Table 2.16
Some important aspects of the Great Dyke of Zimbabwe

Geographic subdivisions (south to north)

Main chambers	Subchambers	Approx. strike length, km
South chamber	1. Wedza	85
	2. Selukwe	99
North chamber	1. Sebakwe	137
	2. Darwendale	189
Muruaradona	1. Musungesi	40

Stratigraphy (based on the Darwendale subchamber)

Major division	Secondary division	Lithology (top to base)
Upper mafic sequence (1150 m)	3. Upper mafic unit (670 m)	Magnetite and hypersthene norites (inverted pigeonite), gabbro and olivine bronzitite
	2. Middle mafic unit (100 m)	Gabbro, gabbronorite, norite
	1. Lower mafic unit (400 m)	
Lower ultramafic sequence (2280 m)	1a. Cyclic unit (P1 unit) (mineralized)	Websterite, bronzitite, and olivine bronzitite
Bronzitite succession	1b. to 6 cyclic units	Bronzitite, olivine bronzitite, harzburgites, 6 chromitites (Cr:Fe = 2,0 to 2,7)
Dunite succession	7 to 14 cyclic units	Bronzitites, harzburgites, dunites, 8 chromitites (Cr:Fe = 2,7 to 3,9).
	Border group	Varied lithology

Thicknesses of the mineralized succession (cyclic unit 1), m

Layer		Dyke margin	Dyke centre
Websterite		5	26
Bronzitite	P1 layer	20	33
01 bronzitite			
Bronzitite		110	162
01 bronzitite			
P1 layer		135	221
Rest unit 1			
Harzburgites		115	191
Dunites			
Total cyclic unit 1		**250**	**412**

a maximum of 19° from the margins to the central geometric axis, and 4° southward along that axis. Similar dips are characteristic of all the other mafic remnants along the 'Dyke'.

The PGE mineralized layers are confined to the upper P1 sequence of the first cyclic unit in the lower ultramafic succession, i.e. just below the ultramafic-to-mafic boundary, where cumulus clinopyroxenes and plagioclase make their first major appearance. Table 2.16 also shows aspects of the P1 pyroxenite layer and the thickening of the individual layers of cyclic unit 1 from the margins to the centre of the intrusion as indicated by boreholes (Pendergast and Wilson, Wilson and Tredoux *op. cit.*). The whole of the P1 layer contains sulphide mineralization to a greater or lesser degree (up to 8 per cent by volume). Significant mineralization occurs in the upper websterite layer (27 m average thickness), and a sporadically developed pegmatoidal pyroxenite, reminiscent of the Merensky pegmatoid, occurs in the upper 0,1 to 0,5 m, but attains a thickness of 1,2 m in the Musengesi sub-chamber, where there is significant PGE mineralization along the geometric axis of the intrusion (Wilson and Tredoux, *op. cit.*). The feldspathic pyroxenite underlying the websterite layer weathers into nodules from 3 to 10 cm, in diameter, which earned it the traditional name of 'potato reef' (Wagner, 1929). Just below this layer is the most consistent and persistent mineralized S1 layer (formerly MSZ or main sulphide zone), with an average thickness of 6,03 m over the whole 'Dyke', but only 1,5 to 2 m in the Darwendale subchamber. It contains high platinum values (3 to 3,5 g/t), and increases in width to the central axis of the intrusion with a drop in platinum value to 2 g/t over a 10 m thickness. Likewise the Pt:Pd ratio rises from 1:1,25 at the margins of the 'Dyke' to 1 at the centre. The behaviour of the PGE and base-metal sulphides (BMS) in the S1 layer, led Wilson and Tredoux (*op. cit.*) to conclude that:

(a) the top 1 m of the layer is devoid of PGE, and the base-metal sulphides (BMS) decrease upwards in what is now called the BMS subzone;
(b) the next layer has two mineralized subzones, in which the Pt+Pd grade, the Pt:Pd ratio, and the BMS increase upwards, attaining a maximum at the top of the upper contact of the upper subzone with the BMS subzone above.

A second 30,5 m thick S2 subzone, on average 23,8 m below the S1 layer, has been located in the Wedza (35 m thick), Darwendale (80 m thick), and Musengesi subchambers, and includes what has commonly been referred to as the S3 mineralized subzone. As in all mineralized layers of layered magmatic complexes, the same amount of bulk PGE is richest in the thinnest layers and poorest in the thickest layers. Although no actual analyses are available, the PGE values of these subzones are reportedly lower than in the S1 subzone, but the PGE and BMS values show a similar vertical distribution.

The economic potential of the PGE mineralization and its grade have been adjudged from boreholes, of which 92 have reportedly been drilled in the Wedza and 186 in the Darwendale subchambers. This drilling and follow-up trenching has proved the existence of the S1 mineralization beneath all the remnant noritic to gabbroic mafic bodies along the entire length of the 'Dyke'. Table 2.17, reproduced from Wilson and Tredoux (*op. cit.*), summarizes the vital statistics for each of the subchambers of the 'Dyke'.

Originally Pendergast and Wilson (*op. cit.*) postulated reserves of 4400 Mt, but a later estimate by Wilson and Tredoux (*op. cit.*) appears to have been based on more closely defined parameters, and suggests a total of about 2570 Mt over a stoping width of 1,00 m, which has been accepted (Table 2.17).

The only available drilling results were published in *Engineering and Mining Journal*, (Sep 1990, pp. 11–15), where the results of 27 'selected representative' boreholes were provided for the Darwendale (formerly Hartley) subchamber. From these results, following weighted averages are calculated for the S1 layer:

thickness 1,34 m
Pt 2,77 g/t
Pd 2,13 g/t
Ni 0,21 per cent
Cu 0,14 per cent.

Although the article provided certain reserve calculations, they have relevance only to the drilling area, and not to the 'Great Dyke'. However useful, the publication provides information concerning recoveries that has been recalculated, and is presented in Table 2.18 for a projected annual production of 2 Mt of ore. Unfortunately, only six analyses were available from which the percentage distribution of the individual PGE could be calculated (which includes the data in Table 2.17):

Pt 55,65 per cent
Pd 33,77 per cent
Ru 5,90 per cent
Rh 2,66 per cent
Ir 1,07 per cent
Os 0,95 per cent.

Corser (1990) estimated the *in-situ* PGE grade for the former Hartley complex to vary from 4,0 to 6,7 g/t. From Table 2.17 the millhead grade would appear to be 5,96 g/t; an average *in-situ* grade for the Wedza mine was 4,3 g/t. For many years, however, the mineralization of

Table 2.17
Details of the strike, suboutcrop areas, and ore reserves of the subchambers of the Great Dyke (stoping width 1 m) (after Wilson and Tredoux)

Subchamber	Musengesi	Darwendale-Sabakwe	Selukwe	Wedza	Total
Exposed outcrop, km	26	197	101	54	376
Suboutcrop area, km²	56	638	107	57	858
Ore reserves, Mt	108	1914	321	171	2574
Percentage reserves	6,5	74,4	12,5	6,6	100,0

Table 2.18
Total PGE reserves of the Great Dyke of Zimbabwe

	Pt	Pd	Ru	Rh	Ir	Os
In-situ, t	5 656	3 377	590	266	107	95
Thousand oz	178,9	108,5	19,0	8,6	3,4	3,0
Millhead, t	4 452	2 702	472	213	86	76
Thousand oz	143,1	86,9	15,2	6,8	2,8	2,4