

APPENDIX 4

**Microscopic observations
of polished sections**

100

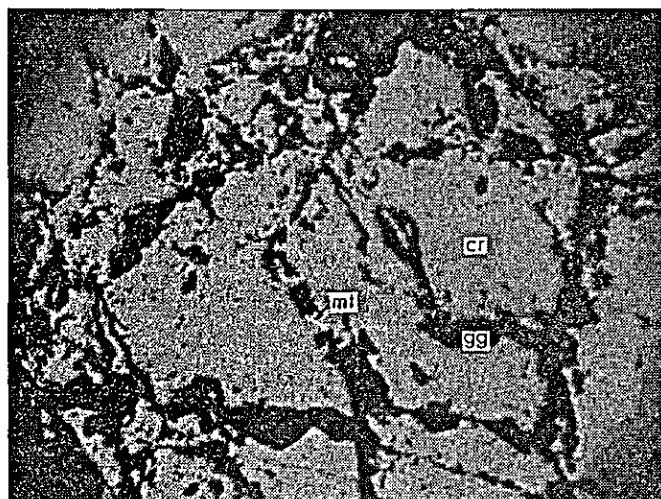
100

1

100

1

Microscopic observation of polished section



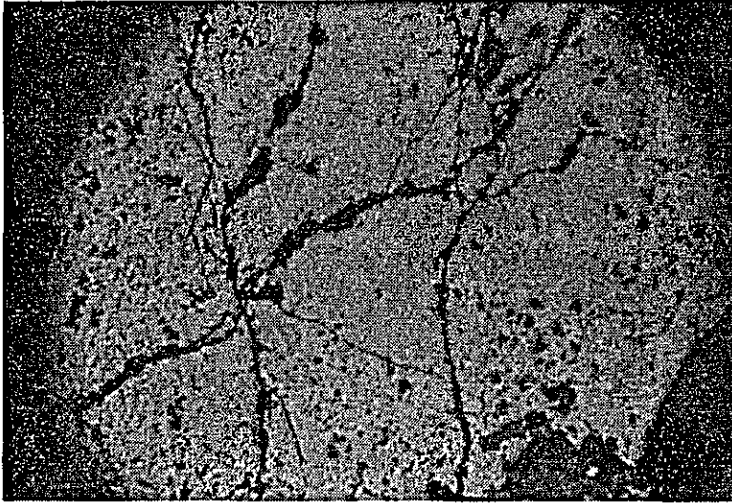
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Acr-7
2. Laboratory No. : AR - 1128
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, a2, No.2
6. Coordinates : 24.32 N, 05.21 E
7. Location : Pembe Gül mine, Keşan Tepe, Cancikkomu, Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is subround, very coarse grained (0.8 cm) and makes aggregates. Grade of the specimen is estimated to be more than 45% Cr_2O_3 . Gangue minerals are creamy white colored powdery serpentine.
12. Microscopy : Chromite makes very coarse aggregates (more than 4 mm). It has subround shape. Fine veinlets of magnetite are present in chromite. Gangue minerals show mesh structure.
13. Remarks : This specimen is taken from the stock of ore. refer Appendix 7-11 (TA-11, 12)
Plate 7-5 (")

Microscopic observation of polished section



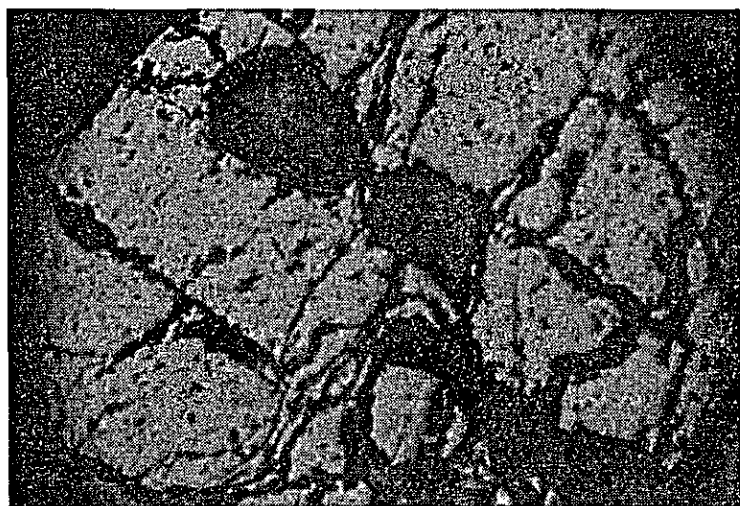
Whole part is composed of chromite. (black part is gangue minerals)

Parallel nicol \times 10

0 0.25 0.5 mm
└──────────┘

1. Sample No. : Acr-12
2. Laboratory No. : AR - 1129
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, a2, No.2
6. Coordinates : 23.78 N, 04.44 E
7. Location : Dikyokuş mine, Baltadeğmez Sr., Cancikkomu, Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : layered
11. Description of specimen : Chromite is round, very coarse grained (0.5 mm) and makes aggregates. Grade of the specimen is estimated to be more than 50% Cr₂O₃. Pale green colored serpentine is observed.
12. Microscopy : Chromite is coarse grained, frequently hexahedral and makes aggregates. It is homogeneous and isotropic. Grain size reaches to 2 mm. Gangue minerals fill the cracks of chromite.
13. Remarks : This specimen is taken from the stock of ore.
refer Appendix 7-10 (TA-10)
Plate 7-6 (TA-10)

Microscopic observation of polished section



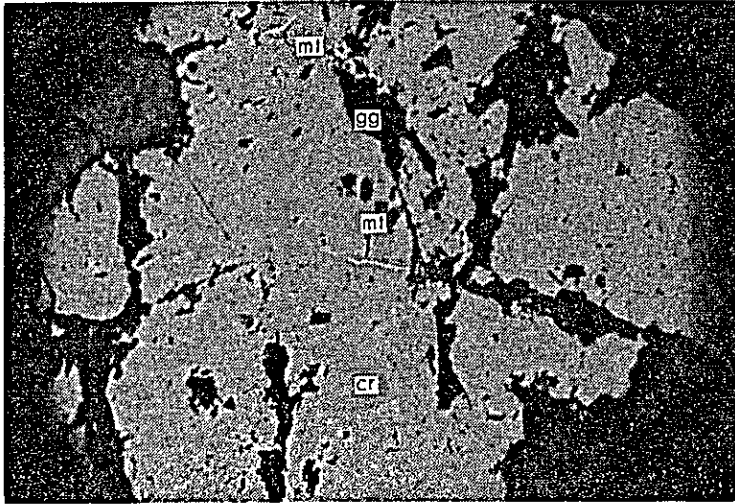
gray part : chromite
black part : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm
└──────────┘

1. Sample No. : Acr-25
2. Laboratory No. : AR - 1126
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, a2, No.1
6. Coordinates : 21.64 N, 99.15 E
7. Location : Kayınlı dere, Hacıbektaş komu, Çayırılı, Erzincan
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is round, coarse-grained (0.5 mm size) and makes aggregates. Grade of the specimen is estimated to be 45 % Cr₂O₃ approximately. Pale green colored serpentine is observed.
12. Microscopy : Chromite is very coarse grained and hexahedral. It is isotropic and more than 4 mm in size. Gangue minerals are found with mesh structure in chromite.
13. Remarks : The specimen is taken from the stock of ore.
refer Appendix 7-21 (TA-21)
Plate 7-6 (TA-21)

Microscopic observation of polished section



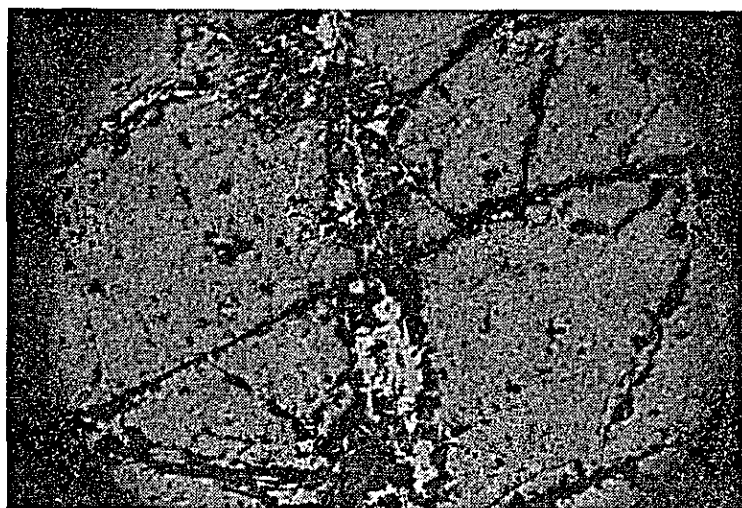
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 20$

0 0.1 0.2 mm
└──────────┘

1. Sample No. : Acr-51
2. Laboratory No. : AR - 1125
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, a2, No.2
6. Coordinates : 21.63 N, 05.36 E
7. Location : Cancikkomu mine, Taşocağı Tepe, Cancikkomu, Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular, network
11. Description of specimen : Chromite is coarse crystalline and makes aggregates. Grade of the specimen is estimated to be more than 50% Cr_2O_3 . Small amount of uvarovite accompanies. Serpentine fills the interstices of chromite.
12. Microscopy : Chromite is very coarse grained (more than 4 mm size) and hexahedral or octahedral. It is isotropic and homogeneous and makes aggregates. Fine veinlet of magnetite occurs commonly in chromite. Gangue minerals make mesh structure in chromite.
13. Remarks : The specimen is taken from the stock of ore.
refer Appendix 7-36 (TA-34)
Plate 7-6 (TA-34)

Microscopic observation of polished section



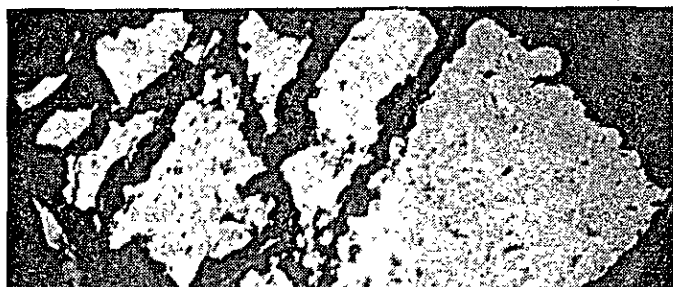
Magnetite veins (center, bright part) in chromite is shown.

Parallel nicol $\times 10$

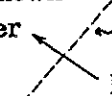
0 0.25 0.5 mm

1. Sample No. : Acr-62
2. Laboratory No. : AR - 1127
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, a2, No.3
6. Coordinates : 15.68N, 05.87 E
7. Location : Cumakomu,
Tercan, Erzincan
8. Host rock : serpentized dunite
9. Name of specimen : massive, high-grade ore
10. Occurrence : uncertain
11. Description of specimen : Chromite is coarse crystalline, compact and makes aggregates. Grade of the specimen is estimated to be 45% Cr_2O_3 . Magnetite is found commonly at interstices of chromite. Gangue minerals (powdery serpentine) occur with mesh structure in serpentine.
12. Microscopy : Chromite is very coarse grained (more than 4 mm size) and hexahedral or octahedral. It is mostly homogeneous and isotropic. Magnetite is found commonly. It dots in chromite and makes veinlets which cut the chromite crystals. Grain size varies from coarse to very fine. Gangue minerals fill the interstices of chromite crystals.
13. Remarks : The specimen is taken from the stock of ore.
refer Appendix 7-217 (TY-37)
Plate 7-7 (TY-37)

Microscopic observation of polished section



Banding of nodule chromite is shown

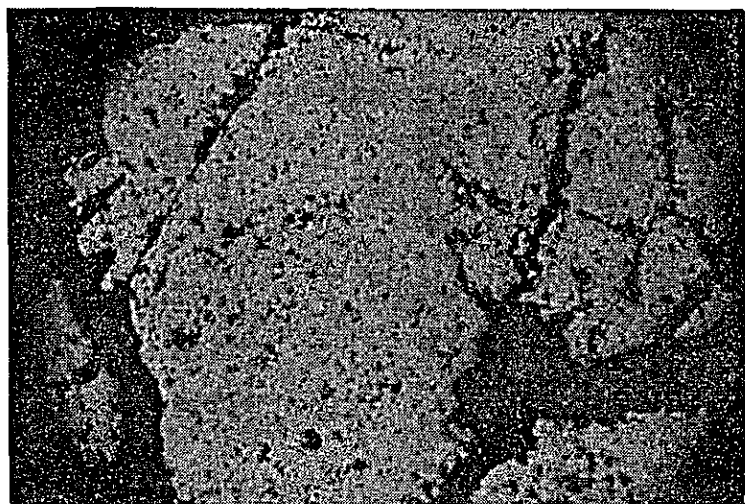
upper  banding plane
lower

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Acr-80
2. Laboratory No. : AR - 1131
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Tortum, H-45, d4, No.4
6. Coordinates : 32.90 N, 31.91 E
7. Location : Orta Tepe, Dencik, Aşkale, Erzurum
8. Host rock : dunite
9. Name of specimen : nodule ore
10. Occurrence : layered
11. Description of specimen : Chromite has nodule shape suggesting sedimentary origin. It is round, very coarse grained (up to 1.2 cm size). Grade of the specimen is estimated approximately 25% Cr_2O_3 . Gangue minerals (serpentine) fill the interstices of chromite.
12. Microscopy : Chromite nodule shows banded structure. Chromite is round, coarse crystalline, and makes aggregates. It is isotropic and homogeneous. Grain size is more than 1 mm. Gangue minerals make networks and irregular patches in chromite.
13. Remarks : The specimen is taken from the stock of ore. refer Appendix 7-44 (TA-42), Appendix 3-13 Plate 7-7 (TA-42)

Microscopic observation of polished section

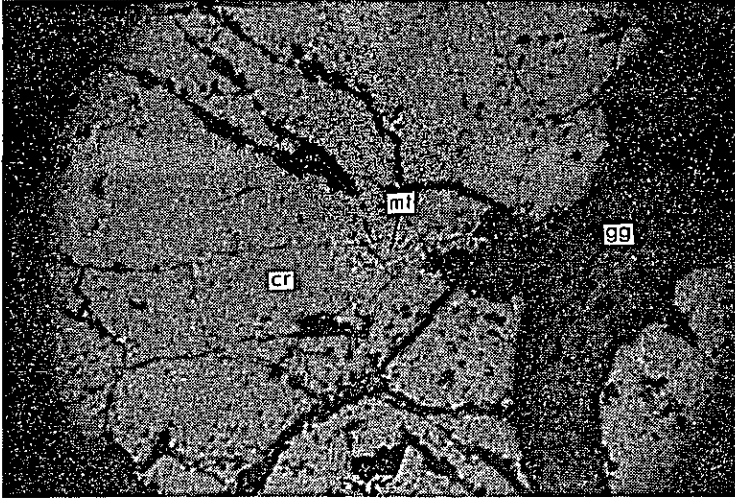


Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Acr-86
2. Laboratory No. : AR - 1130
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzurum, i-45, a1, No.1
6. Coordinates : 78.73 N, 33.62 E
7. Location : Kurudere, Pırnakapan, Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is coarse crystalline (0.4 cm) and makes aggregates. Uvarovite accompanies with it. Grade of the specimen is estimated to be approximately 40% Cr₂O₃. Creamy white-green colored serpentine fills the interstices of chromite.
12. Microscopy : Chromite is coarse grained (more than 4 mm size) and octahedral or hexahedral. It is isotropic, homogeneous and makes aggregates. Gangue minerals make veins, and irregular patches in chromite.
13. Remarks : refer Appendix 3-15, Appendix 7-52 (TA-50)
Plate 7-8 (TA-50)

Microscopic observation of polished section



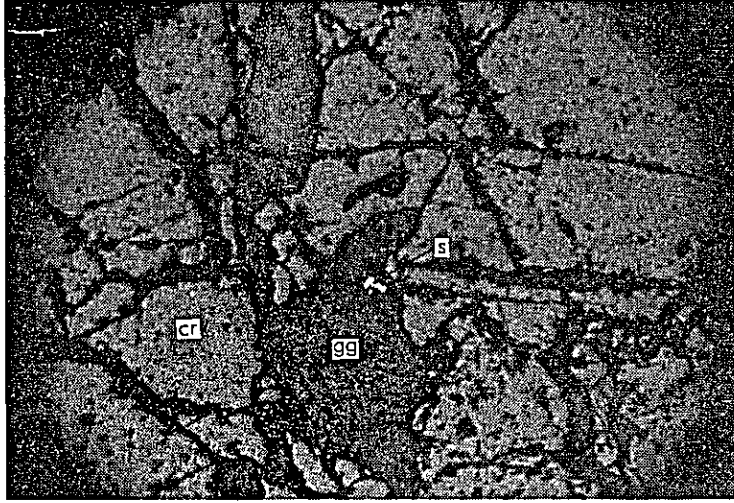
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-2
2. Laboratory No. : AR - 1119
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.09 N, 07.64 E
7. Location : Sulu ocak, Güllünüdere, Sıçankale Y.,
Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is equidimensional, medium crystalline (0.3 cm) and makes aggregates. Grade of the specimen is 47.22% Cr₂O₃. Creamy white colored serpentinite and magnesite makes mesh structure.
12. Microscopy : Chromite is mostly subround octahedral or hexahedral with 3-4 mm size. It is isotropic, homogeneous and makes aggregates. Magnetite of very fine size (0.01 mm) occurs commonly. It is included in chromite with irregular-shaped crystals. Gangue minerals are found at the interstices of chromite.
13. Remarks : refer Appendix 5-5 , Appendix 7-166 (TM-1)
Plate 7-3 (TM-1)

Microscopic observation of polished section



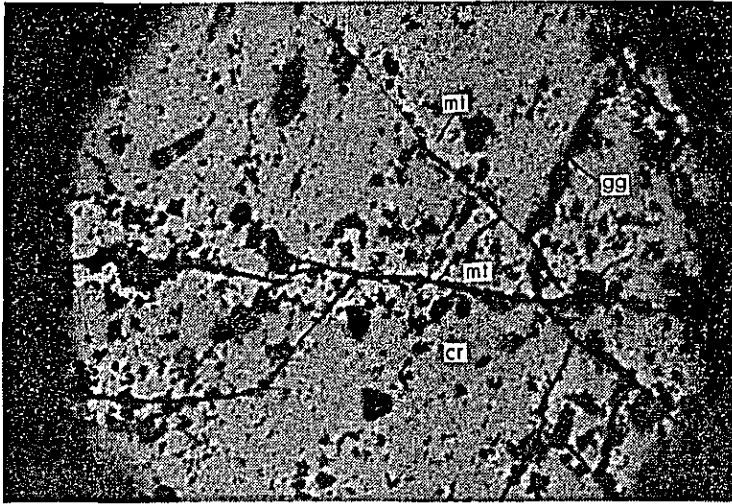
cr : chromite
s : sulfide (pyrite)
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-7
2. Laboratory No. : AR - 1123
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.32 N, 09.09 E
7. Location : Çalazarlarındere, Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive - brecciated ore
10. Occurrence : lenticular - layered
11. Description of specimen : Chromite is subround and brecciated (0.2 cm size). Grade of the specimen is 38.67% Cr₂O₃. Gangue minerals are serpentine.
12. Microscopy : Chromite is round, coarse crystalline (2 - 4 mm size) and octahedral or hexahedral. It is isotropic and homogeneous. Very fine grains of sulfide mineral (pyrite) are scattered in gangue minerals. Gangue minerals make round patches and veins in chromite.
13. Remarks : refer Appendix 5-6 , Appendix 7-231(SZ-1), Appendix 4-19 Plate 7-3 (SZ-1)

Microscopic observation of polished section



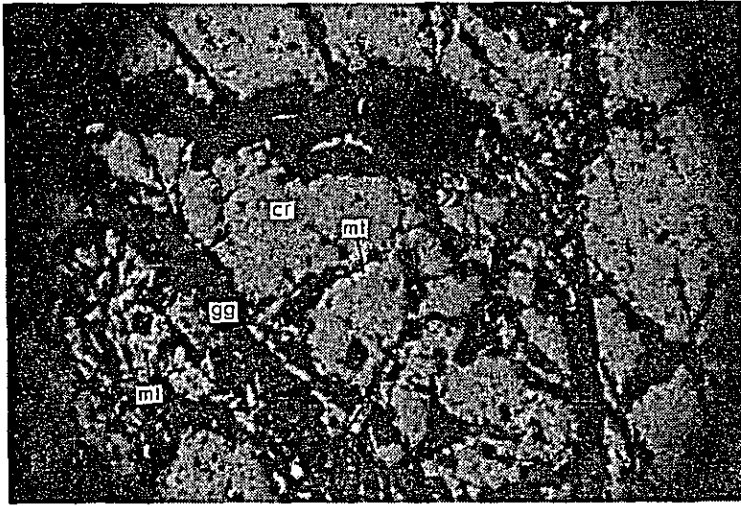
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol \times 20

0 0.1 0.2 mm

1. Sample No. : Ccr-9
2. Laboratory No. : AR - 1120
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.57 N, 10.15 E
7. Location : Gökokuşun Sr. area, Camphitepenin Sr.,
Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is subround and medium crystalline (0.3 cm size). Grade of the specimen is 45.09% Cr₂O₃. Networks of creamy yellowish green colored serpentine are present in chromite.
12. Microscopy : Chromite is medium-coarse crystalline (2 mm - more than 4 mm) and octahedral or hexahedral. It is isotropic and makes aggregates. Magnetite is found in abundance. It makes fine patches and veinlets in chromite. Gangue minerals fill the interstices of chromite.
13. Remarks : The specimen is taken from the stock of ore. refer Appendix 5-6 , Appendix 7- 95 (TC-18)
Plate 7-3 (TC-18)

Microscopic observation of polished section



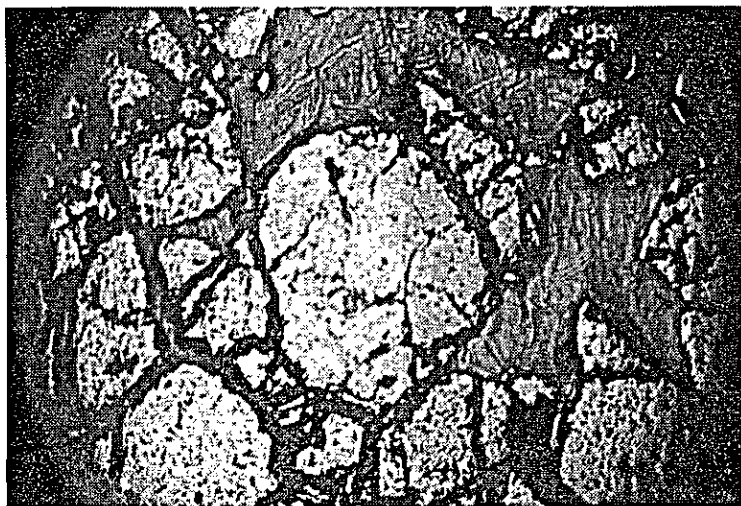
cr : chromite
s : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-21
2. Laboratory No. : AR - 1121
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 23.19 N, 11.73 E
7. Location : Çorakdere, Tecer, Aşkale, Erzurum
8. Host rock : harzburgite
9. Name of specimen : massive, high-grade ore
10. Occurrence : uncertain
11. Description of specimen : Chromite is round-oval shaped and brecciated. Grain size is 0.2 - 0.8 cm. Grade of the ore is 55.90% Cr₂O₃. Small amount of serpentine fills the interstices of chromite.
12. Microscopy : Chromite is round-tabular and coarse crystalline (more than 4 mm). It shows octahedral shape in part. It is brecciated commonly and makes aggregates.
Magnetite is found in abundance. It coexist with chromite as small fragments (0.1 - 0.2 mm size) or it makes veins in chromite.
Gangue minerals show mesh structure in chromite.
13. Remarks : refer Appendix 5-7

Microscopic observation of polished section



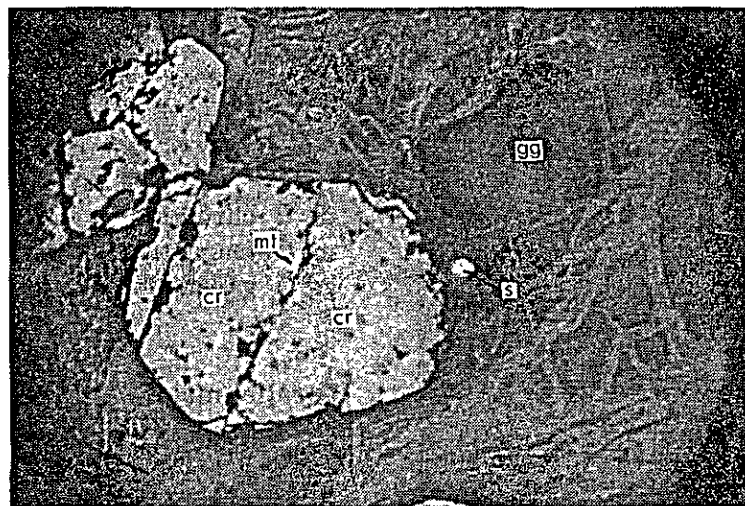
Chromite (light part) and gangue mineral (dark part) are shown.

Parallel nicol $\times 4$

0 0.75 1.5 mm

1. Sample No. : Ccr-22
2. Laboratory No. : AR - 1124
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 24.06 N, 12.05 E
7. Location : Çorakdere, Tecer, Aşkale, Erzurum
8. Host rock : serpentized dunite
9. Name of specimen : disseminated ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is subround and fine grained (less than 2 mm). Grade of the specimen is 43.41% Cr₂O₃. Gangue minerals are creamy white colored powdery serpentine and black colored fine olivine?, which fill interstices of chromite.
12. Microscopy : Chromite is equidimensional and hexahedral or octahedral with 2 mm size. It is isotropic and homogeneous. Gangue minerals are commonly found in chromite as aggregates and veinlets.
13. Remarks : refer Appendix 5-7, Appendix 7-106 (TC-29) Plate 7-9 (TC-29)

Microscopic observation of polished section



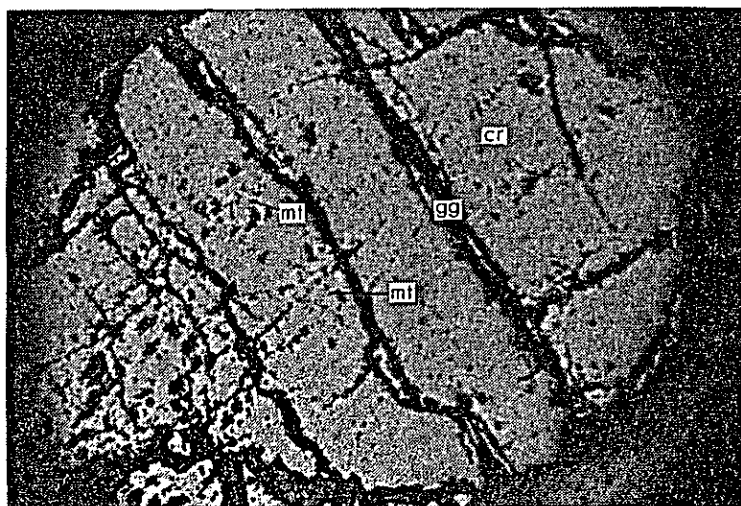
cr : chromite
 mt : magnetite
 s : sulfide (pyrite)
 gg : gangue mineral

Parallel nicol × 10

0 0.25 0.5 mm

1. Sample No. : Ccr-26
2. Laboratory No. : AR - 1122
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Trabzon, H-44, c3, No.4
6. Coordinates : 30.32 N, 21.89 E
7. Location : Fetteninyurdu Sr., Kop, Bayburt, Gümüşhane
8. Host rock : serpentized dunite
9. Name of specimen : brecciated ore
10. Occurrence : uncertain
11. Description of specimen : Chromite is very coarse crystalline (more than 1 cm size) and makes aggregates. Grade of the specimen is 45.11% Cr₂O₃. Uvarovite veinlets are found in chromite and gangue minerals. Gangue mineral (serpentine) fills the interstices of chromite.
12. Microscopy : Chromite is very coarse crystalline (more than 4 mm size) and octahedral or hexahedral. It is isotropic and homogeneous. Magnetite is commonly found. It occurs in chromite as very fine (less than 0.05 mm size) irregular-shaped crystals. Gangue minerals show mesh structure in chromite. It includes very small amount of fine sulfide minerals (pyrite).
13. Remarks : refer Appendix 5-8 , Appendix 7-118(TC-41)

Microscopic observation of polished section



cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-33
2. Laboratory No. : AR - 1155
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 26.01 N, 06.92 E
7. Location : Tepebaşı mine, Büyükgüllünün Sr., Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is coarse crystalline (0.5 cm size) accompanied by uvarovite. Grade of the specimen is estimated to be more than 45% Cr_2O_3 . Gangue minerals are powdery serpentine which fill the cracks of chromite.
12. Microscopy : Chromite is brecciated and makes aggregates of more than 4 mm size.
It is isotropic and homogeneous.
Magnetite occurs commonly in chromite.
It makes irregular-shaped, fine (0.02 mm size) patches.
Gangue minerals show mesh structure in chromite.
13. Remarks : refer Appendix 7-78 (TC-2)
Plate 7-5 (TC-2)

Microscopic observation of polished section

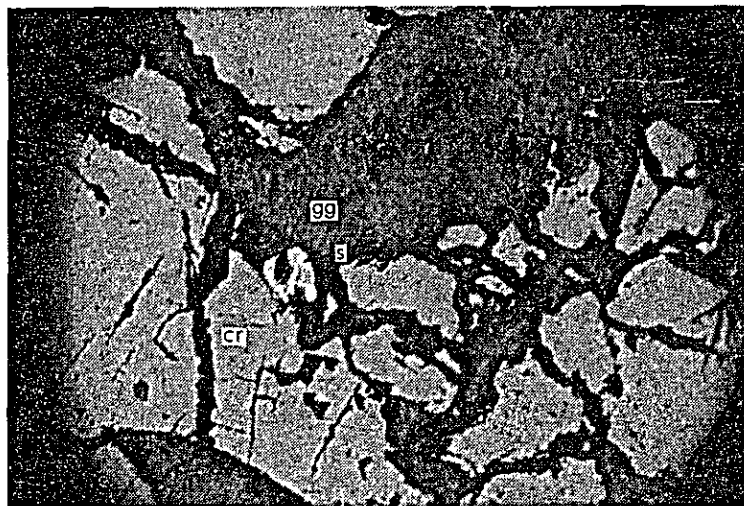


Parallel nicol \times 4

0 0.75 1.5 mm

1. Sample No. : Ccr-34
2. Laboratory No. : AR - 1151
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 26.10 N, 07.02 E
7. Location : Tepebaşı mine, Büyükgüllünün Sr., Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is coarse grained (1 cm size) and makes aggregates. Grade of the specimen is estimated to be more than 50% Cr_2O_3 . Creamy green colored serpentine and asbestos veinlet are present.
12. Microscopy : Chromite is round and coarse crystalline (more than 4 mm size) and makes aggregates. It is isotropic and homogeneous. Very small amount of fine magnetite occurs in chromite. Gangue minerals show mesh structure.
13. Remarks : refer Appendix 7-80 (TC-3)
Plate 7-5 (TC-3)

Microscopic observation of polished section



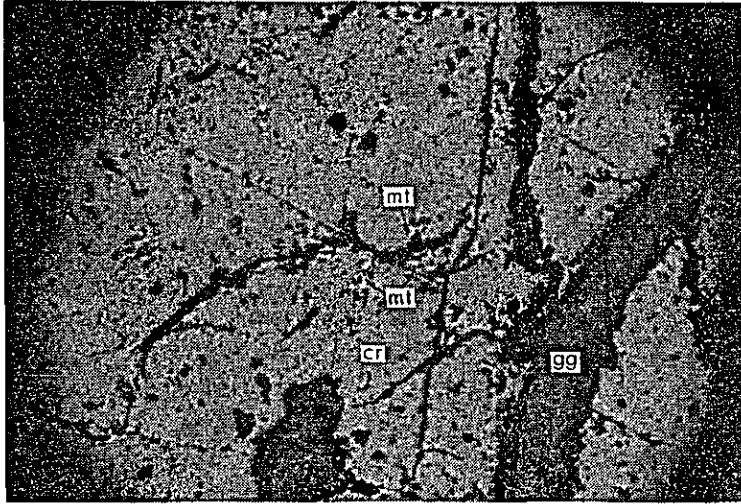
cr : chromite
s : sulfide (pyrite)
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-44
2. Laboratory No. : AR - 1153
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.08 N, 07.37 E
7. Location : C Kafa, Güllünündere, Sıçankale Y. ,
Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is medium grained (0.1 cm size).
Grade of the specimen is estimated to be 35 -
40% Cr_2O_3 . Serpentine and magnesite show
mesh structure.
12. Microscopy : Chromite is fine grained (0.1 - 0.2 mm size),
and octahedral or hexahedral. Partly it shows
brecciated texture. It is isotropic and homo-
geneous.
Small amount of fine sulfide minerals (pyrite,
0.05 mm size) is found commonly in gangue
minerals.
Gangue minerals make fine networks in chromite.
13. Remarks : The specimen is taken from high-grade part of
chromite outcrop near trench (TZ-7).

Microscopic observation of polished section



cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm
└──────────┘

1. Sample No. : Ccr-47
2. Laboratory No. : AR - 1154
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.12 N, 07.74 E
7. Location : Sulu mine, Güllünündere, Sıçankale Y.,
Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is very coarse crystalline (0.8 mm size) accompanied with uvarovite. Grade of the specimen is estimated to be 45% Cr_2O_3 . Serpentine and magnesite show mesh structure in chromite.
12. Microscopy : Chromite is mostly octahedral or hexahedral with 2-4 mm size.
It shows partly subround or brecciated shape.
It is isotropic and homogeneous.
Very fine crystals (0.01 mm size) of magnetite are present commonly in chromite.
Gangue minerals fill the cracks of chromite.
13. Remarks : The specimen is taken from the stock of ore.
refer Appendix 7-108(TC-31)

Microscopic observation of polished section



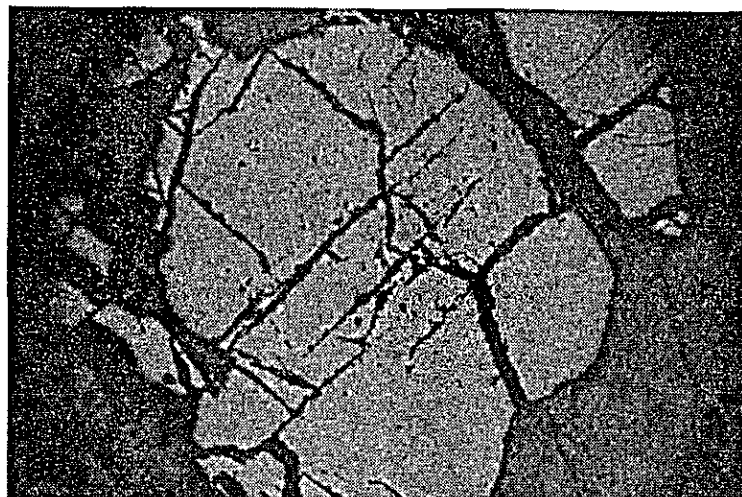
cr : chromite
s : sulfide (pyrite)
gg : gangue mineral

Parallel nicol $\times 4$

0 0.75 1.5 mm

1. Sample No. : Ccr-48
2. Laboratory No. : AR - 1152
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.16 N, 07.69 E
7. Location : Sulu mine, Güllününder, Sıçankale Y.,
Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : massive, high-grade ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is coarse-medium crystalline (0.4 cm size). Grade of the specimen is estimated to be 50% Cr_2O_3 approximately. Serpentine and magnesite show mesh structure.
12. Microscopy : Chromite is octahedral or hexahedral with 4 mm size. Partly it is subround or brecciated. It is isotropic and homogeneous. Very small amount of fine, irregular-shaped crystals (0.1 mm size) of magnetite is found in chromite. Fine euhedral or subhedral crystals (0.03 - 0.05 mm size) of sulfide minerals (pyrite) are present in gangue minerals. Gangue minerals fill the cracks and interstices of chromite crystals.
13. Remarks : The specimen is taken from the outcrop near the adit (GC-2). refer Appendix 7-238

Microscopic observation of polished section

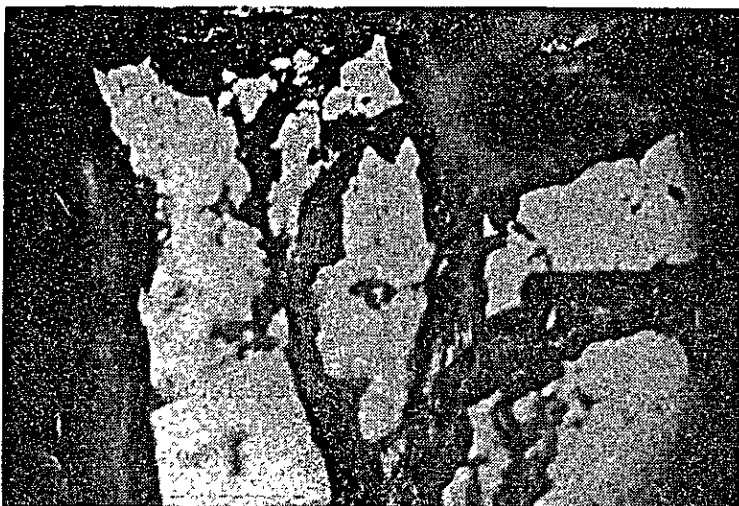


Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Ccr-50
2. Laboratory No. : AR - 1150
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.1
6. Coordinates : 27.32 N, 09.09 E
7. Location : Çalazarlarındere, Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentinite
9. Name of specimen : banded ore
10. Occurrence : layered
11. Description of specimen : Chromite is subround and equidimensionally granular with 0.2 cm size. It is accompanied with uvarovite. Grade of the specimen is estimated to be 35 - 40 % Cr_2O_3 . Serpentine is present.
12. Microscopy : Chromite is round, fine granular (0.1 - 0.2 mm size) and makes aggregates. It is brecciated in part.
Sulfide minerals (pyrite) with fine, irregular-shaped crystal (0.01 - 0.02 mm) are found in gangue minerals.
Gangue minerals fill the interstices of chromite crystals and occur as veinlet.
13. Remarks : refer Appendix 7- 231(SZ-1) , Appendix 4-9 Plate 7-3 (SZ-1)

Microscopic observation of polished section



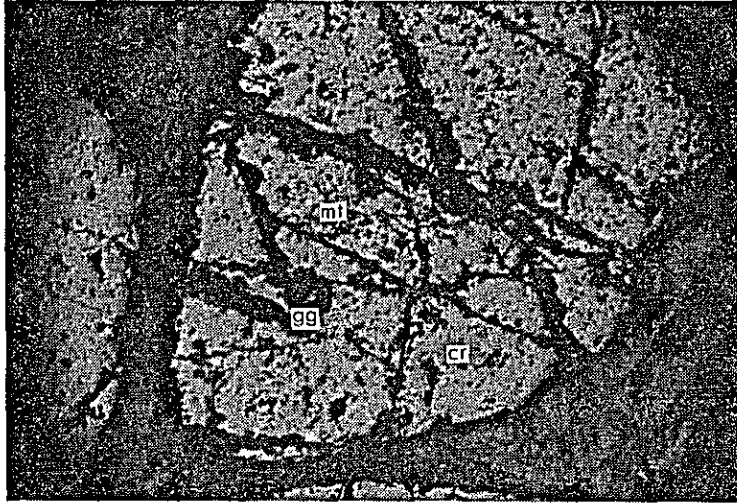
Parallel nicol $\times 20$

0 0.1 0.2 mm

1. Sample No. : Dcr-4
2. Laboratory No. : AR - 1118
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.2
6. Coordinates : 28.16 N, 16.68 E

7. Location : Batı Coşan mine, Bendindere, Sıçankale Y., Aşkale, Erzurum
8. Host rock : serpentized dunite
9. Name of specimen : disseminated ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is medium crystalline aggregates (0.4 cm size). Grade of the specimen is 27.22% Cr_2O_3 . Powdery serpentine and magnesite are present in abundance.
12. Microscopy : Chromite is hexahedral or octahedral granular with 2 - 4 mm size.
It is isotropic and homogeneous.
Magnetite occurs commonly at the rims of chromite crystals.
It is fine grained (0.05 mm size) and irregular in shape. Gangue minerals show mesh structure.
13. Remarks : The specimen is taken from the stock of ore.
refer Appendix 5-9 , Appendix 7-141 (TD-22)
Plate 7-1 (TD-22)

Microscopic observation of polished section



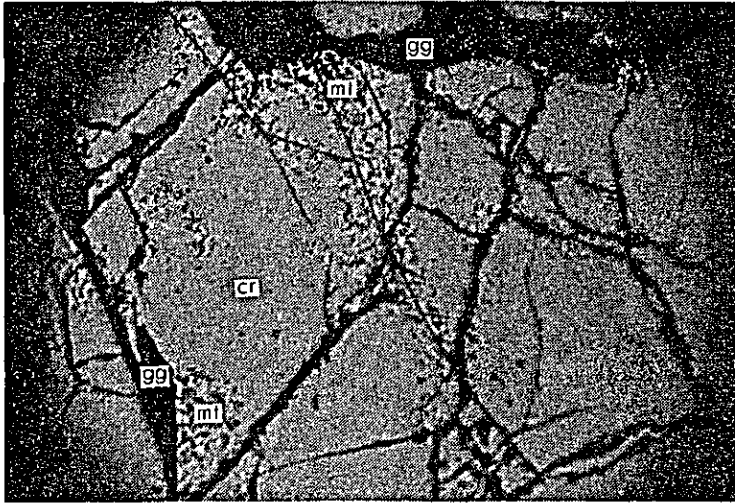
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Dcr-6
2. Laboratory No. : AR - 1117
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Trabzon, H-44, c-3, No.4
6. Coordinates : 30.25 N, 18.81 E
7. Location : Coşan mine, Iskınılığindere, Kop, Bayburt, Gümüşhane
8. Host rock : serpentized dunite
9. Name of specimen : massive ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is subround, fine (0.2 cm size) and makes aggregates. Grade of the specimen is 37.59% Cr₂O₃. Gangue minerals are serpentized olivine which occur at the interstices of chromite.
12. Microscopy : Chromite is hexahedral or octahedral and fine grained (0.5 - 2 mm). It is isotropic and homogeneous. Small irregular-shaped magnetite occurs abundantly in chromite. Gangue minerals show mesh structure.
13. Remarks : The specimen is taken from the stock of ore. refer Appendix 5-10, Appendix 7-152(TD-33) Plate 7-1 (TD-33)

Microscopic observation of polished section



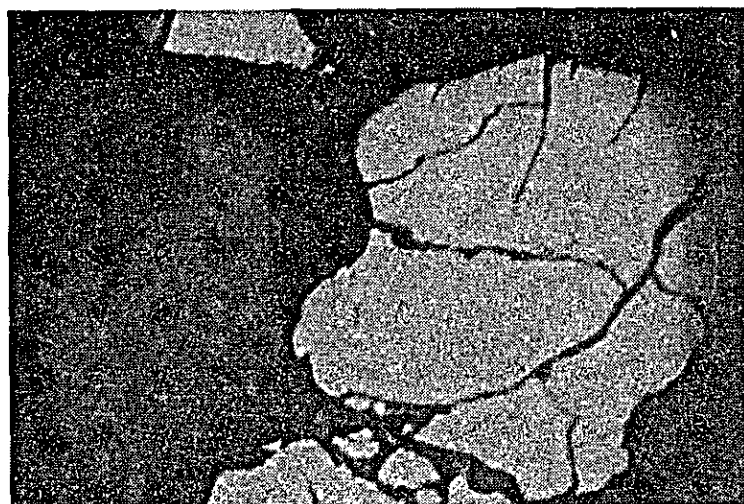
cr : chromite
mt : magnetite
gg : gangue mineral

Parallel nicol $\times 10$

0 0.25 0.5 mm

1. Sample No. : Dcr-14
2. Laboratory No. : AR - 1148
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Trabzon, H-44, c3, No.4
6. Coordinates : 30.05 N, 18.73 E
7. Location : Coşan mine, Iskamlıgündere, Kop, Bayburt, Gümüşhane
8. Host rock : serpentized dunite
9. Name of specimen : disseminated ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is medium-grained (0.1-0.3 cm) and makes aggregates. Grade of the specimen is estimated to be 33% Cr₂O₃ approximately. Creamy white colored serpentine shows mesh structure.
12. Microscopy : Chromite is round, hexahedral or octahedral with 0.1-0.2 mm size. It is isotropic and homogeneous. Fine grained (0.03 mm), irregular-shaped magnetite is found in chromite. It is abundant at the rim of the chromite and along the cracks of chromite. Very small amount of sulfide minerals (pyrite) with 0.2 mm size is included in the gangue minerals. Gangue minerals fill the interstices and cracks of chromite crystals and occur as veinlets.
13. Remarks : refer Appendix 7-150 (TD-31), Plate 7-1 (TD-31)

Microscopic observation of polished section



Parallel nicol $\times 20$

0 0.1 0.2 mm

1. Sample No. : Dcr-15
2. Laboratory No. : AR - 1149
3. Project No. : 78/26
4. Area : Kopdağ
5. Map No. : Erzincan, i-44, b1, No.2
6. Coordinates : 28.07 N, 16.50 E
7. Location : Batı Coşan mine, Bendindere, Siçankale Y., Aşkale, Erzurum .
8. Host rock : serpentinite
9. Name of specimen : massive - brecciated ore
10. Occurrence : lenticular
11. Description of specimen : Chromite is round, brecciated and coarse crystalline (0.5 cm size). It is accompanied with uvarovite. Grade of the specimen is estimated to be 35 -40 % Cr_2O_3 . Creamy green colored, powdery serpentine is observed.
12. Microscopy : Chromite is round and coarse grained. (more than 4 mm size)
It is isotropic and homogeneous.
Small amount of fine grained magnetite is included in it.
Gangue minerals show mesh structure.
13. Remarks : refer Appendix 7-136(TD-17)
Plate 7-1 (TD-17)

APPENDIX 5

List of chemical analyses of ore

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Synthesized list of chemical analysis of ore.

No.	Map No.	Location	Name of mine	Trench No.	Host rock	Type of sample	Location of sample	Method of sampling	Width (m)	Results of chemical analysis %				Cr/Fe	Cr/Al	
										Cr ₂ O ₃	Al ₂ O ₃	FeO	MgO			SiO ₂
Acr-3	EZN I44, A-2, No.2	Kırcakdere, AŞK., EZR.	Civelek	TA-18	S	lenticular massive brecciated	trench	random	0.7	35.87	8.78	13.39	23.52	13.12	2.36	5.28
Acr-9	EZN I44, A-2, No.2	Keşan Tepe, AŞK., EZR.	Pembe Gul	TA-15	powdery S	lenticular massive disseminated	trench	line-cutting	0.55	40.35	9.02	12.89	22.01	11.76	2.76	5.78
Acr-13	EZN I44, A-2, No.2	Balıkdöğmez Str., AŞK., EZR.	Dikyoğuş	TA-10	S	layered non-work massive	trench	random	0.90	19.49	8.07	12.17	29.72	19.89	1.41	3.12
Ber-1	EZN I44, A-2, No.2	Kırcakdere, AŞK., EZR.	Civelek	TB-1	SDu	massive brecciated	stock	random	----	30.65	8.71	13.03	27.46	13.38	2.07	4.55
Ber-4	EZN I44, A-2, No.2	Keşan Tepe AŞK., EZR.	Pembe Gul	TM-3	powdery S	layered massive	stock	random	----	27.53	8.28	10.74	31.10	14.85	2.26	4.30
Ber-9	EZN I44, A-2, No.3	Fındıklıdere, AŞK., EZR.	Kara Tepe	TB-11	SDu	massive	stock	high-grade part	----	52.53	13.12	12.82	17.01	4.62	3.61	5.18
Ber-11	Tortum I45, D-4, No.3	Körösman Tepe, AŞK., EZR.	Körösman Tepe	TB-20	SDu	massive disseminated	stock	random	----	31.96	19.21	15.54	18.76	7.02	1.81	2.15
Cer-2	EZN I44, B-1, No.1	Güllüdere, AŞK., EZR.	Sulu	TM-1	S	lenticular massive	trench	high-grade part	uncertain	47.22	13.98	16.65	17.06	4.78	2.50	4.37
Cer-7	EZN I44, B-1, No.1	Çalazlarlıdere, AŞK., EZR.	Çalazlarlıdere	SZ-1	S	layered lenticular massive brecciated	outcrop	random	uncertain	38.67	11.18	14.25	22.37	10.72	2.39	4.47
Cer-9	EZN I44, B-1, No.1	Camlıtepe'nin Sr., AŞK., EZR.	Gökyokuşun Sr.	TC-18	S	lenticular massive	stock	high-grade part	----	45.09	10.24	19.48	16.35	7.14	2.04	5.69
Cer-21	EZN I44, B-1, No.1	Çorakdere, AŞK., EZR.	Tecer	----	Hz	massive	outcrop	high-grade part	uncertain	55.90	13.76	14.32	15.38	1.2	3.44	5.25
Cer-22	EZN I44, B-1, No.1	Çorakdere, AŞK., EZR.	Tecer	TC-29	SDu	lenticular disseminated	trench	high-grade part	uncertain	43.41	10.21	15.54	18.87	10.24	2.46	5.50
Cer-26	TBZ I44, C-3, No.4	Fattınyurdu Sr., BAY., Gümüşhane	Arapçıyırıdere	TC-41	SDu	massive brecciated	trench	high-grade part	uncertain	45.11	13.84	15.54	17.43	7.74	2.56	4.21
Cer-29	TBZ I44, C-3, No.4	İskunluğücüdere, BAY., Gümüşhane	Coğan	TC-30	SDu	layered massive	trench	random	uncertain	39.78	8.92	17.83	21.30	8.28	1.95	5.77
Der-1	EZN I44, B-1, No.2	Catlınarlıdere, AŞK., EZR.	Sıçankale	TD-13	SDu	lenticular brecciated	stock	random	----	32.24	10.19	15.68	22.76	14.72	1.81	4.09
Der-4	BZN I44, B-1, No.2	Bendin dere, AŞK., EZR.	Batı Coşan	TD-22	SDu	lenticular massive brecciated	stock	random	----	27.22	8.68	12.39	28.75	12.90	1.93	4.05
Der-6	TBZ I44, C-3, No.4	İskunluğücüdere, BAY., Gümüşhane	Coşan	TD-33	SDu	lenticular massive	stock	random	----	37.59	9.54	15.65	22.38	11.37	2.11	5.09
Zer-6	EZN I44, B-1, No.1	Büyükkullunan Sr., AŞK., EZR.	Batı Ezan	TZ-1	powdery S	layered massive disseminated	stock	random	----	38.29	11.45	14.11	22.35	10.24	2.39	4.32

Abbreviations

EZN : Erzincan
 EZR : Erzurum
 TBZ : Trabzon
 AŞK : Aşkale
 BAY : Bayburt

S : Serpentinlite
 SDu : Serpentinized dunite
 Du : Dunite
 Hz : Harzburgite

List of chemical analysis of ore

1. Sample No. : Acr-3
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, a2, No.2
 5. Coordinates : 26.25 N, 06.50 E
 6. Location : Kırıcakdere, Sıçankale Y., Aşkale, Erzurum.
 7. Name of the mine or area : Civelek
 8. Trench or adit related : TA-18
 9. Host rock : serpentinite
 10. Shape of orebody : lenticular
 11. Type of ore : massive, brecciated
 12. Place where sample is taken : trench
 13. Method of sampling : random sampling
 14. Width of Sampling : 0.70 m
 Width of orebody : > 0.70 m
 15. Analytical value : Cr₂O₃ 35.87 % MgO 23.52 %
 Al₂O₃ 8.78 % SiO₂ 13.12 %
 FeO 13.39 %
 16. Metallic ratio : Cr/Fe 2.36
 Cr/Al 5.28
 17. Remarks : refer Appendix 7-18
 Plate 7-5

1. Sample No. : Acr-9
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, a2, No.2
 5. Coordinates : 24.40 N, 05.21 E.
 6. Location : Keşan Tepe, Cancıkkomu, Aşkale, Erzurum.
 7. Name of the mine or area : Pembe Gül
 8. Trench or adit related : TA-15
 9. Host rock : powdery serpentinite
 10. Shape of orebody : lenticular
 11. Type of ore : massive, disseminated
 12. Place where sample is taken : trench
 13. Method of sampling : line-cutting sampling
 14. Width of sampling : 0.55 m
 Width of orebody : > 0.55 m
 15. Analytical value : Cr₂O₃ 40.35 % MgO 22.01 %
 Al₂O₃ 9.02 % SiO₂ 11.76 %
 FeO 12.89 %
 16. Metallic ratio : Cr/Fe 2.76
 Cr/Al 5.78
 17. Remarks : refer Appendix 7-15
 Plate 7-5

List of chemical analysis of ore

1. Sample No. : Acr-13
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 23.78N, 04.44E.
6. Location : Baltadeğmez Sr., Cancıkkomu, Aşkale, Erzurum.
7. Name of the mine or area : Dikyokuş
8. Trench or adit related : TA-10
9. Host rock : serpentinite
10. Shape of orebody : layered, network
11. Type of ore : massive, disseminated
12. Place where sample is taken : trench
13. Method of sampling : random sampling
14. Width of sampling : 0.90 m
- Width of orebody : >0.90 m (width of unit layer is 3 - 15 cm)
15. Analytical value :

Cr ₂ O ₃	19.49 %	MgO	29.72 %
Al ₂ O ₃	8.07 %	SiO ₂	19.89 %
FeO	12.17 %		
16. Metallic ratio :

Cr/Fe	1.41
Cr/Al	3.12
17. Remarks : refer Appendix 7-10
Plate 7-6

This specimen includes large amount of host rocks.

1. Sample No. : Bcr-1
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 26.24N, 06.40 E
6. Location : Kırıcakdere, Sıçankale Y., Aşkale, Erzurum.
7. Name of the mine or area : Civelek
8. Trench or adit related : TB-1
9. Host rock : strongly serpentized dunite
10. Shape of orebody : uncertain
11. Type of ore : massive, brecciated
12. Place where sample is taken : stock of ore
13. Method of sampling : random sampling
14. Width of sampling : -----
- Width of orebody : uncertain
15. Analytical value :

Cr ₂ O ₃	30.65 %	MgO	27.46 %
Al ₂ O ₃	8.71 %	SiO ₂	13.38 %
FeO	13.03 %		
16. Metallic ratio :

Cr/Fe	2.07
Cr/Al	4.55
17. Remarks : refer Appendix 7-55
Plate 7-5

List of chemical analysis of ore

1. Sample No. : Bcr-4
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, a2, No.2
 5. Coordinates : 24.30 N, 5.05 E.
 6. Location : Keşandere, Cancıkkomu, Aşkale, Erzurum.
 7. Name of the mine or area : Pembe Gül
 8. Trench or adit related : TM-3
 9. Host rock : powdery serpentinite

10. Shape of orebody : layered
 11. Type of ore : massive
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sampling
 14. Width of sampling : -----
 Width of orebody : 1.00 m
 15. Analytical value : Cr₂O₃ 27.53 % MgO 31.10 %
 Al₂O₃ 8.28 % SiO₂ 14.86 %
 FeO 10.74 %
 16. Metallic ratio : Cr/Fe 2.26
 Cr/Al 4.39
 17. Remarks : refer Appendix 7-168
 Plate 7-5

1. Sample No. : Bcr-9
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, a2, No.3
 5. Coordinates : 20.64 N, 04.76 E.
 6. Location : Fındıkdere, Cancıkkomu, Aşkale, Erzurum.
 7. Name of the mine or area : Kara Tepe
 8. Trench or adit related : TB-11
 9. Host rock : serpentinitized dunite
 10. Shape of orebody : uncertain
 11. Type of ore : massive
 12. Place where sample is taken : stock of ore
 13. Method of sampling : gravel sample of high-grade part
 14. Width of sampling : -----
 Width of orebody : uncertain
 15. Analytical value : Cr₂O₃ 52.53 % MgO 17.01 %
 Al₂O₃ 13.12 % SiO₂ 4.62 %
 FeO 12.82 %
 16. Metallic ratio : Cr/Fe 3.61
 Cr/Al 5.18
 17. Remarks : refer Appendix 7-65
 Plate 7-6

List of chemical analysis of ore

- | | | | | | |
|-----|-------------------------------|--|---------------|------------------|---------|
| 1. | Sample No. : | Bcr-111 | | | |
| 2. | Project No. : | 78/26 | | | |
| 3. | Area : | Kopdağ | | | |
| 4. | Map No. : | Tortum, H-45, d4, No.3 | | | |
| 5. | Coordinates : | 33.10 N, 34.30 E. | | | |
| 6. | Location : | Körösmân Tepe, Dencik, Aşkale, Erzurum | | | |
| 7. | Name of the mine or area : | Körösmân Tepe | | | |
| 8. | Trench or adit related : | TB-20 | | | |
| 9. | Host rock : | serpentinized dunite | | | |
| 10. | Shape of orebody : | lenticular | | | |
| 11. | Type of ore : | massive, disseminated | | | |
| 12. | Place where sample is taken : | stock of ore | | | |
| 13. | Method of sampling : | random sampling | | | |
| 14. | Width of sampling : | ----- | | | |
| | Width of orebody : | uncertain | | | |
| 15. | Analytical value : | Cr ₂ O ₃ | 31.96 % | MgO | 18.76 % |
| | | Al ₂ O ₃ | 19.21 % | SiO ₂ | 7.02 % |
| | | FeO | 15.54 % | | |
| 16. | Metallic ratio : | Cr/Fe | 1.81 | | |
| | | Cr/Al | 2.15 | | |
| 17. | Remarks : | refer | Appendix 7-74 | | |
| | | | Plate 7-7 | | |
| | | | | | |
| 1. | Sample No. : | Ccr-2 | | | |
| 2. | Project No. : | 78/26 | | | |
| 3. | Area : | Kopdağ | | | |
| 4. | Map No. : | Erzincan, i-44, b1, No.1 | | | |
| 5. | Coordinates : | 27.09 N, 07.64 E. | | | |
| 6. | Location : | Güllünüdere, Sıçankale Y., Aşkale, Erzurum | | | |
| 7. | Name of the mine or area : | Sulu | | | |
| 8. | Trench or adit related : | TM-1 | | | |
| 9. | Host rock : | serpentinite | | | |
| 10. | Shape of orebody : | lenticular | | | |
| 11. | Type of ore : | massive | | | |
| 12. | Place where sample is taken : | trench | | | |
| 13. | Method of sampling | gravel sample of high-grade part | | | |
| 14. | Width of sampling : | uncertain | | | |
| | Width of orebody : | approximately 4.00 m | | | |
| 15. | Analytical value : | Cr ₂ O ₃ | 47.22 % | MgO | 17.06 % |
| | | Al ₂ O ₃ | 13.98 % | SiO ₂ | 4.78 % |
| | | FeO | 16.65 % | | |
| 16. | Metallic ratio : | Cr/Fe | 2.50 | | |
| | | Cr/Al | 4.37 | | |
| 17. | Remarks : | refer | Appendix 4-8 | , Appendix 7-166 | |
| | | | Plate 7-3 | | |

List of chemical analysis of ore

1. Sample No. : Ccr-7
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b1, No.1
 5. Coordinates : 27.32 N, 09.09 E.
 6. Location : Çalazarlırındere, Sıçankale Y., Aşkale, Erzurum
 7. Name of the mine or area : Çalazarlırındere
 8. Trench or adit related : SZ-1
 9. Host rock : serpentinite
 10. Shape of orebody : layered, lenticular
 11. Type of ore : massive, brecciated
 12. Place where sample is taken : outcrop
 13. Method of sampling : random sampling
 14. Width of sampling : uncertain
 Width of orebody : 1.50 m
 15. Analytical value : Cr₂O₃ 38.67 % MgO 22.37 %
 Al₂O₃ 11.18 % SiO₂ 10.72 %
 FeO 14.25 %
 16. Metallic ratio : Cr/Fe 2.39
 Cr/Al 4.47
 17. Remarks : refer Appendix 4-9 , Appendix 7- 231
 Plate 7-3

1. Sample No. : Ccr-9
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b1, No.1
 5. Coordinates : 27.57 N, 10.15 E.
 6. Location : Camlıtepenin Sr, Sıçankale Y., Aşkale, Erzurum
 7. Name of the mine or area : Gökyokuşun Sr.
 8. Trench or adit related : TC-18
 9. Host rock : serpentinite
 10. Shape of orebody : lenticular
 11. Type of ore : massive
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sample of high-grade part
 14. Width of sampling : -----
 Width of orebody : 1.20 m
 15. Analytical value : Cr₂O₃ 45.09 % MgO 16.35 %
 Al₂O₃ 10.24 % SiO₂ 7.14 %
 FeO 19.48 %
 16. Metallic ratio : Cr/Fe 2.04
 Cr/Al 5.69
 17. Remarks : refer Appendix 4-10 , Appendix 7-95
 Plate 7-3

List of chemical analysis of ore

- | | | | | | |
|-----|-------------------------------|---|--------------------------|--|--|
| 1. | Sample No. : | Ccr-21 | | | |
| 2. | Project No. : | 78/26 | | | |
| 3. | Area : | Kopdağ | | | |
| 4. | Map No. : | Erzincan, i-44, b1, No.1 | | | |
| 5. | Coordinates : | 23.19 N, 11.73 E. | | | |
| 6. | Location : | Çorakdere, Tecer, Aşkale, Erzurum | | | |
| 7. | Name of the mine or area : | Tecer | | | |
| 8. | Trench or adit related : | ----- | | | |
| 9. | Host rock : | harzburgite | | | |
| 10. | Shape of orebody : | uncertain | | | |
| 11. | Type of ore : | massive | | | |
| 12. | Place where sample is taken : | outcrop | | | |
| 13. | Method of sampling : | gravel sample of high-grade part | | | |
| 14. | Width of sampling : | uncertain | | | |
| | Width of orebody : | uncertain | | | |
| 15. | Analytical value : | Cr ₂ O ₃ 55.90 % | MgO 15.58 % | | |
| | | Al ₂ O ₃ 13.76 % | SiO ₂ 1.2 % | | |
| | | FeO 14.32 % | | | |
| 16. | Metallic ratio : | Cr/Fe 3.44 | | | |
| | | Cr/Al 5.25 | | | |
| 17. | Remarks : | refer Appendix 4-11 | | | |
| | | | | | |
| 1. | Sample No. : | Ccr-22 | | | |
| 2. | Project No. : | 78/26 | | | |
| 3. | Area : | Kopdağ | | | |
| 4. | Map No. : | Erzincan, i-44, b1, No.1 | | | |
| 5. | Coordinates : | 24.06 N, 12.05 E. | | | |
| 6. | Location : | Çorakdere, Tecer, Aşkale, Erzurum | | | |
| 7. | Name of the mine or area : | Tecer | | | |
| 8. | Trench or adit related : | TC-29 | | | |
| 9. | Host rock : | serpentinized dunite | | | |
| 10. | Shape of orebody : | lenticular | | | |
| 11. | Type of ore : | disseminated, massive | | | |
| 12. | Place where sample is taken : | trench | | | |
| 13. | Method of sampling : | gravel sample of high-grade part | | | |
| 14. | Width of sampling : | uncertain | | | |
| | Width of orebody : | 0.40 m (maximum), 6 unit ore bodies have approximately 1 m width. | | | |
| 15. | Analytical value : | Cr ₂ O ₃ 43.41 % | MgO 18.87 % | | |
| | | Al ₂ O ₃ 10.21 % | SiO ₂ 10.24 % | | |
| | | FeO 15.54 % | | | |
| 16. | Metallic ratio : | Cr/Fe 2.46 | | | |
| | | Cr/Al 5.50 | | | |
| 17. | Remarks : | refer Appendix 4-12 , Appendix 7-106
Plate 7-9 | | | |

List of chemical analysis of ore

1. Sample No. : Ccr-26
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Trabzon, H-44, c3, No.4
5. Coordinates : 30.32 N, 21.89 E.
6. Location : Fatteninyurdu Sr. , Kop, Bayburt, Gümüşhane
7. Name of the mine or area : Arapçayırıdaere
8. Trench or adit related : TC-41
9. Host rock : serpentized dunite
10. Shape of orebody : uncertain
11. Type of ore : massive, brecciated
12. Place where sample is taken : trench
13. Method of sampling : gravel sample of high-grade part
14. Width of sampling : uncertain
14. Width of orebody : 0.50 m
15. Analytical value :

Cr ₂ O ₃	45.11 %	MgO	17.43 %
Al ₂ O ₃	13.84 %	SiO ₂	7.74 %
FeO	15.54 %		
16. Metallic ratio :

Cr/Fe	2.56
Cr/Al	4.21
17. Remarks : refer Appendix 4-13, Appendix 7-118
uvarovite accompanies

1. Sample No. : Ccr-29
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Trabzon, H-44, c3, No.4
5. Coordinates : 30.55 N, 18.99 E.
6. Location : Isıklığındere, Kop, Bayburt, Gümüşhane
7. Name of the mine or area : Coşan
8. Trench or adit related : TC-30
9. Host rock : strongly serpentized dunite
10. Shape of orebody : layered
11. Type of ore : massive
12. Place where sample is taken : trench
13. Method of sampling : random sampling
14. Width of sampling : uncertain
14. Width of orebody : 3.50 m (maximum)
15. Analytical value :

Cr ₂ O ₃	39.78 %	MgO	21.30 %
Al ₂ O ₃	8.92 %	SiO ₂	8.28 %
FeO	17.83 %		
16. Metallic ratio :

Cr/Fe	1.96
Cr/Al	5.77
17. Remarks : refer Appendix 7-107
Plate 7-1

List of chemical analysis of ore

1. Sample No. : Dcr-1
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b1, No.2
 5. Coordinates : 27.69 N, 14.15 E
 6. Location : Catinardinindere, Sığankale Y., Aşkale, Erzurum
 7. Name of the mine or area : Sığankale
 8. Trench or adit related : TD-13
 9. Host rock : serpentized dunite
 10. Shape of orebody : lenticular
 11. Type of ore : massive, brecciated
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sampling
 14. Width of sampling : -----
 Width of orebody : 1.50 m (maximum)
 15. Analytical value : Cr₂O₃ 32.24 % MgO 22.76 %
 Al₂O₃ 10.19 % SiO₂ 14.72 %
 FeO 15.68 %
 16. Metallic ratio : Cr/Fe 1.81
 Cr/Al 4.09
 17. Remarks : refer Appendix 7-132, Appendix 6-12
 Plate 7-2

1. Sample No. : Dcr-4
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b1, No.2
 5. Coordinates : 28.16 N, 16.68 E.
 6. Location : Bendindere, Sığankale Y., Aşkale, Erzurum
 7. Name of the mine or area : Batı Coşan
 8. Trench or adit related : TD-22
 9. Host rock : serpentized dunite
 10. Shape of orebody : lenticular
 11. Type of ore : massive, disseminated, brecciated
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sampling
 14. Width of sampling : -----
 Width of orebody : 1.50 m (maximum)
 15. Analytical value : Cr₂O₃ 27.22 % MgO 28.75 %
 Al₂O₃ 8.68 % SiO₂ 12.90 %
 FeO 12.39 %
 16. Metallic ratio : Cr/Fe 1.93
 Cr/Al 4.05
 17. Remarks : refer Appendix 4-20 , Appendix 7-141
 Plate 7-1

List of chemical analysis of ore

1. Sample No. : Dcr-6
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Trabzon, H-44, c3, No.4
 5. Coordinates : 30.25 N, 18.81 E
 6. Location : Iskinlıgdere, Kop, Bayburt, Gümüşhane
 7. Name of the mine or area : Coşan
 8. Trench or adit related : TD-33
 9. Host rock : serpentized dunite
 10. Shape of orebody : lenticular
 11. Type of ore : massive
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sampling
 14. Width of sampling : -----
 Width of orebody : 7.00 m (average) or 10.00 m (maximum)
 15. Analytical value : Cr₂O₃ 37.59 % MgO 22.38 %
 Al₂O₃ 9.54 % SiO₂ 11.37 %
 FeO 15.65 %
 16. Metallic ratio : Cr/Fe 2.11
 Cr/Al 5.09
 17. Remarks : refer Appendix 4-21 , Appendix 7-152
 Plate 7-1

1. Sample No. : Zcr-6
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b1, No.1
 5. Coordinates : 26.85 N, 06.75 E.
 6. Location : Büyükgüllünün Sr., Sıçankale Y., Aşkale, Erzurum
 7. Name of the mine or area : Batı Ezan
 8. Trench or adit related : TZ-1
 9. Host rock : powdery serpentinite
 10. Shape of orebody : layered
 11. Type of ore : massive, disseminated
 12. Place where sample is taken : stock of ore
 13. Method of sampling : random sampling
 14. Width of sampling : -----
 Width of orebody : 7.50 m (maximum)
 15. Analytical value : Cr₂O₃ 38.29 % MgO 22.35 %
 Al₂O₃ 11.45 % SiO₂ 10.24 %
 FeO 14.11 %
 16. Metallic ratio : Cr/Fe 2.39
 Cr/Al 4.32
 17. Remarks : refer Appendix 7-221
 Plate 7-4

Kaemmererite accompanies.

APPENDIX 6

List of X-ray diffractive analyses

Remarks :

Specifications of measurement are ;

tube - filter	:	Cu - Ni
electric current - voltage	:	15 mA - 30 kV
scanning speed	:	2° /min.
time constant	:	2 sec.
slit system	:	1° - 0.3 mm - 1°
recording speed	:	2 cm/min.
full scale	:	1,000 cps.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

Synthesized list of X-ray diffractive analysis

| Sample No. | Location | Sample name | quartz | feldspar | forsterite | enstatite | augite | serpentine | natrolite | calcite | dolomite | magnesite | hydromagnesite | arhtino | brucite | stichtite | magnesiochromite | argonite | Remarks | * refer Appendix 3 |
|------------|------------------------|-------------------------------|--------|----------|------------|-----------|--------|------------|-----------|---------|----------|-----------|----------------|---------|---------|-----------|------------------|----------|---------|--------------------|
| Acr- 4 | Civlek, Yayla D., Aşk. | serpentinite | | | | | | | | | | | | | | | | | | |
| A - 21 | Kanlıkzey D., Çayırılı | natrolite rock | | + | | | | + | ++ | | | | | | | | + | | | * |
| A - 49 | Cancık komu, Aşk. | lateritic serpentinite | | | | | | ++ | ++ | | | | | | | | | | | * |
| A - 89 | Güllabi komu, Aşk. | serpentinized harzburgite | | ++ | | | | +++ | ++ | | | | | | | | | | | * |
| A - 92 | Hasbey komu, Aşk. | natrolite rock | | + | | | | | ++ | | | | | | | | | | | * |
| A - 93 | Saptıran, Aşk. | " " | | | | | | | ++ | | | | | | | | | | | * |
| Acr- 97 | Baltadegmez, Aşk. | serpentinite | | | | | | + | | | +++ | | + | | | | ++ | | | * |
| A - 114 | Erbağ, Çayırılı | carbonate rock | | | | | | + | | | | | | | | | | | | |
| A - 121 | Baltadegmez, Aşk. | serpentinite | | | | | | + | | | | | | | | | | | | |
| Bx - 1 | Orta Ezan, Aşk. | " " | | | | | | +++ | | | | | | | | | | | | |
| Bx - 2 | Armudlu, Aşk. | " " | | | | | | +++ | | | | | | | | | | | | * |
| Bx - 3 | C Kafa, Aşk. | " " | | | | | | +++ | | | | | | | | | | | | * |
| B - 60 | Uzunçayır Sr., Aşk. | carbonatized serpentinite | | | | | | ± | | | | +++ | | | | | | | | * |
| C - 46 | Altıntaş Aşk. | carbonate rock | | | | | | | | | +++ | | | | | | | | | * |
| Cx - 1 | Batı Ezan, Aşk. | serpentinite | | | | | | +++ | | | | | +++ | | ++ | | | | | |
| Cx - 2 | Tepebaşı, Aşk. | " " | | | | | | + | | | | | +++ | | + | | | | | |
| Cx - 3 | Sulu, Aşk. | serpentinized dunite | | | | | | +++ | | | | | +++ | | | | | | | |
| Cx - 4 | " " | serpentinite | | | | | | + | | | | | +++ | | | | | | | |
| D - 58 | Batı Coşan, Aşk. | serpentinite from dunite | | | | | | +++ | | | | | ++ | | | | | | | * |
| D - 59 | Sıçankale, Aşk. | serpentinized dunite | | | | | | ++ | | | | | ++ | | | | | ± | | |
| D - 60 | " " | " " | | | | | | + | | | | | ++ | | | | | | | |
| D - 61 | " " | harzburgite | | | | | | +++ | | | | | ++ | | | | | | | |
| D - 62 | Batı Coşan, Aşk. | serpentinized dunite | | | | | | +++ | | | | | ++ | | | | | | | |
| D - 63 | Coşan, Bay. | " " | | | | | | +++ | | | | | ++ | | +++ | | | | | |
| X - 12 | Dingik, Aşk. | harzburgite | | | | | | ± | | | | | | | | | | | | * |
| X - 14 | Batı Coşan, Aşk. | serpentinite from dunite | | | | | | +++ | | | | | | | | | | | | * |
| X - 15 | " " | clinopyroxenite | | | | | | + | | | | | | | | | | | | * |
| X - 18 | Sıçankale, Aşk. | serpentinite from harzburgite | | | | | | +++ | | | | | | | | | | | | * |
| X - 21 | Çırmıt köyü, Aşk. | altered serpentinite | | | | | | +++ | | ++ | | | | | | | | | | * |
| Z - 14 | Ağcahisar, Aşk. | dolomite | | | | | | | | | +++ | | | | | | | | | * |

Intensity of X-ray diffracted is shown :

- +++ very strong,
- ++ strong,
- + moderate,
- ± weak

List of X-ray diffractive analysis

1. Sample No. : Acr-4
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 25.84 N, 06.40 E
6. Location : Civelek, Yayla D., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen :

This specimen is taken randomly from the orebody in trench (TA-17) at Civelek and is the mixture of powdery serpentinite and coarse chromite ore which is disseminated along fractures of serpentinite. Width of orebody is more than 150 cm.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentinite | moderate |
| stichtite | weak |
| magnesiochromite | strong |

12. Remarks : refer Appendix 7- 17 (TA-17)
Plate 7- 5 (TA-17)

1. Sample No. : A-21
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.1
5. Coordinates : 22.35 N, 00.76 E
6. Location : Kanlıkzey D., Harabekom Yeri, Çayırılı, Erzincan
7. Lithostratigraphic unit : intrusive rocks
8. Rock name : natrolite rock
9. Occurrence : dyke
10. Description of specimen :

Pale greenish white colored, coarse crystalline and granular. Green mafic minerals are commonly dotted.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| feldspar | moderate |
| natrolite | very strong |

12. Remarks : refer Appendix 3-2

List of X-ray diffractive analysis

1. Sample No. : A-49
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 21.63N, 05.36 E
6. Location : Taşocağı T., Cancıkkomu, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : lateritic serpentinite
9. Occurrence : massive, weathered
10. Description of specimen :

Brownish red colored, ferruginous rock. Original part remains as dark green - yellowish green serpentinite.

This specimen is the host rock of chromite deposit and taken from trench (TA-34) at Cancıkkomu.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentinite | strong |
| dolomite | moderate |

12. Remarks : refer Appendix 3-3
Appendix 7-36 (TA-34)
Plate 7-6 (TA-34)

1. Sample No. : A-89
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzurum, i-45, a-1, No.1
5. Coordinates : 27.02N, 31.64 E
6. Location : Taşlıyayla, Gülabıkomu, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentitized harburgite, powdery serpentinite
9. Occurrence : massive
10. Description of specimen :

Dark green, fine grained. Pyroxene crystals are observable.

Strongly serpentitized. This specimen is taken from trench (TY-20) at Gülabıkomu and host rock of Gülabıkomu chromite deposit.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentinite | very strong |

12. Remarks : refer Appendix 7-200 (TY-20)
Plate 7-9 (TY-20)

List of X-ray diffractive analysis

1. Sample No. : A-92
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzurum, i-45, a1, No.1
 5. Coordinates : 27.06 N, 30.25 E
 6. Location : Henegesuyu, Hasbeykomu, Aşkale, Erzurum
 7. Lithostratigraphic unit : intrusive rock
 8. Rock name : natrolite rock
 9. Occurrence : dyke
 10. Description of specimen :
 Creamy brown colored, very fine grained. Small amount of very fine, fibrous or long prismatic mafic minerals and aggregates of feldspar? are present.
11. Minerals identified :
- | name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| feldspar | strong |
| natrolite | strong |
12. Remarks : This specimen is similar to A-21 (Appendix 6-2) refer Appendix 3-17
1. Sample No. : A-93
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzurum, i-45, a1, No.1
 5. Coordinates : 26.29 N, 30.92 E
 6. Location : Henegesuyu, Saptıran, Aşkale, Erzurum
 7. Lithostratigraphic unit : intrusive rock
 8. Rock name : natrolite rock
 9. Occurrence : dyke
 10. Description of specimen :
 Pale green colored, fine grained. Large amount of white granular feldspar? and green fine granular mafic minerals are observable.
11. Minerals identified :
- | name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| feldspar | moderate |
| natrolite | very strong |
12. Remarks : This specimen is similar to A-92, and A-21 refer Appendix 3-18

List of X-ray diffractive analysis

1. Sample No. : A-97
2. Project No. : 78/26
3. Area : Kopdag
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 23.20N, 04.16 E
6. Location : Baltadeğmez, Cancıkkomu, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of spesimen :

This specimen is taken randomly from chromite deposit in trench (TA-6) at Baltadeğmez mine.

It is composed of powdery serpentinite and massive - powdery coarse crystalline chromite ore.

Width of orebody is more than 35 cm.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | moderate |
| magnesiochromite | very strong |

12. Remarks : refer Appendix 7-6 (TA-6)
Plate 7-6 (TA-6)

1. Sample No. : A-114
2. Project No. : 78/26
3. Area : Kopdag
4. Map No. : Erzincan, i-44, a2, No.4
5. Coordinates : 19.63 N, 01.17 E
6. Location : Kemsakal Sr., Erbaş, Çayırılı, Erzincan
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : carbonate rock
9. Occurrence : lenticular between harzburgite (footwall-side) and terrace deposit (hangingwall-side)
10. Description of specimen :

Pure white colored, fine grained, compact and hard rock.

11. Minerals indentified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| dolomite | very strong |

12. Remarks : refer Appendix 3-23

List of X-ray diffractive analysis

1. Sample No. : A-121
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, a2, No.2
5. Coordinates : 23.23 N, 04.22 E
6. Location : Baltadeğmez, Cancıkkomu, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen :

This specimen is taken at hangingwall contact of orebody to host rock in trench (TA-5) at Baltadeğmez mine. It is composed of pale green powdery serpentinite including large amount of magnesite network and powdery chromite ore.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | moderate |
| hydromagnesite | moderate |
| stichtite | moderate |
| magnesiochromite | strong |

12. Remarks : refer Appendix 7-5 (TA-5)
Plate 7-6 (TA-5)

1. Sample No. : BX-1
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 24.49 N, 07.07 E
6. Location : Orta Ezan, Büyükgüllünün Sr. , Sıçankale Y. , Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen :

This specimen is taken near the gallery (GM-1). It is located at the foot-wall-side of chromite orebody. It is pale greenish white colored, powdery rock.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| stichtite | moderate |
| magnesiochromite | strong |

12. Remarks : refer Appendix 7-249 (GM-1)
Plate 8 (GM-1)

List of X-ray diffractive analysis

1. Sample No. : BX-2
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 26.38 N, 06.65 E
6. Location : Armutlu, Büyükgöllünün Sr., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen :

This specimen is taken from the hangingwall-side of the orebody in trench (TC-1) at Armutlu.

It is creamy white colored, powdery rock.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | strong |
| stichtite | moderate |
| magnesiochromite | moderate |

12. Remarks : refer Appendix 7- 78 (TC-1)
Plate 7- 4 (TC-1)

1. Sample No. : BX-3
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 26.88 N, 7.38 E
6. Location : C kafa, Güllünüdere, Şıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen :

This specimen is taken from the footwall-side of the orebody in trench (TZ-6) at C kafa.

It is composed of creamy white colored, powdery serpentinite.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| hydromagnesite | moderate |
| stichtite | strong |

12. Remarks : refer Appendix 7- 226 (TZ-6)
Plate 7- 4 (TZ-6)

List of X-ray diffractive analysis

1. Sample No. : B-60
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzurum, i-45, a4, No.1
 5. Coordinates : 14.85 N, 36.45 E
 6. Location : Uzunçayır Sr., Persor Y., Aşkale, Erzurum
 7. Lithostratigraphic unit : ultrabasic rocks
 8. Rock name : carbonatized serpentinite
 9. Occurrence : massive
 10. Description of specimen :

This is dark gray colored, coarse grained.
 Serpentine is present commonly with irregular - fibrous shape.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | weak |
| magnesite | very strong |

12. Remarks : refer Appendix 3-28

1. Sample No. : C-46
 2. Project No. : 78/26
 3. Area : Kopdağ
 4. Map No. : Erzincan, i-44, b2, No.1
 5. Coordinates : 23.78 N, 22.10 E
 6. Location : Kale T., Altıntaş, Aşkale, Erzurum
 7. Lithostratigraphic unit : ultrabasic rocks
 8. Rock name : carbonate rock
 9. Occurrence : intercalated in terrace deposit between ultrabasic rocks and Meyramdağ limestone
 10. Description of specimen :

This specimen is pale brown colored, having large amount of breccia and fine cementing material. It is coarse drusy in part.
 Breccia is white - pale green colored, angular and reaches to 1cm size.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| dolomite | very strong |
| magnesite | very strong |

12. Remarks : refer Appendix 3-35

List of X-ray diffractive analysis

1. Sample No. : CX-1
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 26.84 N, 06,95 E
6. Location : Batı Ezan, Büyükgüllünün Sr., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : massive, fragile - powdery
10. Description of specimen :

This specimen is taken from the chromite deposit in trench (TC-7) at Batı Ezan.

It is gray colored and mostly powdery due to the weathering.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| brucite | strong |
| stichtite | weak |
| magnesiochromite | strong |

12. Remarks : refer Appendix 7-83 (TC-7)
Plate 7-4 (TC-7)

1. Sample No. : CX-2
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-45, b1, No.1
5. Coordinates : 26.15 N, 06.95 E
6. Location : Tepebaşı, Büyükgüllünün Sr., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : massive, fragile - powdery
10. Description of specimen :

This specimen is taken from the chromite deposit trench (TC-42) at Tepebaşı.

It is grayish green - creamy white colored, powdery due to the weathering.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | moderate |
| hydromagnesite | very strong |
| stichtite | moderate |
| magnesiochromite | moderate |

12. Remarks : refer Appendix 7-119 (TC-42)

List of X-ray diffractive analysis

1. Sample No. : CX-3
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 27.12N, 7.77 E
6. Location : Sulu, Güllüünder, Sıçankale, Y.,
Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentized dunite
9. Occurrence : massive, fragile – powdery
10. Description of specimen :

This specimen is taken from the footwall-side of orebody in gallery (GC-1) at Sulu.

It is gray colored and fragile.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| brucite | moderate |
| stichtite | weak |

12. Remarks : refer Appendix 7-237 (GC-1)
Plate 8 (GC-1)

1. Sample No. : CX-4
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 27.19 N, 07.65 E
6. Location : Sulu, Güllüünder, Sıçankale Y.,
Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite
9. Occurrence : powdery due to the weathering
10. Description of specimen ;

This specimen is taken from the hangingwall -side of the orebody at Sulu.

It is white colored and powdery due to the weathering. Large amount of network or bead of carbonate minerals is present.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | moderate |
| hydromagnesite | very strong |

List of X-ray diffractive analysis

1. Sample No. : D-58
2. Project No. : 78/26
3. Area : Kopdag
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 28.12 N, 16.82 E
6. Location : Batı Coşan, Bendindere, Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite from dunite
9. Occurrence : massive
10. Description of specimen :

Black colored (partly brownish due to the weathering). Fine-grained, granular chromite disseminates occasionally.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| magnesiochomite | moderate |

12. Remarks : refer Appendix 3-44

1. Sample No. : D-59
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.29 N, 12.71 E
6. Location : Külekçinin Sr., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentized dunite
9. Occurrence : massive
10. Description of specimen :

This specimen is taken from the footwall-side at the contact to orebody in trench (TD-7) at Sıçankale.

It is pale green colored, powdery and abundant with carbonate minerals.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | strong |
| hydromagnesite | strong |

12. Remarks : refer Appendix 7-126 (TD-7) Appendix 3-40
Plate 7-2 (TD-7)

List of X-ray diffractive analysis

1. Sample No. : D-60
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.69N, 14.15E
6. Location : Catinardinın D., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentized dunite
9. Occurrence : massive
10. Description of specimen :

This specimen is taken from the footwall side of the orebody in trench (TD-13) at Sıçankale.

It is pale green colored, fragile, and abundant in carbonate minerals.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | moderate |
| magnesiochromite | very strong |
| aragonite | weak |

12. Remarks : refer Appendix 7-132 (TD-13), Appendix 5-9
Plate 7-2 (TD-13)

1. Sample No. : D-61
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.27N, 12.78E
6. Location : Akdağın Sr., Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : harzburgite
9. Occurrence : massive
10. Description of specimen :

This specimen is taken from the hangingwall-side of the orebody where pyroxenite dyke contacts to, in trench (TD-16) at Sıçankale.

It is pale green colored and fragile.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |

12. Remarks : refer Appendix 7-135 (TD-16)
Plate 7-2 (TD-16)

List of X-ray diffractive analysis

1. Sample No. : D-62
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 28.04 N, 16.55 E
6. Location : Batı Coşan, Bendindere, Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentized dunite
9. Occurrence : massive
10. Description of specimen :

This specimen is taken from host rock at the footwall side of the orebody in trench (TD-18) at Batı Coşan.

It is pale green colored, composed of serpentized dunite and network of carbonate minerals.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| hydromagnesite | strong |

12. Remarks : refer Appendix 7-137 (TD-18)
Plate 7-1 (TD-18)

1. Sample No. : D-63
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Trabzon, H-44, c3, No.4
5. Coordinates : 30.20 N, 18.79 E
6. Location : Coşan, Iskılınğindere, Kop, Bayburt, Gümüşhane
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentized dunite
9. Occurrence : massive
10. Description of specimen :

This specimen is taken from the hangingwall-side of the orebody in trench (TD-32) at Coşan.

It is green colored and more or loss serpentized.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| artinite | very strong |
| brucite | very strong |

12. Remarks : refer Appendix 7-151 (TD-32)
Plate 7-1 (TD-32)

List of X-ray diffractive analysis

1. Sample No. : X-12
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 25.02 N, 13.03 E
6. Location : Taşlıdere, Dingik, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : harzburgite
9. Occurrence : massive
10. Description of specimen :

This specimen is of typical harzburgite.

It has greenish grey color, medium size grain size and much amount of orthopyroxene crystals and veinlets.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| forsterite | strong |
| enstatite | moderate |
| serpentine | weak |

12. Remarks : refer Appendix 3-46

1. Sample No. : X-14
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.75 N, 17.02 E
6. Location : Batı Coşan, Bendindere, Sıçankale Y., Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : brucite-bearing serpentinite from dunite
9. Occurrence : massive
10. Description of specimen :

This specimen is the host rock of chromite deposit and taken from chromite banding zone, east of Batı Coşan.

It is dark gray colored and fine grained.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| magnesiochromite | strong |

12. Remarks : refer Appendix 3-47

List of X-ray diffractive analysis

1. Sample No. : X-15
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.68 N, 17.07 E
6. Location : Batı Coşan, Kücüksivri Sr. , Sıçankale Y. , Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : clinopyroxenite
9. Occurrence : dyke in dunite
10. Description of specimen :

This specimen is pale yellowsh green colored and granular with medium grain size.

It is affected by serpentinization.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| augite | strong |
| serpentine | moderate |

12. Remarks : refer Appendix 3-48

1. Sample No. : X-18
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.2
5. Coordinates : 27.01 N, 12.15 E
6. Location : Kırmızıtaş Sr. , Sıçankale Y. , Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : serpentinite from harzburgite
9. Occurrence : massive
10. Description of specimen :

This specimen has dark grayish green color and very fine grains.

Fine networks of serpentine including asbestos are commonly observable.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| serpentine | very strong |
| brucite | moderate |
| magnesiochromite | moderate |

12. Remarks : refer Appendix 3-49

List of X-ray diffractive analysis

1. Sample No. : X-21
2. Project No. : 78/26'
3. Area : Kopdağ
4. Map No. : Erzurum, i-45, a1
5. Coordinates : 16.40 N, 33.60 E
6. Location : Karaçayırdere, Çırmıt köyü, Aşkale, Erzurum
7. Lithostratigraphic unit : ultrabasic rocks
8. Rock name : altered serpentinite
9. Occurrence : dyke-like appearance in harzburgite
10. Description of specimen :

This specimen is affected strongly by carbonatization and silicification
It is reddish brown colored, and very fine grained.
Coarse, round fragments of serpentine and veinlets of carbonate mineral
are observed.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| quartz | very strong |
| calcite | strong |
| dolomite | strong |
| magnesite | moderate |

12. Remarks : refer Appendix 3-50

1. Sample No. : Z-14
2. Project No. : 78/26
3. Area : Kopdağ
4. Map No. : Erzincan, i-44, b1, No.1
5. Coordinates : 22.14 N, 07.20 E
6. Location : Çerçiliyaş T., Ağcahisar, Aşkale, Erzurum
7. Lithostratigraphic unit : terrace deposit
8. Rock name : dolomite
9. Occurrence : lenticular intercalated in conglomerate.
10. Description of specimen :

This specimen is creamy white colored, very fine grained, and drusy.
Tabular crystals (0.2 - 1 cm size) are present.

11. Minerals identified :

| name of the mineral | intensity of X-ray diffracted |
|---------------------|-------------------------------|
| dolomite | very strong |

12. Remarks : refer Appendix 3-54