0003

BAMBERG ASSOCIATES
Environmental Services

Letter of Transmittal

August 31, 1998

RECEIVED
SEP 14 1998
DIV. OF OIL, GAS & MINING

To: Bob Davidson
Utah Division of Oil, Gas, and Mining
355 West Temple North
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

From: Samuel Bamberg

Copy Bob (all)

Re: Field forms and supporting documents for the 1998 monitoring for the J.B. King site for Phase II Bond Release

ACT/015/002 #2

Enclosed are the field forms and other types of documentation used in the field as you reviewed with us onsite on August 28th. The forms and documents include (as numbered in red) with explanation of use:

1. The random numbers table generated by the computer prior to field work; used to chose points on field grids for sample locations,

2. Base map and grid maps of reference area and J.B. King site; used to establish actual grids in the field; both sites were staked along the two base lines in a cross pattern, sample points were located on the ground by pacing from base stakes and tossing a pencil behind the person as the NW corner of the sample quadrat (see also methods in the monitoring report); a 4 square meter quadrat was used on the site and a 1 square meter on the reference area,

3. Tables of numbers related to choosing field points after grid was established and numbered; used to choose points: and interim calculations of sample adequacy in the field; used to determine if more sample are needed for adequacy,

4. Field data sheets completed for plots surveyed in the field; used to measure field variables of cover and density: species code for abbreviations used on field forms.

5. Computer generated table for reducing and present field data in report; developed from field data sheets and used in producing the report.

If you don't have a copy of the 1998 monitoring report, I can also furnish you a copy with black and white photographs.

As we discussed in the field, we would appreciate a critique of the earlier reports on erosion conditions and control on the site.

Thanks for you help and attention on this site.

cc: Buzz Gerick - Western States Minerals
(without enclosures)

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(1a) Page 1 of 2

Random # Table

6/23/98
JB King

130

On-site
40 samples

179	64	247	22	98	163	22	116
26	58	242	16	154	132	1	5
9	194	60	201	99	160	111	14
20	208	119	230	66	136	130	116
69	83	131	14	94	27	8	51
72	117	129	128	151	197	237	171
144	164	47	156	114	54	141	166
7	236	130	218	176	161	159	206
77	54	113	215	237	124	3	73
126	75	214	211	193	188	187	21
214	18	2	6	165	107	219	22
141	16	28	139	32	119	28	129
187	69	21	96	198	210	47	86
1	145	250	70	124	21	33	17
175	245	247	124	7	26	42	37
20	53	221	197	31	89	133	87
48	87	47	166	90	22	56	31
92	80	50	106	90	64	41	51
123	191	30	2	48	118	140	198
68	97	231	228	228	21	23	4
30	249	28	241	198	204	15	186
76	77	51	100	241	126	195	84
241	107	239	109	167	113	230	234
241	219	221	184	4	196	74	156
92	130	42	129	102	78	221	1
178	242	48	131	199	214	11	152
160	162	185	192	180	8	67	148
230	45	39	125	213	196	66	65
175	15	214	224	36	180	8	80
14	26	1	121	25	56	154	174
204	30	216	37	161	211	26	216
127	232	96	246	191	189	186	72
115	220	63	68	7	223	137	190
82	171	213	39	145	92	47	75
153	90	182	183	182	140	26	247
233	83	115	86	235	34	8	250
189	110	65	148	142	184	94	169
107	14	38	164	95	209	63	233
157	81	24	44	28	10	107	54
49	108	99	57	43	8	233	175
183	106	176	219	121	162	137	140
168	145	96	156	181	144	41	101
56	205	35	80	77	146	42	193
43	119	25	181	224	103	225	166
28	162	181	248	77	90	178	106
120	72	7	38	91	245	52	160
128	107	172	212	233	192	133	84
145	112	56	113	213	80	186	223
218	151	118	54	229	56	77	98

40 143
59 149
88
122

40 ~~5~~ ~~61~~ ~~71~~ ~~85~~ 122
~~46~~ 59 ~~62~~ ~~79~~ ~~86~~
~~69~~ 88

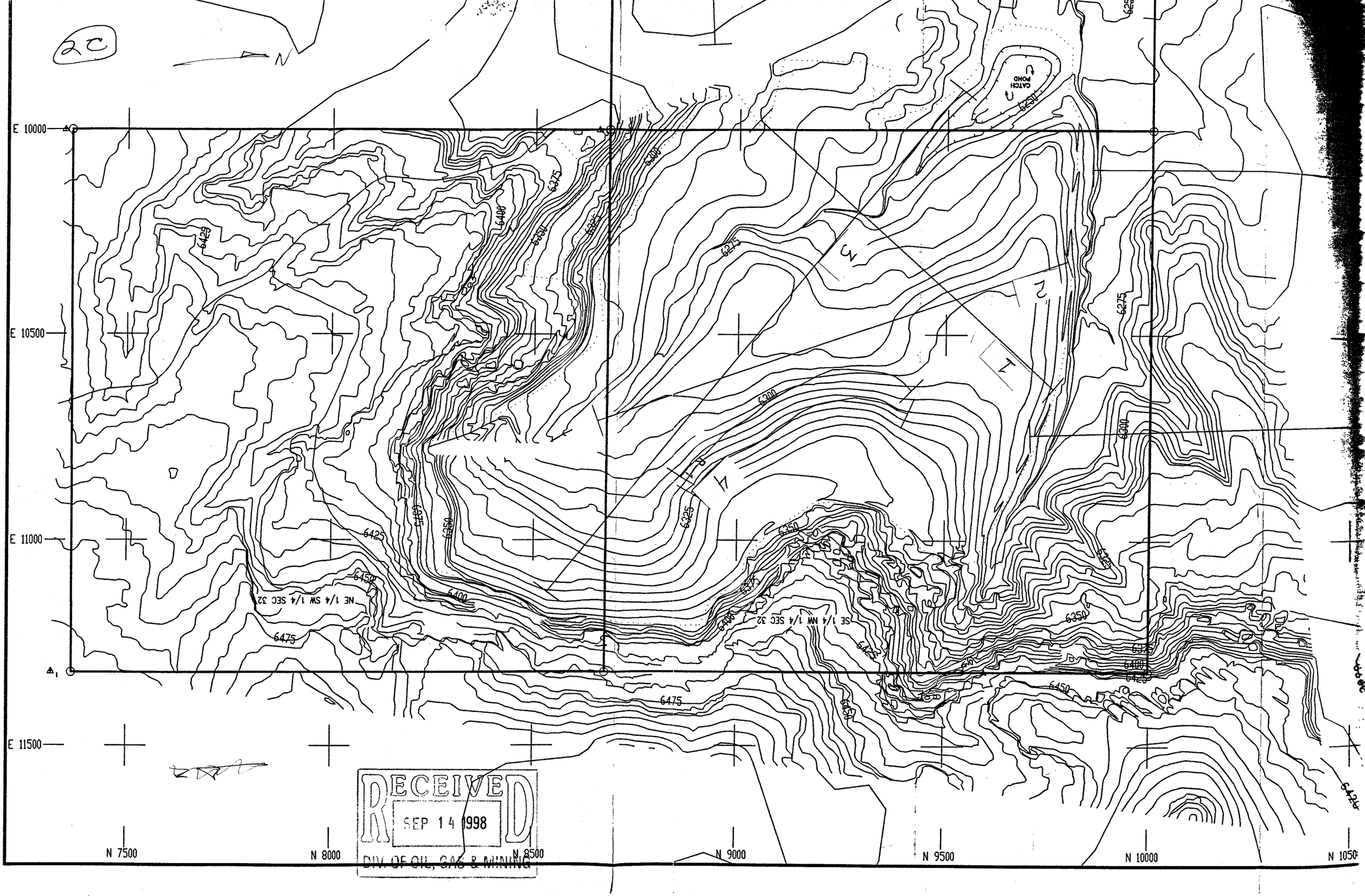
Random # Tab

6/23/98
JB King

(1b)

205	109	170	82	42	106	89	175
85	36	231	93	69	89	226	30
51	138	180	172	175	227	182	76
1	208	152	56	178	31	78	52
113	82	84	85	110	147	116	85
126	93	115	156	46	141	34	112
209	212	250	41	195	218	5	126
220	62	24	250	105	75	87	48
7	8	241	135	110	240	19	126
87	25	50	34	157	27	169	83
198	169	58	231	181	152	182	134
147	105	207	86	5	106	26	203
197	72	96	63	82	229	239	117
117	156	102	211	15	4	35	66
60	132	42	9	120	218	81	26
187	100	167	226	237	42	72	182
207	51	110	238	185	46	8	190
221	167	81	11	24	135	12	45
249	118	82	169	250	51	14	244
222	196	95	80	248	50	205	52
105	188	67	26	20	124	86	13
39	79	115	152	181	6	193	113
8	154	160	85	182	137	239	217
18	90	71	158	187	1	87	204
26	179	157	83	198	85	68	17
188	96	66	244	230	127	184	91
215	55	140	209	84	160	125	225
156	50	1	145	204	124	185	208
34	182	42	111	146	245	204	107
8	125	154	241	61	164	84	159
153	96	161	85	34	207	16	243
86	114	54	111	175	55	72	168
18	104	8	66	112	164	136	47
203	166	154	8	236	14	180	229
54	36	150	123	174	135	212	83
193	20	21	50	85	25	117	142
22	80	151	123	125	248	13	20
6	146	80	34	186	160	5	179
62	25	76	236	240	57	26	1
141	145	213	185	88	161	8	29
199	85	166	231	41	231	17	94
39	126	193	247	36	88	173	55
115	86	66	241	73	197	224	231
90	134	84	82	93	85	233	70
48	129	128	175	181	189	146	164
3	141	171	242	195	20	248	111
132	147	7	126	193	114	174	181
51	64	125	221	125	36	26	116
32	135	112	88	191	109	99	45
166	39	131	94	173	82	172	204
193	26	85	207	161	191	65	168

[redacted]
[redacted], 88
[redacted], [redacted]
122
[redacted], [redacted], [redacted]
143, [redacted] 149



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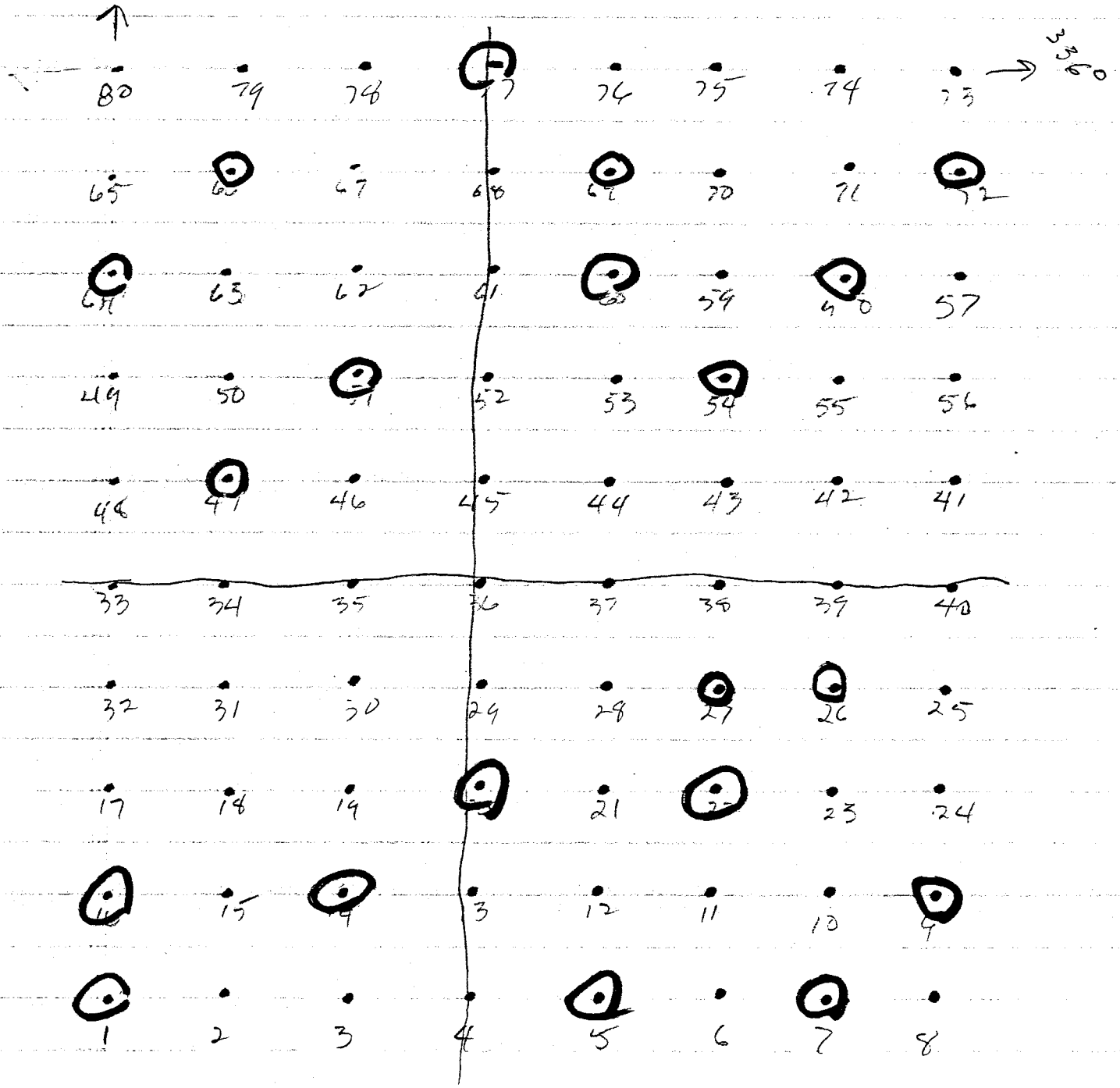
2a

Reference Area Sampling

JB King
6/26/98



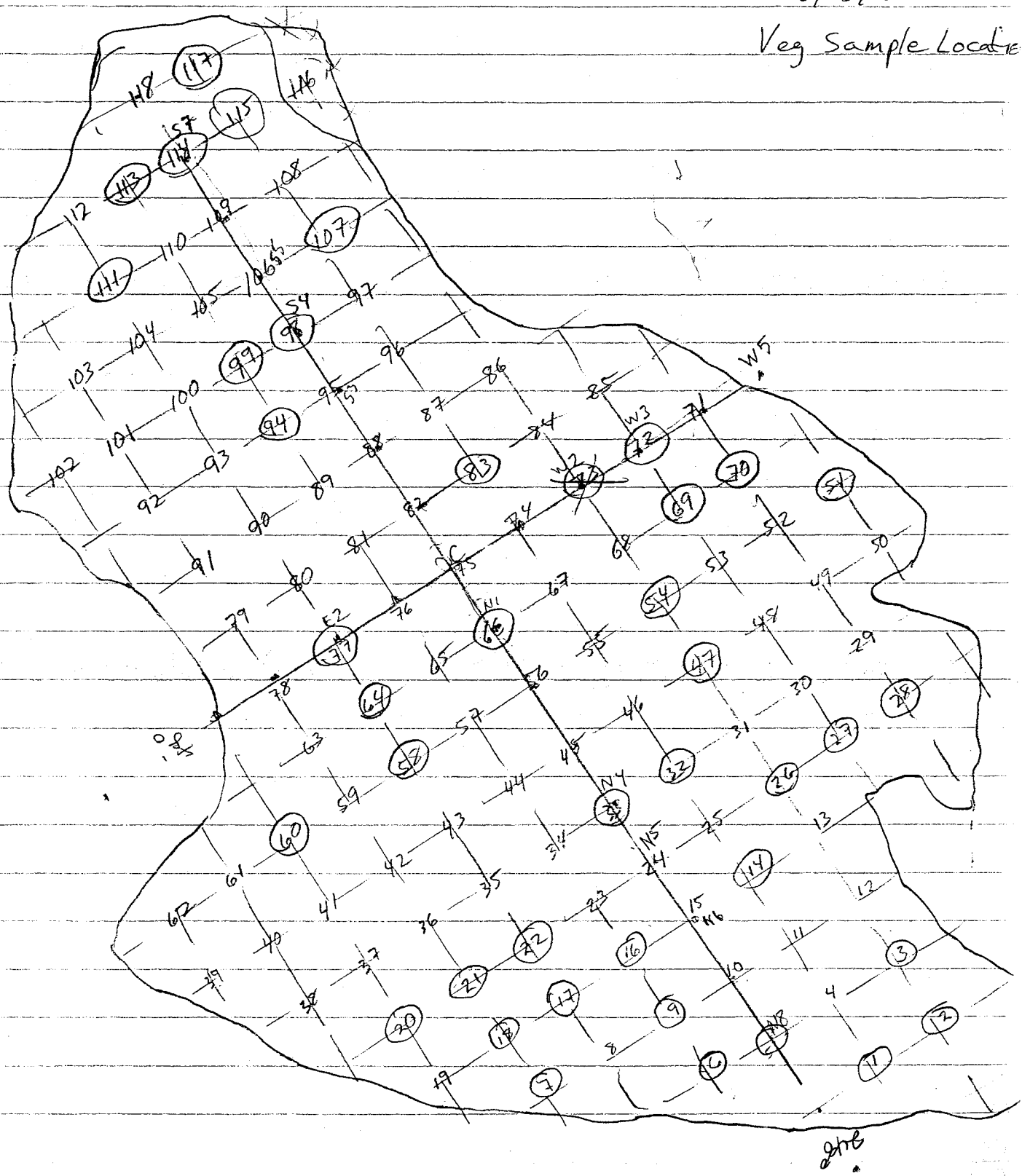
3
73

(2b)

158°
248°

N

JB King
6/25/98
Veg Sample Locatio



(3a)

~~64~~	~~64~~	~~47~~
~~22~~	~~22~~	~~114~~
~~26~~	~~98~~	~~54~~
~~58~~	~~116~~	~~7~~
~~16~~	~~26~~	~~77~~
~~1~~	~~58~~	~~113~~
~~5~~	~~16~~	~~124~~
~~9~~	~~132~~	30 — ~~3~~
~~60~~	~~1~~	~~73~~ — didn't do
~~14~~	~~5~~	~~21~~
~~20~~	10 — ~~9~~	~~18~~
~~66~~	~~60~~	~~2~~
~~69~~	~~94~~	~~6~~
~~27~~	~~117~~	~~107~~
~~51~~	~~14~~	~~28~~
~~32~~	~~20~~	~~32~~
~~47~~	~~119~~	~~70~~
~~54~~	~~66~~	~~33~~
~~7~~	~~136~~	17
~~77~~	~~130~~	53
3	~~69~~	31
73	~~83~~	89
	~~121~~	87
	~~94~~	
	20 — ~~27~~	
	~~51~~	
	~~32~~	
	~~117~~	
	~~129~~	
	~~128~~	

1	54
2	58
3	60
5	64
6	66
7	69
9	70
14	72
16	73
18	77
20	83
21	94
22	98
26	99
27	107
28	111
32	113
33	114
47	116
51	117

1	16	47	64
5	20	51	66
7	22	54	69
9	26	58	72
14	27	60	77
			3
			73

(3b)

% Cover Onsite

17	12	23	31
~~33~~ 23	14	15	18
18	19	13	13
17	10	30	15
30	12	18	14
~~17~~	17	23	11
30	14	12	15
~~13~~ 12	32	8	12
9	26	22	18
24	26	21	24

$\bar{x}$ = ~~20.8~~

stdev = 8

t = 1.31

d = .1

$\frac{108.79}{4.32}$ = 25.23

$\bar{x}$ = ~~18.65~~ 18.375

stdev = ~~6.93~~ 6.59

1.72x

$n_{min} = \frac{\cancel{82.41}\ 74.53}{\cancel{3.48}\ 3.39} = \cancel{23.69}\ 22.01$

$\frac{t^2 s^2}{(dx)^2}$

Shrub density

$\bar{X}$ = ~~5.025~~ 4.575

Stdev = ~~4.388~~ ~~3.273~~

$n_{min} = \frac{\cancel{21.16}\ 18.69}{\cancel{0.25}\ .20}$

$\frac{33.2}{0.25}$

1.72

Sample adequacy

$n_{min} = \frac{t^2 s^2}{(dx)^2}$

t = 1.31

d = .1

S = Stdev

x = mean

% Cover Reference Area

15	14	12	~~17~~ 16
11	14	16	12
14	14	9	12
11	10	13	18
15	13	12	10

$\bar{X}$ = 13.1

Stdev = 2.38

$n_{min} = \frac{9.72}{1.72} = 5.66$

Shrub density

0	4	4	4
0	4	1	1
2	3	1	1
2	1	3	4
3	2	1	1

$\bar{X}$ = ~~3.05~~ 2.10

Stdev = ~~0~~ 1.41

$n_{min} = \frac{\cancel{3.37}\ \cancel{3.42}}{.044} = \cancel{77.}\ 22.$

(4)

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
Species and % Cover

FORM 1: June 1998

Date: 6/26/98
Transect No.:

Observers: JB + IH
Location: Reference Area

Species Code	1		5		7		9		14		16		20		22	
	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den
Atco		Ø		Ø	2	2	4	1	12	3	7	3	4	1	3	1
Gusa							2	1			2	1	4	3	3	2
Oppo																
Hija	6				3		2				1				3	
Bogr	4		2		2		1		1		1		1		1	
Pharcelia	2		1						T				T			
Lapula	2		T				T		T		T		T		T	
Aster	1		1		T		T				T		T		T	
Spae			6		4				2		2					
Sph					2		2				1		3		1	
Plantago			T						T		T		1		T	
Orhy			1													
Hoja					1		T						1		1	
Langlosia	T				T											
Cegr															2	
Total veg cover	15		11		14		11		15		14		14		14	
Litter	10		3		5		4		5		5		6		4	
Standing dead	1		1		3		1		3		2		2		3	
Rock	15		10		4		2		15		10		2		2	
Bare ground	59		75		74		82		62		69		76		77	

includ gravel

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
Species and % Cover

FORM 1: June 1998

Date: 6/27/98
Transect No.:

Observers: SB + IH
Location: Reference Area

Species Code	26		27		47		51		54		58		60		64	
	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den	% Cov	Den.
Atca	1	1	T	1	6	4			1	1	7	2	3	1	2	3
Gusa			2	1	T				T		T	1			1	1
Oppo							2	1								
Hija	T						2		2				3		10	
Bogr	T		1		2		8								2	
Phacelia																
Lapula	T				T		T		T		T		T		T	
Aster			1		T						T		T		T	
Spac			T		1						1					
Sph	2		5		2		1		5		2		2			
Plantago	T		1		T		T		T		T		1		T	
Orhy	2										1					
Hejis	3		3		1		3		1		2		3		1	
Cryp.	2															
Total veg cover	10		13		12		16		9		13		12		17	
Litter	5		5		4		2		3		4		3		6	
Standing dead	12		6		1		1		3		3		4		1	
Rock	1		1		5		10		2		1		4		10	
Bare ground	72		75		78		71		83		79		77		66	

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
Species and % Cover

FORM 1: June 1998

Date: 6/27/98
Transect No.:

Observers: SB + IH
Location: 3,73

Species Code	66		69		72		77		Plot Number							
	%Cov	Den.	%Cov	Den	%Cov	Den	%Cov	Den								
Atca	1	1	5	1	10	3	1	1								
Gusa	T		1	1	1	1	T									
Oppo																
Hija	4		2		1		4									
Bogr	3				2											
Phacelia																
Lapuls	T		T		T											
Aster	T		T		T		T									
Spae																
Sph	2		T				2									
Plantago	T				T											
Orhy			1				1									
Hoju	2		3		3		2									
Cryp																
Spcr					1											
Total veg cover	12		12		18		10									
Litter	6		2		5		5									
Standing dead	5		20		3		1									
Rock	6		2		1		10									
Bare ground	71		64		73		74									

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
6) Species ~~and~~ % Cover + Density (~~Shrubs~~ Perennials)

FORM 1: June 1998
6/25/98

Date: 6/25/98
Transect No.:

Observers: SB, IH
Location: JB King

Species Code	1		2 undisturbed		3		5 Plot Number		6		7		9		18	
	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den
Spcr			8													
Atca	5	2			T						10	2	2	0	10	2
Chna	3	(3) 1														
Save	1	(2) 1							1	1						
Arno	1	1	1													
Gusa	3	(3) 1			9	3										
Atco			6	1			9	1	1	1					9	2
Hacl			T													
Orhy					3											
Chvi					2	1										
Agtr							2		12		2		7		3	
Gela									1	1						
Hija													2			
Agsp													6			
Sihy													1		1	
Stco															1	
															1	
Total veg cover	13		15		14		11		15		12		18		24	
Litter	1		4		2		1		3		5		2		5	
Standing dead	1		Ø		5		2		5		10		6		3	
Rock	80		40		50		35		30		55		35		25	
Bare ground	5		41		29		51		47		18		39		43	

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
by Species % Cover, Density

FORM 1: June 1998

Date: 6/25/98 - 6/26/98
Transect No.:

Observers: SB, IH
Location: JB King On-site

Species Code	20		21		22		16		14		26		27		28	
	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den.	% Cov	Den	% Cov	Den	% Cov	Den
Atca	11	(7)2	22	1			8	1	22	(15)3	15	(6)2	20	3		
Atco					4	(3)2										
Ochy	6								1		3		1		5	
Agtr	1				6						1		T		6	
Sihy			1	1							T				4	
Save					2	1					2	2	10	1		
Bogr									1							
Chna													T	1	2	1
Stco													T			
Gusa															1	1
Total veg cover	18		23		12		8		22		21		31		18	
Litter	10		5		5		5		15		10		2		10	
Standing dead	2		7		7		9		20		5		1		2	
Rock	3		20		20		60		1		30		1		2	
Bare ground	67		45		56		19		42		34		65		68	

*2500
12.5
AR6/201×100

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
Species and % Cover

FORM 1: June 1998

Date: 6/26/98
Transect No.:

Observers: SB + IH
Location: On-site

Species Code	33		32		47		54		69		70		51		72	
	Plot Number															
	% Cov	Den	% Cov	Den.	% Cov	Den.	% Cov	Den	% Cov	Den.	% Cov	Den	% Cov	Den	% Cov	Den.
Atca	6	1	30	(12)3	22	(20)3	25	(15)3	12	2	3	(3) 1			30	3
Atco																
Save	8	3							5	1			2	(3) 2		
Hija			2													
Stco			T		2											
Agtr					2				4		7		5			
Orhy							1				1		5			
Cela									2	2	2	2				
Sihy											T					
Brte											1		3			
Lasq					T		T				2					
Sphi. sp.													1	1		
Total veg cover	14		32		26		26		23		16		16		30	
Litter	15		15		10		15		4		5		15		8	
Standing dead	10		8		6		5		10		15		5		10	
Rock	25		3		8		4		2		25		Ø		7	
Bare ground	36		42		50		50		61		39		64		45	

vegfm22.xls

Bamberg Associates

1.5 - not done due to surface crust plots

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
by Species ~~and~~ % Cover + Density

FORM 1: June 1998

Date: 6/26/98
Transect No.:

Observers: SR + IH
Location: On-site

Species Code	83		66		58		60		64		77		94		99	
	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den	% Cov	Den
Atca	6	2	20	(4)3		Ø	6	1	7	(4)2	3	(2)1	6	2	15	(7)2
Save	3	(3)2					1	1								
Cela			1	1					1	1			2	(4)2		
Agtr			3				5		11		7		2		1	
Orhy					4		2								1	
Spcr					8											
Atco																
Hija													2			
Brte															2	
Weeds	2				5				3		6					
Total veg cover	11		24		17		14		22		16		12		19	
Litter	5		10		8		12		17		5		3		8	
Standing dead	8		5		5		10		10		6		8		4	
Rock	15		3		45		20		40		55		25		30	
Bare ground	61		58		25		48		11		18		52		39	

JB King Mine
Western States Minerals

TRANSECT/PLOT DATA
Vegetation Variables:
Species and % Cover

FORM 1: June 1998

Date: 6/26/98
Transect No.:

Observers: SB + IH
Location: On-site

Species Code	98		107		111		113 Plot Number		114		115		117		17	
	% Cov	Dom	% Cov	Dom.	% Cov	Dom	% Cov	Dom.	% Cov	Dom.	% Cov	Dom	% Cov	Dom	% Cov	Dom
Atca	17	2	14	(3)2	3	2	15	(3)2	30	2	13	(4)2	3	(2)1	10	2
Save					4	1					1	1				
Atga			3	2			2	1			3	1	25	3		
Cela			1	2			T	1					2	2		
Brte			2		2		2				1		3			
Agtr			5		6											
Orhy					5											
Agsp															2	
Halogeton	3								4		7				1	
Total veg cover	20		35		20		19		34		25		33		13	
Litter	10		5		5		12		7		5		15		5	
Standing dead	12		15		6		10		10		8		15		7	
Rock	35		15		20		25		10		25		15		30	
Bare ground	23		30		49		34		39		37		22		45	

4a

Plant Species Code

Table 3-1. Plant Species Floristic List for J.B. King Mine, June 1998.

		SHRUBS				
(Arno)	Arar	*Artemisia arbuscula*	low sagebrush	*Ceratoides lanata*	Winterfat	Cela
	Arbi	*A. bigelovii*	bigelow sagebrush	*Chrysothamnus nauseosus*	Rubber rabbitbrush	Chna
	Arfi	*A. filifolia*	sand sagebrush	*C. viscidiflorus*	Green rabbitbrush	Chvi
	Arfr	*A. frigida*	fringed sagebrush	*Eriogonum corymbosum*	Clustered buckwheat	Erco
	Arlu	*A. ludoviciana*	Cudweed sagewort	*Gutierrezia sarothrae*	Broom snakeweed	Gusa
	Atca	*Atriplex canescens*	four-wing saltbush	*Sarcobatus vermiculatus*	Greasewood	Save
	Atco	*A. confertifolia*	Shadscale	*Tamarix pentandra*	Tamarisk	Tape
	Atga	*A. gardneri*	Gardner's saltbush	*Yucca harrimaniae*	Harriman yucca	Yuha
		GRASSES				
	AgCr	*Agropyron cristatum*	crested wheatgrass	*Hilaria jamesii*	Galleta	Hija
	AgSm	*A. smithii*	western wheatgrass	*Hordeum jubatum*	Foxtail barley	Hoju
	Agsp	*A. spicatum*	Bluebunch wheatgrass	*Oryzopsis hymenoides*	Indian rice grass	Orhy
	Agtr	*A. trichophorum*	Intermediate wheatgrass	*Poa fendleriania*	Fendler's bluegrass	Pofe
	Atpu	*Aristida purpurea*	purple threeawn	*P. secunda*	Sandberg bluegrass	Pose
	Bogr	*Bouteloua gracilis*	blue grama	*Sitanion hystrix*	Squirreltail	Sihy
	Brja	*Bromus japonicus*	Japanese brome	*Sporobolus cryptandrus*	Sand dropseed	Spcr
	Brte	*B. tectorum*	Cheatgrass	*Stipa comata*	Needle-and-thread	Stco
		FORBS				
	Asch	*Aster chilensis*	Pacific aster	*Lappula squarrosa*	European stickseed	Lasq
	Asfo	*A. foliaceous*	Leafybract aster	*Lepidium lasiocarpum*	Peppergrass	Lela
	Asspp	*Astragalus* spp	Milkvetch	*Linanthus septentrionalis*	Linanthus	Lise
	Chspp	*Chenopodium* spp	Goosefoot	*Machaeranthera tanacetifolia*	Tansy-leaf aster	Mata
	Clly	*Cleome lutea*	yellow beeplant	*Malcomia africana*	African mustard	Maaf
	Depi	*Descurainia pinnata*	tansy mustard	*Melilotus officinalis*	Sweet clover	Meof
	Deso	*D. sophia*	Flixweed	*Penstemon palmeri*	Beards tongue	Pepa
	Ersp	*Erigeron speciosus*	Oregon daisy	*Phacelia heterophylla*	Scorpion weed	Phhe
	Erspp	*Eriogonum* spp	Buckwheat	*Plantago patagonica*	Patagonia plantain	Plpa
	Hacl	*Haplopappus clematis*	clement goldenweed	*Polygonum aviculare*	Knotweed	Poav
	Haspp	*H.* spp	Goldenweed	*Sphaeralcea grossulariaefolia*	Gooseberry-leaved globemallow	Spgr
	Hean	*Helianthus annuus*	Common sunflower	*Tragopogon dubius*	Oyster-plant	Trdu
	Hevi	*Heterotheca villosa*	hairy golden aster			
		CACTUS				
		Opuntia polyacantha	Beavertail	*Sclerocactus whipplei*	Fishhook	
		WEEDS				
		Halogeton glomeratus	Halogeton	*Salsola kali*	Russian thistle	
		Kochia americana	Summer cypress			

Table 4. Plant Cover by Individual Plant Species Onsite J.B. King Mine, June 1998.

Plot Number	1	2	3	5	6	7	9	18	20	21	22	16	14	26	27	28	33	32	47	54	69	70	51	72	83	66	58
SHRUBS																											
Ar no	1	1																									
Atriplex canescens	5		T			10	2	10	11	22		8	22	15	20		6	30	22	25	12	3		30	6	20	
Atriplex confertifolia		6		9	1			9			4																
Atriplex gardenerii																											
Ceratoides lanata					1																2	2				1	
Chrysothamnus nauseosus	3														T	2											
Chrysothamnus vicidiflorus			2																								
Gutierrezia sarothrae	3		9													1											
Sarcobatus vermiculatus	1				1						2			2	10		8				5		2		3		
GRASSES																											
Agropyron trichophorum				2	12	2	7	3	1		6			1	T	6			2		4	7	5			3	
Agropyron x							6																				
Bouteloua gracilis													1														
Hilaria jamesli							2											2									
Oryzopsis hymenoides			3						6				1	3	1	5				1		1	5				4
Sitanion hystrix							1	1		1				T		4						T					
Sporobolus cryptandrus		8																									8
Stipa comata								1							T			T	2								
FORBS																											
Haplopappus clematis		T																									
Lappula squarrosa																			T	T		2					
Sphaeralcea coccinea																							1				
WEEDS																											
Bromus tectorum																						1	3				
Halogeton glomeratus																									2		5
TOTAL WEED COVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	2	0	5
DESIRABLE PLANT COVER	13	15	14	11	15	12	18	24	18	23	12	8	24	21	31	18	14	32	26	26	23	15	13	30	9	24	12
STANDING DEAD	1	0	5	2	5	10	6	3	2	7	7	9	20	5	1	2	10	8	6	5	10	15	5	10	8	5	5
LITTER	1	4	2	1	3	5	2	5	10	5	5	5	15	10	2	10	15	15	10	15	4	5	15	8	5	10	8
ROCK	80	40	50	35	30	55	35	25	3	20	20	60	1	30	1	2	25	3	8	4	2	25	0	7	15	3	45
BAREGROUND	5	41	29	51	47	18	39	43	67	45	56	18	40	34	65	68	36	42	50	50	61	39	64	45	61	58	25

Table 4. (continued)

Plot Number	60	64	77	94	99	98	107	111	113	114	115	117	17	total	ave.
SHRUBS															
Ar no														2	0.1
Atriplex canescens	6	7	3	6	15	17	14	3	15	30	13	3	10	421	10.5
Atriplex confertifolia														29	0.7
Atriplex gardenerii							3		2		3	25		33	0.8
Ceratoides lanata		1		2			1		T			2		12	0.3
Chrysothamnus nauseosus														5	0.1
Chrysothamnus viciditlorus														2	0.1
Gutierrezia sarothrae														13	0.3
Sarcobatus vermiculatus	1							4			1			40	1.0
GRASSES															
Agropyron trichophorum	5	11	7	2	1		5	6						98	2.5
Agropyron x													2	8	0.2
Bouteloua gracilis														1	0.0
Hilaria jamesii				2										6	0.2
Oryzopsis hymenoides	2				1			5						38	1.0
Sitanion hystrix														7	0.2
Sporobolus cryptandrus														16	0.4
Stipa comata														3	0.1
FORBS															
Haplopappus clematis														0	0.0
Lappula squarrosa														2	0.1
Sphaeralcea coccinea														1	0.0
WEEDS															
Bromus tectorum					2		2	2	2		1	3		16	0.4
Halogeton glomeratus		3	6			3				4	7		1	31	0.8
TOTAL WEED COVER	0	3	6	0	2	3	2	2	2	4	8	3	1	47	1.2
DESIRABLE PLANT COVER	14	19	10	12	17	17	23	18	17	30	17	30	12	737	18.4
STANDING DEAD	10	10	6	8	4	12	15	6	10	10	8	15	7	293	7.3
LITTER	12	17	5	3	8	10	5	5	12	7	5	15	5	304	7.6
ROCK	20	40	55	25	30	35	15	20	25	10	25	15	30	969	24.2
BAREGROUND	44	11	18	52	39	23	40	49	34	39	37	22	45	1650	41.3

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Table A2-3. Plant Cover by Individual Plant Species for Reference Area Sampling at the J.B. King Mine, June 1993.

Plot Number	1	5	7	9	14	16	20	22	26	27	47	51	54	58	60	64	66	69	72	77	total	ave.
SHRUBS																						
Atriplex confertifolia			2	4	12	7	4	3	1	T	6		1	7	3	2	1	5	10	1	69	3.5
Gutierrezia sarothrae				2		2	4	3		2	T		T	T		1	T	1	1	T	16	0.8
GRASSES																						
Buchloe dactyloides	4	2	2	1	1	1	1	1	T	1	2	8				2	3		2		31	1.6
Hilaria jamesii	6		3	2		1		3	T			2	2		3	10	4	2	1	4	43	2.2
Hordeum jubatum			1	T			1	1	3	3	1	3	1	2	3	1	2	3	3	2	30	1.5
Oryzopsis hymenoides		1							2					1				1		1	6	0.3
Sporobolus cryptandrus																			1		1	0.1
FORBS																						
Chrysothamnus greenii								2													2	0.1
Cryptantha sp.									2												2	0.1
Langlosia sp.	T		T																		0	0.0
Lappula squarrosa	2	T		T	T	T	T	T	T		T	T	T	T	T	T	T	T	T		2	0.2
Plantago sp.		T			T		1	T	T	1	T	T	T	T	1	T	T		T		3	0.2
Phacelia sp.	2	1			T		T														3	0.2
Sporobolus aerodes		6	4		2	2				T	1			1							16	0.8
Sphaeralcea coccinea			2	2		1	3	1	2	5	2	1	5	2	2		2	T		2	32	1.6
Townsendia sp.	1	1	T	T		T	T	T		1	T			T	T	T	T	T	T	T	3	0.2
CACTUS																						
Opuntia polyacantha												2									2	0.1
DESIRABLE PLANT COVER	15	11	14	11	15	14	14	14	10	13	12	16	9	13	12	16	12	12	18	10	131	13.1
LITTER	10	3	5	4	5	5	6	4	5	5	4	2	3	4	3	6	6	2	5	5	52	4.6
STANDING DEAD	1	1	3	1	3	2	2	3	12	6	1	1	3	3	4	1	5	20	3	1	34	3.8
ROCK	15	10	4	2	15	10	2	2	1	1	5	10	2	1	4	10	6	2	1	10	62	5.7
BAREGROUND	59	75	74	82	62	69	76	77	72	75	78	71	83	79	77	67	71	64	73	74	721	72.9

Table 3-2. Average Percent Plant Cover at the J.B. King site, June 1998

Ground Cover Type	Plant Species	Mine Site (% cover)	Reference Area (% cover)
Shrubs	Artemisia nova	0.1	
	Atriplex canescens	10.5	
	Atriplex confertifolia	0.7	3.4
	Atriplex gardenerii	0.8	
	Ceratoides lanata	0.3	
	Chrysothamnus nauseosus	0.1	
	Chrysothamnus vicidiflorus	0.1	
	Gutierrezia sarothrae	0.3	0.8
	Opuntia polyacantha		0.1
	Sarcobatus vermiculatus	1.0	
	Total	13.9	4.3
Grasses	Agropyron trichophorum	2.4	
	Agropyron sp.	0.2	
	Bouteloua gracilis	Trace	
	Buchloe dactyloides		1.6
	Hilaria jamesii	0.2	2.1
	Hordeum jubatum		1.5
	Oryzopsis hymenoides	0.9	0.3
	Sitanion hystrix	0.2	
	Sporobolus cryptandrus	0.4	Trace
	Stipa comata	0.1	
	Total	4.4	5.5
Forbs	Chrysothamnus greenii		0.1
	Cryptantha sp.		0.1
	Haplopappus clematis	Trace	
	Langlosia sp.		Trace
	Lappula squarrosa	0.1	0.2
	Plantago sp.		0.2
	Phacelia sp.		0.1
	Sporobolus aerodes		0.8
	Sphaeralcea coccinea	Trace	1.6
	Townsendia sp.		0.2
	Total	0.1	3.3
Desirable Plant Cover		18.4	13.1
Weeds		1.2	0.0
Standing Dead		7.3	3.8
Litter		7.6	4.6
Rock		24.2	5.6
Bare ground		41.3	72.9

Table 3-3. Shrub Density for the J.B. King site, June 1998

Shrub Species On Mine Site	Number of Shrubs per			Percent Composition
	4 m^2	Hectare	Acre	
Atriplex canescens	1.475	3687.5	1475	51.30
Sarcobatus vermiculatus	0.425	1062.5	425	14.78
Ceratoides lanata	0.350	875.0	350	12.17
Atriplex confertifolia	0.175	437.5	175	6.09
Atriplex gardneri	0.175	437.5	175	6.09
Gutierrezia sarothrae	0.125	312.5	125	4.35
Chrysothamnus nauseosus	0.075	187.5	75	2.61
Artemisia nova	0.025	62.5	25	0.87
Chrysothamnus viscidiflorus	0.025	62.5	25	0.87
Sphaeralcea coccinea	0.025	62.5	25	0.87
Total for Mine Site	2.875	7187.5	2875	100.00
Shrub Species On Reference Area	Number of Shrubs per			Percent Composition
	1.0 m^2	Hectare	Acre	
Atriplex confertifolia	1.450	14500.0	5800	69.05
Gutierrezia sarothrae	0.600	6000.0	2400	28.57
Opuntia sp.	0.050	500.0	200	2.38
Total for Reference Area	2.100	21000.0	84000	100.00

3.3 Sample Adequacy

We calculated plant cover sample adequacies for this sampling period as follows;

For the J. B. King site:

$$n_{min} = \frac{1.31^2 \times 6.6^2}{(0.1 \times 18.4)^2} = 22$$

At least 22 samples were need. Since we did 40 samples, no more samples were needed.

For the reference area:

$$n_{min} = \frac{1.31^2 \times 2.4^2}{(0.1 \times 13.1)^2} = 6$$

At least 6 samples were need for sample adequacy, 10 to met The Division's requirements. Since we did 20 samples, no more samples were needed.