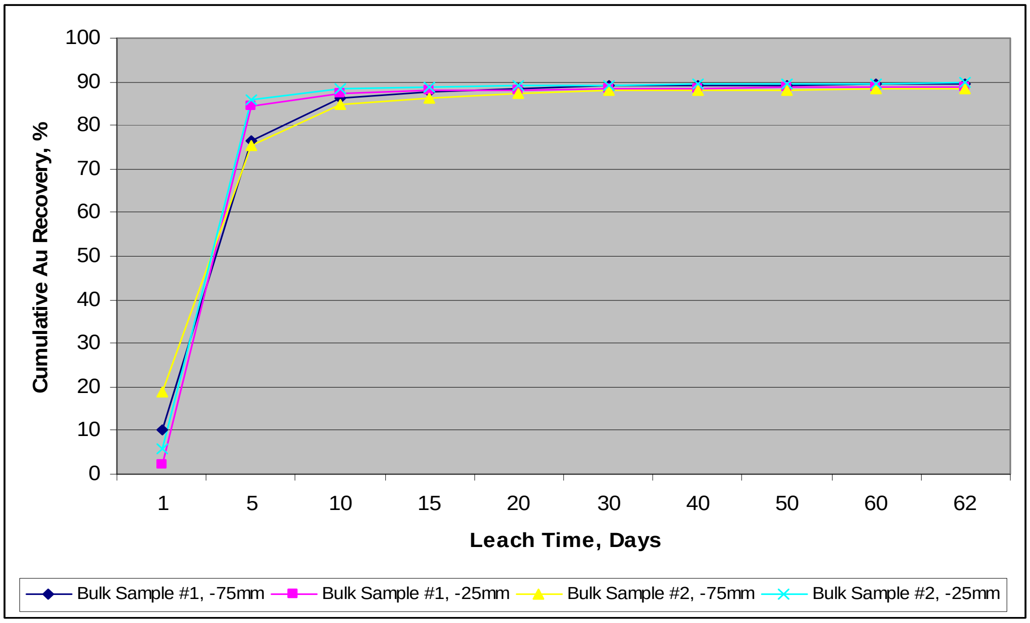
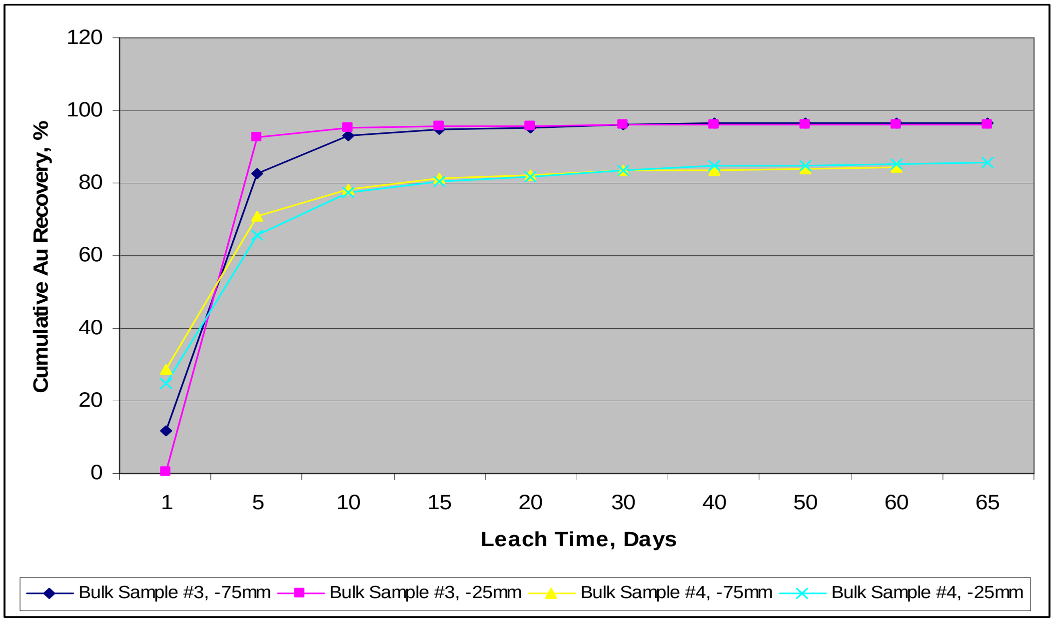


Table 16.5 Overall Column Leach Test Results - Bulk Samples #3 and #4

Metallurgical Result	Bulk Sample #3		Bulk Sample #4	
	-75mm	**-25mm**	**-75mm**	**-25mm**
Extraction: % of total Au				
1st Effluent	11.7	0.3	28.6	24.6
In 5 days	82.5	92.7	70.9	65.8
In 10 days	93.2	95.4	78.4	77.2
In 15 days	94.6	95.7	81.2	80.4
In 20 days	95.1	95.8	82.2	81.9
In 30 days	96.1	96.1	83.3	83.5
In 40 days	96.4	96.2	83.6	84.7
In 50 days	96.4	96.2	83.9	84.8
In 60 days	96.5	96.2	84.2	85.3
End of Leach/Rinse	96.6	96.3	84.2	85.6
Calculated Head (g Au/t)	14.87	13.25	2.03	2.02
Assay Head (g Au/t)	14.80	14.80	1.82	1.82
NaCN Consumed (kg/t)	0.40	0.59	0.25	0.48
Cement Added (kg/t)	3.00	3.00	3.00	3.00
Leach/Rinse Cycle (days)	65	69	60	69

Figure 16.4 Column Leach Rate Profiles - Bulk Samples #3 and #4



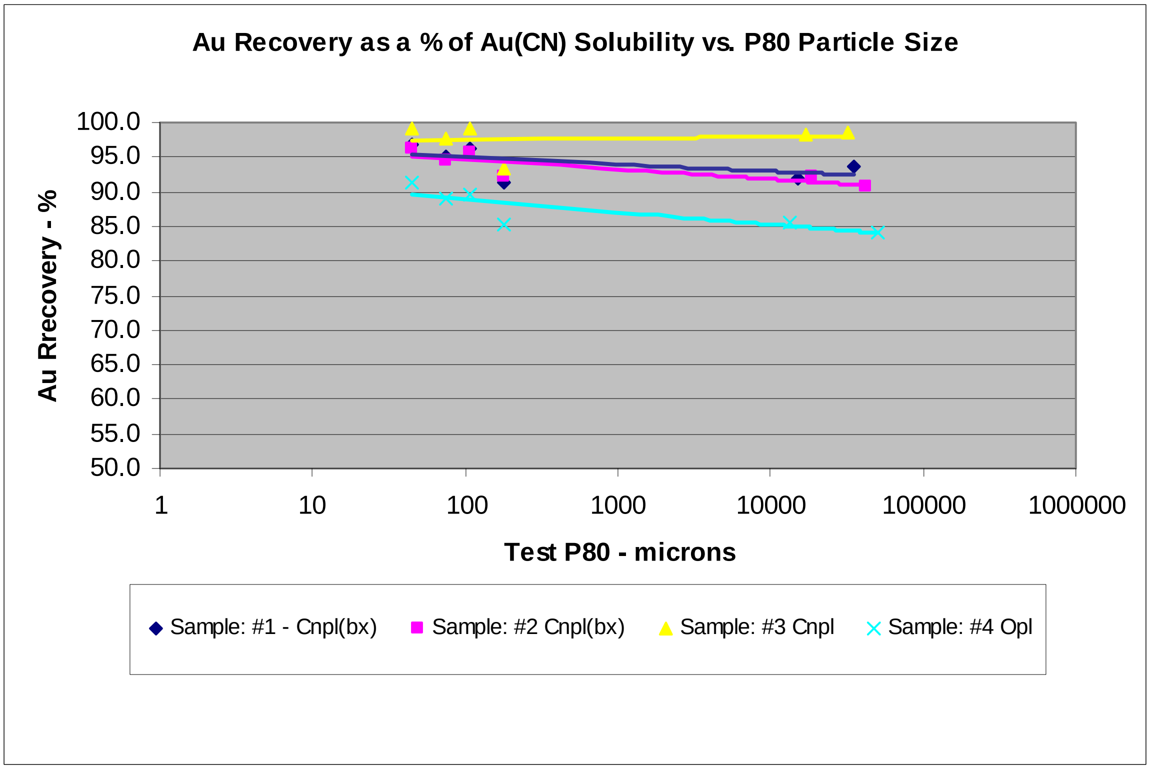
The Long Canyon bulk samples are amenable to simulated heap-leach cyanidation treatment at both feed sizes evaluated. Column test gold recoveries for the -75-millimetre feed size ranged from 84.2% to 96.6%, and averaged 89.7%, in approximately 65 days of leaching and rinsing. Column test gold recoveries for the -25-millimetre feed size ranged from 85.6% to 96.3%, and averaged 90.1%, in approximately 69 days of leaching and rinsing. Gold recovery rates for all samples were very rapid, and gold extraction was substantially complete in 10 to 15 days of leaching.

Cyanide consumptions were low. The average cyanide consumptions for the -75 and -25-millimetre feeds were 0.39 and 0.55 kg NaCN/t, respectively. Column-test cyanide consumptions are usually higher than experienced in commercial production. It is expected that commercial heap-leach cyanidation consumption for the mineralization types represented by the Long Canyon samples probably would not exceed 0.3 kg NaCN/t. The cement added during agglomeration (3.0 kg/t) was sufficient for maintaining protective alkalinity during leaching. No solution percolation, fines migration, or solution channeling problems were encountered during column leaching.

16.2.5 Gold Recovery Projections

Bottle roll and column-leach data are plotted to show gold recovery as a function of gold cyanide solubility percent and particle size in Figure 16.5.

Figure 16.5 Overall Column-Leach Gold Recovery Using all Bottle Roll and Column-Leach Data



Using these data, straight-line (logarithmic) projections can be made for gold recovery, as a percent of gold cyanide solubility taken from the resource database, using any particle size selected. Gold recovery formulae were developed for each sample type and recoveries were calculated based upon three potential processing options:

1. Milling at a particle size P_{80} = 200 mesh (74 microns)
2. Crushed heap leaching at a particle size P_{80} = 2 inch (50,000 microns)
3. Run-of-Mine (“ROM”) heap leaching at a particle size P_{80} = 6 inch (150,000 microns).

Gold recovery projections are presented in Table 16.6.

Table 16.6 Gold Recovery Projections as a Percent of Gold Cyanide Solubility

Sample #	Sample Description	P_{80} = 200 Mesh 74µ 72-hr leach (Au Recovery %)	P_{80} = -2 inch 50,000µ 69-day leach (Au Recovery %)	P_{80} = -6 inch 150,000µ 69-day leach (Au Recovery %)
#1	Cnpl(bx)	94.0	90	89
#2	Cnpl(bx)	96.4	95	94
#3	Cnpl	93.9	89	87
#4	Opl	88.1	82	80

Notes: 1 % soluble Au recovery loss assumed for 74 micron milling
2 % soluble Au recovery loss assumed for 50,000 micron crush/heap leach (LOM cycle)
3 % soluble Au recovery loss assumed for 150,000 ROM leaching (LOM cycle)

All known mineralization types are not represented by the four bulk samples taken by Fronteer, and therefore projecting recoveries into a larger resource tonnage and other potential types of mineralization than what is represented by the current test results should be considered at-risk until additional testing is completed. Due to the lack of data for all material types, a recovery of 88% for mineralization containing more than 1.25 g Au/t and 80% for material containing less than 1.25 g Au/t was recommended for use in the preliminary economic assessment. These recoveries are applied based on estimated fire-assay grades.

16.3 Phase 1 Metallurgical Testing From Drill Core Composites

16.3.1 Long Canyon Composites

A total of 19 barrels and 7 buckets of broken (-100 millimetre) half-split drill core samples from Fronteer's Long Canyon project were sent to McClelland for metallurgical testing. Testing parameters included:

1. Sample preparation, standard assays for gold, cyanide-soluble gold, and silver, as well as whole rock and ICP analyses;
2. Bottle roll testing at (80% passing) P_{80} = 37, 75 and 1700 microns;
3. Column leach testing at (80% passing) P_{80} = 12.5, 25 and 50 millimetre sizes;
4. Load permeability testing on 17 column-leach residue samples;
5. Flotation and gravity testing on four composite samples; and
6. Comminution testing on six selected composites.

The results of direct head assays on the 21 composites are shown in Table 16.7. Re-logged geology/alteration descriptions are provided in the tables throughout the report.

Table 16.7 Head Assay Results - Long Canyon Phase 1 Metallurgical Composites

			Head Grade				
Comp No.	**Zone/X-Section**	**Re-logged Geology**	**Au (g/t)**	**AuCN(g/t)**	**AuCN/Au (%)**	**Ag(g/t)**	**$S^{=}$ (%)**
Comp #1	WZ 11,150N	Cnpdz/I/w/(bx)	0.52	0.47	90.4%	1.3	0.02
Comp #2	WZ 11,150N	Cnplw(massive)/w/(bx)/onc+Lamp	0.46	0.41	89.1%	1.0	0.01
Comp #3	WZ 11,150N	Lamp	2.39	2.21	92.5%	1.0	0.01
Comp #4	WZ 11,150N	Cnplw(bx)/(jsp)+Lamp	8.06	7.72	95.8%	2.0	<.01
Comp #5	SZ 12,000N	Cnplw(massive)/w/(bx)	0.58	0.51	87.9%	1.3	0.01
Comp #6	SZ 12,000N	Cnpd(bx)/z	1.08	0.87	80.6%	1.0	0.02
Comp #7	SZ 12,000N	Cnplw(bx)/onc/w (Silicified)	3.88	3.41	87.9%	1.3	<.01
Comp #8	SZ 12,000N	Oplw(bx)/w	2.65	2.46	92.8%	1.3	0.01
Comp #9	SZ 12,000N	Cnplus+(bx)	4.61	4.36	94.6%	1.3	0.01
Comp #10	DZ 12,000N	Cnplonc/us/w/(bx)	0.75	0.63	84.0%	1.6	0.02
Comp #11	DZ 12,000N	Oplw(cavn)/(bx)/w/sm(bx)	0.54	0.47	87.0%	3.0	0.01
Comp #12	DZ 12,000N	Cnpd(bx)	0.23	0.20	87.0%	0.9	N/S
Comp #13	DZ 11,150N	Oplw(bx)/sm/sm(bx)	5.17	4.95	95.7%	1.0	0.01
Comp #14	DZ 11,150N	Cnplw(massive)/(jsp)/(bx)/onc/w	1.11	1.00	90.1%	1.0	<.01
Comp #15	DZ 11,150N	Cnplw(cavn)/onc/(jsp)/(bx)	2.84	2.63	92.6%	1.0	0.01
Comp #16	DZ 11,150N	Lamp+Cnplw/(jsp)	7.87	7.10	89.9%	1.4	N/S
Comp #17	DZ 11,150N	Cnplus/(bx)/onc+Lamp	8.43	8.01	95.0%	0.9	0.01
Comp #18	CZ 12,400N	Oplw/sm&(bx)+Opl&(bx)+Cnpdl	0.73	0.68	93.2%	0.9	0.02
Comp #19	CZ 12,400N	Oplsm&(bx)	4.25	4.07	95.8%	0.9	0.02
Comp #20	CZ 12,400N	Oplw&(bx)+Lamp+Oplsm	6.39	6.24	97.7%	0.9	0.02
Comp #21	CZ 12,400N	Cnpdl	1.26	1.21	96.0%	0.9	N/S

The head analysis show that the Long Canyon deposit can be characterized as having high gold cyanide solubility (AuCN/Au >80.6%), low silver grade, and very low sulfide sulfur content (<0.02%). Whole rock and ICP analyses were performed on all composites and these are provided in the body of the McClelland report.

16.3.2 Bottle Roll Test Procedures and Results

Direct agitated cyanidation bottle roll tests were conducted on 21 Long Canyon drill core composites at 80% passing 1.7 millimetres, 75 micron, and 37-micron feed sizes to determine gold recovery, recovery rate, reagent requirements, and sensitivity to feed size.

Milling cyanidation (75 and 37 micron) feeds were stage ground using a laboratory steel ball mill. Material charges were mixed with water to achieve 40% solids. Natural pHs were measured. Lime was added to adjust the pH of the pulps to between 10.5 and 11.0 before adding cyanide. Sodium cyanide, equivalent to 1.0 gram per liter of solution, was added to the alkaline pulps.

Leaching was conducted by rolling the pulps in bottles for 72 hours (75 and 37-micron samples) to 96 hours (1.7-millimetre samples). Rolling was briefly suspended after 2, 6, 24, 48, 72, and 96 hours to allow the pulps to settle so samples of pregnant solution could be measured and sampled. Cyanide concentration and pH were determined for each solution sample. Make-up water, equivalent to that withdrawn, was added to the pulps. Lime was added, when necessary, to maintain the leaching pH at between 10.5 and 11.0. Rolling was then resumed.

After 72 or 96 hours, the pulps were filtered to separate liquids and solids. Final pH and cyanide concentrations were determined. Leached residues were washed, dried, weighed, and assayed in triplicate to determine residual precious metal content. Overall metallurgical results from the bottle-roll test program are provided in Table 16.8, which is colour coded for easy referencing of low, medium, and high-grade composites.

Table 16.8 Phase 1 - Bottle Roll Test Results

				Bottle Rolls - Au Recovery %		
Comp. No.	Zone/x-Section	Re-logged Geology	Head Grade Au(gpt)	37 µ	75 µ	1700 µ
Comp #1	WZ 11,150N	Cnpdz/l/w/(bx)	0.52	93.0	90.9	81.0
Comp #2	WZ 11,150N	Cnplw(massive)/w/(bx)/onc+Lamp	0.46	89.7	88.1	82.0
Comp #3	WZ 11,150N	Lamp	2.39	92.9	92.5	89.2
Comp #4	WZ 11,150N	Cnplw(bx)/(jsp)+Lamp	8.06	93.2	92.6	89.9
Comp #5	SZ 12,000N	Cnplw(massive)/w/(bx)	0.58	83.6	80.0	68.5
Comp #6	SZ 12,000N	Cnpd(bx)/z	1.24	84.0	82.4	72.7
Comp #7	SZ 12,000N	Cnplw(bx)/onc/w (Silicified)	3.88	82.8	78.6	73.6
Comp #8	SZ 12,000N	Oplw(bx)/w	2.65	94.0	92.9	88.1
Comp #9	SZ 12,000N	Cnplus+(bx)	4.61	96.2	95.8	94.5
Comp #10	DZ 12,000N	Cnplonc/us/w/(bx)	0.75	90.3	90.3	89.0
Comp #11	DZ 12,000N	Oplw(cavn)/(bx)/w/sm(bx)	0.54	88.7	87.3	83.1
Comp #12	DZ 12,000N	Cnpd(bx)	0.23	81.0	81.0	60.9
Comp #13	DZ 11,150N	Oplw(bx)/sm/sm(bx)	5.17	94.3	92.5	91.0
Comp #14	DZ 11,150N	Cnplw(massive)/(jsp)/(bx)/onc/w	1.11	86.4	83.8	75.6
Comp #15	DZ 11,150N	Cnplw(cavn)/onc/(jsp)/(bx)	2.84	92.5	91.1	87.5
Comp #16	DZ 11,150N	Lamp+Cnplw/(jsp)	7.87	95.8	95.7	95.9
Comp #17	DZ 11,150N	Cnplus/(bx)/onc+Lamp	8.43	95.7	95.6	92.0
Comp #18	CZ 12,400N	Oplw/sm&(bx)+Opl&(bx)+Cnpdl	0.73	91.1	91.1	86.4
Comp #19	CZ 12,400N	Oplsm&(bx)	4.25	94.0	92.9	89.4
Comp #20	CZ 12,400N	Oplw&(bx)+Lamp+Oplsm	6.39	91.9	90.2	86.1
Comp #21	CZ 12,400N	Cnpdl	1.26	86.6	83.9	59.2

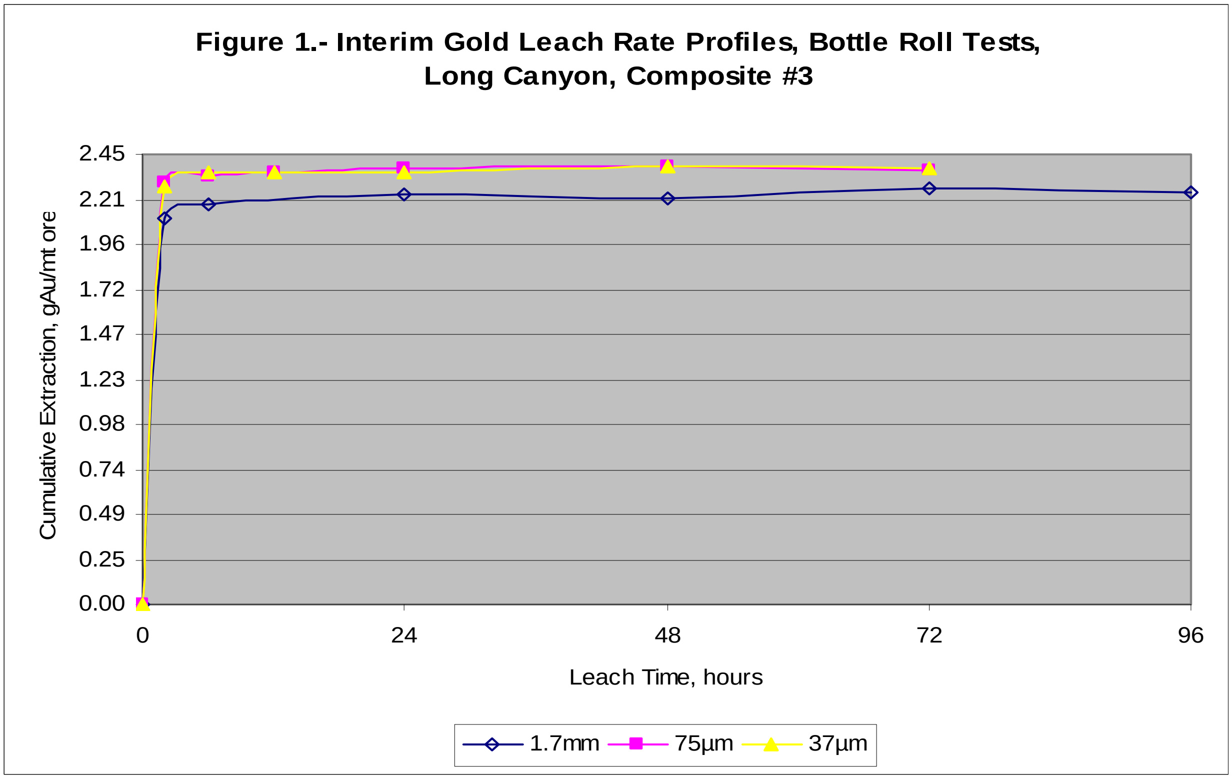
- Low Grade Samples (<1.26 g/t Au)
- Medium Grade Samples (>1.26, <5.0 g/t Au)
- High Grade Samples (>5.0 g/t Au)

WZ = West Zone, SZ = Shadow Zone
DZ = Discovery Zone, CZ = Crevasse Zone

Bottle roll cyanide consumptions were very low, ranging from <0.07 - 0.15 kg NaCN/t of solids. Lime consumptions were also low, ranging from 0.7 – 5.5 kg/t, with the higher consumptions being attributed to the 37-micron bottle roll samples.

Gold recovery kinetic rates were fast for all of the 75 and 37-micron bottle roll tests, with kinetic rates reaching a plateau by the six-hour sampling period. A typical medium gold grade kinetic-rate curve is provided for composite #3, in Figure 16.6.

Figure 16.6 Interim Gold Bottle-Roll Leach Rate Profiles - Composite #3



Gold recoveries varied from insensitive to mildly sensitive to particle size for the high-grade and medium-grade composites. Gold recovery for the low-grade composites varied from insensitive to highly sensitive to particle size. The highly sensitive low-grade composites are typically associated with Notch Peak Limestone (Cnpd) formation and/or those composites characterized as massive or siliceous in nature.

16.3.3 Column Leach Test Procedures and Results

Column percolation-leach tests were conducted on 18 of the 21 Long Canyon core composite samples at 80% passing 12.5 millimetres, five composites at 80% passing 25 millimetres, and seven of the 21 composites at 80% passing 50-millimetre feed sizes to determine gold recovery, recovery rate, and reagent requirements under simulated heap leach conditions.

Leaching was conducted by applying cyanide solutions (0.5 g NaCN/l) over the charges at a rate of 0.20 lpm/m^2 of column cross-sectional area. Pregnant solutions were collected each 24-hour period. Pregnant solution volumes were measured by weighing, and samples were taken for gold and silver analysis using conventional A.A. methods. Cyanide concentration and pH were determined for each pregnant solution sample. Pregnant solutions were pumped through a three-stage carbon circuit for adsorption of dissolved precious metal values. Barren solution, with appropriate make-up reagent, was applied to the column charges daily.

After leaching, freshwater rinsing was conducted to remove residual cyanide and to recover any remaining dissolved precious metals values. Moisture required to saturate the charges (in-process solution inventory) and retained moistures were determined. Apparent bulk densities were measured before and after leaching.

After leaching, rinsing, and draining, residues were removed from the columns and moisture samples immediately taken. Remaining residues were air dried, blended, and split to obtain samples for triplicate tail assay. Head and tail screen-assay results and recovery by size fraction data were tabulated for each column charge.

Overall metallurgical balance summaries are provided in Table 16.9. The average gold head grade, reported in Table 16.9 is the average of all calculated heads (if more than one column leach test was performed) from column tests performed on each respective composite.

Table 16.9 Column Leach Tests Results

			Column Leach - Au Recovery %			
Comp. No.	**Zone/x-Section**	**Re-logged Geology**	**Avg Head Grade Au(gpt)**	**Nominal P80=12.5 mm**	**Nominal P80=25 mm**	**Nominal P80=50 mm**
Comp #1	WZ 11,150N	Cnpdz/l/w/(bx)	0.55	75.9	76.8	N/S
Comp #2	WZ 11,150N	Cnplw(massive)/w/(bx)/onc+Lamp	0.63	77.6	N/S	61.0
Comp #3	WZ 11,150N	Lamp	2.60	89.2	N/S	N/S
Comp #4	WZ 11,150N	Cnplw(bx)/(jsp)+Lamp	7.08	87.3	N/S	N/S
Comp #5	SZ 12,000N	Cnplw(massive)/w/(bx)	0.60	64.7	N/S	51.0
Comp #6	SZ 12,000N	Cnpd(bx)/z	1.25	65.6	N/S	N/S
Comp #7	SZ 12,000N	Cnplw(bx)/onc/w (Silicified)	3.59	69.6	N/S	62.5
Comp #8	SZ 12,000N	Oplw(bx)/w	2.77	82.3	N/S	N/S
Comp #9	SZ 12,000N	Cnplus+(bx)	6.58	93.6	93.4	N/S
Comp #10	DZ 12,000N	Cnplonc/us/w/(bx)	0.83	89.2	N/S	N/S
Comp #11	DZ 12,000N	Oplw(cavn)/(bx)/w/sm(bx)	0.77	78.2	78.7	N/S
Comp #12	DZ 12,000N	Cnpd(bx)	N/S	N/S	N/S	N/S
Comp #13	DZ 11,150N	Oplw(bx)/sm/sm(bx)	4.94	89.5	N/S	88.9
Comp #14	DZ 11,150N	Cnplw(massive)/(jsp)/(bx)/onc/w	0.92	70.8	N/S	67.0
Comp #15	DZ 11,150N	Cnplw(cavn)/onc/(jsp)/(bx)	3.22	83.9	N/S	82.0
Comp #16	DZ 11,150N	Lamp+Cnplw/(jsp)	N/S	N/S	N/S	N/S
Comp #17	DZ 11,150N	Cnplus/(bx)/onc+Lamp	12.08	95.2	N/S	N/S
Comp #18	CZ 12,400N	Oplw/sm&(bx)+Opl&(bx)+Cnpdl	0.76	78.6	N/S	74.1
Comp #19	CZ 12,400N	Oplsm&(bx)	4.67	85.4	86.3	N/S
Comp #20	CZ 12,400N	Oplw&(bx)+Lamp+Oplsm	6.78	81.9	80.2	N/S
Comp #21	CZ 12,400N	Cnpdl	N/S	N/S	N/S	N/S

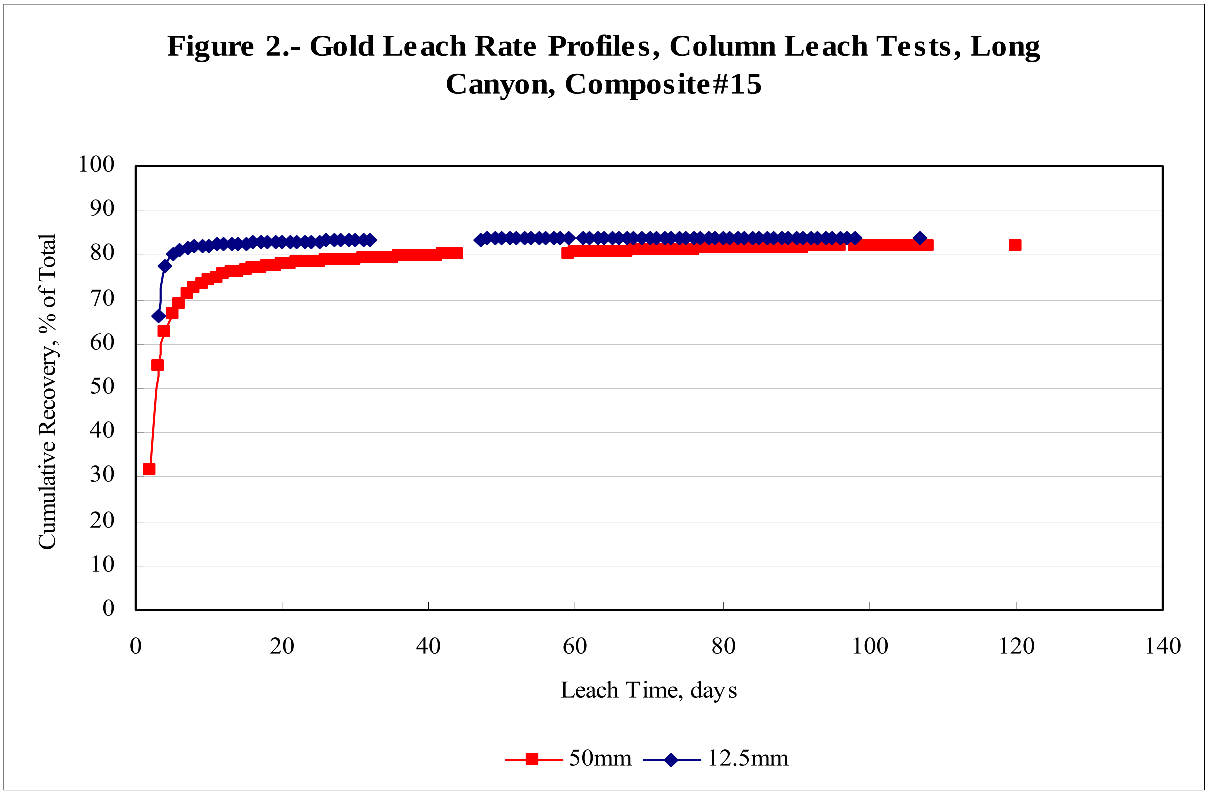
- Low Grade Samples (<1.26 g/t Au)
- Medium Grade Samples (>1.26, <5.0 g/t Au)
- High Grade Samples (>5.0 g/t Au)

WZ = West Zone, SZ = Shadow Zone
DZ = Discovery Zone, CZ = Crevasse Zone

The Long Canyon core samples are amenable to simulated heap-leach cyanidation treatment at all feed sizes evaluated. Column leach gold recoveries for the 80% passing 50-millimetre feed size ranged from 51.0 to 88.9%, for the 80% passing 25-millimetre feed size gold recoveries ranged from 76.8 to 93.4%, and for the 80% passing 12.5-millimetre feed size gold recoveries ranged from 64.7 to 95.2%

Column leach kinetics for gold was fast for the overwhelming majority of samples tested. Time under leach varied from approximately 50 to 100 days, including a complete rinse/drain down cycle. The majority of gold leaching (>80% leachable gold) occurred within a 10 to 40 day period, with the coarser columns typically taking a little longer than the finer crushed columns. A typical, medium gold grade (3.22 g/t) leach kinetic curve is provided for composite #15 in Figure 16.7.

Figure 16.7 Gold Column Leach Rate Profiles - Composite #5



Cyanide consumptions were modest. The average cyanide consumption for the 80% passing 50-millimetre columns ranged from 0.27 - 0.88 kg NaCN/t, the 80% passing 25-millimetre columns ranged from 0.20 – 0.73 kg NaCN/t, and the 80% passing 12.5-millimetre columns ranged from 0.38 - 1.7 kg NaCN/t. Commercial-scale cyanide consumptions are typically expected to be in the range of one-half of the laboratory column-leach consumptions.

Lime additions were low. The lime addition was the same for all the 80% passing 50-millimetre columns at 1.0 kg $Ca(OH)_2$/t, for the 80% passing 25-millimetre columns lime addition ranged from 1.0 – 1.5 kg $Ca(OH)_2$/t, and for the 80% passing 12.5-millimetre columns lime addition ranged from 1.0 – 1.5 kg $Ca(OH)_2$/t. Commercial-scale lime additions are expected to be similar to laboratory requirements.

No cement additions, binders, or agglomeration techniques were used in the column test program. No fines migration was observed and none of the columns experienced any plugging.

Due to the low silver grades of the Long Canyon composites, silver recoveries are not reported for the bottle roll and column leach tests.

16.3.4 Hydraulic Conductivity Testing Results

Samples were transported from McClelland's Lab in Reno, Nevada to AMEC Earth & Environmental, Inc. in Reno for hydraulic conductivity testing on the 80% passing 12.5-millimetre column leach residues from composites 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 19 and 20, in order to measure hydraulic conductivity rates under imposed (simulated) progressive heap loading heights of 0, 20, 40, 60, 80 and 100 metres. Hydraulic conductivity measurements for each simulated heap loading height are summarized in Table 16.10.

Table 16.10 Load Permeability Test Results

Table 3. Load Permeability Test Results, Long Canyon Project

	Met	Hydraulic Conductivity (cm/sec) at Load					
Column ID	**Compoiste**	**0 m**	**20 m**	**40 m**	**60 m**	**80 m**	**100 m**
P10	#1	1.90 * 10-1	1.65 * 10-1	1.44 * 10-1	1.38 * 10-1	1.31 * 10-1	1.29 * 10-1
P11	#2	1.52 * 10-1	1.36 * 10-1	1.24 * 10-1	1.20 * 10-1	1.14 * 10-1	1.13 * 10-1
P13	#4	9.52 * 10-2	5.75 * 10-2	5.71 * 10-2	5.00 * 10-2	4.24 * 10-2	3.45 * 10-2
P14	#5	1.63 * 10-1	1.43 * 10-1	1.38 * 10-1	1.31 * 10-1	1.21 * 10-1	1.20 * 10-1
P15	#6	1.18 * 10-1	9.81 * 10-2	9.48 * 10-2	9.46 * 10-2	9.06 * 10-2	9.04 * 10-2
P16	#7	8.54 * 10-2	6.68 * 10-2	6.24 * 10-2	5.62 * 10-2	5.27 * 10-2	5.06 * 10-2
P17	#8	1.02 * 10-1	8.36 * 10-2	7.84 * 10-2	7.25 * 10-2	7.01 * 10-2	6.85 * 10-2
P18	#9	9.24 * 10-2	7.08 * 10-2	5.98 * 10-2	5.89 * 10-2	4.95 * 10-2	4.35 * 10-2
P19	#10	1.42 * 10-1	1.25 * 10-1	1.18 * 10-1	1.14 * 10-1	1.09 * 10-1	1.09 * 10-1
P20	#11	1.59 * 10-1	1.43 * 10-1	1.29 * 10-1	1.24 * 10-1	1.17 * 10-1	1.16 * 10-1
P21	#13	8.19 * 10-2	6.51 * 10-2	5.82 * 10-2	5.25 * 10-2	4.09 * 10-2	4.08 * 10-2
P22	#14	1.20 * 10-1	1.05 * 10-1	9.31 * 10-2	9.07 * 10-2	8.60 * 10-2	8.56 * 10-2
P23	#15	7.74 * 10-2	6.51 * 10-2	6.01 * 10-2	5.26 * 10-2	4.61 * 10-2	4.58 * 10-2
P24	#17	1.03 * 10-1	8.04 * 10-2	7.26 * 10-2	6.49 * 10-2	5.84 * 10-2	5.39 * 10-2
P25	#18	6.13 * 10-2	4.95 * 10-2	4.66 * 10-2	4.27 * 10-2	3.84 * 10-2	3.29 * 10-2
P26	#19	1.57 * 10-1	1.33 * 10-1	1.25 * 10-1	1.16 * 10-1	1.09 * 10-1	1.06 * 10-1
P27	#20	1.07 * 10-1	8.57 * 10-2	8.33 * 10-2	7.85 * 10-2	7.38 * 10-2	7.26 * 10-2

Hydraulic conductivity measurements ranged from 1.02 x 10-1 to 9.81 x 10-2 cm/sec. Laboratory (and typical commercial) heap percolation rates of 0.20 lpm/m^2 equates to a hydraulic conductivity of 3.4 x 10-4 cm/sec (two orders of magnitude lower than the lowest hydraulic conductivity measurement by AMEX), indicating that no solution-flow problems are anticipated for simulated heap loading heights up to 100 metres for any of the composites tested.

16.3.5 Flotation Testing Test Procedures and Results

Bulk sulfide flotation tests were conducted on three Long Canyon high-grade composites (composite #4, #17, and #20) and one mid-grade composite (composite #7) at 80% passing 75-micron feed size to determine the response of the Long Canyon mineralization to concentration by conventional flotation methods.

Flotation feeds were ground using a laboratory steel ball mill to 80% passing 75 microns. Flotation was conducted using a Denver laboratory flotation machine at 1,200 rpm. Each sample was slurried with water to 30% solids and was conditioned for 10 minutes with 0.25 kg $CuSO_4$/t of solids. Flotation was conducted in five stages, with incremental additions of 0.005 kg/t of solids of potassium amyl xanthate (PAX) collector and AERO 208 promoter. Total addition of each reagent was 0.025 kg/t. AEROFROTH 65 was used as the frothing agent. The pulps were floated at natural pH. The five stages of concentrate were combined into a single rougher concentrate for cleaning. Rougher concentrate was cleaned one time to produce a cleaner concentrate and cleaner tail. No additional reagent was added during cleaner flotation. The cleaner concentrate products were dried, weighed, examined under a microscope, and assayed in entirety to determine precious metal content. The flotation rougher tailings were dried, weighed, and assayed in triplicate to determine residual precious metal content.

Overall metallurgical results for the flotation tests are provided in Table 16.11.

Table 16.11 Flotation Concentration Test Results

Comp ID	Flotation Product	Wt (%)	Cum Wt (%)	Assay (g/t)		Au Distribution (%)	
Comp #4	Cl. Conc.	2.6	2.6	47.0	1	16	16
	Cl. Tail	5.1	7.7	29.5	7	19.8	35.8
	Ro. Tail	92.3	100.0	5.30	2	64.2	100.0
Comp #7	Cl. Conc.	0.5	0.5	95.0	<1	12.8	12.8
	Cl. Tail	1.5	2.0	46.9	9	19.0	31.8
	Ro. Tail	98.0	100.0	2.58	1	68.2	100.0
Comp #17	Cl. Conc.	0.5	0.5	396.0	13	24.1	24.1
	Cl. Tail	1.3	1.8	181.5	5	28.7	52.8
	Ro. Tail	98.2	100.0	3.95	1	47.2	100.0
Comp #20	Cl. Conc.	0.6	0.6	222.0	1	21.5	21.5
	Cl. Tail	2.1	2.7	95.7	<5	32.5	54.0
	Ro. Tail	97.3	100.0	2.92	1	46.0	100.0

None of the Long Canyon composites responded favorably to flotation testing. Gold distribution into the first cleaner concentrate was poor for all samples tested and can be attributed to the totally oxidized nature of the composites and lack of any significant elemental gold (see gravity test results below). No follow-up flotation work is planned.

16.3.6 Gravity Testing Procedures and Results

Gravity concentration tests were conducted on three Long Canyon high-grade composites (composite #4, #17, and #20) and one mid-grade composite (composite #7) at an 80% passing 212-micron feed size to determine the response of the Long Canyon mineralization to concentration by gravity methods.

Each charge (~10 kg) was ground using a laboratory steel ball mill to 80% passing 212 microns in size. Rougher gravity concentration was conducted by passing each milled feed through a Knelson (KC-MD3) centrifugal gravity concentrator. The resulting rougher concentrate was cleaned by hand panning to produce a gravity concentrate and cleaner tailings. The gravity concentrate products were dried, weighed, and assayed in entirety to determine precious metal content. The gravity rougher tailings were dried, weighed, and assayed in triplicate to determine residual precious metal content.

Overall metallurgical results for the gravity concentration tests are provided in Table 16.12.

Table 16.12 Gravity Concentration Test Results

Comp ID	Gravity Product	Wt (%)	Cum Wt (%)	Assay (g/t)		Au Distribution (%)	
Comp #4	Cl. Conc.	0.1	0.1	25.0	49	0.3	0.3
	Cl. Tail	0.7	0.8	5.17	9	0.5	0.8
	Ro. Tail	99.2	100.0	7.47	3	99.2	100.0
Comp #7	Cl. Conc.	0.1	0.1	3.00	<1	0.1	0.1
	Cl. Tail	0.7	0.8	3.27	<5	0.8	0.9
	Ro. Tail	99.2	100.0	2.82	1	99.1	100.0
Comp #17	Cl. Conc.	0.1	0.1	9.00	<1	0.1	0.1
	Cl. Tail	0.7	0.8	5.13	<5	0.4	0.5
	Ro. Tail	99.2	100.0	8.20	1	99.5	100.0
Comp #20	Cl. Conc.	0.5	0.5	5.00	<1	0.4	0.4
	Cl. Tail	10.2	10.7	3.63	<5	6.6	7.0
	Ro. Tail	89.3	100.0	5.87	1	93.0	100.0

The Long Canyon composites did not respond well to concentration using conventional gravity concentration methods. First gravity cleaner concentrates contained less than 1% of the total gold contained in the feed. No follow up gravity concentration testing is planned.

16.3.7 Comminution Testing Results

Six Long Canyon metallurgical composites were sent to Hazen Research, Inc. in Golden, Colorado ("Hazen") and were received on September 28, 2009. The six composite were given Hazen HRI numbers for comminution testing. The Hazen HRI and McClelland metallurgical composite correlation is given in Table 16.13.

Table 16.13 Sample Identification

Hazen HRI No.	McClelland ID
52262-1	3367 Composite #3
52262-2	3367 Composite #6
52262-3	3367 Composite #7
52262-4	3367 Composite #13
52262-5	3367 Composite #15
52262-6	3367 Composite #20

The six composites were subjected to semi-autogenous ("SAG") mill comminution ("SMC"), Bond ball mill work index ("BWi"), and Bond abrasion index ("Ai") testing.

The SMC test was developed by SMC Testing Pty Ltd ("SMCT") to provide a cost-effective means of obtaining drop-weight parameters form drill core samples, as well as in situations where limited quantities of material are available. The results of the evaluations were sent to SMCT to determine the JKSimMet parameters using their database. Table 16.14 is a summary of the parameters determined by SMCT from results of the SMC evaluation on the samples.

Table 16.14 Summary of SMC Breakage Evaluations

Parameter	Hazen HRI No. and Test Parameter Value					
	52262-1	52262-2	52262-3	52262-4	52262-5	52262-6
sg (by weighing in water & air)	2.62	2.63	2.66	2.62	2.65	2.64
SMCT Parameters						
A (maximum breakage)	58.8	69.1	68.2	61.0	63.1	71.2
b (relation between energy and impact breakage	1.28	1.20	0.95	1.06	1.02	0.68
A x b (overall AG-SAG Hardness)	75.26	82.92	64.79	64.66	64.36	48.42
DWi, kWh/m^3	3.47	3.16	4.11	4.05	4.11	5.46
DWi, %	21	18	28	28	29	47
M_{ia}, kWh/t	11.9	10.9	13.4	13.4	13.4	16.9
M_{ih}, kWh/t	7.7	7.0	9.0	9.0	9.0	12.0
M_{ic}, kWh/t	4.0	3.6	4.6	4.6	4.6	6.2
t_a	0.75	0.82	0.63	0.64	0.63	0.47

The A x b (overall AG-SAG Hardness) numbers, ranging from 48.42 – 82.92, are considered to be modest and do not indicate any problems for consideration of using conventional SAG and SAG/Ball milling circuit designs.

The Bond Ball Mill Work Index (BWi) and Bond Abrasion Index (Ai) results are summarized in Table 16.15. The complete test data sheets are appended in Hazen's independent report.

Table 16.15 Summary of BWi and Ai Results

Hazen HRI No.	BWi, kWh/t	Ai, g
52262-1	7.2	0.0029
52262-2	8.3	0.0657
52262-3	7.6	0.0180
52262-4	10.4	0.0452
52262-5	9.7	0.0302
52262-6	9.5	0.0455

The Bond Ball Mill Work Index (BWi) and Bond Abrasion Index (Ai) numbers are in the lower spectrum for hardness and abrasion, as compared to the majority of gold milling operations, processing whole rock material, around the world. Low energy input and low materials wear rates are expected if a mill is needed for processing all or a portion of the Long Canyon resource.

17.0 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

17.1 Introduction

Mineral resources described in this report for the Long Canyon project have been estimated in accordance with standards adopted by the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") in August 2000, as amended, and prescribed by Canadian Securities Administrators' NI 43-101 ("NI 43-101"). The modeling and estimate of the mineral resources were done under the supervision of Michael M. Gustin, a qualified person with respect to Mineral Resource estimation under NI 43-101. Mr. Gustin is independent of Fronteer and AuEx by the definitions and criteria set forth in NI 43-101; there is no affiliation between Mr. Gustin and Fronteer and AuEx except that of an independent consultant/client relationship. There are no Mineral Reserves estimated for the Long Canyon project as of the date of this report. The Long Canyon resources were modeled, estimated, and classified in March through early May of 2010.

Although MDA is not an expert with respect to any of the following aspects of the project, MDA is not aware of any unusual environmental, permitting, legal, title, taxation, socio-economic, marketing, or political factors that may materially affect the Long Canyon mineral resources as of the date of this report.

The mineral resources presented in this report for the Long Canyon project conform to the definitions adopted by the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") in December 2000 and modified in 2005, and meet the criteria of those definitions, where:

> *A Mineral Resource is a concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.*
>
> *Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.*
>
> *An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques for locations such as outcrops, trenches, pits, workings and drill holes.*
>
> *Due to the uncertainty that may be attached to Inferred Mineral Resources, it cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration.*

An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.

17.2 Resource Modeling

17.2.1 Data

A model was created for estimating the gold resources at Long Canyon from data generated by Pittston, AuEx, and the Fronteer-AuEx Joint Venture through 2009, including geologic mapping, core and RC drill data, and project topography derived from 2007 IntraSearch, Inc. aerial photography and DEM data. These data were incorporated into a digital database using UTM Zone 11 coordinates with NAD83 datum expressed in metres, and all subsequent modeling of the Long Canyon resource was performed using Gemcom Surpac® mining software.

17.2.2 Deposit Geology Pertinent to Resource Modeling

The Long Canyon gold mineralization occurs primarily as stratiform mineralization within silty and/or thinly bedded limestone units and as solution breccia-hosted mineralization within massive units in the lowermost Pogonip Group and the uppermost Notch Peak limestone at their contacts with dolomite mega-boudins at the top of the Notch Peak Formation. Gold mineralization is especially prevalent along the noses of the boudins or within and adjacent to incipient, boudin-forming breaks in the dolomite. The structural contact of the Pogonip and Notch Peak limestone units between the mega-boudins (boudin neck areas, where the dolomite is absent) is also a favourable horizon for mineralization. Higher-grade gold mineralization occurs primarily within highly decalcified limestone and/or solution breccias that most commonly are associated with the noses of the boudins or the incipient boudin-forming breaks. Moderate to low-angle, northwest-dipping normal faults located in boudin neck areas also appear to localize mineralization.

17.2.3 Geologic and Oxidation Modeling

Fronteer provided MDA with (1) a computer-generated three-dimensional solid of the dolomite unit within the uppermost Notch Peak Formation; (2) computer-generated surfaces representing a number of fault structures; and (3) sectional interpretations of a number of units, including the basal unit in the Pogonip Group (Oplw), the oncolitic unit (Cnplonc) and upper siltstone unit (Cnplus) in the Notch Peak Limestone, and interpreted areas of dolomite alteration. These solids, surfaces, and sectional interpretations were defined using data from geologic logging of the drill holes as well as detailed surface mapping.

The entire drilled extent of the Long Canyon mineral resources is oxidized; only very local occurrences of partially oxidized pyrite have been noted in the drill samples. No explicit modeling of oxidation was therefore warranted.

17.2.4 Density

MDA examined the data derived from 829 dry bulk specific gravity ("SG") determinations completed on core samples submitted to AAL and Chemex. Samples were taken from all types of mineralized rocks, including stratiform mineralization, breccias, jasperoids, and intrusions, as well as unmineralized limestone and dolomite above and below the mineralized zones. Twenty-three of the samples selected for SG determination consisted of pieces of half core at least 25 centimetres in length, while the remainder of the samples consisted of whole pieces of core at least 10 centimetres in length. AAL and Chemex coated the samples with wax where appropriate and determined the specific gravity by the water displacement method.

Descriptive statistics of the specific-gravity dataset were compiled for the major rock units, as well as by the gold mineral domains defined by MDA (discussed below). MDA then chose to assign unique specific-gravity values to each of the three mineral domains, as well as unmineralized Pogonip Group, the dolomite unit within the uppermost Notch Peak Formation and dolomite alteration, the remaining undifferentiated Notch Peak Formation, and alluvium. These values are listed in the "Model SG" column of Table 17.1.

Table 17.1 Long Canyon Bulk Specific Gravity Data

Type	Mean	Median	Min	Max	Count	Model SG
Mineral Domain 100	2.59	2.63	1.91	2.82	84	2.60
Mineral Domain 200	2.50	2.55	1.96	2.72	36	2.50
Mineral Domain 300	2.46	2.48	2.09	2.83	47	2.45
Pogonip Limestone	2.66	2.67	1.94	3.03	162	2.65
Notch Peak Dolomite/Dolomitized Limestone	2.79	2.81	2.26	2.93	180	2.80
Notch Peak Limestone	2.69	2.7	2.37	2.8	190	2.70
Alluvium	-	-	-	-	-	1.80

17.2.5 Gold Modeling

The mineral resources at Long Canyon were modeled and estimated by evaluating the drill data statistically, utilizing the dolomite solid, sectional lithologic interpretations, and fault surfaces provided by Fronteer to interpret mineral domains on cross sections spaced at 50-metre intervals, rectifying the mineral domain interpretations on cross sections spaced at 10-metre intervals, analyzing the modeled mineralization geostatistically to aid in the establishment of estimation parameters, and estimating grades into a three-dimensional block model. All modeling of the Long Canyon resources was performed using Gemcom Surpac® mining software.

Mineral Domains. MDA modeled the Long Canyon gold mineralization by interpreting mineral-domain polygons on northeast-looking cross sections that span the extents of the deposit. A mineral domain is a natural grade population of a metal that occurs in a specific geologic environment. In order to define the mineral domains at Long Canyon, the natural populations were identified on quantile graphs that plot the gold-grade distributions of the drill-hole assays. This analysis led to the identification of low-, medium-, and high-grade gold populations with approximate grade ranges of ~0.15 to ~1.5, ~1.5 to 3.5, and >~3.5 g Au/t (domain 100, 200 and 300, respectively). Ideally, each of these populations can be correlated with specific geologic characteristics that are captured in the project database to define the mineral domains.

At Long Canyon, the high-grade domain (domain 300) occurs primarily within hematitic, highly decalcified units and solution breccias developed in limestones of the lower Pogonip Group and upper Notch Peak Formation along the dolomite contacts, typically around the nose of the mega-boudins or associated with incipient boudin-forming breaks. The higher-grade mineralization tends to have limited cross-sectional extents, on the order of a few metres to a few tens of metres, but can extend for hundreds of metres in northeasterly or northerly directions that have shallow plunges. Lesser amounts of the domain 300 mineralization occur within highly decalcified stratigraphic and/or structural horizons, especially within the necks of the dolomite boudins. It is important to note that the solution breccias are often difficult to recognize in the RC drill chips, and therefore are largely defined by core drill holes and are inferred in many instances in the RC drill data. The solution-breccia geology is coupled with the high-grade gold population to define mineral domain 300.

The medium-grade mineral domain (domain 200) typically envelopes high-grade domain 300 mineralization or extends outwards from it. This domain includes less permeable portions of the solution breccia, where matrix-dominated breccia that often hosts higher-grade mineralization grades into crackle breccia along the walls of the karstic structures, and mineralization associated with less intensely decalcified limestone that is typical of domain 300. Lower-grade domain 100 occurs as disseminated mineralization within less intensely decalcified units that encompass and extend outwards from the higher-grade mineral domains. Domain 100 mineralization also pervades favourable stratigraphic horizons within the limestone units.

A total of 48 vertical N40˚E-looking cross sections spaced at 50-metre intervals across the deposit were used for the initial modeling of the Long Canyon mineral domains. The drill-hole traces, topographic profile, slices of the Fronteer dolomite solid and fault surfaces, and the Fronteer sectional lithologic interpretations were plotted on the sections, with gold assays (coloured by the grade domain population ranges defined above) and various geologic codes plotted along the drill-hole traces, including hematite percentage, breccia types, and degree of decalcification. These data, in addition to the results from surface sampling (including detailed channel sampling of project drill roads), were used as the base for MDA's interpretations of the mineral domains. Mineral-domain envelopes were interpreted on the sections to more-or-less capture assays corresponding approximately to each of the defined grade populations in combination with available and reasonably assumed geologic criteria. Representative cross sections showing gold mineral-domain interpretations are shown in Figure 17.1, Figure 17.1, and Figure 17.3.

Figure 17.1 Cross Section 10950 Showing Gold Mineral Domains

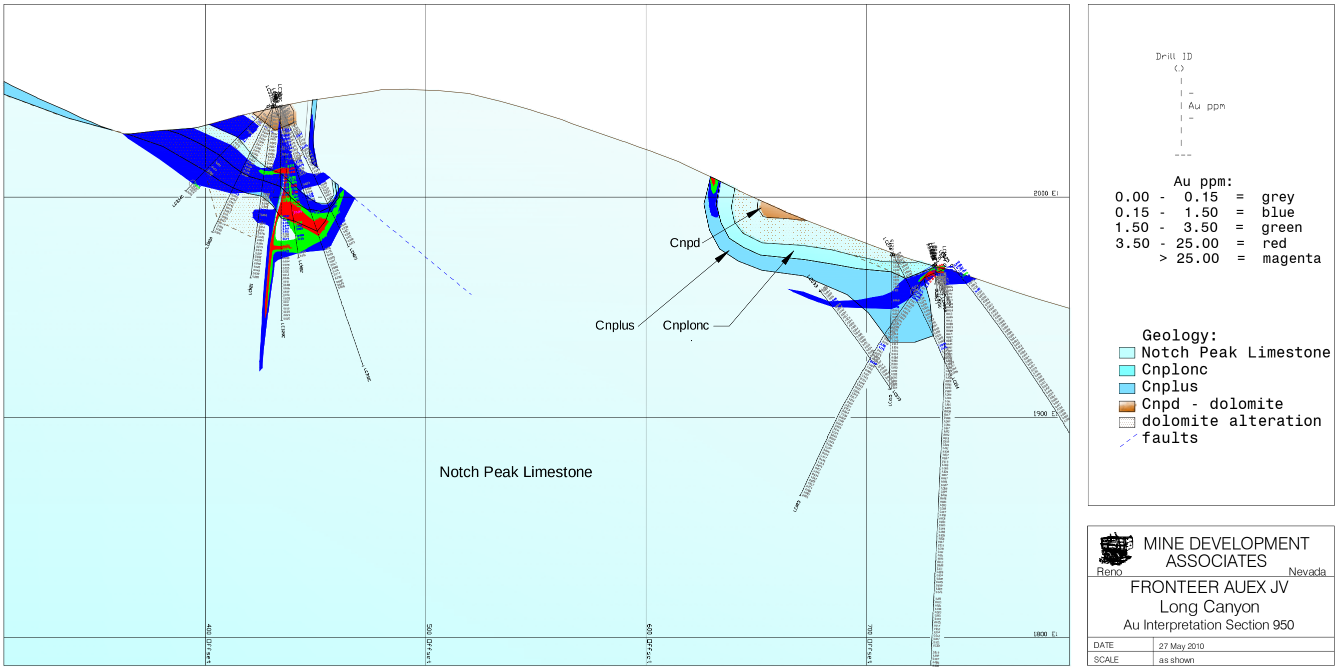


Figure 17.2 Cross Section 11700 Showing Gold Mineral Domains

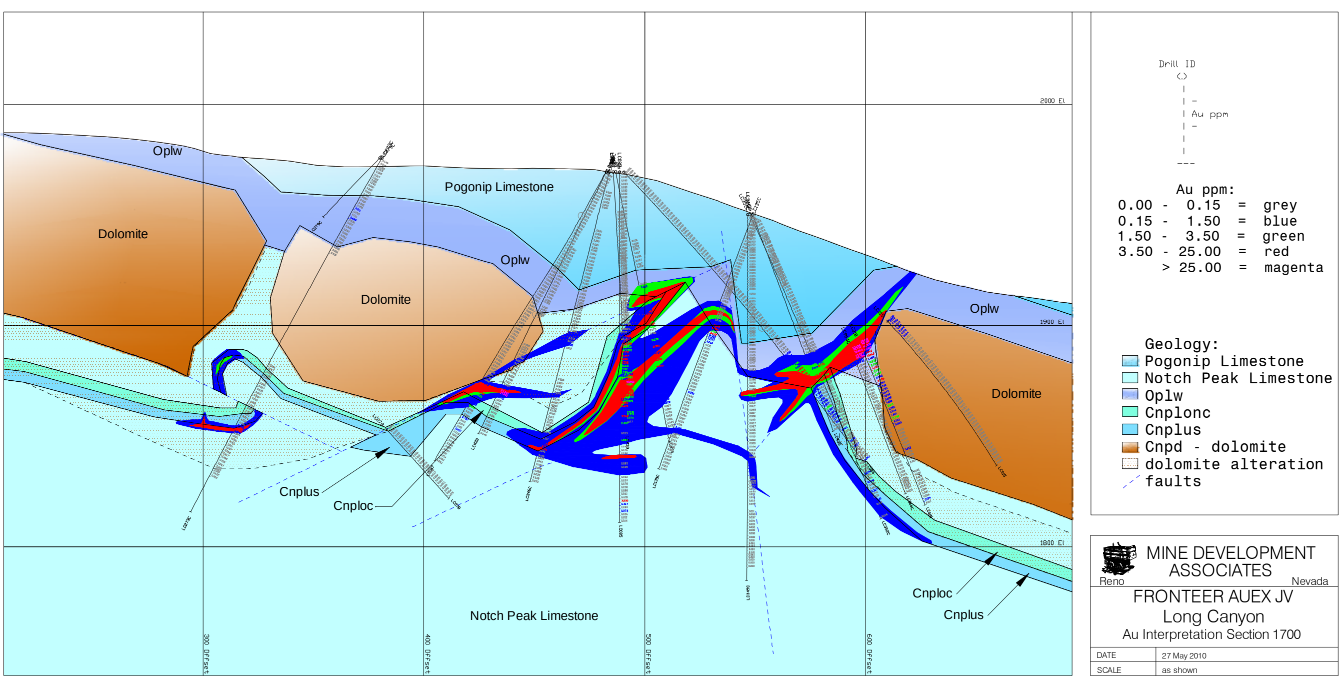
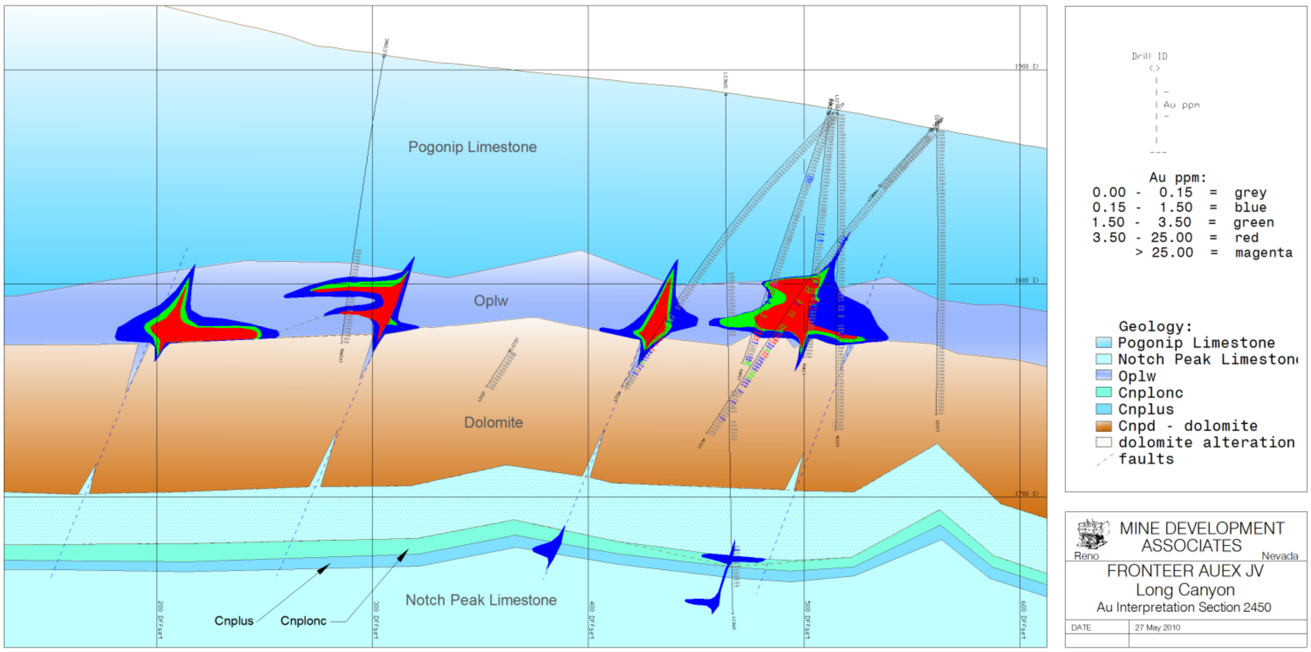


Figure 17.3 Cross Section 12450 Showing Gold Mineral Domains



The 50-metre spaced sectional mineral-domain interpretations were used as control sections to create intermediary northeast-looking sections at 10-metre intervals using Gemcom Surpac's morphing routine. The 10-metre spacing was chosen to match the block length along the northeast axis of the model, which was chosen to reflect drill-data density. The morphing algorithm allows the user to explicitly correlate the geometry of a mineral-domain polygon on one control section with that of an associated polygon on an adjacent control section by creating control lines. After sufficient control lines correlating the two polygons have been selected, the software interpolates polygons at the specified interval, in this case 10 metres, which gradually morph from the shape of one control polygon to the shape of the adjacent control polygon. Each of the morphed polygons, as well as the control sections, was then modified as necessary to honor the assay and geologic data. The final product is a set of 10-metre spaced mineral-domain envelopes that three-dimensionally honor the drill data at the resolution of the block model.

Assay Coding, Capping, and Compositing. Drill-hole gold assays were coded to their domains by the sectional mineral-domain envelopes. Descriptive statistics of the coded assays are provided in Table 17.2.

Table 17.2 Descriptive Statistics of Coded Gold Assays

Domain	Assays	Count	Mean	Median	Std. Dev.	CV	Min.	Max.
100	Au	2818	0.519	0.350	0.673	1.297	0.000	22.131
	Au Cap	2818	0.504	0.350	0.466	0.924	0.000	3.000
200	Au	734	2.387	2.210	1.177	0.493	0.003	18.598
	Au Cap	734	2.368	2.210	1.024	0.433	0.003	7.000
300	Au	783	9.705	7.110	8.164	0.841	0.136	56.400
	Au Cap	783	9.705	7.110	8.164	0.841	0.136	56.400
All	*Au*	*4335*	*2.405*	*0.661*	*4.838*	*2.012*	*0.000*	*56.400*
	Au Cap	*4335*	*2.392*	*0.661*	*4.820*	*2.015*	*0.000*	*56.400*

The process of determining assay caps began with inspection of quantile plots of the coded assays by domain to assess the mineral-domain populations and identify possible high-grade outliers that might require capping. Descriptive statistics of the coded assays by domain and visual reviews of the spatial relationships of the possible outliers and their potential impacts during grade interpolation were also considered in the process of determining appropriate assay caps (Table 17.3). The effects of the assay capping can be qualitatively evaluated by examination of the descriptive statistics of the mineral-domain assays (Table 17.2).

Table 17.3 Long Canyon Gold Assay Caps

Domain	Capping Values	
	g Au/t	Number Capped (% of samples)
100	3.00	16 (<1%)
200	7.00	4 (<1%)
300	-	0

In addition to the assay caps for domains 100 and 200, search restrictions of higher grade portions of domains 100 and 300 were applied during grade interpolations (discussed below).

The capped assays were composited down-hole by domain; surface sample data were not included in the compositing or grade interpolation. The composite length was initially chosen to match the block height of three metres, but while the mean grades of the composites by domain matched those of the coded assays, the median grade of the low-grade composites (domain 100) was 12% higher than the coded assays. A composite length of 1.52 metres (5 feet), which matches the RC sample intervals and modal sample length of all drill-hole intervals, was therefore used. Descriptive statistics of the composites are shown in Table 17.4.

Table 17.4 Descriptive Statistics of Long Canyon Gold Composites

Domain	Count	Mean (g Au/t)	Median (g Au/t)	Std. Dev.	CV	Min. (g Au/t)	Max. (g Au/t)
100	2790	0.504	0.359	0.443	0.879	0.000	3.000
200	729	2.368	2.220	0.946	0.400	0.006	7.000
300	733	9.705	7.308	7.709	0.794	0.710	56.400
All	*4252*	*2.392*	*0.675*	*4.686*	*1.959*	*0.000*	*56.400*

Block Model Coding. The 10-metre spaced sectional mineral-domain polygons were used to code a three-dimensional block model comprised of 5 metres (width) x 10 metres (length) x 3 metres (height) blocks. The model bearing is rotated so that the "y" direction is N40˚E, matching the orientation and view of the cross sections. In order for the block model to better reflect the irregularly shaped limits of the various gold domains, as well as to explicitly model dilution, the percentage volume of each mineral domain within each block is stored (the "partial percentages").

The model is coded to specific gravity using the values listed in Table 17.1 from lithologic solids and surfaces. The percentage of each block that lies below the topographic surface is also stored.

Grade Interpolation. A variographic study was performed using the gold composites from each mineral domain, collectively and separately, at various azimuths, dips, and lags. There are insufficient pairs to define reasonable structures for the domain 200 and 300 composites individually. Applying reasonable geologic orientations to the variography of domain 200 and 300 composites collectively, as well as composites from all domains collectively, yielded maximum ranges of approximately 25 metres in the principle orientations of 125˚ (strike) and -10˚ at 035˚ (down plunge). The variogram in the strike direction for the combined domain 200 and 300 composites is shown in Figure 17.4, and is fairly typical in terms of the definition of the modeled structures. Parameters from the variography were used in the ordinary krige interpolation and provided information relevant to the estimation parameters used in the inverse-distance interpolation and resource classification.

As in the 2009 estimate, search restrictions were placed on high-grade populations captured within the low-grade (domain 100) and high-grade (domain 300) domains. The search-ellipse orientations and estimation parameters are presented in Table 17.5 and Table 17.6, respectively.

Figure 17.4 Long CanyonVariogram

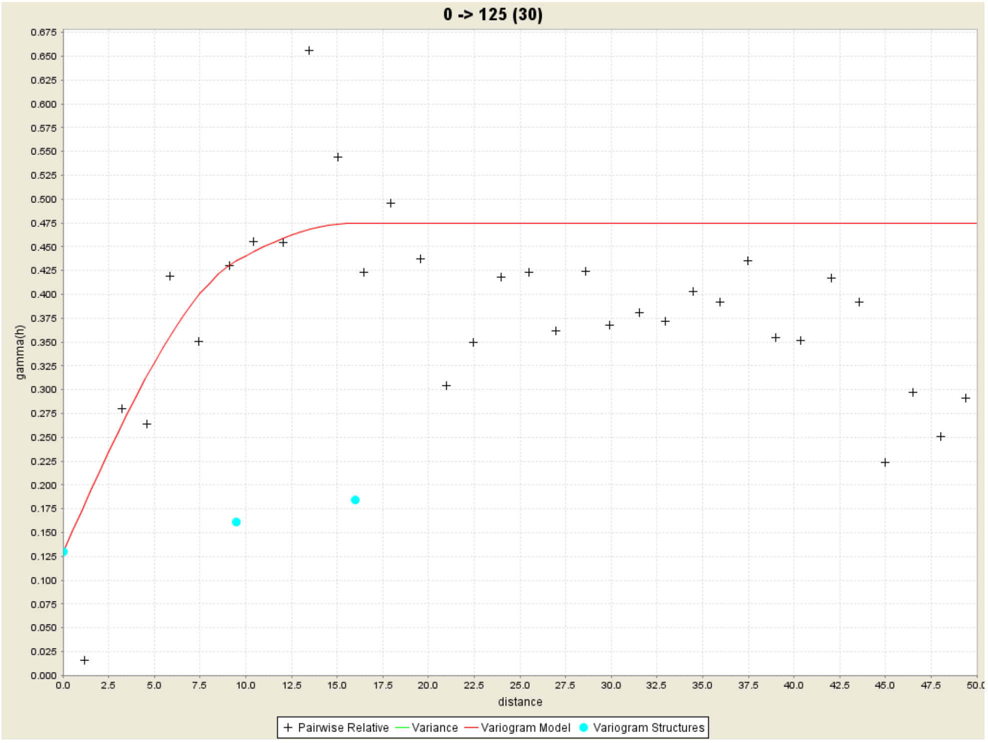


Table 17.5 Search Ellipse Orientations

Search Ellipse Orientation

Estimation Domain	Major Bearing	Plunge	Tilt
100,200,300	35	-10	-10

Table 17.6 Summary of Long Canyon Estimation Parameters

Au Domain 100

Estimation Pass	Search Ranges (m)			Comp Constraints			
	Major	S-Major	Minor	Min	Max	Max/hole	Search Restriction
1	75	75	30	1	18	3	50m for >1 g/t
2	175	175	70	1	18	3	150m for >1 g/t

Au Domain 200

Estimation Pass	Search Ranges (m)			Comp Constraints			
	Major	S-Major	Minor	Min	Max	Max/hole	Search Restriction
1	75	75	30	1	18	3	-
2	175	175	70	1	18	3	-

Au Domain 300

Estimation Pass	Search Ranges (m)			Comp Constraints			
	Major	S-Major	Minor	Min	Max	Max/hole	Search Restriction
1	75	75	30	1	18	3	20m for >15 g/t
2	175	175	70	1	18	3	100m for >15 g/t

Krige Parameters[1]

Estimation Domain	Model	Orientation			Nugget	First Structure				Second Structure			
		Major Bearing	Major Plunge	Clockwise Tilt	c_0	c_1	Ranges (m)			c_2	Ranges (m)		
100,200,300	SPH-Pairwise	35	-10	-10	0.130	0.161	10	3	3	0.184	20	20	7

[1] krige interpolation used as a check against the reported inverse-distance interpolation

The major and semi-major axes of the search ellipses approximate the average plunge and apparent dip directions of the gold mineralization. The first-pass search distances take into consideration the results of the variography, drill-hole spacing, and the results of multiple interpolation iterations to obtain optimal ranges. The second pass was designed to estimate grade into almost all blocks coded to the mineral domains that were not estimated in the first pass. Grades were interpolated using inverse distance to the third power, ordinary krige, and nearest-neighbor methods. The mineral resources reported herein were estimated by inverse-distance interpolation.

The two estimation passes were performed independently for each of the mineral domains, so that only composites coded to a particular domain were used to estimate grade into blocks coded by that domain. The estimated grades were coupled with the partial percentages of the mineral domains and unmodeled waste stored in the blocks to enable the calculation of a single weight-averaged block-diluted grade for each block.

17.2.6 Long Canyon Mineral Resources

The Long Canyon mineral resources are listed in Table 17.7 using a cutoff grade of 0.2 g Au/t. This cutoff is lower than the 0.2 g Au/t cutoff previously used (Gustin and Smith, 2009) so as to be consistent with the internal cutoff reported in the Long Canyon preliminary economic assessment (Gustin *et al*., 2009). The cutoff was chosen to capture mineralization potentially available to open-pit extraction and heap-leach processing. The block-diluted resources are also tabulated at additional cutoffs in order to provide grade-distribution information, as well as to provide for economic conditions other than those envisioned by the 0.2 g Au/t cutoff.

Table 17.7 Long Canyon Mineral Resources

	Measured Resources			Indicated Resources			Measured & Indicated Resources		
Cutoff (g Au/t)	Tonnes	g Au/t	oz Au	Tonnes	g Au/t	oz Au	Tonnes	g Au/t	oz Au
0.20	***587,000***	***2.50***	***47,000***	***11,653,000***	***1.67***	***625,000***	***12,240,000***	***1.71***	***672,000***
0.30	510,000	2.84	47,000	9,839,000	1.93	611,000	10,348,000	1.98	657,000
0.50	418,000	3.38	45,000	7,272,000	2.47	578,000	7,690,000	2.52	624,000
1.00	297,000	4.47	43,000	4,432,000	3.61	515,000	4,729,000	3.67	558,000
1.50	244,000	5.18	41,000	3,429,000	4.31	475,000	3,672,000	4.37	516,000
3.00	150,000	7.06	34,000	1,917,000	6.02	371,000	2,067,000	6.10	405,000
5.00	84,000	9.51	26,000	966,000	8.10	252,000	1,050,000	8.21	277,000
10.00	25,000	16.12	13,000	151,000	15.66	76,000	175,000	15.72	89,000

Long Canyon Inferred Resources			
Cutoff (g Au/t)	Tonnes	g Au/t	oz Au
0.20	***10,394,000***	***1.65***	***552,000***
0.30	8,292,000	2.01	536,000
0.50	5,807,000	2.71	505,000
1.00	3,571,000	3.97	456,000
1.50	2,851,000	4.66	427,000
3.00	1,791,000	6.17	355,000
5.00	1,043,000	7.73	259,000
10.00	116,000	13.35	50,000

The Long Canyon deposit was subdivided into two areas for the purposes of resource classification: Area 1, which is well drilled and well understood geologically, and Area 2, which encompasses the remainder of the deposit (Figure 17.5). Criteria for the assignment of Measured, Indicated, and Inferred resources are summarized in Table 17.8. Pre-2009 holes are excluded from the calculation of the minimum Measured criteria due to the potential impacts of possible down-hole contamination (see Section 12.3).

Figure 17.5 Long Canyon Classification Areas

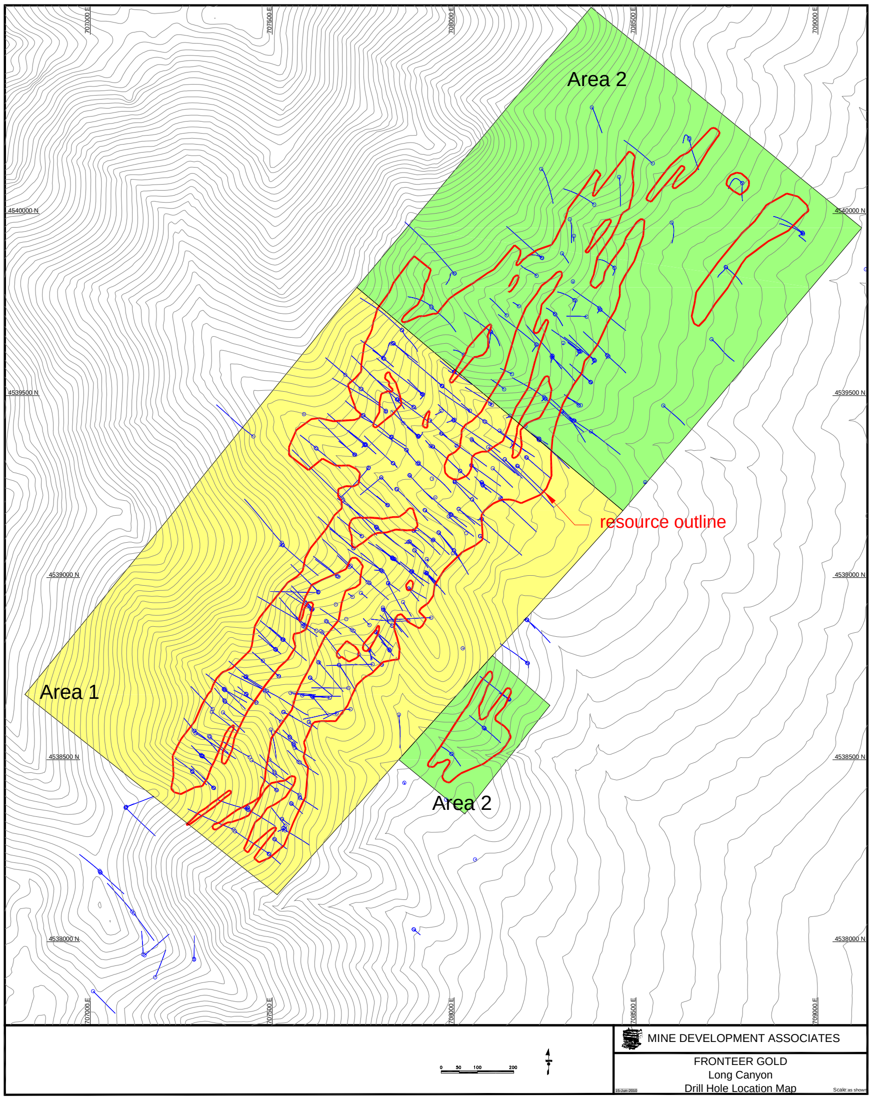


Table 17.8 Long Canyon Classification Parameters

Class	Class Area	Min. No. Composites	Additional Constraints
Measured	1	2	Minimum of two holes, exclusive of pre-2009 RC holes, that lie an average of 12m or less from block
Indicated	1 or 2	2	Minimum of two composites that lie within 5m of block
	1	2	Minimum of two holes lying an average of 30m or less from block
	2	2	Minimum of two holes lying an average of 25m or less from block
Inferred	all other estimated blocks		

Figure 17.6, Figure 17.7, and Figure 17.8 show cross sections of the block model that correspond to the mineral-domain cross sections in Figure 17.1, Figure 17.2, and Figure 17.3, respectively.

Figure 17.6 Cross Section 10950 Showing Block Model Gold Grades

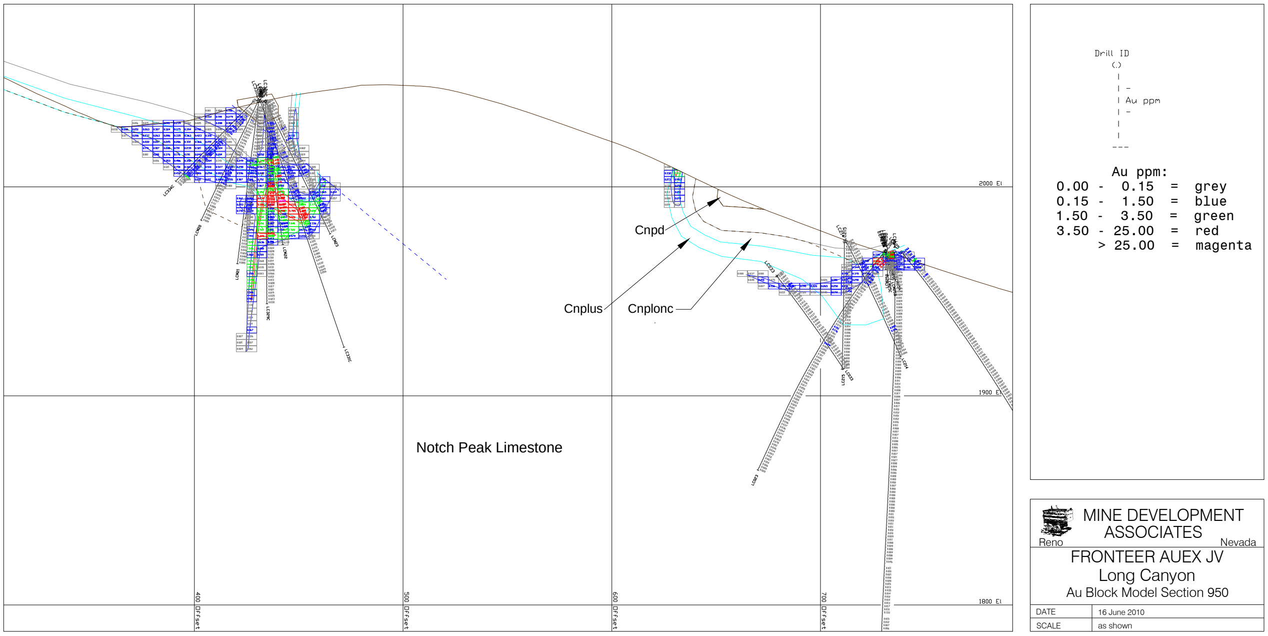


Figure 17.7 Cross Section 11700 Showing Block Model Gold Grades

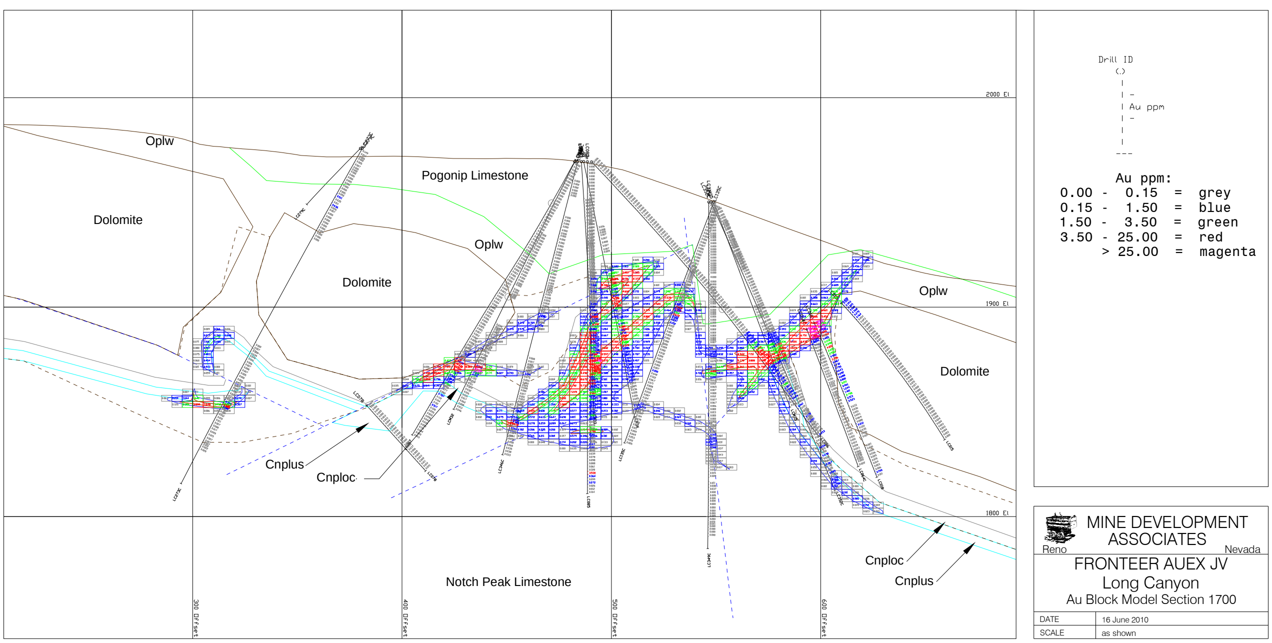
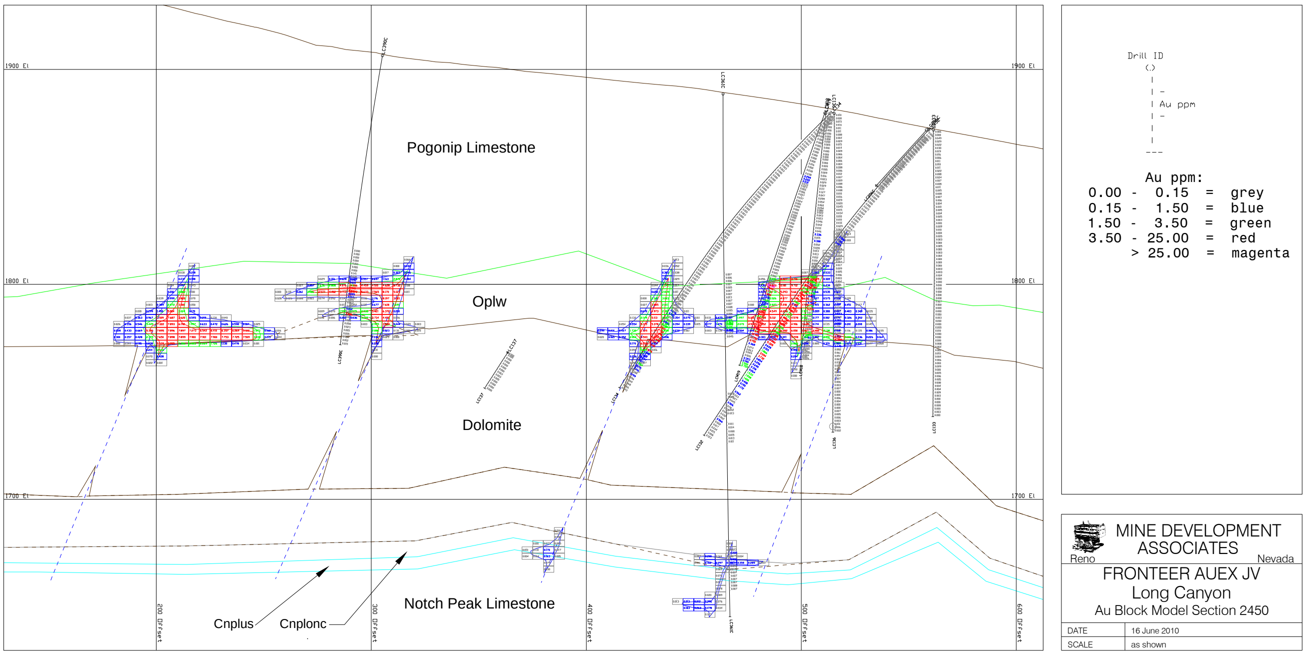


Figure 17.8 Cross Section 12450 Showing Block Model Gold Grades



17.3 Comments on the Resource Modeling

The block size used in the resource modeling has a relatively short vertical dimension (three metres). MDA chose this block height so as not to overestimate dilution, which is a concern due to the abundance of relatively small dimensions of the mineralized zones, while allowing for selective mining of the mineralized zones. At the reporting cutoff of 0.2 g Au/t, the model blocks have an average of 14% dilution (at zero grade) explicitly modeled and incorporated into the block-diluted resources. The model can be re-blocked to produce blocks with a height of six metres, if needed in economic studies.

While high-grade mineralization at Long Canyon is typically associated with strong hematite, which should be easily distinguished from unmineralized material, mineralization close to a mining cutoff grade may not be as easily distinguished from waste.

18.0 OTHER RELEVANT DATA AND INFORMATION

The following subsections summarize the results of a preliminary economic assessment (the 2009 PEA) undertaken using the prior (2009) Long Canyon resource model, as well as geotechnical and waste-rock characterization studies completed subsequent to the PEA.

MDA is not aware of any other information relevant to this technical report on the Long Canyon project that is not discussed herein.

18.1 2009 Preliminary Economic Assessment

MDA completed the 2009 PEA for the Long Canyon deposit using the May 2009 resource model (Gustin *et al*., 2009). ***The 2009 PEA was not based on the current mineral resources discussed herein, which exceed those reported in 2009, and therefore only a summary of the results are included below.***

The 2009 PEA assumed open-pit mining, using conventional trucks and shovels, and run-of-mine leaching of the 2009 Indicated and Inferred gold resources. A gold price of $800 per ounce was used for the economic evaluation. Economic highlights included:

- Life-of-mine pre-tax cash flow of US$181 million
- Net present value (5% discount rate) of US$145 million
- Internal rate of return of 64%
- Payback period of 1.3 years
- Life-of-mine cash cost of $351 per ounce of gold
- Total pre-tax cost of $479 per ounce of gold
- Pit designs contain 651,000 ounces of gold
- 565,000 ounces of gold recovered.

18.2 Geotechnical Pit-Slope Study

In early July 2009, Golder Associates ("Golder") began an extensive program of field investigation and geotechnical characterization to support pre-feasibility level pit-slope design recommendations. Golder representatives Graeme Major, Principal Geotechnical Engineer, and Joe Blaylock, Project Geologist, began the investigation by reviewing all available data, which included NI 43-101 reports, geological model, surface mapping of outcrops and major structures, surface structural data (1,121 data points), geological database, RQD database, and preliminary pit designs developed by MDA. Golder reviewed representative core and completed a site reconnaissance visit where they viewed the geological model and drilling data at the site office. Following the review, Golder and Fronteer personnel selected four sites for geotechnical core holes at locations that are considered representative of the highest (west) pit slopes. The core-drilling program started in early July and was completed in mid August of 2009. A total of 677.4 metres of geotechnical core were drilled. All geotechnical core logging and data collection (point load tests) were completed at the drill rig while the core was still in split tubes of the triple-tube coring system. Collection of these data enables the calculation of a quantitative Rock Mass rating ("RMR") value, which is a number between 0 and 100 and is a measure of rock mass quality. Based on the geotechnical core logging data, Pogonip rocks in the project area have an RMR value of 43, which ranks the rock quality as "fair", while the Notch Peak units have an RMR average value of 60, which ranks the rock quality as "fair" to "good".

Each geotechnical core hole was surveyed upon completion of drilling by Colog, of Lakewood, Colorado, using optical and acoustic tele-viewers. The digital raw image files of the surveys were used to reconcile the image with the physical core and geotechnical logging. The tele-viewer data are input into the WellCAD software, which assembles the raw data and properly rotates the selected structures to true orientations.

General conclusions from the geotechnical investigation show the rock quality and structural conditions to be favourable for the development of moderately steep to steep inter-ramp slopes within the competent limestone bedrock (Figure 18.1). The competent rock mass should preclude the development of rock mass failures. Bench-face angles are expected to be controlled by operating practices throughout most pit slopes, with bedding plane structures controlling crest stability if blasting practices are poor. Specific conclusions supported by the characterization and data analysis include:

- Rock mass stability analysis indicate adequate factor-of-safety with respect to overall rock mass failure;
- There is no extensive clay alteration, and significant potential for clay alteration appears to be limited to dike margins;
- Since the pit is above the groundwater table, groundwater will not influence slope stability and no slope dewatering will be required;
- Kinematic stability analyses indicate significant potential for planar failures of bench-scale and multi-bench slopes only in the southeast sectors of the pits; and
- Steep bench-face angles should generally be achievable with careful blasting, excavation, and scaling.

For bedrock slopes where there is indicated to be little potential for rock mass or structural control of overall or inter-ramp slope angles, pit-slope angles will be determined by the bench configurations that can be developed and maintained safely. Bench configurations are defined by production bench height, achievable bench-face angle, and catch-bench width, all of which combine to define the inter-ramp angle. Golder's recommended bench configurations are shown in Table 18.1.

Figure 18.1 Bench and Inter-Ramp Slope Configuration

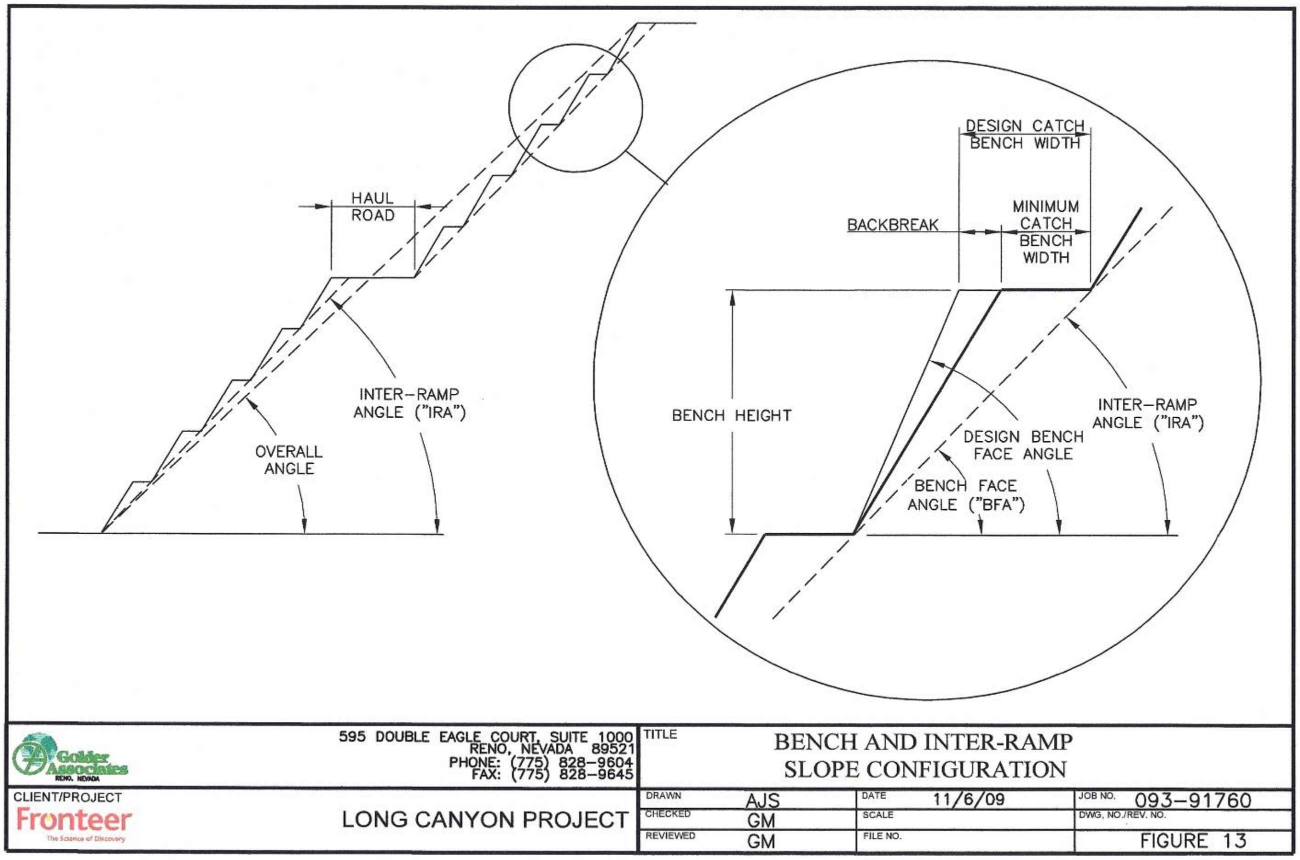


Table 18.1 Bench Configuration Recommendations

Table xx: Summary Slope Design Recommendations					
Geotechnical Unit	**Production Bench Height (m)**	**Bench Configuration**	**Catch Bench Width (m)**	**Bench Face Angle (°)**	**Inter-Ramp Angle (°)**
Alluvium[1]	6	Single[1]	4.7	63.4	38
Bedrock (except Southeast sectors)	6	Double	6	71	50
Bedrock (Southeast sectors)	6	Double	6	60	43

[1] Incorporate a catch bench at base of alluvium to facilitate drainage and cleanup

It is important to note that these recommendations were provided subsequent to the 2009 PEA study and therefore they were not incorporated into the pit designs.

18.3 Waste-Rock Characterization

SRK Consulting was contracted in 2009 to prepare a study regarding waste rock characterization, including a summary of the Acid Base Accounting ("ABA") and Net Acid Generation ("NAG") potential of waste rock (SRK, 2010). SRK performed a field and office review, including examination of representative core. They then collected nine large samples representing four general rock types (Pogonip and Notch Peak limestones, Notch Peak Dolomite, and lamprophyre) in various states of alteration. Samples were submitted to McClelland Laboratory for preparation and testing, including assay, multi-element ICP-MS, ABA, NAG, and Meteoric Water Mobility Procedure ("MWMP") testing.

The ABA method includes laboratory analysis and theoretical calculations based on acidification potential ("AP") and neutralization potential ("NP"). The neutralization potential ratio ("NPR"; ratio of NP to AP) is calculated and plotted against the Net Neutralization Potential ("NNP"; the difference between NP and AP). NPR values greater than three and NNP values less than 20 eq. kg $CaCO_3$/ton generally indicative of acid neutralizing rocks. The results for all samples collected at Long Canyon showed significant neutralization potential, with the highest neutralizing potential in rocks of the Notch Peak Formation and lowest neutralizing potential in samples of lamprophyre dike material.

NAG potential was investigated by subjecting samples to a weak hydrogen peroxide solution in order to induce oxidation. Resultant NAG pH was greater than 7.5 for all Long Canyon samples, confirming the ABA test results and indicating that no acid generation would be predicted for the Long Canyon deposit. As a result, no further testing of acid-generating potential (humidity cells, etc.) was recommended by SRK for Long Canyon. Further test work was recommended to investigate the potential for metal leaching under high pH conditions using MWMP testing. This testing is currently in progress.

19.0 INTERPRETATION AND CONCLUSIONS

MDA reviewed the project data and the Long Canyon drill-hole database, visited the project site, and obtained duplicate drill-hole samples for verification purposes. MDA believes that the data provided by Fronteer and AuEx, as well as the geological interpretations Fronteer has derived from the data, are generally an accurate and reasonable representation of the Long Canyon project.

Gold mineralization has been defined within a 2.2 kilometre-long northeast-trending area that is up to 400 metres wide and lies on a portion of the Long Canyon property. Mineralization is of the sediment-hosted gold type and is present in both surface outcrops and in exploration drill holes.

The primary structural/stratigraphic controls of the Long Canyon mineralization are related to the development of mega-boudins within the uppermost dolomite unit in the Notch Peak Formation. Gold occurs in limestones along the margins of the boudins (especially at and near the boudin noses) and within boudin necks. High-grade gold occurs within solution-collapse breccias and zones of strong decalcification within these structural/stratigraphic settings.

Long Canyon mineralization is generally characterized as being highly oxidized and non preg-robbing, with high cyanide solubility of gold. Results from the testing performed on both bulk surficial materials and drill core suggest that this mineralization is amenable to extraction of gold by cyanidation via oxide milling or heap leaching methods.

Fronteer provided MDA with a project database consisting of information derived from 246 core holes and 223 RC holes completed by Pittston, AuEx, and the Fronteer-AuEx Joint Venture. MDA rebuilt the drill-hole assay portion of the database, and the mineral resources reported herein were estimated using this database.

An analysis of the QA/QC data collected during the AuEx and Joint Venture drilling programs did not identify any serious issues with the sample preparation and analyses of the drill samples. The drill data do indicate the presence of down-hole contamination in some portion of the RC sample database, however. This issue was mitigated to a large extent by removing suspect intervals from the resource modeling, but some uncertainty in the remaining RC data, in the form of unrecognized contamination, persists.

The Long Canyon gold resources are tabulated at a cutoff grade of 0.20 g Au/t to capture the oxidized mineralization potentially available for open-pit extraction. Measured and Indicated resources total 12.240 million tonnes averaging 1.71 g Au/t (672,000 ounces), with an additional 10.394 million tonnes averaging 1.65 g Au/t (552,000 ounces) assigned to the Inferred category.

Results of a preliminary economic assessment, completed on the earlier 2009 resource model, indicated that Long Canyon is a deposit of merit and has the potential to yield a robust return on capital.

Drilling at Long Canyon was successful in outlining potentially economic gold mineralization in numerous drill holes. The limits of the gold mineralization are not fully delineated, however, and the deposit remains open along strike and at depth within the presently defined zones. There is also excellent potential for the discovery of new, parallel zones of mineralization related to dolomite boudins and incipient boudins that have yet to be identified.

Rock chip and soil sample results have proven to be direct guides to the definition of shallow drill targets at Long Canyon. While many of the obvious targets have been drilled, several geochemical anomalies in favourable geologic settings remain to be tested. Definition of new targets will likely require the use of more sophisticated exploration methods. The known mineralized zones trend into areas of shallow cover that provide virtually no geochemical response in surface sampling. In these areas, subtle changes in the strike and dip of strata in the basal Pogonip Group can provide evidence of an underlying boudin neck. These indirect methods were successfully employed in the discovery of the Shadow and Crevasse Zones in 2008.

20.0 RECOMMENDATIONS

Significant, relatively shallow oxide mineral resources have been outlined at Long Canyon. These resources remain open, with substantial additions conceivable. Beyond the extensions of known zones of mineralization, there is excellent potential for the discovery of new mineralized zones. It is clear that the Long Canyon project warrants significant additional expenditures.

Further drilling at Long Canyon should focus on three objectives: (i) the expansion of resources by drilling open-ended extensions of the six mineralized zones; (ii) the identification of additional zones of mineralization within new structural/stratigraphic settings; and (iii) continued upgrading of the resource classification through infill drilling.

MDA strongly recommends that diamond-core drilling methods continue to be used to complete all infill drilling at Long Canyon. Core drilling provides higher-quality samples that will allow for the definition of Measured resources. RC drilling should be confined to the testing of new exploration targets, as well as the initial testing of the extensions of presently defined zones of mineralization. The geologic model should continue to be refined as new drill data are received.

Significant exploration drilling is justified. While several areas beyond the limits of Long Canyon deposit have already been outlined for drill testing, additional detailed geologic mapping, systematic sampling of road cuts along new access roads, extensions of the existing soil grid, and geophysical surveys should be used to identify new targets.

The Fronteer-AuEx Joint Venture approved a 2010 exploration program with a budget of US$19,800,000 program for Long Canyon. The budget includes 45,500 metres of core and RC drilling, as well as a continuation of the ongoing geological mapping program, further rock, soil, and road-cut sampling, continued efforts pursuant to refining the Long Canyon geological model and geological controls on mineralization, and the continuation of various engineering, metallurgical, and environmental investigations, and possible purchase of strategically located private property. MDA believes that Long Canyon is a project of merit that warrants this level of expenditures.

Upon completion of the 2010 program at Long Canyon, MDA recommends that the mineral resources be updated and used as the basis for updated economic studies.

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22.0 DATE AND SIGNATURE PAGE

Effective Date of report:	March 1, 2010
Completion Date of report:	June 28, 2010

"Michael M. Gustin" June 28, 2010

Michael M. Gustin, P. Geo. Date Signed

June 28, 2010

Moira Smith, P. Geo. Date Signed

"Gary L. Simmons" June 28, 2010

Gary L. Simmons, PE Date Signed

23.0 CERTIFICATE OF AUTHORS

MICHAEL M. GUSTIN, P.GEO.

I, Michael M. Gustin, P. Geo., do hereby certify that I am currently employed as Senior Geologist by Mine Development Associates, Inc., 210 South Rock Blvd., Reno, Nevada 89502 and:

1. I graduated with a Bachelor of Science degree in Geology from Northeastern University in 1979 and a Doctor of Philosophy degree in Economic Geology from the University of Arizona in 1990. I have worked as a geologist in the mining industry for more than 25 years. I am a Licensed Professional Geologist in the state of Utah (#5541396-2250), a Licensed Geologist in the state of Washington (# 2297), and a member of the Society of Mining Engineers and the Geological Society of Nevada.
2. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101), and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101. I am independent of Fronteer Gold and AuEx Ventures, Inc., and all of each of their subsidiaries, as defined in Section 1.4 of NI 43-101 and in Section 3.5 of the Companion Policy to NI 43-101.
3. I visited the Long Canyon project site most recently on November 5, 2009.
4. I am responsible, or have co-responsibility, for all Sections except Sections 16.0 (Mineral Processing and Metallurgical Testing in this report titled, "***Updated Technical Report on the Long Canyon Project, Elko County, Nevada***", dated June 28, 2010 (the "Technical Report"), subject to my reliance on other experts identified in Section 3.0.
5. Except for work related to the Gustin and Smith (2009) and Gustin et al. (2009) technical reports, I have had no prior involvement with the property or project that is the subject of the Technical Report.
6. As of the date of the certificate, to the best of my knowledge, information, and belief, this Technical Report contains all the scientific and technical information that is required to be disclosed to make this technical report not misleading.
7. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
8. The Technical Report contains information relating to mineral titles, permitting, environmental issues, regulatory matters, and legal agreements. I am not a legal, environmental or regulatory professional, and do not offer a professional opinion regarding these issues.
9. A copy of this report is submitted as a computer readable file in Adobe Acrobat© PDF© format. The requirements of electronic filing necessitate submitting the report as an unlocked, editable file. I accept no responsibility for any changes made to the file after it leaves my control.

Dated June 28, 2010

"Michael M. Gustin"

Michael M. Gustin

MOIRA T. SMITH

I, **Moira T. Smith**, P. Geo., do hereby certify that:

1) I am a geologist residing at 928 Hardrock Place, Spring Creek, NV 89815, and employed by Fronteer Development USA, Inc., as Senior Geoscientist.

2) I am a graduate of Pomona College, with a B.A in Geology in 1983. I obtained a M.Sc. in Geology from Western Washington University in 1986, and a Ph.D. in Geology from University of Arizona in 1990. I have practiced my profession continuously since 1990.

3) I am a Professional Geoscientist registered in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (#122720);

4) I have worked on the property continuously since May 15th, 2008 and have relevant experience having led or participated in geological studies supporting 6 advanced exploration and development projects and/or operations, in 4 different countries.

5) I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with professional associations (as deemed in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" (QP) for the purposes of NI 43-101.

6) I was responsible for the preparation of Sections 4 - 10 of the report entitled "***Updated Technical Report on the Long Canyon Project, Elko County, Nevada***", dated June 28, 2010, (the "Technical Report") relating to the Long Canyon property. I have worked on the property in a technical capacity since May 15, 2008 and personally visited the site most recently in April 2009.

7) As of March 1st, 2010, and to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading and I have read the disclosure being filed and it fairly and accurately represents the information in the Technical Report that supports the disclosure.

8) I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which make the Technical Report misleading.

9) I am not independent of the issuer applying all the tests in Section 1.5 of NI 43-101 and acknowledge that I hold securities of Fronteer Development Group, Inc. in the form of stock and stock options.

10) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11) I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 28th day of June 2010 in Elko, Nevada

Moira Smith
Senior Geoscientist
Fronteer Development USA, Inc.

GARY L. SIMMONS, METALLURGICAL ENGINEER

I, Gary L. Simmons, do hereby certify that I am currently a Metallurgical Engineering Consultant and owner of G. L. Simmons Consulting, LLC, 105 Chapel Road, Clyde Park, Montana 59018 and:

1. I graduated with a Bachelor of Science degree in Metallurgical Engineering from the Colorado School of Mines in 1973. I have worked as a metallurgical engineer in the mining industry for more than 30 years. I am a member of the Mining and Metallurgical Society of America (MMSA) and a Qualified Professional (QP) Member with special expertise in Metallurgy – Member Number—01013QP. I am also a member of the Society for Mining, Metallurgical and Exploration, Inc (SME).
2. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101), and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101. I am independent of Fronteer Gold and AuEx Ventures, Inc., and all of each of their subsidiaries, as defined in Section 1.4 of NI 43-101 and in Section 3.5 of the Companion Policy to NI 43-101.
3. I visited the Long Canyon project site most recently on May 25-26, 2010.
4. I am responsible for Section 16.0 (Mineral Processing and Metallurgical Testing) in this report titled, "***Updated Technical Report on the Long Canyon Project, Elko County, Nevada***", dated June 28, 2010 (the "Technical Report").
5. I have had no prior involvement with the property or project, other than on-going consulting activities for Fronteer, that is the subject of the Technical Report.
6. As of the date of the certificate, to the best of my knowledge, information, and belief, this Technical Report contains all the scientific and technical information that is required to be disclosed to make this technical report not misleading.
7. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated June 28, 2010

"Gary L. Simmons"

Gary L. Simmons

APPENDIX A

Long Canyon Project Federal Lode Mining Claims as of March 1, 2010

(compiled and provided by Fronteer Gold)

Long Canyon Joint Venture

Elko County, Nevada

Township 35 North, Range 66 East, Sections 1-8, 11, 12

Township 36 North, Range 66 East, Sections 8, 14, 16-20, 22, 26, 28-32

Township 36 North, Range 65 East, Sections 24, 25, 36

Total Claims: 477

CLAIM NAME	LOCATION DATE	DATE FILED (COUNTY)	COUNTY DOCUMENT NO	DATE FILED (BLM)	BLM NMC#
PNG 293	09/14/1996	12/12/1996	399634	12/12/1996	757013
PNG 294	09/14/1996	12/12/1996	399635	12/12/1996	757014
PNG 295	09/14/1996	12/12/1996	399636	12/12/1996	757015
PNG 296	09/14/1996	12/12/1996	399637	12/12/1996	757016
PNG 297	09/14/1996	12/12/1996	399638	12/12/1996	757017
PNG 298	09/14/1996	12/12/1996	399639	12/12/1996	757018
PNG 299	09/14/1996	12/12/1996	399640	12/12/1996	757019
PNG 300	09/14/1996	12/12/1996	399641	12/12/1996	757020
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PNG 378	09/16/1996	12/12/1996	399719	12/12/1996	757098
PNG 379	09/16/1996	12/12/1996	399720	12/12/1996	757099
PNG 380	09/16/1996	12/12/1996	399721	12/12/1996	757100

CLAIM NAME	LOCATION DATE	DATE FILED (COUNTY)	COUNTY DOCUMENT NO	DATE FILED (BLM)	BLM NMC#
PNG 381	09/16/1996	12/12/1996	399722	12/12/1996	757101
PNG 382	09/16/1996	12/12/1996	399723	12/12/1996	757102
SM 289	01/05/2000	03/17/2000	456321	03/17/2000	814578
SM 290	01/05/2000	03/17/2000	456322	03/17/2000	814579
SM 291	01/05/2000	03/17/2000	456323	03/17/2000	814580
SM 292	01/05/2000	03/17/2000	456324	03/17/2000	814581
SM 293	01/05/2000	03/17/2000	456325	03/17/2000	814582
SM 294	01/05/2000	03/17/2000	456326	03/17/2000	814583
SM 295	01/05/2000	03/17/2000	456327	03/17/2000	814584
SM 296	01/05/2000	03/17/2000	456328	03/17/2000	814585
SM 297	01/05/2000	03/17/2000	456329	03/17/2000	814586
SM 298	01/05/2000	03/17/2000	456330	03/17/2000	814587
SM 299	01/05/2000	03/17/2000	456331	03/17/2000	814588
SM 300	01/05/2000	03/17/2000	456332	03/17/2000	814589
SM 301	01/04/2000	03/17/2000	456333	03/17/2000	814590
SM 302	01/04/2000	03/17/2000	456334	03/17/2000	814591
SM 303	01/04/2000	03/17/2000	456335	03/17/2000	814592
SM 304	01/04/2000	03/17/2000	456336	03/17/2000	814593
SM 305	01/04/2000	03/17/2000	456337	03/17/2000	814594
SM 306	01/04/2000	03/17/2000	456338	03/17/2000	814595
SM 307	01/04/2000	03/17/2000	456339	03/17/2000	814596
SM 308	01/04/2000	03/17/2000	456340	03/17/2000	814597
SM 309	01/04/2000	03/17/2000	456341	03/17/2000	814598
SM 310	01/04/2000	03/17/2000	456342	03/17/2000	814599
SM 311	01/04/2000	03/17/2000	456343	03/17/2000	814600
SM 312	01/04/2000	03/17/2000	456344	03/17/2000	814601
SM 313	01/04/2000	03/17/2000	456345	03/17/2000	814602
SM 314	01/04/2000	03/17/2000	456346	03/17/2000	814603
SM 315	01/04/2000	03/17/2000	456347	03/17/2000	814604
SM 316	01/04/2000	03/17/2000	456348	03/17/2000	814605
SM 317	01/04/2000	03/17/2000	456349	03/17/2000	814606
SM 318	01/04/2000	03/17/2000	456350	03/17/2000	814607
SM 325	01/05/2000	03/17/2000	456357	03/17/2000	814614
SM 326	01/05/2000	03/17/2000	456358	03/17/2000	814615
SM 327	01/05/2000	03/17/2000	456359	03/17/2000	814616
SM 328	01/05/2000	03/17/2000	456360	03/17/2000	814617
SM 329	01/05/2000	03/17/2000	456361	03/17/2000	814618
SM 330	01/05/2000	03/17/2000	456362	03/17/2000	814619
SM 331	01/05/2000	03/17/2000	456363	03/17/2000	814620
SM 332	01/05/2000	03/17/2000	456364	03/17/2000	814621
SM 333	01/05/2000	03/17/2000	456365	03/17/2000	814622
SM 334	01/05/2000	03/17/2000	456366	03/17/2000	814623
SM 335	01/05/2000	03/17/2000	456367	03/17/2000	814624
SM 336	01/05/2000	03/17/2000	456368	03/17/2000	814625
SM 343	01/07/2000	03/17/2000	456375	03/17/2000	814632
SM 344	01/07/2000	03/17/2000	456376	03/17/2000	814633
SM 345	01/07/2000	03/17/2000	456377	03/17/2000	814634
SM 346	01/07/2000	03/17/2000	456378	03/17/2000	814635
SM 347	01/07/2000	03/17/2000	456379	03/17/2000	814636
SM 348	01/07/2000	03/17/2000	456380	03/17/2000	814637
SM 349	01/07/2000	03/17/2000	456381	03/17/2000	814638

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SM 350	01/07/2000	03/17/2000	456382	03/17/2000	814639
SM 351	01/07/2000	03/17/2000	456383	03/17/2000	814640
SM 352	01/07/2000	03/17/2000	456384	03/17/2000	814641
SM 353	01/07/2000	03/17/2000	456385	03/17/2000	814642
SM 354	01/07/2000	03/17/2000	456386	03/17/2000	814643
SM 355	01/07/2000	03/17/2000	456387	03/17/2000	814644
SM 356	01/07/2000	03/17/2000	456388	03/17/2000	814645
SM 357	01/07/2000	03/17/2000	456389	03/17/2000	814646
SM 358	01/07/2000	03/17/2000	456390	03/17/2000	814647
SM 359	01/07/2000	03/17/2000	456391	03/17/2000	814648
SM 360	01/07/2000	03/17/2000	456392	03/17/2000	814649
SM 361	01/06/2000	03/17/2000	456393	03/17/2000	814650
SM 363	01/06/2000	03/17/2000	456395	03/17/2000	814652
SM 365	01/06/2000	03/17/2000	456397	03/17/2000	814654
SM 367	01/06/2000	03/17/2000	456399	03/17/2000	814656
SM 369	01/06/2000	03/17/2000	456401	03/17/2000	814658
SM 371	01/06/2000	03/17/2000	456403	03/17/2000	814660
SM 373	01/06/2000	03/17/2000	456405	03/17/2000	814662
SM 375	01/06/2000	03/17/2000	456407	03/17/2000	814664
SM 377	01/06/2000	03/17/2000	456409	03/17/2000	814666
SM 425	04/08/2000	06/30/2000	459723	06/29/2000	816759
SM 426	04/08/2000	06/30/2000	459724	06/29/2000	816760
SM 427	04/08/2000	06/30/2000	459725	06/29/2000	816761
SM 428	04/08/2000	06/30/2000	459726	06/29/2000	816762
SM 429	04/08/2000	06/03/2000	459727	06/29/2000	816763
SM 430	04/08/2000	06/03/2000	459728	06/29/2000	816764
SM 431	04/08/2000	06/03/2000	459729	06/29/2000	816765
SM 432	04/08/2000	06/03/2000	459730	06/29/2000	816766
SM 433	04/08/2000	06/03/2000	459731	06/29/2000	816767
SM 434	04/08/2000	06/03/2000	459732	06/29/2000	816768
SM 435	04/08/2000	06/03/2000	459733	06/29/2000	816769
SM 436	04/08/2000	06/03/2000	459734	06/29/2000	816770
SM 437	04/08/2000	06/03/2000	459735	06/29/2000	816771
SM 438	04/08/2000	06/03/2000	459736	06/29/2000	816772
SM 439	04/08/2000	06/03/2000	459737	06/29/2000	816773
SM 440	04/08/2000	06/03/2000	459738	06/29/2000	816774
SM 441	04/08/2000	06/03/2000	459739	06/29/2000	816775
SM 442	04/08/2000	06/03/2000	459740	06/29/2000	816776
SM 443	04/08/2000	06/03/2000	459741	06/29/2000	816777
SM 444	04/08/2000	06/03/2000	459742	06/29/2000	816778
SM 445	04/08/2000	06/03/2000	459743	06/29/2000	816779
SM 446	04/08/2000	06/03/2000	459744	06/29/2000	816780
SM 447	04/08/2000	06/03/2000	459745	06/29/2000	816781
SM 448	04/08/2000	06/03/2000	459746	06/29/2000	816782
PQ 112	10/18/2005	12/22/2005	545912	01/11/2006	917832
PQ 113	10/18/2005	12/22/2005	545913	01/11/2006	917833
PQ 114	10/18/2005	12/22/2005	545914	01/11/2006	917834
PQ 115	10/18/2005	12/22/2005	545915	01/11/2006	917835
PQ 116	10/18/2005	12/22/2005	545916	01/11/2006	917836
PQ 117	10/18/2005	12/22/2005	545917	01/11/2006	917837
PQ 118	10/18/2005	12/22/2005	545918	01/11/2006	917838

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PQ 119	10/18/2005	12/22/2005	545919	01/11/2006	917839
PQ 120	10/18/2005	12/22/2005	545920	01/11/2006	917840
PQ 121	10/18/2005	12/22/2005	545921	01/11/2006	917841
PQ 122	10/31/2005	12/22/2005	545925	01/11/2006	917844
PQ 123	10/31/2005	12/22/2005	545926	01/11/2006	917845
PQ 124	10/31/2005	12/22/2005	545927	01/11/2006	917846
PQ 125	10/31/2005	12/22/2005	545928	01/11/2006	917847
PQ 126	10/31/2005	12/22/2005	545929	01/11/2006	917848
PQ 127	10/31/2005	12/22/2005	545930	01/11/2006	917849
PQ 128	10/31/2005	12/22/2005	545931	01/11/2006	917850
PQ 129	10/31/2005	12/22/2005	545932	01/11/2006	917851
PQ 130	10/31/2005	12/22/2005	545933	01/11/2006	917852
PQ 131	10/31/2005	12/22/2005	545934	01/11/2006	917853
PQ 132	10/31/2005	12/22/2005	545935	01/11/2006	917854
PQ 133	10/31/2005	12/22/2005	545936	01/11/2006	917855
PQ 134	10/31/2005	12/22/2005	545937	01/11/2006	917856
PQ 135	10/31/2005	12/22/2005	545938	01/11/2006	917857
PQ 136	10/31/2005	12/22/2005	545939	01/11/2006	917858
PQ 137	10/31/2005	12/22/2005	545940	01/11/2006	917859
PQ 138	10/31/2005	12/22/2005	545941	01/11/2006	917860
PQ 139	10/31/2005	12/22/2005	545942	01/11/2006	917861
PQ 140	10/31/2005	12/22/2005	545943	01/11/2006	917862
PQ 141	10/31/2005	12/22/2005	545944	01/11/2006	917863
PQ 142	10/31/2005	12/22/2005	545945	01/11/2006	917864
PQ 143	10/31/2005	12/22/2005	545946	01/11/2006	917865
PQ 144	10/31/2005	12/22/2005	545947	01/11/2006	917866
PQ 145	10/31/2005	12/22/2005	545948	01/11/2006	917867
PQ 146	10/31/2005	12/22/2005	545949	01/11/2006	917868
PQ 147	10/31/2005	12/22/2005	545950	01/11/2006	917869
PQ 148	10/31/2005	12/22/2005	545951	01/11/2006	917870
PQ 149	10/31/2005	12/22/2005	545952	01/11/2006	917871
PQ 150	10/31/2005	12/22/2005	545953	01/11/2006	917872
PQ 151	10/31/2005	12/22/2005	545954	01/11/2006	917873
PQ 152	10/31/2005	12/22/2005	545955	01/11/2006	917874
PQ 153	10/31/2005	12/22/2005	545956	01/11/2006	917875
PQ 154	10/31/2005	12/22/2005	545957	01/11/2006	917876
PQ 155	10/31/2005	12/22/2005	545958	01/11/2006	917877
PQ 156	10/31/2005	12/22/2005	545959	01/11/2006	917878
PQ 157	10/31/2005	12/22/2005	545960	01/11/2006	917879
PQ 221	11/09/2005	12/22/2005	545922	01/11/2006	917842
PQ 221 (amended)	05/30/2006	07/20/2006	557142	07/25/2006	
PQ 222	11/09/2005	12/22/2005	545923	01/11/2006	917843
PQ 222 (amended)	05/30/2006	07/20/2006	557143	07/25/2006	
PQ 233	02/08/2006	02/23/2006	549185	02/22/2006	920835
PQ 234	02/08/2006	02/23/2006	549186	02/22/2006	920836
PQ 235	02/08/2006	02/23/2006	549187	02/22/2006	920837
PQ 236	02/08/2006	02/23/2006	549188	02/22/2006	920838
PQ 237	02/08/2006	02/23/2006	549189	02/22/2006	920839
PQ 238	02/08/2006	02/23/2006	549190	02/22/2006	920840
PQ 239	02/08/2006	02/23/2006	549191	02/22/2006	920841
PQ 240	02/08/2006	02/23/2006	549192	02/22/2006	920842

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PQ 241	02/08/2006	02/23/2006	549193	02/22/2006	920843
PQ 242	02/08/2006	02/23/2006	549194	02/22/2006	920844
PQ 243	02/08/2006	02/23/2006	549195	02/22/2006	920845
PQ 244	02/08/2006	02/23/2006	549196	02/22/2006	920846
PQ 245	02/08/2006	02/23/2006	549197	02/22/2006	920847
PQ 246	02/08/2006	02/23/2006	549198	02/22/2006	920848
PQ 247	02/08/2006	02/23/2006	549199	02/22/2006	920849
PQ 248	02/08/2006	02/23/2006	549200	02/22/2006	920850
PQ 249	02/08/2006	02/23/2006	549201	02/22/2006	920851
PQ 250	02/08/2006	02/23/2006	549202	02/22/2006	920852
PQ 251	02/08/2006	02/23/2006	549203	02/22/2006	920853
PQ 252	02/08/2006	02/23/2006	549204	02/22/2006	920854
PQ 253	02/08/2006	02/23/2006	549205	02/22/2006	920855
PQ 254	02/08/2006	02/23/2006	549206	02/22/2006	920856
PQ 265	01/14/2006	02/23/2006	549217	02/22/2006	920867
PQ 266	01/14/2006	02/23/2006	549218	02/22/2006	920868
PQ 267	01/14/2006	02/23/2006	549219	02/22/2006	920869
PQ 268	01/14/2006	02/23/2006	549220	02/22/2006	920870
PQ 269	02/08/2006	02/23/2006	549221	02/22/2006	920871
PQ 270	02/08/2006	02/23/2006	549222	02/22/2006	920872
PQ 271	02/08/2006	02/23/2006	549223	02/22/2006	920873
PQ 272	02/08/2006	02/23/2006	549224	02/22/2006	920874
PQ 273	02/08/2006	02/23/2006	549225	02/22/2006	920875
PQ 274	02/08/2006	02/23/2006	549226	02/22/2006	920876
PQ 275	02/08/2006	02/23/2006	549227	02/22/2006	920877
PQ 276	02/08/2006	02/23/2006	549228	02/22/2006	920878
PQ 277	02/08/2006	02/23/2006	549229	02/22/2006	920879
PQ 278	02/08/2006	02/23/2006	549230	02/22/2006	920880
PQ 279	02/08/2006	02/23/2006	549231	02/22/2006	920881
PQ 280	02/08/2006	02/23/2006	549232	02/22/2006	920882
PQ 281	02/08/2006	02/23/2006	549233	02/22/2006	920883
PQ 282	02/08/2006	02/23/2006	549234	02/22/2006	920884
PQ 283	02/08/2006	02/23/2006	549235	02/22/2006	920885
PQ 284	02/08/2006	02/23/2006	549236	02/22/2006	920886
PQ 285	02/08/2006	02/23/2006	549237	02/22/2006	920887
PQ 286	02/08/2006	02/23/2006	549238	02/22/2006	920888
PQ 460	01/16/2006	04/06/2006	550876	04/06/2006	923331
PQ 461	01/16/2006	04/06/2006	550877	04/06/2006	923332
PQ 462	01/16/2006	04/06/2006	550878	04/06/2006	923333
PQ 463	01/16/2006	04/06/2006	550879	04/06/2006	923334
PQ 464	01/16/2006	04/06/2006	550880	04/06/2006	923335
PQ 465	01/16/2006	04/06/2006	550881	04/06/2006	923336
PQ 466	01/15/2006	04/06/2006	550882	04/06/2006	923337
PQ 467	01/15/2006	04/06/2006	550883	04/06/2006	923338
PQ 468	01/15/2006	04/06/2006	550884	04/06/2006	923339
PQ 469	01/15/2006	04/06/2006	550885	04/06/2006	923340
PQ 470	01/15/2006	04/06/2006	550886	04/06/2006	923341
PQ 471	01/15/2006	04/06/2006	550887	04/06/2006	923342
PQ 472	01/15/2006	04/06/2006	550888	04/06/2006	923343
PQ 473	01/15/2006	04/06/2006	550889	04/06/2006	923344
PQ 474	01/15/2006	04/06/2006	550890	04/06/2006	923345

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PQ 475	01/15/2006	04/06/2006	550891	04/06/2006	923346
PQ 476	01/15/2006	04/06/2006	550892	04/06/2006	923347
PQ 477	01/15/2006	04/06/2006	550893	04/06/2006	923348
PQ 478	01/15/2006	04/06/2006	550894	04/06/2006	923349
PQ 479	01/15/2006	04/06/2006	550895	04/06/2006	923350
PQ 480	01/15/2006	04/06/2006	550896	04/06/2006	923351
PQ 481	01/15/2006	04/06/2006	550897	04/06/2006	923352
PQ 500	07/02/2006	08/08/2006	558065	08/10/2006	932047
PQ 501	07/02/2006	08/08/2006	558066	08/10/2006	930248
PQ 502	07/02/2006	08/08/2006	558067	08/10/2006	932049
PQ 503	07/02/2006	08/08/2006	558068	08/10/2006	932050
PQ 504	07/02/2006	08/08/2006	558069	08/10/2006	932051
PQ 505	07/02/2006	08/08/2006	558070	08/10/2006	932052
PQ 506	07/02/2006	08/08/2006	558071	08/10/2006	932053
PQ 507	07/02/2006	08/08/2006	558072	08/10/2006	932054
PQ 508	07/02/2006	08/08/2006	558073	08/10/2006	932055
PQ 509	07/02/2006	08/08/2006	558074	08/10/2006	932056
PQ 510	07/02/2006	08/08/2006	558075	08/10/2006	932057
PQ 511	07/02/2006	08/08/2006	558076	08/10/2006	932058
PQ 512	07/02/2006	08/08/2006	558077	08/10/2006	932059
PQ 513	07/02/2006	08/08/2006	558078	08/10/2006	932060
PQ 514	07/02/2006	08/08/2006	558079	08/10/2006	932061
PQ 515	07/02/2006	08/08/2006	558080	08/10/2006	932062
PQ 516 A	07/02/2006	08/08/2006	558081	08/10/2006	932063
PQ 517 A	07/02/2006	08/08/2006	558082	08/10/2006	932064
PQ 518 A	07/02/2006	08/08/2006	558083	08/10/2006	932065
PQ 519 A	07/02/2006	08/08/2006	558084	08/10/2006	932066
PQ 520 A	07/02/2006	08/08/2006	558085	08/10/2006	932067
PQ 521 A	07/02/2006	08/08/2006	558086	08/10/2006	932068
PQ 522 A	07/02/2006	08/08/2006	558087	08/10/2006	932069
PQ 523 A	07/02/2006	08/08/2006	558088	08/10/2006	932070
PQ 524 A	07/02/2006	08/08/2006	558089	08/10/2006	932071
PQ 516	01/16/2006	04/06/2006	550898	04/06/2006	923353
PQ 517	01/16/2006	04/06/2006	550899	04/06/2006	923354
PQ 518	01/16/2006	04/06/2006	550900	04/06/2006	923355
PQ 519	01/16/2006	04/06/2006	550901	04/06/2006	923356
PQ 520	01/16/2006	04/06/2006	550902	04/06/2006	923357
PQ 521	01/16/2006	04/06/2006	550903	04/06/2006	923358
PQ 522	01/16/2006	04/06/2006	550904	04/06/2006	923359
PQ 523	01/16/2006	04/06/2006	550905	04/06/2006	923360
PQ 524	01/15/2006	04/06/2006	550906	04/06/2006	923361
PQ 525	01/15/2006	04/06/2006	550907	04/06/2006	923362
PQ 526	01/15/2006	04/06/2006	550908	04/06/2006	923363
PQ 527	01/15/2006	04/06/2006	550909	04/06/2006	923364
PQ 528	01/15/2006	04/06/2006	550910	04/06/2006	923365
PQ 529	01/15/2006	04/06/2006	550911	04/06/2006	923366
PQ 530	01/15/2006	04/06/2006	550912	04/06/2006	923367
PQ 531	01/15/2006	04/06/2006	550913	04/06/2006	923368
PQ 532	01/15/2006	04/06/2006	550914	04/06/2006	923369
PQ 533	01/15/2006	04/06/2006	550915	04/06/2006	923370
PQ 534	01/15/2006	04/06/2006	550916	04/06/2006	923371

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PQ 535	01/15/2006	04/06/2006	550917	04/06/2006	923372
SM 416 A	11/12/2005	12/22/2005	546025	01/11/2006	917943
SM 416 A (amended)	05/30/2006	07/20/2006	557144	07/25/2006	
SM 418 A	11/12/2005	12/22/2005	546026	01/11/2006	917944
SM 418 A (amended)	05/30/2006	07/20/2006	557145	07/25/2006	
SM 420 A	11/12/2005	12/22/2005	546027	01/11/2006	917945
SM 420 A (amended)	05/30/2006	07/20/2006	557146	07/25/2006	
SM 422 A	11/12/2005	12/22/2005	546028	01/11/2006	917946
SM 422 A (amended)	05/30/2006	07/20/2006	557147	07/25/2006	
SM 424 A	11/12/2005	12/22/2005	546029	01/11/2006	917947
SM 424 A (amended)	05/30/2006	07/20/2006	557148	07/25/2006	
SM 424 A (amended)	05/30/2006	09/18/2006	557149	09/15/2006	
PQ 536	05/23/2006	08/11/2006	558245	08/14/2006	932340
PQ 537	05/23/2006	08/11/2006	558246	08/14/2006	932341
PQ 231	09/13/2006	10/20/2006	561980	10/23/2006	937215
PQ 232	09/13/2006	10/20/2006	561981	10/23/2006	937216
PQ 263	09/13/2006	10/20/2006	561982	10/23/2006	937217
PQ 264	09/13/2006	10/20/2006	561983	10/23/2006	937218
LC 1	05/09/2007	06/11/2007	574736	7/10/2007	960073
LC 2	05/09/2007	06/11/2007	574737	7/10/2007	960074
LC 3	05/09/2007	06/11/2007	574738	7/10/2007	960075
LC 4	05/09/2007	06/11/2007	574739	7/10/2007	960076
LC 5	05/09/2007	06/11/2007	574740	7/10/2007	960077
LC 6	05/09/2007	06/11/2007	574741	7/10/2007	960078
LC 7	05/09/2007	06/11/2007	574742	7/10/2007	960079
LC 8	05/09/2007	06/11/2007	574743	7/10/2007	960080
LC 9	05/09/2007	06/11/2007	574744	7/10/2007	960081
LC 10	05/09/2007	06/11/2007	574745	7/10/2007	960082
LC 11	05/09/2007	06/11/2007	574746	7/10/2007	960083
LC 12	05/09/2007	06/11/2007	574747	7/10/2007	960084
LC 13	05/09/2007	06/11/2007	574748	7/10/2007	960085
LC 14	05/09/2007	06/11/2007	574749	7/10/2007	960086
LC 15	05/09/2007	06/11/2007	574750	7/10/2007	960087
LC 16	05/09/2007	06/11/2007	574751	7/10/2007	960088
LC 17	05/09/2007	06/11/2007	574752	7/10/2007	960089
LC 18	05/09/2007	06/11/2007	574753	7/10/2007	960090
LC 19	05/09/2007	06/11/2007	574754	7/10/2007	960091
LC 20	05/09/2007	06/11/2007	574755	7/10/2007	960092
LC 21	05/09/2007	06/11/2007	574756	7/10/2007	960093
LC 22	05/09/2007	06/11/2007	574757	7/10/2007	960094
LC 23	05/09/2007	06/11/2007	574758	7/10/2007	960095
LC 24	05/09/2007	06/11/2007	574759	7/10/2007	960096
LC 25	05/09/2007	06/11/2007	574760	7/10/2007	960097
LC 26	05/09/2007	06/11/2007	574761	7/10/2007	960098
LC 27	05/09/2007	06/11/2007	574762	7/10/2007	960099
LC 28	05/09/2007	06/11/2007	574763	7/10/2007	960100
LC 29	05/09/2007	06/11/2007	574764	7/10/2007	960101
LC 30	05/09/2007	06/11/2007	574765	7/10/2007	960102
LC 31	05/09/2007	06/11/2007	574766	7/10/2007	960103
LC 32	05/09/2007	06/11/2007	574767	7/10/2007	960104
LC 50	12/04/2008	02/11/2009	609325	02/12/2009	1003791

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LC 52	12/04/2008	02/11/2009	609327	02/12/2009	1003793
LC 54	12/04/2008	02/11/2009	609329	02/12/2009	1003795
LC 56	12/04/2008	02/11/2009	609331	02/12/2009	1003797
LC 58	12/04/2008	02/11/2009	609333	02/12/2009	1003799
LC 60	12/04/2008	02/11/2009	609335	02/12/2009	1003801
LC 62	12/04/2008	02/11/2009	609337	02/12/2009	1003803
LC 67	12/04/2008	02/11/2009	609342	02/12/2009	1003808
LC 69	12/04/2008	02/11/2009	609344	02/12/2009	1003810
LC 71	12/04/2008	02/11/2009	609346	02/12/2009	1003812
LC 73	12/04/2008	02/11/2009	609348	02/12/2009	1003814
LC 75	12/04/2008	02/11/2009	609350	02/12/2009	1003816
LC 77	12/04/2008	02/11/2009	609352	02/12/2009	1003818
LC 79	12/04/2008	02/11/2009	609354	02/12/2009	1003820
LC 86	12/04/2008	02/11/2009	609361	02/12/2009	1003827
LC 88	12/04/2008	02/11/2009	609363	02/12/2009	1003829
LC 90	12/04/2008	02/11/2009	609365	02/12/2009	1003831
LC 92	12/04/2008	02/11/2009	609367	02/12/2009	1003833
LC 94	12/04/2008	02/11/2009	609369	02/12/2009	1003835
LC 99	12/04/2008	02/11/2009	609374	02/12/2009	1003840
LC 101	12/04/2008	02/11/2009	609376	02/12/2009	1003842
LC 103	12/04/2008	02/11/2009	609378	02/12/2009	1003844
LC 105	12/04/2008	02/11/2009	609380	02/12/2009	1003846
LC 107	12/04/2008	02/11/2009	609382	02/12/2009	1003848
LC 33 A	03/19/2009	06/10/2009	613900	06/10/2009	1007013
LC 34 A	03/19/2009	06/10/2009	613901	06/10/2009	1007014
LC 35 A	03/19/2009	06/10/2009	613902	06/10/2009	1007015
LC 36 A	03/19/2009	06/10/2009	613903	06/10/2009	1007016
LC 37 A	03/19/2009	06/10/2009	613904	06/10/2009	1007017
LC 38 A	03/19/2009	06/10/2009	613905	06/10/2009	1007018
LC 39 A	03/19/2009	06/10/2009	613906	06/10/2009	1007019
LC 40 A	03/19/2009	06/10/2009	613907	06/10/2009	1007020
LC 41 A	03/19/2009	06/10/2009	613908	06/10/2009	1007021
LC 42 A	03/19/2009	06/10/2009	613909	06/10/2009	1007022
LC 43 A	03/19/2009	06/10/2009	613910	06/10/2009	1007023
LC 44 A	03/19/2009	06/10/2009	613911	06/10/2009	1007024
LC 45 A	03/19/2009	06/10/2009	613912	06/10/2009	1007025
LC 46 A	03/19/2009	06/10/2009	613913	06/10/2009	1007026
LC 47 A	03/19/2009	06/10/2009	613914	06/10/2009	1007027
LC 48 A	03/19/2009	06/10/2009	613915	06/10/2009	1007028
LC 49 A	03/19/2009	06/10/2009	613916	06/10/2009	1007029
LC 51 A	03/19/2009	06/10/2009	613917	06/10/2009	1007030
LC 53 A	03/19/2009	06/10/2009	613918	06/10/2009	1007031
LC 55 A	03/19/2009	06/10/2009	613919	06/10/2009	1007032
LC 57 A	03/19/2009	06/10/2009	613920	06/10/2009	1007033
LC 59 A	03/19/2009	06/10/2009	613921	06/10/2009	1007034
LC 61 A	03/19/2009	06/10/2009	613922	06/10/2009	1007035
LC 63 A	03/19/2009	06/10/2009	613923	06/10/2009	1007036
LC 64 A	03/19/2009	06/10/2009	613924	06/10/2009	1007037
LC 65 A	03/19/2009	06/10/2009	613925	06/10/2009	1007038
LC 66 A	03/19/2009	06/10/2009	613926	06/10/2009	1007039
LC 68 A	03/19/2009	06/10/2009	613927	06/10/2009	1007040

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LC 70 A	03/19/2009	06/10/2009	613928	06/10/2009	1007041
LC 72 A	03/19/2009	06/10/2009	613929	06/10/2009	1007042
LC 74 A	03/19/2009	06/10/2009	613930	06/10/2009	1007043
LC 76 A	03/19/2009	06/10/2009	613931	06/10/2009	1007044
LC 78 A	03/19/2009	06/10/2009	613932	06/10/2009	1007045
LC 80 A	03/19/2009	06/10/2009	613933	06/10/2009	1007046
LC 81 A	03/19/2009	06/10/2009	613934	06/10/2009	1007047
LC 82 A	03/19/2009	06/10/2009	613935	06/10/2009	1007048
LC 83 A	03/20/2009	06/10/2009	613936	06/10/2009	1007049
LC 84 A	03/20/2009	06/10/2009	613937	06/10/2009	1007050
LC 85 A	03/20/2009	06/10/2009	613938	06/10/2009	1007051
LC 87 A	03/20/2009	06/10/2009	613939	06/10/2009	1007052
LC 89 A	03/20/2009	06/10/2009	613940	06/10/2009	1007053
LC 91 A	03/20/2009	06/10/2009	613941	06/10/2009	1007054
LC 93 A	03/20/2009	06/10/2009	613942	06/10/2009	1007055
LC 95 A	03/20/2009	06/10/2009	613943	06/10/2009	1007056
LC 96 A	03/20/2009	06/10/2009	613944	06/10/2009	1007057
LC 97 A	03/20/2009	06/10/2009	613945	06/10/2009	1007058
LC 98 A	03/20/2009	06/10/2009	613946	06/10/2009	1007059
LC 100 A	03/20/2009	06/10/2009	613947	06/10/2009	1007060
LC 102 A	03/20/2009	06/10/2009	613948	06/10/2009	1007061
LC 104 A	03/20/2009	06/10/2009	613949	06/10/2009	1007062
LC 106 A	03/20/2009	06/10/2009	613950	06/10/2009	1007063
LC 108 A	03/20/2009	06/10/2009	613951	06/10/2009	1007064
LC 109 A	03/20/2009	06/10/2009	613952	06/10/2009	1007065
LC 110 A	03/20/2009	06/10/2009	613953	06/10/2009	1007066
LC 111 A	05/13/2009	06/10/2009	613954	06/10/2009	1007067
LC 112 A	03/21/2009	06/10/2009	613955	06/10/2009	1007068
LC 113 A	05/13/2009	06/10/2009	613956	06/10/2009	1007069
LC 114 A	03/21/2009	06/10/2009	613957	06/10/2009	1007070
LC 115 A	05/13/2009	06/10/2009	613958	06/10/2009	1007071
LC 116 A	03/21/2009	06/10/2009	613959	06/10/2009	1007072
LC 117 A	05/13/2009	06/10/2009	613960	06/10/2009	1007073
LC 118 A	03/21/2009	06/10/2009	613961	06/10/2009	1007074
LC 119 A	05/13/2009	06/10/2009	613962	06/10/2009	1007075
LC 120 A	03/21/2009	06/10/2009	613963	06/10/2009	1007076
LC 121 A	05/13/2009	06/10/2009	613964	06/10/2009	1007077
LC 122 A	03/21/2009	06/10/2009	613965	06/10/2009	1007078
LC 123 A	05/13/2009	06/10/2009	613966	06/10/2009	1007079
LC 124 A	03/21/2009	06/10/2009	613967	06/10/2009	1007080
LC 125 A	05/13/2009	06/10/2009	613968	06/10/2009	1007081
LC 126 A	03/21/2009	06/10/2009	613969	06/10/2009	1007082
LC 127 A	05/13/2009	06/10/2009	613970	06/10/2009	1007083
LC 128 A	03/21/2009	06/10/2009	613971	06/10/2009	1007084
LC 129 A	05/13/2009	06/10/2009	613972	06/10/2009	1007085
LC 130 A	03/21/2009	06/10/2009	613973	06/10/2009	1007086
PNG 383	09/16/1996	12/12/1996	399724	12/12/1996	757103
PNG 384	09/16/1996	12/12/1996	399725	12/12/1996	757104
PNG 385	09/16/1996	12/12/1996	399726	12/12/1996	757105
PNG 386	09/16/1996	12/12/1996	399727	12/12/1996	757106
PNG 387	09/16/1996	12/12/1996	399728	12/12/1996	757107

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PNG 388	09/16/1996	12/12/1996	399729	12/12/1996	757108
PNG 389	09/16/1996	12/12/1996	399730	12/12/1996	757109
PNG 390	09/16/1996	12/12/1996	399731	12/12/1996	757110
PNG 391	09/16/1996	12/12/1996	399732	12/12/1996	757111
PNG 392	09/16/1996	12/12/1996	399733	12/12/1996	757112
PNG 393	09/16/1996	12/12/1996	399734	12/12/1996	757113
PNG 394	09/16/1996	12/12/1996	399735	12/12/1996	757114
PNG 395	09/16/1996	12/12/1996	399736	12/12/1996	757115
PNG 396	09/16/1996	12/12/1996	399737	12/12/1996	757116
PNG 397	09/16/1996	12/12/1996	399738	12/12/1996	757117
PNG 398	09/16/1996	12/12/1996	399739	12/12/1996	757118
PNG 399	09/16/1996	12/12/1996	399740	12/12/1996	757119
PNG 400	09/16/1996	12/12/1996	399741	12/12/1996	757120
SM 319	01/04/2000	03/17/2000	456351	03/17/2000	814608
SM 320	01/04/2000	03/17/2000	456352	03/17/2000	814609
SM 321	01/04/2000	03/17/2000	456353	03/17/2000	814610
SM 322	01/04/2000	03/17/2000	456354	03/17/2000	814611
SM 323	01/04/2000	03/17/2000	456355	03/17/2000	814612
SM 324	01/04/2000	03/17/2000	456356	03/17/2000	814613
SM 337	01/05/2000	03/17/2000	456369	03/17/2000	814626
SM 338	01/05/2000	03/17/2000	456370	03/17/2000	814627
SM 339	01/05/2000	03/17/2000	456371	03/17/2000	814628
SM 340	01/05/2000	03/17/2000	456372	03/17/2000	814629
SM 341	01/05/2000	03/17/2000	456373	03/17/2000	814630
SM 342	01/05/2000	03/17/2000	456374	03/17/2000	814631
SM 362	01/06/2000	03/17/2000	456394	03/17/2000	814651
SM 364	01/06/2000	03/17/2000	456396	03/17/2000	814653
SM 366	01/06/2000	03/17/2000	456398	03/17/2000	814655
SM 368	01/06/2000	03/17/2000	456400	03/17/2000	814657
SM 370	01/06/2000	03/17/2000	456402	03/17/2000	814659
SM 372	01/06/2000	03/17/2000	456404	03/17/2000	814661
SM 374	01/06/2000	03/17/2000	456406	03/17/2000	814663
SM 376	01/06/2000	03/17/2000	456408	03/17/2000	814665
SM 378	01/06/2000	03/17/2000	456410	03/17/2000	814667