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To: Rik Visagie  
From: Gregg Jilson

11/27/84

Subject: A small high grade pit at Vangorda

The attached tabulation of overburden and waste rock volumes should accompany my previous estimate of high grade, shallow baritic ore tonnage and grade for the Vangorda Deposit. Neither of these estimates are rigorous calculations but should be in the general ball-park nonetheless.

Since the focus of this estimate was on the shallow baritic ore averaging above 10% Pb+Zn there is a fair amount of mineralized rock included in waste. Much of this is 4A in the southwest portion of the "pit" and will be high enough grade to be mined as well, however, I have not had time to re-calculate the relevant data to give reasonable numbers for this material.

The Vangorda database is now "up" on the HP-3000 at Vancouver and with some considerable editing would be the logical vehicle for a continuation of this sort of study. I think the sort of sectional calculation that has been done on Faro would be well advised for Vangorda as well since I have looked at only a small part of the overall deposit.

One thing that is clear from the sections is that as the target for mining becomes smaller and more specialized we need more data to define it. There are several places where drill holes are uncomfortably far apart to provide good control on the small shallow high-grade zone we are looking at. I think about five 100 m. fill-in drillholes should be seriously considered if high-grading Vangorda looks like a viable proposition. These should be large diameter drillholes that could also be used to obtain samples for met. testing since it seems reasonable that just as more precise data are needed to define the ore geometry and grade, more precise data will also be needed to define the metallurgy of this very specific ore type.

This is all in keeping with Robin Tolbert's recent comments on the decrease in reliability of reserve estimates as the cutoff grade is increased following the theoretical predictions of geostatistics.

As you will note on the attached tabulation, as the ore plunges to the northwest the stripping ratio, particularly for rock as opposed to overburden increases rapidly. This is why I originally did not include 0 East in the shallow high-grade area. If 0 East looks attractive then the incremental gains from deepening and extending to the southeast probably will be close to as good and should be quantified.

The 30° slope on the northeast wall may be excessively shallow, it is due to the S<sub>2</sub> foliation dipping into the pit there. Increasing this slope to 45° would give approximately the following decreases in rock and overburden volumes (in cu. yd.):

section	overburden	rock
0 E	29700	300000
2 E	35600	116000
4 E	63000	81000
6 E	19000	25000
8 E	nil	nil
10 E	nil	nil

I hope this is of some use.

N13 see revised tabulation for stats of steepen  
pit.

VANGORDA DEPOSIT - PIT VOLUMES TO ACCOMPANY HIGH GRADE ORE CALCULATION

\*\*\*\*\*THIS IS A PRELIMINARY ESTIMATE ONLY\*\*\*\*\*

SECTION	overburden volume cu. m.	overburden volume cu. yd.	waste rock volume cu. m.	waste rock volume cu. yd.	waste rock tonnage (S.G.=2.75) tonnes	ore volume cu. m.	ore volume cu. yd.	ore tonnage tonnes	average S.G. used for ore	overall total waste waste/ore (rock+O.B.) by volume	total waste (rock+O.B.) cu. yd
2 EAST	172788	255997	433997	567643	1193492	73628	96301	286415	3.89	8.55	823648
4 EAST	271433	355019	250077	327086	687712	120576	157707	443720	3.68	4.33	682105
6 EAST	306009	400242	175571	229637	482820	87545	114504	329344	3.76	5.50	629879
8 EAST	327698	428611	35635	46608	97996	59895	78339	227002	3.79	6.07	475219
10 EAST	334807	437909	16880	22077	46420	52575	68764	187167	3.56	6.69	459986
total 2E-10E	1412735	1877778	912160	1193051	2508440	394219	515615	1473648		5.96	3070829
0 EAST (estimated)	170000	256000	650000	852000	1800000	73000	96000	268000	3.67	11.54	1108000
grand total	1582735	2133778	1562160	2045051	4308440	467219	611615	1741648		6.83	4178829

Notes:

Northeast wall and overburden slopes at 30 deg.

Southwest wall at 45 deg.

Ore S.G. used is pulp S.G. reduced by 10% in accord with studies on massive ores.

No ramps were specifically allowed for.

Northwest and Southeast ends of pit are simple extrapolation of last sections.

Section 0 East not measured, estimated by comparison to 2E.

LANGORDA DEPOSIT - PIT VOLUMES TO ACCOMPANY HIGH GRADE ORE CALCULATION  
 \*\*\*\*\*THIS IS A PRELIMINARY ESTIMATE ONLY\*\*\*\*\*

revision to show OB tonnage, both volume & tonnage  
 stripping ratios and effect of steeper NE wall:

CASE 1  
 Northeast wall and overburden slopes at 30 deg.  
 Southwest wall at 45 deg.

SECTION	overburden	overburden	overburden	waste rock	waste rock	waste rock	ore	ore	ore	average total waste	total waste	total waste	STRIPPING RATIOS	
	volume	volume	tonnage	volume	volume	tonnage	volume	volume	tonnage				S.G. used	(rock+O.B.)
	cu. m.	cu. yd.	(S.G.=2.33) tonnes	cu. m.	cu. yd.	(S.G.=2.75) tonnes	cu. m.	cu. yd.	tonnes	for ore	cu. yd.	tonnes	by volume	by tonnage
2 EAST	172788	253997	402596	433997	567643	1193492	73628	96301	286415	3.89	823640	1596088	8.55	5.57
4 EAST	271433	355019	632439	250077	327086	687712	120576	157707	443720	3.68	682105	1326131	4.33	2.98
6 EAST	306009	400242	713001	175371	229637	482820	87545	114504	329344	3.76	629879	1175821	5.50	3.63
8 EAST	327698	428611	763536	35635	46608	97996	59895	78339	227002	3.79	475219	861532	6.07	3.88
10 EAST	334807	437909	780100	16880	22077	46420	52575	68764	187167	3.56	459986	826520	6.69	4.42
total 2E-10E	1412735	1877778	3291673	912160	1193051	2508440	394219	515615	1473648		3070829	5800113	5.76	3.74
8 EAST (estimated)	170000	256000	396100	650000	852000	1800000	73000	96000	268000	3.67	1108000	2196100	11.54	8.17
grand total	1582735	2133778	3687773	1562160	2045051	4308440	467219	611615	1741648		4178829	7996213	6.83	4.59

CASE 2  
 Northeast and Southwest walls in rock with 45 deg. slope  
 Slopes in overburden at 30 deg.

SECTION	overburden	overburden	overburden	waste rock	waste rock	waste rock	ore	ore	ore	average total waste	total waste	total waste	STRIPPING RATIOS	
	volume	volume	tonnage	volume	volume	tonnage	volume	volume	tonnage				S.G. used	(rock+O.B.)
	cu. m.	cu. yd.	(S.G.=2.33) tonnes	cu. m.	cu. yd.	(S.G.=2.75) tonnes	cu. m.	cu. yd.	tonnes	for ore	cu. yd.	tonnes	by volume	by tonnage
2 EAST	148507	220397	392620	345308	451643	949596	73628	96301	286415	3.89	672040	1342216	6.98	4.69
4 EAST	223266	292019	520209	188147	246086	517405	120576	157707	443720	3.68	538105	1037614	3.41	2.34
6 EAST	291482	381242	679153	154457	204637	430257	87545	114504	329344	3.76	585879	1109410	5.12	3.37
8 EAST	327698	428611	763537	35635	46608	97995	59895	78339	227002	3.79	475219	861532	6.07	3.88
10 EAST	334807	437909	780101	16879	22077	46418	52575	68764	187167	3.56	459986	826519	6.69	4.42
total 2E-10E	1345768	1768178	3135621	742426	971851	2041671	394219	515615	1473648		2731229	5177292	5.30	3.51
8 EAST (estimated)	172798	226000	402601	422037	552000	1160601	73000	96000	268000	3.67	778000	1563202	8.18	5.83
grand total	1518566	1994178	3538222	1164462	1523851	3202271	467219	611615	1741648		3509229	6740494	5.74	3.87

Notes:  
 Ore S.G. used is pulp S.G. reduced by 10% in accord with studies on massive ores.  
 No ramps were specifically allowed for.  
 Northwest and Southeast ends of pit are simple extrapolation of last sections.  
 Section 8 East not measured, estimated by comparison to 2E.

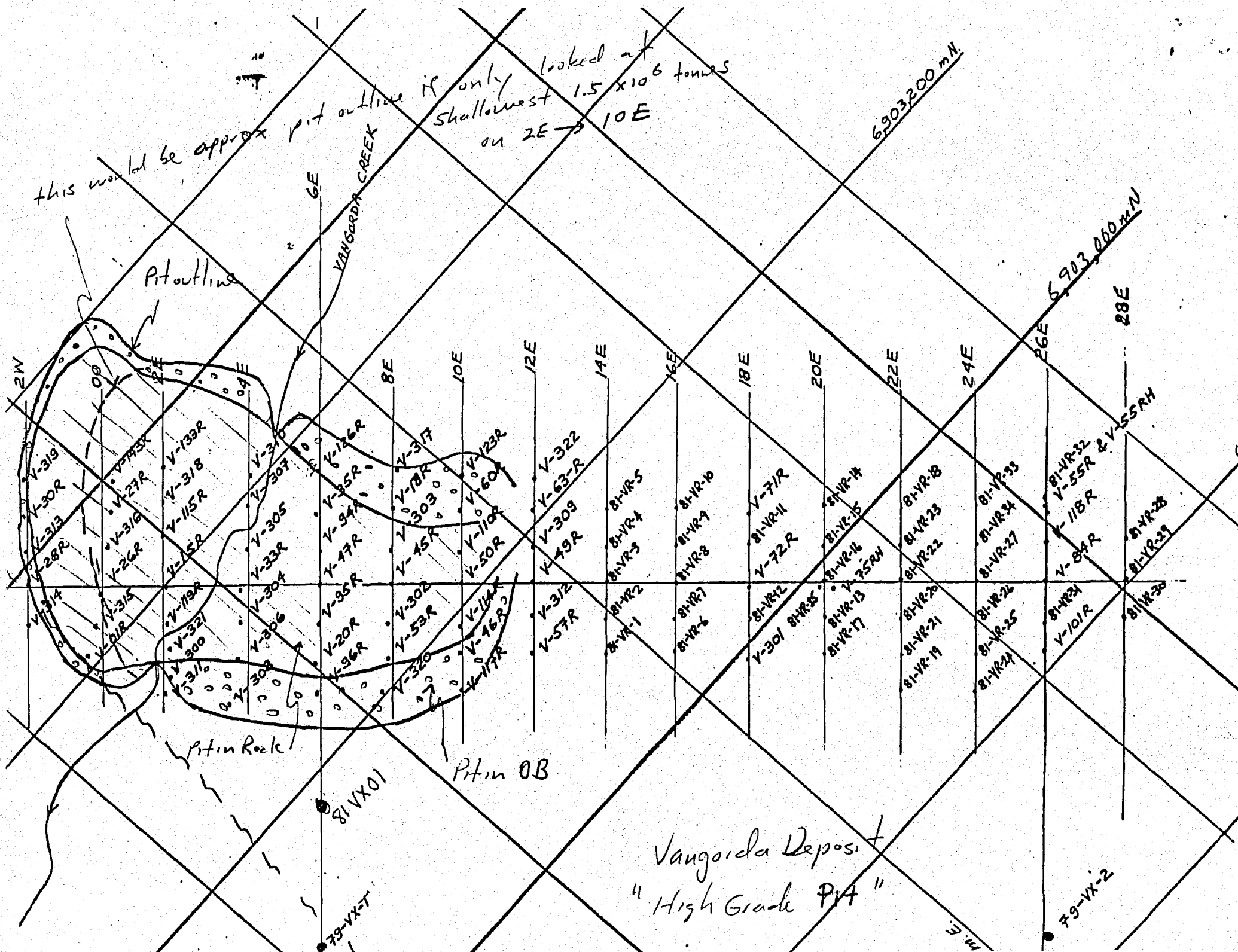
this would be approx pit outline if only looked at shallowest  $1.5 \times 10^6$  tonnes on 2E  $\rightarrow$  10E

Pit outline

VANGARDA CREEK

6903200 mN

6903000 mN



block	from	to	length	S.G.	Pb	Zn	Cu	Ag	Au	BaO	Pb + Zn	DDH	AREA	VOLUME	TONNAGE
SECTION 10 EAST															
10-E-1	46.0	50.8	4.8	3.65	7.05	9.60	.11	59.3	.02	.97	16.65	V-110-R	153	9241	31982
10-E-2	34.1	55.2	21.1	4.23	5.75	7.44	.07	67.1	.54	19.89	13.19	V-50-R	552	33396	127089
10-E-3	32.9	36.9	4.0	3.05	4.76	4.04	.09	39.4	.07	27.74	8.80	V-114-R	156	9438	25865
averages/totals				3.95	5.84	7.34	.08	61.8	.38	17.72	13.17			52075	184935
SECTION 8 EAST															
8-E-1	28.8	36.8	8.0	3.30	3.76	5.75	.11	55.5	.29	7.39	9.51	V-303	190	11503	34188
8-E-2	31.7	46.9	15.2	4.40	4.29	7.98	.04	66.6	.35	30.91	12.27	V-45-R	442	26756	106016
8-E-3	41.9	52.6	10.7	4.46	4.50	5.70	.20	67.6	1.28	13.37	10.19	V-302	356	21568	86586
averages/totals				4.21	4.29	6.77	.11	65.3	.70	20.67	11.06			59827	226790
SECTION 6 EAST															
6-E-4	25.1	34.2	9.1	4.13	5.35	6.08	.07	74.1	.28	10.11	11.43	V-94-R	252	15246	56713
6-E-1	50	57.3	7.3	4.15	4.72	6.62	.06	70.4	.27	19.30	11.34	V-94-R	221	13386	49980
6-E-5	38.1	45.7	7.6	3.99	4.68	5.69	.11	68.4	.95	7.56	10.37	V-47-R	285	17258	61903
6-E-2	48.2	62.1	13.9	4.46	3.62	5.59	.05	59.6	.44	17.73	9.21	V-47-R	331	20030	80381
6-E-3	48.1	60.7	12.6	4.13	6.64	7.17	.04	83.3	.43	20.15	13.81	V-95-R	357	21614	80315
averages/totals				4.18	5.02	6.24	.06	71.2	.48	15.33	11.26			87533	329292

block	from	to	length	S.G.	Pb	Zn	Cu	Ag	Au	BaO	Pb + Zn	DDH	AREA	VOLUME	TONNAGE
SECTION 4 EAST															
4-E-1	42	63.5	21.5	4.15	4.52	7.77	.05	70.9	.47	23.92	12.30	V-305	746	45103	168495
4-E-4	28.5	37.1	8.6	4.39	5.31	6.66	.16	77.4	1.42	18.56	11.97	V-33-R	240	14520	57318
4-E-3	18.4	29.8	11.4	3.99	4.05	4.40	.10	56.8	.47	12.94	8.45	V-305	307	18574	66678
4-E-2	42.3	63.2	20.9	4.02	3.93	5.91	.08	58.6	.75	23.40	9.83	V-33-R	640	38750	140220
4-E-5	36.9	39.2	2.3	3.33	4.68	8.01	.11	63.6	1.02	1.37	12.69	V-304	60	3630	10676
averages/totals				4.09	4.37	6.54	.08	65.6	.70	20.86	10.91			120576	443588
SECTION 2 EAST															
2-E-1	42.4	67.7	25.3	4.40	5.89	6.71	.12	82.0	.01	14.95	12.59	V-115-R	570	34485	136591
2-E-2	50.6	65.4	14.8	4.23	4.33	5.44	.14	64.3	1.00	15.38	9.77	V-15-R	494	29911	113997
averages/totals				4.32	5.18	6.13	.13	74.0	.46	15.14	11.31			64396	250589

block	from	to	length	S.G.	Pb	Zn	Cu	Ag	Au	BaO	Pb+Zn	DDH	AREA	VOLUME	TONNAGE
SECTION 0 EAST															
0-E-1	65.5	81.1	15.6	4.05	7.67	6.09	.08	99.3	.37	7.87	13.76	V-316	320	19341	70417
0-E-2	84.6	90.6	6.0	4.01	4.10	6.39	.06	59.9	.68	17.84	10.49	V-316	206	12451	44922
0-E-6	32.1	34.9	2.8	3.21	4.08	9.00	.07	72.8	.96	.12	13.09	V-26-R	64	3856	11169
0-E-5	50.3	52.6	2.3	4.61	5.55	8.76	.26	86.6	1.48	15.75	14.31	V-26-R	76	4613	19136
0-E-3	61.2	66.2	5.0	4.29	4.67	5.51	.16	59.4	.99	13.15	10.18	V-26-R	139	8410	32448
0-E-4	69.4	72.4	3.0	4.46	5.21	5.66	.11	69.8	.94	22.96	10.88	V-26-R	106	6413	25742
0-E-8	26.3	29.9	3.6	3.09	4.45	7.19	.09	70.0	1.10	.21	11.64	V-315	88	5351	14904
0-E-7	32.9	35.9	3.0	4.61	5.65	7.70	.20	109.5	1.48	11.15	13.34	V-315	79	4792	19859
0-E-9	11.6	22.3	10.7	4.21	6.85	13.74	.37	87.5	1.61	9.18	20.59	V-01-R	144	8715	33022
averages/totals				4.08	5.77	7.45	.15	80.9	.92	11.80	13.21			73950	271619

VANGROA DEPOSIT: summary of sectional reserves, main layer high grade

SECTION	TONNAGE	VOLUME	S.G.	Pb	Zn	Cu	Ag	Au	BaO	Pb + Zn
10E	184935	52075	3.95	5.84	7.34	.08	61.8	.38	17.72	13.17
8E	226790	59827	4.21	4.29	6.77	.11	65.3	.70	20.67	11.06
6E	329293	87533	4.18	5.02	6.24	.06	71.2	.48	15.33	11.26
4E	443588	120576	4.09	4.37	6.54	.08	65.6	.70	20.86	10.91
2E	250589	64396	4.32	5.18	6.13	.13	74.0	.46	15.14	11.31
0E	271619	73950	4.08	5.77	7.45	.15	80.9	.92	11.80	13.21
total	1706814	458357	4.14	4.99	6.68	.10	69.9	.62	17.15	11.67
	tonnes	cu. m.		%	%	%	g/tn	g/tn	%	%

NB,  
the one tonnage  
is a little  
different here  
because of  
slight revisions  
in areas.