



MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO



JORNADA TECNICA SOBRE IMPLANTACIÓN PLAN DE ACCIÓN DE AGUAS SUBTERRÁNEAS

Técnicas de investigación hidrogeológica y modelización de las aguas subterráneas

“Técnicas geofísicas para estudios hidrogeológicos regionales “

Ángel Granda Sanz

INTERNATIONAL GEOPHYSICAL TECHNOLOGY, SL

- Empresa española creada en 1989
- Minería , Hidrogeología , Geotecnia , Medio ambiente y Arqueología
- Experiencia internacional en más de 60 países





Estudio geofísico para el abastecimiento de agua a la mina de Oyu Tolgoi (Mongolia)





MINA DE OYU TOLGOI (Mongolia)

21.000 empleados
Cielo abierto + subterránea con 5 rampas hasta 1300 m de profundidad
200 Km de túneles
500.000 T/año de Cu
Procesa 100.000 T/día

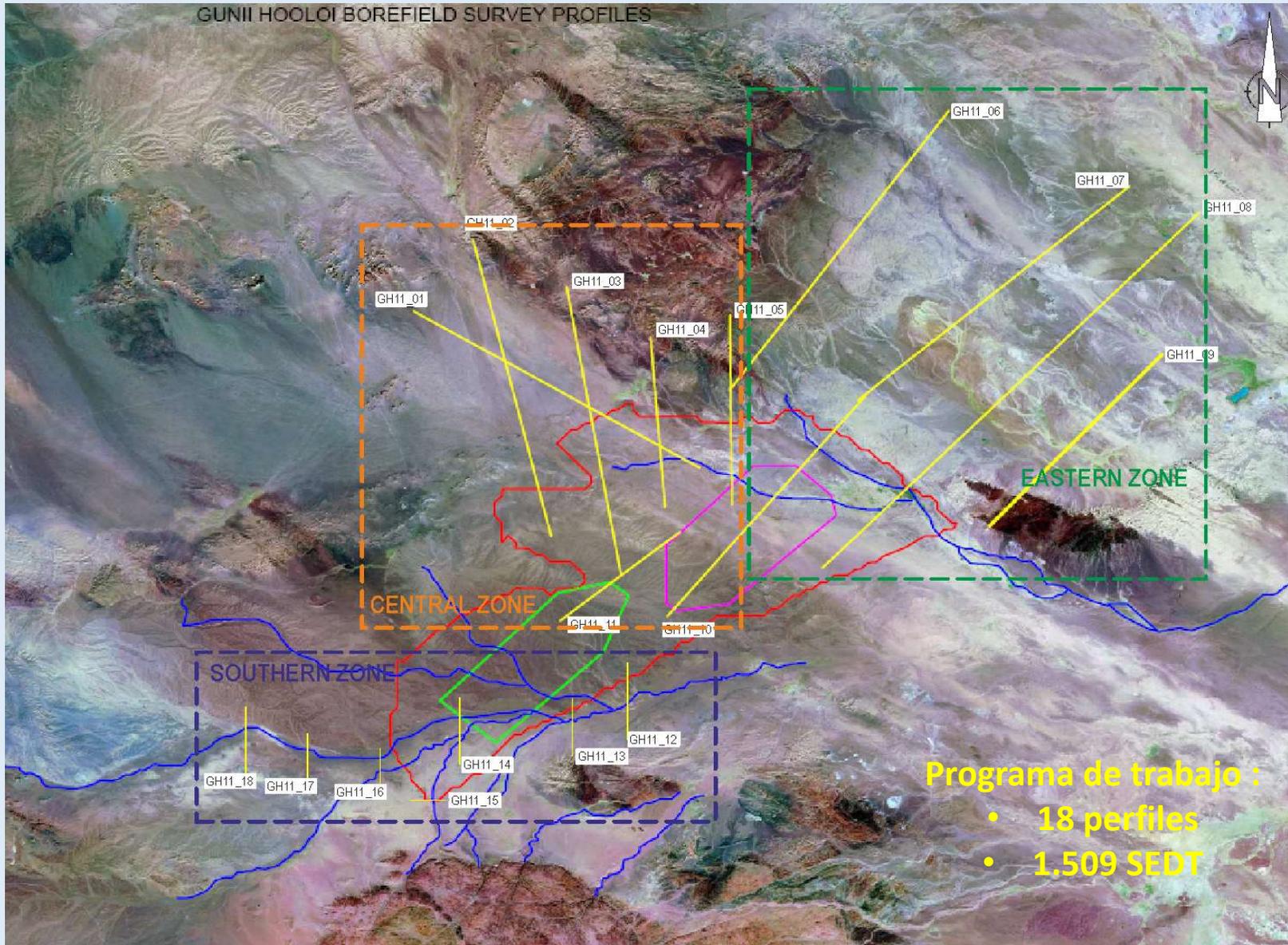


**Consumo de agua en los procesos
mineros y en la planta de tratamiento :
 $1,2 \text{ m}^3/\text{T} = 120.100 \text{ m}^3/\text{día}$**

Localización de la zona de estudio

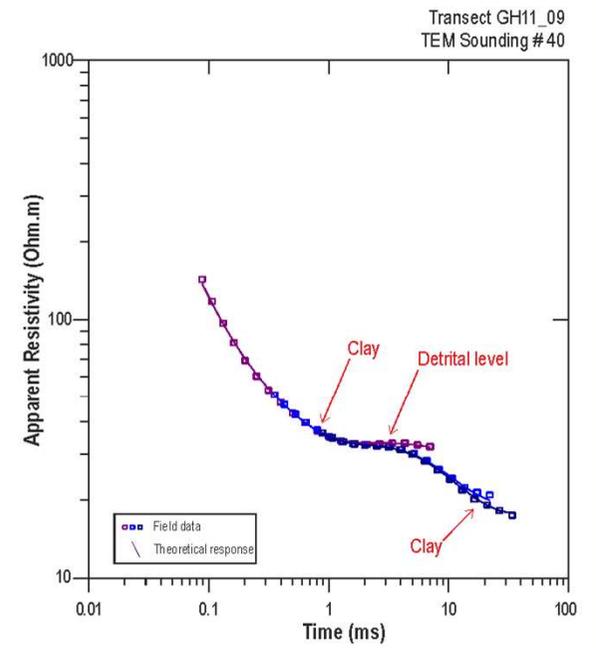
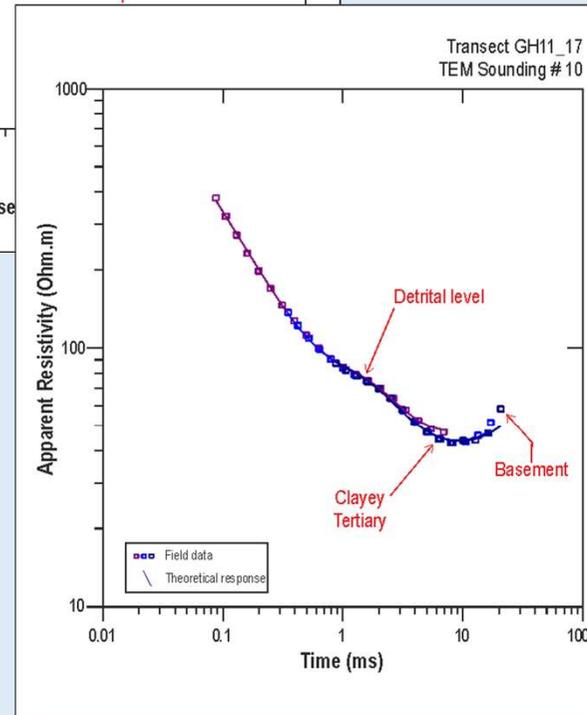
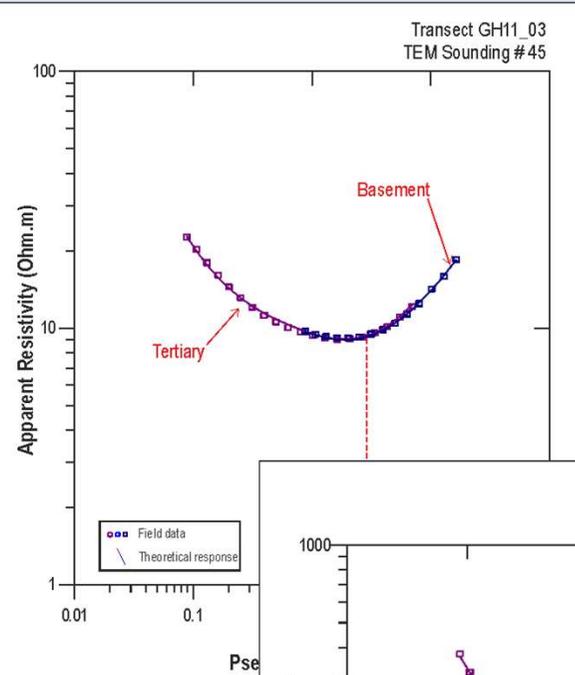
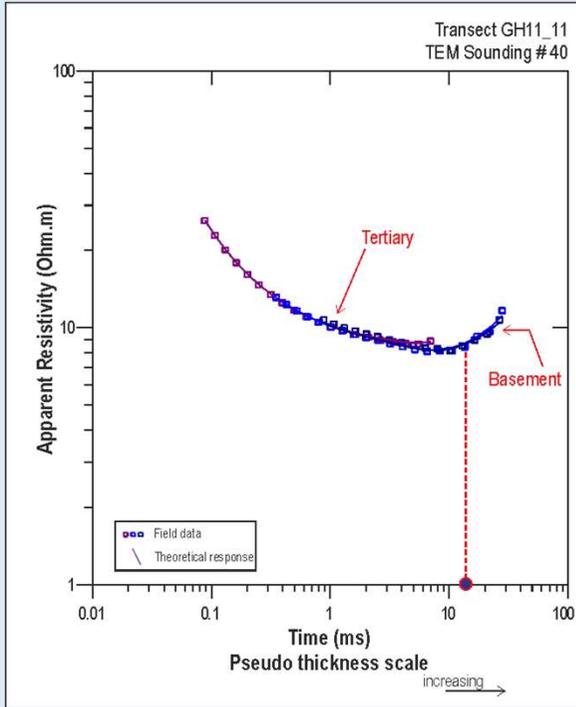


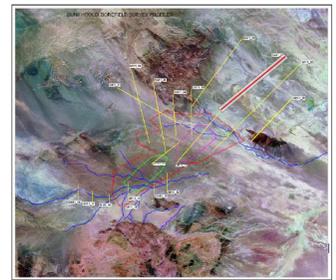
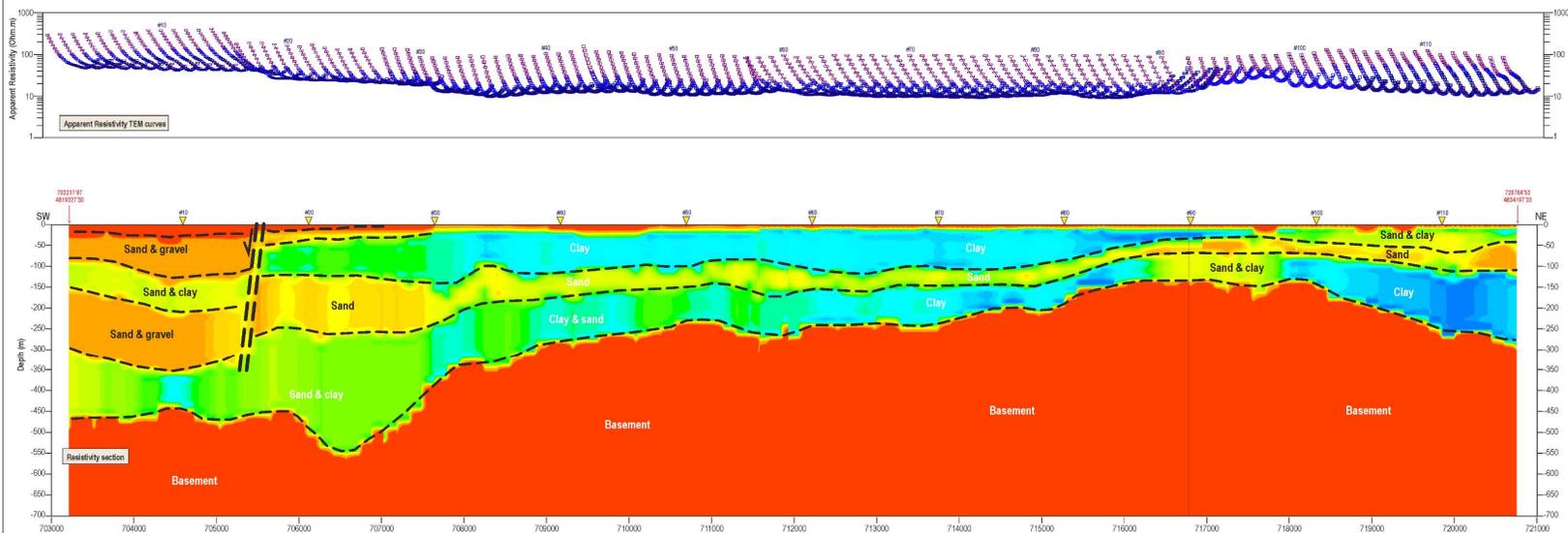
GUNII HOOLOI BOREFIELD SURVEY PROFILES



Programa de trabajo :

- 18 perfiles
- 1,509 SEDT





Gunii Hooloi Borefield Survey Transects

Oyu Tolgoi RPS Aqueterra

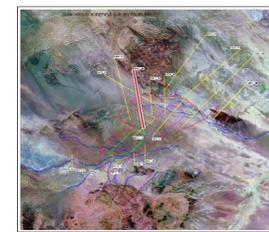
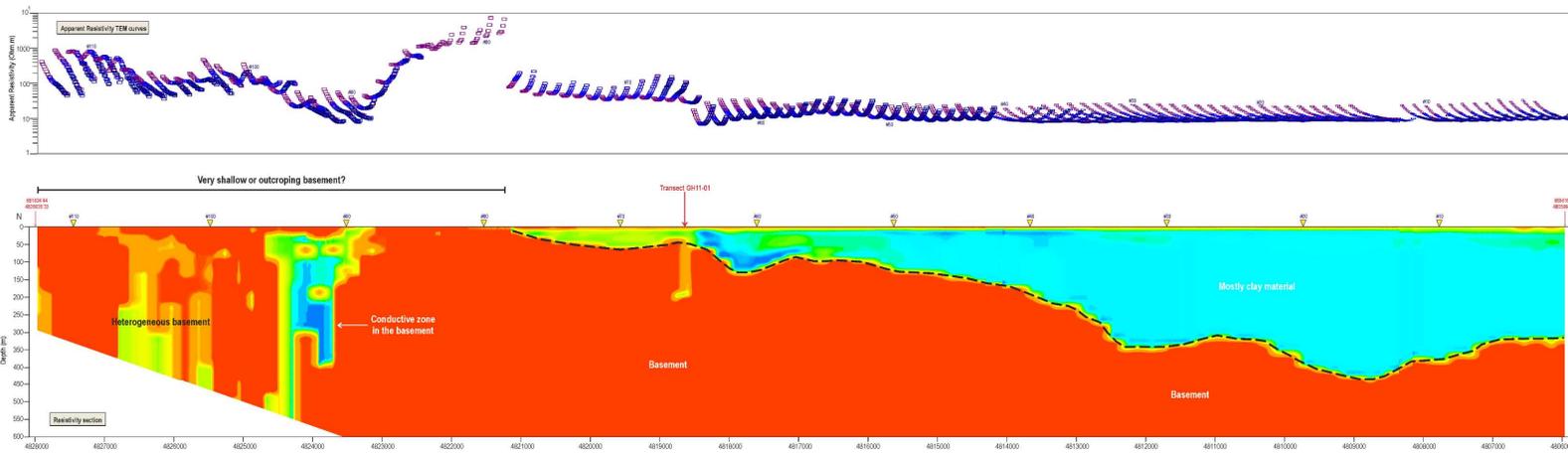
T.E.M. Soundings Geophysical Survey
In Gunii Hooloi Borefield, Oyu Tolgoi (Mongolia).

Resistivity section for Transect GH11_07

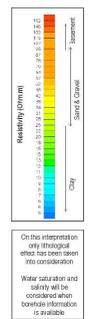
Consultants	Date	Scale	Sheet
Oyu Tolgoi	February 2, 2012	Hs. 1:25,000 Vs. 1:50,000	7

On this interpretation only lithological effect has been taken into consideration

Water saturation and salinity will be considered when borehole information is available



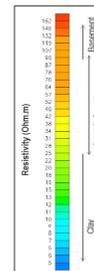
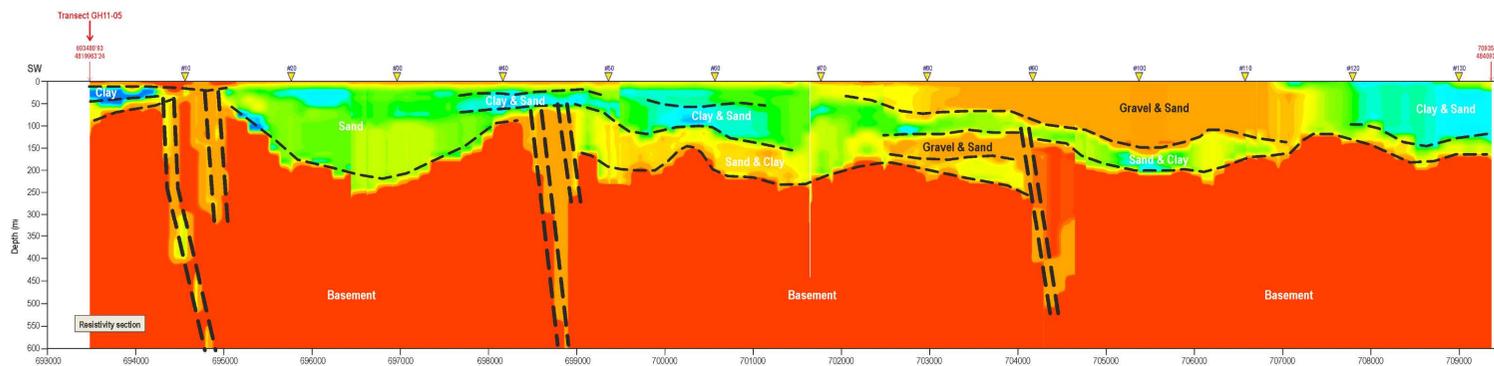
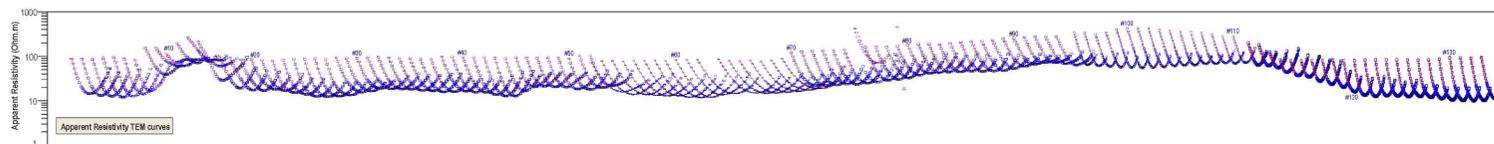
Guni Hooli Borefield Survey Transects



On the interpretation only lithological data has been taken into consideration. Water saturation and salinity will be considered when borehole information is available.

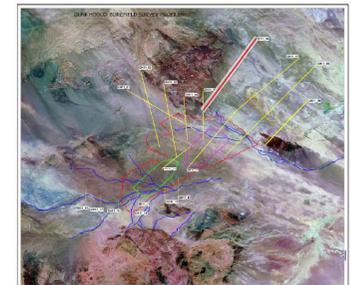
T.E.M. Soundings Geophysical Survey
in Guni Hooli Borefield, Oyu Tolgoi (Mongolia)
Resistivity section for Transect GH11_03

Client	Date	Scale	Sheet
Minerals Development Corporation	February 2012	1:50,000	3



On this interpretation only lithological effect has been taken into consideration.

Water saturation and salinity will be considered when borehole information is available.

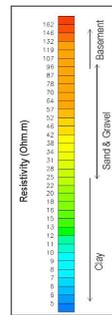
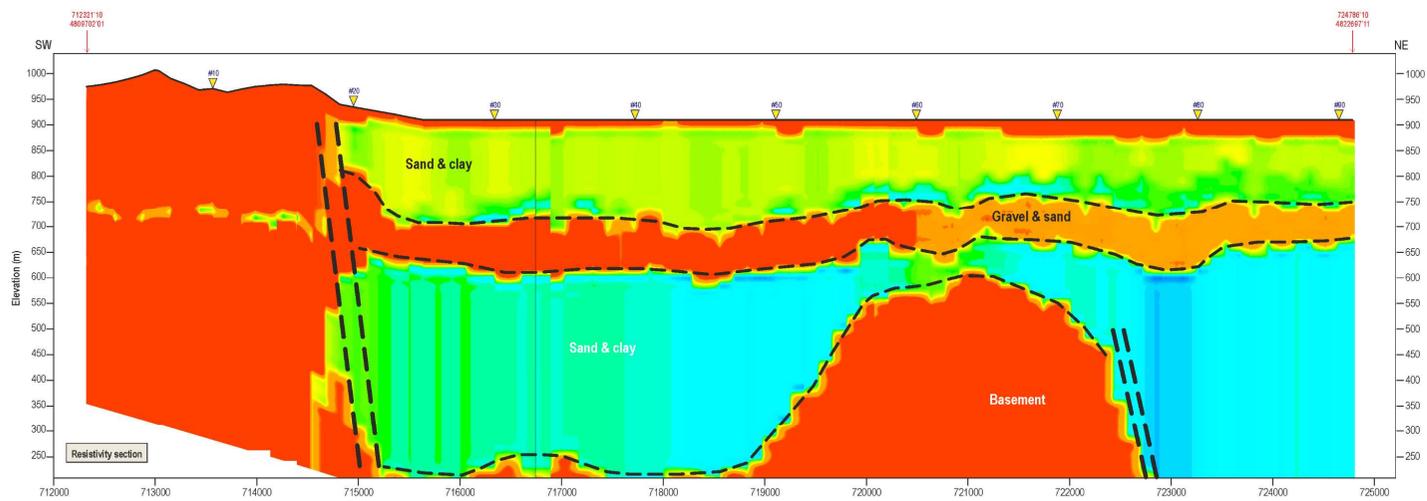
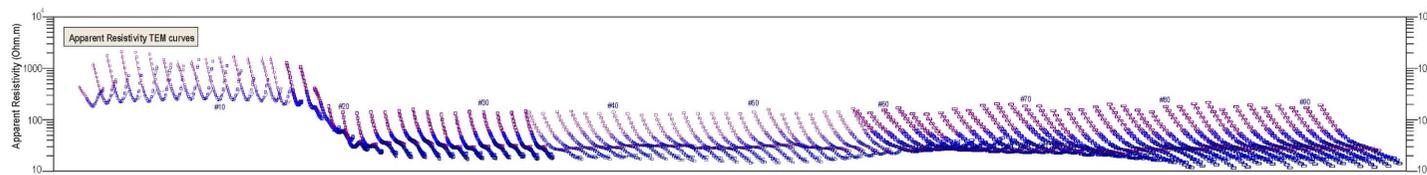





T.E.M. Soundings Geophysical Survey
in Gunii Hoolai Borefield, Oyu Tolgoi (Mongolia).

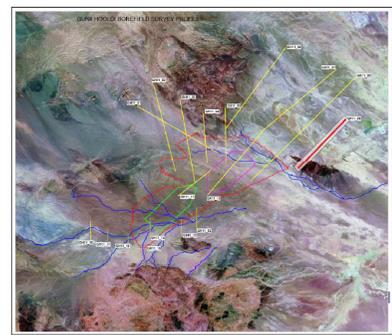
Resistivity section for Transect GH11_08

Consultants	Date	Scale	Sheet
 	February 2 012	As 1:25,000 Vs. 1:5,000	6

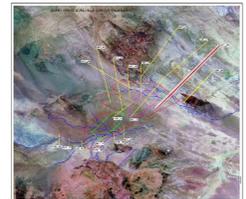
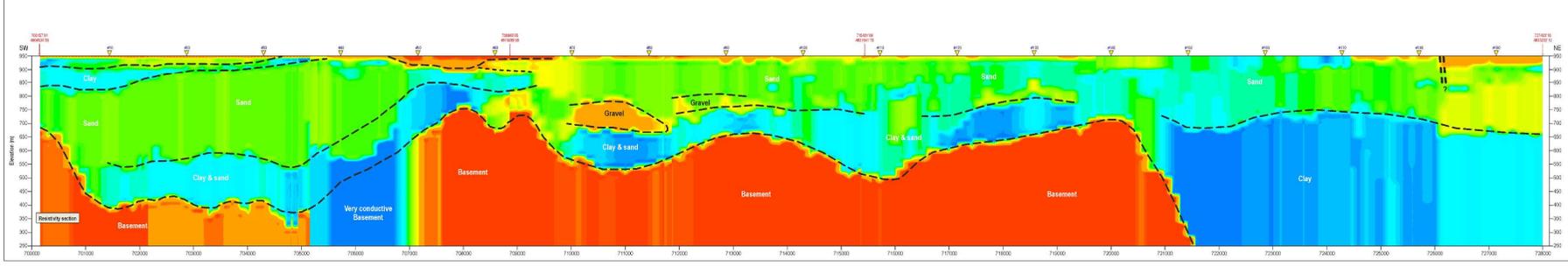
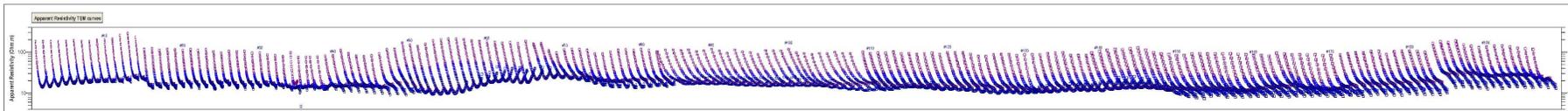


On this interpretation only lithological effect has been taken into consideration

Water saturation and salinity will be considered when borehole information is available



T.E.M. Soundings Geophysical Survey in Guni Hooloi Borefield, Oyu Tolgoi (Mongolia).			
Resistivity section for Transect GH11_09			
Consultants 	Date February 2012	Scale Hs_1:25,000 Vs_1:5,000	Sheet 9



Resistivity (Ohm m)

100000
50000
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
0.00001
0.000001

Very High Resistivity
High Resistivity
Moderate Resistivity
Low Resistivity
Very Low Resistivity
Extremely Low Resistivity

SW NE

0 100 200 300 400 500 600 700 800 900 1000

0 100 200 300 400 500 600 700 800 900 1000

70000 71000 72000 73000 74000 75000 76000 77000 78000 79000 80000

On this interpretation only, interpreted data has been taken into consideration. Water saturation and other parameters considered when borehole information is available.

TERRA Aquaterra

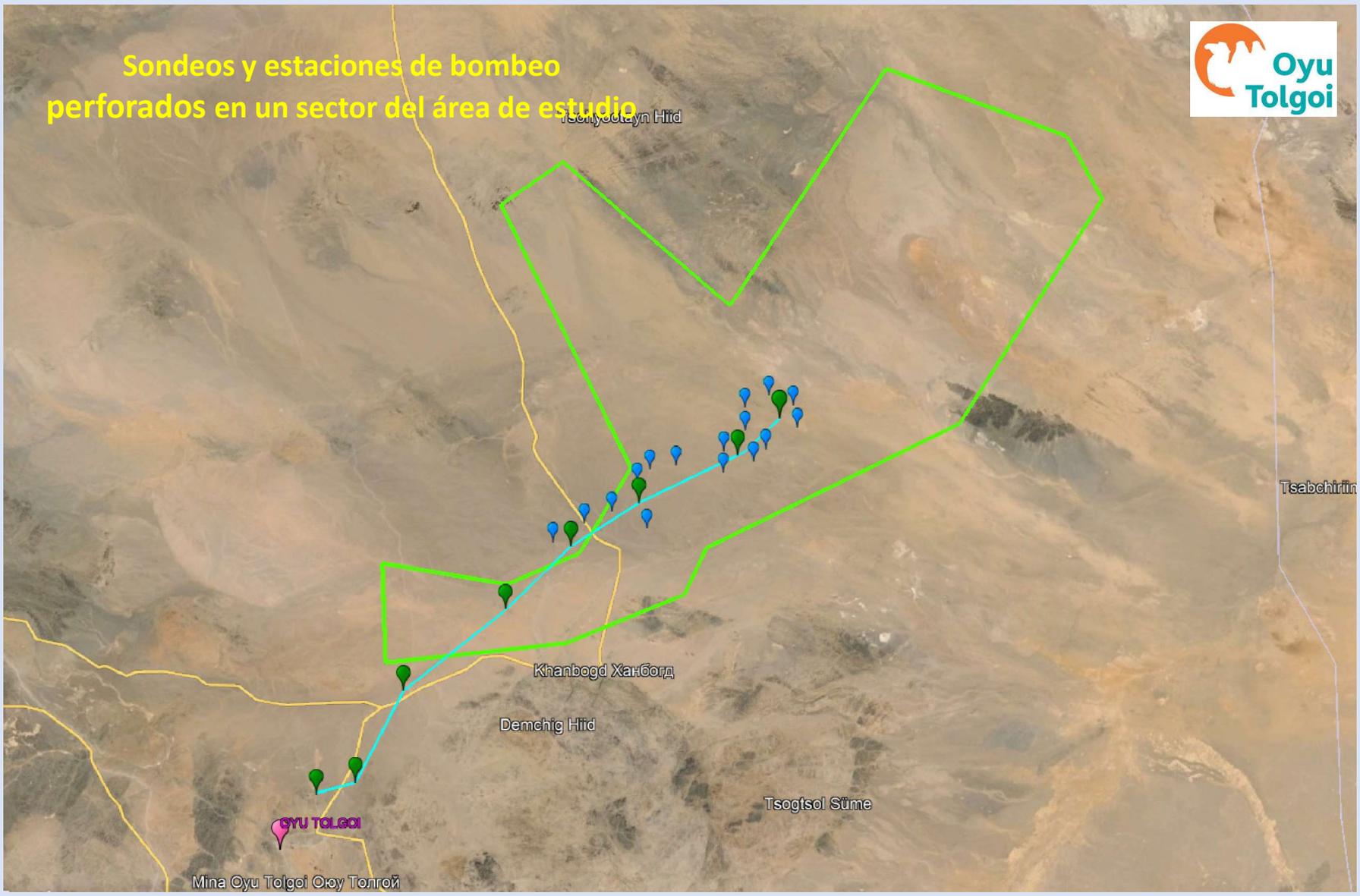
T.E.M. Grounding Geophysical Survey
in Guntur Borefield, C/o Tigid (Borefield).

TED Geophysics in Guntur Borefield

Resistivity section for Traverse GH1_08

Client	TIGID	Date	10/08/2010
Project	GH1_08	Scale	1:10000
Sheet	1	Page	8

Sondeos y estaciones de bombeo perforados en un sector del área de estudio



Mina Oyu Tolgoi Оюу Толгой

Tschyoclayn Hiid

Khanbogd Ханбогд

Demchig Hiid

Tsogtsol Süme

Tsabchirin

Una estación de bombeo y uno de los campamentos de instaladores de la red de tuberías y sistemas de bombeo



Detalle de localización de sondeos
en el entorno de una estación de
bombeo



Equipo técnico del estudio









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**A fecha de hoy
seguimos haciendo estudios geofísicos en Oyu Tolgoi**

