

DETAILED LOG

Hole Number: ES2004-05

Units: METRIC

Project Name: Norway - Espedalen	Primary Coordinates Grid: UTM84-32N	Destination Coordinates Grid: UTM:	Collar Dip: -79.00
Project Number: 201	North: 6805039.72	North: 61.38	Collar Az: 230.00
Location: Surface	East: 533840.27	East: 9.63	Length: 119.40 (m)
	Elev: 726.65	Elev: 726.65	Start Depth: 0.00 (m)
Date Started: Aug 16, 2004	Collar Survey: Y	Plugged: N	Contractor: Geo Drilling A/S
Date Completed: Aug 18, 2004	Multishot Survey: N	Hole Size: TT46	Core Storage: Strand Fjellstue
Logged By: Yannick Beaudoin	Pulse EM Survey: Y	Casing: Left in Hole, capped	Final Depth: 119.40 (m)

Comments: Purpose: Test UTEM conductor ESP_15_15. Conductivity = 800 Siemens

Result: Hole collared in mineralized peridotite bounded downhole by a fine grained mafic unit in turn followed by anorthosite/anorthositic gabbro. Mineralization in the UM consisted of 5-20% net-textured to disseminated sulphides and minor remobilized veinlets. A narrow zone with increased sulphide content (20-25%) was intersected adjacent to the downhole contact of the ultramafic body.

Assays: 0.45% Ni, 0.20% Cu, 0.03% Co / 34.40m (9.60-40.00m)
0.90% Ni, 0.27% Cu, 0.06% Co / 0.75m (53.40-54.15m)

Borehole UTEM: In-hole response centered between 20m and 30m.

Lithological interpretation: Sheared anorthositic and fine grained mafic country rocks intruded by mineralized ultramafic.

Sample Averages

Average Type	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
WEIGHTED	8.80	40.00	31.20	0.4484	0.1851	0.0312
WEIGHTED	8.80	74.60	65.80	0.2805	0.1157	0.0203
WEIGHTED	11.00	29.00	18.00	0.5133	0.2017	0.0333

Detailed Lithology		Assay Data							
From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
0	9.40	C, Casing 0.8 meters of casing core recovered; cased in mineralized peridotite (see Major Units 6b for full description). 10-15% sulphides; visually resembles net textured mineralization; pyrrhotite with trace chalcopyrite; bright flecks in pyrrhotite may be pentlandite	PG00106	8.80	9.60	0.80	0.4100	0.0900	0.0300

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Detailed Lithology		Lithology	Assay Data						
From (m)	To (m)		Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
9.40	54.16	PRDT, Peridotite	PG00107	9.60	10.00	0.40	0.3000	0.1500	0.0200
		Medium to coarse grained, weakly foliated, strongly magnetic, dark grey, moderately serpentinized peridotite with large cm scale sub-hedral to sub-rounded pyroxene oikocrysts. Oikocrysts are light to dark grey and are partially replaced by serpentine and magnetite. Unit is transitional between a 'good' oikocrystic pyroxenite and a 'good' peridotite.	PG00108	10.00	11.00	1.00	0.3200	0.1100	0.0400
		Visually, the unit looks brecciated due to the distribution of the oikocrysts.	PG00109	11.00	12.00	1.00	0.5100	0.1600	0.0400
		Unit is cut by cm to dm scale talc/serpentinite veins.	PG00110	12.00	13.00	1.00	0.7700	0.3600	0.0600
		Between 40m and 45.5m, a more sheared and serpentinized zone is observed. Serpentine/talc veins permeate this zone with some veins containing good concentrations of remobilized chalcopyrite. The general sulphide content of this zone is <5%. This zone marks a notable decrease in sulphide content between the previous portion of the unit and the section beyond the zone.	PG00111	13.00	14.00	1.00	0.5600	0.1700	0.0400
		The lower contact is at 82 degrees relative to the core axis (nearly perpendicular).	PG00112	14.00	15.00	1.00	0.6200	0.2500	0.0500
		Sulphide mineralization throughout the unit averages between 15 and 20%. Visually mineralization appears as net-textured. Pyrrhotite is the dominant sulphide with trace to minor chalcopyrite and what appears to be flecks of pentlandite within the pyrrhotite. Variability in sulphide content is broken down under the 'Mineralization' header.	PG00113	15.00	16.00	1.00	0.3300	0.1400	0.0100
		From 53.3m to 54.16 (end of unit), grain size diminishes and sulphide content increases to between 35-40%.	PG00114	16.00	17.00	1.00	0.3700	0.2800	0.0100
		Interpretation: Consistent with Heim's Rock Suite 2b (Peridotite - Pyroxenite).	PG00115	17.00	18.00	1.00	0.4000	0.1900	0.0200
		Mineralization	PG00116	18.00	19.00	1.00	0.3500	0.1600	0.0100
		9.40 - 30.00 : Po Pyrrhotite, NT Net-Textured, 17% 15-20%; trace cpy	PG00117	19.00	20.00	1.00	0.5200	0.1700	0.0300
		30.00 - 39.40 : Po Pyrrhotite, D Disseminated, 8% looks like net-textured; trace cpy	PG00118	20.00	21.00	1.00	0.5800	0.1400	0.0500
		39.40 - 53.30 : Po Pyrrhotite, D Disseminated, 3%	PG00119	21.00	22.00	1.00	0.5100	0.2800	0.0400
		53.30 - 54.16 : Po Pyrrhotite, NT Net-Textured, 38% 35-40%; minor cpy	PG00120	22.00	23.00	1.00	0.4500	0.1800	0.0400
		Alteration	PG00121	23.00	24.00	1.00	0.6400	0.2100	0.0300
		9.60 - 54.16 :TL Talc, V Vein, M Moderate	PG00122	24.00	25.00	1.00	0.4400	0.1300	0.0300
		Structure	PG00123	25.00	26.00	1.00	0.5000	0.1500	0.0300
		39.40 - 45.50	PG00124	26.00	27.00	1.00	0.5300	0.1400	0.0400
		54.15 - 54.16 : LC Lower Contact, 82 Deg to CA	PG00126	27.00	28.00	1.00	0.5800	0.2300	0.0300
		RQD	PG00127	28.00	29.00	1.00	0.5800	0.2900	0.0400
		9.40 - 13.00 : 72.00 % RQD 95.00 % Core	PG00128	29.00	30.00	1.00	0.4900	0.2300	0.0300
		13.00 - 16.00 : 70.00 % RQD 98.00 % Core	PG00129	30.00	31.00	1.00	0.4400	0.2000	0.0400
			PG00130	31.00	32.00	1.00	0.4200	0.1900	0.0300
			PG00131	32.00	33.00	1.00	0.3300	0.1600	0.0200
			PG00132	33.00	34.00	1.00	0.3400	0.1700	0.0200
			PG00133	34.00	35.00	1.00	0.3300	0.2400	0.0300
			PG00134	35.00	36.00	1.00	0.3100	0.1200	0.0200
			PG00135	36.00	37.00	1.00	0.3300	0.1200	0.0100
			PG00136	37.00	38.00	1.00	0.3000	0.1400	0.0400
			PG00137	38.00	39.00	1.00	0.3600	0.1400	0.0300
			PG00138	39.00	39.40	0.40	0.3200	0.1200	0.0300
			PG00139	39.40	40.00	0.60	0.3400	0.2400	0.0300
			PG00140	40.00	41.00	1.00	0.2200	0.1000	0.0100
			PG00141	41.00	42.00	1.00	0.1900	0.1000	0.0200
			PG00142	42.00	43.00	1.00	0.2100	0.0700	0.0100
			PG00143	43.00	44.00	1.00	0.1800	0.1600	0.0200
			PG00144	44.00	45.00	1.00	0.1500	0.0600	0.0100
			PG00145	45.00	46.00	1.00	0.2400	0.1200	0.0200
			PG00146	46.00	47.00	1.00	0.2700	0.1000	0.0200
			PG00147	47.00	48.00	1.00	0.2000	0.0800	0.0100
			PG00148	48.00	49.00	1.00	0.1700	0.0800	0.0100
			PG00149	49.00	50.00	1.00	0.1300	0.0250	0.0100
			PG00151	50.00	51.00	1.00	0.1000	0.0250	0.0200

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Detailed Lithology		Assay Data							
From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
		RQD	PG00152	51.00	52.00	1.00	0.2300	0.0900	0.0300
	16.00 - 19.00 :	63.00 % RQD 98.00 % Core	PG00153	52.00	53.40	1.40	0.2200	0.1200	0.0100
	19.00 - 22.00 :	68.00 % RQD 100.00 % Core	PG00154	53.40	54.15	0.75	0.9000	0.2700	0.0600
	22.00 - 25.00 :	67.00 % RQD 100.00 % Core	PG00155	54.15	55.00	0.85	0.2300	0.1100	0.0200
	25.00 - 28.00 :	68.00 % RQD 100.00 % Core							
	28.00 - 31.00 :	78.00 % RQD 100.00 % Core							
	31.00 - 34.00 :	81.00 % RQD 100.00 % Core							
	34.00 - 37.00 :	85.00 % RQD 100.00 % Core							
	37.00 - 40.00 :	86.00 % RQD 98.00 % Core							
	40.00 - 43.00 :	44.00 % RQD 100.00 % Core							
	43.00 - 46.00 :	42.00 % RQD 100.00 % Core							
	46.00 - 49.00 :	76.00 % RQD 100.00 % Core							
	49.00 - 52.00 :	91.00 % RQD 100.00 % Core							
	52.00 - 55.00 :	68.00 % RQD 100.00 % Core							

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From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
54.16	77.58	10a, Massive flows Mafic volcanic sequence Unit dominated by fine to medium grained, altered (chloritic?) mafic volcanic flows (or sills??). The upper contact (with the peridotite) is defined by a highly sheared unit that may represent a sheared version of the volcanic, or a volcanoclastic (tuff?) sediment. Core axis to foliation angle is 84 degrees. 1-3% pyrite mineralization is observed as veinlets, disseminated and along fracture planes. The lower contact is characterized by a unit of thinly layered, deformed (soft sediment deformation??) volcanic sediments. Pyrite occurs along fracture plains, in disseminated form and in veinlets. Lower contact occurs at 55 degrees with respect to core axis. Two separate ultramafic units intruded the volcanic package (see Minor Units). Interpretation: This unit is not consistent with units mapped by Heim. Since this hole was drilled low in the topography of the complex, these units may represent previously unmapped (unexposed elsewhere) units of the Espedalen complex. Structure 77.57 - 77.58 : LC Lower Contact, 55 Deg to CA RQD 55.00 - 58.00 : 69.00 % RQD 100.00 % Core 58.00 - 61.00 : 64.00 % RQD 100.00 % Core 61.00 - 64.00 : 87.00 % RQD 100.00 % Core 64.00 - 67.00 : 58.00 % RQD 100.00 % Core 67.00 - 70.00 : 34.00 % RQD 100.00 % Core 70.00 - 73.00 : 44.00 % RQD 100.00 % Core 73.00 - 76.00 : 39.00 % RQD 100.00 % Core 76.00 - 79.00 : 63.00 % RQD 100.00 % Core	PG00156	65.70	66.20	0.50	0.0250	0.0250	0.0100
			PG00157	66.20	67.00	0.80	0.1400	0.0800	0.0100
			PG00158	67.00	68.00	1.00	0.1100	0.0250	0.0100
			PG00159	68.00	68.90	0.90	0.1000	0.0250	0.0100
			PG00160	68.90	69.90	1.00	0.2600	0.1100	0.0300
			PG00161	72.80	73.30	0.50	0.0900	0.0250	0.0100
			PG00162	73.30	74.00	0.70	0.2200	0.0700	0.0300
			PG00163	74.00	74.60	0.60	0.3600	0.1200	0.0200
			PG00164	74.60	75.10	0.50	0.1100	0.0800	0.0100

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Detailed Lithology		Assay Data							
From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
		<p>MINOR INTERVALS:</p> <p>Minor Interval: 66.17 - 68.9 6e, Ultramafic Schist Highly sheared, fine grained pyroxenitic unit; variable foliation from near 90 degree to core axis to 60-65 degrees to core axis.</p> <p>Minor mineralization ~5%</p> <p>Moderately magnetic</p> <p>Fault cuts through at 67.5m</p> <p>Mineralization 66.17 - 68.90 : Po Pyrrhotite, D Disseminated, 5%</p> <p>Structure 67.30 - 67.60 : F Fractured, 70 Deg to CA</p> <p>Minor Interval: 73.2 - 74.62 6e, Ultramafic Schist Sheared pyroxenitic unit; moderately magnetic.</p> <p>Locally 5-10% mineralization; disseminated and stringer style that give the unit an almost brecciated appearance (locally).</p> <p>Upper contact at ~12 degrees from core axis; lower contact at ~60 degrees to core axis.</p> <p>Mineralization 73.20 - 74.62 : Po Pyrrhotite, D Disseminated, 6% and stringers; brecciated look</p>							

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From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
77.58	119.40	<p>4, Anorthosite / Anorthosite Gabbro</p> <p>Anorthosite to anorthositic gabbro (mainly anorthositic gabbro). Medium-coarse to medium grained, mottled texture. Locally sheared/tectonized and sausseritized.</p> <p>Core axis to foliation angle consistently lies between 65 and 75 degrees.</p> <p>Locally, pyrite occurs as veinlets and also fills fracture planes. Some disseminated pyrite is also observed.</p> <p>Interpretation: Unit classification based on observation and correlation with similar units from other drill holes (e.g. ES2004-08, 09).</p> <p>RQD</p> <p>79.00 - 82.00 : 39.00 % RQD 98.00 % Core</p> <p>82.00 - 85.00 : 28.00 % RQD 100.00 % Core</p> <p>85.00 - 88.00 : 65.00 % RQD 100.00 % Core</p> <p>88.00 - 91.00 : 59.00 % RQD 100.00 % Core</p> <p>91.00 - 94.00 : 72.00 % RQD 100.00 % Core</p> <p>94.00 - 97.00 : 61.00 % RQD 100.00 % Core</p> <p>97.00 - 100.00 : 59.00 % RQD 100.00 % Core</p> <p>100.00 - 103.00 : 47.00 % RQD 100.00 % Core</p> <p>103.00 - 106.00 : 64.00 % RQD 100.00 % Core</p> <p>106.00 - 109.00 : 60.00 % RQD 100.00 % Core</p> <p>109.00 - 112.00 : 48.00 % RQD 100.00 % Core</p> <p>112.00 - 115.00 : 48.00 % RQD 100.00 % Core</p> <p>115.00 - 118.00 : 88.00 % RQD 100.00 % Core</p> <p>118.00 - 119.40 : 40.00 % RQD 100.00 % Core</p> <p>MINOR INTERVALS:</p> <p>Minor Interval:</p> <p>83.81 - 86.52 MD, Mafic Dike</p> <p>Mafic volcanic/sill</p> <p>Medium grained, non magnetic.</p> <p>Chloritic alteration.</p> <p>Upper and lower contact at 70 degrees to core axis and parallel to foliation in anorthosite.</p> <p>Alteration</p> <p>83.81 - 86.52 :CH Chlorite, BL Bleached, S Strong</p>							

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Detailed Lithology		Assay Data							
From (m)	To (m)	Lithology	Sample Number	From (m)	To (m)	Length (m)	Ni%	Cu%	Co%
		<p>MINOR INTERVALS:</p> <p>Minor Interval: 102.52 - 107.6 MD, Mafic Dike Mafic volcanic/sill</p> <p>Medium grained, non magnetic.</p> <p>Chloritic alteration.</p> <p>Upper and lower contact at 70 degrees to core axis and parallel to foliation in anorthosite. Contacts characterized by 0.5m long zones of altered anorthosite (Major Unit).</p> <p>Alteration 102.52 - 107.60 :CH Chlorite, BL Bleached, S Strong</p> <p>Minor Interval: 113.9 - 119.4 MD, Mafic Dike Mafic volcanic/sill</p> <p>Medium grained, non magnetic.</p> <p>Chloritic alteration.</p> <p>Upper and lower contact at 70 degrees to core axis and parallel to foliation in anorthosite. Contacts characterized by 0.5m long zones of altered anorthosite (Major Unit).</p> <p>The unit is cut off by the end of the hole.</p> <p>Alteration 113.90 - 119.40 :CH Chlorite, BL Bleached, S Strong</p>							

Samples

Sample Number	From (m)	To (m)	Ni%	Cu%	Co%
Sample Type	ASSAY				
PG00106	8.80	9.60	0.4100	0.0900	0.0300
PG00107	9.60	10.00	0.3000	0.1500	0.0200
PG00108	10.00	11.00	0.3200	0.1100	0.0400
PG00109	11.00	12.00	0.5100	0.1600	0.0400
PG00110	12.00	13.00	0.7700	0.3600	0.0600
PG00111	13.00	14.00	0.5600	0.1700	0.0400
PG00112	14.00	15.00	0.6200	0.2500	0.0500
PG00113	15.00	16.00	0.3300	0.1400	0.0100
PG00114	16.00	17.00	0.3700	0.2800	0.0100
PG00115	17.00	18.00	0.4000	0.1900	0.0200

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Samples

Sample Number	From (m)	To (m)	Ni%	Cu%	Co%
Sample Type	ASSAY				
PG00116	18.00	19.00	0.3500	0.1600	0.0100
PG00117	19.00	20.00	0.5200	0.1700	0.0300
PG00118	20.00	21.00	0.5800	0.1400	0.0500
PG00119	21.00	22.00	0.5100	0.2800	0.0400
PG00120	22.00	23.00	0.4500	0.1800	0.0400
PG00121	23.00	24.00	0.6400	0.2100	0.0300
PG00122	24.00	25.00	0.4400	0.1300	0.0300
PG00123	25.00	26.00	0.5000	0.1500	0.0300
PG00124	26.00	27.00	0.5300	0.1400	0.0400
PG00126	27.00	28.00	0.5800	0.2300	0.0300
PG00127	28.00	29.00	0.5800	0.2900	0.0400
PG00128	29.00	30.00	0.4900	0.2300	0.0300
PG00129	30.00	31.00	0.4400	0.2000	0.0400
PG00130	31.00	32.00	0.4200	0.1900	0.0300
PG00131	32.00	33.00	0.3300	0.1600	0.0200
PG00132	33.00	34.00	0.3400	0.1700	0.0200
PG00133	34.00	35.00	0.3300	0.2400	0.0300
PG00134	35.00	36.00	0.3100	0.1200	0.0200
PG00135	36.00	37.00	0.3300	0.1200	0.0100
PG00136	37.00	38.00	0.3000	0.1400	0.0400
PG00137	38.00	39.00	0.3600	0.1400	0.0300
PG00138	39.00	39.40	0.3200	0.1200	0.0300
PG00139	39.40	40.00	0.3400	0.2400	0.0300
PG00140	40.00	41.00	0.2200	0.1000	0.0100
PG00141	41.00	42.00	0.1900	0.1000	0.0200
PG00142	42.00	43.00	0.2100	0.0700	0.0100
PG00143	43.00	44.00	0.1800	0.1600	0.0200
PG00144	44.00	45.00	0.1500	0.0600	0.0100
PG00145	45.00	46.00	0.2400	0.1200	0.0200
PG00146	46.00	47.00	0.2700	0.1000	0.0200
PG00147	47.00	48.00	0.2000	0.0800	0.0100
PG00148	48.00	49.00	0.1700	0.0800	0.0100
PG00149	49.00	50.00	0.1300	0.0250	0.0100
PG00151	50.00	51.00	0.1000	0.0250	0.0200
PG00152	51.00	52.00	0.2300	0.0900	0.0300
PG00153	52.00	53.40	0.2200	0.1200	0.0100
PG00154	53.40	54.15	0.9000	0.2700	0.0600

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Sample Type	ASSAY				
PG00155	54.15	55.00	0.2300	0.1100	0.0200
PG00156	65.70	66.20	0.0250	0.0250	0.0100
PG00157	66.20	67.00	0.1400	0.0800	0.0100
PG00158	67.00	68.00	0.1100	0.0250	0.0100
PG00159	68.00	68.90	0.1000	0.0250	0.0100
PG00160	68.90	69.90	0.2600	0.1100	0.0300
PG00161	72.80	73.30	0.0900	0.0250	0.0100
PG00162	73.30	74.00	0.2200	0.0700	0.0300
PG00163	74.00	74.60	0.3600	0.1200	0.0200
PG00164	74.60	75.10	0.1100	0.0800	0.0100