Zonge Engineering and Research Organization (Australia) Pty Ltd

Roger River
Dipole-Dipole Induced Polarisation Survey

Logistics Summary

February 2014

For

Leached Cap Pty Ltd

Compiled by:

S. Mann

Report No: 140037 Date : February 2014

Zonge Engineering & Research Organization (Australia) Pty Ltd

39 Raglan Avenue Edwardstown SA 5039

Tel +61 8 83710020 Fax +61 8 83710080

CONTENTS

TABLES

APPENDICES

1. SUMMARY

During January and February 2014, Zonge Engineering and Research Organization (Zonge) mobilised a 3-person geophysical field crew to the Roger River project in north western Tasmania to conduct a Dipole-Dipole Induced Polarisation (DDIP) survey for Leached Cap Pty Ltd. Information specific to this survey as provided to Zonge by Leached Cap Pty Ltd may be found within the "Survey_Info" folder on the accompanying disc. Pre-survey planning information provided by Leached Cap Pty Ltd is presented in Appendix III.

Survey line parameters were provided to Zonge by Philip Muir acting as consultant geophysicist for Leached Cap Pty Ltd. During this program 6.4 line kilometres of DDIP were surveyed providing 420 resistivity and chargeability data points.

Data quality and repeatability were monitored throughout the course of the survey which ensured that the best possible data was acquired given local conditions and time constraints. Raw data direct from the field was sent to Zonge's Adelaide office for processing and modelling. Processed results were sent to Philip Muir for interpretation.

2. IP INSTRUMENTATION

A GDD GRX-32 IP receiver was used to take all of the data for this project. Data was recorded using specialised multi-conductor receiver cables allowing reading of all channels simultaneously. Porous ceramic pots filled with copper sulphate were used as non-polarisable receiver electrodes.

Transmitted fields were generated using a Zonge GGT-30 geophysical transmitter at 0.125 Hz. Signal frequency was controlled by a Zonge XMT transmitter controller; synchronisation was automatically detected by the GDD IP Receiver.

The raw data from each day was downloaded every evening from the PDA used with the receiver to a laptop computer and emailed to Zonge's Adelaide office and the client representative. For Quality control purposes data review, processing and modelling were performed at Zonge's Adelaide office.

3. IP SURVEY PARAMETERS

Philip Muir was present during the survey to oversee data collection techniques and data quality. The survey was conducted as planned and did not require any modifications during the program.

All data recorded during this survey was taken at a frequency of 0.125 Hertz. During acquisition chargeability data is recorded over 20 time windows after an initial delay of 40ms. A semi-log window scheme was used to record decay data over the 2000ms off-time. Stack size was varied depending on signal strength and number of repeat stacks was adjusted in the field to balance survey speed with data quality.

Surveying was conducted using a fixed 16 channel receiver spread with the transmitter moving from east to west and receiver channels added from 1 to 16 accordingly. This method was used to avoid having live transmitter wires passing alongside active receiver wires, this prevents wire to wire coupling and improves safety. In order to survey across the busy road that crossed all lines, wires were run under culverts under the road.

A local grid system was provided by Philip Muir and was used for both line and station numbers, these and associated coordinates for each line in GDA94 z55 are shown below in Table 1.

Table 1 Survey line specifications

Prospect	*RX Line*	*Start*			*End*			*Orientation (True)*	*Line length* (kms)*	*Data points***
		Local	*UTM*		*Local*	*UTM*				
			Easting	*Northing*		*Easting*	*Northing*			
Roger River	10000N	49500E	336040	5458085	51100E	337357	5457177	125	1.6	105
Roger River	11100N	49500E	336680	5459000	51100E	337993	5458086	125	1.6	105
Roger River	11950N	48930E	336680	5459995	50530E	337993	5459081	125	1.6	105
Roger River	13000N	48700E	337090	5460980	50300E	338403	5460066	125	1.6	105

*** Line length is taken from maximum extent of electrodes.**

**** Number of data points after averaging and editing**

4. PRODUCTION ISSUES AND SUMMARY

No problems or incidents were reported by the crew during completion of this survey. Assistance from the client representatives during the survey allowed efficient production despite steep terrain in places and road crossings.

Appendix II provides a summary of the production of Job 140037. More detailed information on daily production may be found on the accompanying disc under *"Production Reports".* All safety documentation completed during this survey are contained within the *"Safety_Documentation"* folder on the accompanying disc.

5. DATA PROCESSING

Raw data were reviewed at Zonge's Adelaide office to ensure data quality, raw, edited and processed results were subsequently provided to Philip Muir. Data were imported into a Scientific Computing Applications TQIP database for review and editing. The quality of each block of raw DDIP data was examined before being averaged to create a single record for each data point. Blocks or channels that were considered of poor quality were skipped before averaging each station's data. Chargeability data was recalculated over 590-1540ms integration timeframe. All raw data taken during this survey are included on the accompanying disc so that this data may be re-averaged if necessary.

2D inversion modelling was performed by Zonge for quality control purposes and are presented below in Appendix I. These models are default setting only and Zonge have not modified modelling parameters in order to ensure results are consistent with any preconceived geological models. The topography used in modelling this data was provided by Philip Muir.

6. EXPLANATION OF FILES

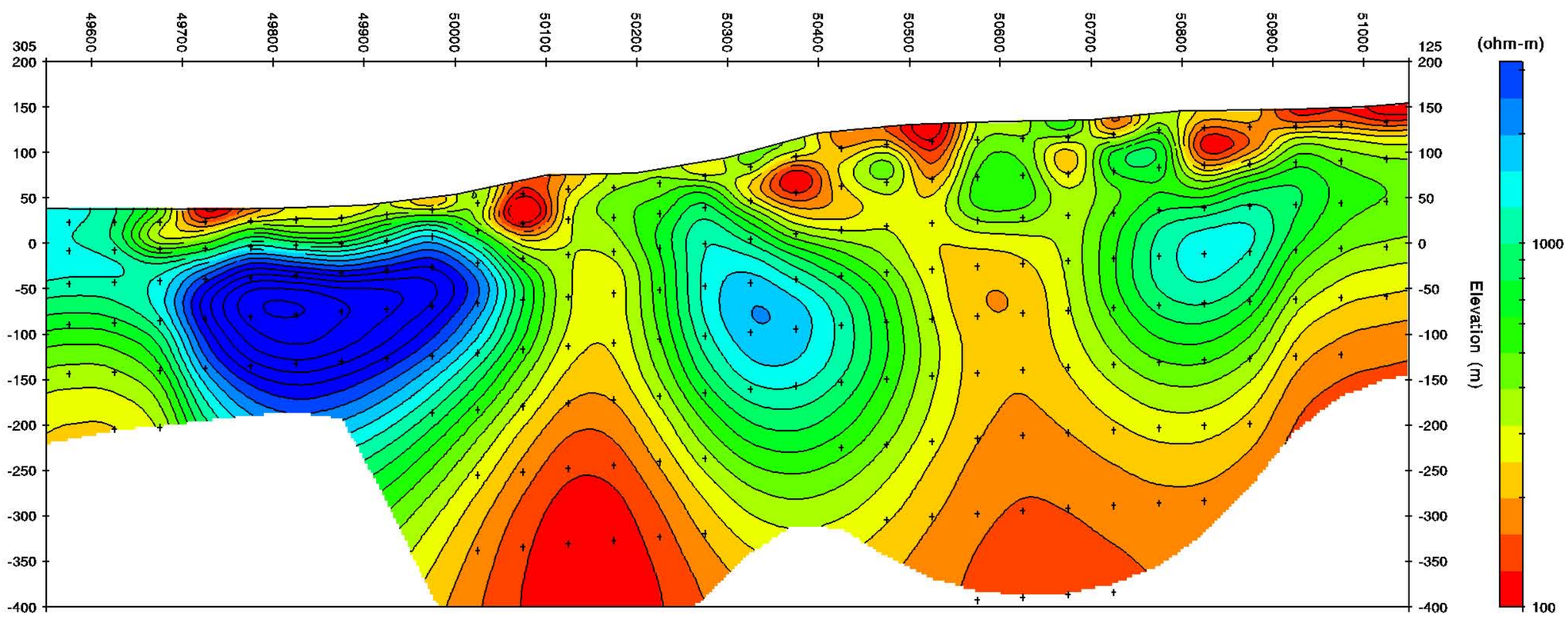
Digital data is provided on CD along with paper plots of the data. Data from each surveyed line are placed in the following directory structure on the accompanying CD: *Processed_Data**line#*. File formats are explained below:

***.DAT**	Averaged data file from TQIP containing averaged and edited DDIP data, two varying formats are used for the TS2DIP and RES2DINV inversions
***.MDB**	TQIP database file containing all DDIP data.
***.IPM**	Inversion model files produced by TS2DIP
***.PNG/*.BMP**	Panel plot files showing modelled, observed and calculated data
***.GDD**	The edited raw data downloaded from the GDD receiver.
***.STN**	Station co-ordinate files containing station number, easting, northing and elevation.

APPENDIX I

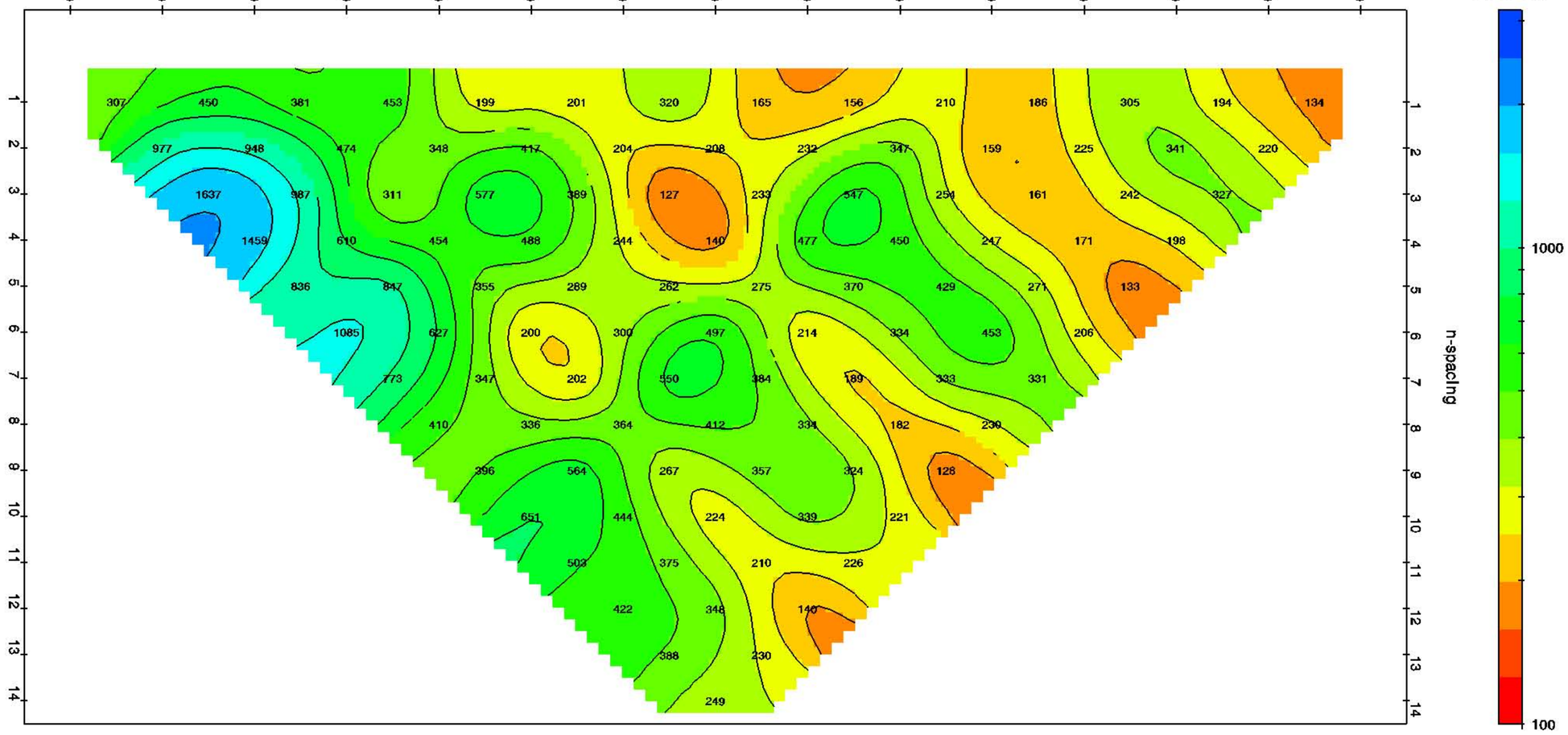
2D chargeability and resistivity inversion models

Resistivity Inversion Model



Roger River
Line 10000N

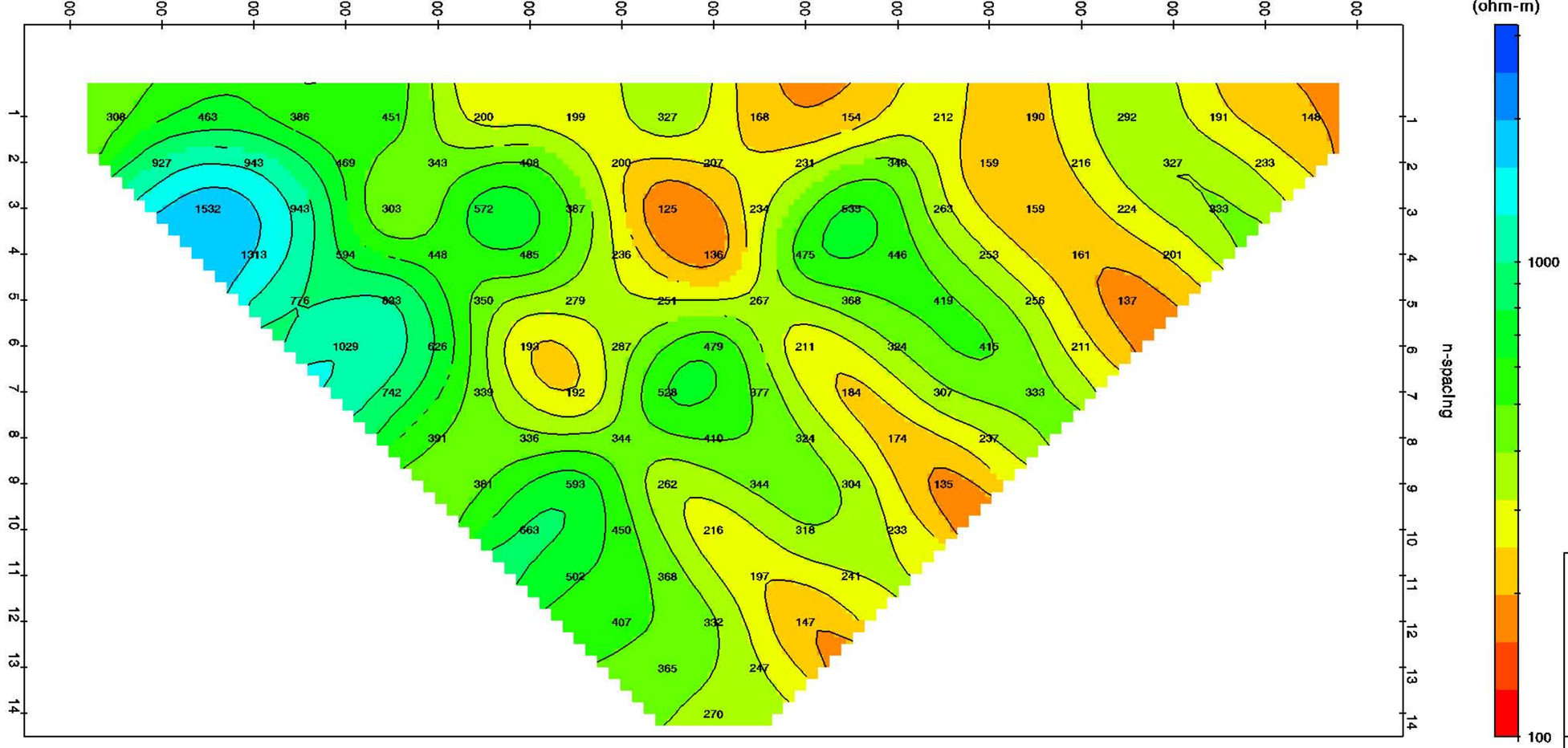
Resistivity Observed Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
ResSmth=1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

Resistivity Calculated Data



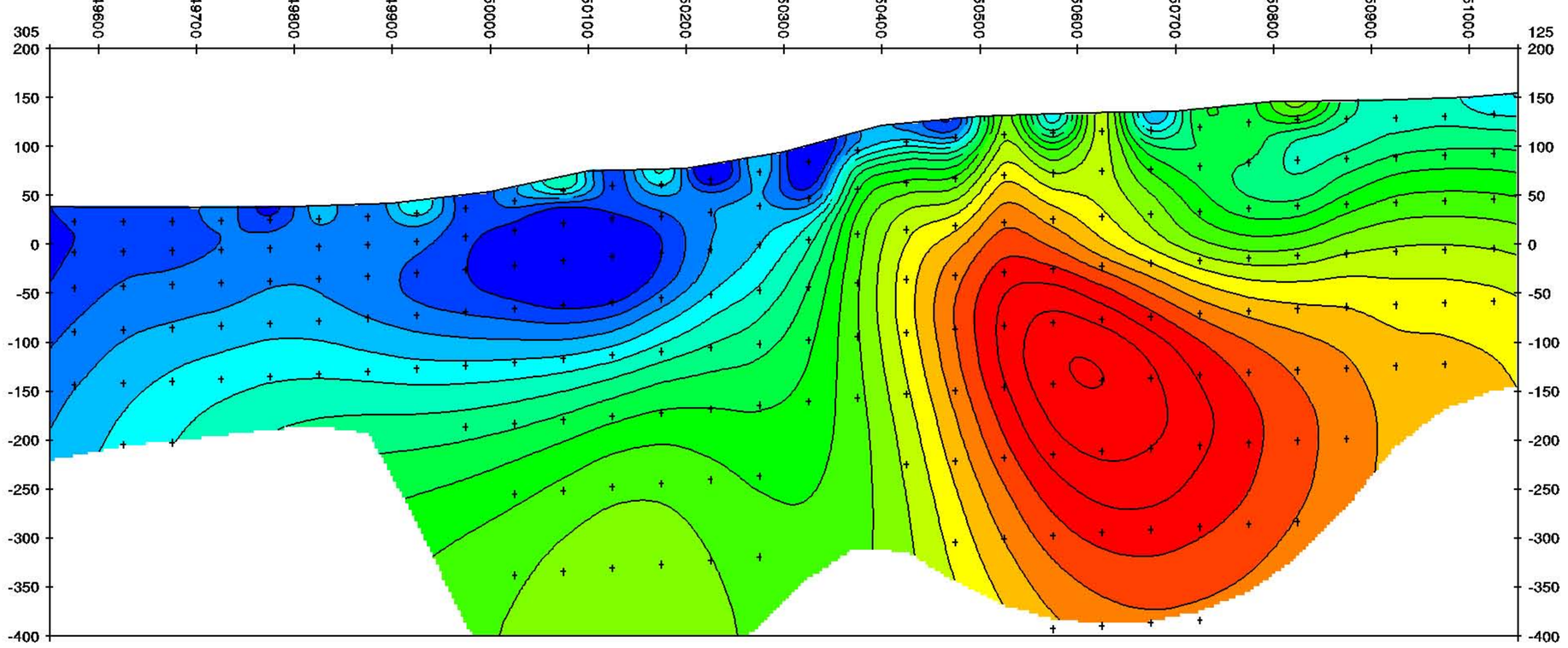
300 m

Leached Cap
Roger River
Line 10000N
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	05/02/14	1:5000	140037

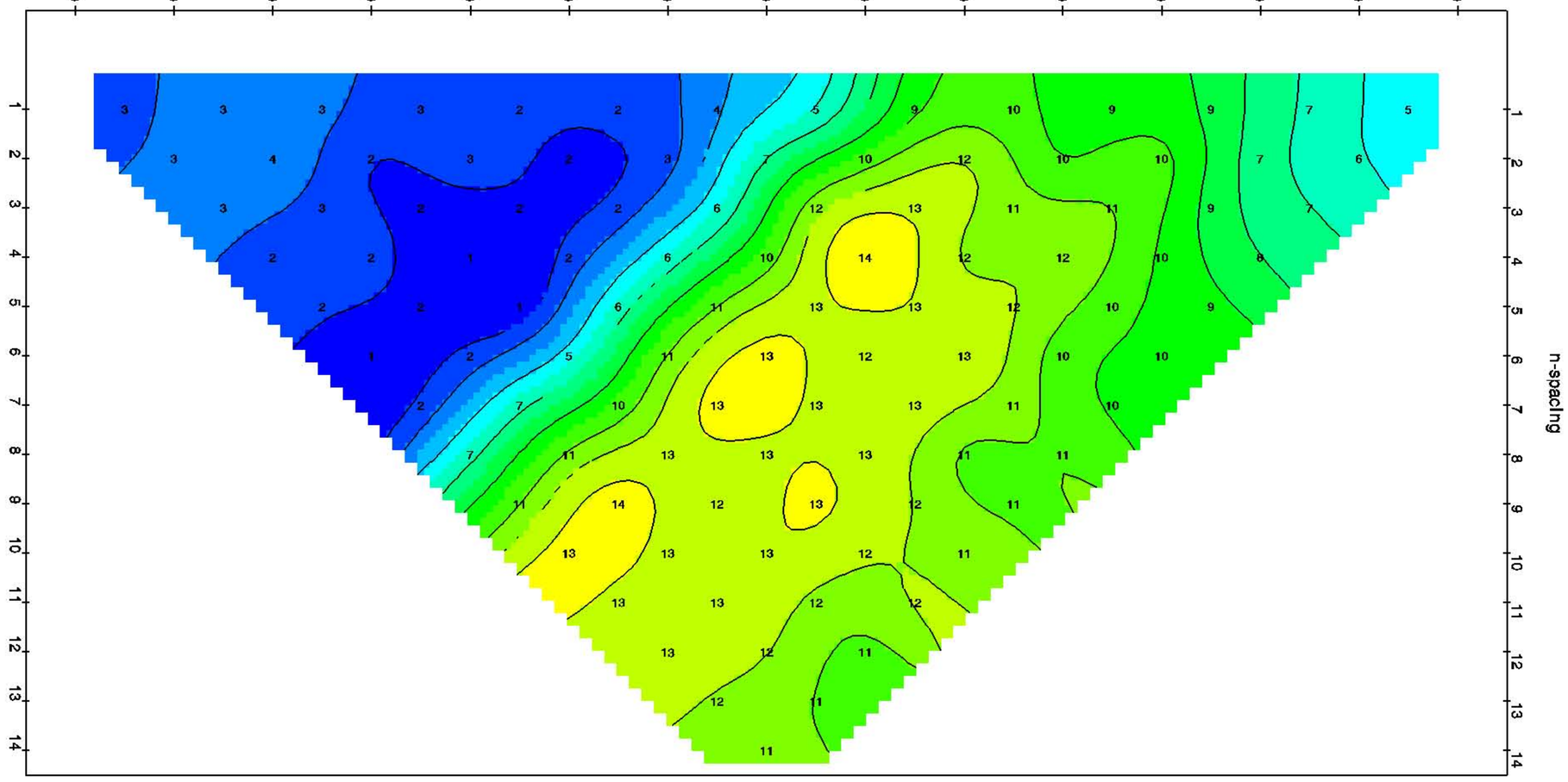
REF: Line_10000N.s2d

IP Inversion Model



Roger River
Line 10000N

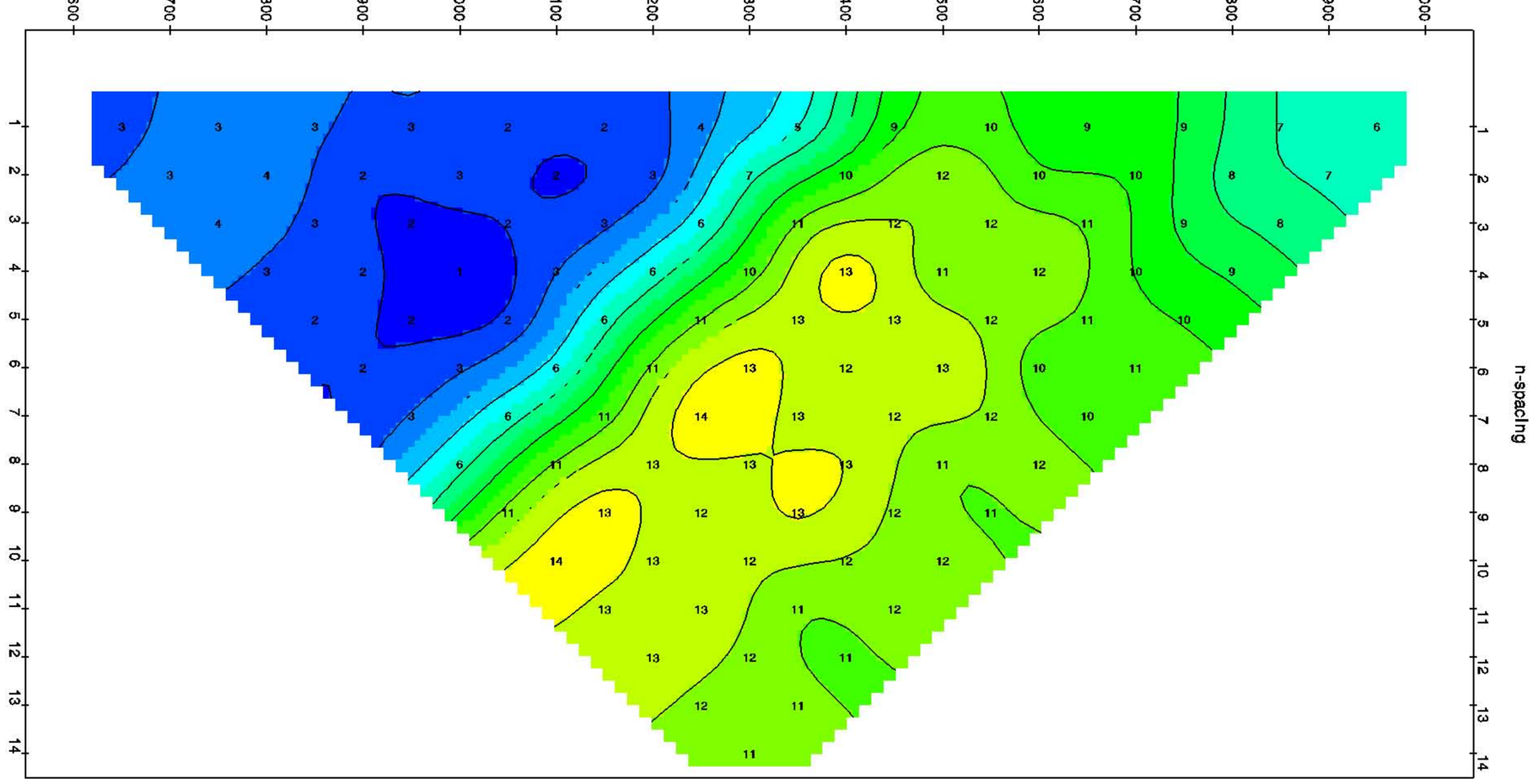
IP Observed Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
IPSmth=0.1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

IP Calculated Data



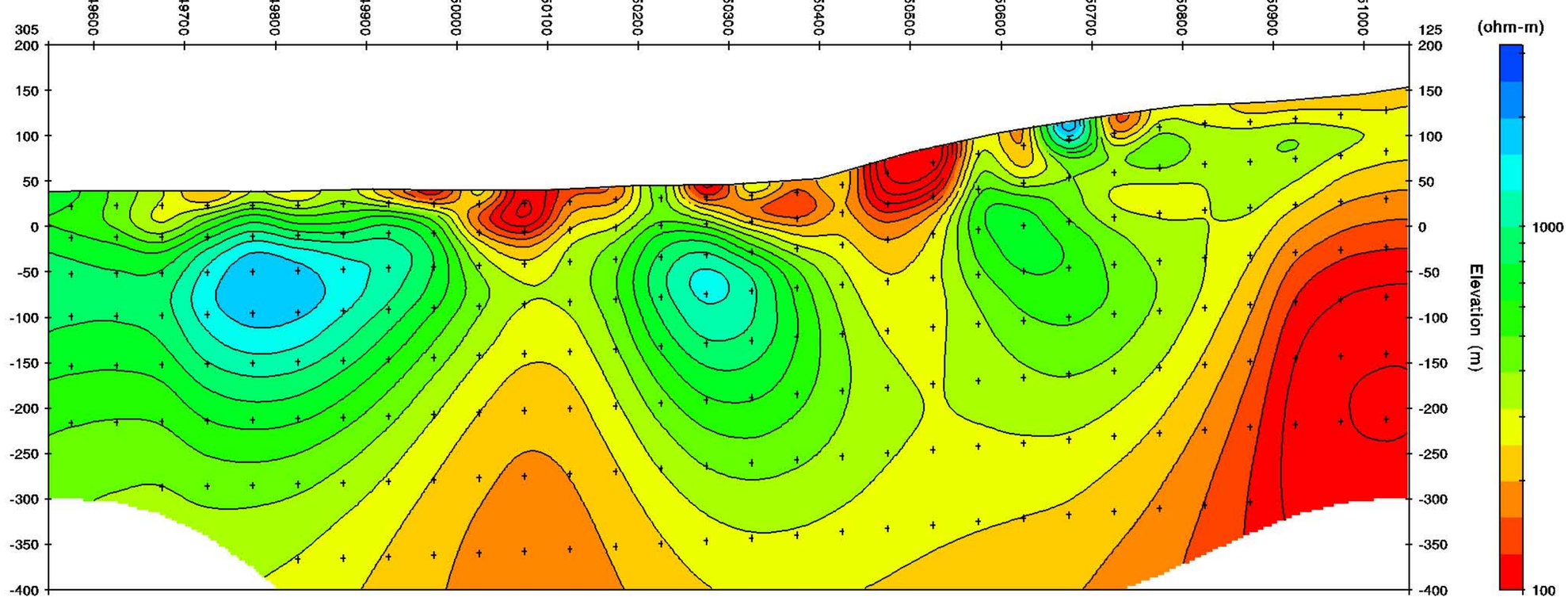
300 m

Leached Cap
Roger River
Line 10000N
2D Smooth-Model Inversion
Dipole-Dipole IP Data

AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	05/02/14	1:5000	140037

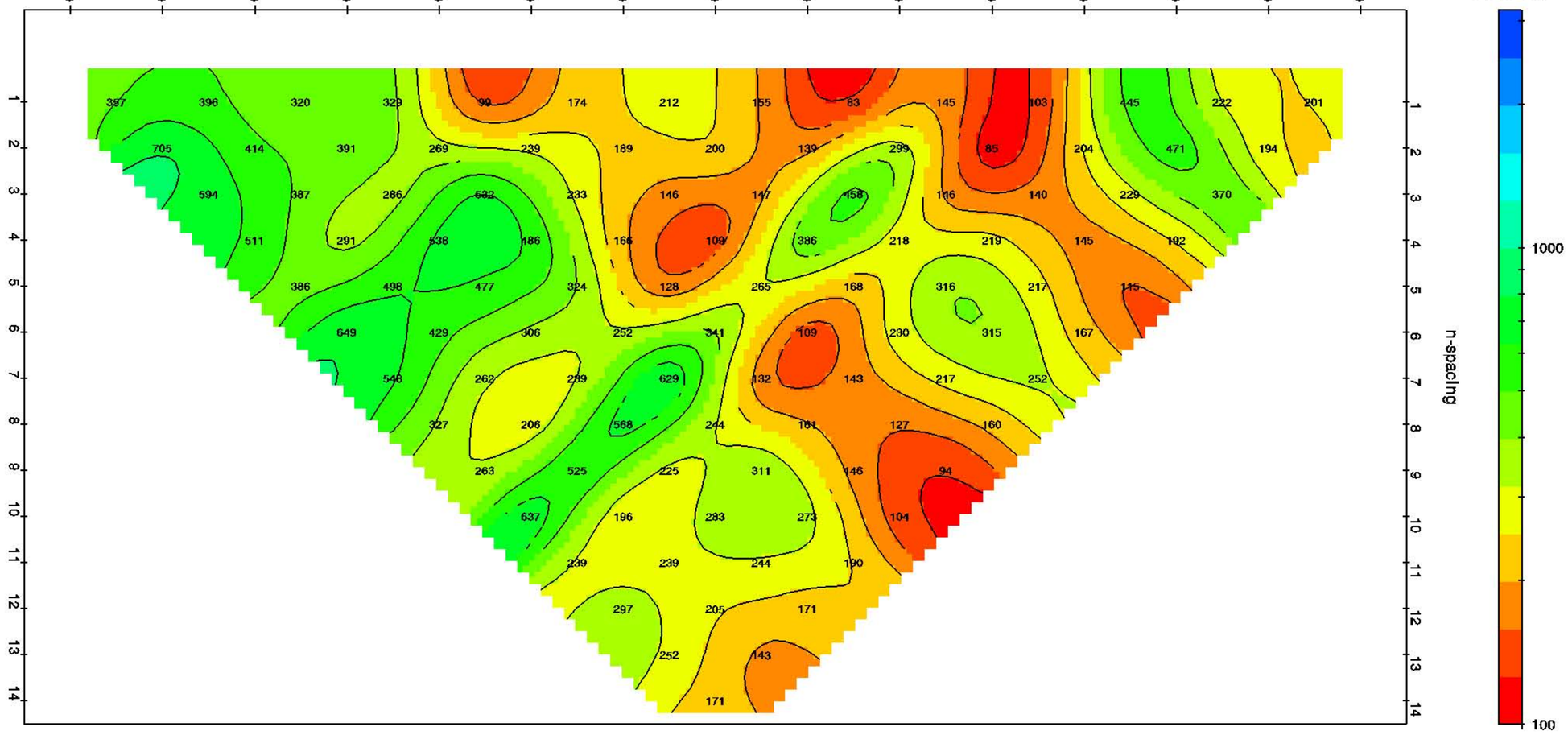
REF: Line_10000N.s2d

Resistivity Inversion Model



Roger River
Line 11100N

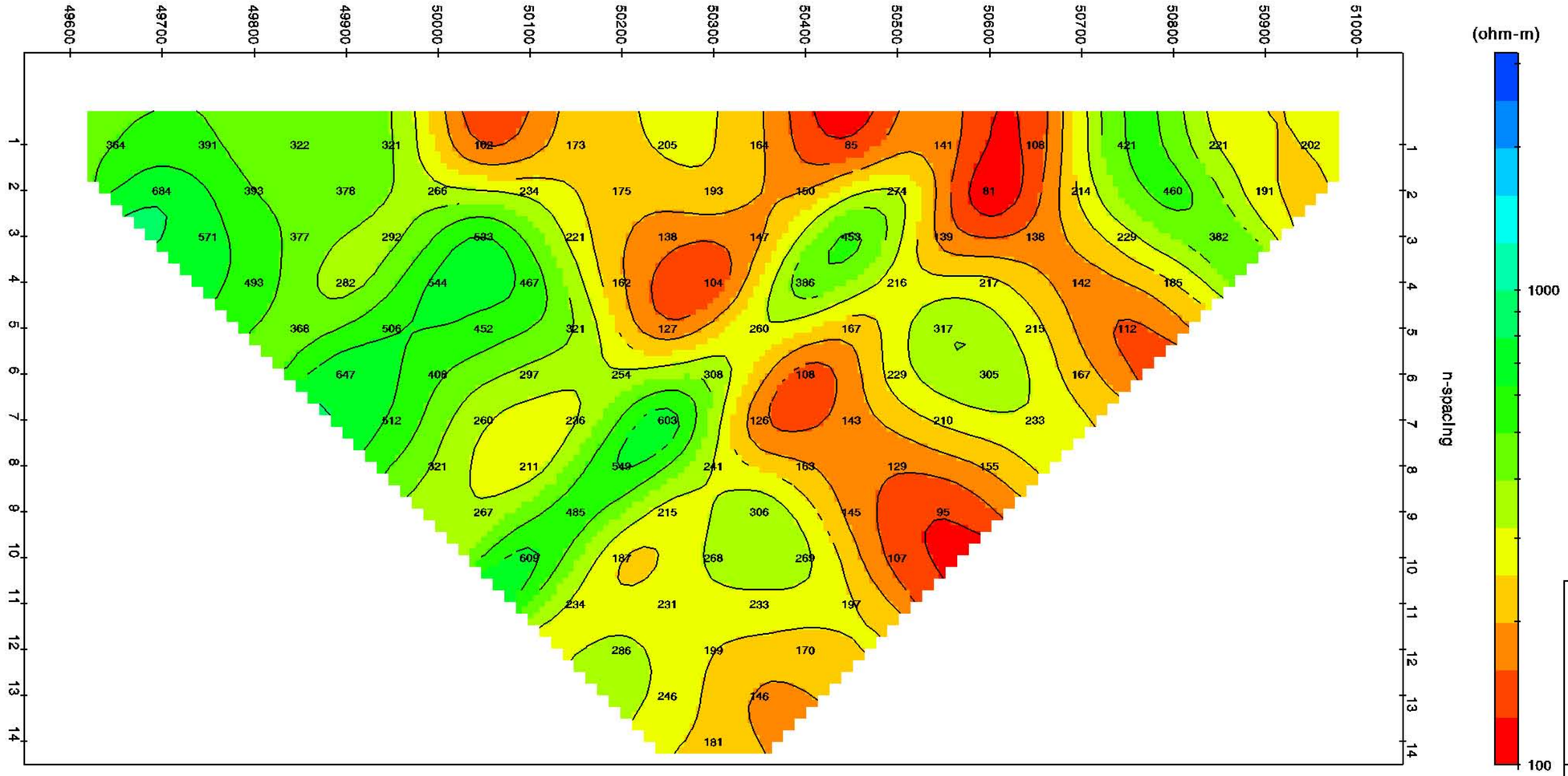
Resistivity Observed Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
ResSmth=1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

Resistivity Calculated Data

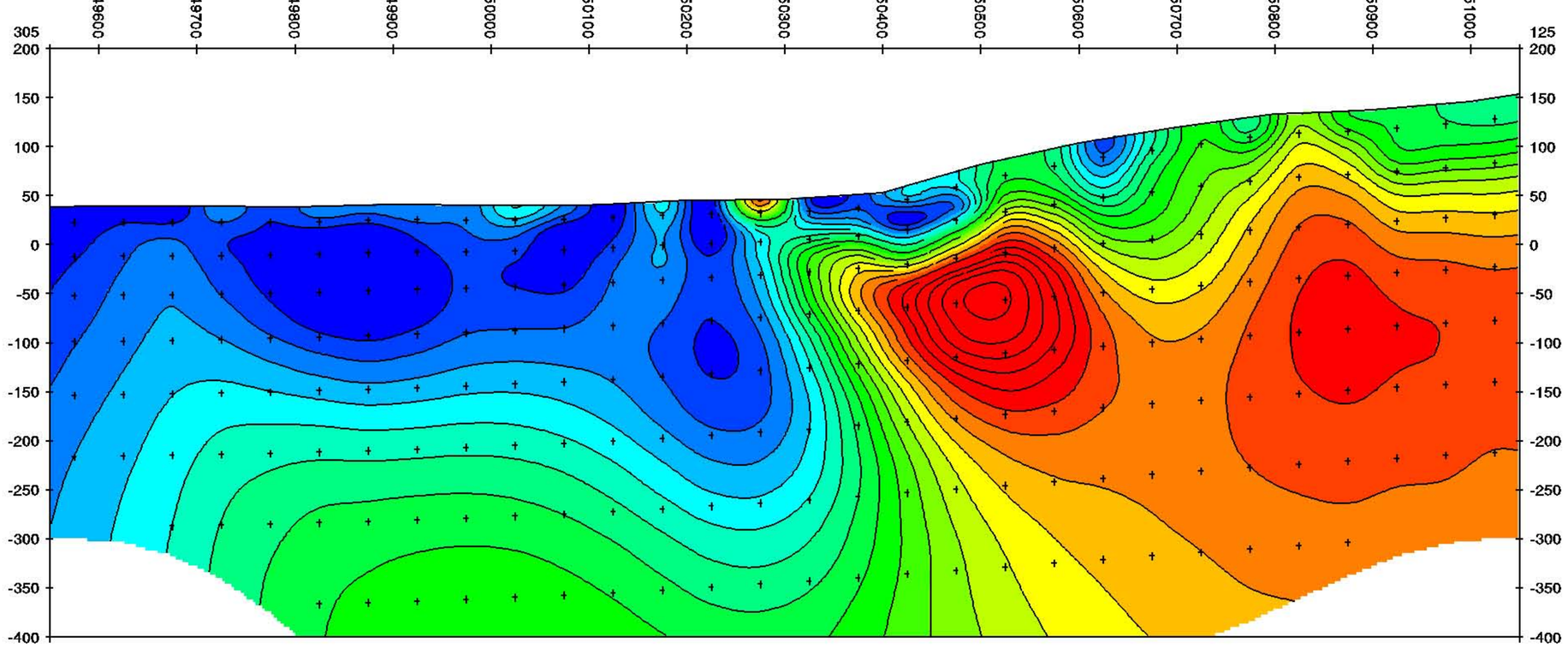


300 m

Leached Cap
Roger River
Line 11100N
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

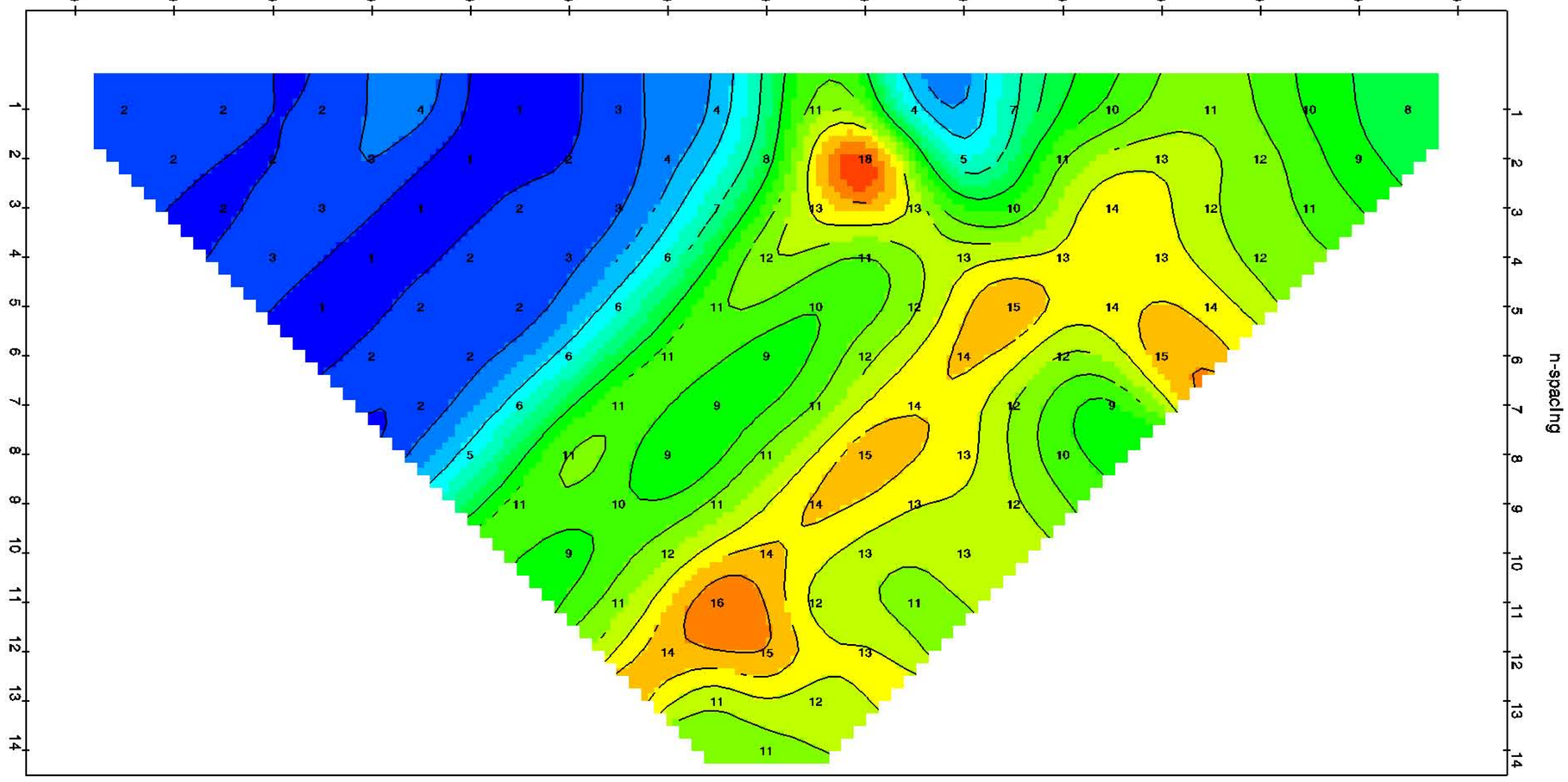
AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	05/02/14	1:5000	140037
REF:				

IP Inversion Model

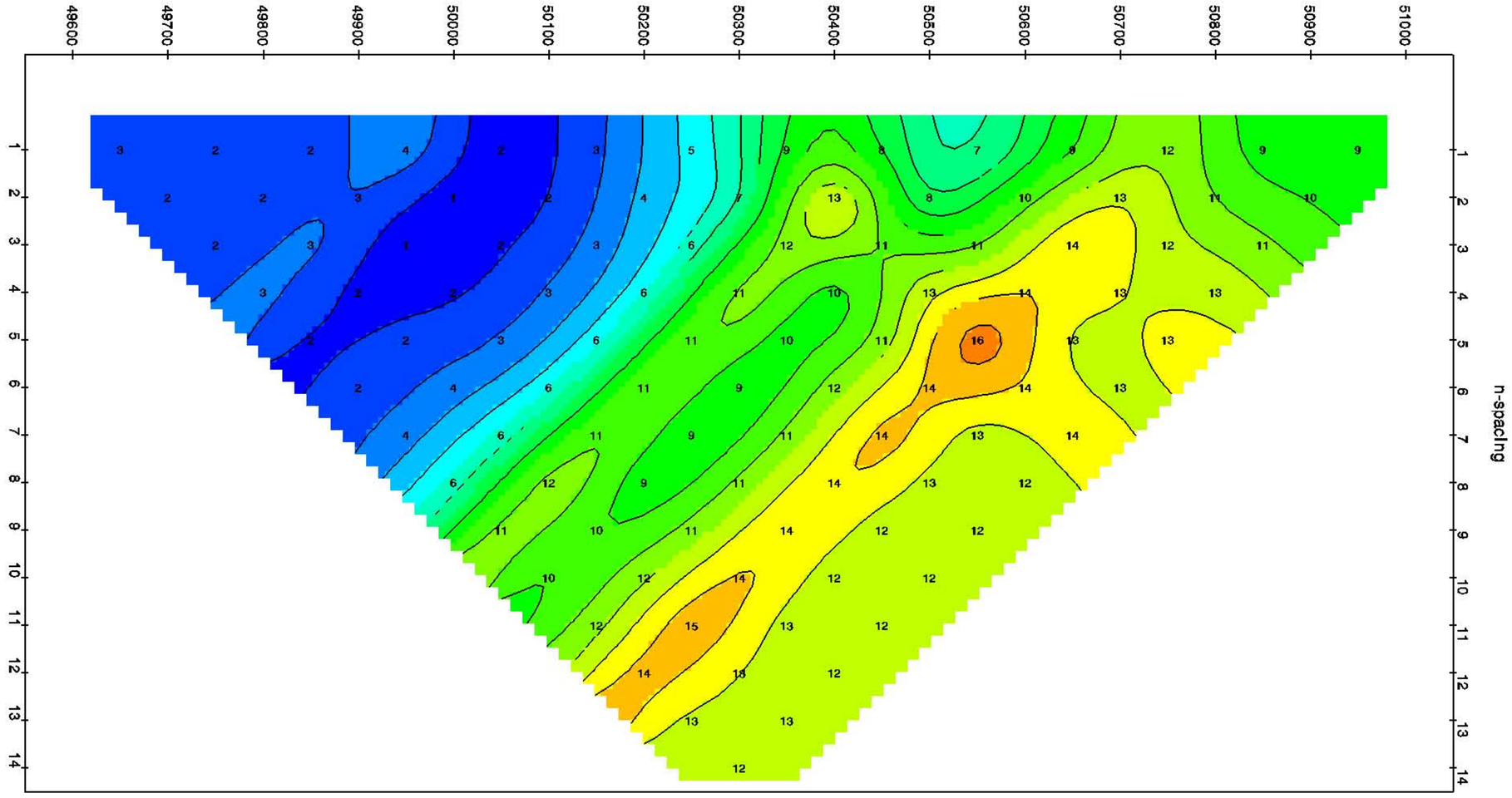


Roger River
Line 11100N

IP Observed Data



IP Calculated Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
IPSmth=0.1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

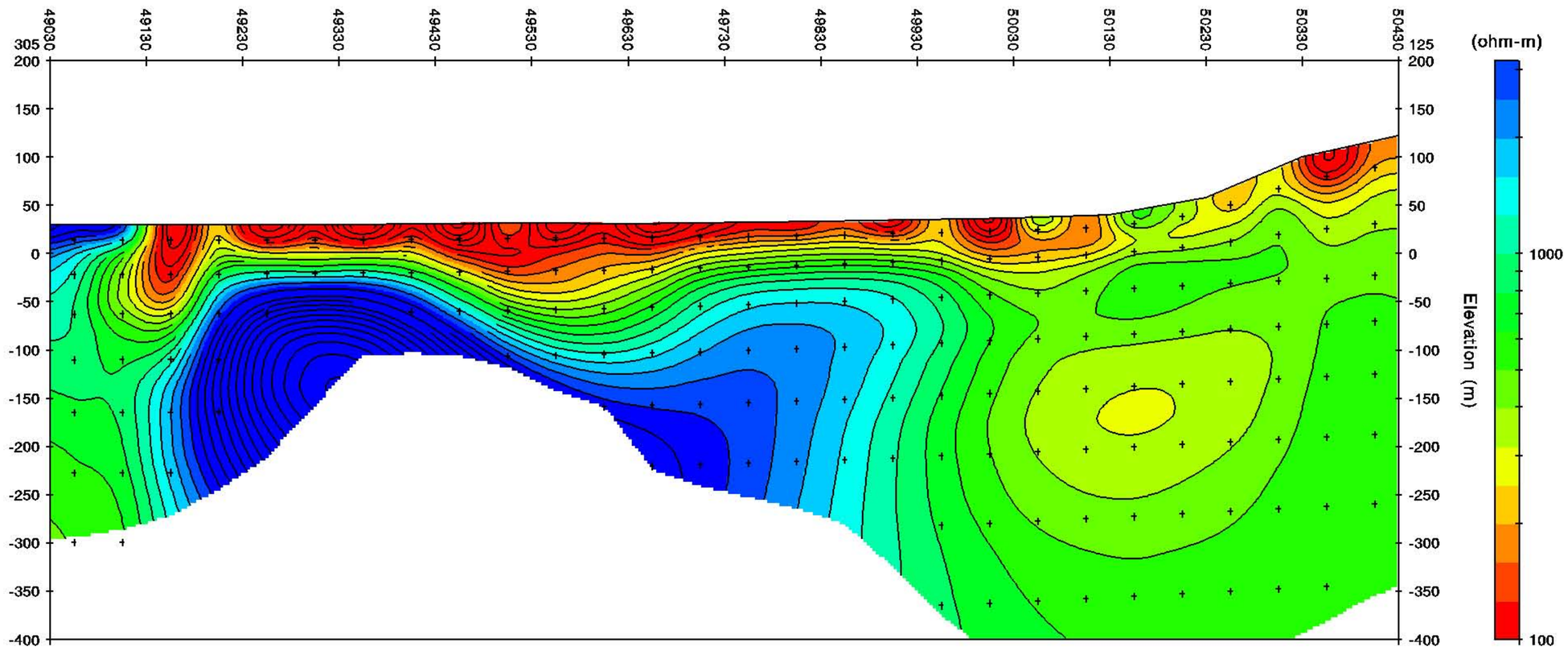
300 m

Leached Cap
Roger River
Line 11100N
2D Smooth-Model Inversion
Dipole-Dipole IP Data

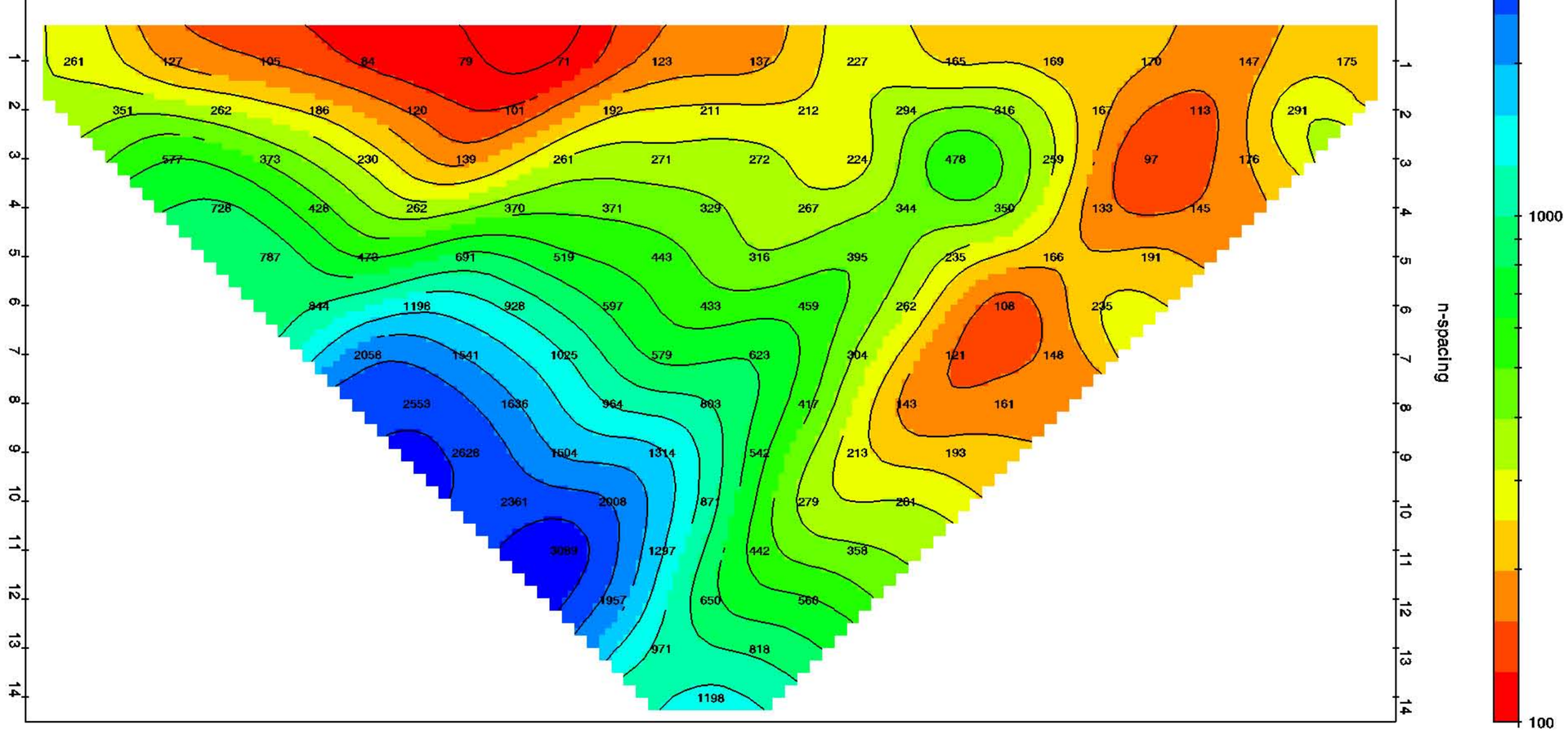
AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	05/02/14	1:5000	140037
REF:				

Roger River
Line 11950N

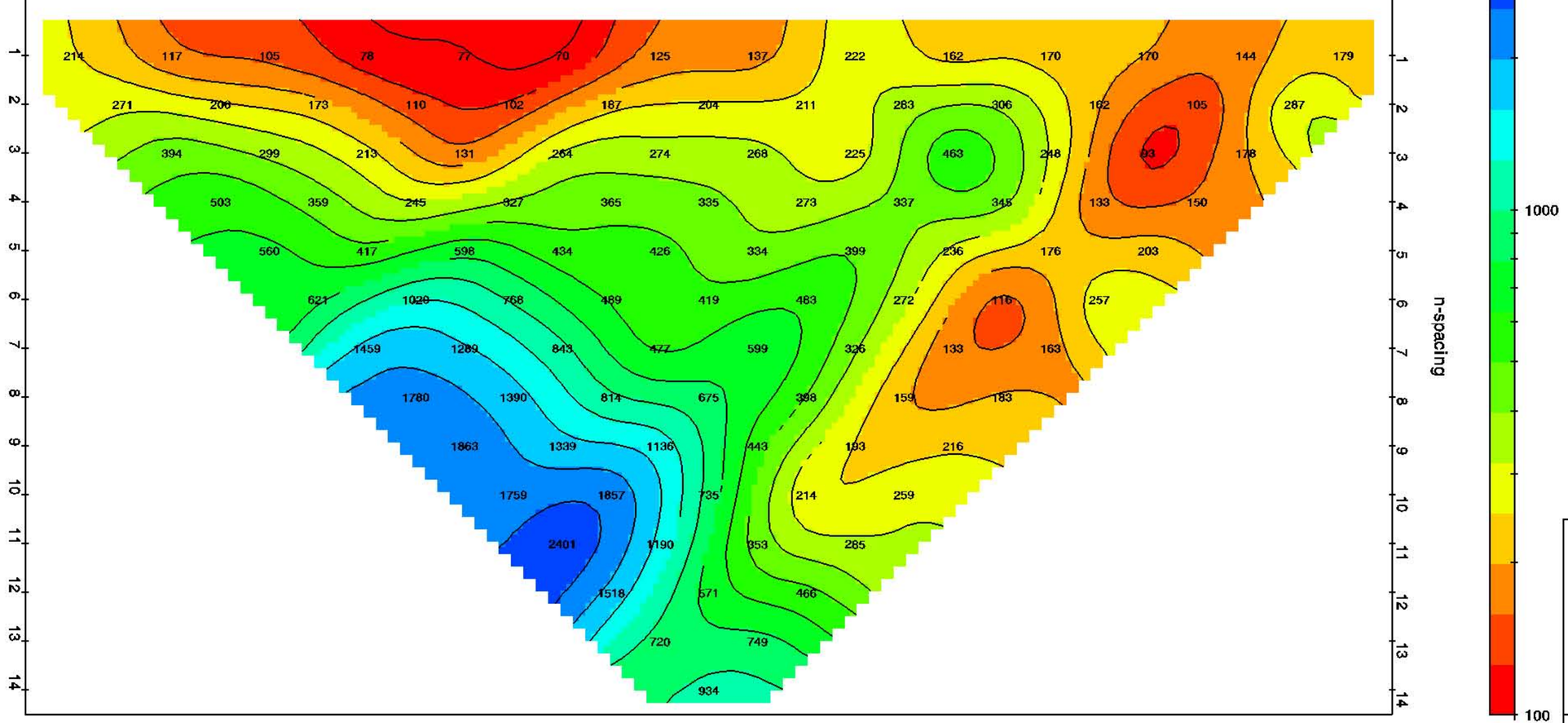
Resistivity Inversion Model



Resistivity Observed Data



Resistivity Calculated Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
ResSmth=1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

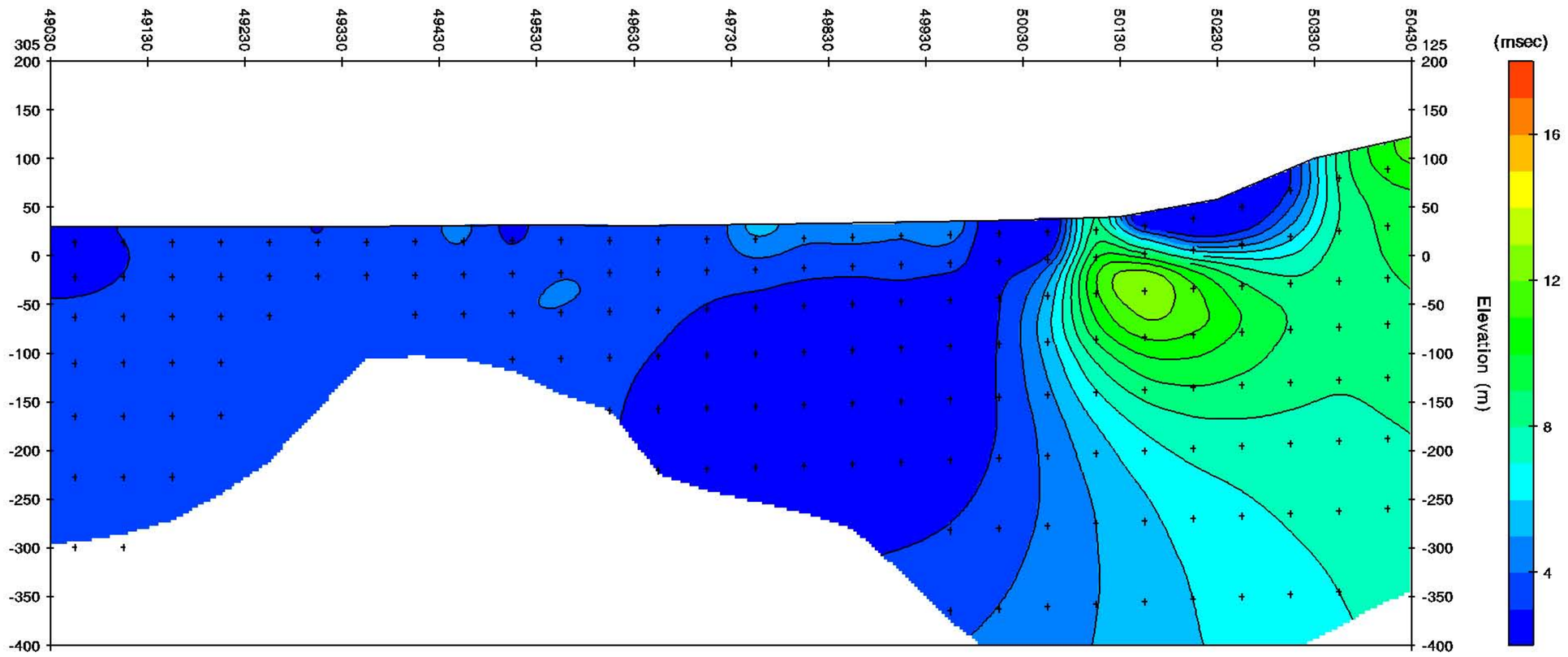
300 m

Leached Cap
Roger River
Line 11950N
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

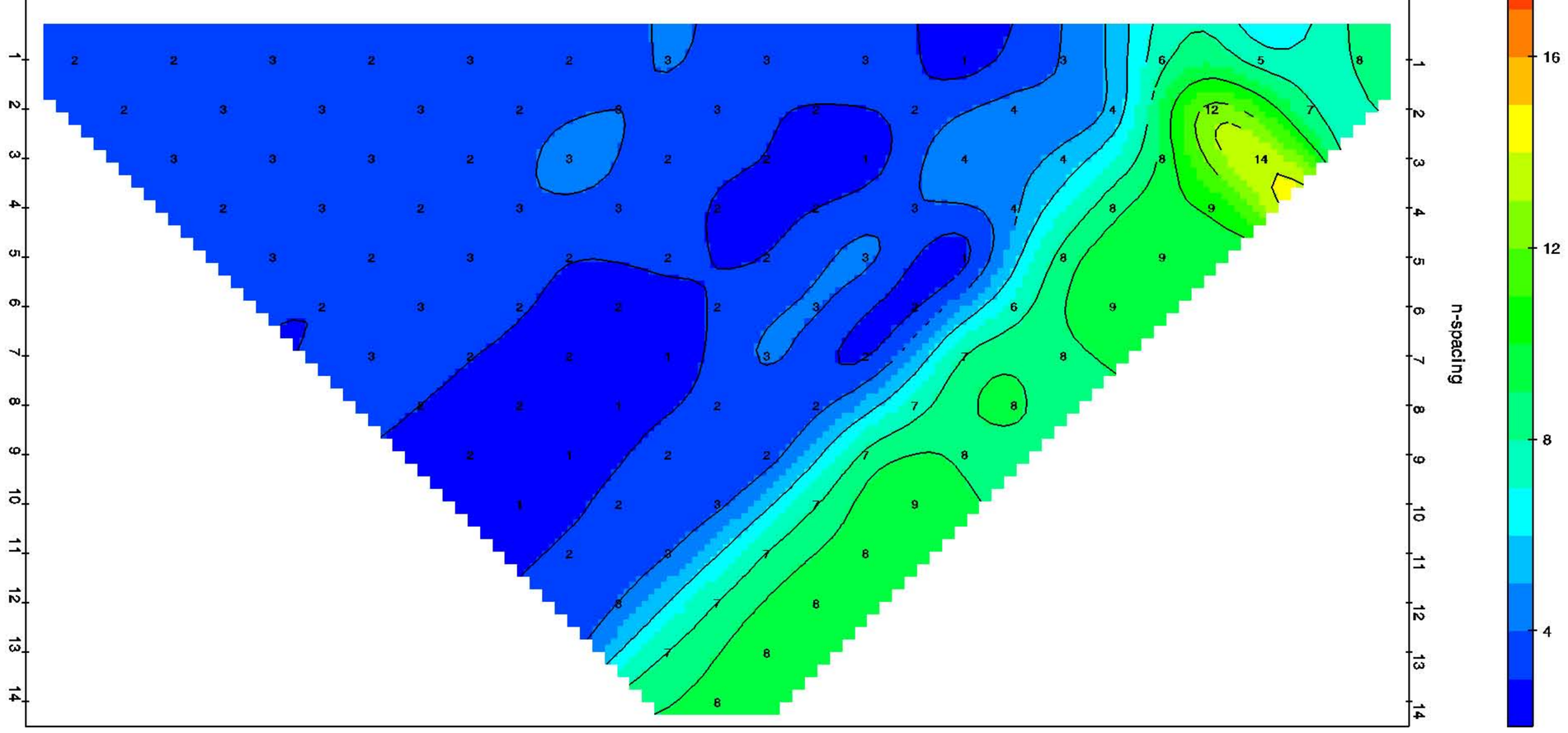
AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	07/02/14	1:5000	140037

REF: Line_11950N.s2d

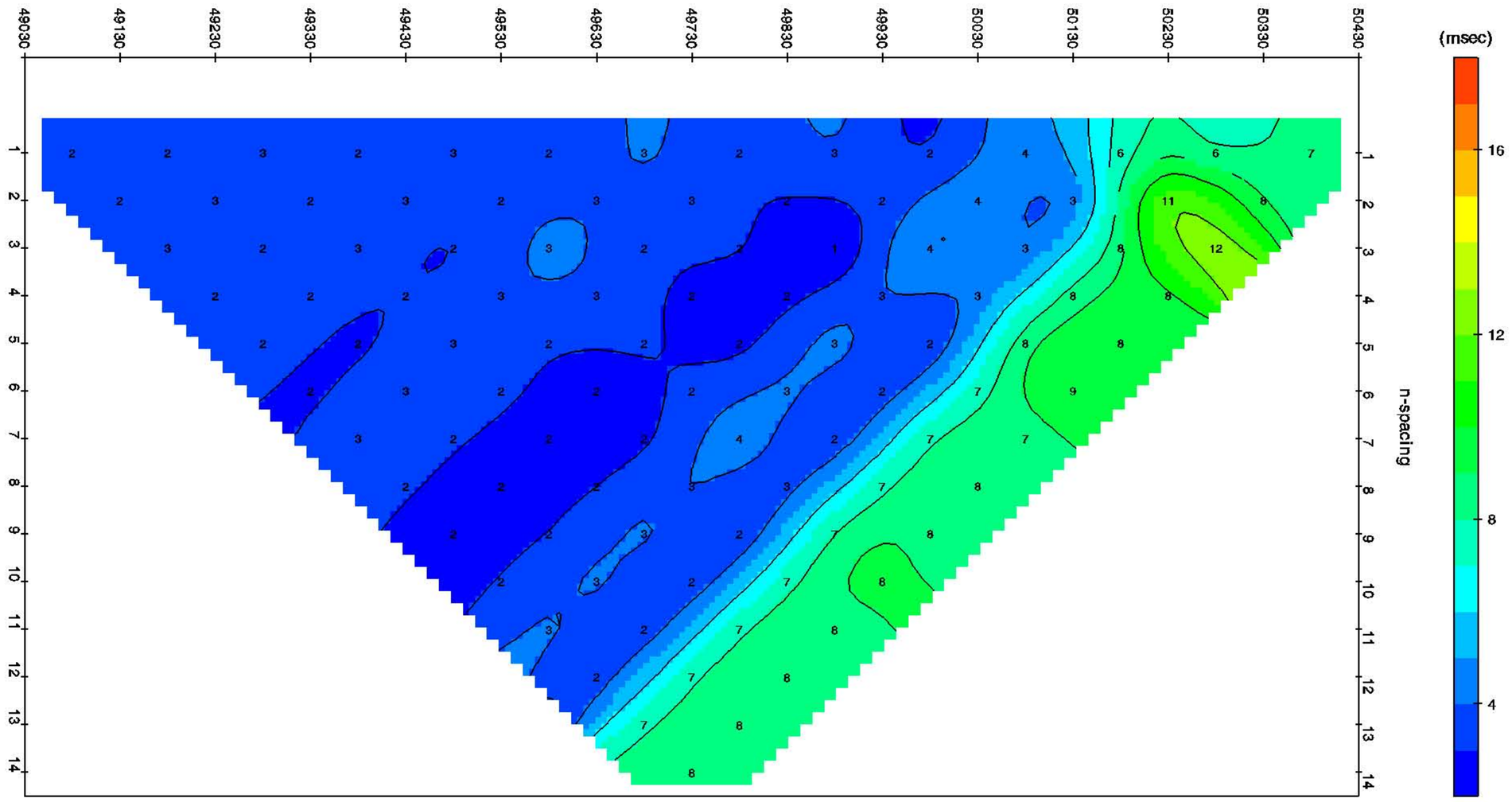
IP Inversion Model



IP Observed Data



IP Calculated Data



Roger River
Line 11950N

Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
IPSmth=0.1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

300 m

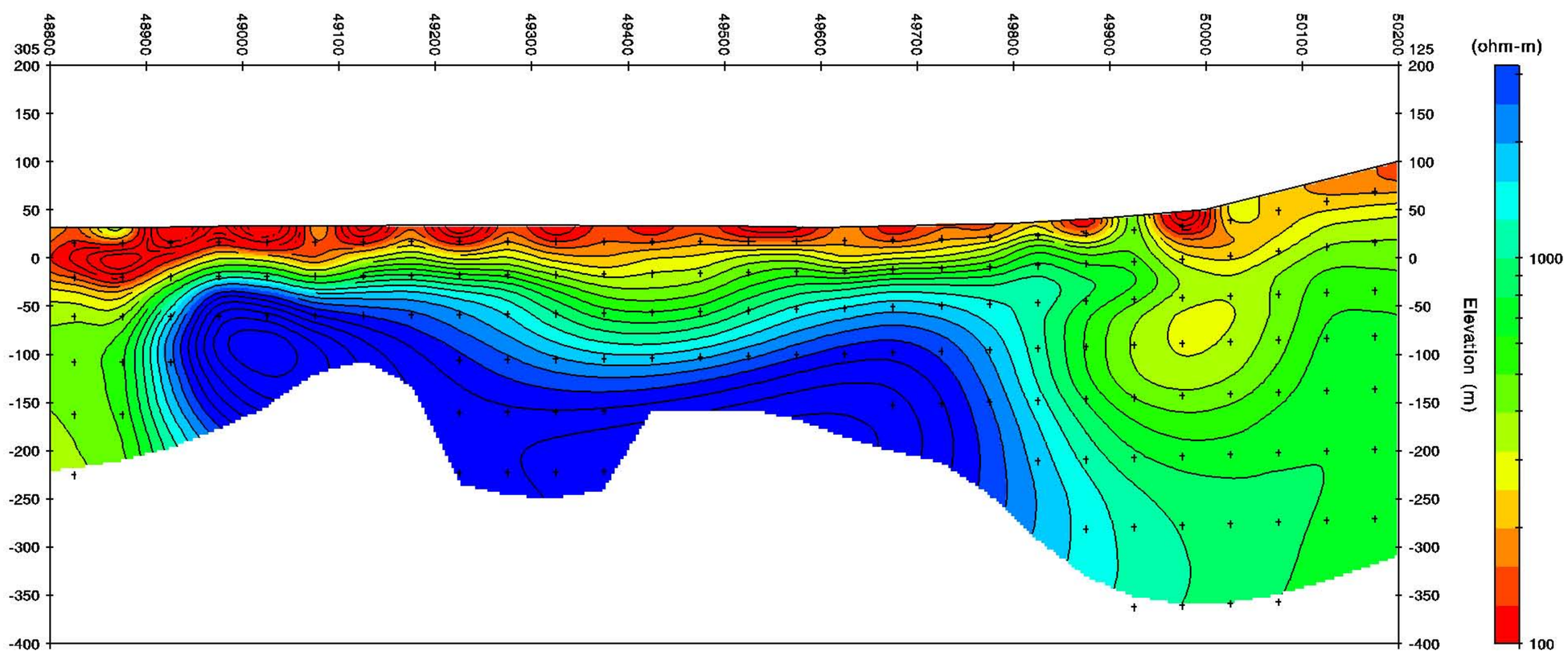
Leached Cap
Roger River
Line 11950N
2D Smooth-Model Inversion
Dipole-Dipole IP Data

AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	07/02/14	1:5000	140037

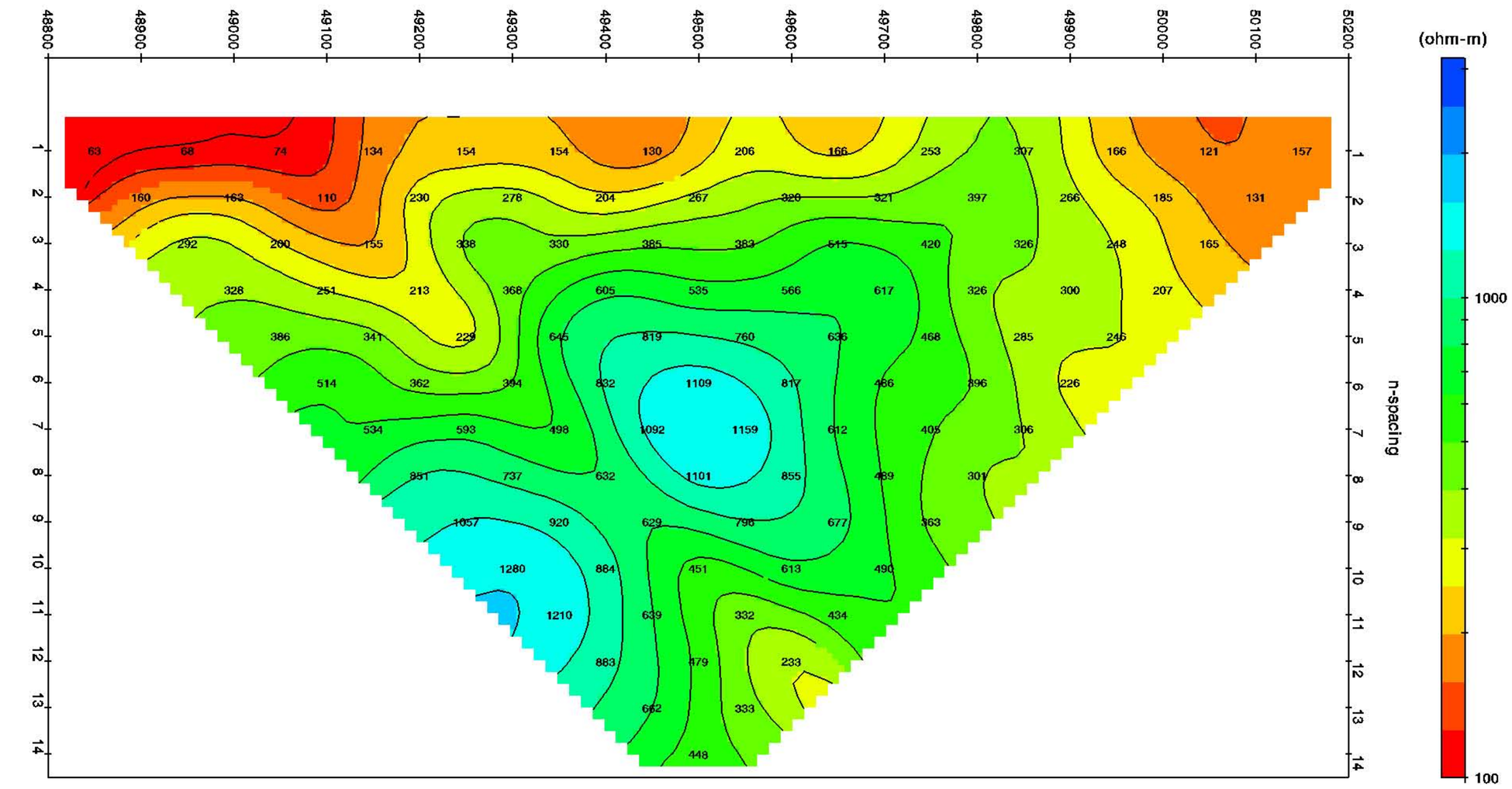
REF: Line_11950N.s2d

Roger River
Line 13000N

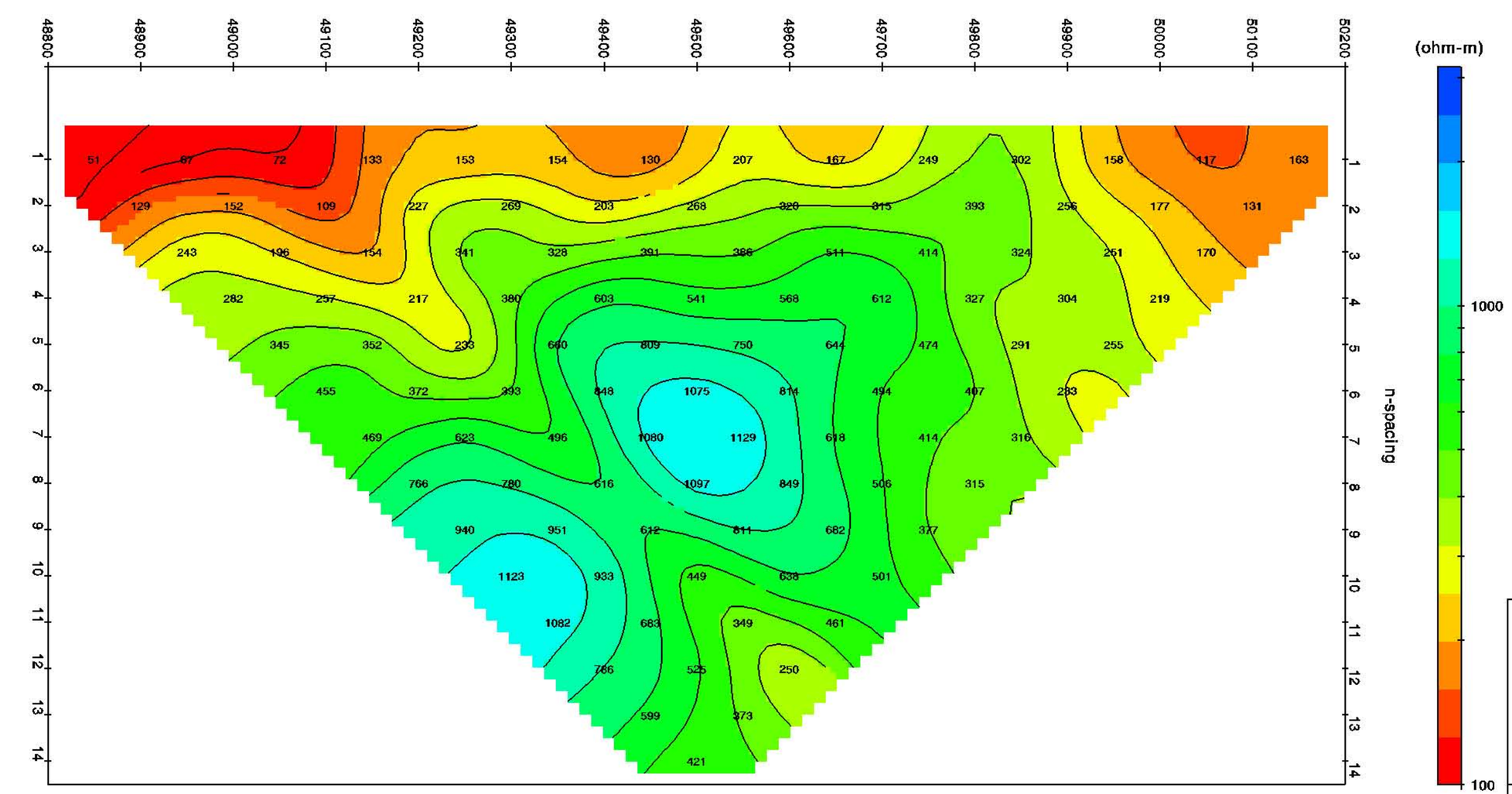
Resistivity Inversion Model



Resistivity Observed Data



Resistivity Calculated Data



Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
ResSmth=1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

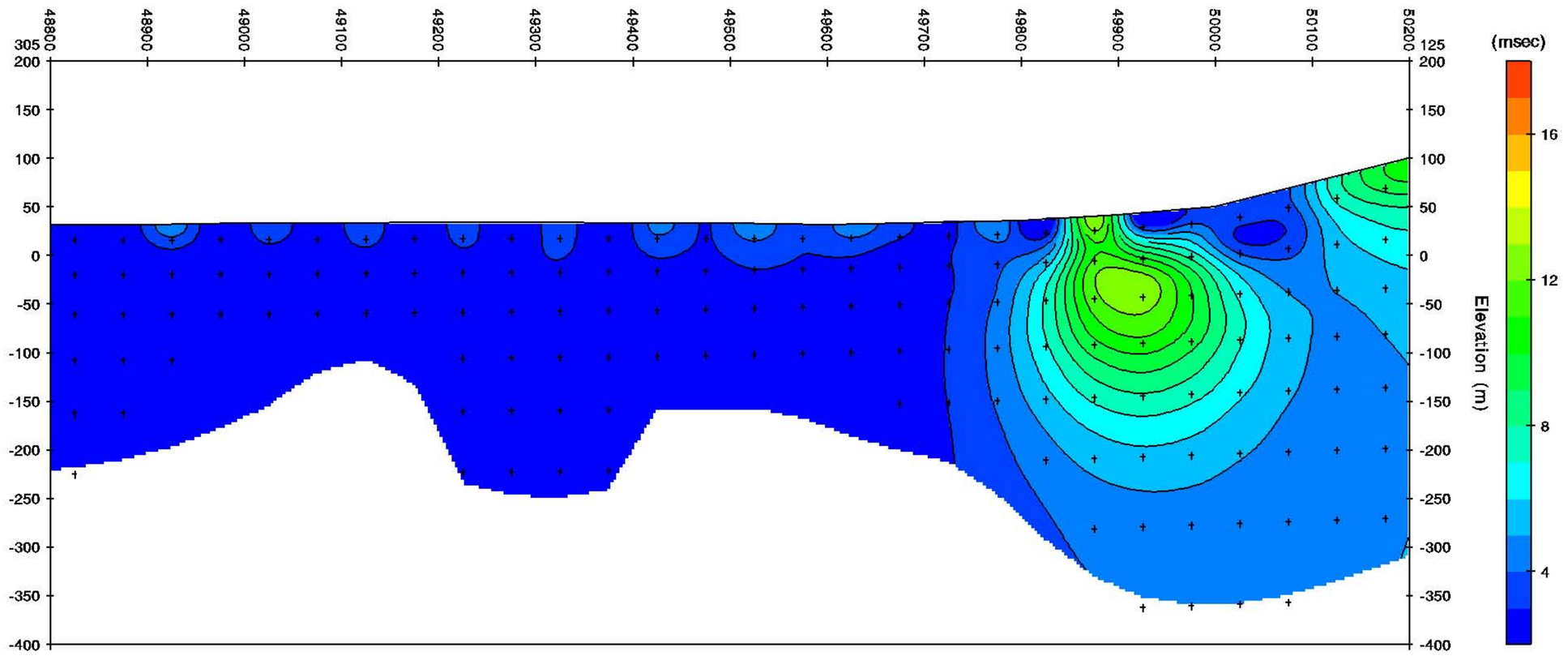
300 m

Leached Cap
Roger River
Line 13000N
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

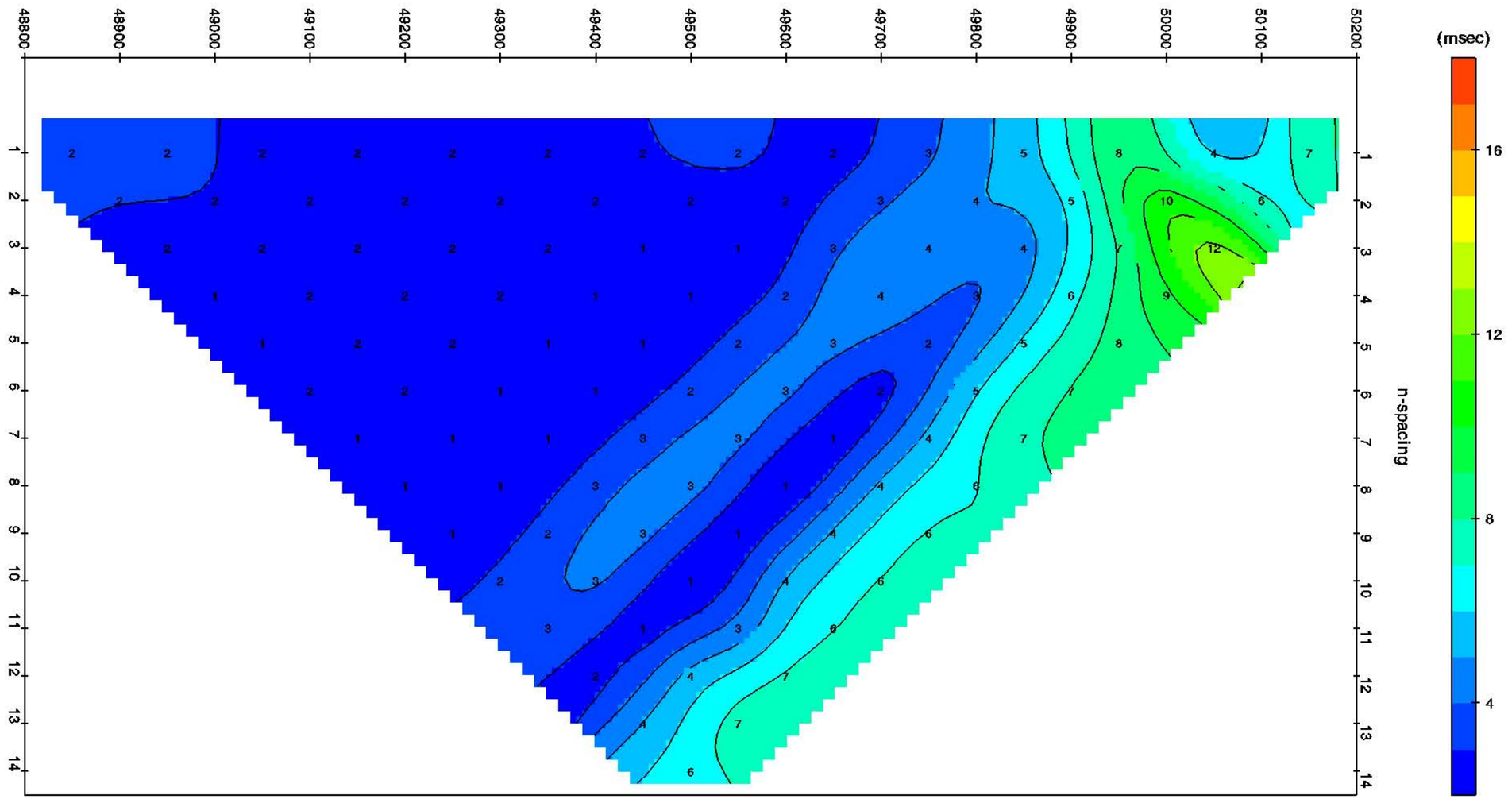
AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	08/02/14	1:5000	140037

REF: Line_13000N.s2d

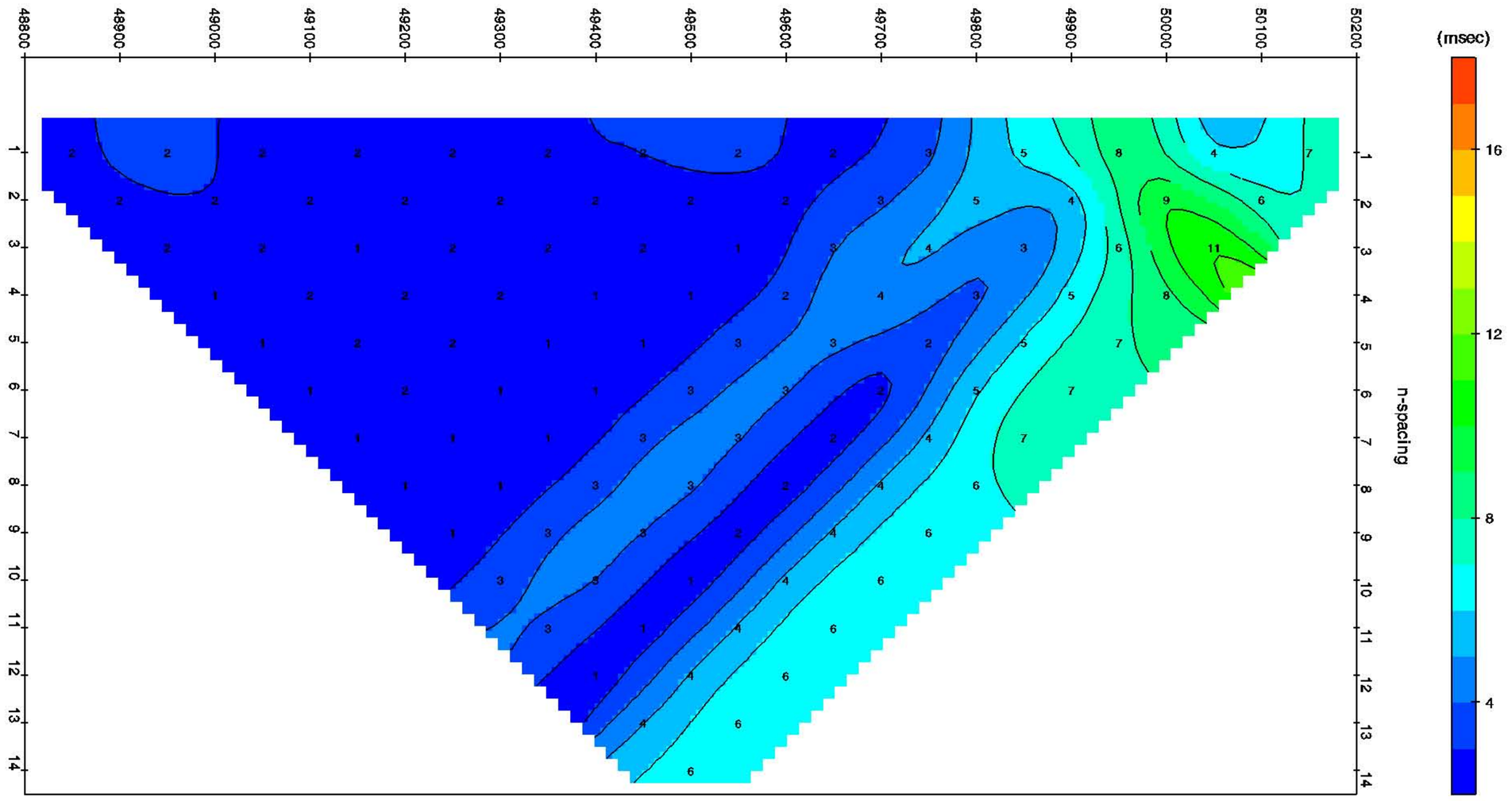
IP Inversion Model



IP Observed Data



IP Calculated Data



Roger River
Line 13000N

Survey Parameters:
100 m Dipole-Dipole data
0.125 hertz repetition rate

Inversion control parameters:
IPSmth=0.1, dpW=0.5, dxW=1, dzW=1
TS2DIP v4.70e

300 m

Leached Cap
Roger River
Line 13000N
2D Smooth-Model Inversion
Dipole-Dipole IP Data

AUTHOR	DRAWN	DATE	SCALE	REPOR
Zonge	Zonge	08/02/14	1:5000	140037

REF: Line_13000N.s2d

APPENDIX II

Job 140037 Production Summary

Zonge Engineering & Research Organization (Aust) Pty Ltd

JOB HOURS SUMMARY

Job No.: 140037 **Date:** 13/02/2014
Client: Leached Cap Pty Ltd **By:** Lachlan McDonald
Project Name: Roger River
Summary Sheet: 1 of 1 page

DATE	Prod. Hours		Misc Hours	Equip.		Comments
	Mobe	3 man	Standby (3 man)	Vehicle	Zonge Hours	
30-Jan-2014	13.25					Mobilisation from Adelaide to Melbourne - check in and board ferry - Overnight
31-Jan-2014	3.25		8		1	Continue Mobilisation from Devonport to Smithton, site recon, unload
1-Feb-2014		12				Begin prep line 10000N
2-Feb-2014		12.25			1	Prep for line 10000N was completed, and line was read the remainder of the day.
3-Feb-2014		10.5			0.5	Crew packed up line 10000N and began prep on 11100N.
4-Feb-2014		12.5			0.5	Crew completed prep and read line 11100N.
5-Feb-2014		8.5				Crew packed up line 11100N and prep/set up for 11950.
6-Feb-2014		11.5			0.5	Crew completed reading line 11950, began prep line 13000
7-Feb-2014		11.5			1	Crew completed reading line 13000, then survey pack up.
8-Feb-2014	4					Crew load vehicles and drive to Devonport
9-Feb-2014	13.5					Crew de-mobe-Devonport to Ballarat
10-Feb-2014	8.5					Crew de-mobe-Ballarat to Adelaide

TOTAL HOURS

TOTALS	Mobe	3 man	Standby (3 man)	Vehicle	Zonge Hours
Sub Totals	42.5	78.75	8	0	4.5
Totals	42.5	78.75	8	0	4.5
Rate p/hr	232.5	310	232.5	0	0
Billable Total	**$9 881.25**	**$24 412.50**	**$1 860.00**	**$0.00**	**$0.00**

APPENDIX III

Pre-Survey Client Checklist as completed by Leached Cap Pty Ltd

PRE SURVEY CLIENT CHECKLIST

Survey Details (Please attach maps or relevant documents)

1.	Zonge Job Number:	140037
2.	Client Company:	Leached Cap Pty Ltd
3.	Client Representative Planning Survey:	**Phil Muir, Ken Morrison**
4.	Survey / Project Name:	Roger River
5.	Exploration License Number:	**EL 19/2012**
6.	Coordinate Datum / Zone to be used:	GDA94 z55
7.	Survey Type:	Dipole-Dipole IP
8.	Station / Dipole Spacing:	100m dipoles, station spacing 100m
9.	Frequency:	0.125hz
10.	Data coverage required for IP:	Fixed 16 channel receiver array
11.	Can the crew contact the client representative out of hours (weekends) if necessary?	**Phil will be on site,** **Ken mobile 0419873 702 any time**
12.	Will Zonge be required to perform specific processing or inversion modeling on the data acquired?	Inversion models provided on line completion
13.	Will the client require a hardcopy of the logistics report as well as digital?	**One hardcopy only.**

PRE SURVEY CLIENT CHECKLIST

Site Details (please provide information where possible)

14.	Crew Accommodation:	**Bridge Hotel, Smithton, 03 6452 1389, motel room per person, all meals (but not bar drinks) paid by client account**
15.	Client contact for crew ***(name, phone and email)***:	**Phil Muir 0417 942 729 phil.muir@bigpond.com Ken Morrison 0419 873 702 kcm@tassie.net.au**
16.	Relevant site liaison contacts ***(name, phone and email)***:	**N/A**
17.	Will Zonge crew be required to contact landowners or other external interested parties?	**Not routinely, client personnel will be on site**
18.	Level of mobile phone coverage at accommodation or survey area:	**Accommodation good, not sure yet about the entire field coverage**
19.	Please describe level of vehicle access along survey lines and expected topography ***(attach photos or maps if possible)***:	**More than half line metres on flat paddocks but crops and wet ground may be factors (see map)**
20.	Known obstacles along lines ***(fences, roads etc)***:	**Fences and one main road** (**see map**)
21.	Are cultural noise sources present ***(power lines, fences, houses etc)***?	**Mainly electric fences, they will be turned off but still plenty of wire and steel about**
22.	Please describe access to nearest water source, both potable and non potable:	**Drinking water to be carried by crew from Smithton. Process water from Duck River (max distance about 3 km)**
23.	Are large volumes of water available for grounded electrodes ***(up to ~2000L/day)***?	**Plenty of water available but will need manual transport in many places**
24.	Are there cultural or environmental restrictions the crew should be aware of?	**Normal respect for private land, no special factors**
25.	Please describe nearest refueling location ***(diesel and petrol)***:	**Edith Creek (15 minutes), Smithton (30 minutes and accommodation base)**
26.	Do you require daily or scheduled contact with crew?	**Yes, with Phil who will be on site**

PRE SURVEY CLIENT CHECKLIST

27.	Will the crew be required to work around other personnel?	**Yes, client personnel**
28.	Please describe requirements (if any) for crew to work on site ***(restricted work hours, induction, drug test, PPE etc)***:	**N/A**
29.	Have the lines been flagged prior to crew arrival?	**They will be**
30.	What level of rehabilitation of transmitter electrodes is required?	**Neat and tidy ground surface**
31.	Will a client based Emergency Response Plan be available? ***(If so please attach copy)***	**Self Sufficient first aid required by crew. Hospital at Smithton (30 minutes), phone 000**
32.	Will there be stock or animals in the survey area?	**Yes, they will be moved as needed**
33.	Describe site vehicle requirements: ***e.g. no split rims, flashing lights etc.***	**No special requirements**

Form reviewed by _____K Morrison, P Muir_____ **on behalf of Client**

Date: _____14th Jan 2014_____

Form reviewed by _____ **on behalf of Zonge Engineering Australia**

Date: _____

Form reviewed by _____ **on behalf of Zonge Engineering Australia**

Date: _____