



Tyrone Operations
P.O. Drawer 571
Tyrone, NM 88065

January 8, 2013

Certified Mail #70092820000389631543
Return Receipt Requested

Mr. Holland Shepherd
Program Manager
Mining Act Reclamation Program
Mining and Minerals Division
Energy, Minerals and Natural Resources Department
1220 South St. Francis Dr.
Santa Fe, NM 87505-6110

Dear Mr. Shepherd,

Re: Release of Financial Assurance for Jersey Lilly Mine Permit, GR008RE

In April of 1996 the Mining Act Reclamation Bureau issued Permit No. GR008RE for the Jersey Lilly, Snowflake and Virtue mines located on the south side of the Little Burrow Mountains in Grant Count, New Mexico. In December of 1999 the Mining and Minerals Division (MMD) approved the closeout plan for these mines and an associated financial assurance was put in place.

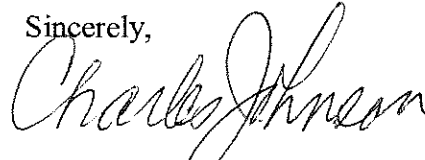
Starting in 2001 Freeport-McMoRan Tyrone Inc. implemented the closeout plan and has been conducting monitoring and reporting under the permit since then. The first of two successive quantitative vegetation success assessments of the reclaimed area was reported to the MMD in April of 2012. That assessment was performed in August of 2011. Enclosed with this letter are two copies of a report prepared by Golder Associates Inc. on the second quantitative vegetation assessment which was conducted in September of 2012. Both of these assessments indicate that the vegetation success criterion in the closeout plan has been exceeded, with an estimated 49% canopy cover in 2011 and 40% in 2012. The criterion in the closeout plan is 15%. These canopy cover values are for the perennial vegetation.

Having completed all the required reclamation and met the closure plan criterion, Tyrone is requesting release of the financial assurance for Permit No. GR008RE. The current financial assurance instrument is Irrevocable Letter of Credit 96656/80085 issued by Scotia bank in the amount of \$46,600.00.

Mr. Holland Shepard
January 8, 2013
Page 2

Please advise if any additional action on our part is necessary to effect release of the financial assurance for this permit.

Sincerely,

A handwritten signature in cursive script, appearing to read "Charles Johnson".

for

Thomas L. Shelley, Manager
Reclamation

TLS:cj
Enclosures
20130108-102

c: David Ohori



TRANSMITTAL

Date: January 4, 2013
To: Charles Johnson
From: Lewis Munk & Doug Romig
cc:

Project No.: 123-80005
Company: Freeport McMoRan Tyrone Inc.
Address: Hwy 90 South Tyrone Mine Rd.
Tyrone, NM 88065

Email: LMunk@golder.com
DRomig@golder.com

RE: **FINAL VEGETATION SUCCESS MONITORING, YEAR 2 -- JERSEY LILY, SNOWFLAKE, AND VIRTUE MINES**

- | | |
|---|--|
| <input checked="" type="checkbox"/> Federal Express (<u>priority</u> , standard, 2-day, 3-day) | <input type="checkbox"/> U.S. Mail |
| <input type="checkbox"/> UPS | <input type="checkbox"/> Courier |
| <input type="checkbox"/> DHL | <input type="checkbox"/> Hand Delivery |
| <input type="checkbox"/> Email _____ | <input type="checkbox"/> Other _____ |

Quantity	Item	Description
6	Technical Memorandum	Final Vegetation Success Monitoring, Year 2 – Jersey Lily, Snowflake, and Virtue Mines, dated December 31, 2012, w/cds

Notes:

Please call me if you have any questions or concerns at 505-821-3043.

Thank you,

Lewis Munk

Please advise us if enclosures are not as described.

ACKNOWLEDGEMENT REQUIRED:

☐ Yes ☒ No

p:\abq projects\2011 projects\11380005 (ty-veg)\vegetation monitoring\2012 report\lsv\final (2012)\final report\transmittal to charles johnson.docx

Golder Associates Inc.
5200 Pasadena Avenue N.E., Suite C
Albuquerque, NM 87113 USA
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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

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Date: December 31, 2012**To:** Mr. Charles Johnson**Project No.:** 123-80005**Company:** Freeport-McMoRan Tyrone, Inc.**From:** Lewis Munk and Doug Romig**cc:****RE: FINAL VEGETATION SUCCESS MONITORING, YEAR 2 – JERSEY LILY, SNOWFLAKE,
AND VIRTUE MINES**

1.0 INTRODUCTION

The Jersey Lily, Snowflake, and Virtue (JLSV) mines are located along the western flanks of the Little Burro Mountains on lands owned by Freeport-McMoRan Tyrone Inc. (Tyrone) in Grant County, New Mexico. Figure 1 provides a general overview of the three mines. The JLSV mines were small underground operations that mined non-sulfide bearing rock. Surface disturbance was limited to access roads, small benches, and dumps of benign waste rock. Production ceased at the JLSV mines in 1987.

The JLSV mines are permitted as existing mines (Permit No. GR008RE) by the Mining and Minerals Division (MMD). The mine facilities include:

1. Jersey Lily - 1 shaft, 2 adits, 1 small waste pile, access road;
2. Snowflake - 1 shaft, 3 adits, 1 small waste pile, access road; and
3. Virtue - 1 shaft, 2 adits, 1 stope opening, 1 small waste pile, access road.

Total disturbance associated with these mines is approximately 22 acres. Closure and reclamation activities were conducted by Tyrone in 2001 with the construction of bat-compatible metal barriers, blasting and/or backfilling mine openings, and revegetation of dumps, roads, and closure-related disturbance areas in order to achieve a post-mining land use (PMLU) of wildlife habitat.

Golder Associates Inc. (Golder) conducted qualitative vegetation and erosion inspections of the sites in the fall of 2006 and 2010 (Golder 2007; 2011a). The inspections characterized the revegetation efforts as successful because the majority of the disturbed areas supported robust and diverse plant communities and soil surfaces were generally stable. During the intervening years, Golder observed an increase in both canopy cover and the number of plant species at the reclaimed sites.

Condition 8.F of Revision 95-1 to Permit GR008RE requires that quantitative vegetation monitoring occur in the two consecutive years prior to financial assurance (FA) release. This technical memorandum provides a summary of the quantitative vegetation data and analyses for second year of the required the 2 consecutive years of monitoring. Vegetation sampling was conducted in August 29, 2012 by Douglas



Romig and Perrienne Houghton of Golder. The first year monitoring was conducted in September 2011 and was reported in April, 2012 (Golder, 2012).

2.0 REVEGETATION SUCCESS STANDARDS AND MONITORING METHODS

Vegetation attributes of the JLSV reclaimed sites were quantified using the same methods used to monitor the reclaimed lands and reference area at Tyrone (Golder 2011b). This section details the revegetation success standards and quantitative monitoring methods used in the field inventory and data analyses.

2.1 Success Standards

The primary success criterion for the JLSV mines is canopy cover of perennial species. Canopy cover was selected as the primary success criteria because it is an important determinant of soil erosion processes. The numerical success standard required in the Permit is at least 15 percent canopy cover for disturbed areas. The Permit required data to be collected from a total of 24 quadrats and the statistical confidence to be reported recognizing that statistical adequacy is unlikely to be achieved for the area.

Additionally, Tyrone committed to developing a list of plant species occurring in the disturbed areas to demonstrate that the site supports a broad range of plants and possesses vegetative attributes similar to the surrounding areas. A complete listing of species on the disturbed areas is meant to complement the species composition data from the quadrats.

2.2 Quantitative Monitoring Methods

Prior to formal sampling, each site was traversed to inventory plants growing across the reclaimed facility to capture more uncommon plant species that may not occur in the sampling quadrats. A systematic random sampling procedure employing a transect/quadrat system was then used to select sample sites within the reclaimed areas. Eight 15-meter (m) transects were randomly located in reclaimed areas and three 1-m² quadrats were located at pre-determined intervals along each transect for quantitative vegetation measurements.

2.2.1 Canopy and Basal Cover

For each quadrat, ocular estimates of total canopy, species canopy cover, basal cover, surface litter, surface rock fragments and bare soil were made. Canopy cover estimates included the foliage and foliage interspaces of all individual plants rooted in the quadrat. For the monitoring effort, canopy cover is defined as the percentage of quadrat area included in the vertical projection of the canopy (Daubenmire 1968). The canopy cover estimates made on a species basis and may exceed 100 percent in individual quadrats where the vegetation has multi-layered canopies. In contrast, the sum of the total canopy cover, surface litter, rock fragments, and bare soil does not exceed 100 percent.

Basal cover is defined as the proportion of the ground occupied by the crowns of grasses and rooting stems of forbs and shrubs. Basal cover estimates were also made for surface litter, rock fragments, and bare soil. Like the total cover estimates, the basal cover estimates do not exceed 100 percent. All cover estimates were made in 0.1 percent increments. Percent area cards were used to increase the accuracy and consistency of the cover estimates. Plant frequency was also determined on a species-basis by counting the number of individual plants rooted in each quadrat.

2.2.2 Shrub Density

Though not required as a revegetation success criteria, shrub density, or the number of plants per square meter, was determined using the frequency count data from the quadrats and the point-centered quarter (PCQ) method (Bonham 1989). Shrub density was calculated from the quadrat data by dividing the total number of individual plants counted by the number of quadrats measured. The PCQ method involves measuring the distance (in cm) to the nearest shrub stem in the four quadrats surrounding a fixed point (Bonham 1989). PCQ distance measurements were taken from the beginning point of the transect. Density was calculated from PCQ data using the following formula:

$$\text{Density} = \frac{1}{d^2}$$

Where d = the mean distance (cm) of the sample points.

2.2.3 Sample Adequacy

The number of samples required to characterize a particular vegetation attribute depends on the uniformity of the vegetation and the desired degree of certainty required for the analysis. While rigorous statistical guidelines are typically applied to bond release analyses, the JLSV permit does not require sample adequacy given the small area of disturbance. Nevertheless, sample adequacy was calculated using the following method:

$$N_{\min} = \frac{t^2 s^2}{(dX)^2}$$

where N_{\min} = minimum number of quadrats or samples needed
t = 1-tailed t-value for the appropriate confidence interval
s = sample variance
d = desired change in the mean (0.1)
X = the sample mean

Statistical adequacy was determined for total canopy and basal cover as well as shrub density.

3.0 RESULTS

Results of the 2012 vegetation survey are provided in this section. Transect locations are illustrated on Figure 2. Appendix A provides a summary of basal and canopy quadrat data and PCQ measurements. Photo documentation of each quadrat is provided in the photo log (Appendix B).

Mean total canopy cover for the JLSV reclamation was 41.4% [$\pm 7.2\%$] (Table 1). Total canopy cover in the individual quadrats ranged from 9.1 to 92%. Total canopy cover from perennial vegetation was 39.8%. The minimum sample size needed to meet sample adequacy (N_{\min}) for total canopy cover was calculated at 72 samples. Mean basal cover was estimated at 2.8% [$\pm 1.7\%$] (Table 1). The distribution of basal and canopy cover components are displayed in Figure 3 and 4.

Table 2 provides a summary of species identified on the JLSV mines as well as summary statistics for cover and density. Grasses dominated the canopy, representing 65% of the total relative cover. Cane bluestem, sideoats grama, tufted lovegrass, and single-awn threeawn were the dominant perennial grasses encountered in the quadrats. Relative herbaceous forb cover was 26%. The dominant forbs included Wright's deervetch, Louisiana sagewort, white prairie clover, red domed blanketflower and white dalea. Relative shrub cover was 9% with California brickellbush, and broom snakeweed being the dominant species.

In total, 111 plant species (Table 2) were identified on the JLSV sites during the 2011 and 2012 quantitative monitoring events. In comparison, 38 species occurred in the quadrats sampled in 2012. Of the 14 species seeded, 7 have been found growing in the reclaimed areas (Table 2). The reclaimed sites have successfully recruited 104 native species from adjacent undisturbed areas. Nearly 75% of the species are perennial. No noxious weeds have been observed on the reclaimed sites. A broad diversity of species and life forms are present on the JLSV reclamation including 55 forbs, 33 grasses, and 23 shrubs.

Shrub density at the JLSV reclamation area was 0.3 stems/m² as measured by the PCQ method (Table 1). California brickellbush and broom snakeweed were the most frequent shrubs measured with the PCQ and contributed the most to shrub density (Appendix A, Table A-3). Shrub density based on frequency data from quadrats was 0.8 stems/m² (Table 1).

4.0 CONCLUSION

Revegetation efforts are considered successful at the Jersey-Lily, Snowflake, Virtue mines based on data from two consecutive years of monitoring. The total canopy cover on the reclamation was 52.6% in 2011 and 41.4% in 2012, which exceeds the performance criterion of 15% canopy cover. The vegetation is dominated by native perennials and noxious weeds are absent from the site. The reclamation has recruited numerous species from surrounding areas, indicating that the reclaimed areas are capable of maintaining a vegetated cover that is viable and self-sustaining.

The vegetation performance is particularly notable given the severe drought conditions that prevailed in both 2011 and 2012. The reduction in canopy cover in 2012 compared to 2011 may be related cumulative effects of the sequential drought years.

5.0 REFERENCES

Bonham. C.D. 1989. Measurements of terrestrial vegetation. John Wiley and Sons, NY.

Daubenmire, R. 1968. Plant communities: A textbook of plant synecology. Harper and Row, publishers, NY.

Golder. 2007. Jersey Lily, Snowflake, and Virtue mines - 2007 inspection report and corrective action report for the Virtue mine. Submitted to Phelps Dodge Tyrone, Inc., November 1, 2007.

Golder. 2011a. Jersey Lily, Snowflake, and Virtue mines - 2010 inspection report. Submitted to Freeport McMoRan Tyrone, Inc., April 14, 2011.

Golder. 2011b Vegetation success monitoring workplan. Submitted to Freeport McMoRan Tyrone, Inc., June 15, 2011.

Golder. 2012. Final vegetation success monitoring, Year 1 Summary- Jersey-Lily, Snowflake, Virtue Mines. Submitted to Freeport-McMoRan Tyrone, Inc. April 26, 2012.

Attachments: Tables 1 and 2
Figures 1 through 4
Appendix A: Summaries of Sampling Data
Appendix B: Photo Log

TABLES

Table 1: Summary Statistics for Jersey Lily, Snowflake, and Virtue Mine

Jersey Lily, Snowflake, and Virtue Mine	
Total Canopy (%)	
Mean	41.4
Standard Deviation	20.5
90% Confidence Interval	7.2
Nmin ¹	72
Basal Cover (%)	
Mean	2.8
Standard Deviation	1.7
90% Confidence Interval	0.6
Nmin ¹	111
Shrub Density (#/m²) from Quadrats	
Mean	0.8
Standard Deviation	1.3
90% Confidence Interval	0.4
Nmin ¹	687
Shrub Density (#/m²) from Point-Centered Quarter	
Mean	0.3
Standard Deviation	0.3
90% Confidence Interval	0.2
Nmin ¹	431

Notes:

¹minimum number of samples required to obtain 90 percent probability that the sample mean is within 10 percent of the population mean

²With this probability the true value of the mean is within 10 percent of the mean for the sample size

Table 2: Mean cover and density of plant species identified at the Jersey Lily, Snowflake and Virtue mines

Scientific Name	Common Name	Species	Mean Canopy Cover (%)	Mean Basal Cover (%)	Mean Density (#/m ²)
GRASSES					
<i>Aristida adscensionis</i> ¹	Sixweeks threeawn	ARAD	0.74	0.04	7.21
<i>Aristida havardii</i>	Harvard's threeawn	ARHA	---	---	---
<i>Aristida purpurea</i>	Purple threeawn	ARPU	0.54	0.08	0.38
<i>Aristida schiedeana</i>	Single-awn threeawn	ARSC	4.78	0.15	2.46
<i>Bothriochloa barbinodis</i>	Cane bluestem	BOBA	10.05	0.82	8.45
<i>Bouteloua barbata</i> ¹	Sixweeks grama	BOBA3	0.16	0.02	1.67
<i>Bouteloua curtipendula</i> ²	Sideoats grama	BOCU	5.28	0.50	5.83
<i>Bouteloua gracilis</i> ²	Blue grama	BOGR	0.43	0.05	0.71
<i>Bouteloua hirsuta</i>	Hairy grama	BOHI	1.44	0.10	1.42
<i>Bromus inermis</i>	Smooth brome	BRIN	---	---	---
<i>Chloris verticillata</i>	Tumble windmillgrass	CHVE	---	---	---
<i>Chloris virgata</i> ¹	Feather fingergrass	CHVI	---	---	---
<i>Cyperus flavicomus</i>	Whiteedge flatsedge	CYFL	---	---	---
<i>Dasyochloa pulchella</i>	Fluffgrass	DAPU	---	---	---
<i>Echinochloa crus-galli</i> ¹	Barnyardgrass	ECCR	---	---	---
<i>Elymus elymoides</i> ²	Bottlebrush squirreltail	SIHY	---	---	---
<i>Eragrostis capillaris</i> ¹	Lace grass	ERCA	---	---	---
<i>Eragrostis curvula</i>	Weeping lovegrass	ERCU	---	---	---
<i>Eragrostis intermedia</i> ²	Plains lovegrass	ERIN	1.70	0.12	1.67
<i>Eragrostis mexicana</i> ¹	Mexican lovegrass	ERME	---	---	---
<i>Eragrostis pectinacea</i> ¹	Tufted lovegrass	ERPE	4.10	0.33	4.50
<i>Hilaria belangeri</i>	Curly mesquite	HIBE	---	---	---
<i>Leptochloa dubia</i> ²	Green sprangletop	LEDU	---	---	---
<i>Lycurus phleoides</i>	Wolfstail	LYPH	0.54	0.07	0.92
<i>Muhlenbergia metcalfei</i>	Metcalfe's muhly	MUME	---	---	---
<i>Panicum capillare</i> ¹	Witchgrass	PACA	---	---	---
<i>Panicum halli</i> ¹	Hall's panicgrass	PAHI	---	---	---
<i>Panicum obtusum</i>	Vine mesquite	PAOB	---	---	---
<i>Panicum virgatum</i>	Switchgrass	PAVI	---	---	---
<i>Pleuraphis jamesii</i> ²	Galleta	PLJA	---	---	---
<i>Schizachyrium scoparium</i>	Little bluestem	SCSC	---	---	---
<i>Setaria macrostachya</i>	Plains bristlegrass	SEMA	---	---	---
<i>Sporobolus cryptandrus</i>	Sand dropseed	SPCR	---	---	---
FORBS					
<i>Acourtioa nana</i>	Dwarf desertpeony	ACNA	---	---	---
<i>Allionia incarnata</i> ¹	Trailing windmills	ALIN	---	---	---
<i>Artemisia ludoviciana</i>	Louisiana sagewort	ARLU	0.75	0.01	1.75
<i>Astragalus nuttallianus</i>	Nuttall's loco	ASNU	---	---	---
<i>Bahia dissecta</i>	Bahia	BADI	0.25	T	0.17
<i>Boerhavia spicata</i> ¹	Creeping spiderling	BOSP	---	---	---
<i>Chaenactis stevioides</i>	False yarrow	CHST	0.24	0.02	0.21
<i>Chamaesyce albomarginata</i> ¹	Rattlesnake weed	CHAL	---	---	---

Table 2: Mean cover and density of plant species identified at the Jersey Lily, Snowflake and Virtue mines

Scientific Name	Common Name	Species	Mean Canopy Cover (%)	Mean Basal Cover (%)	Mean Density (#/m ²)
<i>Chamaesyce prostrata</i> ¹	Prostrate sandmat	CHPR	0.01	T	0.04
<i>Chamaesyce serpyllifolia</i> ¹	Thymeleaf spurge	CHSE	---	---	---
<i>Chenopodium leptophyllum</i> ¹	Narrow-leaved goosefoot	CHLE	0.02	T	0.04
<i>Cleome serrulata</i> ¹	Rocky Mountain bee plant	CLSE	---	---	---
<i>Cologania angustifolia</i>	Narrowleaf tick-clover	COAN	---	---	---
<i>Conyza canadensis</i> ¹	Horseweed	COCA	---	---	---
<i>Convolvulus</i>	Bindweed	CONV	---	---	---
<i>Croton texensis</i> ¹	Texas croton	CRTE			
<i>Dalea albiflora</i>	White dalea	DAAL	0.50	0.01	1.13
<i>Dalea candida</i>	White prairie clover	DACA	0.61	0.02	3.71
<i>Dalea lanata</i>	Woolly dalea	DALA	---	---	---
<i>Dalea nana</i>	Dwarf dalea	DANA	---	---	---
<i>Dalea pogonathera</i>	Bearded prairie clover	DAPO	---	---	---
<i>Datura quercifolia</i>	Oak-leaved thornapple	DAQU	---	---	---
<i>Desmanthus cooleyi</i>	Cooley's bundleflower	DECO	---	---	---
<i>Eriogonum wrightii</i>	Bastardsage	ERWR	0.05	T	0.08
<i>Evolvulus sericeus</i>	Silver dwarf morning-glory	EVSE	---	---	---
<i>Gaillardia pinnatifida</i>	Red dome blanketflower	GAPI	0.55	0.02	0.54
<i>Glandularia bipinnatifida</i>	Dakota vervain	GLBI	0.01	T	0.08
<i>Ipomoea cristulata</i>	Scarlet morning glory	IPCR	---	---	---
<i>Kallstroemia parviflora</i> ¹	Warty caltrop	KAPA	---	---	---
<i>Kochia scoparia</i> ¹	Burningbush	KOSC	---	---	---
<i>Lotus wrightii</i>	Wright's deervetch	LOWR	7.00	0.17	4.54
<i>Machaeranthera canescens</i>	Purple aster	MACA	0.23	0.01	0.88
<i>Machaeranthera gracilis</i> ¹	Slender goldenweed	MAGR	0.38	T	0.17
<i>Medicago sativa</i>	Alfalfa	MESA	---	---	---
<i>Melampodium leucanthum</i>	Blackfoot	MELE	0.13	0.01	0.58
<i>Mentzelia multiflora</i> ¹	Blazing star	MEMU	---	---	---
<i>Mimosa rupertiana</i>	Sensitive briar	MIRU	---	---	---
<i>Mirabilis coccinea</i>	Red four o'clock	MICO	---	---	---
Unk Moss	Moss	MOSS	0.10	0.10	0.17
<i>Pectis angustifolia</i> ¹	Lemonweed	PEAN	---	---	---
<i>Pectis papposa</i> ¹	Chinchweed	PEPA	---	---	---
<i>Penstemon barbatus</i>	Beardlip penstemon	PEBA	---	---	---
<i>Pseudognaphalium canescens</i>	Grey everlasting	PSCA	0.03	T	0.04
<i>Psoralea tenuiflorum</i>	Scurfpea	PSTE	0.56	0.01	0.13
<i>Ratibida columnifera</i>	Prairie coneflower	RACO	---	---	---
<i>Salsola tragus</i> ¹	Tumblweed	SATR	---	---	---
<i>Sida abutilifolia</i>	Spreading mallow	SIAB	0.03	T	0.50
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	SOEL	0.02	T	0.08
<i>Sphaeralcea fendleri</i> ²	Scarlet globemallow	SPFE	0.01	T	0.04
<i>Stephanomeria pauciflora</i>	Skeletonweed	STPA	0.10	0.01	0.04
<i>Thelesperma megapotamicum</i>	Greenthread	THME	---	---	---

Table 2: Mean cover and density of plant species identified at the Jersey Lily, Snowflake and Virtue mines

Scientific Name	Common Name	Species	Mean Canopy Cover (%)	Mean Basal Cover (%)	Mean Density (#/m ²)
<i>Xanthium strumarium</i> ¹	Cocklebur	XAST	---	---	---
<i>Unknown Forb</i> ¹	Unknown forb	UNF 1	0.23	T	0.04
<i>Unknown Forb 1</i> ¹	Unknown forb 1	UNK F1	---	---	---
<i>Unknown Forb 2</i> ¹	Unknown forb 2	UNK F2	---	---	---
SHRUBS, TREES, AND CACTI					
<i>Acacia angustissima</i>	Prairie acacia	ACAN	---	---	---
<i>Artemisia dracunculus</i>	Wild tarragon	ARDR	---	---	---
<i>Artemisia carruthii</i>	Carruth's sagewort	ARCA	T	T	0.17
<i>Artemisia frigida</i>	Fringed sage	ARFR	---	---	---
<i>Baccharis pteronioides</i>	Yerba de pasmo	BAPT	---	---	---
<i>Brickellia californica</i>	California bricklebrush	BRCA	1.57	0.02	0.17
<i>Brickellia spp.</i>	Bricklebush	BRSP	---	---	---
<i>Chilopsis linearis</i>	Desert willow	CHLI	---	---	---
<i>Cylindropuntia imbricata</i>	Tree cholla	CYIM	---	---	---
<i>Dasyliion wheeleri</i>	Common sotol	DAWH	0.75	0.05	0.04
<i>Gutierrezia sarothrae</i>	Broom snakeweed	GUSA	1.55	0.04	0.25
<i>Isocoma tenuisecta</i>	Burroweed	ISTE	---	---	---
<i>Krascheninnikovia lanata</i> ²	Winterfat	KRLA	---	---	---
<i>Mimosa biuncifera</i>	Mimosa	MIBI	---	---	---
<i>Nolina microcarpa</i>	Beargrass	NOMI	---	---	---
<i>Opuntia cholla</i>	Cacti	OPIM	---	---	---
<i>Opuntia phaeacantha</i>	Tulip pricklypear	OPPH	---	---	---
<i>Pinus edulis</i>	Pinyon	PIED	---	---	---
<i>Populus deltoides</i>	Cottonwood	PODE	---	---	---
<i>Prosopis glandulosa</i>	Honey mesquite	PRGL	---	---	---
<i>Senecio douglasii</i>	Douglas' ragwort	SEDO	---	---	---
<i>Tetradymia canescens</i>	Spineless horsebrush	TECA	---	---	---
<i>Viguiera cordifolia</i>	Rough goldeneye	VICO	0.03	T	0.04

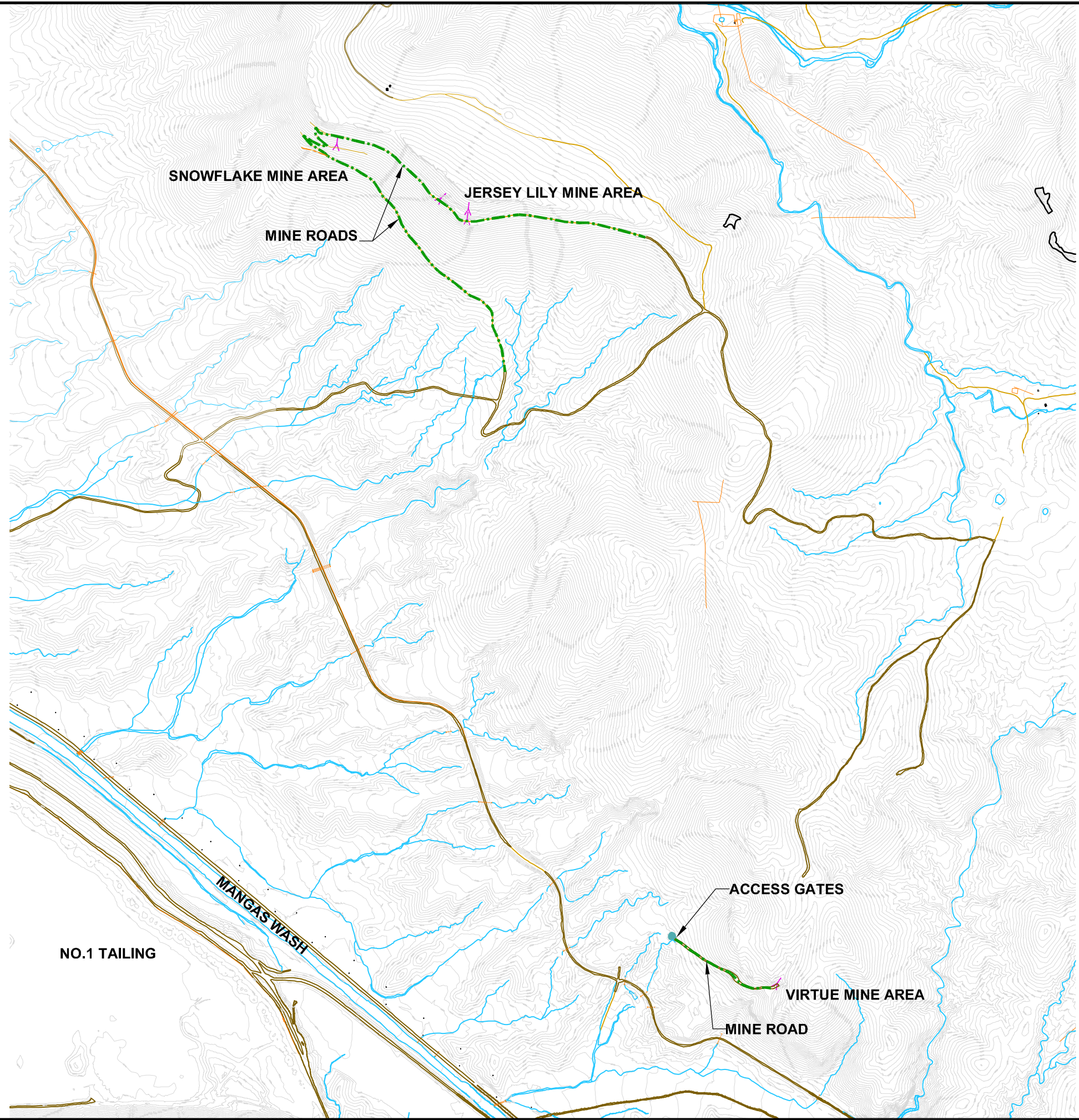
Notes:¹ = annual² = species in the seed mix

--- species observed on site but not in quadrats

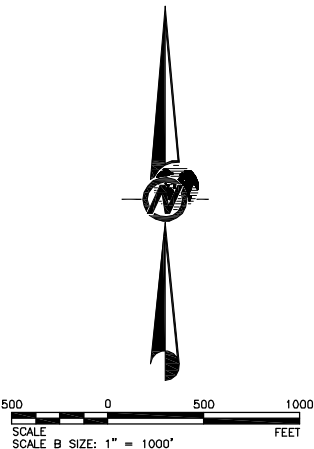
T = Trace

FIGURES

Drawing file: JL_Snow_Virtue Overview.dwg Apr 25, 2012 - 2:20pm



-  HISTORICAL ADIT
-  MINE ROAD
-  RANCH ROAD




PROJECT

FREEPORT McMoRan TYRONE INC.
GRANT COUNTY, NEW MEXICO

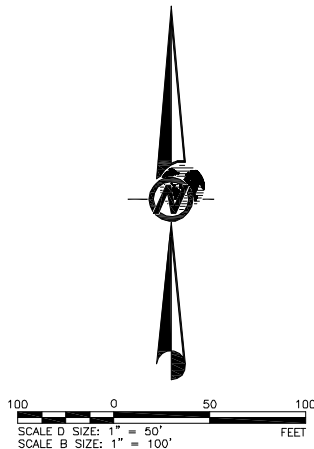
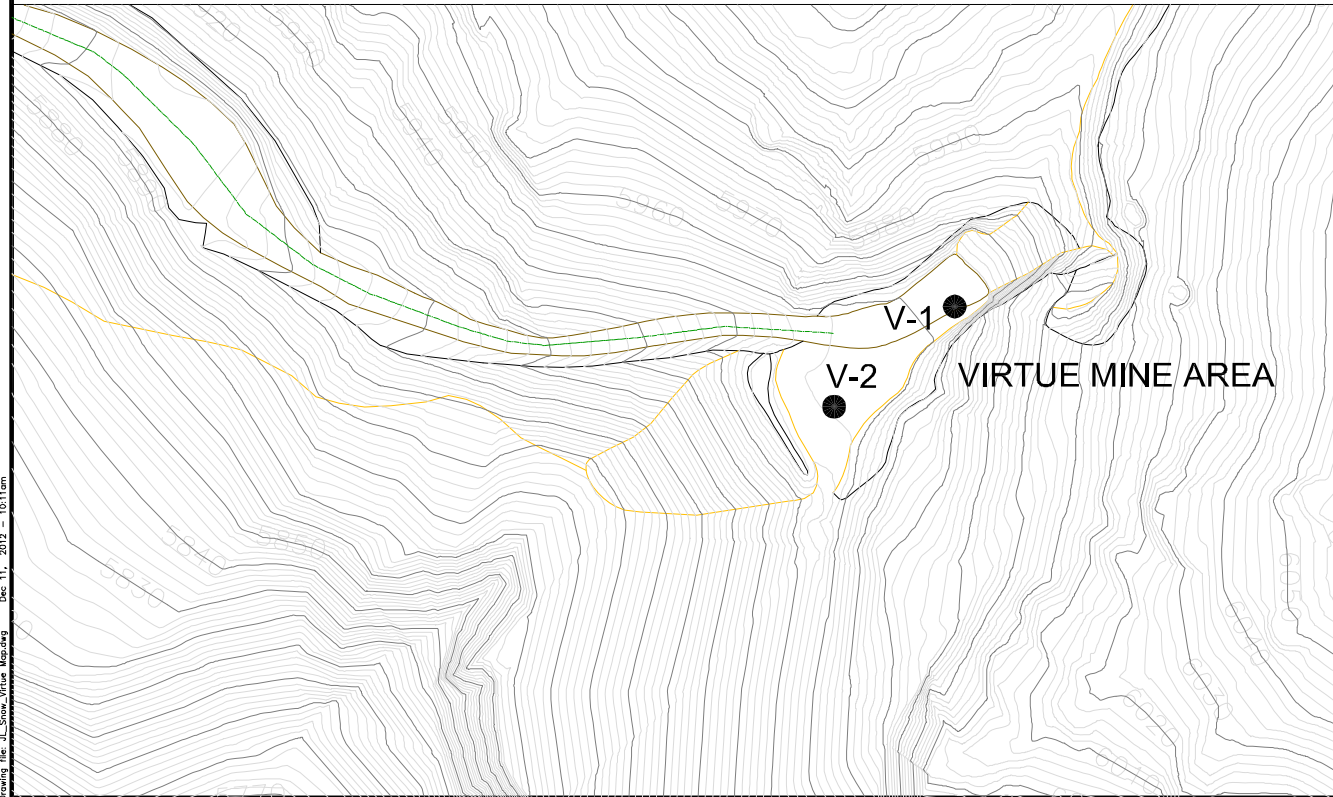
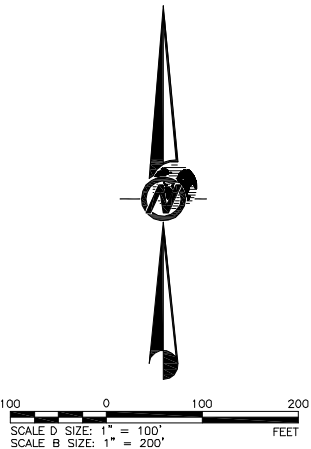
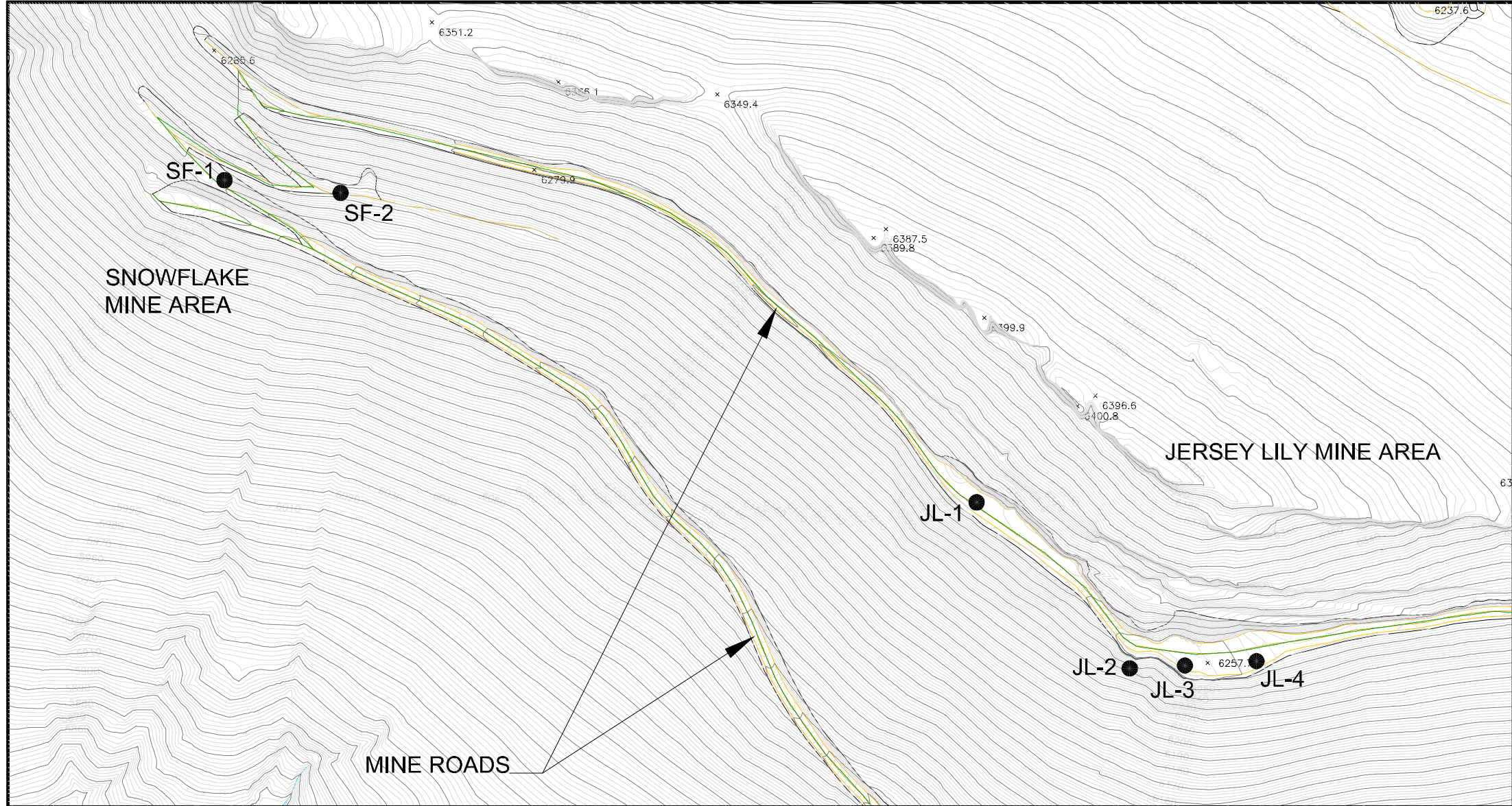
TITLE

GENERAL OVERVIEW
JERSEY LILY, SNOWFLAKE & VIRTUE MINES



**Golder
Associates**
Albuquerque, New Mexico

PROJECT No.	113-80005	FILE No.	JL_Snow_Virtue Over			
DESIGN	BN	07/20/06	SCALE	AS SHOWN	REV.	0
CADD	CM	04/25/12	FIGURE 1			
CHECK	DR	04/25/12				
REVIEW	LM	04/25/12				



- MINE ROAD
- JL-1 VEGETATION TRANSECT

PROJECT

FREEPORT McMoRan TYRONE INC.
GRANT COUNTY, NEW MEXICO

TITLE

VEGETATION TRANSECT LOCATIONS
JERSEY LILY, SNOWFLAKE & VIRTUE MINES



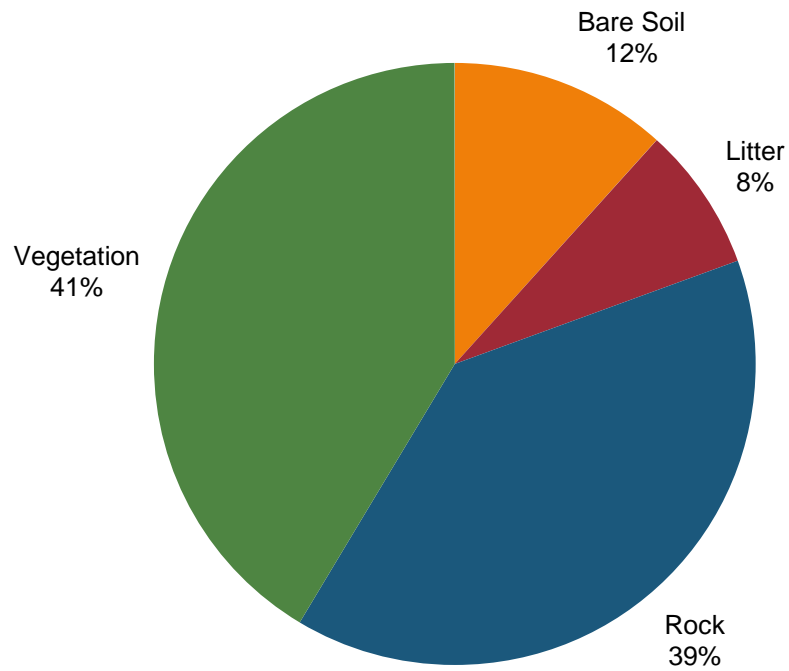
Golder Associates

Albuquerque, New Mexico

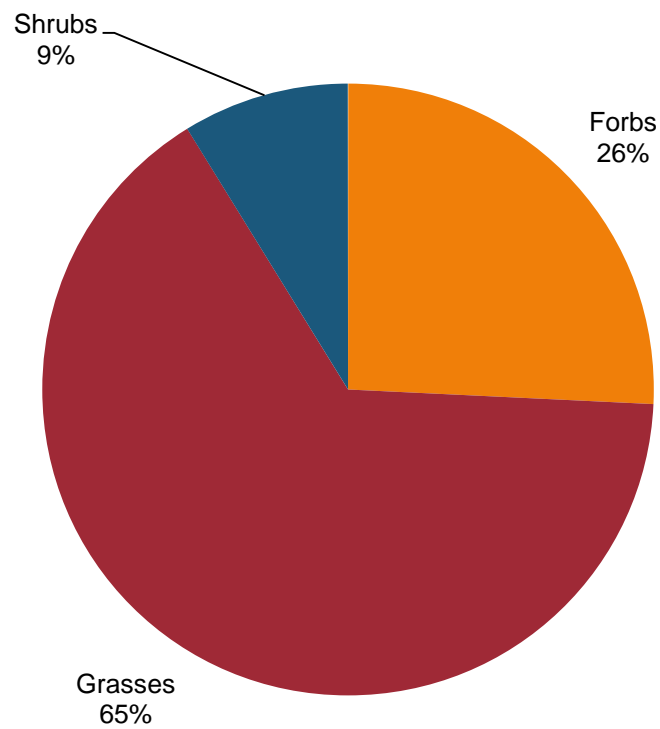
PROJECT No.	113-80005	FILE No.	JL_Snow_Virtue.dwg
DESIGN	DR	11/01/07	SCALE AS SHOWN REV. 0
CADD	CM	12/11/12	
CHECK	DR	12/11/12	
REVIEW	LM	12/11/12	

FIGURE 2

Figure 3
Jersey Lily, Snowflake, Virtue Mines Mean Canopy Cover

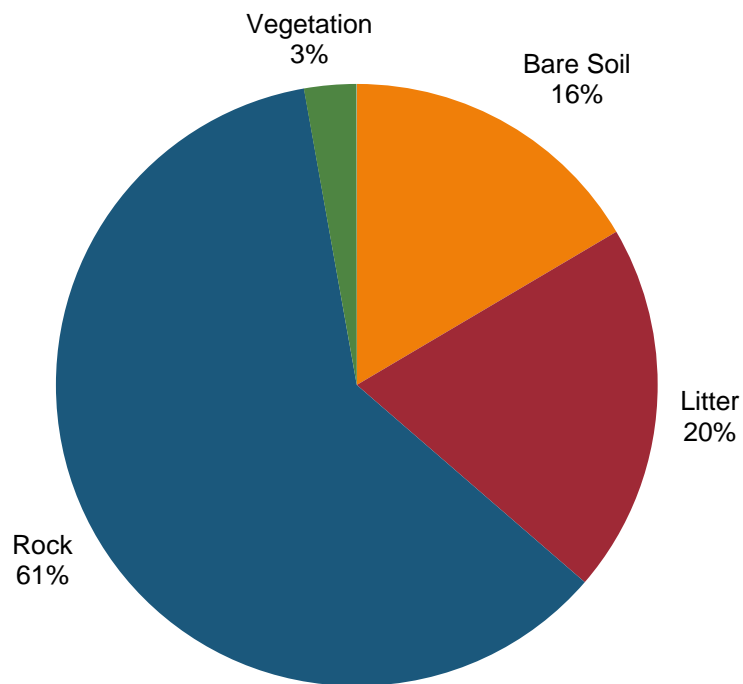


Mean Canopy Cover Components

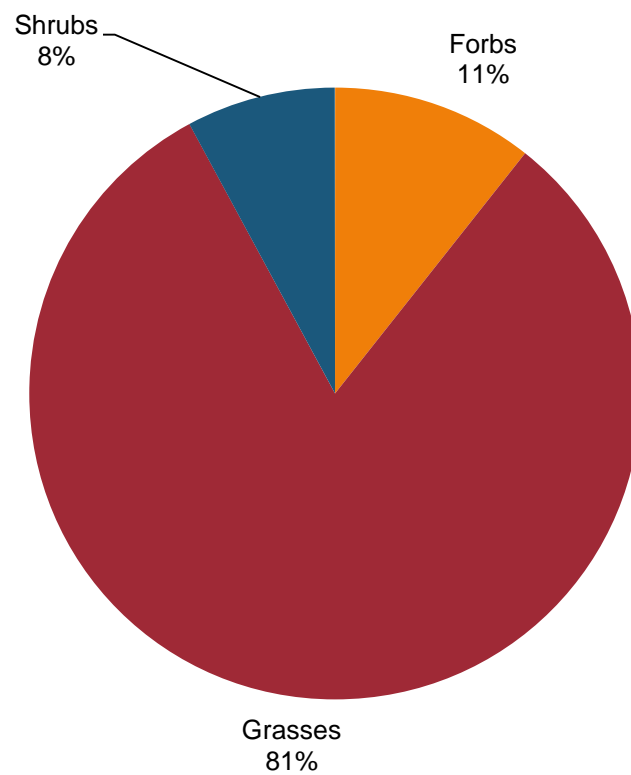


Proportional Canopy Cover Contributed by Plant Classes

Figure 4
Jersey Lily, Snowflake, Virtue Mines Mean Basal Cover



Mean Basal Cover Components



Proportional Basal Cover Contributed by Plant Classes

APPENDIX A
SUMMARIES OF SAMPLING DATA

Table A1: Jersey Lily, Snowflake, Virtue Mines Canopy Vegetation Data

Transect	JL1			JL2			JL3			JL4			V1			V2			S1			S2		
Quadrat	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Forbs																								
LOWR	13.0	4.5	19.0	--	--	--	34.0	15.5	9.2	12.2	2.0	18.5	4.0	16.0	4.0	7.5	8.6	--	--	--	--	--	--	--
ARLU	--	--	--	--	--	--	--	--	--	--	--	--	11.0	--	7.0	--	--	--	--	--	--	--	--	--
BADI	--	--	--	--	--	--	--	--	--	--	--	--	0.5	--	--	--	--	0.1	--	--	5.5	--	--	--
CHLE	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CHPR	--	--	--	--	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--
CHST	--	--	0.8	--	--	--	0.3	--	--	--	--	--	--	--	--	--	--	4.6	--	--	--	--	--	--
DAAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12.0	--	--	--	--	--	--	--	--	--
DACA	--	--	--	--	--	--	--	--	--	--	12.0	0.4	--	--	--	--	--	--	--	--	--	--	1.6	0.7
ERWR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3	--	--	--	--	--
GAPI	--	--	0.5	--	--	--	--	--	--	4.3	--	--	--	--	--	--	--	--	--	--	--	1.5	6.4	0.5
GLBI	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3
MACA	--	--	--	4.8	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	--	0.1
MAGR	--	8.0	--	--	--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MELE	--	--	--	--	T	0.3	--	--	--	--	--	--	1.0	1.0	--	--	0.2	0.7	--	--	--	--	--	--
MOSS	--	--	--	--	18.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSCA	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--
PSTE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13.5
SAIB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--	--	--	--
SOEL	--	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPFE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2
STPA	--	--	--	--	--	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UNF 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.4	--	--	--	--	--	--
Grasses																								
ARAD	--	--	--	--	--	--	0.8	0.8	3.6	0.1	6.0	T	--	--	--	--	--	--	--	--	--	0.6	--	5.8
ARPU	6.0	3.5	3.5	3.3	6.3	11.0	--	--	--	--	--	19.5	--	--	--	--	--	--	22.0	15.0	2.5	13.5	7.0	13.5
ARSC	1.3	--	6.0	--	--	--	0.9	--	0.1	--	--	--	1.5	1.0	--	6.5	3.0	12.0	--	--	--	--	2.2	0.1
BOBA	--	--	--	--	--	--	--	1.1	--	0.6	8.5	0.1	--	--	--	--	--	--	--	--	--	--	--	--
BOBA2	0.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.0	2.0	3.5	12.5	18.0
BOCU	8.4	5.5	15.0	--	--	--	1.2	7.8	13.2	17.5	1.0	4.3	--	--	6.0	24.0	36.5	1.2	9.0	25.0	17.0	32.0	16.5	--
BOGR	--	--	--	--	--	--	0.7	0.3	--	--	--	--	--	--	12.0	--	--	--	--	--	--	--	--	--
BOHI	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13.0	--	--	--	--	--	--	--	--	--
ERIN	--	--	--	--	--	--	--	--	--	--	--	--	26.0	14.0	--	42.0	3.5	13.0	--	--	--	--	--	--
ERPE	2.5	--	--	--	--	--	--	--	--	4.0	--	--	8.0	--	--	31.0	7.5	36.2	1.8	--	2.5	8.2	7.5	5.5
LYPH	--	--	--	--	--	--	--	--	0.3	0.1	3.5	T	--	--	--	--	--	--	--	--	--	--	--	--
Shrubs																								
GUSA	--	--	4.5	--	--	--	--	--	--	--	--	--	--	--	17.0	--	--	--	--	--	5.0	--	1.0	0.7
ARCA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	29.5	0.1	--	8.0	--	--	--	--
BRCA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--
DAWH	--	--	--	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VICO	--	--	--	--	--	--	--	--	--	--	--	--	2.5	--	--	--	--	--	--	--	--	--	--	--
Totals																								
BARE	4.0	7.0	5.0	25.0	36.0	45.0	27.0	6.0	12.0	6.0	4.0	5.0	7.0	35.0	5.5	0.5	--	7.0	13.0	7.0	15.5	2.0	1.0	5.0
LITTER	2.8	1.2	2.5	3.5	24.0	12.0	5.0	11.2	3.0	3.5	4.5	3.5	7.0	3.0	5.5	2.0	23.0	2.3	4.7	9.0	7.5	26.0	5.0	14.5
ROCK	64.2	70.3	47.5	62.4	15.7	29.7	31.0	56.8	64.5	57.0	59.5	54.5	35.0	30.0	22.0	5.5	3.0	20.7	48.8	34.0	44.5	14.0	35.0	34.0
TOTAL	29.0	21.5	45.0	9.1	24.4	13.3	37.0	26.0	20.5	33.5	32.0	37.0	51.0	32.0	67.0	92.0	74.0	70.0	33.5	50.0	32.5	58.0	59.0	46.5

Notes:
Species codes defined in Table A3

Table A2: Jersey Lily, Snowflake, Virtue Mines Basal Vegetation Data

Transect	JL1			JL2			JL3			JL4			V1			V2			S1			S2		
Quadrat	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Forbs																								
LOWR	0.4	0.1	0.4	--	--	--	0.3	0.2	0.3	0.6	0.1	0.8	T	0.1	0.1	0.3	0.4	--	--	--	--	--	--	--
ARLU	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	0.1	--	--	--	--	--	--	--	--	--
BADI	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	T	--	--	0.1	--	--	--
CHLE	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CHPR	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--
CHST	--	--	T	--	--	--	T	--	--	--	--	--	--	--	--	--	--	0.3	--	--	--	--	--	--
DAAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--	--
DACA	--	--	--	--	--	--	--	--	--	--	0.3	T	--	--	--	--	--	--	--	--	--	--	0.2	0.1
ERWR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--
GAPI	--	--	T	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--	--	--	--	0.1	0.2	0.1
GLBI	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
MACA	--	--	--	0.1	T	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	T
MAGR	--	0.1	--	--	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MELE	--	--	--	--	T	T	--	--	--	--	--	--	T	T	--	--	T	T	--	--	--	--	--	--
MOSS	--	--	--	--	--	--	--	--	--	--	--	--	2.5	--	--	--	--	--	--	--	--	--	--	--
PSCA	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--
PSTE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3
SAIB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--
SOEL	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SPFE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T
STPA	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UNF 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--
Grasses																								
ARAD	--	--	--	--	--	--	0.1	T	0.1	T	0.6	T	--	--	--	--	--	--	--	--	--	T	--	0.1
ARPU	--	--	--	--	--	--	0.3	0.2	--	--	--	--	--	--	1.4	--	--	--	--	--	--	--	--	--
ARSC	0.1	--	--	--	--	--	--	--	--	0.1	--	--	0.7	--	--	0.5	0.2	1.2	0.1	--	T	0.4	0.2	0.2
BOBA	0.9	0.8	1.2	--	--	--	0.3	0.8	0.5	0.7	0.1	0.4	--	--	0.6	1.2	2.0	0.2	0.7	2.8	1.7	3.6	1.2	--
BOBA2	--	--	--	--	--	--	--	--	0.1	T	0.3	T	--	--	--	--	--	--	--	--	--	--	--	--
BOCU	0.8	0.8	0.3	0.2	1.0	1.4	--	--	--	--	--	1.6	--	--	--	--	--	--	2.4	0.9	0.3	1.2	0.5	0.6
BOGR	--	--	--	--	--	--	--	0.3	--	0.1	0.7	0.1	--	--	--	--	--	--	--	--	--	--	--	--
BOHI	0.1	--	0.5	--	--	--	0.1	--	T	--	--	--	0.1	0.1	--	0.9	--.1	0.3	--	--	--	--	0.4	0.1
ERIN	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	0.1	0.2	1.0	1.2
ERPE	--	--	--	--	--	--	--	--	--	--	--	--	2.6	1.1	--	3.2	0.4	0.7	--	--	--	--	--	--
LYPH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.7	--	--	--	--	--	--	--	--	--
Shrubs																								
GUSA	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	0.3	--	--	--	--	--	0.1	--	0.2	0.1
ARCA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--
BRCA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	0.4	T	--	0.1	--	--	--	--
DAWH	--	--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VICO	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals																								
BARE	5.0	8.0	6.0	30.0	43.0	52.0	40.9	8.0	15.0	9.0	5.0	7.0	13.0	40.0	6.0	10.0	2.6	20.0	22.0	17.0	23.0	3.0	3.0	8.0
LITTER	3.2	1.5	4.5	4.0	26.0	15.0	9.0	17.0	8.0	7.5	5.5	8.5	16.0	11.5	13.0	60.0	75.9	30.0	5.5	8.0	8.0	74.5	45.1	18.5
ROCK	89.7	88.9	86.8	65.7	28.8	31.5	49.0	73.6	76.0	82.0	87.5	81.6	65.1	47.3	76.7	22.5	18.0	47.3	69.2	70.9	66.9	17.0	48.0	70.9
TOTAL	2.1	1.7	2.7	0.3	2.2	1.6	1.1	1.4	1.0	1.5	2.0	3.0	6.0	1.3	4.3	7.5	3.5	2.8	3.3	4.2	2.2	5.5	3.9	2.7

Notes:
Species codes defined in Table A3



Table A3: Jersey Lily, Snowflake, Virtue Mines Point-Center Quarter Data

Jersey Lily		
Transect	Species	Q (feet)
1	GUSA	7.4
1	GUSA	1.6
1	GUSA	5.8
1	ISTE	12.9
2	BRCA	3.7
2	BRCA	8.1
2	PRGL	4.2
2	BRCA	6.1
3	VICO	4.4
3	GUSA	16.4
3	VICO	12.5
3	VICO	7.5
4	VICO	7.1
4	BRCA	25.3
4	VICO	23
4	VICO	18.1
Snowflake		
Transect	Species	Q (feet)
1	DAWH	8.7
1	BAPT	8.5
1	GUSA	5.6
1	GUSA	5.9
2	PAIN	1.2
2	VICO	6.3
2	GUSA	4.6
2	BRCA	9.4
Virtue Mine		
Transect	Species	Q (feet)
1	BRCA	8.1
1	BRCA	11
1	BRCA	11.3
1	BRCA	8.6
2	BRCA	2.4
2	BRCA	1.3
2	BRCA	7.8
2	BRCA	0.9

APPENDIX B
PHOTO LOG



Virtue Mine
Transect 1



Virtue Mine
V-1 Q-1



Virtue Mine
V-1 Q-2



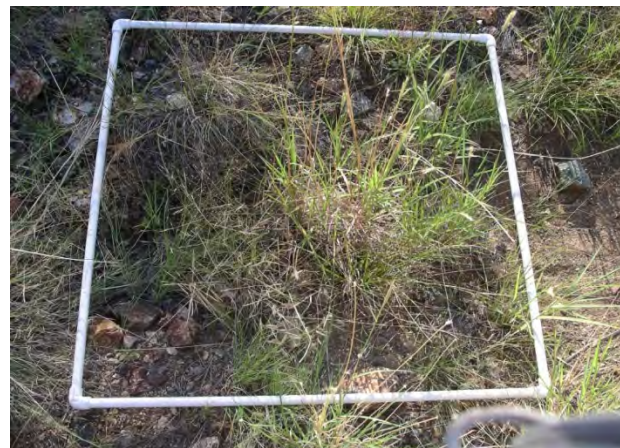
Virtue Mine
V-1 Q-3



Virtue Mine



Virtue Mine
Transect 2



Virtue Mine
V-2 Q-1



Virtue Mine
V-2 Q 2



Virtue Mine
V-2 Q-3



Snowflake
Transect 1



Snowflake
S-1 Q-1



Snowflake
S-1 Q-2



Snowflake
S-1 Q-3



Snowflake
Transect 2



Snowflake
S-2 Q-1



Snowflake
S-2 Q-2



Snowflake
S-2 Q-3



Jersey Lily
Transect 1



Jersey Lily
JL-1 Q-1



Jersey Lily
JL-1 Q-2



Jersey Lily
JL-1 Q-3



Jersey Lily
Transect 2



Jersey Lily
JL-2 Q-1



Jersey Lily
JL-2 Q-2



Jersey Lily
JL-2 Q-3



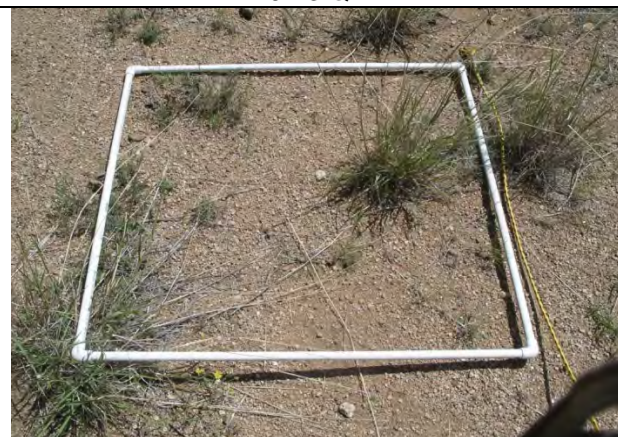
Jersey Lily
Transect 3



Jersey Lily
JL-3 Q-1



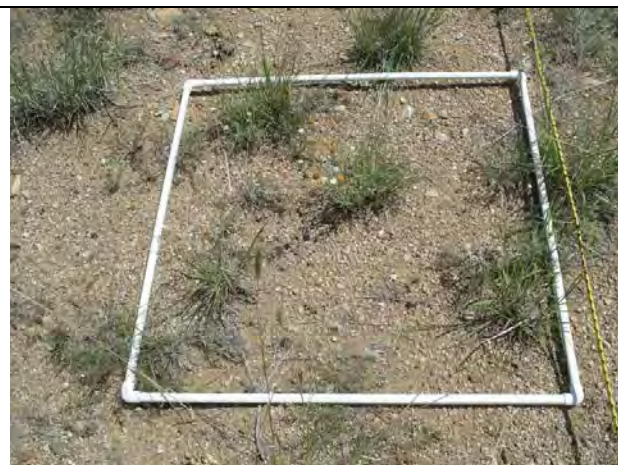
Jersey Lily
JL-3 Q-2



Jersey Lily
JL-3 Q-3



Jersey Lily
Transect 4



Jersey Lily
JL-4 Q-1



Jersey Lily
JL-4 Q-2



Jersey Lily
JL-4 Q-3