A summary on Spaçi ore deposit

(Geological structure, Sulphide mineralization, Mining)

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April 2007

I. Geographic position and relief

Spaci ore deposit is located in the central part of Mirdita district. The geographic coordinates are as following: 41°53'25'' 41°54'27'' north latitude 20°02'56'' 20°05'16'' east longitude

The deposit occurs in the eastern side of Sefta e Spacit about 7 km far from Repsi. The altitude of outcrop varies from 700÷950 m.

II. The hydrography of ore deposit

As to the hydrological conditions the Spaci ore deposit ranks between normal to the difficult conditions.

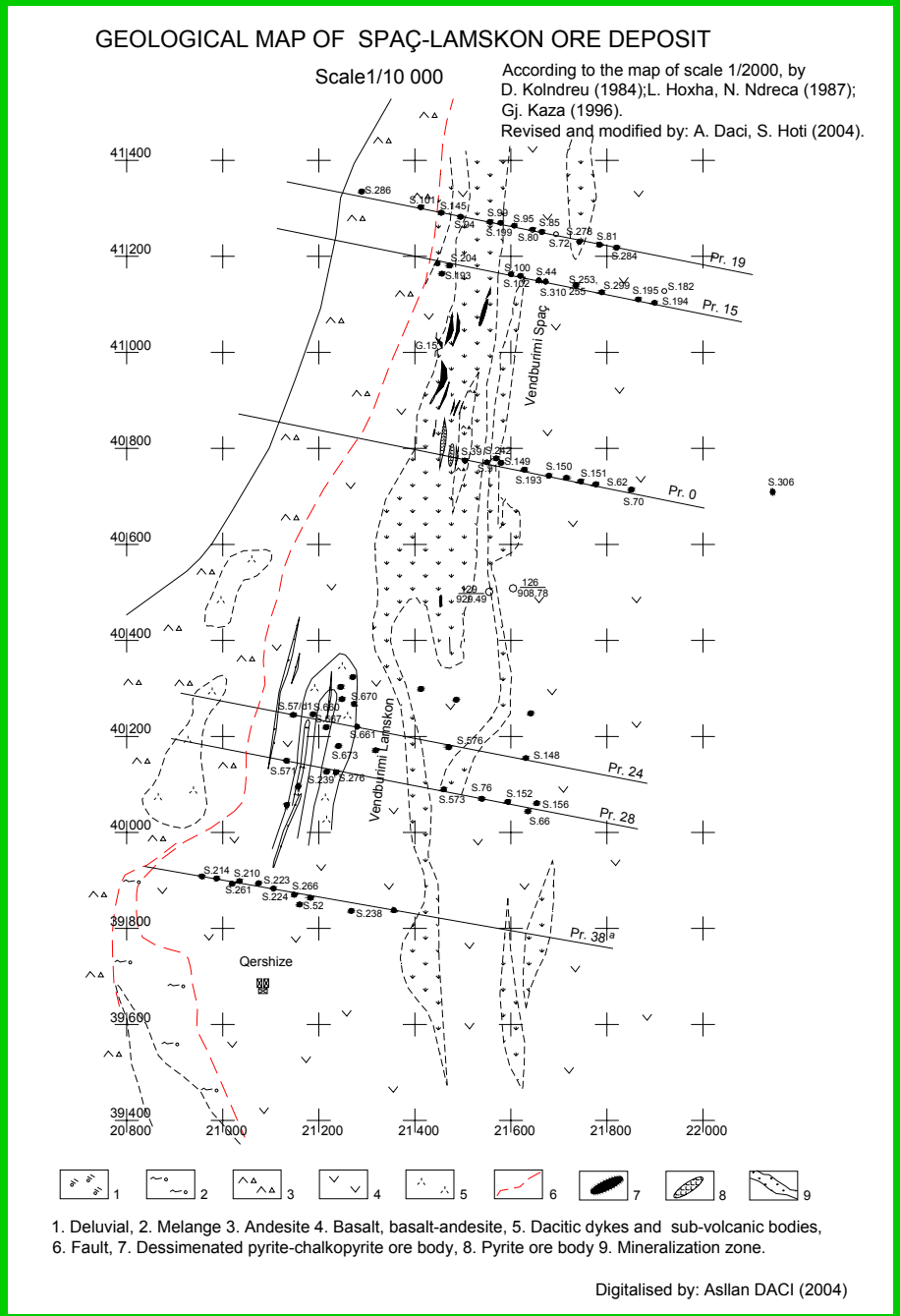
<u>Two hydrodynamic zones are determined.</u>

- Zone of free ground waters over level 550 m
- Zone of pressure waters at altitudes under 550 m

Water debit of the first zone is low (0.003 l/s) whereas in the second zone is 30-38 l/s. The waters of first zone are very acidic (pH 2.2-5.0) because of the oksidation of sulphides. The water debit is generally constant with some small diferencies for different seasions.

Geological framework of the region

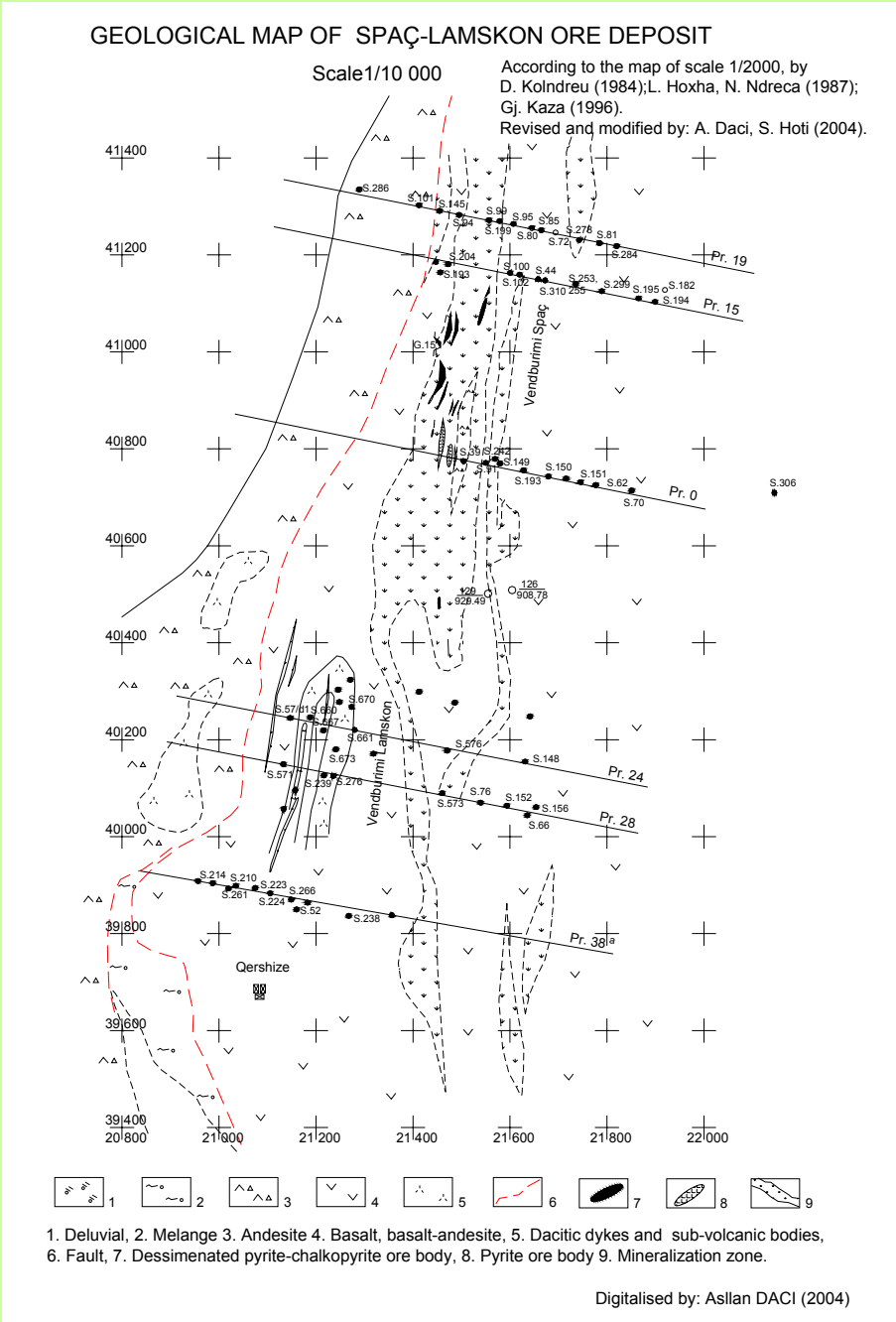
Spaci deposit is located in the central part of Perlat- Qaf Mali mineralized belt.
This belt which extends about 40 km contains several big ore deposits as **Lak Roshi, Tuçi, Qafe Bari, Munella, Gurth Spaçi, Spaci and Perlati** and several medium size ore deposits containing 100 thousand up to 1 million tons ore and numerous small prospects containing 5000 tons up to 100 thusand tons. The sulphide mineralization of this belt is located in extrusive rocks of central Mirdita represented by basalts, andesite-basalts, basalte andesites, boninites, dacites and rhyolites.
The alteration is rather intensive where can be distinguished epidotization chloritization, argillization, kaolinization, silicifation, carbonatization, sericitization and zeolitization.
In Spaci area sulfide mineralization is widely developed where deposits encountered strongly mineralized zones and potent gossans.
The zone is characterized by frequent facial differences.



Geological structure of the ore deposit

The area of the deposit is constituted by the following units (Hoxha L. et al. 1987):

- Sheeted dyke complex
- Lower pack represented of felsitic pillow lavas, basaltic in composition.
- Upper pack represented by basaltic to andesitic agglomerates rhyodacite dykes
- Radiolarian cherts
- Argillite pack with clasts



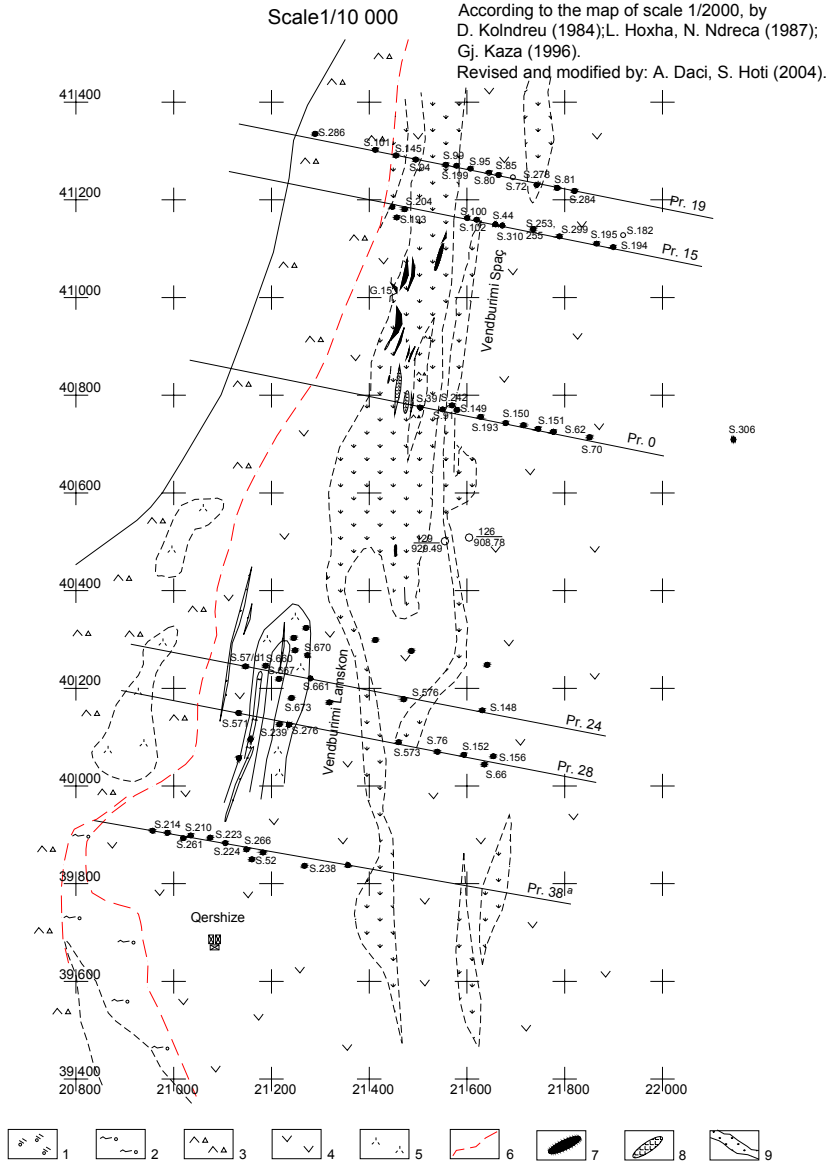
The structural features of the ore deposit

•The majority of the authors consider the ore deposit as a monocline and intermittent against the host rocks (Bakalli F. 1967; Bezhani V. and Çakali P. 1981; Kolndreu D. and Sulejmani Ll. 1984; Qirinxhi A and Bezhani V. 1973; Shima G. 1967). According to the Kolndreu D. and Sulejmani Ll.1984 the mineralization is related to the pre-mineralization faults Lambda (λ), ksi (ξ) and S shaped.

•The other group consider the mineralization in conformity to the host rocks and both are folded, forming anticline and syncline structures with meridional striking (Hoxha L. 1980, 1981; Hoxha L et. al 1987.

•The faulting is rather developed and the most important ones are of overthruting type with meridional striking and dipping towards east at gentle angles 25 – 35^0.

GEOLOGICAL MAP OF SPAÇ-LAMSKON ORE DEPOSIT



1. Deluvial, 2. Melange 3. Andesite 4. Basalt, basalt-andesite, 5. Dacitic dykes and sub-volcanic bodies, 6. Fault, 7. Dessimenated pyrite-chalkopyrite ore body, 8. Pyrite ore body 9. Mineralization zone.

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Mineral zones, mineral bodies, structural elements, shapes and their dimensions

Mineral zones amongst which are found economic concentrations of copper and pyrites has a general meridional strike extending about **1 km** and dipping towards east at angle **45 -70^0**.

The mineralization zone outcrop at the altitude 750 – 950 m

Thickness of mineral zone varies from 70 to 200 m.

In northern part (towards Plakez) zone became poorer and it gradually pinches out.

Southern continuation of the deposit is thought to be towards Qershiza prospect (D.Kolndreu et al 1984) or towards mineral zones of Shemeri (L.Hoxha 1981, L.Hoxha and B.Zaganjori 1987, S.Imami 1983).

Mineral showings Spac-Shemeri are developed in lower parts of microgranular basalt lavas (spilitic).

Two mineralization types are evident (P.Kati, Zh.Kotmilo 1964, D.Kolndreu et al 1984, L.Hoxha et al 1987):

- Massive ore or pyrite ore bodies (Developed al altitude 600 – 900 m)
- Disseminated mineralization or copper ore bodies (developed at altitude 375 – 900m)

Within an intensive hydrothermal alteration zone about 1 km length and up to 200m thick are encountered **1592** copper and pyrite lens- shaped bodies, of which

548 copper bodies, Cu>0.5%

984 copper bodies, Cu<0.5%

24 pyrite bodies, S>30%

23 pyrite bodies, S<30%

Main ore bodies and some of their features:

A. Copper ore bodies

No.of ore body	Extension in Strike length direction	Extensin in the dip direction	Thichness (m)	Reserves (in tons). After Hoxha L. 1987	The average content of Cu (%)	Reserves (in tons). After Kolndreu D. 1984	The average content of Cu (%)
48	400 m	300 m	1 - 5 up to 37 m	1 300 000	1.09 %	828 339	1.23 %
81	250 m	300 m	1 - 20 m	777 000	1.53 %	433 493	1.38%
114	200 m	250 m	2 - 20 m	640 000	1.24%	416 956	1.52 %
171	200 m	200 m				107 388	0.83 %
128	300 m	140 m				196 142	1.09 %
176	300 m	250 m	2 -10 up to 15 m	751 000	1.28%		
170	200 m	200 m	1 - 2 up to 15 m	419 000	0.96 %		
600	150 m	200 m				100 165	0.89 %
84	160 m	120 m				137 302	0.97 %

Main ore bodies and some of their features:

B. Pyrite ore bodies

No of ore body	Extension in Strike length direction	Extension in the dip direction	Thickness (m)	Reserves (in tons). After Kolndreu D. 1984	The content of S (%)	The average content of S (%)
5	200 m	150 m		403 113	32.25 – 51.82 %	
4	150 m	110 m		99 384	34.11 – 46.90 %	
15	140	130		118 559	21.22 – 48.12 %	44.88 %

The shape and the features of other bodies are similar to above mentioned bodies but their dimensions are smaller.

Mineral composition of ore

In Spaci deposit are encountered two ore types:

•massive ore

•disseminated ore

Massive ore is represented by massive bodies of pyrite containing spot–like,vesicular chalcopyrite and individual disseminations as well, with heterogeneous distributions.

Disseminated ore is characteristic for copper bearing ore bodies where pyrite, chalcopyrite, hematite-muschetovite and magnetite are found. Mineralization is concentrated in the alterated effusive basic rocks in the shape of spots, veins and veinlets and disseminated grains and rarely forming massive concentrations.

As to the hydrothermal alteration silicifation and chloritization predominate, whereas epidotization and carbonatizaton, which is characteristic for other areas, is less developed in Spaçi deposit.

Chemical composition of ore

Copper **-** The average content of Cu reserves within the balance sheet is 1.33% and 0.44% for those out of balance sheet.

Cobalt **-** The average content of Co for Copper ore bodies within the balance sheet is 0.008% and for those out of balance sheet is higher.

Sulfur **-** The average content of S in massive pyrite ore bodies is about 44.15%. In copper ore bodies it is 4-5%, sometimes 2-3% rarely over 10%.

Gold + Silver – the composite samples assayed in the laboratory of (Geological Researches Institute) offered low results. In the oxidation zones the presence of Au and Ag were observed applying the flame test method.

The rate of Au/Ag varies from 1/10-1/15. At the exported pyrite the presence of Au is 0.075%-0.89 gr/t and traces of Ag up to 0.60 gr/t.

Lead – is not detected Zinc – is below the levels of 0.005%

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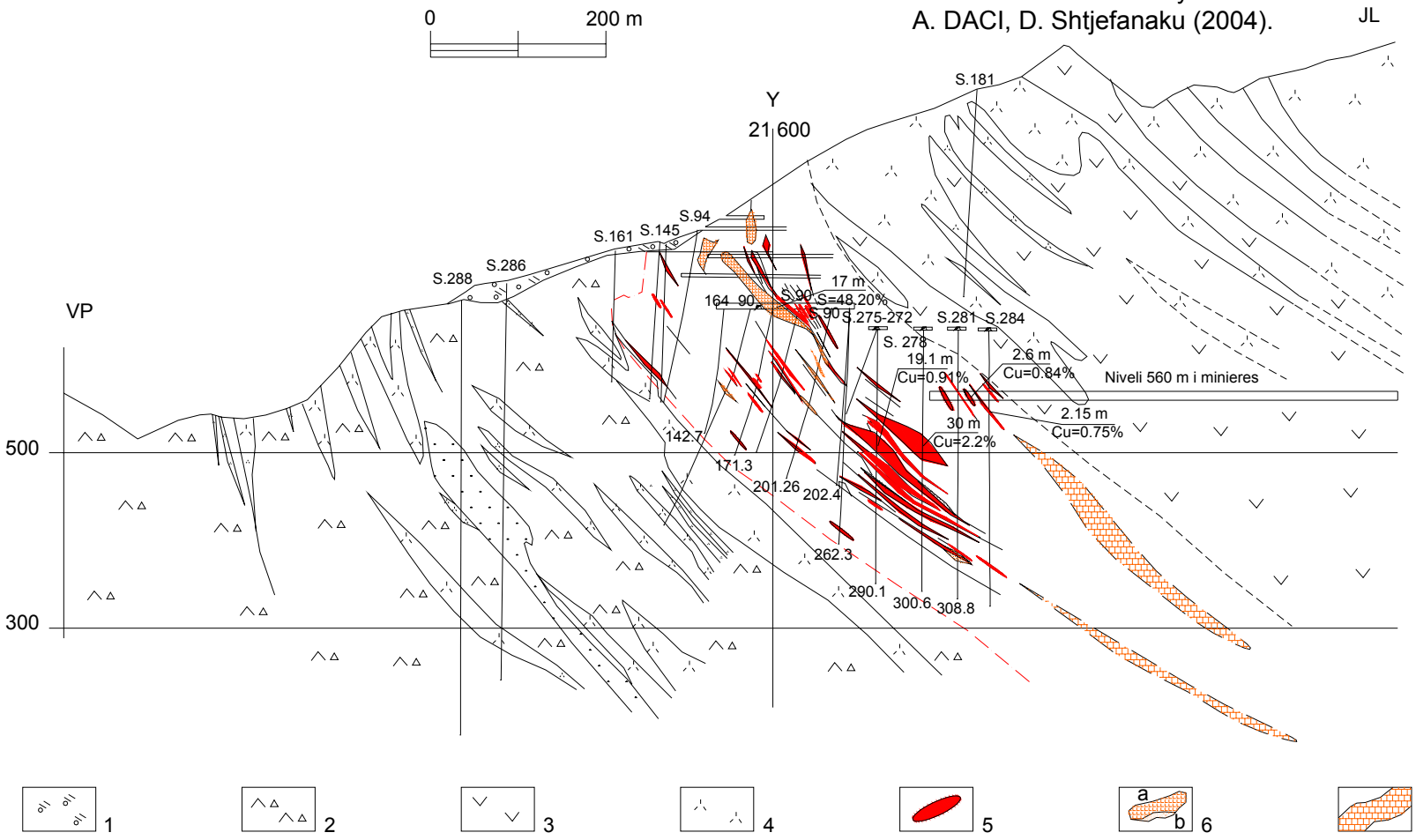
S E C T I O N 1 9

According to: Ded Kolndreu (1984)
Revised and modified by:
A. DACI, D. Shtjefanaku (2004).



1. Deluvial, 2. Andesite, 3. Basalte, basalt-andesite, 4. Dacitic dykes and sub-volcanic bodies, 5. Disseminated pyrite-chalkopyrite ore body, 6. Pyrite ore body: a (massive), b (disseminated), 7. Prognosed copper ore bodies.

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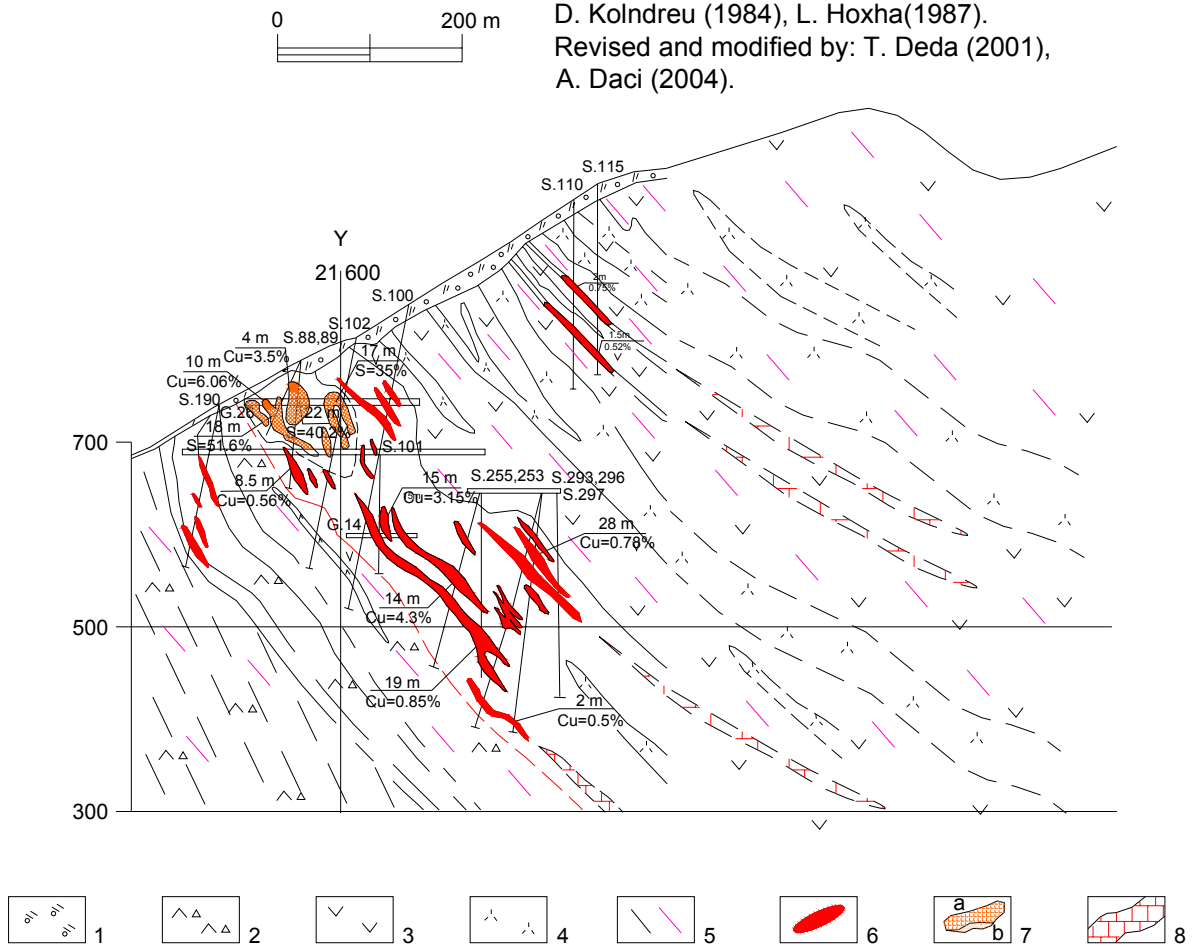
S P A Ç I D E P O S I T
S E C T I O N 1 5

According to: R. Bulaj (1962), F. Bakalli (1966),
D. Kolndreu (1984), L. Hoxha(1987).
Revised and modified by: T. Deda (2001),
A. Daci (2004).



1. Deluvial, 2. Andesite, 3. Basalte, basalt-andesite, 4. Dacitic dykes and sub-volcanic bodies, 5. Dykes: a) diabase, b) dacite; 6. Disseminated pyrite-chalkopyrite ore body, 7. Pyrite ore body: a (massive), b (disseminated), 8. Prognosed copper ore bodies.

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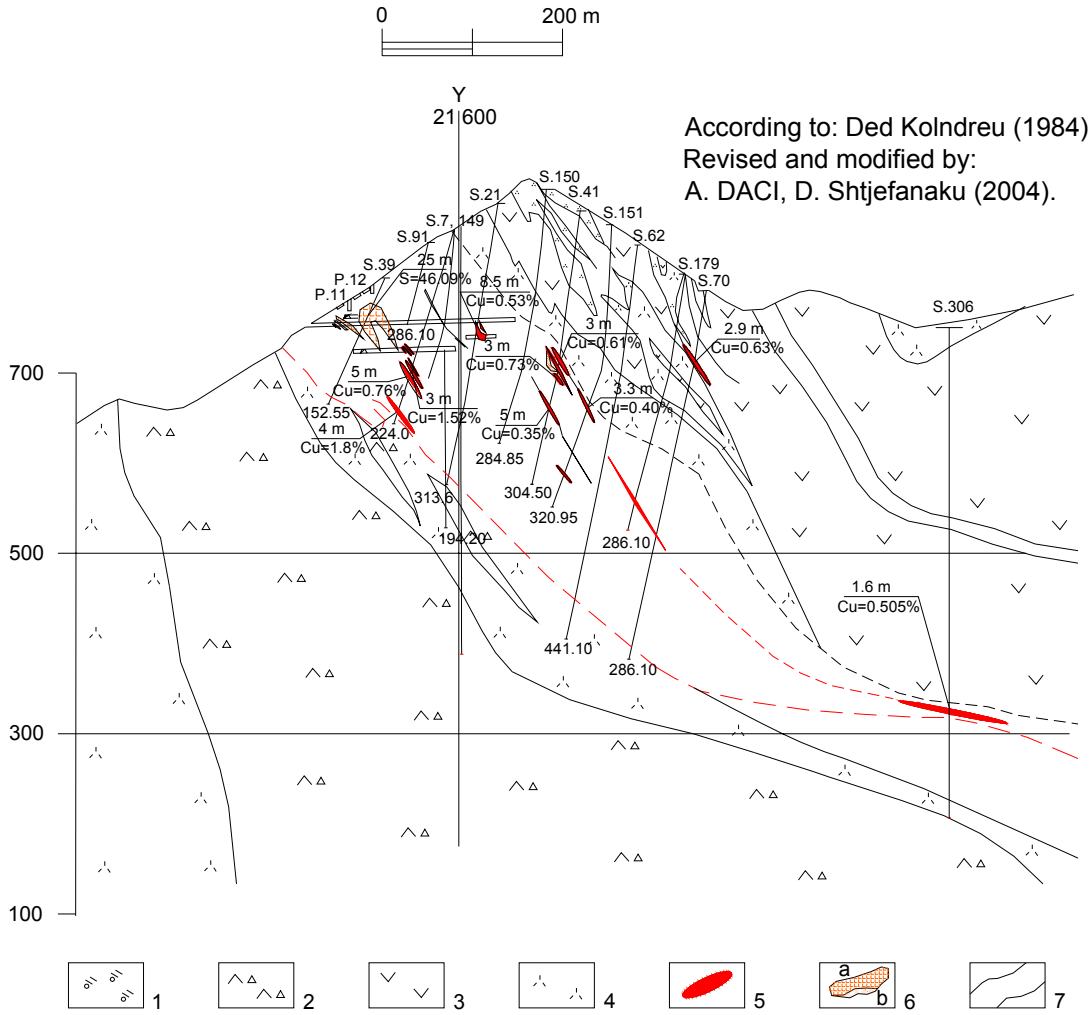

1. Deluvial, 2. Andesite, 3. Basalte, basalt-andesite, 4. Dacitic dykes and sub-volcanic bodies, 5. Disseminated pyrite-chalkopyrite ore body, 6. Pyrite ore body: a (massive), b (disseminated), 7. Prognosed copper ore bodies.

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The performance of Spaci mine

The terraine is very suitable for underground mining
The horizontal galleries differ in altitude 50 m from each other (so called floors)
The altitudes of mining levels are as following:

- Main gallery at altitude 700 which was used for mining of ore reserves of third zone.
- Main gallery at altitude 650 which was used for mining of ore reserves of first zone.
- Main gallery at altitude 550 which was used for mining of ore reserves of fourth zone.
- Main gallery at altitude 523 which was used for mining of ore reserves between levels 523 up to 560.
- Main gallery at altitude 420 (the last level) which is open in the all length of mine, 1976 m long, reaching the main shaft.
- Main shaft of the mine links the levels 560 and 420

Mining

The mining of Spaci ore deposit started in 1966 and lasted for 34 year until 1999.
The all ore production of this deposit went to the processing plant of Repsi and further to smelting plants of Rubiku and Laçi.

The ore production through years (according to INTP Minerals 2001 and Albabaker Company)

Years	Production in tons	The average grade of copper in %	Years	Production in tons	The average grade of copper in %
1966	13600	1	**1983**	150794	0.765
1967	20403	0.98	**1984**	184995	0.736
1968	28088	0.97	**1985**	168986	0.68
1969	24947	1	**1986**	168106	0.786
1970	30000	1.08	**1987**	187815	0.81
1971	41443	0.99	**1988**	183574	0.806
1972	60059	1	**1989**	192338	0.78
1973	65613	1.06	**1990**	126752	0.91
1974	76540	1.01	**1991**	53573	0.81
1975	84795	0.98	**1992**	35885	0.785
1976	95983	0.889	**1993**	37867	0.85
1977	111516	1	**1994**	34142	1.01
1978	139090	1.05	**1995**	62737	0.91
1979	150656	1.06	**1996**	53789	0.96
1980	156502	1.09	**1997**	6256	0.99
1981	172284	0.84	**1998**	18246	1.11
1982	172515	0.801	**1999**	9297	1.02
			Total	**3 058 832**	**0.884**

Remained ore reserves converted to the mineable ones (01.09.1999), According to Jorgji Tavanxhi et. Al. 2001

	Geological reserves (Categories)								Mineable reswerves	
Nr.	A_2		B		C_1		C_2			
	ton	%Cu	ton	%Cu	ton	%Cu	ton	%Cu	ton	%Cu
1	221956	1.20							221195	1.02
2			638881	1.13					511104	0.94
3					2175214	1.28			1522649	1.08
4							593893	1.17	207862	0.96
Total	**3 629 944 me 1.23%**									

Prepared reserves (1.1.1999) According to Jorgji Tavanxhi et. Al. 2001

Ore reserves containing over 1% Cu

Mining levels	Open reserves		Prepared reserves		Ready for mining resrves	
	Sasia (ton)	Cu %	Sasia (ton)	Cu %	Sasia (ton)	Cu %
560÷574	81444	1.21	81444	1.21	81444	1.21
523÷560	469083	1.36	297295	1.42	68689	1.25
523÷574	550528	1.34	378739	1.37	151133	1.23

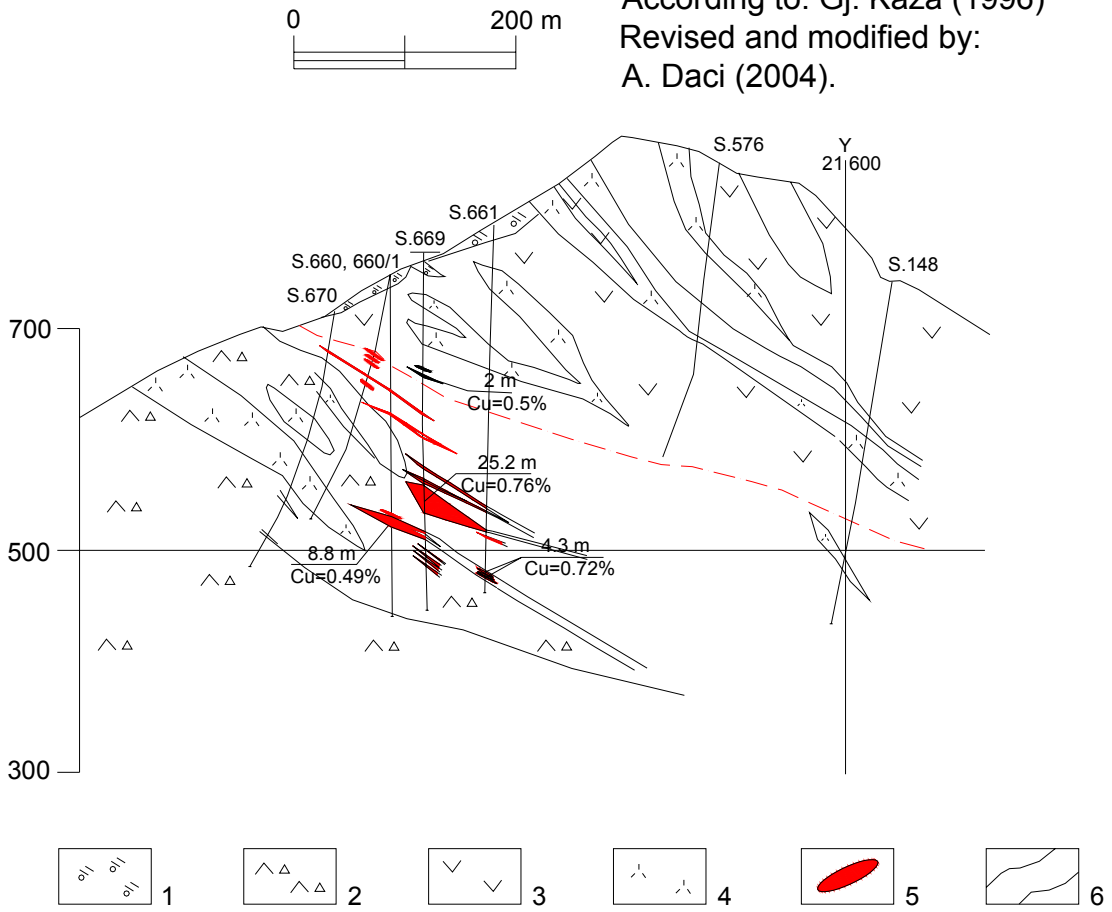
Ore reserves containing lower than 1% Cu

560÷610	208510	0.91	54808	0.77	--	--
523÷560	335502	0.83	--	--	--	--
523÷610	544012	0.86	54808	0.77	--	--

Total prepared ore reserves:

Mining levels	Open reserves		Prepared reserves		Ready for mining resrves	
	Sasia (ton)	Cu %	Sasia (ton)	Cu %	Sasia (ton)	Cu %
All levels	1094540	1.1	433547	1.07	151133	1.23

LAMSKON DEPOSIT
SECTION 24



1. Deluvial, 2. Andesite, 3. Basalte, basalt-andesite, 4. Dacitic dykes and sub-volcanic bodies,
5. Disseminated pyrite-chalkopyrite ore body, 6. Mineralization zone.

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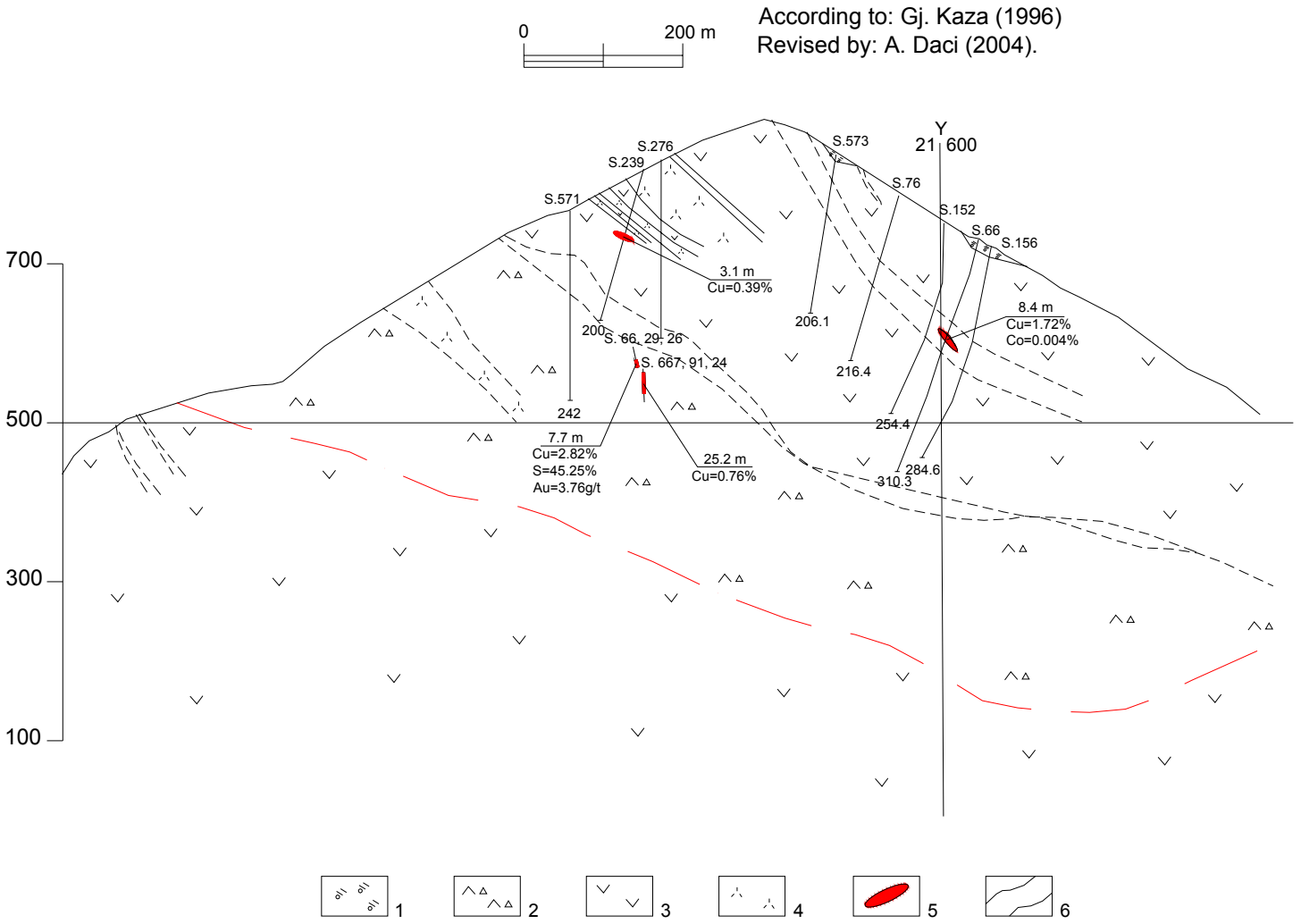
LAMSKON DEPOSIT
SECTION 28



1. Deluvial, 2. Andesite, 3. Basalte, basalt-andesite, 4. Dacitic dykes and sub-volcanic bodies,
5. Disseminated pyrite-chalkopyrite ore body, 6. Mineralization zone.

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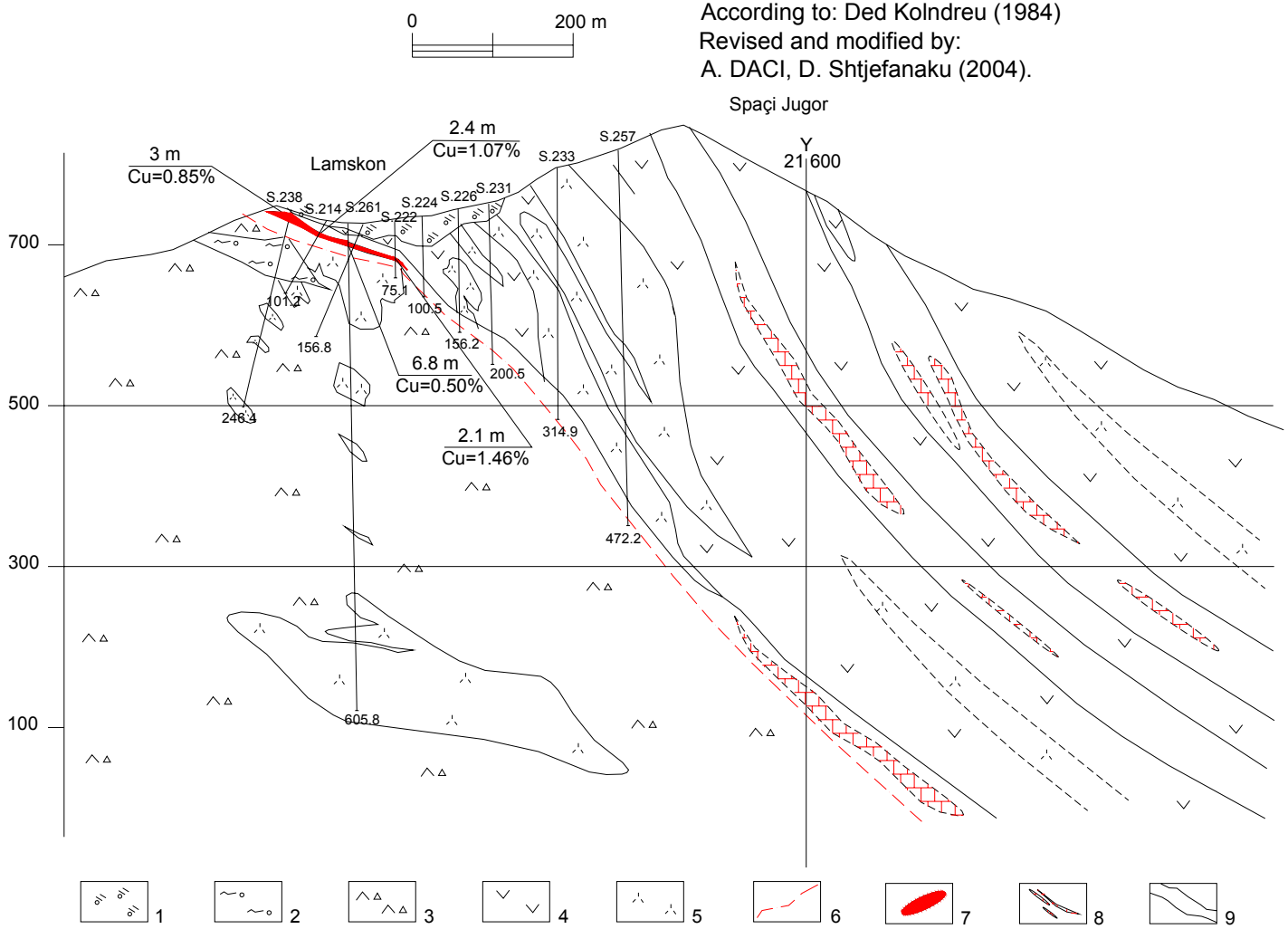
LAMSKON DEPOSIT
SECTION 38a/a



1. Deluvial, 2. Melange, 3. Andesite, 4. Basalte, basalt-andesite, 5. Dacitic dykes and sub-volcanic bodies, 6. Fault,
7. Disseminated pyrite-chalkopyrite ore body, 8. Supposed pyrite-chalkopyrite ore body (Spaçi south continuation),
9. Mineralization zone.

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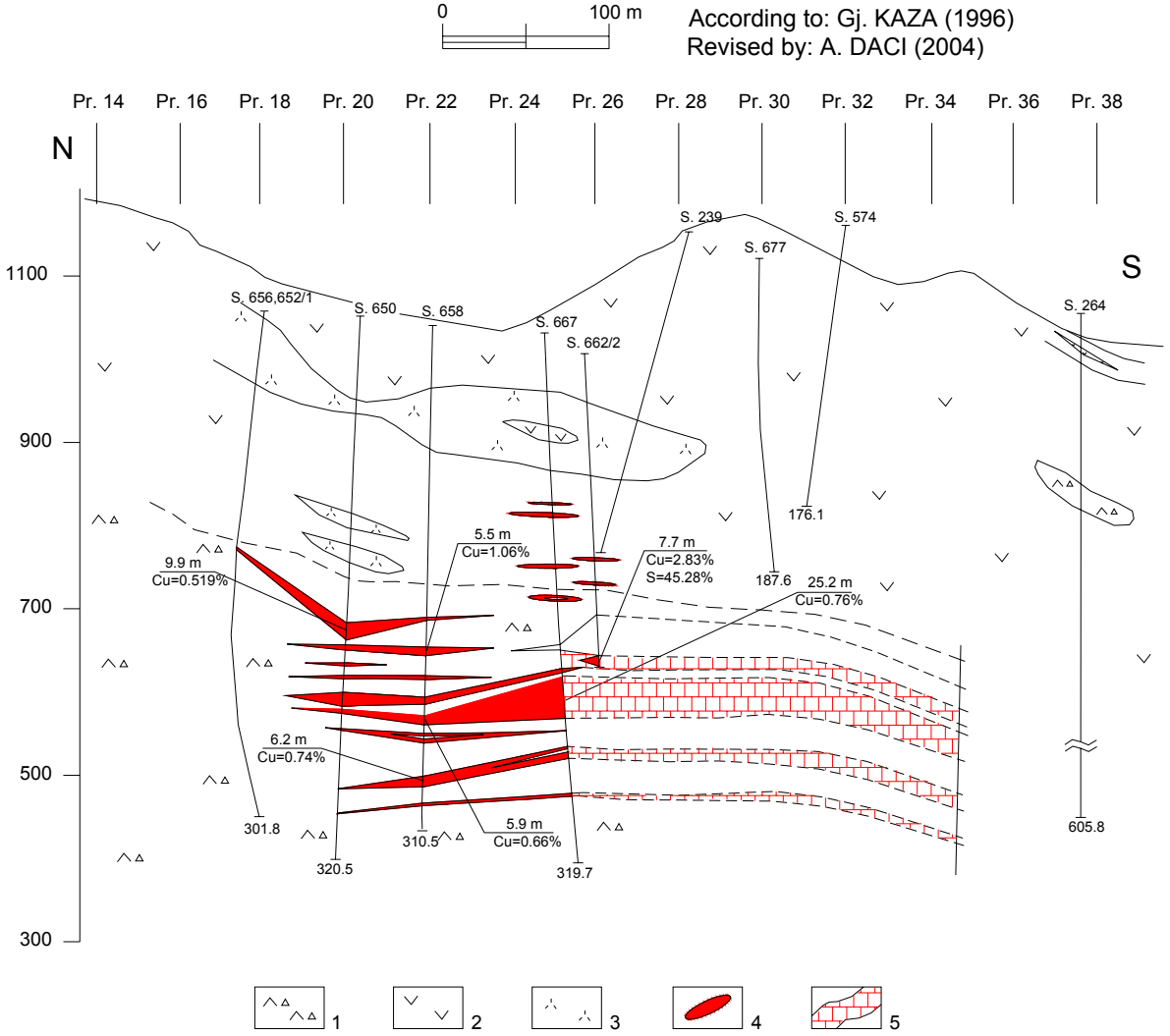
LAMSKON DEPOSIT
LONGITIDUNAL SECTION



1. Andesit, 2. Basalt, basalt-andesite, 3. Dacitic dykes and sub-volcanic bodies,
4. Disseminated pyrite-chalkopyrite ore body, 5. Supposed copper ore body.

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