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Memo

To:	Bill Mitchell, DIAND	**Date:**	January 17, 2006
cc:		**From:**	Bruce Murphy
Subject:	Site Wide Crown Pillar Stability Investigation	**Project #:**	1CI001.013.B1.01

Assessment Objective

This memorandum is a follow up document to the initial review undertaken in August 2005. Since that time the crown pillar areas have been re-examined in further detail in terms of potential consequence of failure and the increased likelihood of failure if the stopes were not filled. Following these evaluations, a recommendation is made as to the specific surface crown pillar areas that need further evaluation and what the requirements of this evaluation should be. As such, this memorandum should be seen to supersede the previous memorandum.

For the site wide assessment of the crown pillar stability, all crown pillars that fall within a 30 m (100-ft) zone from the current ground surface was undertaken. The level of consequence risk was evaluated in terms of what would be affected on surface if the upper areas of the stope were to become unstable. This is in contrast to the total risk related to both the surface and underground impact. In this study, stopes that have been intersected by the various pits and had their crown pillars mined out and which are backfilled are not considered to have a significant consequence risk to surface structures since instability would be contained within the open pit excavations. As such, these are considered to be of low risk and were not further evaluated. The exception to this are stopes that are located under the B1 Pit, which will be backfilled and covered as part of the freeze system installation.

It should be noted that this evaluation also excluded the stopes and chambers containing arsenic trioxide dust, as these had been evaluated previously (*Crown Pillar Stability Evaluation Arsenic Trioxide Dust Storage Chambers and Stopes - Giant Mine, Yellowknife*, SRK 2005).

Methodology

To facilitate the study, the surface crown pillars were separated into the following separate areas as shown in Figure 1.

- A2 Pit Area;
- A1 Pit Area;
- C1 Pit Area;
- B1 and B2 Area; and the
- B3 and B4 Pit Area

Detailed drawings and sections are included in Appendix 1. Many of these drawings are reproduced directly from the mining geology sections as detailed engineering drawings do not exist for most of the stopes. Therefore, the drawings may not show final stope geometry or surface topography clearly in many of the figures. These details were developed by DIAND based on a review of all sections and plans available.

Using the geometrical parameters generated by DIAND (Table 1, attached) and the various sections of the relevant stopes, a preliminary evaluation was undertaken as to the level of consequence risk to surface structures and a number of stopes were then selected that would need further evaluation (Table 2, attached). Stopes that were geometrically small, and those that had been intersected by the various pits, but would not affect slope stability, were excluded.

Mining Areas Requiring Further Evaluation

The selected stoping areas were further evaluated using the "Scaled Crown Pillar Span Concept" (Carter, 1992), as reported by Hutchinson et al (2002). Carter (1992) found that crown pillar instability would occur if the scaled crown pillar span (Cs) was greater than the critical span (Sc).

These parameters are defined as follows:

Scaled crown pillar span, Cs:

$$C_s = S\sqrt{\frac{S.G.}{T(1+S/L)(1-0.4\cos\theta)}}$$

where:

S	= crown pillar span (m)
L	= crown pillar length (m)
T	= crown pillar thickness (m)
S.G.	= specific gravity of the rockmass
θ	= orebody/foliation dip (degrees)

And the critical span, Sc:

Sc = 3.3 x Q (0.43)

where:

Q = rockmass quality (as quantified by Tunnel Quality Index, Barton et al., 1974).

As measured geotechnical parameters are not available for the rock mass that constitutes the specific crown pillar areas, a "low" value representing the high quality rock observed at Giant Mine and an "average to high" value representing shear zones associated with the mineralized ore zones, were assumed from recent geotechnical evaluations undertaken by SRK in the arsenic storage areas. Also, the stopes were considered to be mostly filled, with only the upper back of the stopes exposed. The results of this Scaled Crown Pillar Evaluation are included as Table 3 (attached).

As a third part of the evaluation, the various stope sections were then again evaluated visually and judged as to the potential impact on upper stope stability if the stopes were not totally filled. The potential implications of reduced fill are documented in the Table 2.

Findings

The results of the final assessment are tabulated below in Table 4. For each of the stopes a level of consequence of crown pillar instability is noted, the findings of the Critical Span evaluation combined with the impact of reduced backfill content listed, and the specific requirements of further evaluation work to be undertaken on the higher risk stopes is listed.

Table 4: Consequence and Stability Risk Level

Stope	Consequence Level of Crown Pillar Area Instability	Stability Evaluation Risk Level	Further Evaluation Recommended
2-01	Moderate	Possible if weak ground conditions prevail and the stope is unfilled.	Build a full 3D Stope and further verify that this stope is filled with backfill
3-70	High	Low	Build a full 3D Stope, re-verify the overburden thickness and further verify that this stope is filled with backfill
2-19	Moderate	Low	No further evaluations required
2-18	Moderate to High	Low	No further evaluations required
1-18	Moderate	Moderate if not filled	Verify that all these areas are adequately filled
1-18 #1	Moderate	Moderate if not filled	As above
1-18 EB	Moderate	Moderate if not filled	As above
1-18 EA	Moderate	Moderate if not filled	As above
2-15	Moderate	Low	None
2-06	Moderate	Low	None
1-31	Low	Not Evaluated	Build 3D model of the stope and pit excavation and further evaluate the stability for a number of likely stope fill scenarios.
1-26	Moderate	Low	No further evaluations required
1-36	Moderate	Low	No further evaluations required
1-37	Moderate	Low	No further evaluations required
1-43	Moderate	Likely instability if the weaker ground conditions prevail and there is no fill.	Build 3D Stope and further evaluate the stope geometry, Assess the stability of pillars likely left behind and assess the overall stability
1-43 #1	Moderate	As above	As above
1-43 #1 & Upper	Moderate	As above	As above
1-43 lower	Moderate	As above	As above

Bruce Murphy
Principal Consultant – Rock Mechanics

Table 1
Stope Geometry

STOPE	Section (geology grid)	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Location	Book # or folder #
		A	B	C	D	E	F	G			
DWC	4450N	94'	12'	39'	0	95'	295'	14'	10' - 18'	DWC	1
(eng. grid)	4500N	hanging wall	surface B/T	91	-	167	295	16	10 - 21		
	4550N	hanging wall	surface B/T	75	-	160	295	14	10 -13		
	4600N	25	7	40	3'	129	295	11	7 - 12		
	4650N	25	7	28	2	117	295	14	7 - 19		
	4700N	13	7	22	0	82	295	10	1 - 12		
DWC HW	4600N	80	15	22	0	55	145	12	11 - 14	DWC	1
(eng. grid)	4650N	59	16	51	8	55	145	15	10 - 19		
	4700N	57	14	31	9	60	145	8	5 - 10		
2-61	6250S	34	25	36	0	29	195	30	20 - 36	A2 Pit	2
	6200S	hanging wall	pit B/T	46	0	83	195	17	12 - 26		
	6150S	hanging wall	pit B/T	110	0	96	195	38	13 - 78		
	6100S	hanging wall	pit B/T	40	0	58	195	18	16 - 24		
	6050S	hanging wall	pit B/T	118	0	153	195	45	9 - 95		
	6000S	hanging wall	pit B/T	27	0	48	195	11	10 - 12		
2-62	6150S	hanging wall	pit B/T	42	0	55	95	26	23 - 29	A2 Pit	2
	6100S	hanging wall	pit B/T	36	0	94	95	30	12 - 37		
3-61	6250S	32	17	27	0	39	150	18	17 - 27	A2 Pit	2
	6200S	42	14	47	0	58	150	33	14 - 47		
3-02	5900S	hanging wall	surface B/T	70	0	38	220	38	34 - 42	A2 Pit	2
	5850S	hanging wall	surface B/T	112	0	118	220	40	10 - 65		
	5800S	hanging wall	surface B/T	50	0	71	220	16	10 - 20		
	5750S	48	33	62	0	94	220	32	16 - 40		
	5700S	96	19	38	0	60	220	20	10 - 26		

Table 1 (cont.)
Stope Geometry

STOPE	Section (geology grid)	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Location	Book # or folder #
		A	B	C	D	E	F	G			
2-01	5300S	77'	20'	108'	13'	67'	135'	50'	20' - 102'	A-Shaft	3
	5250S	72	26	133	26	80	135	90	24 - 130		
	5200S	73	9	20	25	28	135	14	9 - 20		
2-69	6625S	32	16	25	0	37	50	16	9 - 20	A1 Pit	4
(eng. grid)	6650S	hanging wall		32	0	30	50	16	8 - 29		
3-69	6700N	75	16	59	0	98	275	22	12 - 41	A1 Pit	4
(eng. grid)	6750N	110	10	40	0	105	275	30	7 - 35		
	6800N	120	20	59	0	98	275	30	14 - 57		
	6850N	120	16	56	0	74	275	40	16 - 47		
	6900N	65	27	47	0	62	275	30	22 - 40		
	6950N	92	12	53	0	75	275	26	11 - 32		
	7000N	100	17	25	0	42	275	18	15 - 20		
2-24	7050N	103	14	15	0	56	95	15	14 - 16	A1 Pit	4
(eng. grid)	7100N	59	24	38	0	20	95	26	24 - 28		
	7125N	64	26	29	0	21	95	28	26 - 29		
3-70	7500N	61	27	120	14	379	295	18	6 - 29	A1 Pit	4
(eng. grid)	7550N	63	14	120	14	380	295	14	7 - 20		
	7600N	60	13	97	9	379	295	20	7 - 47		
	7650N	51	22	80	8	381	295	18	8 - 30		
	7700N	68	32	55	6	203	295	12	4 - 29		
	7750N	80	31	55	2	125	295	16	10 - 26		

Table 1 (cont.)
Stope Geometry

STOPE	Section (geology grid)	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Location	Book # or folder #
		A	B	C	D	E	F	G			
3-25	2700S	62'	46'	46'	none	274'	220'	20'	10' - 46'	C1 Pit	10
	2650S	hanging wall	pit B/T	76	none	314	220	15	10 - 19		
	2600S	35	36	41	none	242	220	18	7 - 36		
	2550S	hanging wall	pit B/T	76	none	205	220	25	10 -42		
2-26	2500S	hanging wall	pit B/T	75	none	194	95	22	12 - 40	C1 Pit	10
	2450S	hanging wall	pit B/T	74	none	352	95	20	6 - 32		
3-24	2425S	90	17	35	none	88	45	18	8 - 24	C1 Pit	10
	2400S	97	13	20	none	34	45	14	13 - 20		
2-22	2300 S	42	20	36	none	209	120	18	7 - 28	C1 Pit	10
	2250S	50	21	25	none	32	120	20	18 - 23		
2-21	2200S	hanging wall	pit B/T	36	none	182	70	12	7 - 14	C1 Pit	10
	2150S	56	6	54	none	315	70	14	6 - 19		
2-20	2100S	hanging wall	pit B/T	58	none	371	120	20	7 - 32	C1 Pit	10
	2050S	94	9	108	none	311	120	22	7 - 35		
	2025S	73	9	60	none	220	120	18	9 - 28		
2-19	2000S	hanging wall	pit B/T	22	none	116	100	12	9 - 14	C1 Pit	12
	1950S	16	12	15	none	52	100	12	9 - 15		
	1925S	4	11	23	none	83	100	14	10 - 17		
2-18	1900S	33	15	133	none	349	145	20	3 - 30	C1 Pit	12
	1850S	54	9	143	no info	354	145	20	6 - 32		
	1800S	38	9	139	bedrock	353	145	16	5 - 22		

Table 1 (cont.)
Stope Geometry

STOPE	Section (geology grid)	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Location	Book # or folder #
		A	B	C	D	E	F	G			
1-18	250S	115'	24'	42'	none	40'	350'	17'	12' - 24'	B1 area	24
	200S	70	52	100	none	80	350	24	16 - 52		
	150S	66 to 74	54	72	none	57	350	40	23 - 57		
	100S	62 - 68	22	43	none	53	350	24	15 - 22		
	50S	82 to 90	51	65	8'	35	350	44	17 - 51		
	00	86	37	60	16	40	350	33	16 - 37		
1-18 #1	00	53'	16'	38'	20'	51'	45'	12'	9' - 16'	B1 area	24
1-18 EB	00	55'	15'	64'	16'	50'	70'	10	7' - 15'		24
	50N	86'	12'	37'	pit/fill	36'	70'	16'	11'-37'		
1-18 EA	100N	65'	46'	100'	pit/fill	63'	145'	36'	26' - 46	B1 Pit	24
	150N	88	20	156	bedrock	114	145	30	10 - 85		
	200N	60	21	122	bedrock	84	145	22	12 - 36		
2-15	300N	40'	13'	54'	bedrock (ramp)	47'	125'	15'	12' - 30'	B1 Pit	24
	350N	52	20	86	bedrock (ramp)	85	125	30	11 - 55		
	400N	67	9	105	bedrock (ramp)	68	125	40	9 - 68		
2-06	500N	83'	17'	72'	bedrock (ramp)	104'	70'	15	10' - 32'	B1 Pit	24
	550N	140	26	58	-	116	70	30	11 - 41		
1-31	3075N	hanging wall	pit B/T	130'	no info	50'	150'	70'	28' - 80'	B3 Pit	46
	3150N	hanging wall	pit B/T	100	no info	55	150	80	30 - 138		
	3175N	35 to 130	18	130	approx 7'	47	150	65	18 - 132		
	3225N	100 (est.)	pit B/T	105	no info	36	150	30	20 - 48		
1-26	3875N	40'	13'	39'	none	20'	100'	18'	13' - 39'	B4 Pit	47
	3925N	55	12	38	13	23	100	20	10 - 27		
	3975N	57	11	25	13	20	100	24	10 - 18		

Table 1 (cont.)
Stope Geometry

STOPE	Section (geology grid)	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Location	Book # or Folder #
	A	B	C	D	E	F	G				
1-36	3525N	56'	7'	37'	15'	30'	95'	14'	7' - 20'	B4 Pit	48
	3575N	50	12	52	10	42	95	20	12 - 25		
	3600N	57	15	47	15	48	95	18	15 - 26		
1-37	3650N	63	17	31	20	17	70	30	17 - 31	B4 Pit	48
	3675N	58	20	39	7	30	70	32	5 - 37		
	3700N	37	9	52	31	52	70	28	9 - 32		
1-43	3775N	90	15	65	10	52	225	20	15 - 25	B4 Pit	48
	3825N	71	11	82	14	98	225	25	11 - 42		
	3875N	56	21	118	9	118	225	26	14 -46		
	3900N	64	30	134	16	119	225	30	11 - 61		
	3975N	60	12	57	12	41	225	14	12 - 17		
1-43 #1	3950N	46	19	42	11	34	70	25	16 - 42	B4 area	48/49
	3975N	45	46	53	12	36	70	45	18 - 53		
	4000N	40	26	34	12	38	70	25	15 - 33		
1-43 #1	4025N	45	26	172	14	60	95	70	15 - 101	B4 area	49
& upper	4075N	51	6	190	12	55	95	80	6 - 154		
1-43 lower	4125N	85	7	138	no info	187	195	30	7 - 70	B4 area	49
	4200N	84	86	235	no info	122	195	40	9 - 112		
	4250N	98	105	270	no info	161	195	45	12 - 115		
	4300N	96	47	201	no info	86	195	30	9 - 71		

Table 2
Preliminary Stability Evaluation

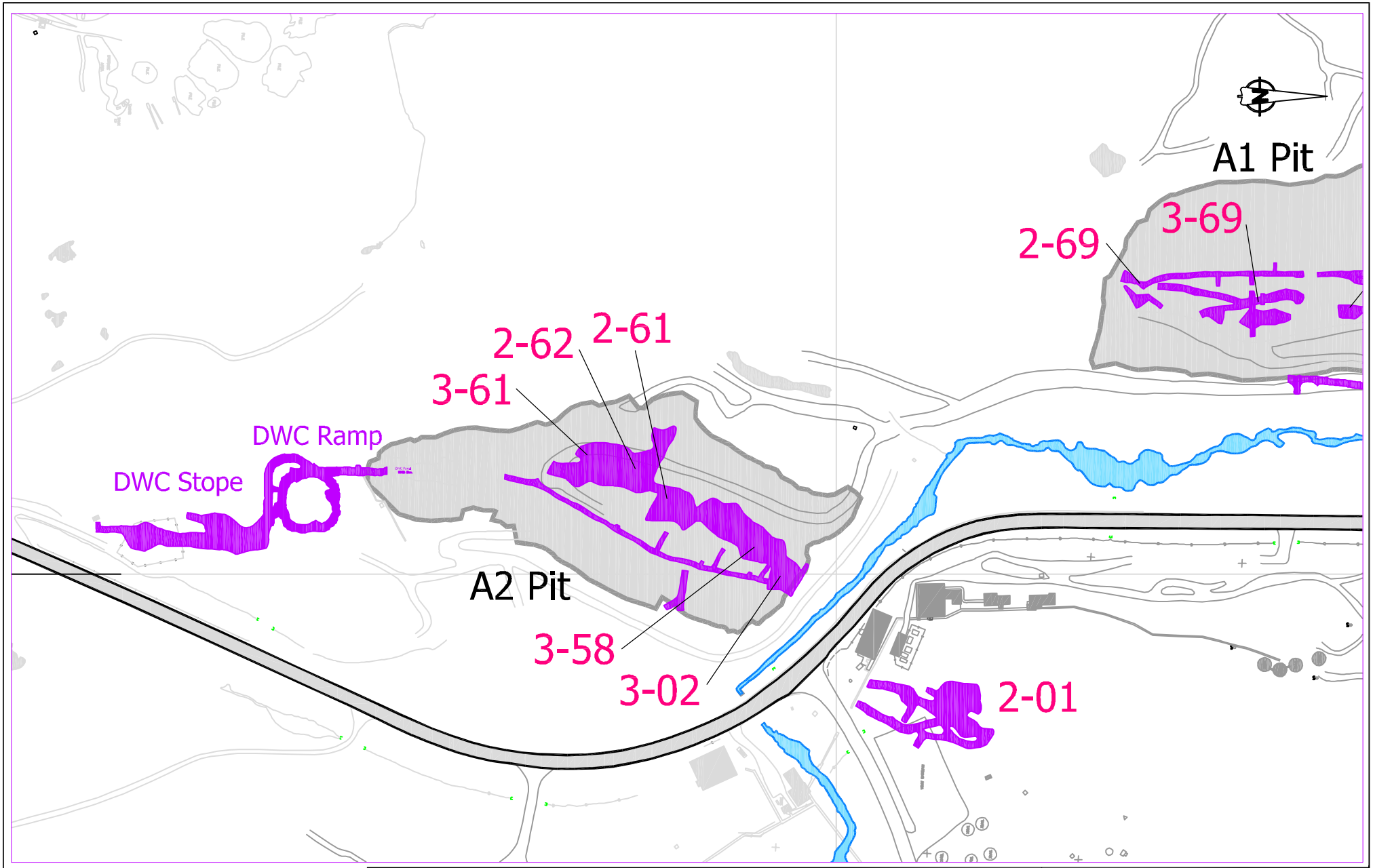
STOPE	Initial Review Finding	Implication if Stope Not Totally Filled	Section	A Depth Below Surface	B Width Top of Stope	C Stope Dip Footprint Length	D Overburden Thickness	E Stope Height	F Length of stope	G Average Stope Width	H Range of Stope Width	Reference Plan Location
DWC	This stope had holed to surface and has subsequently been filled to surface and should not pose a future risk unless the ground moves down below the currently filled area.	N/A	4450N	94.00	12	39	0	95	295	14	10' - 18'	A2 Pit Area
			4500N	hanging wall	surface B/T	91	-	167	295	16	10 - 21	
			4550N	hanging wall	surface B/T	75	-	160	295	14	10 -13	
			4600N	25	7	40	3	129	295	11	7 - 12	
			4650N	25	7	28	2	117	295	14	7 - 19	
			4700N	13	7	22	0	82	295	10	1 - 12	
2-61	This stope is below the pit bottom and has intersected the pit. This has been backfilled. The consequence of a failure/subsidence will be confined to the pit area. The consequence of this is low.	N/A	4600N	80	15	22	0	55	145	12	11 - 14	
			4650N	59	16	51	8	55	145	15	10 - 19	
			4700N	57	14	31	9	60	145	8	5 - 10	
			6250S	34	25	36	0	29	195	30	20 - 36	
			6200S	hanging wall	pit B/T	46	0	83	195	17	12 - 26	
			6150S	hanging wall	pit B/T	110	0	96	195	38	13 - 78	
			6100S	hanging wall	pit B/T	40	0	58	195	18	16 - 24	
			6050S	hanging wall	pit B/T	118	0	153	195	45	9 - 95	
			6000S	hanging wall	pit B/T	27	0	48	195	11	10 - 12	
2-62	This stope is below the pit bottom and has intersected the pit. This has been backfilled. The consequence of a failure/subsidence will be confined to the pit area. The consequence of this is low.	N/A	6150S	hanging wall	pit B/T	42	0	55	95	26	23 - 29	
			6100S	hanging wall	pit B/T	36	0	94	95	30	12 - 37	
3-61	Same situation as above	N/A	6250S	32	17	27	0	39	150	18	17 - 27	
			6200S	42	14	47	0	58	150	33	14 - 47	
3-02	Same situation as above	N/A	5900S	hanging wall	surface B/T	70	0	38	220	38	34 - 42	
			5850S	hanging wall	surface B/T	112	0	118	220	40	10 - 65	
			5800S	hanging wall	surface B/T	50	0	71	220	16	10 - 20	
			5750S	48	33	62	0	94	220	32	16 - 40	
			5700S	96.00	19	38	0	60	220	20	10 - 26	
2-01	If this stope is not filled there is a potential for instability. This geometry requires evaluation using the critical span concept.	This stope has a fairly large footprint and if unfilled will potentially result in instability that could be manifested on surface.	5300S	77.00	20	108	13	67	135	50	20' - 102'	
			5250S	72	26	133	26	80	135	90	24 - 130	
			5200S	73	9	20	25	28	135	14	9 - 20	
2-69	This stope is below the pit bottom and has intersected the pit. This has been backfilled. The consequence of a failure/subsidence will be confined to the pit area. The consequence of this is low.	N/A	6625S	32	16	25	0	37	50	16	9 - 20	A1 Pit Area
			6650S	hanging wall		32	0	30	50	16	8 - 29	
3-69	This stope is significantly below the pit bottom, and is of a small enough geometry to not result in instability. If this does occur, the consequence thereof is considered to be low.	The stope back is narrow (<7 m) and the stope is more vertical, so if unfilled, this should still remain stable	6700N	75	16	59	0	98	275	22	12 - 41	
			6750N	110	10	40	0	105	275	30	7 - 35	
			6800N	120	20	59	0	98	275	30	14 - 57	
			6850N	120	16	56	0	74	275	40	16 - 47	
			6900N	65	27	47	0	62	275	30	22 - 40	
			6950N	92	12	53	0	75	275	26	11 - 32	
			7000N	100	17	25	0	42	275	18	15 - 20	
2-24	Based on the current understanding this is considered to have been intersected by the pit, and does not pose a risk.	N/A	7050N	103	14	15	0	56	95	15	14 - 16	
			7100N	59	24	38	0	20	95	26	24 - 28	
			7125N	64	26	29	0	21	95	28	26 - 29	
3-70	This stope is below the Baker Creek and as such the consequence of a crown pillar collapse his high. For this reason this should be further evaluated using the critical span concept.	The stope is a drift width in the upper area widening to 9 m lower down, but is vertical in orientation. Should be reevaluated.	7500N	61	27	120	14	379	295	18	6 - 29	
			7550N	63	14	120	14	380	295	14	7 - 20	
			7600N	60	13	97	9	379	295	20	7 - 47	
			7650N	51	22	80	8	381	295	18	8 - 30	
			7700N	68	32	55	6	203	295	12	4 - 29	
			7750N	80	31	55	2	125	295	16	10 - 26	
3-25	This stope is below the pit bottom and has intersected the pit. This has been backfilled. The consequence of a failure/subsidence will be confined to the pit area. The consequence of failure to the surface area is low.	N/A	2700S	62'	46	46	none	274	220	20	10' - 46'	C1 Pit
			2650S	hanging wall	pit B/T	76	none	314	220	15	10 - 19	
			2600S	35	36	41	none	242	220	18	7 - 36	
			2550S	hanging wall	pit B/T	76	none	205	220	25	10 -42	
2-26	As above	N/A	2500S	hanging wall	pit B/T	75	none	194	95	22	12 - 40	
			2450S	hanging wall	pit B/T	74	none	352	95	20	6 - 32	
3-24	As above	N/A	2425S	90	17	35	none	88	45	18	8 - 24	
			2400S	97	13	20	none	34	45	14	13 - 20	
2-22	As above	N/A	2300 S	42	20	36	none	209	120	18	7 - 28	
			2250S	50	21	25	none	32	120	20	18 - 23	
2-21	As above	N/A	2200S	hanging wall	pit B/T	36	none	182	70	12	7 - 14	
			2150S	56	6	54	none	315	70	14	6 - 19	
2-20	As above	N/A	2100S	hanging wall	pit B/T	58	none	371	120	20	7 - 32	
			2050S	94	9	108	none	311	120	22	7 - 35	
			2025S	73	9	60	none	220	120	18	9 - 28	
2-19	This stope is in the areas of the road and the consequence of failure is high and as such should be further evaluated using the critical span concept.	The stope is vertically orientated. If the stope is not filed, the footprint does not really increase.	2000S	hanging wall	pit B/T	22	none	116	100	12	9 - 14	
			1950S	16	12	15	none	52	100	12	9 - 15	
			1925S	4	11	23	none	83	100	14	10 - 17	
2-18	As above	The footprint of this stope would increase if there was no fill, but the stope remains narrow so this should not dramatically affect it's stability	1900S	33	15	133	none	349	145	20	3 - 30	
			1850S	54	9	143	no info	354	145	20	6 - 32	
			1800S	38	9	139	bedrock	353	145	16	5 - 22	
1-18	This stope is below the Baker Creek and as such the consequence of a crown pillar collapse his high. For this reason this should be further evaluated using the critical span concept.	The potential unstable span would increase substantially if this stope were not filled	250S	115.00	24	42	none	40	350	17	12' - 24'	B1 and B2 Pit Areas
			200S	70	52	100	none	80	350	24	16 - 52	
			150S	70.00	54	72	none	57	350	40	23 - 57	
			100S	66.00	22	43	none	53	350	24	15 - 22	
			50S	86.00	51	65	8	35	350	44	17 - 51	
			00	86	37	60	16	40	350	33	16 - 37	
1-18 #1	These stopes are below the B1 pit, which is to be filled. The risk of people working in this area and the longterm stability of the freeze pipes should be understood and for this reason the stopes should be evaluated using the critical span concept.	As above	00	53.00	16	38	20	51	45	12	9' - 16'	
1-18 EB	As above	As above	00	55.00	15	64	16	50	70	10	7' - 15'	
			50N	86.00	12	37	pit/fill	36	70	16	11'-37'	
1-18 EA	As above	As above	100N	65.00	46	100	pit/fill	63	145	36	26' - 46	
			150N	88	20	156	bedrock	114	145	30	10 - 85	
			200N	60	21	122	bedrock	84	145	22	12 - 36	
2-15	As above	The possible unstable span would increase by a small margin if the stope was unfilled	300N	40.00	13	54	bedrock (ramp)	47	125	15	12' - 30'	
			350N	52	20	86	bedrock (ramp)	85	125	30	11 - 55	
			400N	67	9	105	bedrock (ramp)	68	125	40	9 - 68	
2-06	As above	The footprint of this stope would increase if there was no fill, but the stope remains narrow so this should not dramatically affect its' stability	500N	83.00	17	72	bedrock (ramp)	104	70	15	10' - 32'	
			550N	140	26	58	-	116	70	30	11 - 41	
1-31	This area is currently subsiding. The stope geometry should be evaluated using the critical span concept.	The potential unstable span would dramatically increase if the stope was unfilled - unlikely scenario based on the current performance.	3075N	hanging wall	pit B/T	130	no info	50	150'	70	28' - 80'	B3 and B4 Pit Areas
			3150N	hanging wall	pit B/T	100	no info	55	150	80	30 - 138	
			3175N	35 to 130	18	130	approx 7'	47	150	65	18 - 132	
			3225N	100.00	pit B/T	105	no info	36	150	30	20 - 48	
1-26	This stope is on the outside of the B4 pit. The consequence of a crown pillar failure will be moderate. This needs to be evaluated using the critical span concept	The possible unstable span would increase by a small margin if the stope was unfilled	3875N	40.00	13	39	none	20	100	18	13' - 39'	
			3925N	55	12	38	13	23	100	20	10 - 27	
			3975N	57	11	25	13	20	100	24	10 - 18	
1-36	The stope is between the B4 pit and the road. This should be evaluated as the consequence of a crown pillar failure could be moderate to high.	As above	3525N	56.00	7	37	15	30	95	14	7' - 20'	
			3575N	50	12	52	10	42	95	20	12 - 25	
			3600N	57.00	15	47	15	48	95	18	15 - 26	
1-37	As above	Stope is relatively small and narrow no backfill would not really have an effect.	3650N	63	17	31	20	17	70	30	17 - 31	
			3675N	58	20	39	7	30	70	32	5 - 37	
			3700N	37	9	52	31	52	70	28	9 - 32	
1-43	This stope has a large footprint area and should be evaluated using the critical span concept	The potential unstable span would increase substantially if this stope were not filled	3775N	90	15	65	10	52	225	20	15 - 25	
			3825N	71	11	82	14	98	225	25	11 - 42	
			3875N	56	21	118	9	118	225	26	14 -46	
			3900N	64	30	134	16	119	225	30	11 - 61	
			3975N	60	12	57	12	41	225	14	12 - 17	
1-43 #1	As above	As above	3950N	46	19	42	11	34	70	25	16 - 42	
			3975N	45	46	53	12	36	70	45	18 - 53	
			4000N	40	26	34	12	38	70	25	15 - 33	
1-43 #1	As above	As above	4025N	45	26	172	14	60	95	70	15 - 101	
			4075N	51	6	190	12	55	95	80	6 - 154	
1-43 lower	As above	As above	4125N	85	7	138	no info	187	195	30	7 - 70	
			4200N	84	86	235	no info	122	195	40	9 - 112	
			4250N	98	105	270	no info	161	195	45	12 - 115	
			4300N	96	47	201	no info	86	195	30	9 - 71	

Table 3

EVALUATION OF THE SURFACE CROWN PILLARS - GIANT MINE
ASSUMPTION: ALL STOPES ARE BACKFILLED

Stope Area	Q Range		Critical Span (Sc)		Length F	Span G	Thick. A	Dip	S.G.	Scaled Crown Pillar Span (Cs)	Sc - Cs Lower	Sc - Cs Higher	Comments
	Lower	Upper	Lower	Upper									
	4.3	18.0	6.2	11.4	41.0	7.0	14.0	70	2.6	3.0	3.2	8.4	Stable
2-01	4.3	18.0	6.2	11.4	23.0	22.0	14.0	70	2.6	7.3	-1.1	4.1	Unstable under poor ground Conditions.
2-01 unfilled	4.3	18.0	6.2	11.4	23.0	35.0	14.0	70	2.6	10.2	-4.0	1.2	Unstable under poor ground Conditions.
3-70	4.3	18.0	6.2	11.4	90.0	7.0	15.0	70	2.6	3.0	3.2	8.4	Stable
2-19	4.3	18.0	6.2	11.4	30.0	4.0	3.0	70	2.6	3.8	2.4	7.7	Stable
2-18	4.3	18.0	6.2	11.4	44.0	5.0	13.0	70	2.6	2.3	3.9	9.2	Stable
1-18	4.3	18.0	6.2	11.4	107.0	11.0	18.0	70	2.6	4.3	1.9	7.2	Marginal stability if the poor ground conditions prevail and back is exposed with the fill level lower down.
	4.3	18.0	6.2	11.4	107.0	16.0	18.0	70	2.6	6.1	0.1	5.3	Marginal stability if the poor ground conditions prevail
1-18 #1	4.3	18.0	6.2	11.4	14.0	5.0	16.0	70	2.6	1.9	4.3	9.6	Stable
1-18 EA	4.3	18.0	6.2	11.4	44.0	10.0	22.0	70	2.6	3.3	2.8	8.1	Stable
2-15	4.3	18.0	6.2	11.4	38.0	5.0	16.0	70	2.6	2.0	4.1	9.4	Stable
	4.3	18.0	6.2	11.4	38.0	1.0	16.0	70	2.6	0.4	5.8	11.0	Stable
2-06	4.3	18.0	6.2	11.4	21.0	8.0	34.0	70	2.6	2.0	4.2	9.4	Stable
1-26	4.3	18.0	6.2	11.4	30.0	6.0	13.0	70	2.6	2.6	3.5	8.8	Stable
1-26 unfilled	4.3	18.0	6.2	11.4	30.0	6.0	13.0	70	2.6	2.6	3.5	8.8	Stable
1-36	4.3	18.0	6.2	11.4	29.0	6.0	10.0	70	2.6	3.0	3.2	8.4	Stable
1-37	4.3	18.0	6.2	11.4	21.0	5.0	10.0	70	2.6	2.5	3.7	9.0	Stable
	4.3	18.0	6.2	11.4	21.0	10.0	10.0	70	2.6	4.5	1.7	6.9	Stable
1-43	4.3	18.0	6.2	11.4	69.0	8.0	13.0	70	2.6	3.6	2.5	7.8	
1-43 #1	4.3	18.0	6.2	11.4	21.0	11.0	10.0	70	2.6	4.9	1.3	6.5	
1-43 #1	4.3	18.0	6.2	11.4	29.0	6.0	11.0	70	2.6	2.9	3.3	8.6	
	4.3	18.0	6.2	11.4	29.0	22.0	11.0	70	2.6	8.7	-2.5	2.8	Likely instability if the weaker ground conditions prevail and the stopes are not filled
1-43 lower	4.3	18.0	6.2	11.4	59.0	26.0	21.0	70	2.6	8.2	-2.0	3.2	
	4.3	18.0	6.2	11.4	59.0	13.0	21.0	70	2.6	4.5	1.7	7.0	

Appendix 1
Site Plans and Stope Sections



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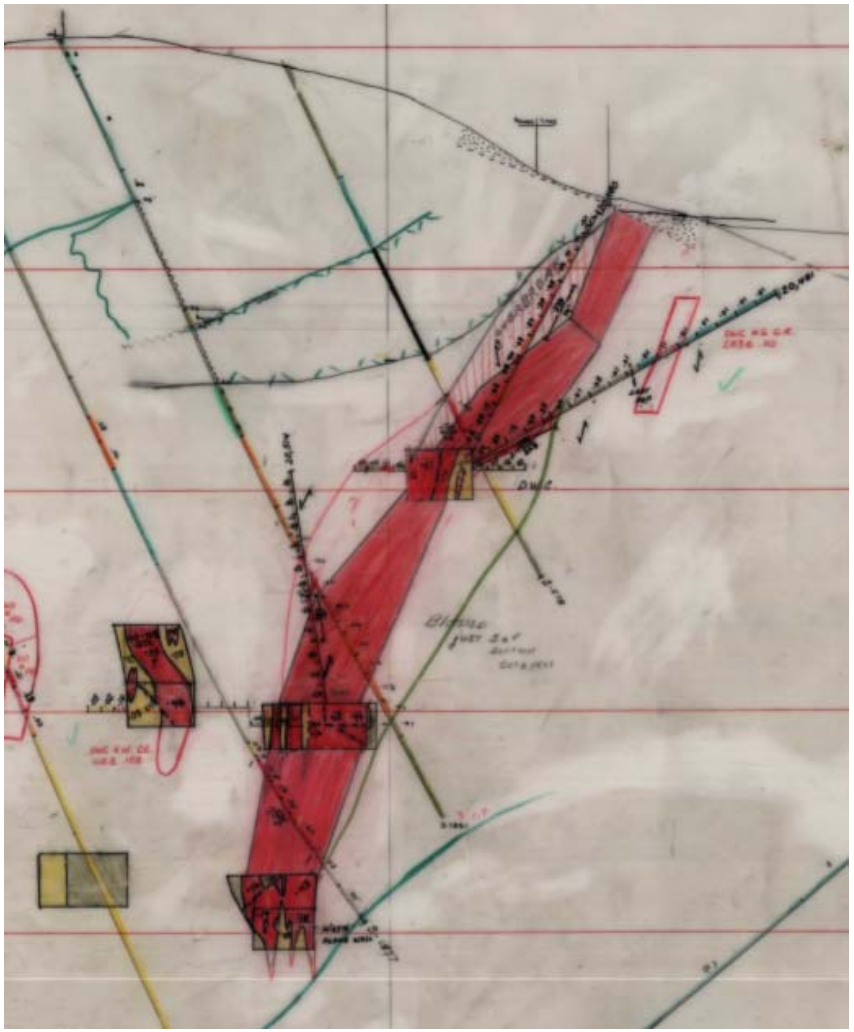
A1 Pit Area - Crown Pillars

SRK JOB NO.: 1CI001.013

FILE NAME: SurfaceCrownPillars.dwg

Giant Surface Crown Pillar Review

DATE:	APPROVED:	FIGURE:
Jan. 2006		1



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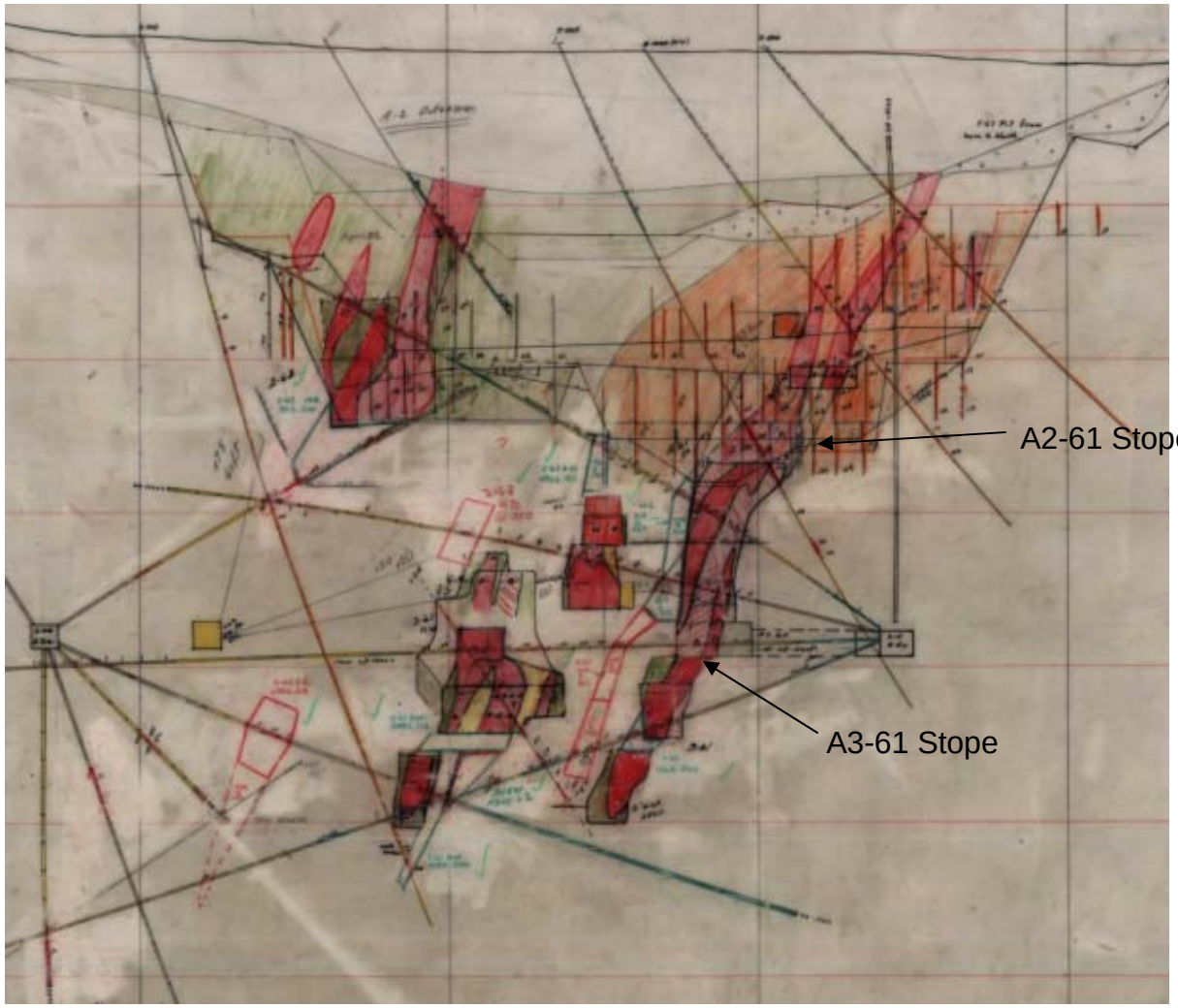
Crown Pillar Stability Assessment
Giant Mine

DWC STOPE: A-Shaft, 4500N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 2



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Crown Pillar Stability Assessment
Giant Mine

A2-61: A-Shaft, 6200S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 3

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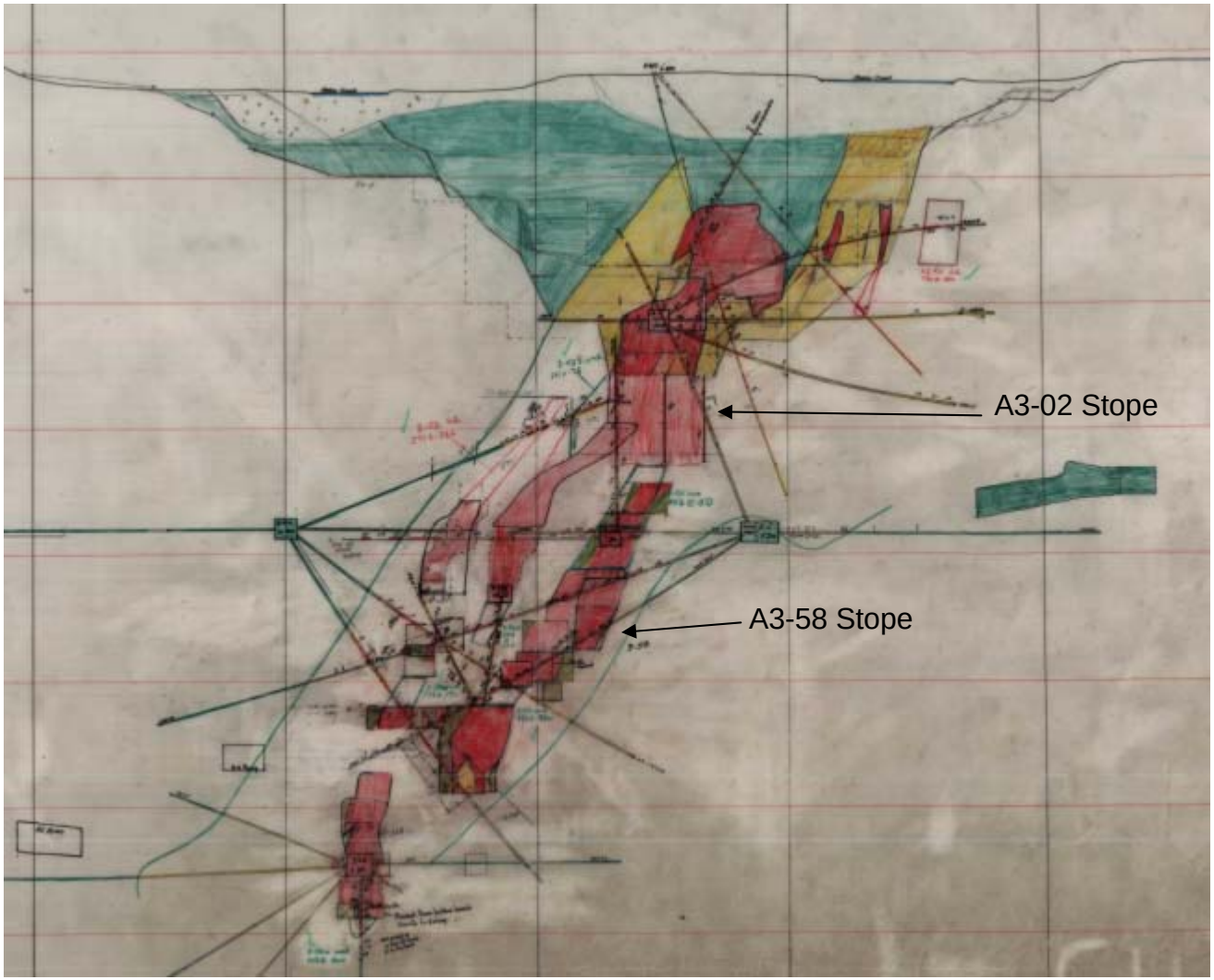
Crown Pillar Stability Assessment
Giant Mine

A2-61, A2-62: A-Shaft. 6100S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 4



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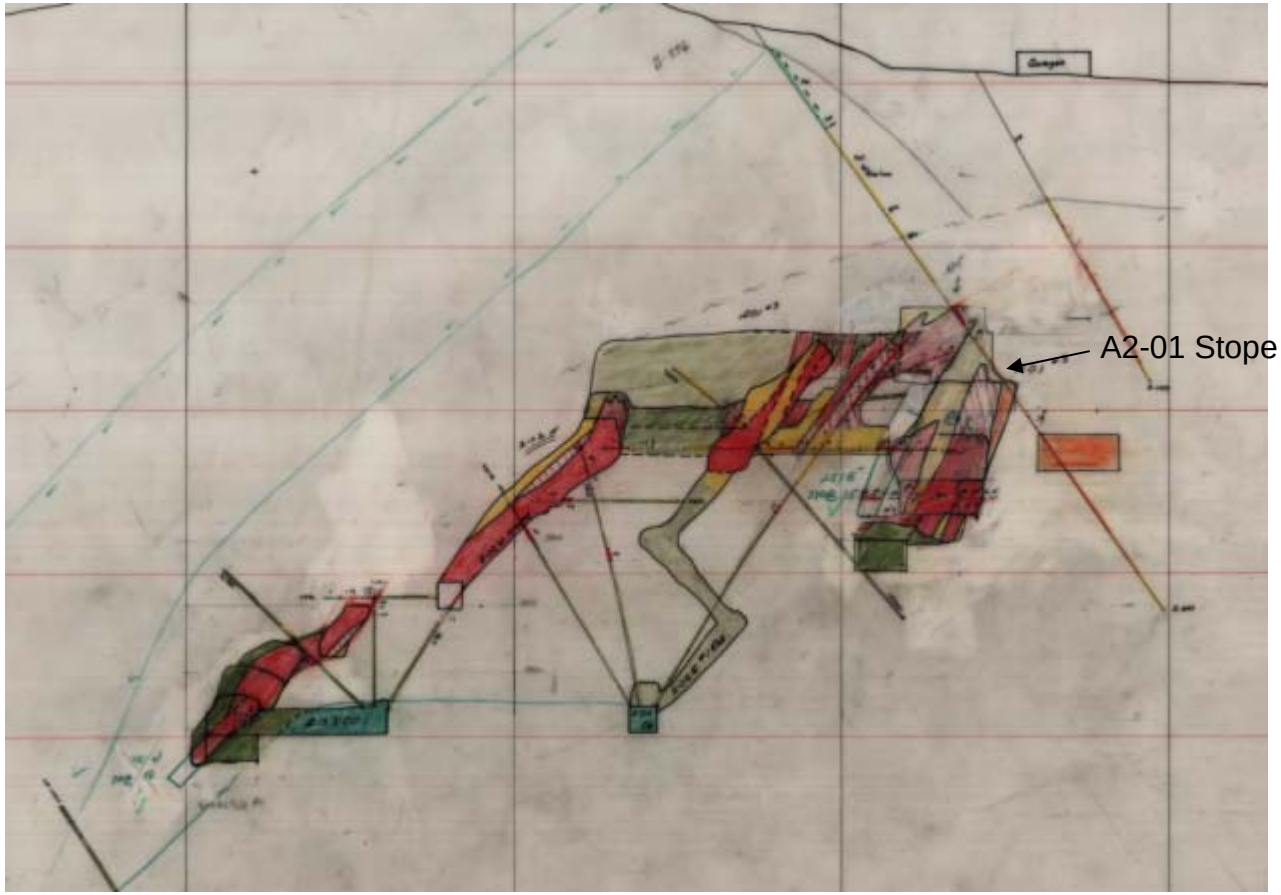
Crown Pillar Stability Assessment
Giant Mine

A3-02: A-Shaft, 5800S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 5



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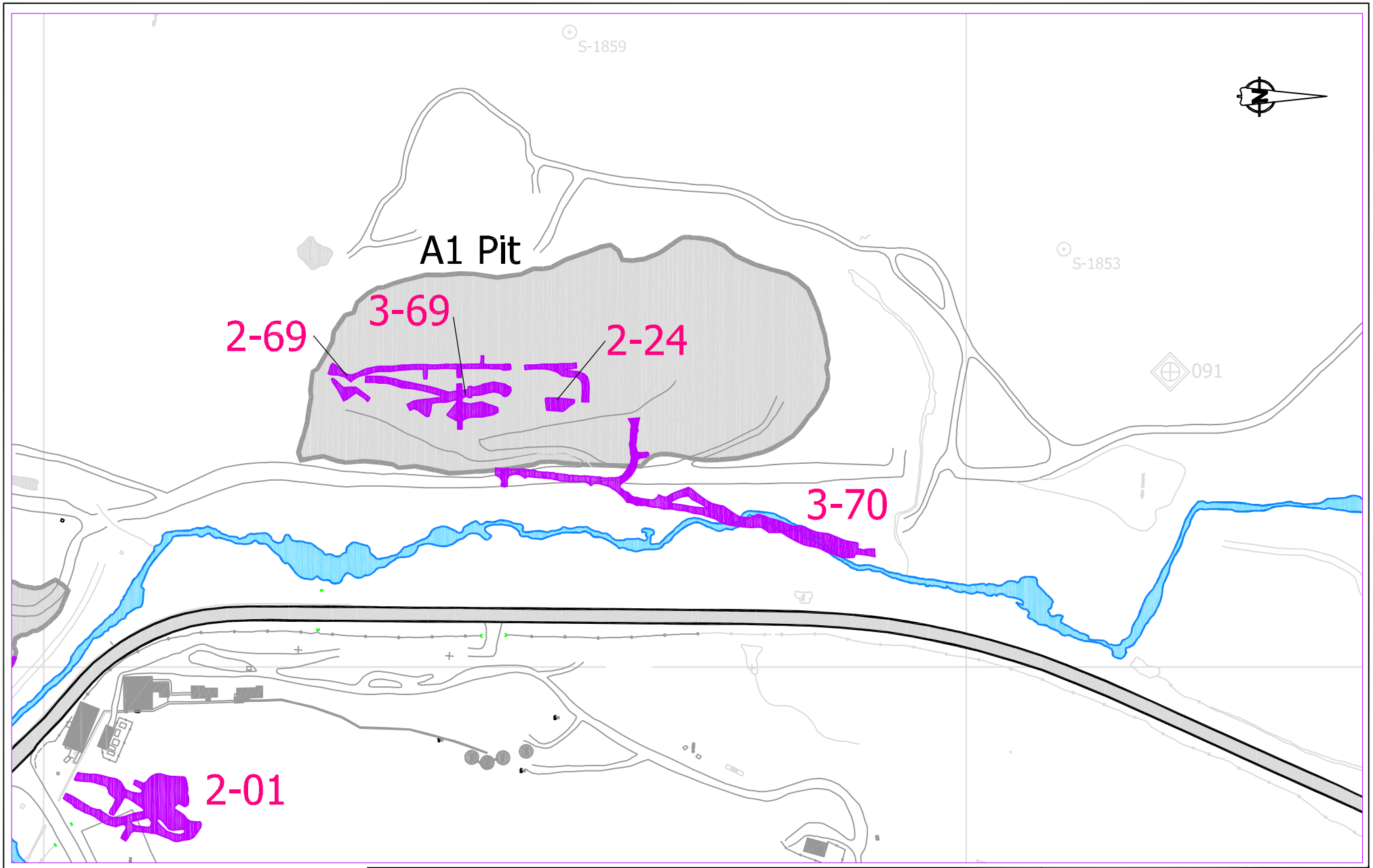
Crown Pillar Stability Assessment
Giant Mine

A2-01 Stope: A-Shaft, 5250S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 6



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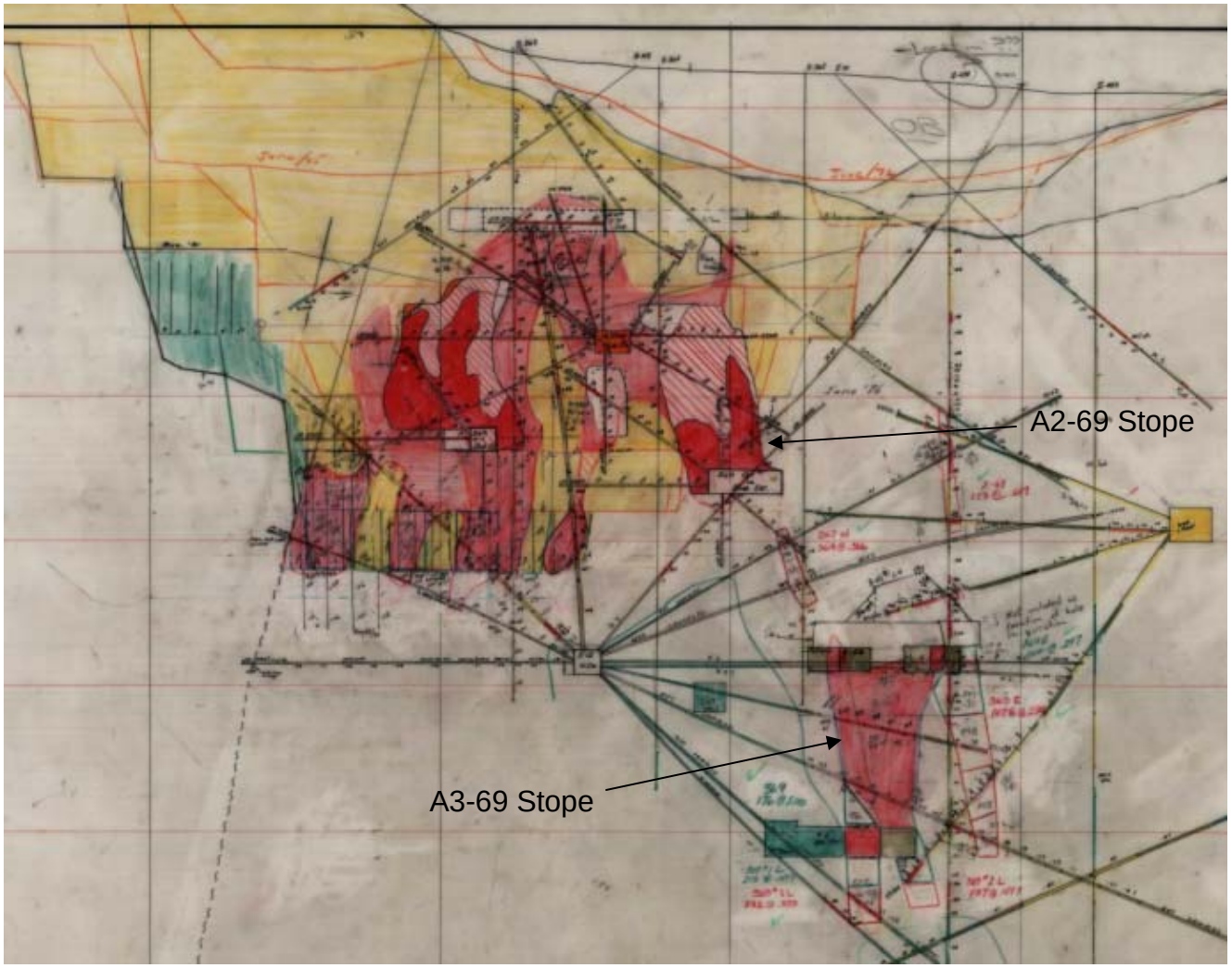
A1 Pit Area - Crown Pillars

SRK JOB NO.: 1CI001.013

FILE NAME: SurfaceCrownPillars.dwg

Giant Surface Crown Pillar Review

DATE:	APPROVED:	FIGURE:
Sept. 05		7



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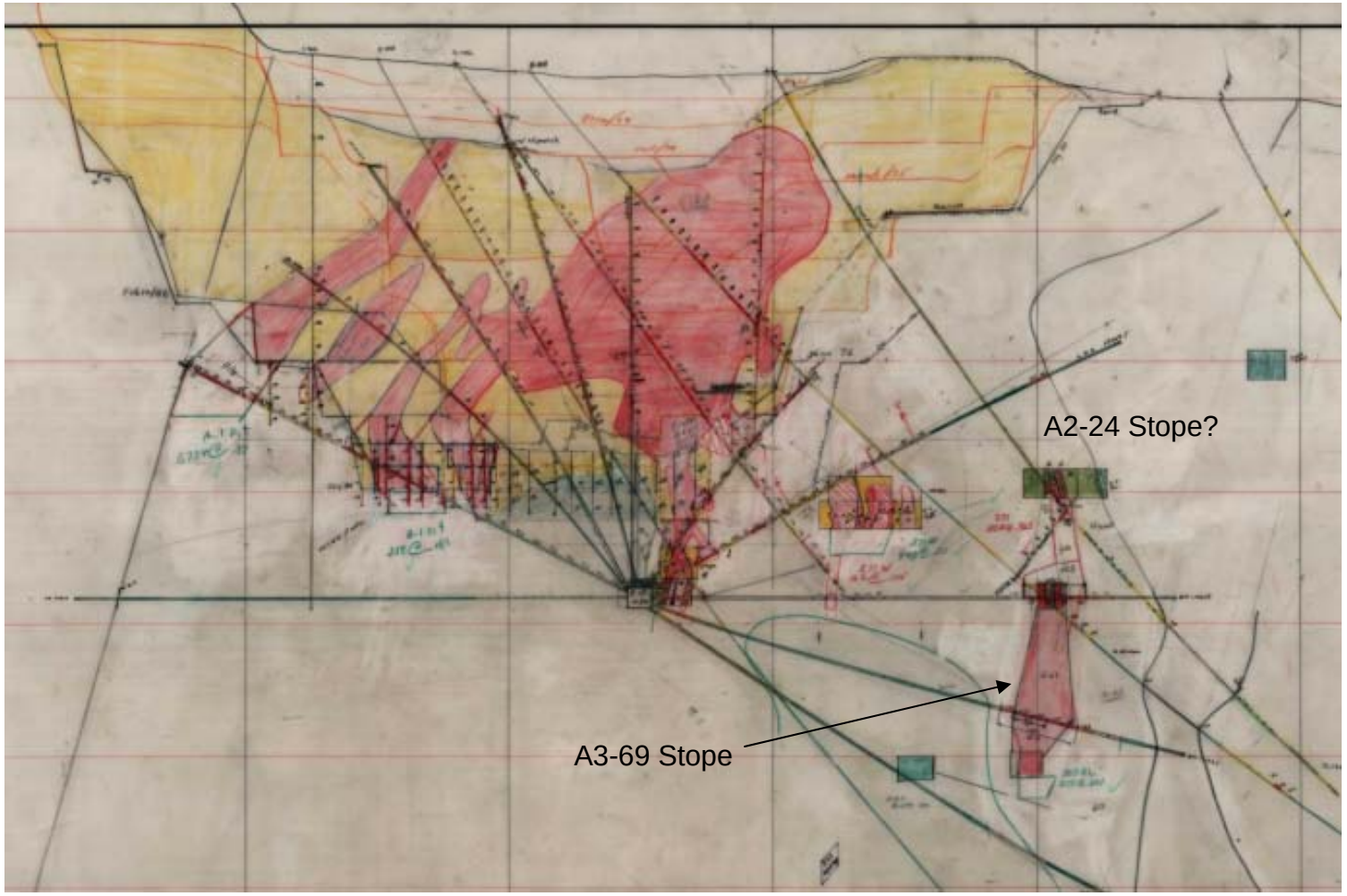
Crown Pillar Stability Assessment
Giant Mine

A2-69: A-Shaft, 6800N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 8



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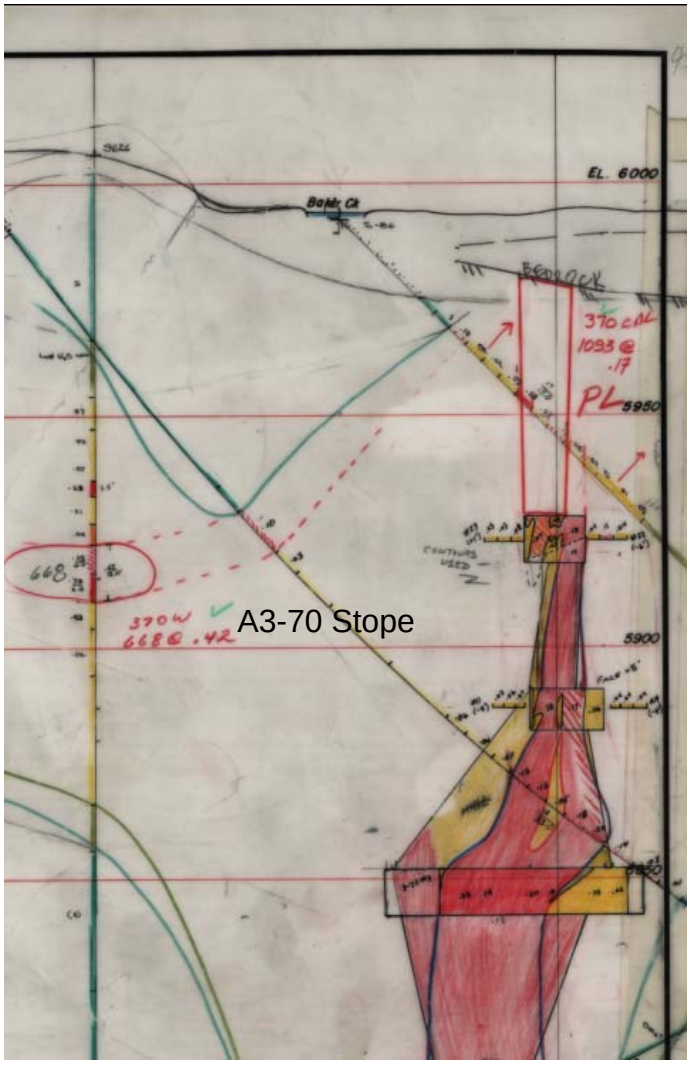
Crown Pillar Stability Assessment
Giant Mine

A2-24: A-Shaft, 7100N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 9



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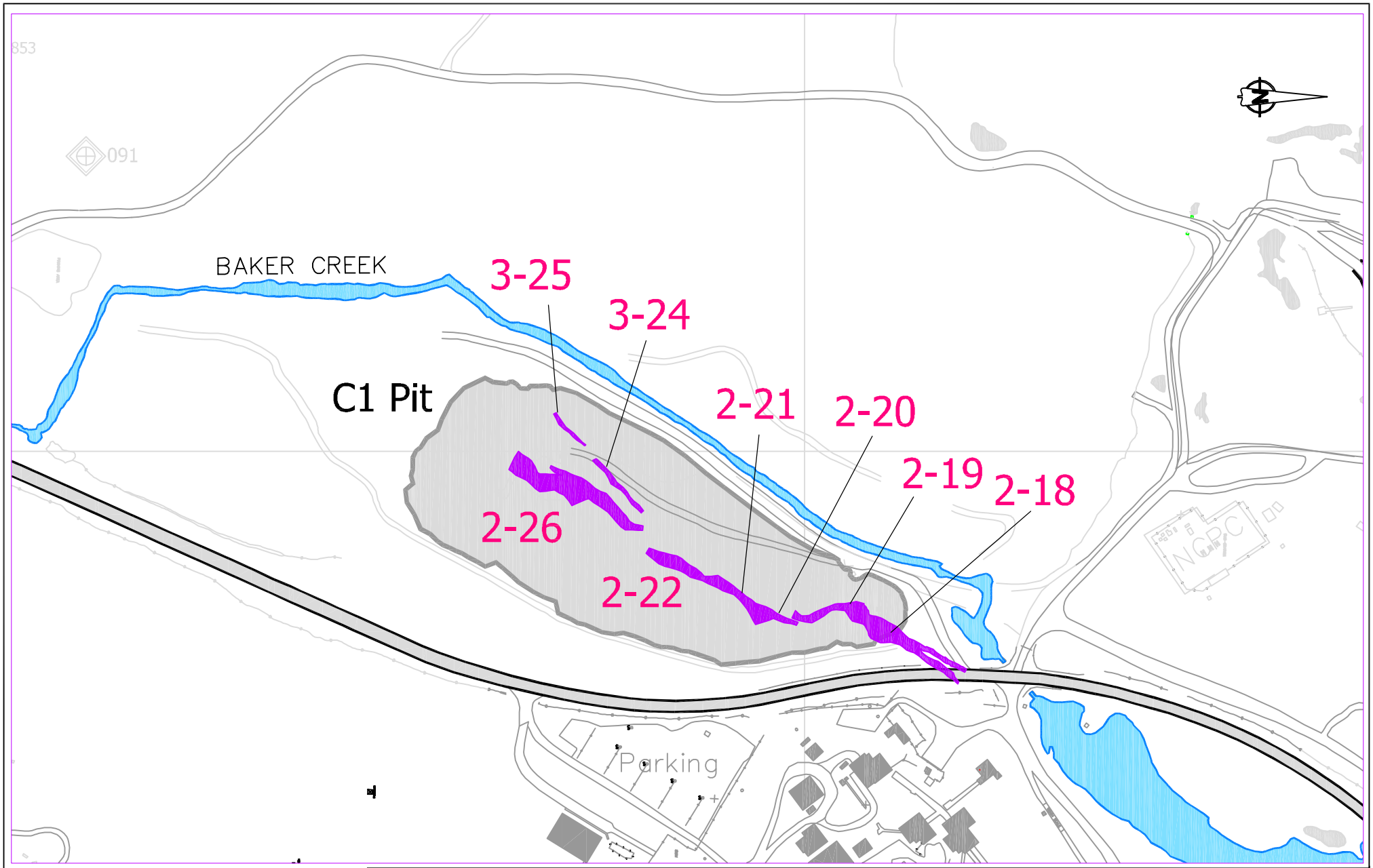
Crown Pillar Stability Assessment
Giant Mine

A3-70: A-Shaft, 7600N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 10



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C1 Pit Area - Crown Pillars

SRK JOB NO.: 1CI001.013

FILE NAME: SurfaceCrownPillars.dwg

Giant Surface Crown Pillar Review

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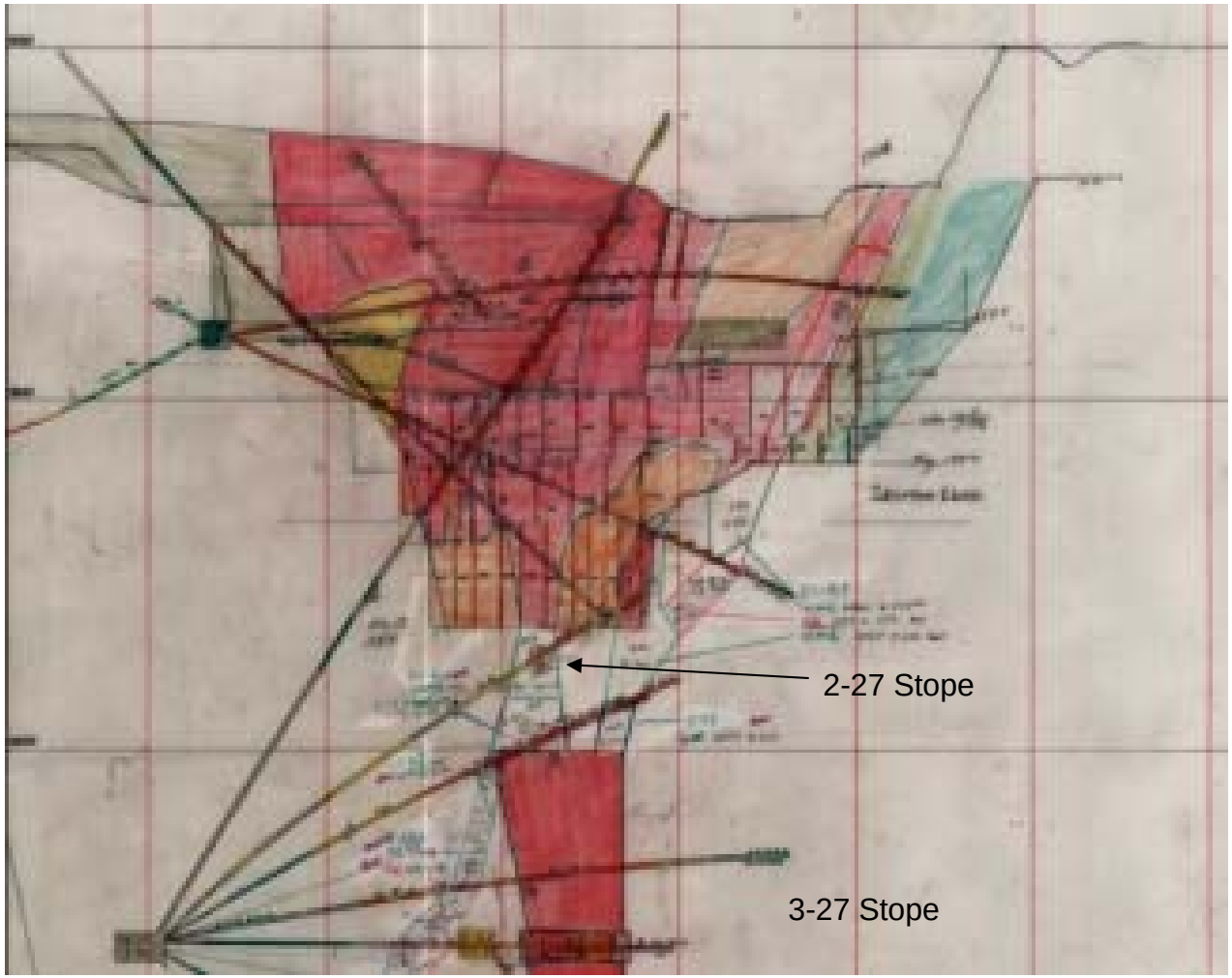
Jan. 2006		11



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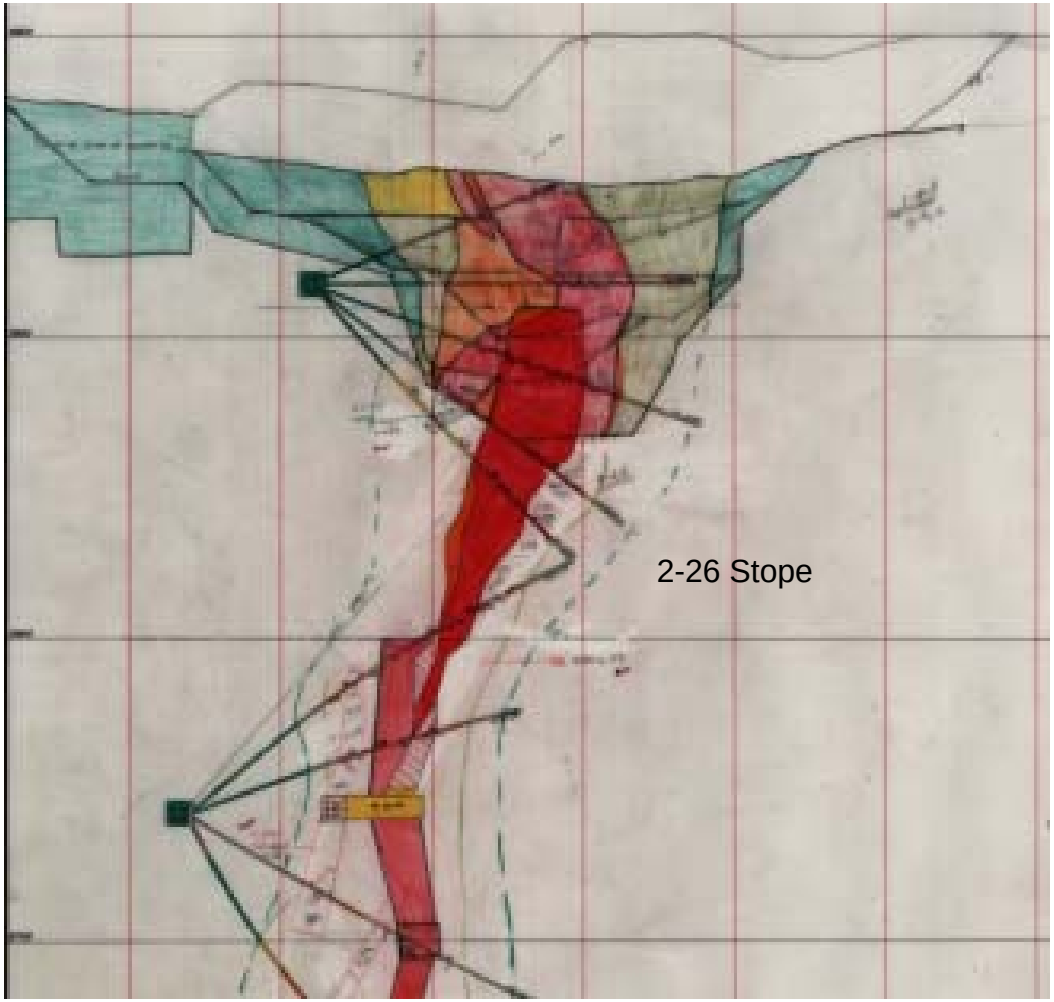
Crown Pillar Stability Assessment
Giant Mine

2-27 Stope: C-Shaft, 2600S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 12



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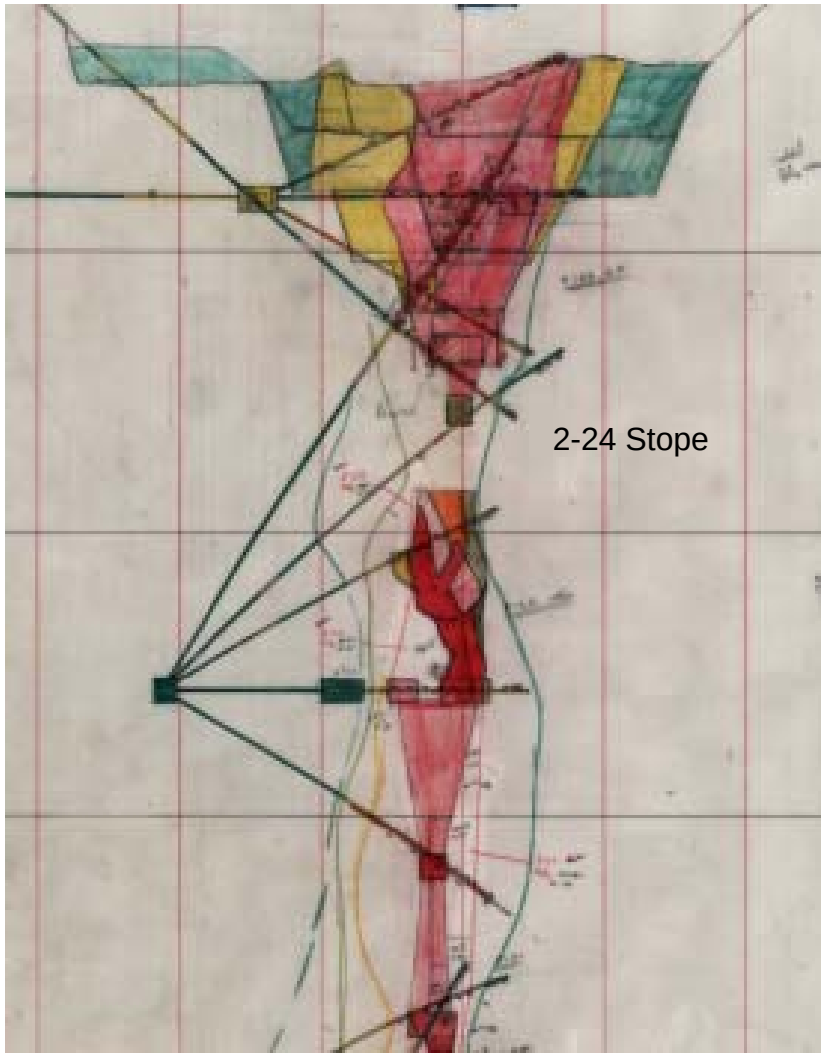
Crown Pillar Stability Assessment
Giant Mine

2-26 Stope: C-Shaft, 2475S

	DATE:	APPROVED:	FIGURE::
1CI001.013.0B01	January 2006		13



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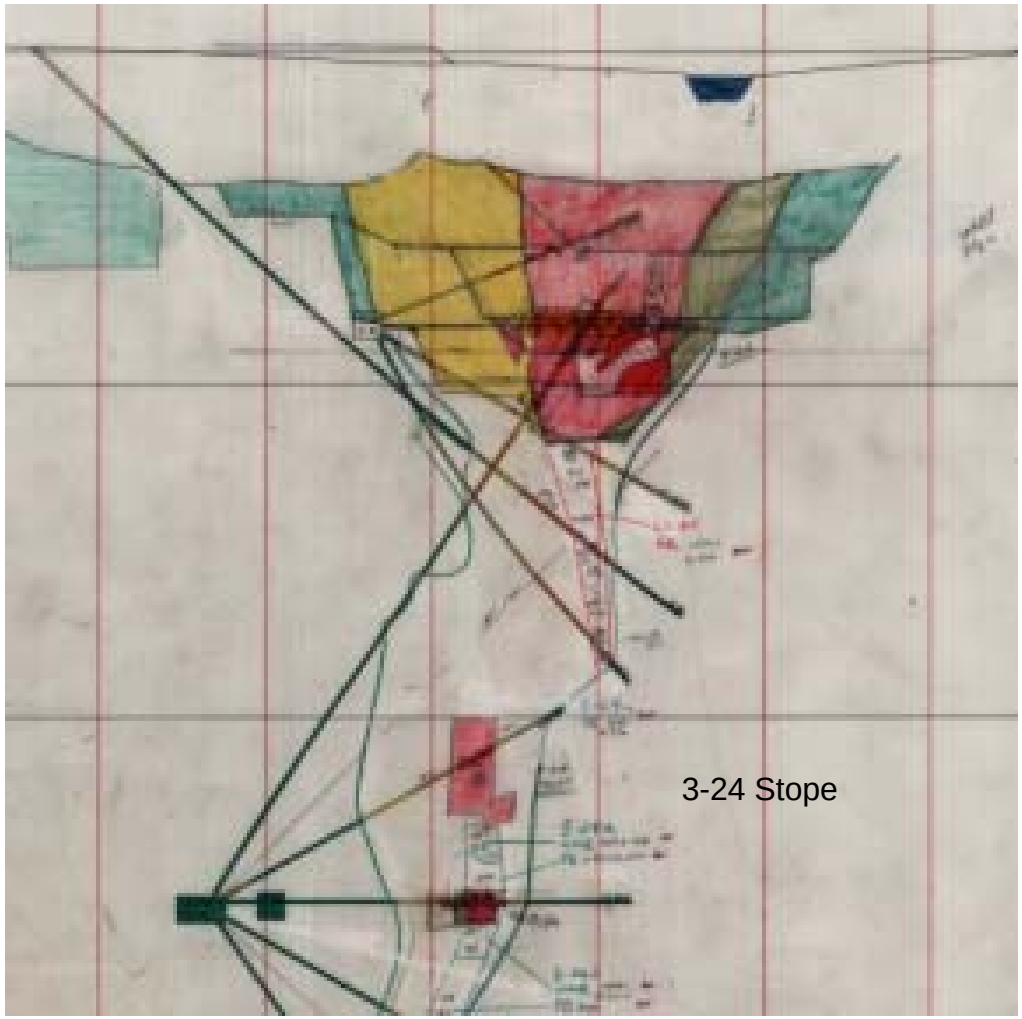
Crown Pillar Stability Assessment
Giant Mine

2-24 Stope: C-Shaft, 2300S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 14



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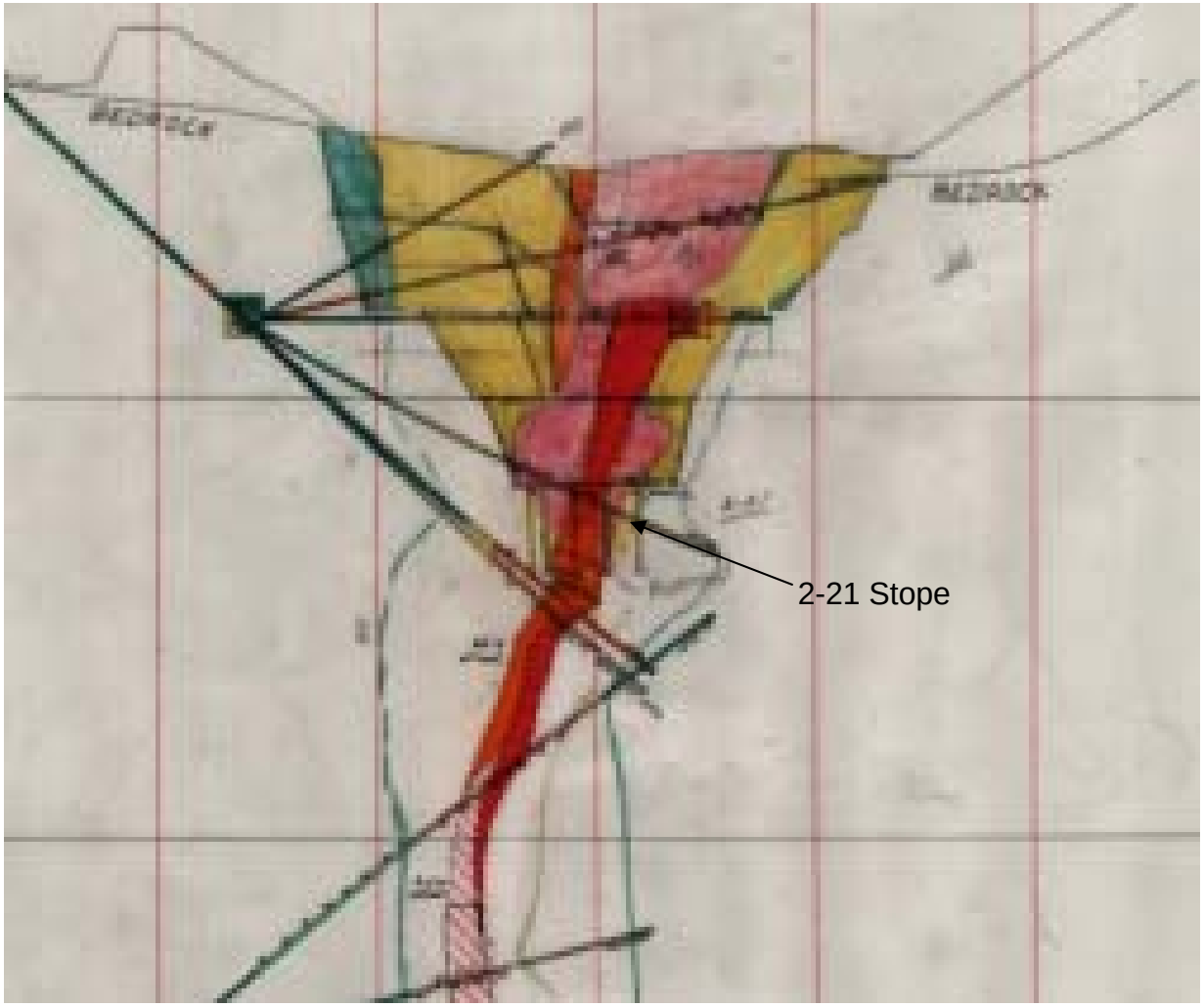
Crown Pillar Stability Assessment
Giant Mine

3-24 Stope: C-Shaft, 2400S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 15



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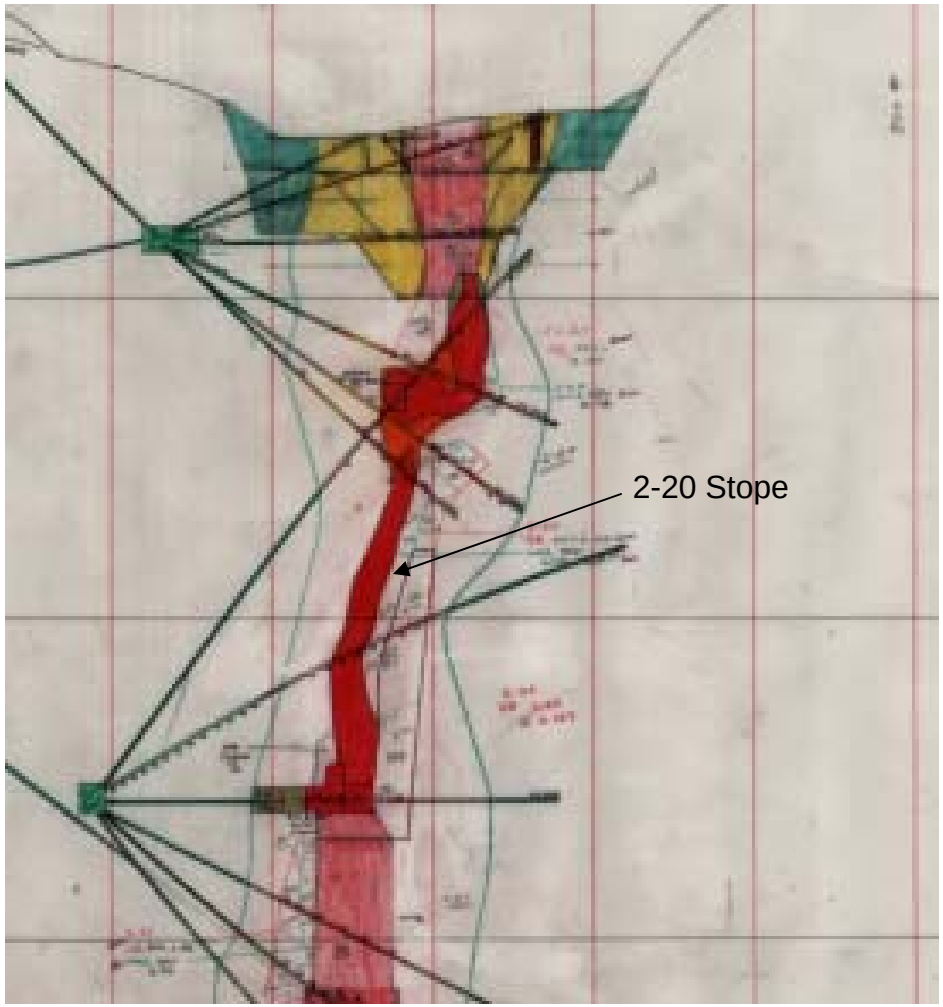
Crown Pillar Stability Assessment
Giant Mine

2-21 Stope: C-Shaft, 2200S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 16



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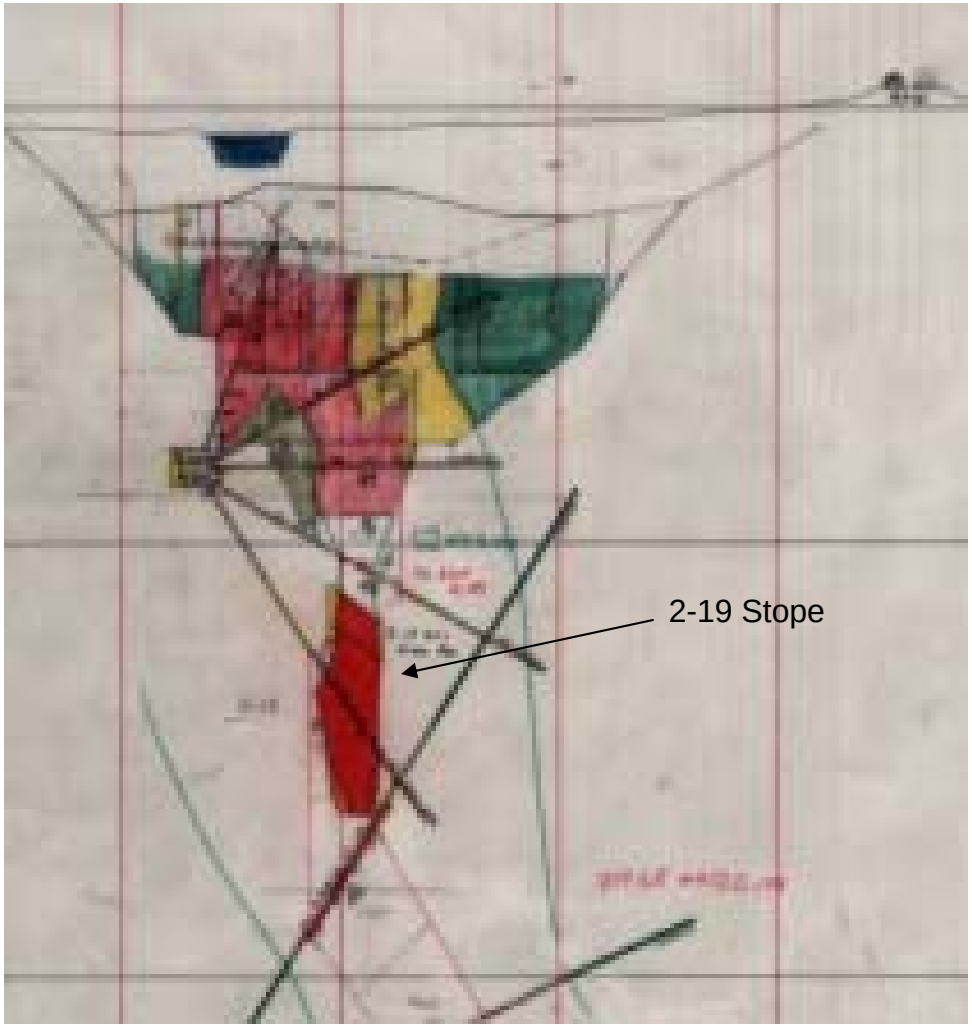
Crown Pillar Stability Assessment
Giant Mine

2-20 Stope: C-Shaft, 2100S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 17



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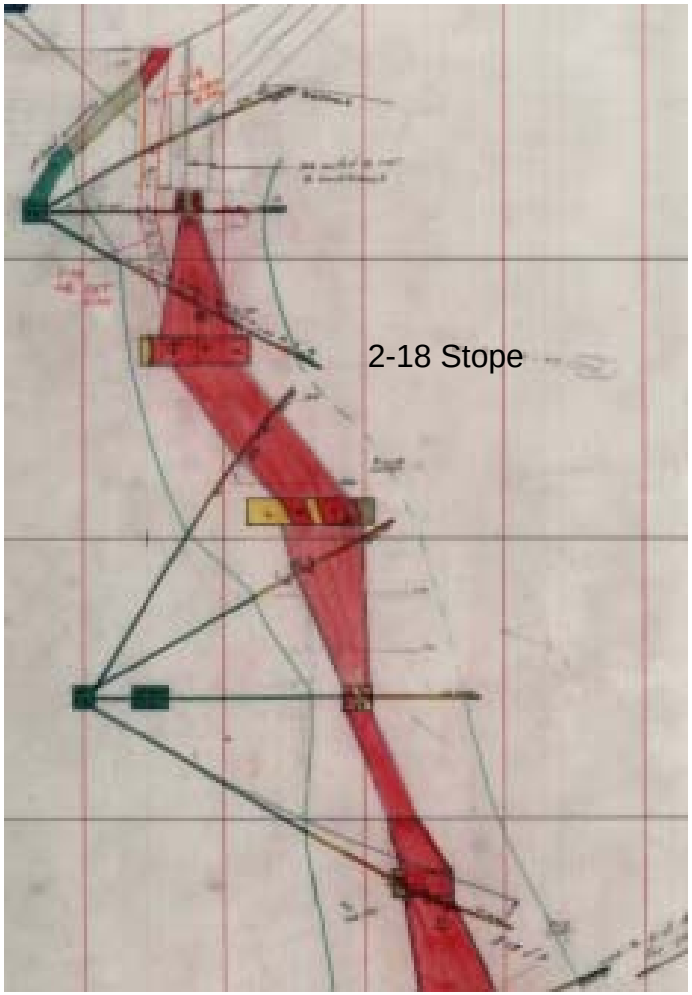
Crown Pillar Stability Assessment
Giant Mine

2-19 Stope: C-Shaft, 1950S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 18



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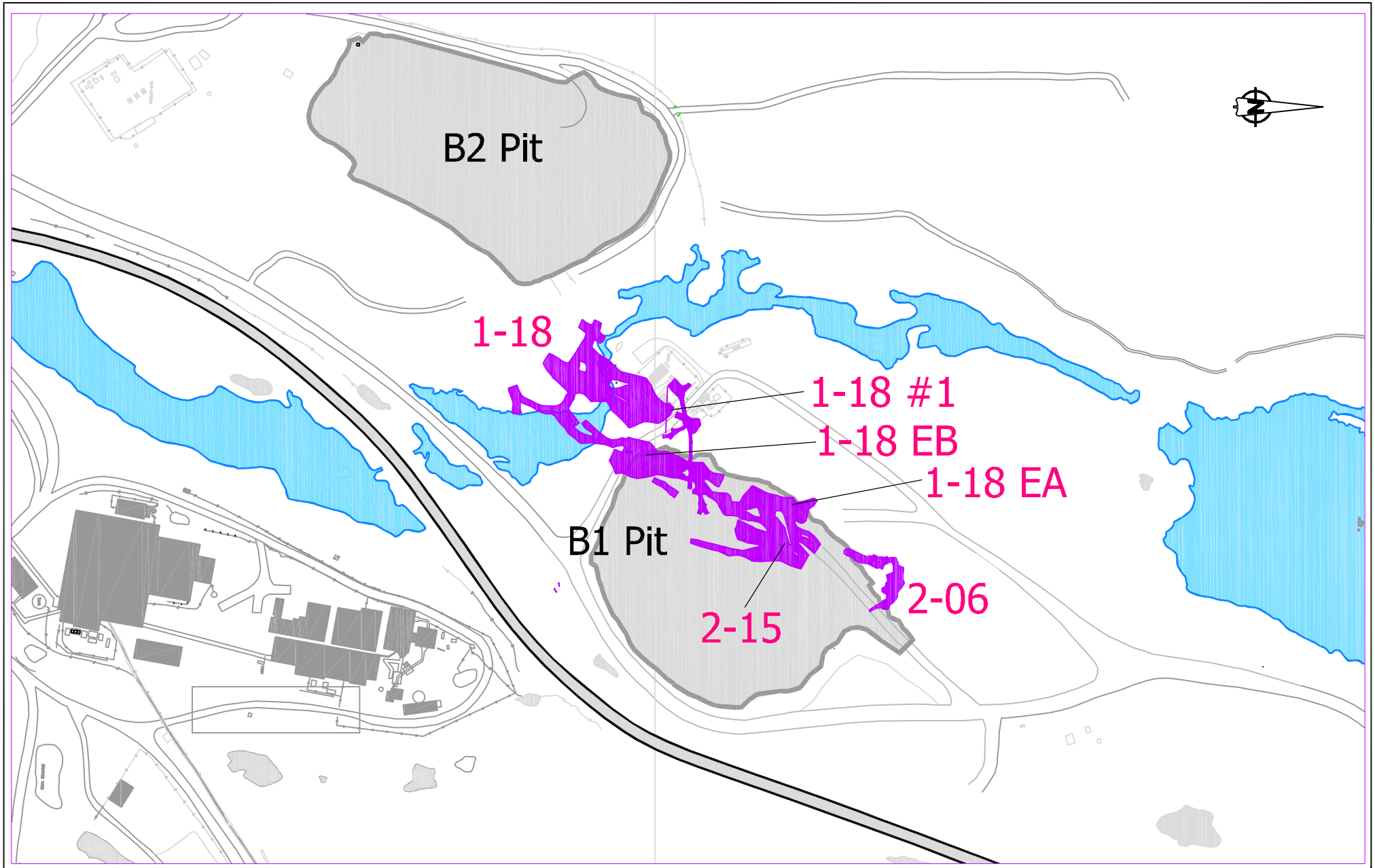
Crown Pillar Stability Assessment
Giant Mine

2-18 Stope: C-Shaft, 1850S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 19



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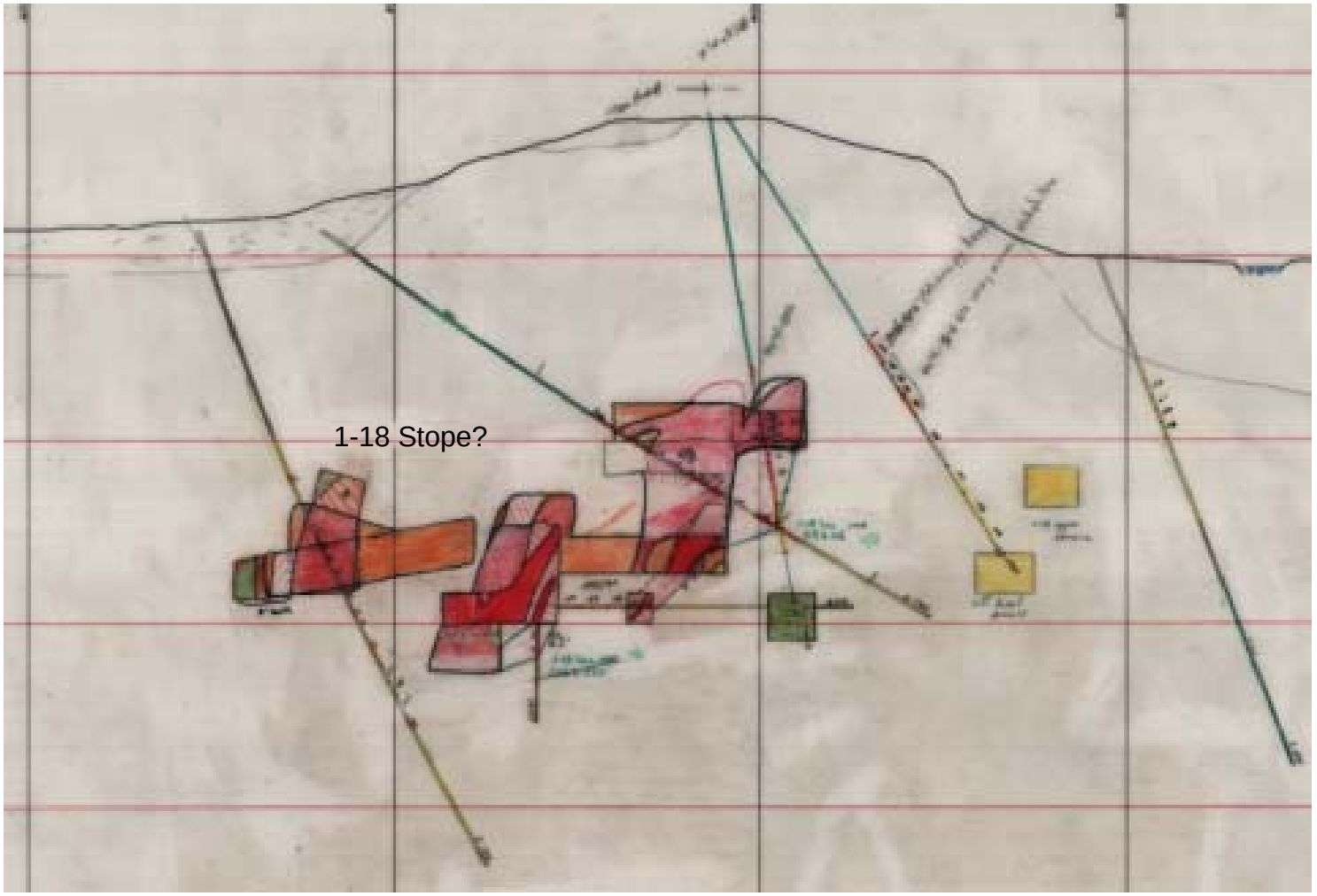
B1 and B2 Pit Areas - Crown Pillars

SRK JOB NO.: 1CI001.013

FILE NAME: SurfaceCrownPillars.dwg

Giant Surface Crown Pillar Review

DATE:	APPROVED:	FIGURE:
Jan. 2006		20



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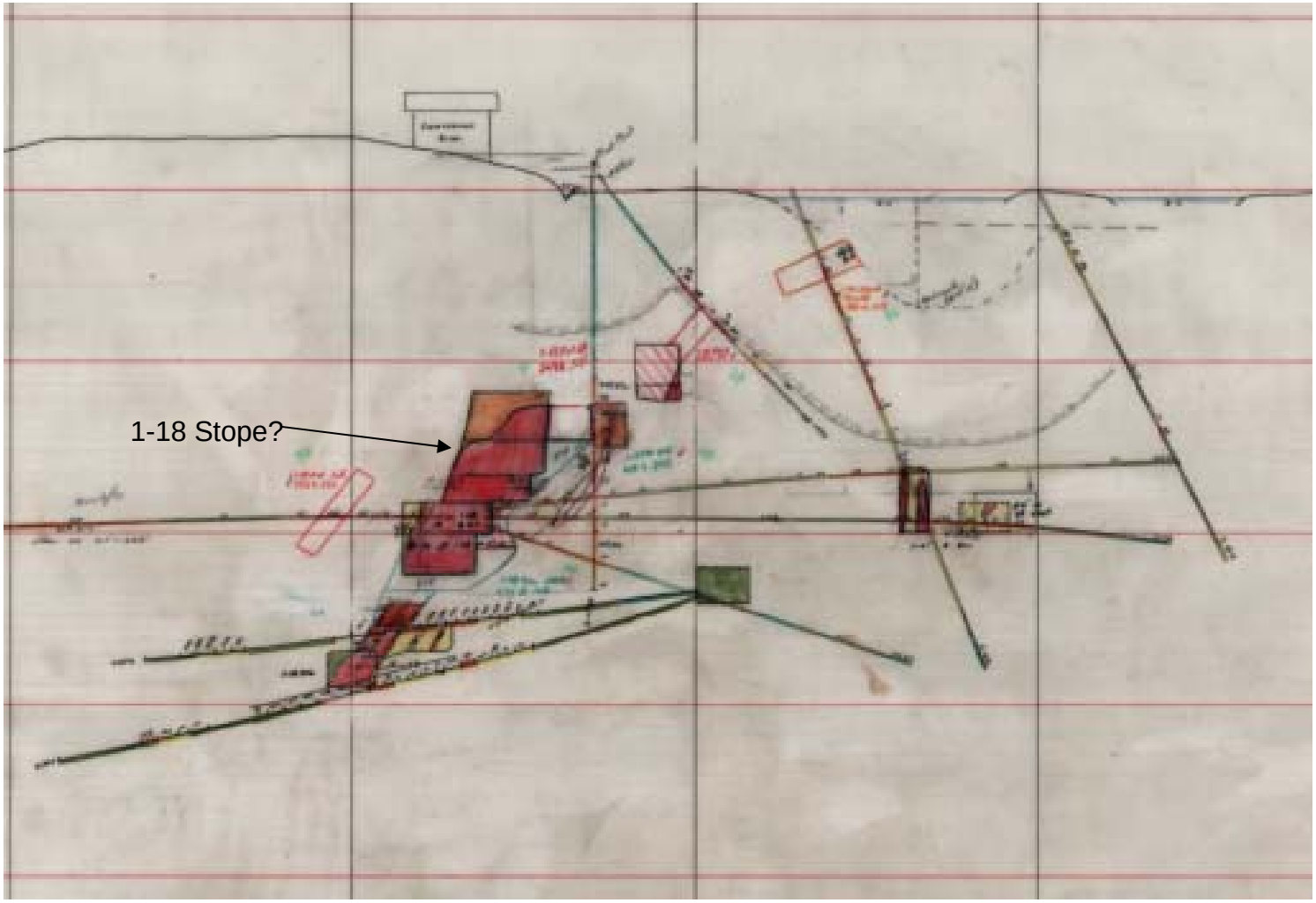
Crown Pillar Stability Assessment
Giant Mine

1-18 Stope?: B-Shaft, 200S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 21



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Crown Pillar Stability Assessment
Giant Mine

1-18 Stope?: B-Shaft, 100S

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 22

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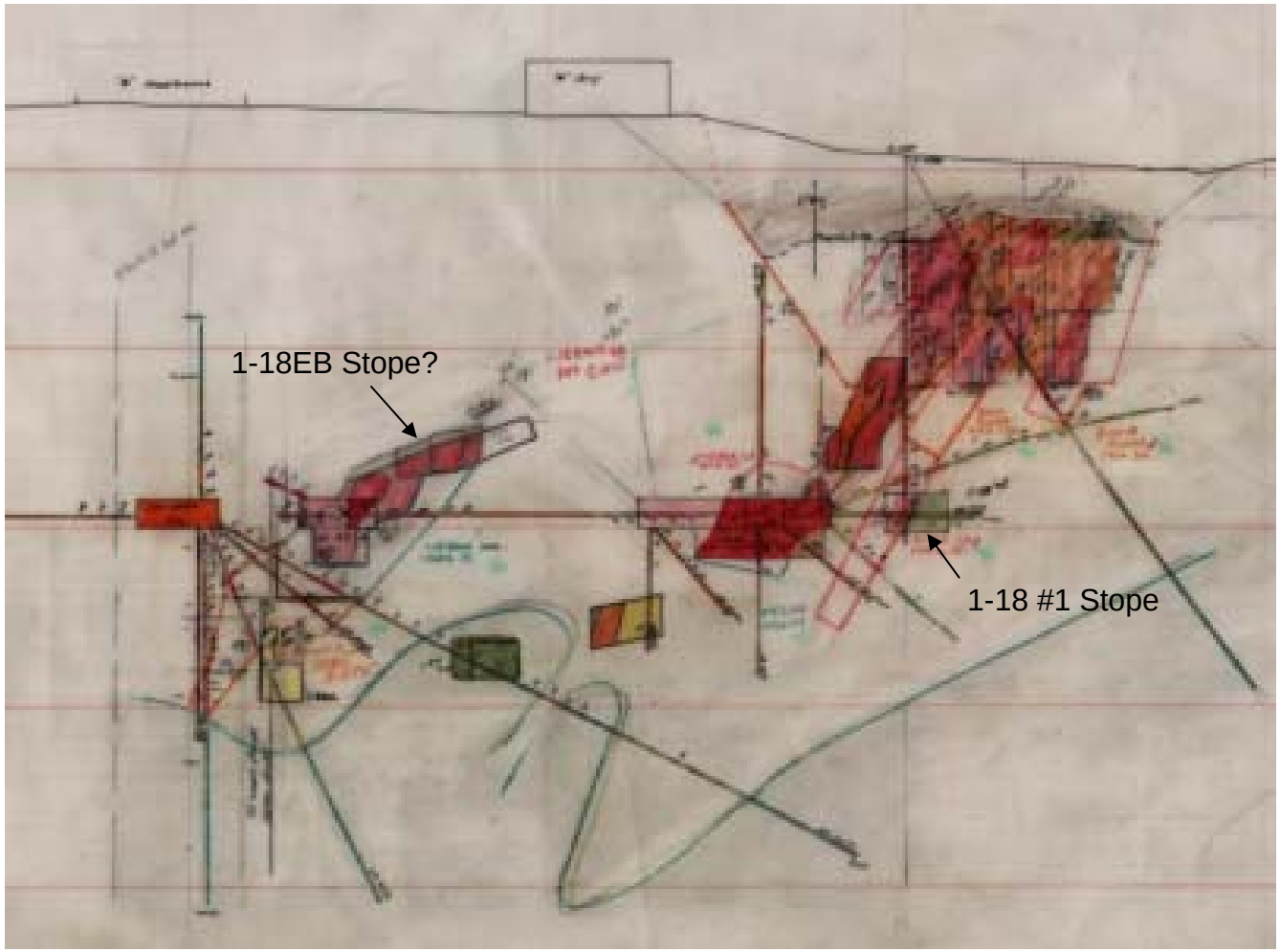
Crown Pillar Stability Assessment
Giant Mine

1-15, 1-18/1-18EB? Stope:

B-Shaft, 00

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 23



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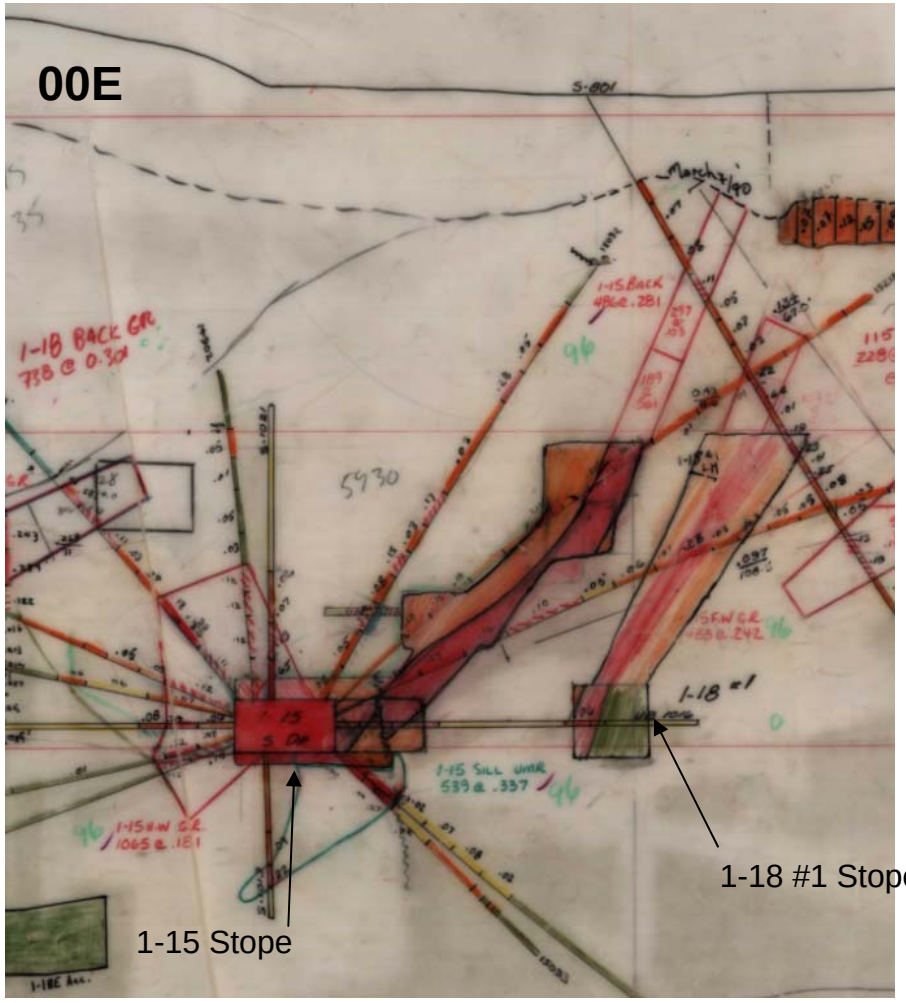
Crown Pillar Stability Assessment
Giant Mine

1-18 Stopes: B-Shaft, 25N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 24



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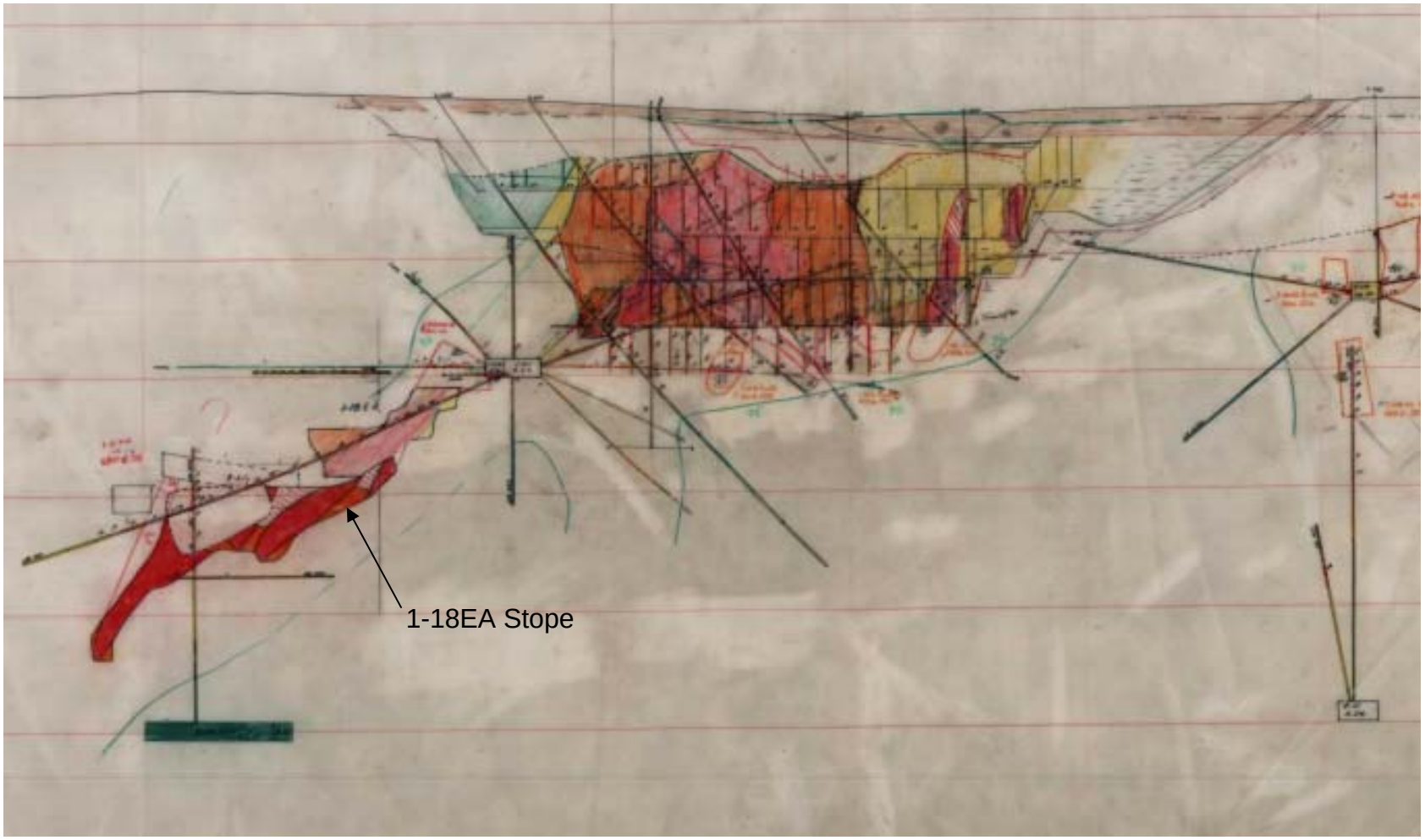
Crown Pillar Stability Assessment
Giant Mine

1-18 #1 Stope: B-Shaft, 25N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 25



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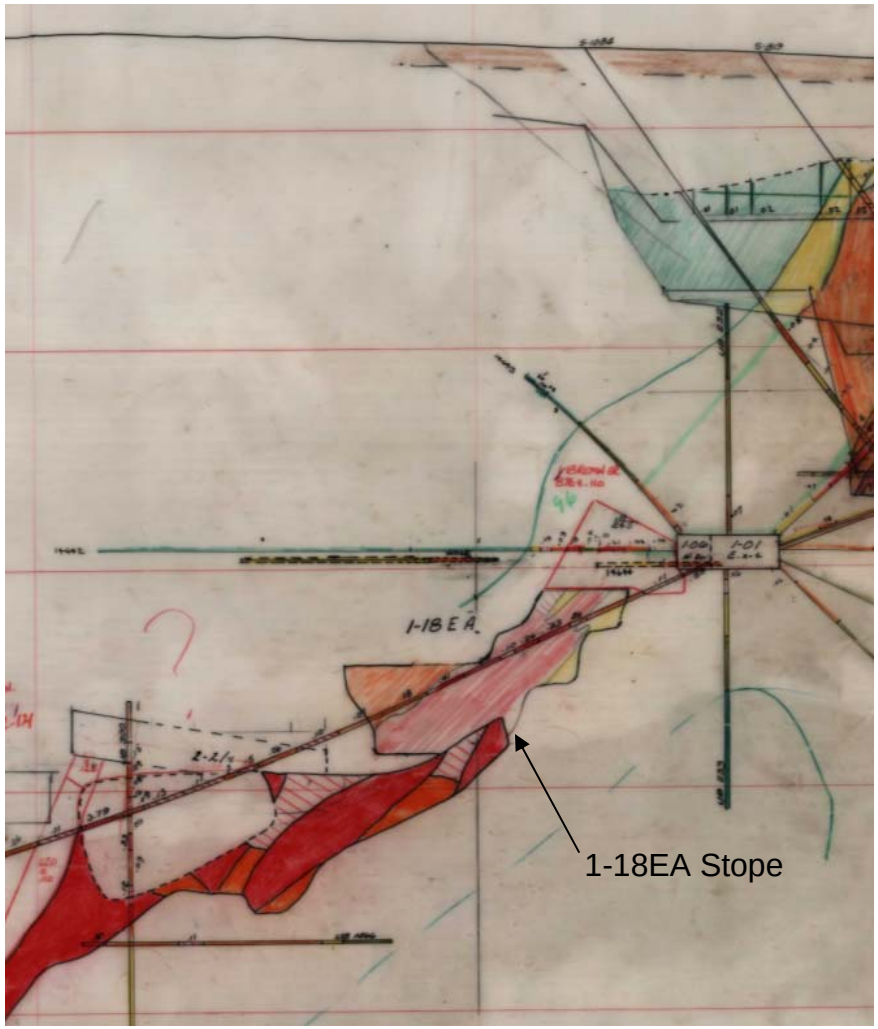
Crown Pillar Stability Assessment
Giant Mine

1-18 Stope: B-Shaft, 150N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 26



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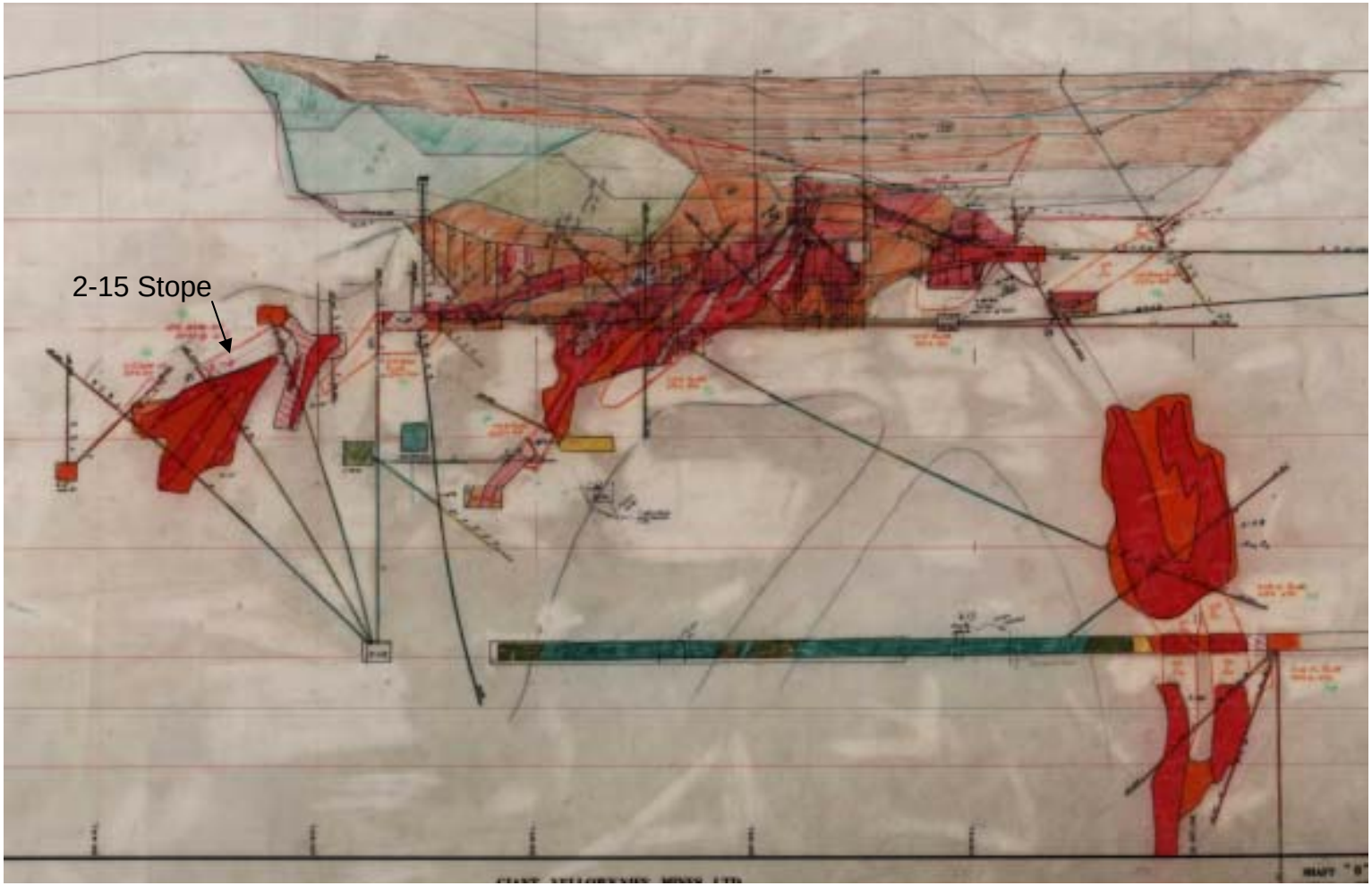
Crown Pillar Stability Assessment
Giant Mine

1-18EA Stope: B-Shaft, 150N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 27



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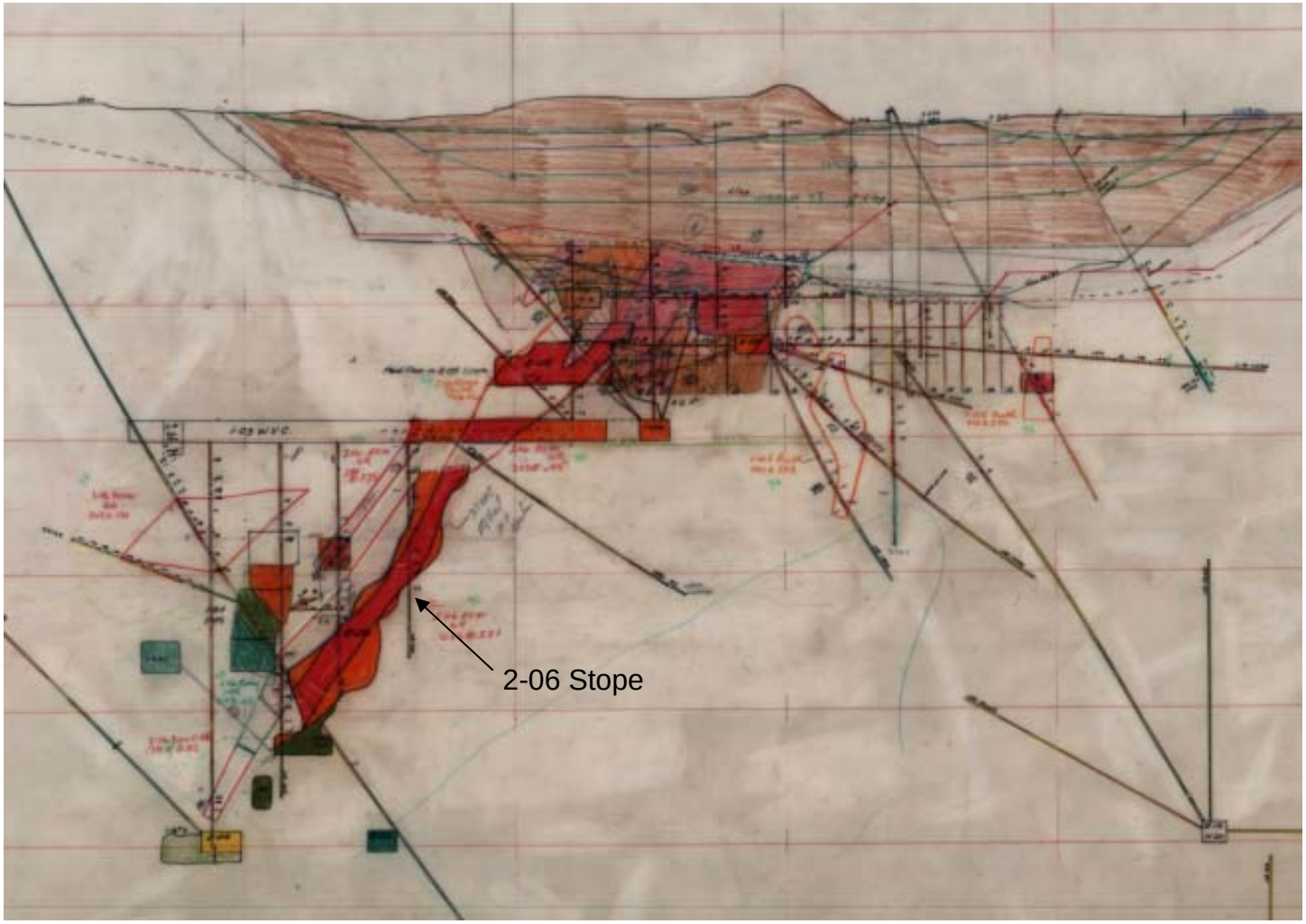
Crown Pillar Stability Assessment
Giant Mine

2-15 Stope: B-Shaft, 350N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 28



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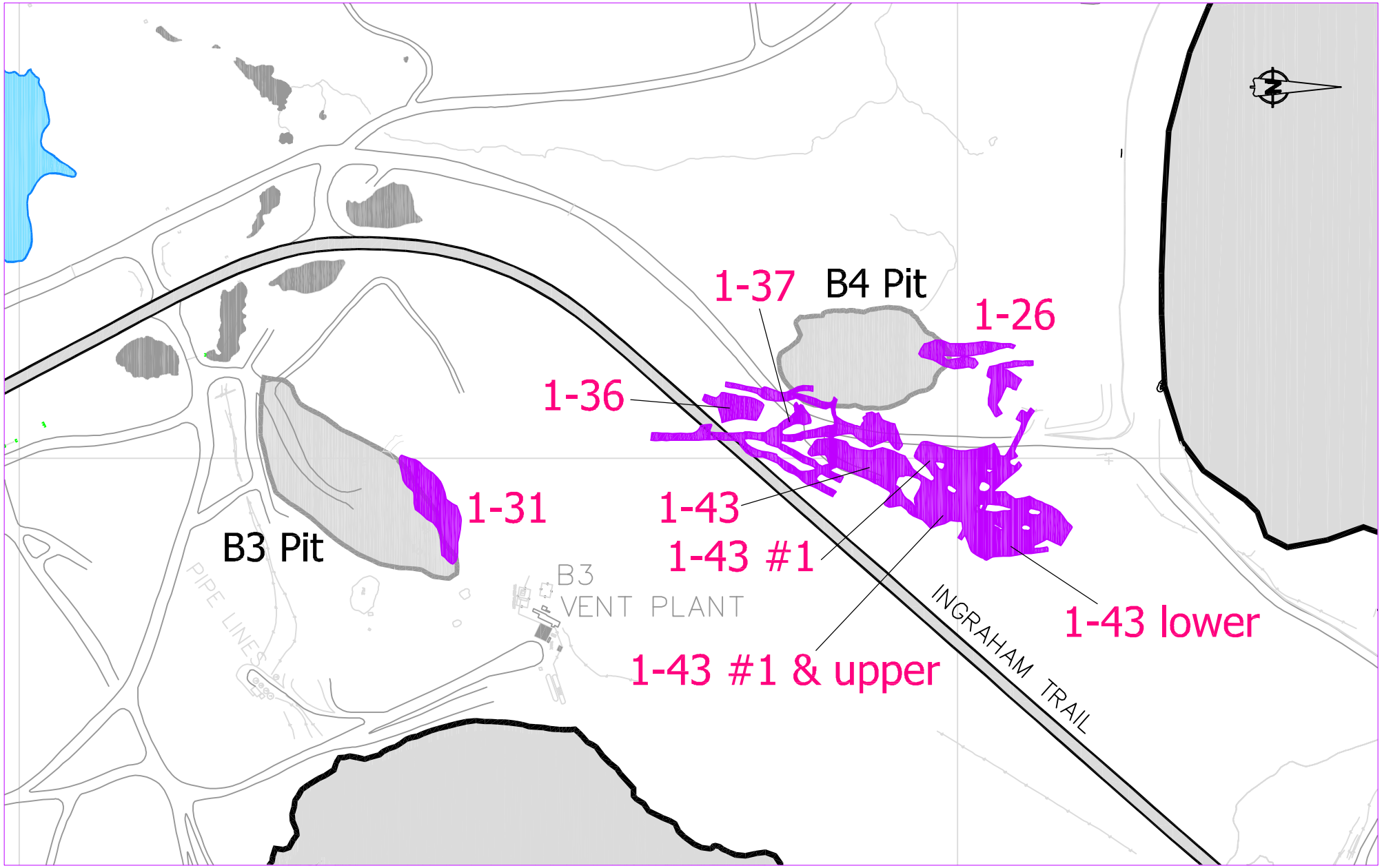
Giant Mine

2-06 Stope: B-Shaft, 500N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 29



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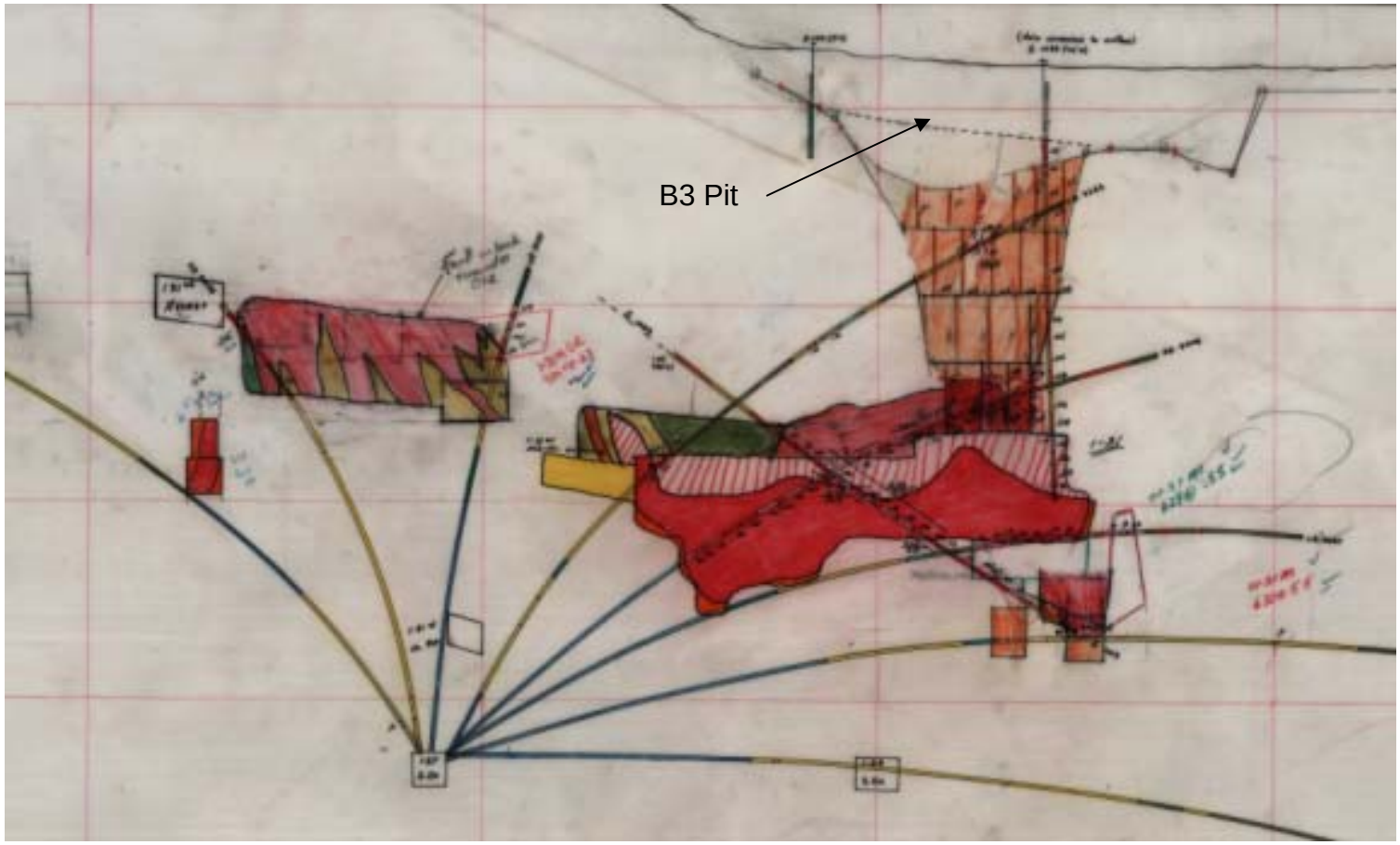
B3 and B4 Pit Areas - Crown Pillars

SRK JOB NO.: 1CI001.013

FILE NAME: SurfaceCrownPillars.dwg

Giant Surface Crown Pillar Review

DATE:	APPROVED:	FIGURE:
Jan. 2006		30



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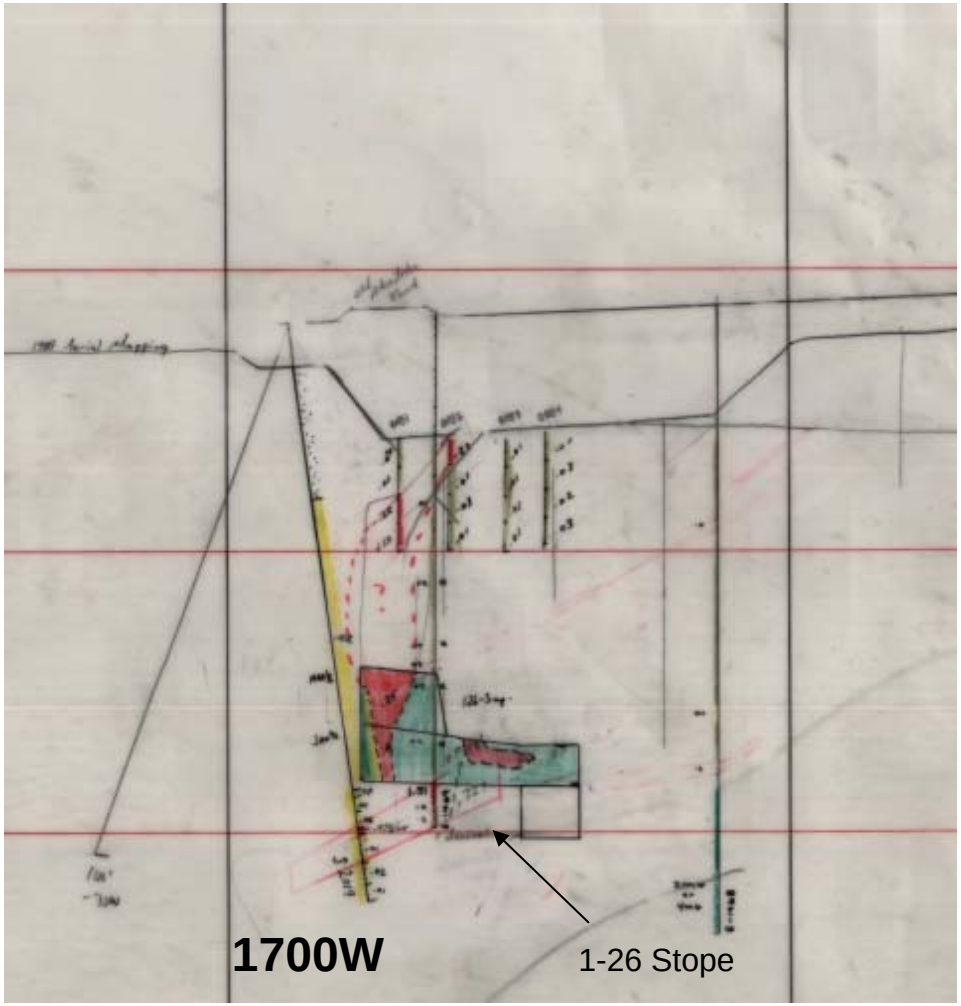
Giant Mine

B-3, 1-31 - 3150N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 31



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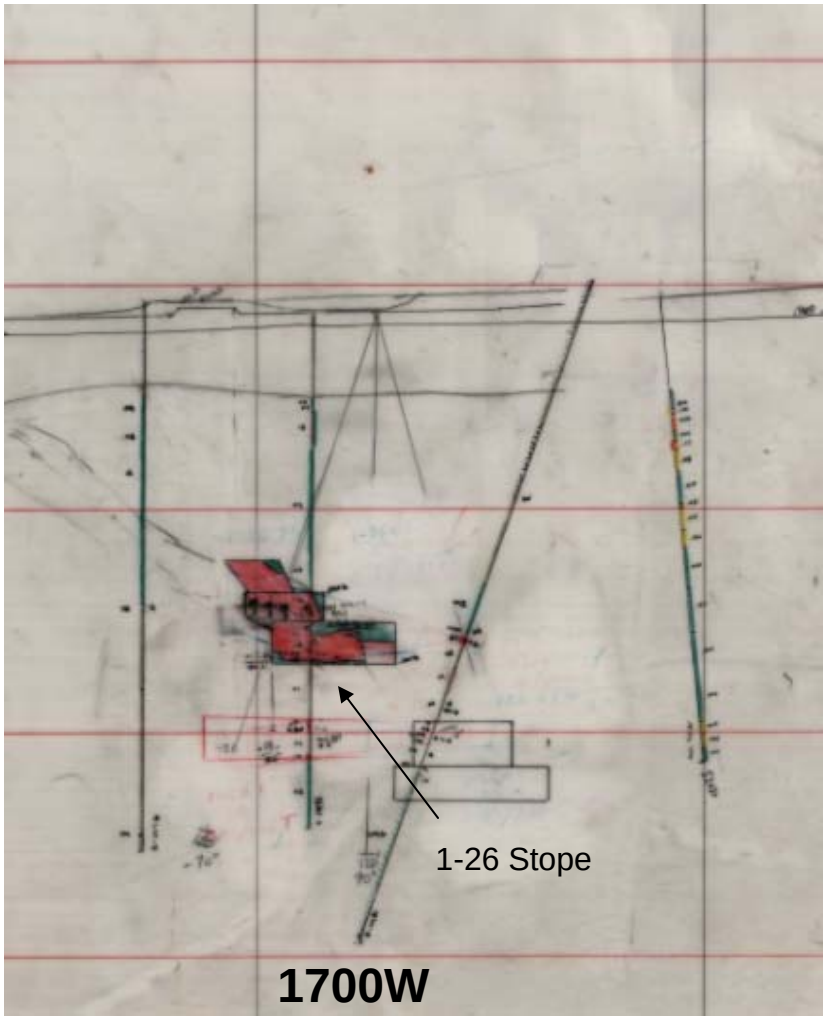
Giant Mine

1-26 Stope: 3875N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 32



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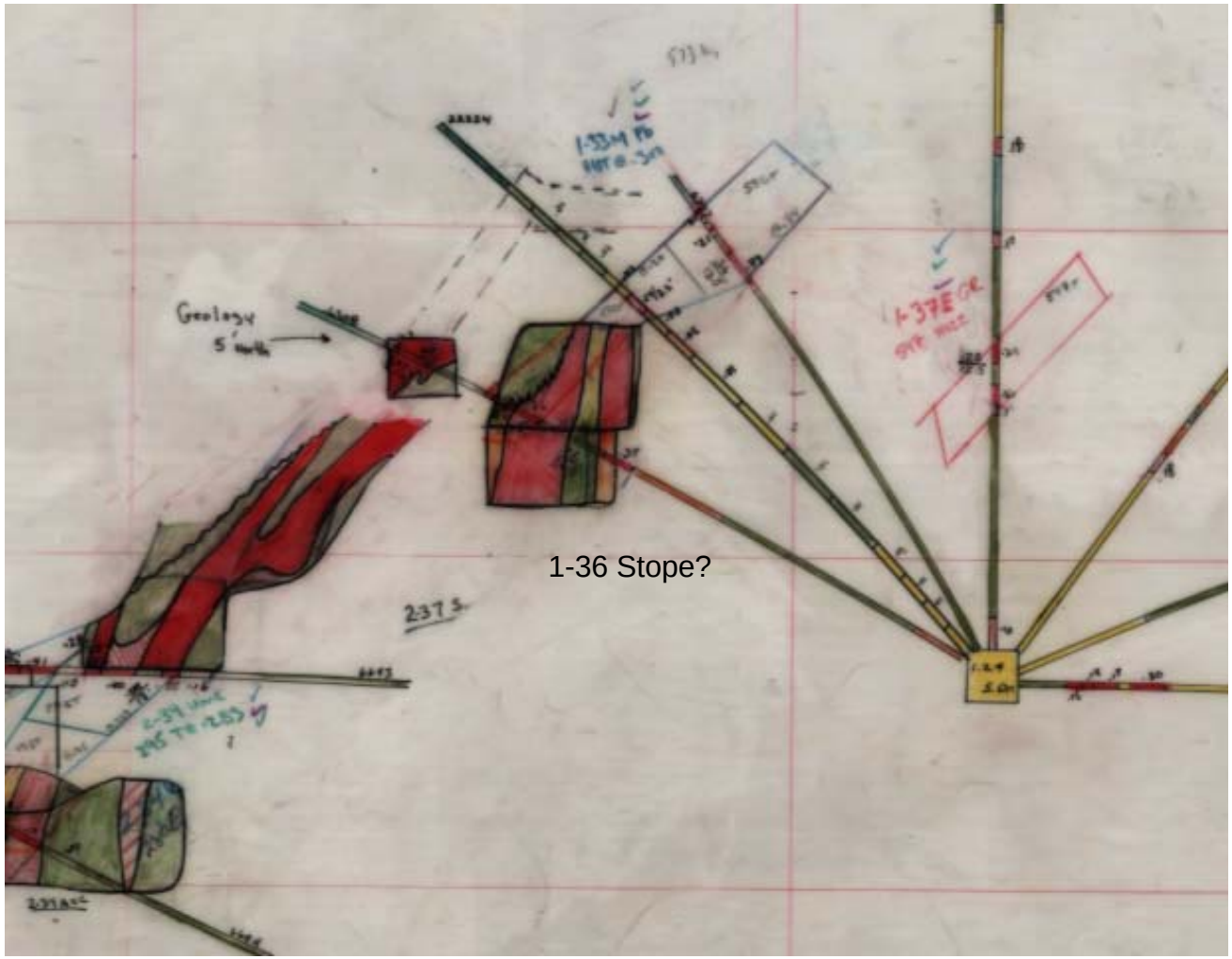
Giant Mine

1-26 Stope: 3925N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 33



No surface marked

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1-36 Stope: B-3, 3550N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 34

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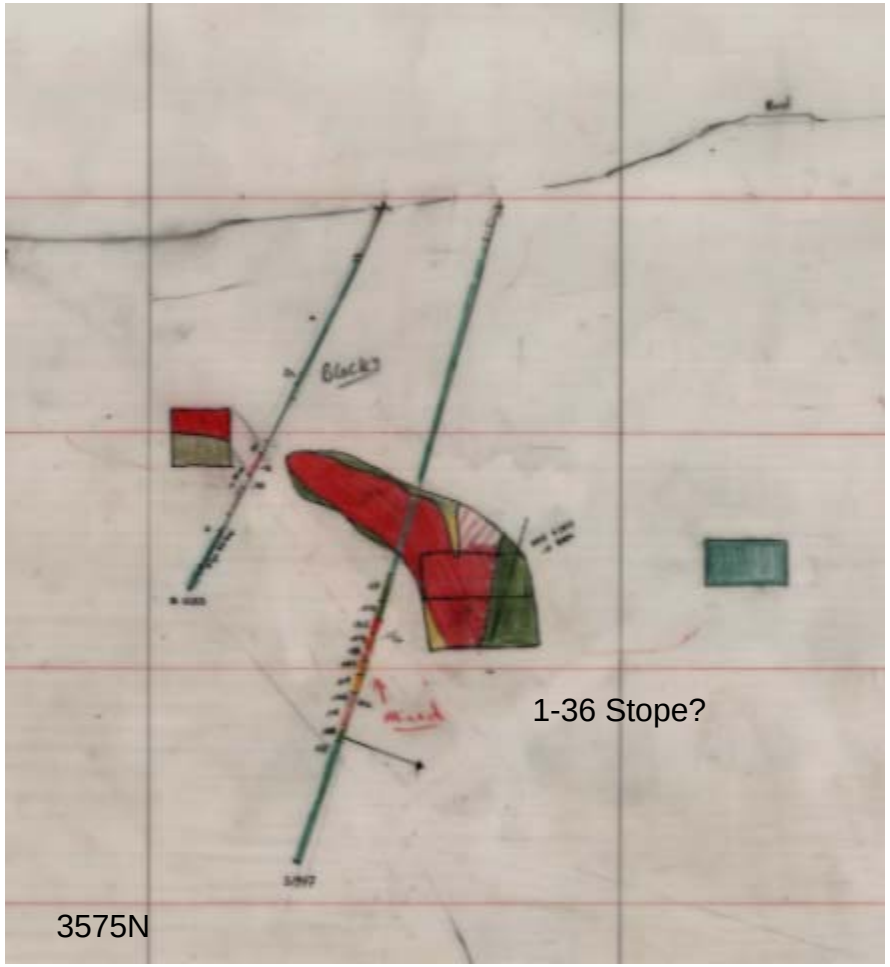
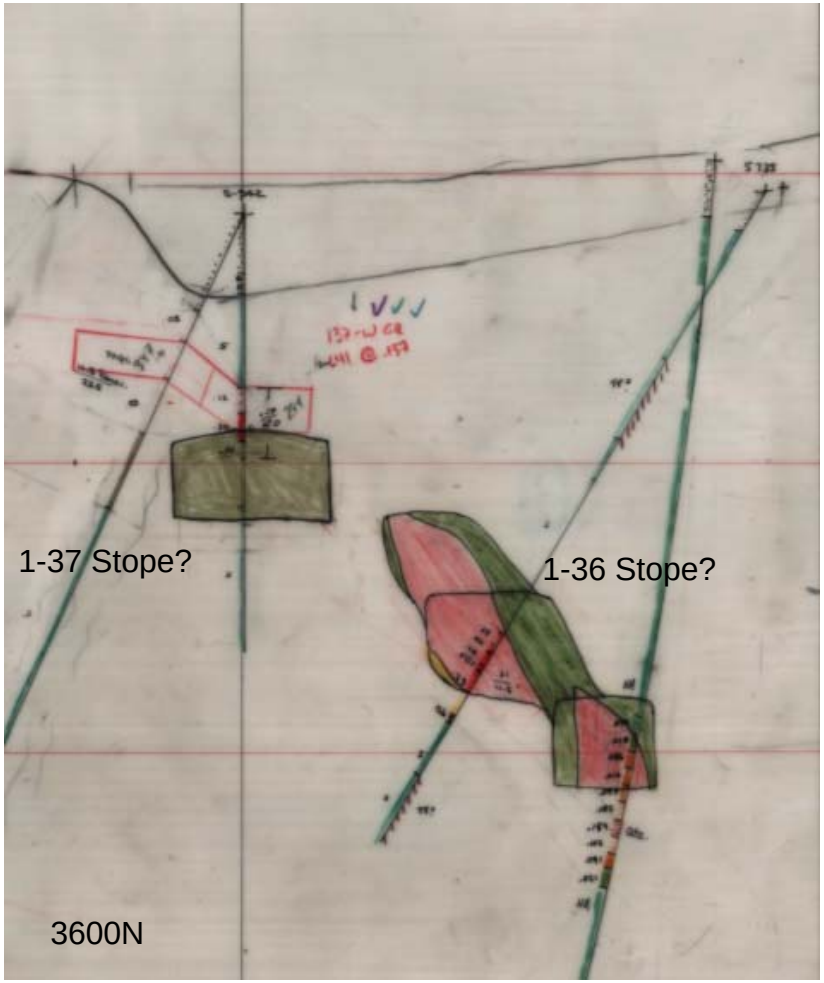
Giant Mine

1-37 Stope: B-3, 3650N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 35





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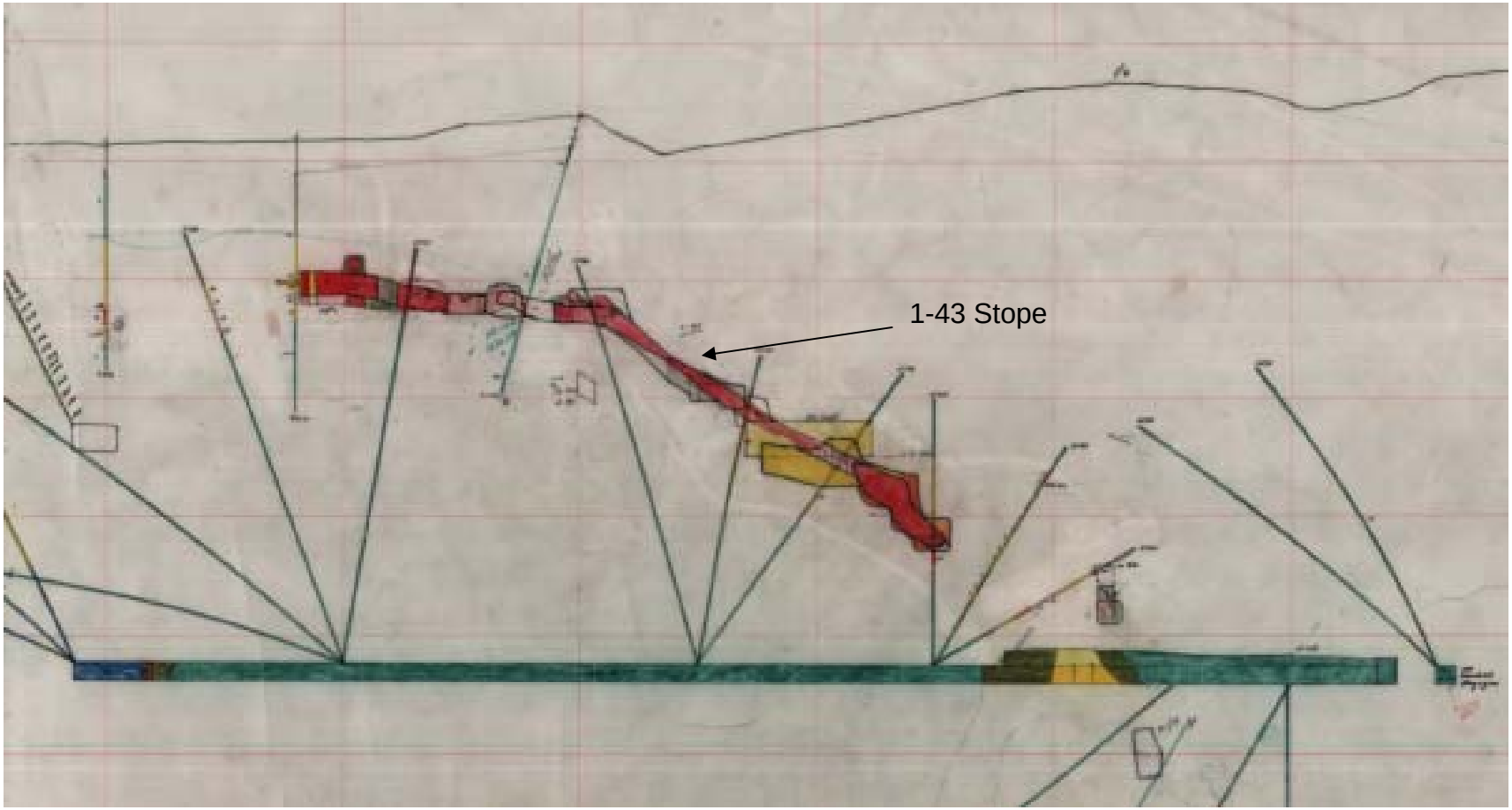
Giant Mine

1-36 Stope?: B-3, 3575-3600N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 36



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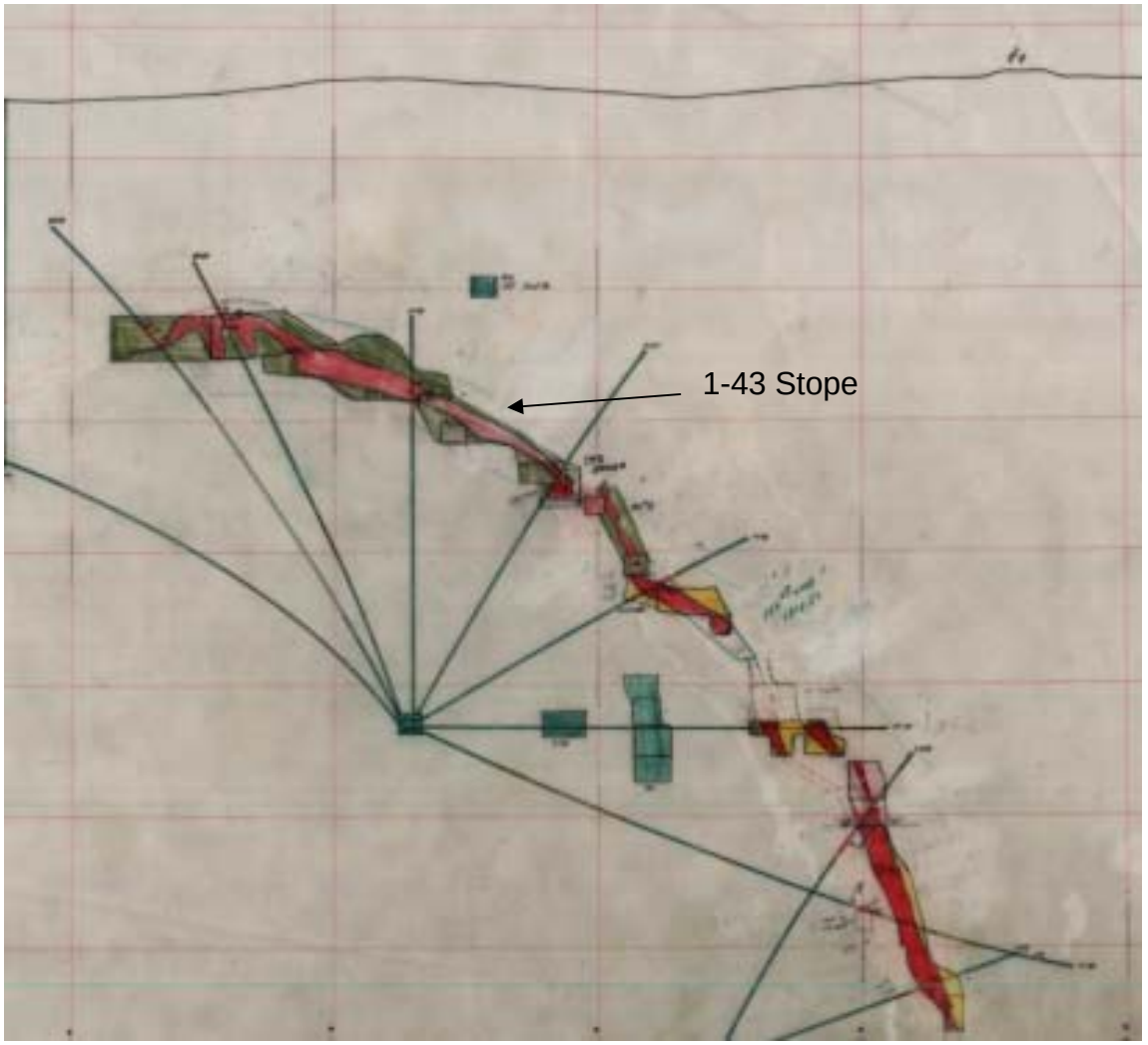
Crown Pillar Stability Assessment
Giant Mine

1-43 Stope: B-4, 4050N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 37



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1-43 Stope: B-4, 4200N

1CI001.013.0B01	DATE: January 2006	APPROVED:	FIGURE:: 38