

Date: April 26, 2012

Project No.: 123-80005

To: Mr. Charles Johnson

Company: Freeport McMoRan Tyrone, Inc.

From: Lewis Munk and Doug Romig

cc:

RE: FINAL VEGETATION SUCCESS MONITORING, YEAR 1 SUMMARY – 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 materials. 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 year 1 of the 2 year monitoring



required for the JLSV mine. Vegetation sampling of the three mines was conducted on September 22, 2011 by Douglas Romig, Perrianne Houghton, and Stephanie Owen of Golder.

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 2011 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 52.4% [\pm 10.1%] (Table 1). Canopy cover in the individual quadrats ranged from 0 to 97%. Total canopy cover from perennial vegetation was at 48.9%. The minimum sample size needed to meet sample adequacy (N_{min}) for total canopy cover was calculated at 89 samples. Mean basal cover was estimated at 3.3 percent [\pm 0.79%] (Table 1). The general components of basal and canopy cover are displayed in Figure 3.

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 83.4% of the total relative cover. Cane bluestem, plains lovegrass, sideoats grama and hairy grama were the dominant perennial grasses. Relative herbaceous forb cover was 5.6%. Native legumes were the dominant forbs including white prairie clover, dwarf dalea, and Wright's deerclover. Relative shrub cover was 11.0% with California brickellbush, honey mesquite, and broom snakeweed being the dominant species. Figure 4 provides a graphical interpretation of canopy and basal cover components relative to life forms.

In total, 107 plant species (Table 2) have been identified on the JLSV sites during the interim field inspections (Golder 2007; 2011a) and first year quantitative monitoring. In comparison, only 56 species occurred in the sampling quadrats. Of the 14 species seeded, 7 have been found growing in the reclaimed areas (Table 2). The reclaimed sites have successfully recruited 99 native species from adjacent undisturbed areas. Nearly 80% of the species are perennial. No noxious weeds have been observed on the reclaimed sites. A broad diversity of life forms are present on the JLSV reclamation including 50 forbs, 33 grasses, and 24 shrubs.

Shrub density at the JLSV reclamation area was 0.2 stems/m² as measured by the PCQ method. 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 SUMMARY

Revegetation efforts have been successful at the JLSV sites as these areas now support robust and diverse plant community and the surfaces are stable. The perennial canopy cover on the reclamation was 48.9%, well above the performance criterion of 15%. 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. Second year vegetation monitoring for FA release will be completed in the late-summer of 2012.

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.

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

Total Canopy (%)	
Mean	52.6
Standard Deviation	29.42
90% Confidence Interval	10.1
Nmin ¹	89
Basal Cover (%)	
Mean	3.3
Standard Deviation	2.3
90% Confidence Interval	0.79
Nmin ¹	135
Shrub Density (#/m²) from Quadrats	
Mean	1.35
Standard Deviation	2.57
90% Confidence Interval	0.88
Nmin ¹	1023
Shrub Density (#/m²) from Point-Centered Quarter	
Mean	0.2
Standard Deviation	0.2
90% Confidence Interval	0.11
Nmin ¹	191

Notes:

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

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	2.61	0.04	18.04
<i>Aristida havardii</i>	Harvard's threeawn	ARHA	0.10	0.01	0.08
<i>Aristida purpurea</i>	Purple threeawn	ARPU	0.17	T	0.13
<i>Aristida schiedeana</i>	Single-awn threeawn	ARSC	1.81	0.06	0.46
<i>Bothriochloa barbinodis</i>	Cane bluestem	BOBA	13.53	1.18	7.71
<i>Bouteloua barbata</i> ¹	Sixweeks grama	BOBA3	1.18	0.03	19.42
<i>Bouteloua curtipendula</i> ²	Sideoats grama	BOCU	5.61	0.35	4.00
<i>Bouteloua gracilis</i> ²	Blue grama	BOGR	1.97	0.35	2.58
<i>Bouteloua hirsuta</i>	Hairy grama	BOHI	3.50	0.23	3.75
<i>Bromus inermis</i>	Smooth brome	BRIN	---	---	---
<i>Chloris verticillata</i>	Tumble windmillgrass	CHVE	---	---	---
<i>Chloris virgata</i>	Feather fingergrass	CHVI	1.68	0.05	16.92
<i>Cyperus flavicomus</i>	Whiteedge flatsedge	CYFL	0.02	T	0.17
<i>Dasyochloa pulchella</i>	Fluffgrass	DAPU	0.05	T	0.25
<i>Echinochloa crus-galli</i> ¹	Barnyardgrass	ECCR	---	---	---
<i>Elymus elymoides</i> ²	Bottlebrush squirreltail	SIHY	---	---	---
<i>Eragrostis capillaris</i> ¹	Lace grass	ERCA	4.10	0.18	52.38
<i>Eragrostis curvula</i>	Weeping lovegrass	ERCU	---	---	---
<i>Eragrostis intermedia</i> ²	Plains lovegrass	ERIN	9.80	0.50	4.00
<i>Eragrostis mexicana</i>	Mexican lovegrass	ERME	0.02	T	1.00
<i>Eragrostis pectinacea</i>	Tufted lovegrass	ERPE	T	T	0.46
<i>Hilaria belangeri</i>	Curly mesquite	HIBE	---	---	---
<i>Leptochloa dubia</i> ²	Green sprangletop	LEDU	0.75	0.03	0.33
<i>Lycurus phleoides</i>	Wolfstail	LYPH	0.20	0.03	0.21
<i>Muhlenbergia metcalfei</i>	Metcalfe's muhly	MUME	---	---	---
<i>Panicum capillare</i> ¹	Witchgrass	PACA	1.32	0.01	18.58
<i>Panicum hallii</i> ¹	Hall's panicgrass	PAHI	0.01	T	0.08
<i>Panicum obtusum</i>	Vine mesquite	PAOB	---	---	---
<i>Panicum virgatum</i>	Switchgrass	PAVI	---	---	---
<i>Pleuraphis jamesii</i> ²	Galleta	PLJA	0.67	0.03	0.13
<i>Schizachyrium scoparium</i>	Little bluestem	SCSC	---	---	---
<i>Setaria macrostachya</i>	Plains bristlegrass	SEMA	---	---	---
<i>Sporobolus cryptandrus</i>	Sand dropseed	SPCR	0.63	0.08	1.13
FORBS					
<i>Acourtia nana</i>	Dwarf desertpeony	ACNA	---	---	---
<i>Allionia incarnata</i> ¹	Trailing windmills	ALIN	---	---	---
<i>Artemisia ludoviciana</i>	Louisiana sagewort	ARLU	---	---	---
<i>Astragalus nuttallianus</i>	Nuttall's loco	ASNU	---	---	---
<i>Bahia dissecta</i>	Bahia	BADI	---	---	---
<i>Boerhavia spicata</i> ¹	Creeping spiderling	BOSP	0.21	0.01	1.17
<i>Chaenactis stevioides</i>	False yarrow	CHST	0.18	0.02	0.67

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 albomarginata</i> ¹	Rattlesnake weed	CHAL	0.34	0.02	1.67
<i>Chamaesyce serpyllifolia</i> ¹	Thymeleaf spurge	CHSE	0.23	0.01	0.63
<i>Chenopodium leptophyllum</i> ¹	Narrow-leaved goosefoot	CHLE	0.01	T	0.25
<i>Cleome serrulata</i>	Rocky Mountain bee plant	CLSE	T	T	0.04
<i>Cologania angustifolia</i>	Narrowleaf tick-clover	COAN	0.03	T	0.04
<i>Convolvulus arvensis</i>	Bindweed	COAR	0.21	T	0.08
<i>Conyzia canadensis</i> ¹	Horseweed	COCA	---	---	---
<i>Croton texensis</i> ¹	Texas croton	CRTE	0.04	0.01	0.38
<i>Dalea candida</i>	White prairie clover	DACA	0.36	0.02	7.04
<i>Dalea lanata</i>	Woolly dalea	DALA	---	---	---
<i>Dalea nana</i>	Dwarf dalea	DANA	0.36	0.20	1.04
<i>Dalea pogonathera</i>	Bearded prairie clover	DAPO	0.16	0.01	0.46
<i>Datura quercifolia</i>	Oak-leaved thornapple	DAQU	---	---	---
<i>Desmodium rosei</i>	Rose's ticktrefoil	DERO	0.17	0.01	0.29
<i>Eriogonum wrightii</i>	Bastardsage	ERWR	0.04	0.01	0.04
<i>Evolvulus sericeus</i>	Silver dwarf morning-glory	EVSE	---	---	---
<i>Gaillardia pinnatifida</i>	Red dome blanketflower	GAPI	0.06	T	0.08
<i>Glandularia bipinnatifida</i>	Dakota vervain	GLBI	---	---	---
<i>Ipomoea cristulata</i>	Scarlet morning glory	IPCR	T	T	0.04
<i>Kallstroemia parviflora</i> ¹	Warty caltrop	KAPA	0.56	0.02	1.17
<i>Kochia scoparia</i> ¹	Burningbush	KOSC	0.02	0.01	0.33
<i>Lotus wrightii</i>	Wright's deervetch	LOWR	0.24	T	0.50
<i>Machaeranthera canescens</i>	Purple aster	MACA	---	---	---
<i>Machaeranthera gracilis</i> ¹	Slender goldenweed	MAGR	T	T	0.04
<i>Medicago sativa</i>	Alfalfa	MESA	---	---	---
<i>Melampodium leucanthum</i>	Blackfoot	MELE	---	---	---
<i>Mentzelia multiflora</i> ¹	Blazing star	MEMU	---	---	---
<i>Mimosa rupertiana</i>	Sensitive briar	MIRU	0.03	T	0.13
<i>Mirabilis coccinea</i>	Red four o'clock	MICO	---	---	---
<i>Pectis angustifolia</i> ¹	Lemonweed	PEAN	0.02	0.01	0.29
<i>Pectis paposa</i> ¹	Chinchweed	PEPA	0.04	T	0.17
<i>Penstemon barbatus</i>	Beardlip penstemmon	PEBA	---	---	---
<i>Pseudognaphalium canescens</i>	Grey everlasting	PSCA	0.02	T	0.04
<i>Ratibida columnifera</i>	Prairie coneflower	RACO	---	---	---
<i>Salsola tragus</i> ¹	Tumbleweed	SATR	0.04	0.01	1.13
<i>Sida abutifolia</i>	Spreading mallow	SIAB	---	---	---
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	SOEL	---	---	---
<i>Sphaeralcea fendleri</i> ²	Scarlet globemallow	SPFE	0.07	T	0.08
<i>Stephanomeria pauciflora</i>	Skeletonweed	STPA	---	---	---
<i>Thelesperma megapotamicum</i>	Greenthread	THME	0.03	T	0.04
<i>Xanthium strumarium</i> ¹	Cocklebur	XAST	---	---	---
<i>Unknown Forb 1</i> ¹		UNK F1	T	T	2.50
<i>Unknown Forb 2</i> ¹		UNK F2	T	T	0.08

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

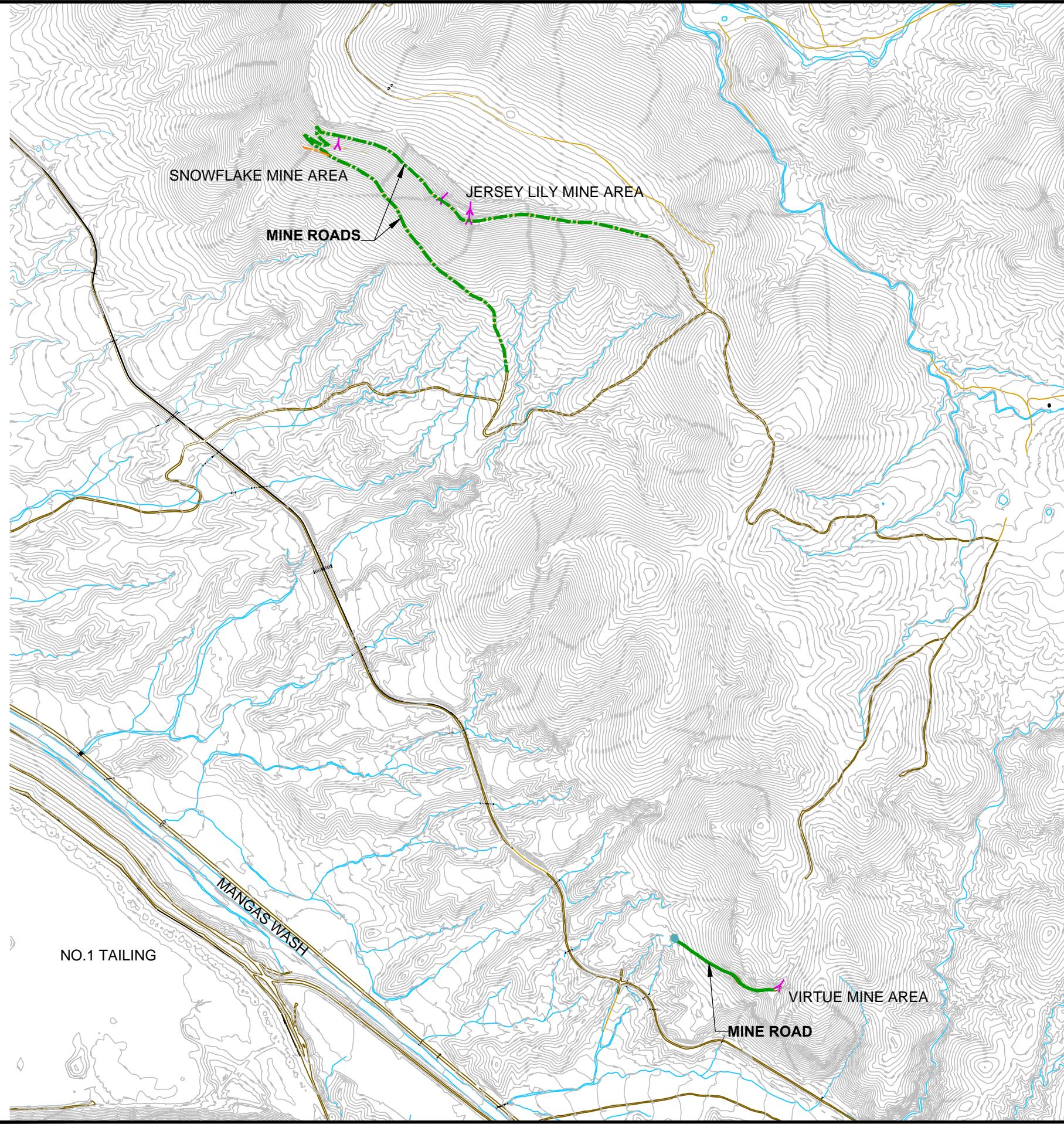
Scientific Name	Common Name	Species	Mean Canopy Cover (%)	Mean Basal Cover (%)	Mean Density (#/m ²)
SHRUBS, TREES, AND CACTI					
<i>Acacia angustissima</i>	Prairie acacia	ACAN	---	---	---
<i>Artemisia carruthii</i>	Carruth's sagewort	ARCA	0.08	T	0.42
<i>Artemisia frigida</i>	Fringed sage	ARFR	---	---	---
<i>Baccharis pteronioides</i>	Yerba de pasmo	BAPT	---	---	---
<i>Brickellia californica</i>	California brickellbush	BRCA	3.11	0.04	0.75
<i>Brickellia spp.</i>	Brickellbush	BRSP	---	---	---
<i>Chilopsis linearis</i>	Desert willow	CHLI	---	---	---
<i>Cylindropuntia imbricata</i>	Tree cholla	CYIM	T	T	0.04
<i>Dasyliion wheeleri</i>	Common sotol	DAWH	---	---	---
<i>Desmanthus cooleyi</i>	Cooley's bundleflower	DECO	---	---	---
<i>Gutierrezia sarothrae</i>	Broom snakeweed	GUSA	1.73	0.05	0.50
<i>Isocoma tenuisecta</i>	Burroweed	ISTE	---	---	---
<i>Krascheninnikovia lanata</i> ²	Winterfat	KRLA	---	---	---
<i>Mimosa biuncifera</i>	Catclaw mimosa	MIBI	---	---	---
<i>Nolina microcarpa</i>	Beargrass	NOMI	---	---	---
<i>Opuntia phaeacantha</i>	Tulip pricklypear	OPPH	---	---	---
<i>Parthenium incanum</i>	Mariola	PAIN	---	---	---
<i>Pinus edulis</i>	Pinyon	PIED	---	---	---
<i>Populus deltoides</i>	Cottonwood	PODE	---	---	---
<i>Prosopis glandulosa</i>	Honey mesquite	PRGL	1.71	0.03	0.06
<i>Prunus persica</i>	Peach	PRPE	---	---	---
<i>Senecio douglasii</i>	Douglas' ragwort	SEDO	---	---	---
<i>Tetradymia canescens</i>	Spineless horsebrush	TECA	---	---	---
<i>Viguiera cordifolia</i>	Rough goldeneye	VICO	---	---	---

Notes:¹ = annual² = species in the seed mix

--- species observed on site but not in quadrats

T = Trace

FIGURES



HISTORICAL ADIT
MINE ROAD
RANCH ROAD



500 0 500 1000
SCALE
SCALE B SIZE: 1" = 1000' FEET

PROJECT	FREEPORT McMoRAN TYRONE INC GRANT COUNTY, NEW MEXICO		
TITLE	GENERAL OVERVIEW JERSEY LILY, SNOWFLAKE & VIRTUE MINES		
 Golder Associates ALBUQUERQUE, NEW MEXICO			
PROJECT No.	113-8005	FILE No.	JL_Snow_Virtue Over
DESIGN	BN	07/20/06	SCALE AS SHOWN REV. 0
CADD	CM	4/25/12	
CHECK	DR	04/25/12	
REVIEW	LM	04/25/12	

FIGURE 1

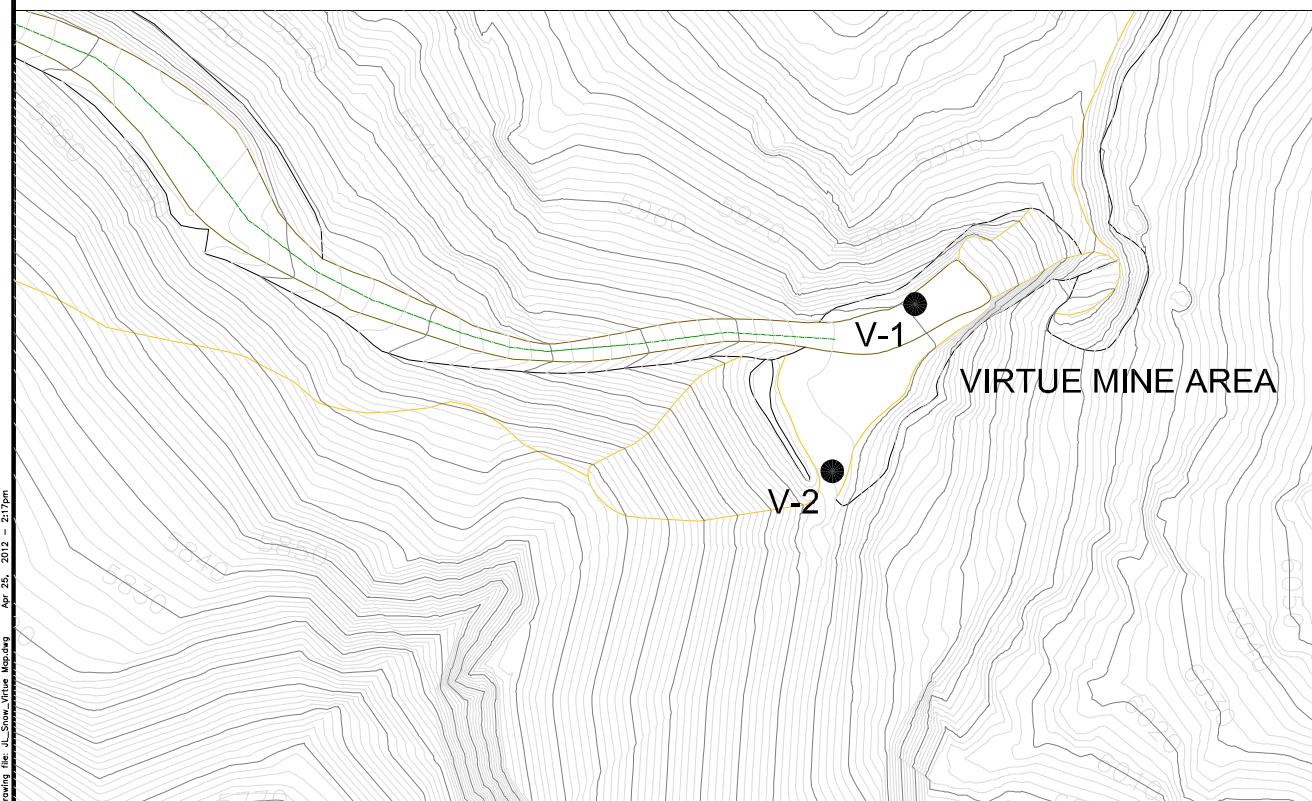
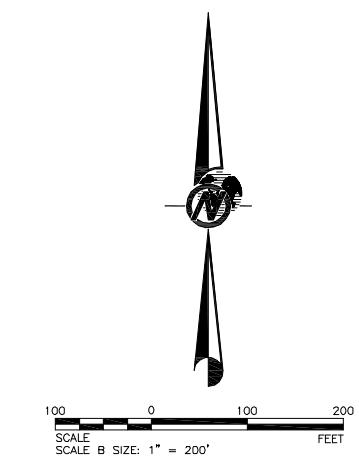
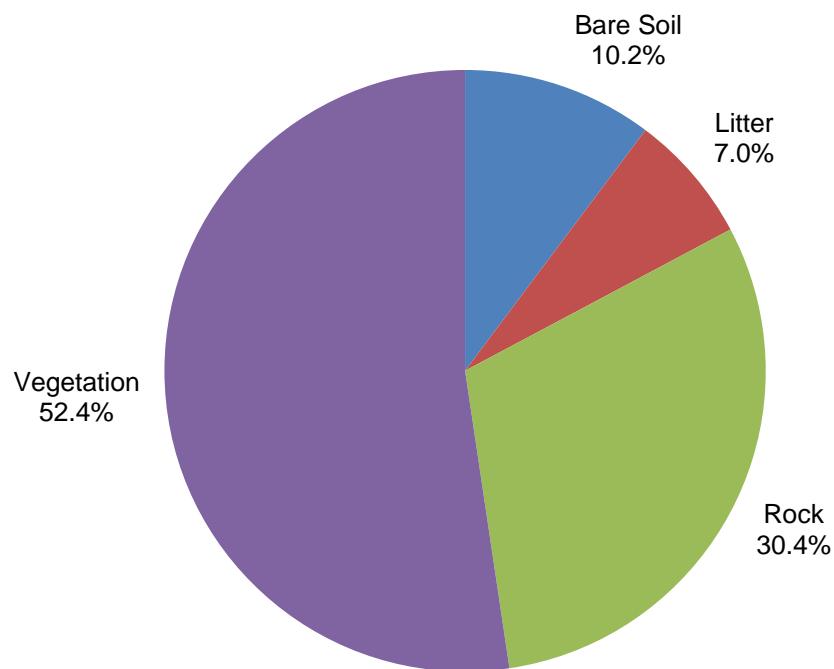
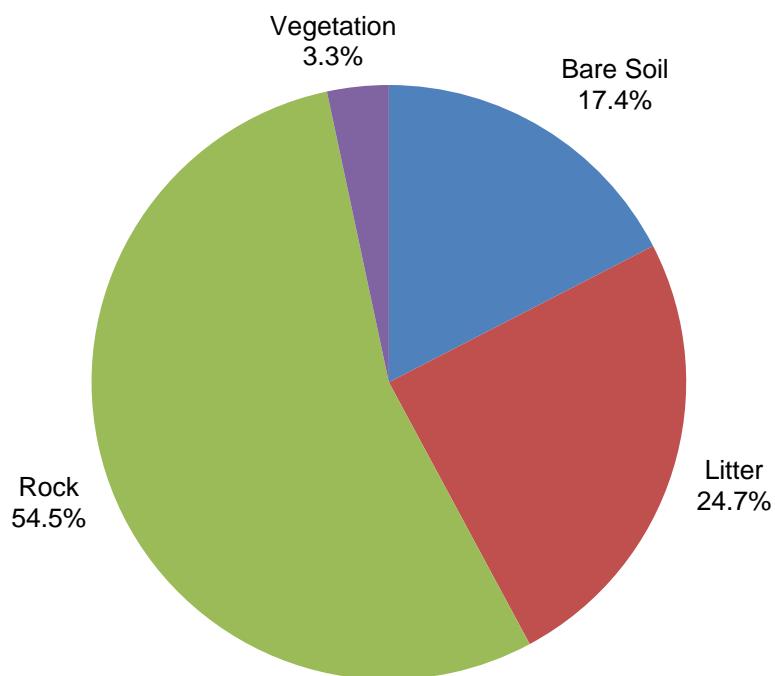


Figure 3
Jersey Lily, Snowflake and Virtue
Cover Components



Mean Canopy Cover Components

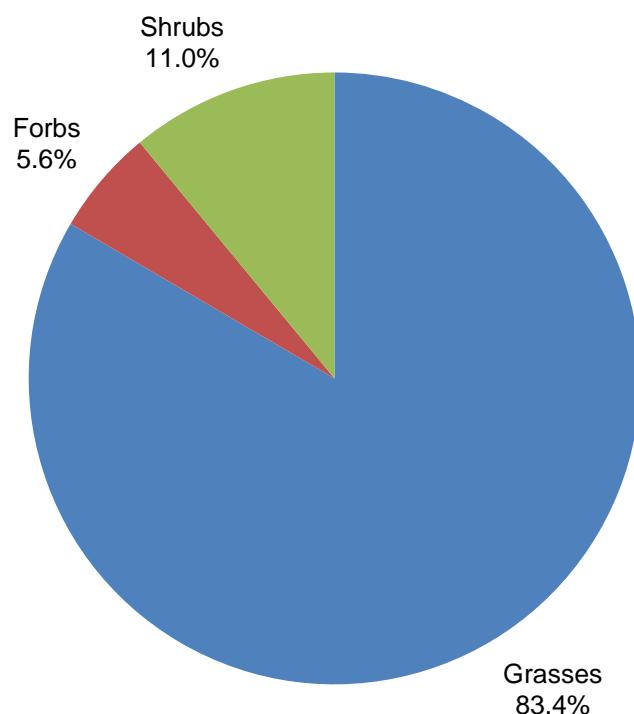


Mean Basal Cover Components

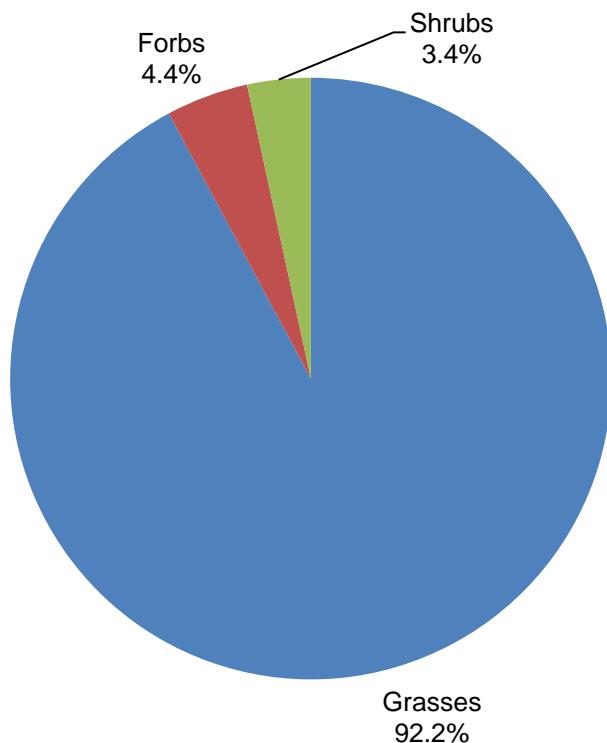
April 2012

Figure 4
Jersey Lily, Snowflake and Virtue
Cover Contributions by Plant Class

123-80005



Proportional Canopy Cover Contributed by Plant Classes



Proportional Basal Cover Contributed by Plant Classes

APPENDIX A
SUMMARIES OF SAMPLING DATA

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

Transect	JL1			JL2			JL3			JL4			SF1			SF2			V1			V2			
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																									
BOSP	--	--	--	--	--	--	--	--	--	T	T	0.1	--	--	--	--	--	--	--	--	--	--	--	--	
CHAL	--	--	--	--	--	T	T	T	--	T	T	--	--	--	--	--	--	--	T	T	--	--	--	--	
CHLE	--	--	--	--	--	--	--	--	T	--	--	--	--	T	--	--	--	--	--	--	--	--	--	--	
CHSE	--	--	--	T	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
CHST	--	--	--	0.1	--	--	T	--	--	--	--	--	--	--	--	--	--	0.1	T	--	--	--	--	--	
CLSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	
COAN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	
CONV	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
CRTE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	T	T	--	T	--	T	--	--	
DAAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	
DACA	0.1	--	T	T	--	--	T	--	0.1	--	--	--	--	--	--	--	--	T	--	T	T	T	--	--	
DANA	--	--	--	--	--	--	T	T	--	1	T	--	--	--	--	--	--	--	--	--	--	--	--	--	
DAPO	--	--	--	--	--	T	--	0.1	--	--	--	T	--	--	T	--	--	--	--	--	--	--	--	--	
DERO	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--	
ERWR	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	
GAPI	--	--	--	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
IPCR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	--	
KAPA	--	--	--	--	--	--	--	T	0.1	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
KOSC	--	--	--	--	--	--	--	--	T	T	T	--	--	--	--	--	--	--	--	--	--	--	--	--	
LOWR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	T	--	--	T	--	
MAGR	--	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MIRU	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	
PEAN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	T	T	T	--	--	--	--	
PEPA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	
PSCE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	
SATR	--	--	0.1	T	--	--	--	--	--	--	--	T	T	--	--	--	--	--	--	--	--	--	--	--	
SPFE	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	--	
THME	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	
Unk Forb1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--	
Unk Forb2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	--	--	--
Grasses																									
ARAD	0.2	--	0.1	0.1	0.1	--	0.1	0.1	T	--	--	--	--	T	--	T	0.3	T	--	--	T	--	--	--	--
ARHA	--	--	--	--	--	--	--	--	--	--	--	--	0.3	--	0.1	--	--	--	--	--	--	--	--	--	--
ARPU	--	--	--	--	--	--	0.2	--	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ARSC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2	--	0.5	0.3	0.3	0.2	--	--
BOBA	2.3	0.9	--	1.5	2.2	3.6	2.3	1.0	1.5	--	0.1	--	4.1	0.3	1.2	0.1	3.2	--	1.8	1.0	1.4	--	--	--	--
BOBA3	0.2	T	0.2	--	--	0.1	0.1	T	--	--	--	0.1	0.1	--	0.1	--	--	--	--	--	--	--	--	--	--
BOCU	--	0.1	--	--	0.3	--	--	--	--	T	--	--	--	--	3.3	2.0	2.5	--	0.3	--	T	--	--	T	--
BOGR	--	1.0	1.4	--	--	0.8	--	0.1	--	T	0.1	--	--	0.4	1.0	--	--	3.2	--	0.1	0.2	--	--	--	--
BOHI	1.9	0.5	--	1.9	T	--	--	--	--	--	--	--	--	--	0.3	0.2	0.2	--	--	--	--	--	--	0.4	--
CHVI	T	--	0.3	--	0.1	0.5	T	0.1	--	--	--	--	0.1	0.1	--	--	0.1	--	--	T	--	--	T	--	
CYFL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	--	--	
DAPU	--	--	--	--	--	0.1	T	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
ERCA	0.2	--	--	T	4.0	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	T	T	--	
ERIN	--	--	--	0.2	T	--	--	--	--	--	--	--	0.3	0.6	0.1	0.1	0.2	2.5	0.3	0.4	4.2	1.2	2.0	--	--
ERME	T	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	--	T	--	--	--	--</

Table A2: Burro Mountain Basal Vegetation Data

Transect	JL1			JL2			JL3			JL4			SF1			SF2			V1			V2			
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																									
BOSP	--	--	--	--	--	--	--	--	--	0.4	0.6	4	--	--	--	--	--	--	--	--	--	--	--	--	
CHAL	--	--	--	--	--	0.1	0.1	0.7	--	0.5	3.8	--	--	--	--	--	--	--	2	1	--	--	--	--	
CHLE	--	--	--	--	--	--	--	--	0.2	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	
CHSE	--	--	--	1.6	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
CHST	--	--	--	1.5	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	2.5	0.2	--	--	--	--	
CLSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	
COAN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.8	--	--	--	--	--	
CONV	--	--	--	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
CRTE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	0.2	0.2	--	0.1	--	0.1	--	--	
DAAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	--	--	
DACA	1.5	--	0.1	0.5	--	0.5	--	5	--	--	--	--	--	--	--	--	--	0.1	--	0.7	0.1	0.1	--	--	
DANA	--	--	--	--	--	--	0.6	1.3	--	0.3	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	
DAPO	--	--	--	--	--	1.5	--	2.2	--	--	--	T	--	--	--	0.1	--	--	--	--	--	--	--	--	
DERO	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.0	--	--	--	--		
ERWR	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	
GAPI	--	--	--	--	--	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
IPCR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	
KAPA	--	--	--	--	--	--	--	--	5	2.2	6.3	--	--	--	--	--	--	--	--	--	--	--	--	--	
KOSC	--	--	--	--	--	--	--	--	0.3	T	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	
LOWR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	5.4	--	--	--	--	--	
MAGR	--	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MIRU	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	
PEAN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	T	--	0.2	0.1	0.2	--	--	--	--	
PEPA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.0	--	--	--	--	--	--	--
PSCE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	--	
SATR	--	--	0.7	0.1	--	--	--	--	--	--	--	0.1	0.1	--	--	--	--	--	--	--	--	--	--	--	
SPFE	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	
THME	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--	
Unk Forb1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--	--	
Unk Forb2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	--	
Grasses																									
ARAD	22.5	--	3.5	1.0	2.0	--	7.5	9.2	1.3	--	--	--	0.1	--	0.5	14.0	0.8	--	--	0.2	--	--	--	--	
ARHA	--	--	--	--	--	--	--	--	--	--	--	2.0	--	0.3	--	--	--	--	--	--	--	--	--	--	
ARPU	--	--	--	--	--	--	4.0	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
ARSC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.5	--	13.0	7.5	12.0	7.5	--	--	
BOBA	9.0	6.1	--	30.0	30.0	25.0	19.0	17.0	25.0	--	1.0	--	25.0	5.5	25.0	2.5	60.0	--	13.0	15.0	16.7	--	--	--	
BOBA3	0.3	0.5	12.0	--	--	1.1	2.5	0.2	--	--	--	1.3	7.0	--	3.5	--	--	--	--	--	--	--	--	--	
BOCU	--	1.5	--	6.0	--	--	--	--	0.2	--	--	--	--	60.0	38.0	27.0	--	2.0	--	0.1	--	--	--	--	
BOGR	--	7.3	2.8	--	--	9.0	--	0.8	--	0.2	1.1	--	--	4.0	4.5	--	14.5	--	1.9	1.2	--	--	--	--	
BOHI	23.3	5.5	--	35.0	T	--	--	--	--	--	--	--	--	4.5	1.0	6.0	--	--	--	--	8.6	--	--	--	
CHVI	0.2	--	15.0	--	0.4	20.0	0.5	0.2	--	--	--	0.8	3.0	--	--	0.2	--	--	0.1	--	--	--	--	--	
CYFL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	--	--	--	
DAPU	--	--	--	--	--	0.5	0.2	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
ERCA	21.4	--	--	0.5	75.0	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--	0.7	0.2	--	--	--	
ERIN	--	--	--	5.0	1.0	--	--	--	--	--	--	5.0	2.7	2.3	5.0	1.5	85.0	4.0							

**Table A3: Point-Centered Quarter
Shrub Occurrence**

Transect	Species	Q (feet)
JL1	GUSA	3.9
JL1	BRCA	13.4
JL1	GUSA	3.1
JL1	GUSA	2.6
JL2	GUSA	2.2
JL2	BRCA	5.3
JL2	BRCA	6.5
JL2	BRCA	4.6
JL3	VICO	12.6
JL3	BRCA	29.4
JL3	VICO	4.1
JL3	PRGL	5.2
JL4	OPPH	12.3
JL4	BRCA	9.5
JL4	DAWH	5.6
JL4	DAWH	6.3
SF1	GUSA	17.5
SF1	ISTE	4.8
SF1	ISTE	5.0
SF1	PAIN	13.7
SF2	GUSA	9.1
SF2	GUSA	2.5
SF2	GUSA	1.7
SF2	GUSA	4.4
V1	BRCA	13.2
V1	GUSA	6.8
V1	BRCA	11.5
V1	PODE	15.0
V2	GUSA	17.3
V2	BRCA	10.0
V2	BRCA	3.3
V2	BRCA	5.9

APPENDIX B
PHOTO LOG



April 2012

Snowflake, Jersey Lily, and Virtue Vegetation
Quadrat Photos

123-80005

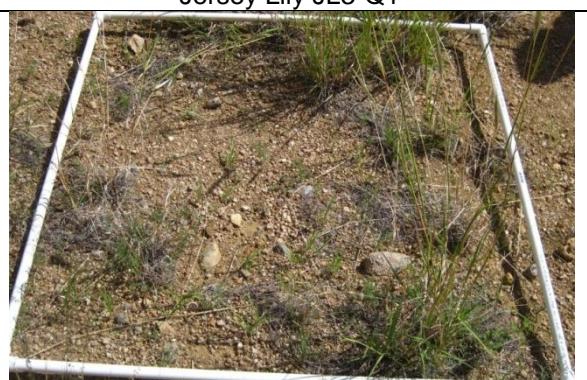
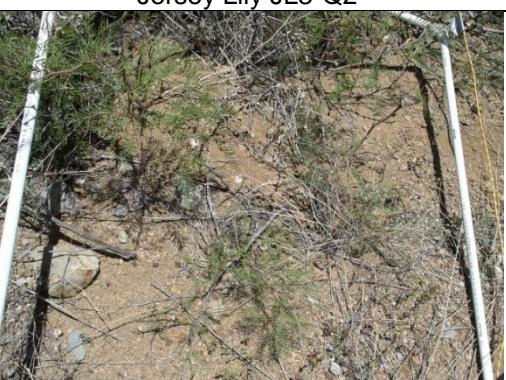
Snowflake SF1-Q1	Snowflake SF1-Q2
Snowflake SF1-Q3	Snowflake SF2-Q1
Snowflake SF2-Q2	Snowflake SF2-Q3
Jersey Lily JL1-Q1	Jersey Lily JL1-Q2



April 2012

Snowflake, Jersey Lily, and Virtue Vegetation
Quadrat Photos

123-80005

	
Jersey Lily JL1-Q3	Jersey Lily JL2-Q1
	
Jersey Lily JL2-Q2	Jersey Lily JL2-Q3
	
Jersey Lily JL3-Q1	Jersey Lily JL3-Q2
	
Jersey Lily JL3-Q3	Jersey Lily JL4-Q1



April 2012

Snowflake, Jersey Lily, and Virtue Vegetation
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Jersey Lily JL4-Q2	Jersey Lily JL4-Q3
Virtue V1-Q1	Virtue V1-Q2
Virtue V1-Q3	Virtue V2-Q1
Virtue V2-Q2	Virtue V2-Q3