Results of Electromagnetic Survey in Hutchinson, Kansas in May 2001

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1930 Constant Avenue
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Final Report

Open-file Report No. 2002-52

December 2002

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by
Jianghai Xia

of the

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Abstract

An electromagnetic (EM) survey was conducted in May 2001 with a GEM-2, an electromagnetic instrument, on about 400,000 ft^2 in Hutchinson, Kansas after a previous EM survey successfully located an uncapped abandoned brine well, 4 inches in diameter and buried at a depth of 5 ft. The survey area was plotted in 100 ft by 100 ft grids using a compass and a tape to guide measurements. Data were acquired of each grid along 2-ft spaced lines using three frequencies—2,430 Hz, 7,290 Hz, and 18,270 Hz. Fifteen anomalies were verified. One anomaly was caused by an 8-in horizontal pipe that could have been used as a brine transportation pipe. No brine wells were found in this survey area. This report compiles EM data and anomaly sources.

Introduction

On January 17, 2001, a natural gas explosion and fire destroyed two downtown Hutchinson businesses. The next day another explosion occurred at a mobile home park 3 miles away, and two residents died of injuries sustained in that explosion. Hundreds of people were evacuated as gas geysers began erupting across the area. The geysers spewed a mixture of natural gas and saltwater. The pathways to the land surface at both the explosion sites and the geysers were abandoned brine wells used for solution mining of salt (Allison, 2001).

The Hutchinson Response Project is charged with finding these abandoned brine wells. Hutchinson City and state officials estimate that there may be more than 160 abandoned brine wells in and around Hutchinson. It is estimated that it will cost about $60,000 to plug each abandoned well (*Hutchinson News*, May 9, 2001) once it is found. An EM survey was conducted in March 2001 in the open field on the southwest corner of 11th and Chemical Streets (Xia, 2001). Four anomalies were identified and reported. One anomaly was determined to be an abandoned brine well, 4 inches in diameter and buried in 5 ft deep. The other three anomalies were discussed in Xia (2001 and 2002).

The City of Hutchinson conducted an EM survey on grids of approximately 400,000 ft^2 (Figure 1) in May 2001. The Kansas Geological Survey processed the collected data and determined locations to excavate anomalies.

EM Survey

The survey area was defined by 100 ft by 100 ft grids with a compass and a tape (Figure 1). Three frequencies were chosen for the survey—2,430 Hz, 7,290 Hz, and 18,270 Hz. For each frequency, both in-phase and quadrature components of the induced EM field in ppm were recorded. Data were acquired with a GEM-2 (Figure 2) on each 100 ft by 100 ft grid along lines spaced 2 ft apart (Figure 3). EM signals from a known well were first recorded to determine what kind of anomaly might be caused by a buried well. The signals then were compared with EM reconnaissance results acquired on an assigned area to determine locations to excavate.

Well 8c is the well that costs two people their lives. I acquired EM data on a 20 ft by 20 ft area along lines with 2 ft spacing. Well 8c is located at point (10, 10). The signals from the well are all ellipses in both in-phase and quadrature components (in the Appendix, Figures A1a - f). A positive anomaly in the southeast corner is caused by rebar in the driveway. Amplitudes of signals with 2,430 Hz from the well are much higher than signals with the other two frequencies (Table 1).

Table 1. Amplitudes (in ppm) of EM signals from well 8c.
I: in-phase component; Q: quadrature component.

2,430 Hz (I/Q)	7,290 Hz (I/Q)	18,270 Hz (I/Q)
1,700/1,200	2,500/1,700	2,700/2,000

A survey crew of the City of Hutchinson conducted EM data acquisition on forty 100 ft by 100 ft grids. Measurements were first gridded into 1 ft × 1 ft grids by the kriging method (Surfer®, 1999), then data displayed using Surfer® in a color scale to enhance anomalies. The appendix of this report contains figures showing all survey results. Results from the KGS grid are shown in Figures A2a-f. Results from grids 1 through 40 are shown in Figures B1 to B40.

Verification of Anomalies

Anomalies were picked based on their amplitudes and shapes. A backhoe was on site during a follow-up trip to Hutchinson in July 2001 to verify anomalies by excavation as soon as their locations had been identified. Fifteen anomalies were verified (Table 2). One anomaly was caused by an 8-in horizontal pipe that might have been used for brine transportation. The backhoe traced the pipe for 20 ft to the corroded end of the pipe. No brine wells were found on the survey area.

Acknowledgements

I greatly appreciate Dennis Clennan and Stephen William of the City of Hutchinson for their advice in locating the test site and Reg Jones, Kreg Luman, Robert Cape, Bill Stoy, and Chris Rucbke of the City of Hutchinson for their efforts in field data acquisition. I thank Sihao Xia of the University of Kansas for his assistant in data processing and preparation of this report. I also thank Mary Brohammer for her assistance in preparation of this report.

References

Allison, M.L., 2001, Hutchinson, Kansas: A Geologic detective story: Geotimes, v. 46, no. 10, 14-18.
Surfer® 7, 1999, User's guide: Golden Software, Inc., 619 p.

Xia, J., 2001, Using electromagnetic method to locate abandoned brine wells in Hutchinson, Kansas: Kansas Geological Survey Open-file Report 2001-17.

Xia, J., 2002, Using electromagnetic methods to locate abandoned brine wells in Hutchinson, Kansas: Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) 2002 Annual Meeting of EEGS, Las Vegas, Nevada, February 10-14, 2002, 11 pp, available on CD.

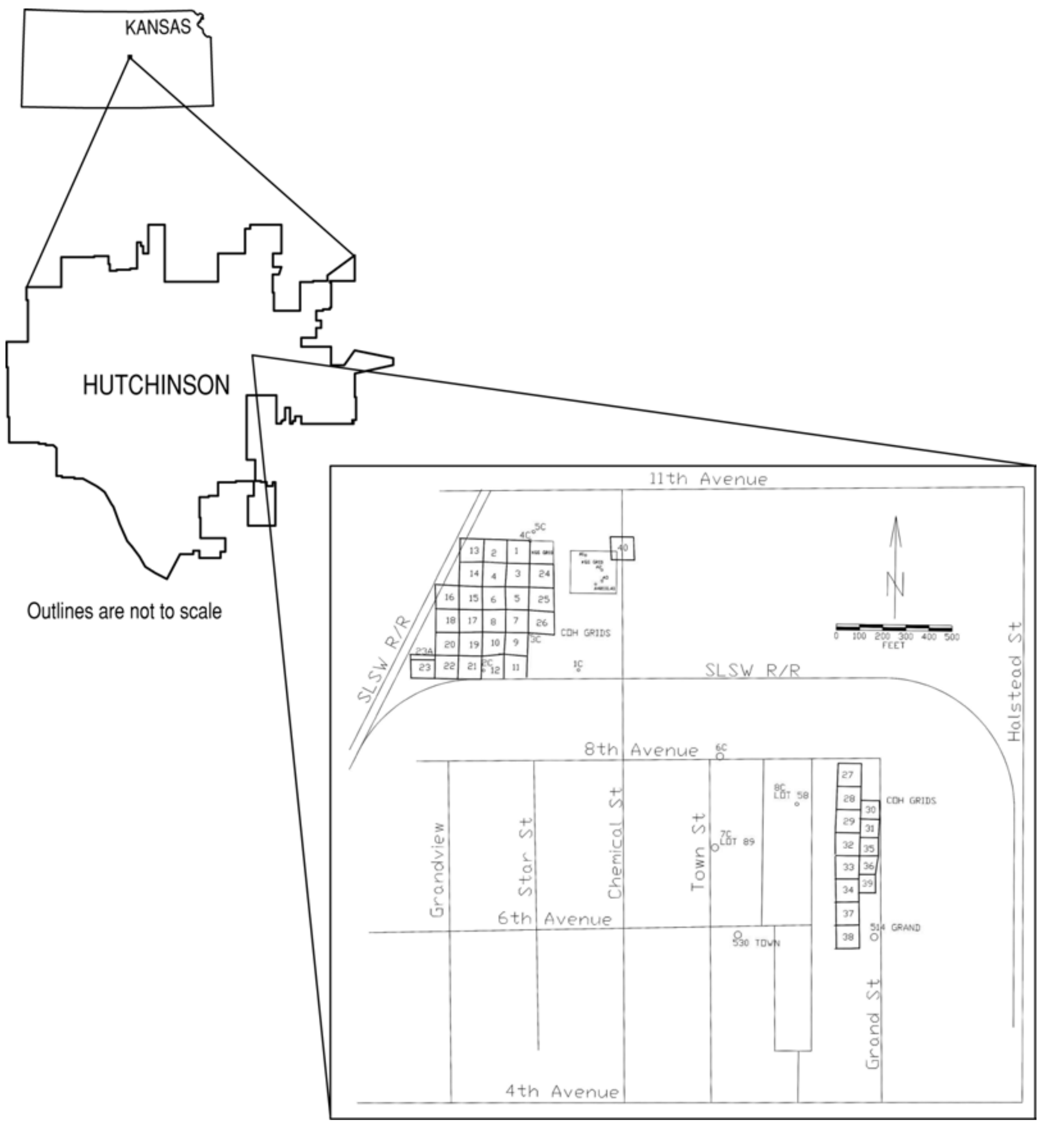


Figure 1. Site map of the EM survey. Numbers in each square are grid numbers. The grid (180 ft by 200 ft) located in the southwest corner of grid 40 is the first test grid that was done in March 2001 (Xia, 2001).

Figure 2. EM survey with a GEM-2 at Well 8c. Xia is surveying.

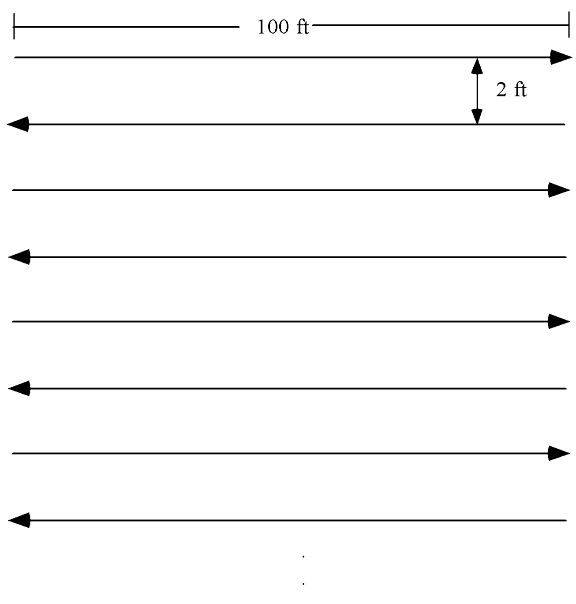


Figure 3. Arrows indicate the walking direction.

Table 2. Verified electromagnetic anomalies.

Anomaly values shown in tables are in ppm relative to the primary field. I: In phase component; Q: Quadrature component.

1. Positive Anomalies

Grid #	Location (x, y)	2430 Hz (I/Q)	7290 Hz (I/Q)	18270 Hz (I/Q)	Shape	Source(s)
0 (KGS)	47.4, 26	5700/1200	6000/NA	6000/NA	Three Bull's-eyes (2 ft by 3 ft)	Three steel bars 2 ft long in a concrete at a depth of 1 ft (Figure A2-g).
3	92, 66	1400/NA	1000/NA	1000/NA	Bull's-eye (2 ft)	Nothing comes out.
5	69, 40	1400/500	1600/200	1500/NA	Irregular (3 ft by 5 ft)	A metal pipe at a depth of 1 ft (Figure B5-g).
6	45.5, 74	1000/200	800/NA	500/NA	Bull's-eye (2 ft)	Nothing comes out.
8	32.3, 41.4	19000/2600	20000/NA	20000/NA	Bull's-eye (4 ft)	A horizontal thin metal plate with a size of 2.5 ft by 3.5 ft by 1 in at a depth of 3 ft (Figure B8-g).
18	37, 2	8000/2000	8000/1000	8000/NA	Cylinder (3 ft by 6 ft)	A cluster of metal sheets at a depth of 4 ft (Figure B18-g).
23	35, 30	5000/3000	2000/3000	3000/2000	Bull's-eye (2 ft by 3 ft)	A dumping field of an old railroad company. It was not dug.
24	84, 4	8000/2400	8000/500	8000/-1000	Bull's-eye (6 ft)	A metal sheet 2 ft by 2 ft at a depth of 2 ft (Figure B24-g).
36	79, 34	7000/1000	7000/-200	7000/-500	A positive-negative-positive cluster	Two metal sheets at a depth of 1.5 ft (Figure B36-g).

2. Anomalies with positive in phase values, negative quadrature values

Grid #	Location (x, y)	2430 Hz (I/Q)	7290 Hz (I/Q)	18270 Hz (I/Q)	Shape	Source(s)
16	47.4, 40	3500/-2500	1700/-350	1200/NA	Bull's-eyes (3 ft)	A horizontal metal with a size 1.5 ft by 2.5 ft by 0.5 in at a depth of 0.5 ft (Figure B16-g).
16	71, 58	2500/-800	1700/-800	1000/-500	Bull's-eye (3 ft)	Slag (Figure B16-h)

3. Negative Anomalies

Grid #	Location (x, y)	2430 Hz (I/Q)	7290 Hz (I/Q)	18270 Hz (I/Q)	Shape	Source(s)
29	26, 76	-2200/-300	-2500/-400	-1300/NA	Bull's-eyes (2 ft)	A metal sheet on the ground 1 ft by 1.5 ft (Figure B29-g).
40	92, 30	-15000/-19000	-15000/-15000	-15000/17000	Cylinder (3 ft by 12 ft)	An 8-in pipe (E-W) on the ground (Figure B40-g).
40	72.8 16	-12000/-4700	-15000/-500	-15000/NA	Bull's-eye (3 ft)	A dumped water heater on the ground (Figure B40-h).

4. Linear Anomaly

Grid #	Location	2430 Hz	7290 Hz	18270 Hz	Shape	Source(s)
19	y = 85	Positive-negative-positive in the y direction	Positive-negative-positive in the y direction	Positive-negative-positive in the y direction	Linear along the y direction	An 8 in-pipe that could be an abandoned brine pipe at a depth of 2 ft (Figure B19-g).

Appendix

List of Figures

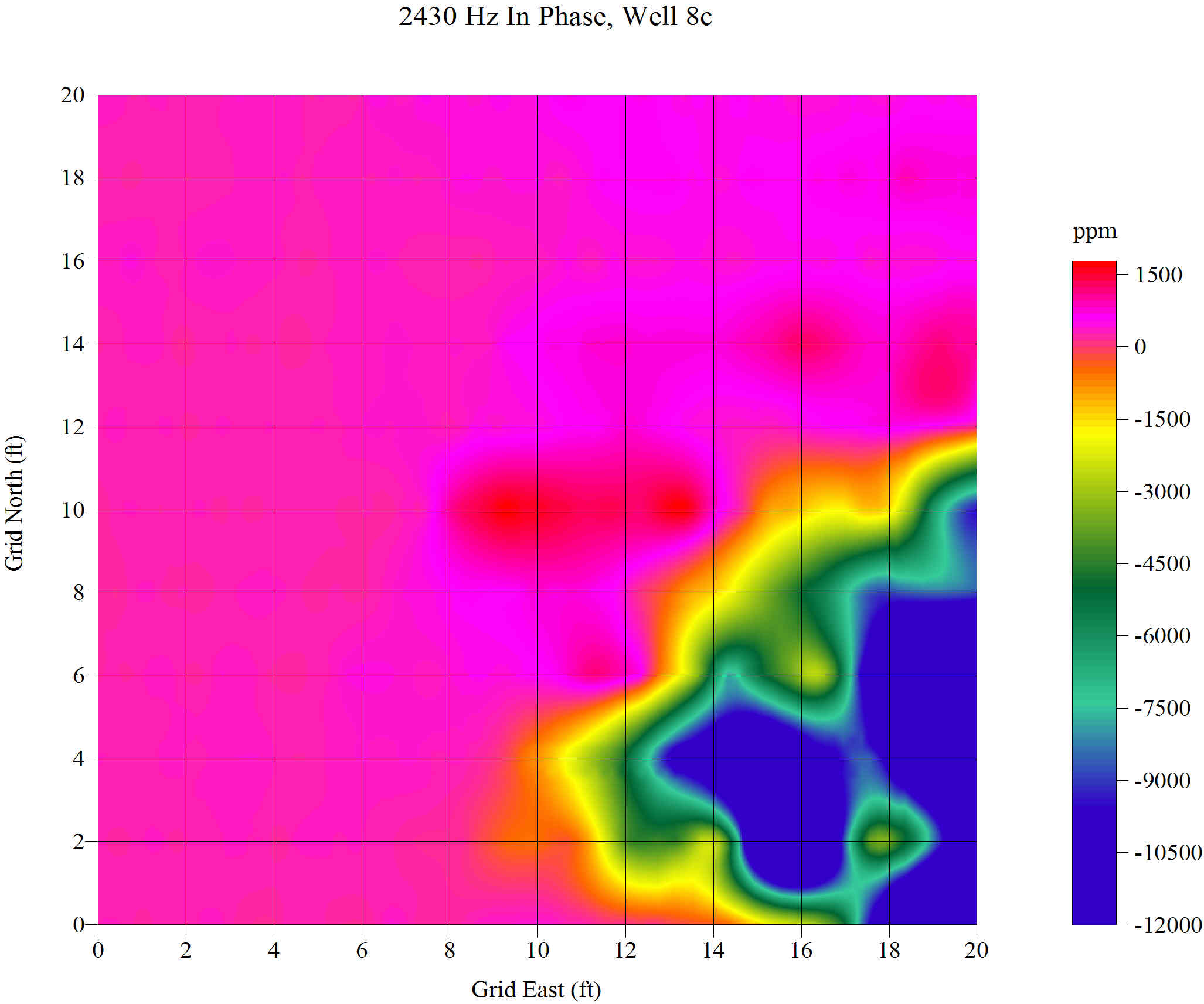

2430 Hz In Phase, Well 8c
Grid North (ft)
Grid East (ft)
ppm
1500
0
-1500
-3000
-4500
-6000
-7500
-9000
-10500
-12000
0
2
4
6
8
10
12
14
16
18
20

Figure A1-a

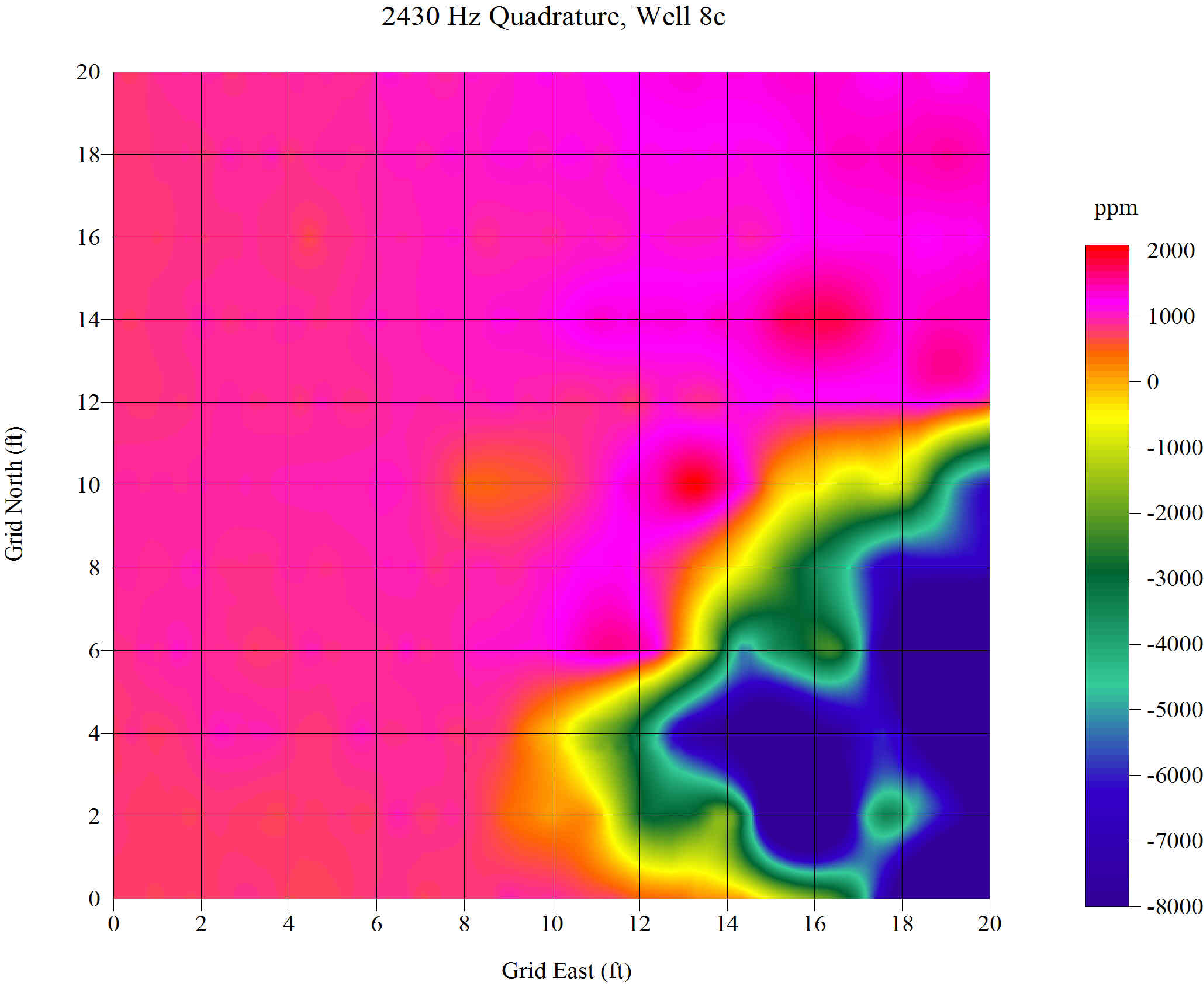

2430 Hz Quadrature, Well 8c
Grid North (ft)
Grid East (ft)
0
2
4
6
8
10
12
14
16
18
20
ppm
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000

Figure A1-b

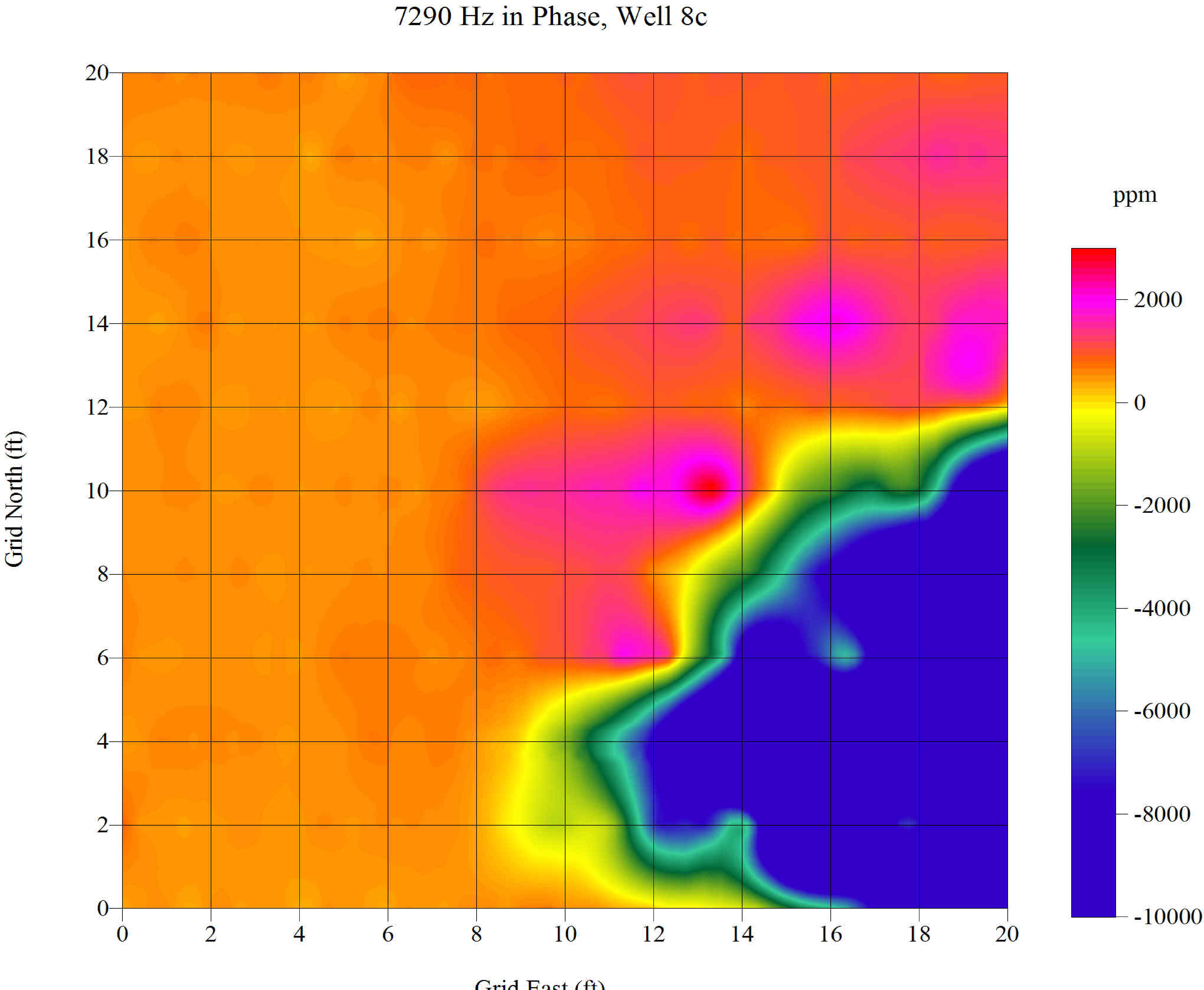

7290 Hz in Phase, Well 8c
Grid North (ft)
Grid East (ft)
ppm
2000
0
-2000
-4000
-6000
-8000
-10000
0
2
4
6
8
10
12
14
16
18
20

Figure A1-c

7290 Hz Quadrature, Well 8c

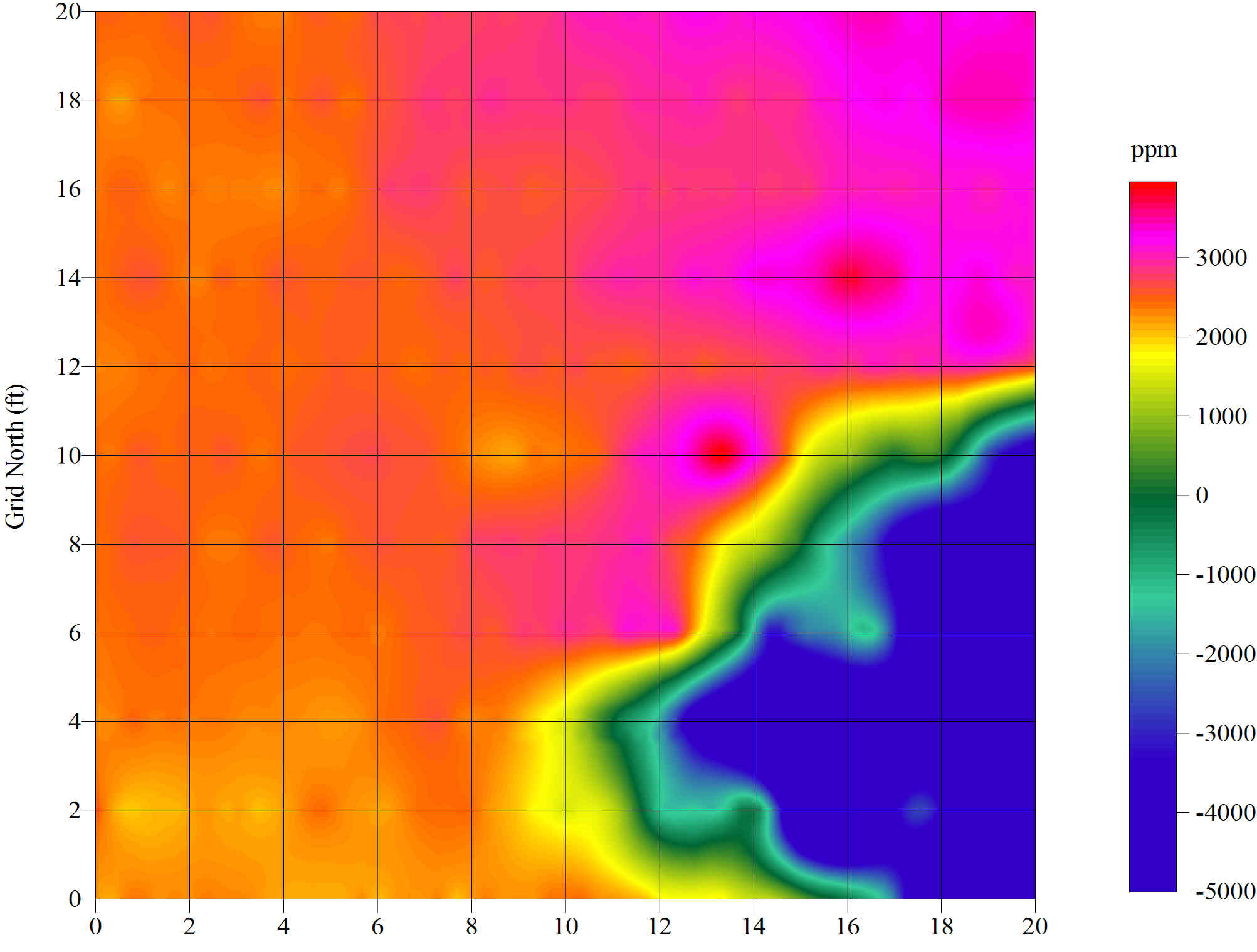


Figure A1-d

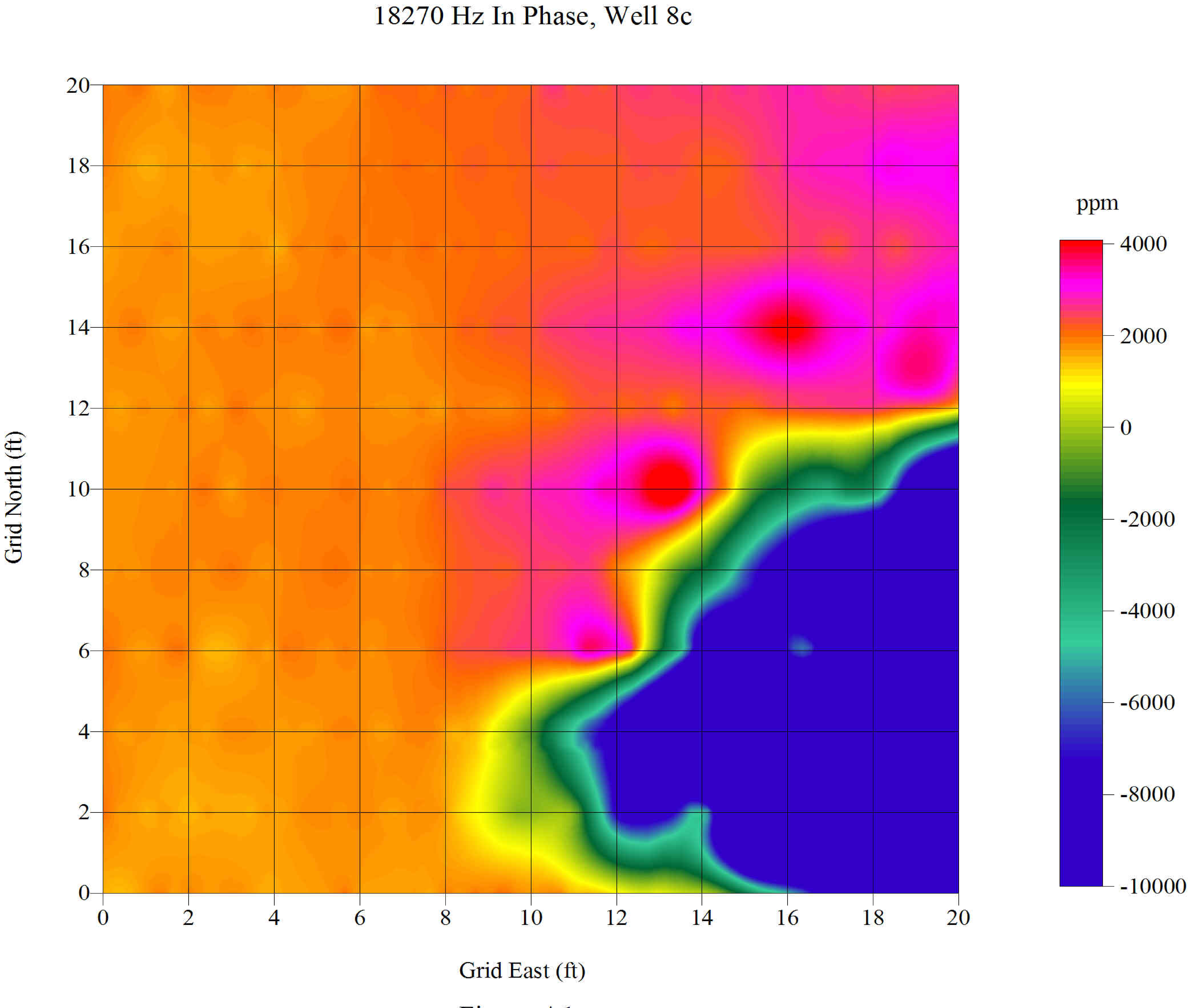
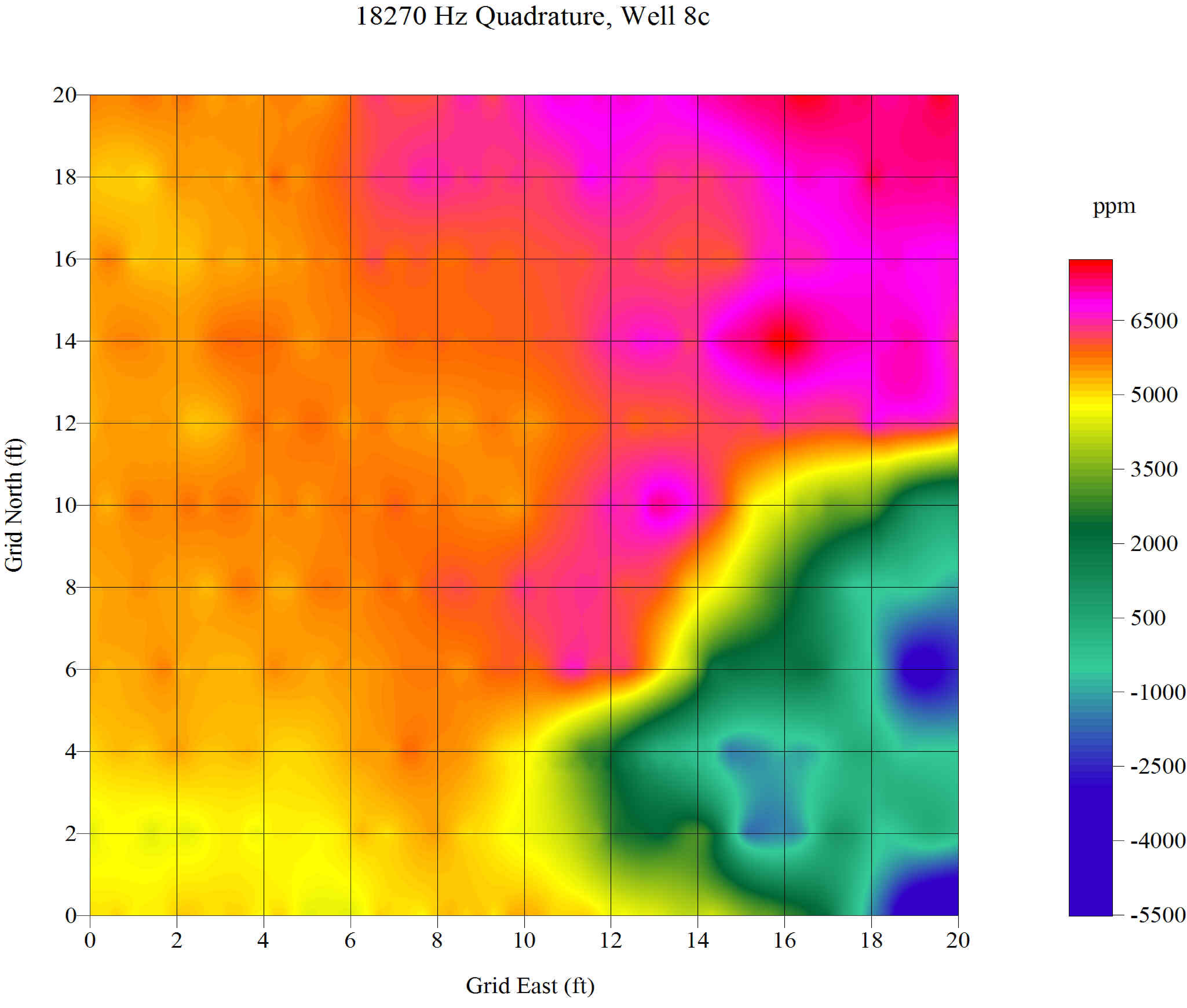
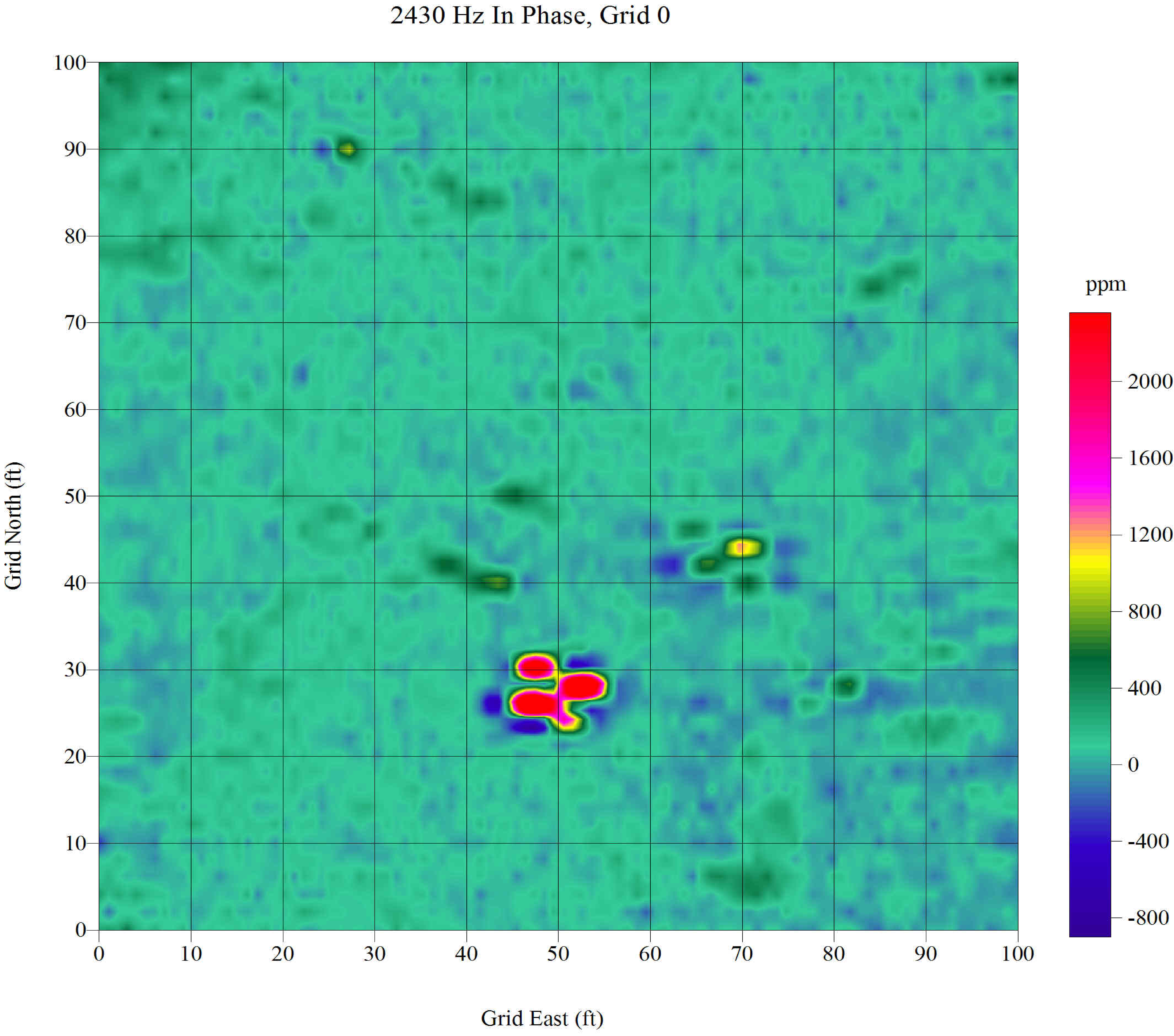

18270 Hz In Phase, Well 8c
Grid North (ft)
Grid East (ft)
ppm
4000
2000
0
-2000
-4000
-6000
-8000
-10000
0
2
4
6
8
10
12
14
16
18
20

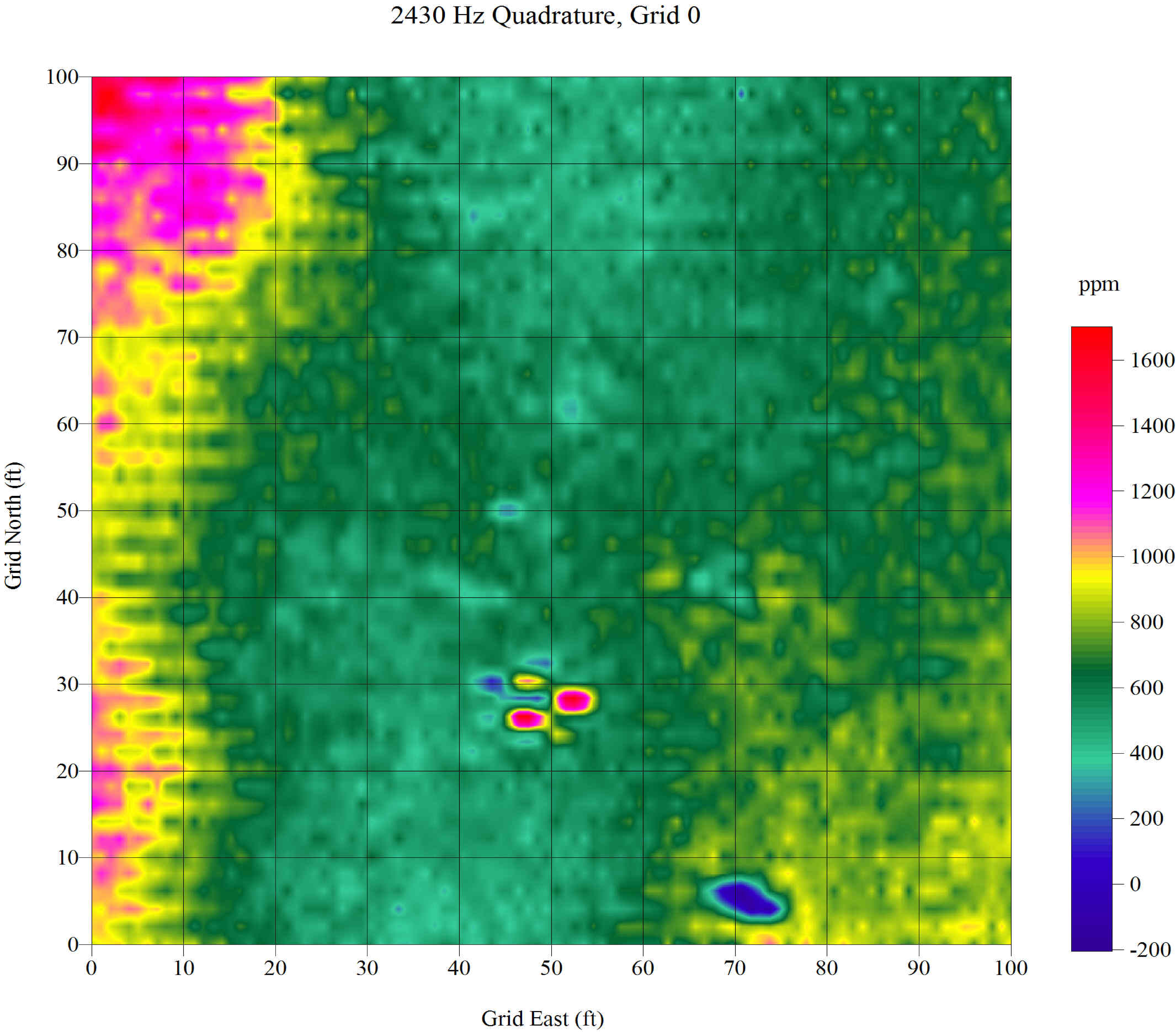
Figure A1-e



18270 Hz Quadrature, Well 8c
Grid North (ft)
0
2
4
6
8
10
12
14
16
18
20
Grid East (ft)
ppm
6500
5000
3500
2000
500
-1000
-2500
-4000
-5500

Figure A1-f


2430 Hz In Phase, Grid 0
Grid North (ft)
Grid East (ft)
ppm
2000
1600
1200
800
400
0
-400
-800
0
10
20
30
40
50
60
70
80
90
100
Figure A2-a



2430 Hz Quadrature, Grid 0
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
1600
1400
1200
1000
800
600
400
200
0
-200

Figure A2-b

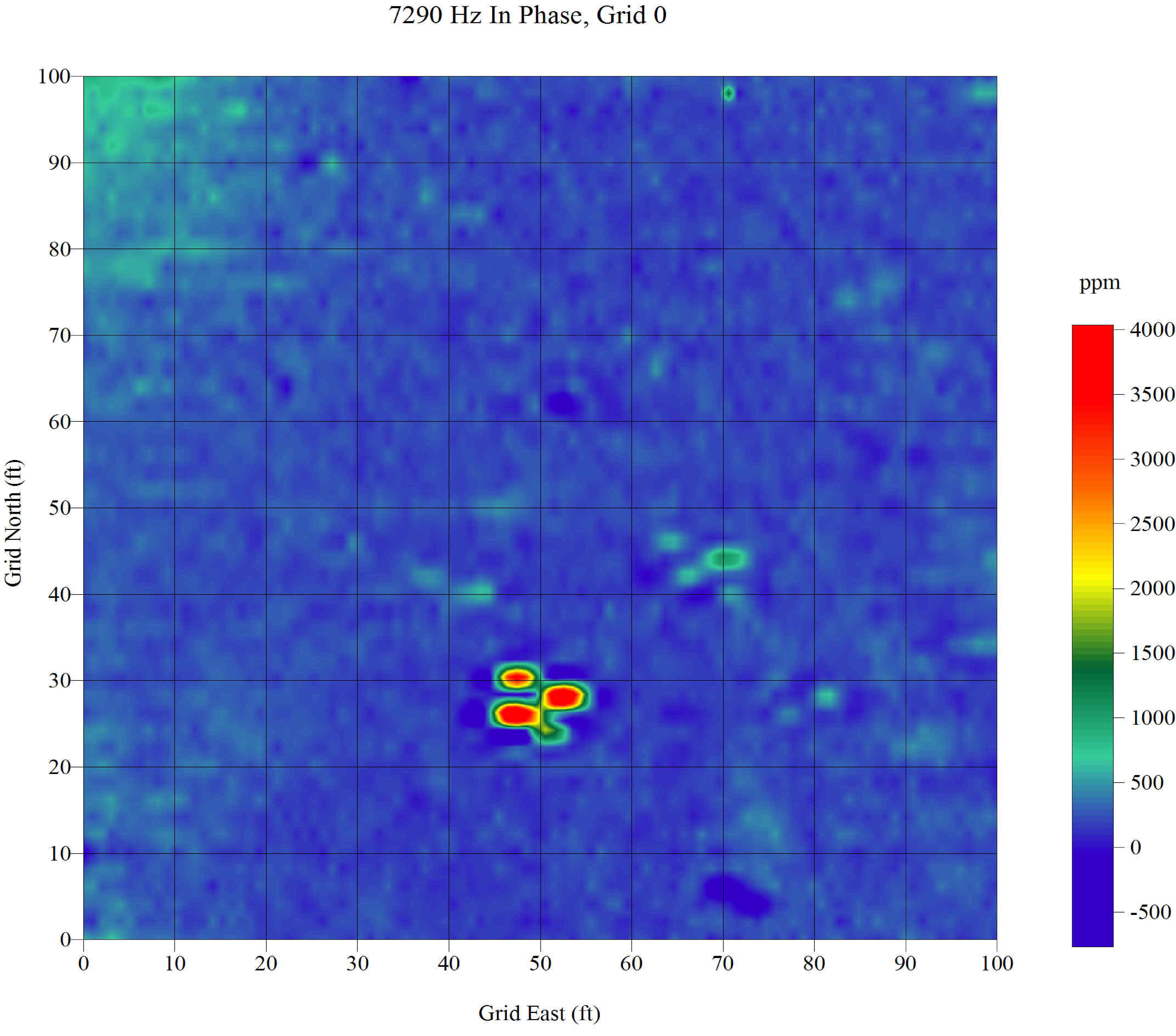

7290 Hz In Phase, Grid 0
Grid North (ft)
100
90
80
70
60
50
40
30
20
10
0
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
4000
3500
3000
2500
2000
1500
1000
500
0
-500

Figure A2-c

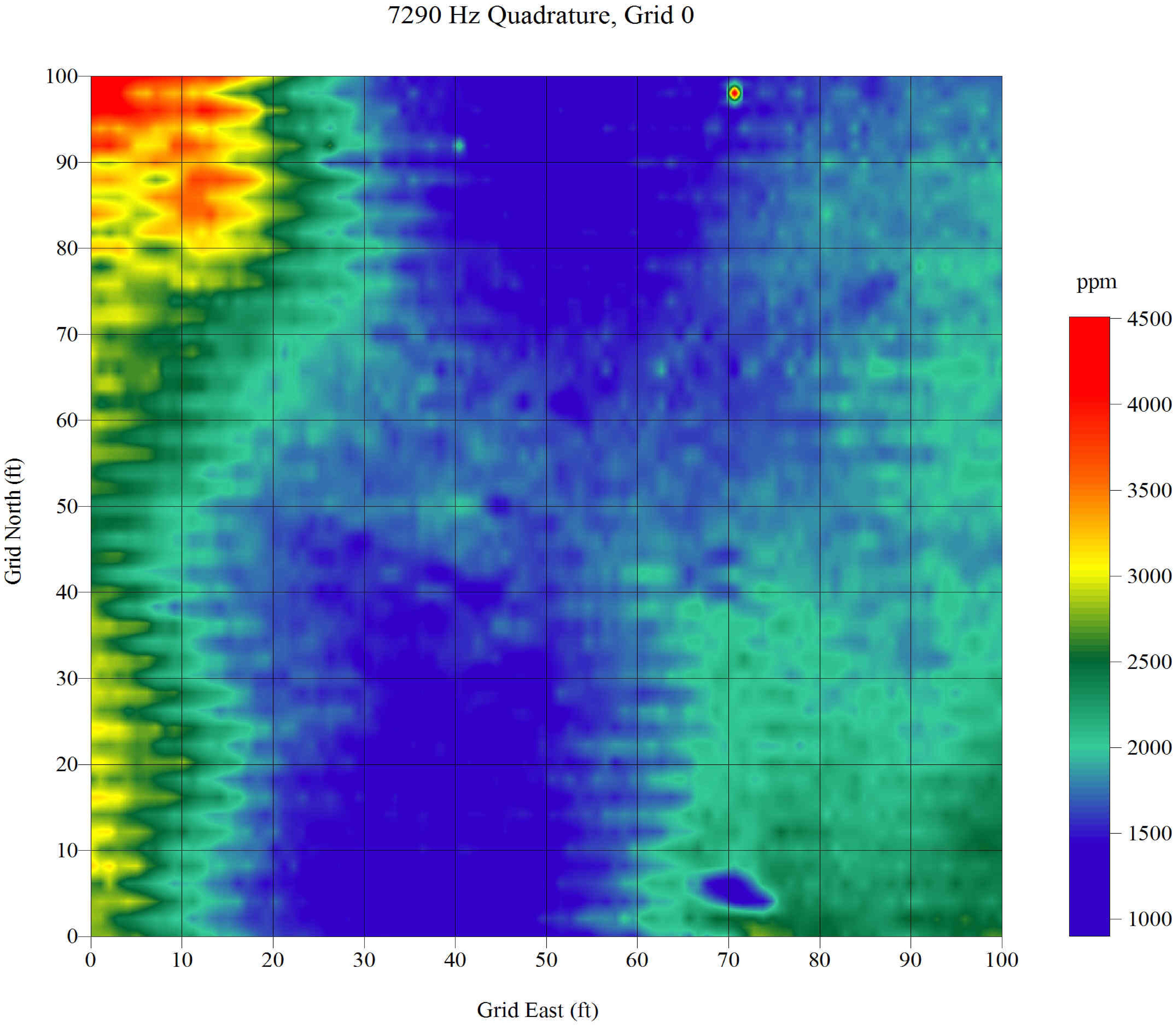

7290 Hz Quadrature, Grid 0
Grid North (ft)
Grid East (ft)
ppm
4500
4000
3500
3000
2500
2000
1500
1000
0
10
20
30
40
50
60
70
80
90
100

Figure A2-d

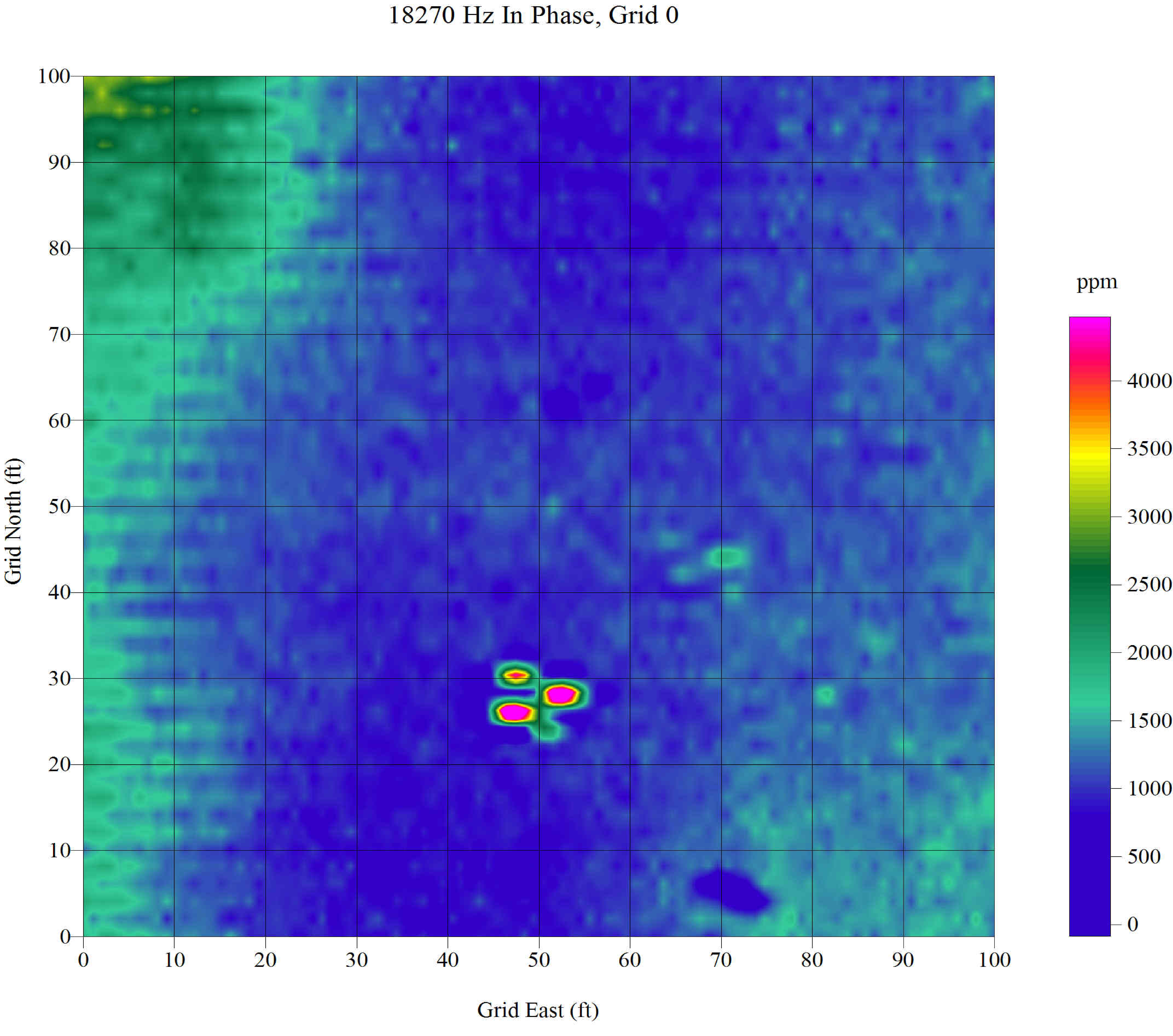

18270 Hz In Phase, Grid 0
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
500
1000
1500
2000
2500
3000
3500
4000

Figure A2-e

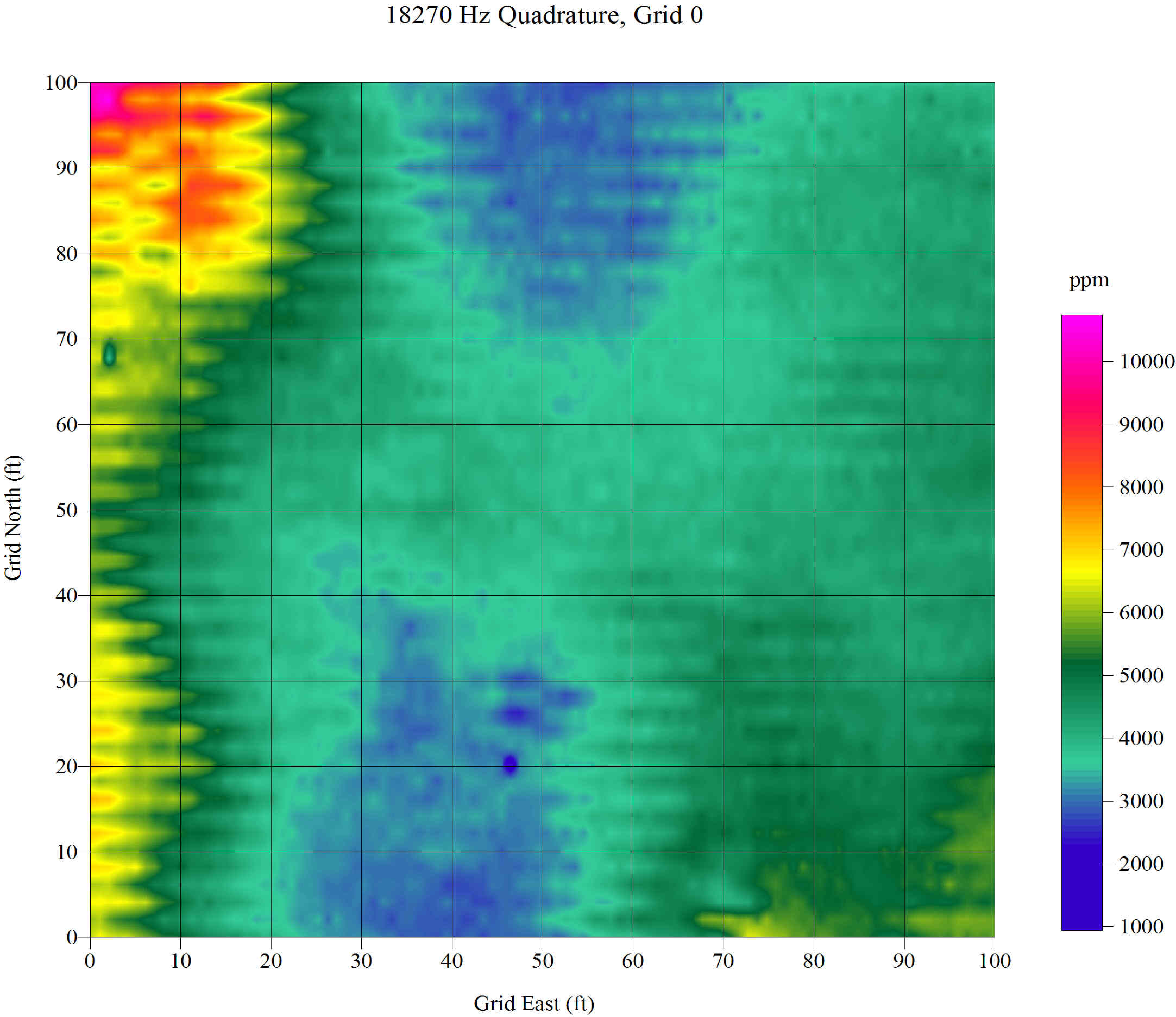
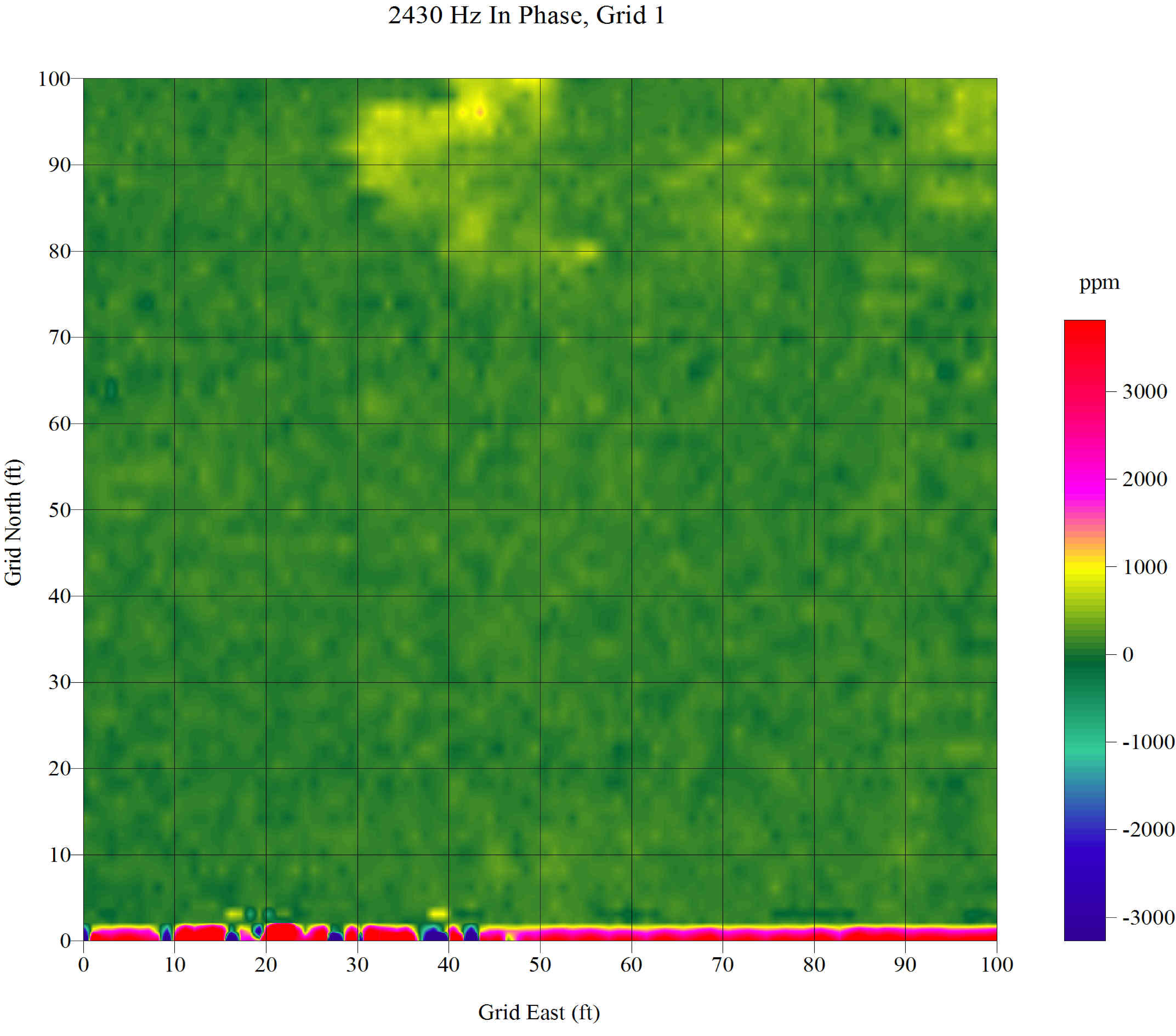

18270 Hz Quadrature, Grid 0
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000

Figure A2-f

Figure A2-g



2430 Hz In Phase, Grid 1
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
3000
2000
1000
-1000
-2000
-3000

Figure B1-a

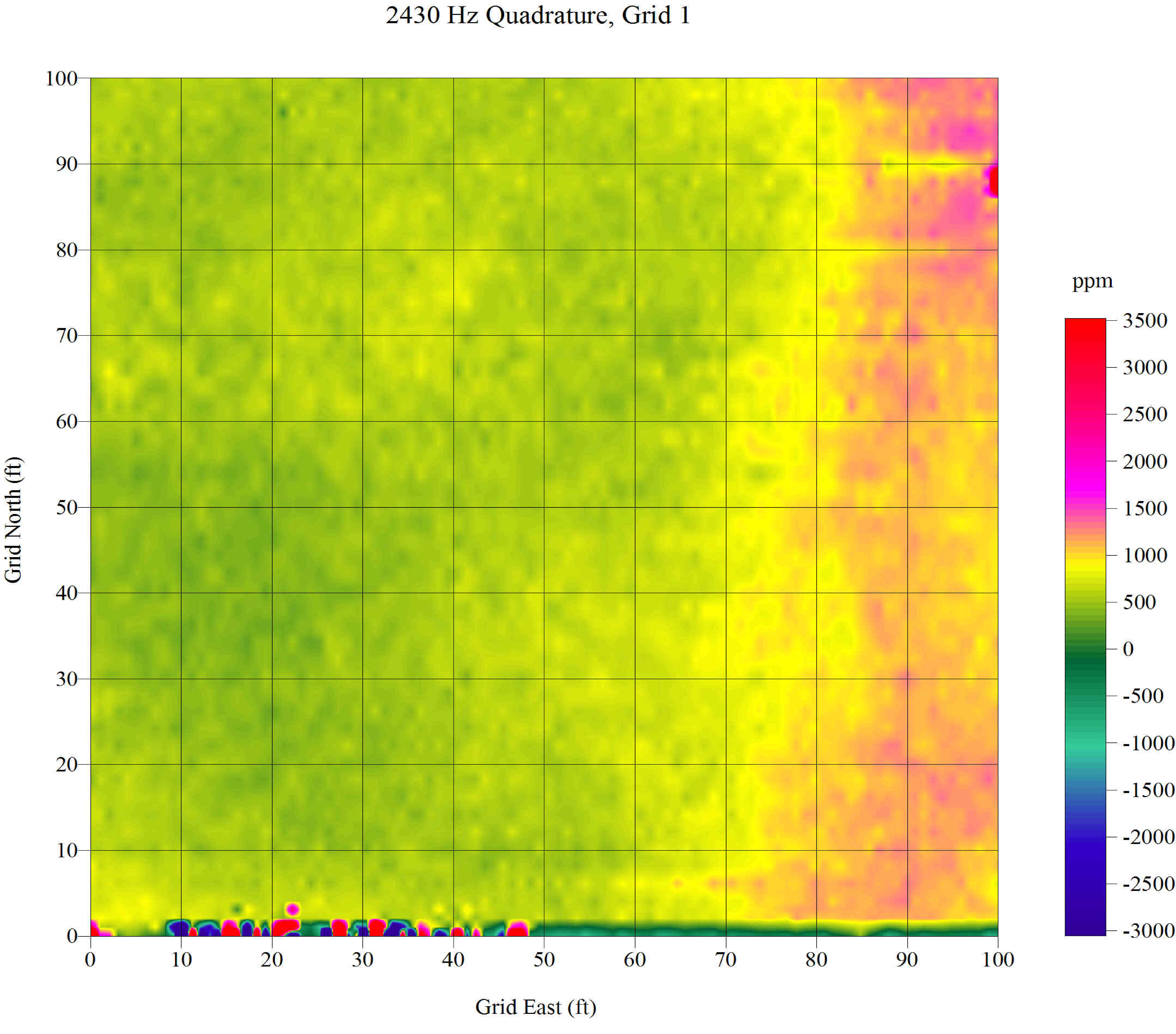

2430 Hz Quadrature, Grid 1
Grid North (ft)
Grid East (ft)
ppm
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100

Figure B1-b

7290 Hz In Phase, Grid 1

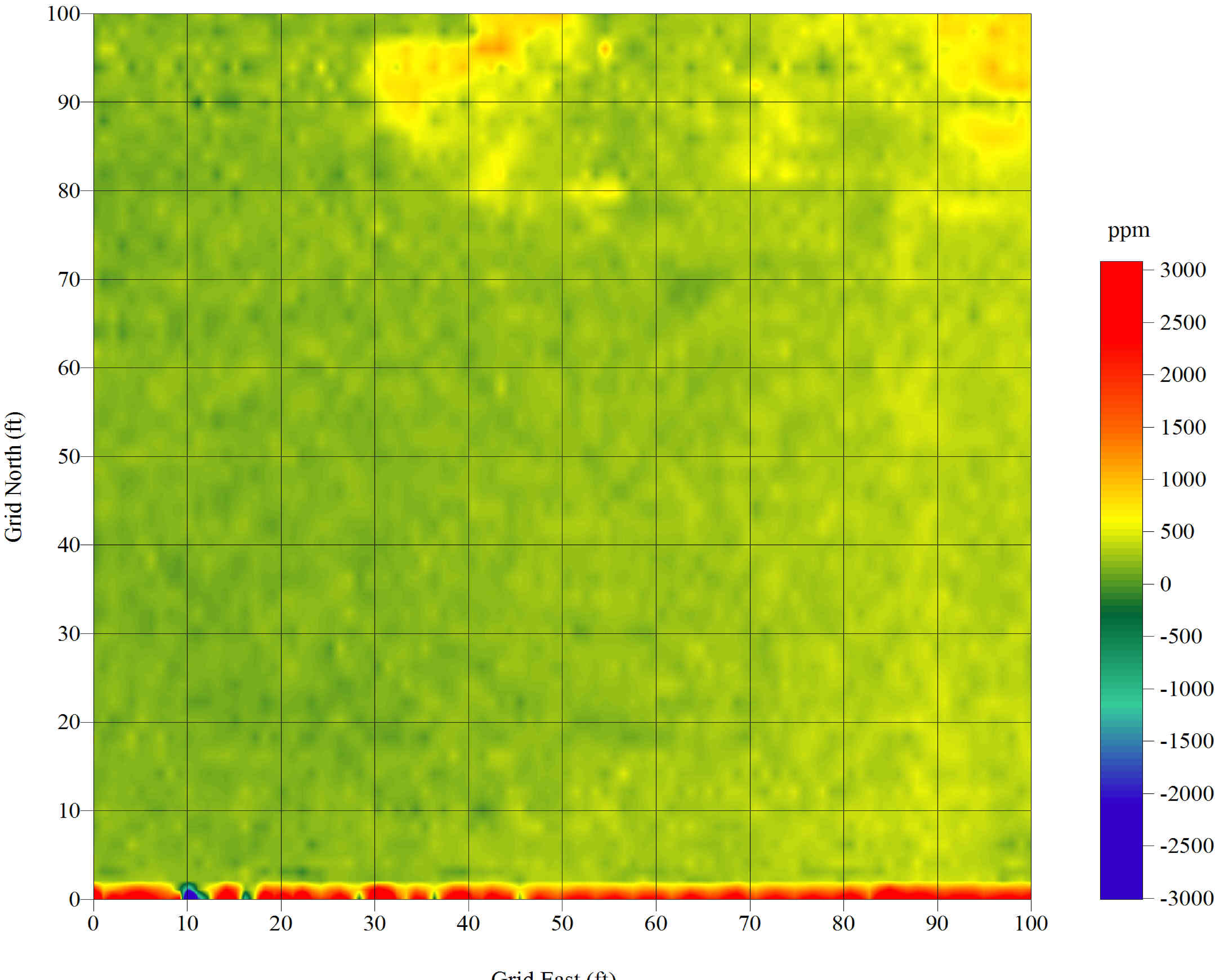


Figure B1-c

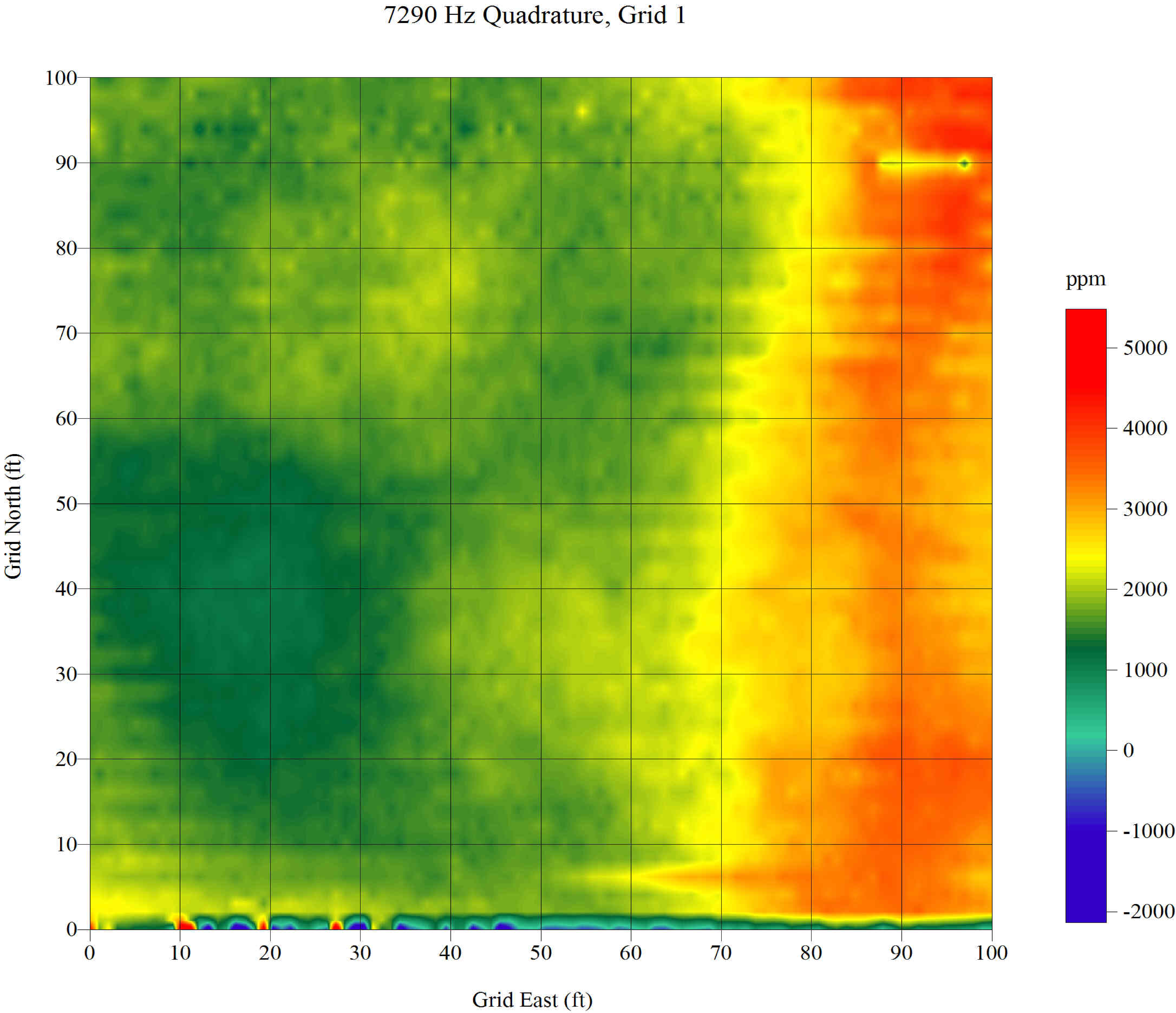

7290 Hz Quadrature, Grid 1
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
5000
4000
3000
2000
1000
0
-1000
-2000

Figure B1-d

18270 Hz In Phase, Grid 1

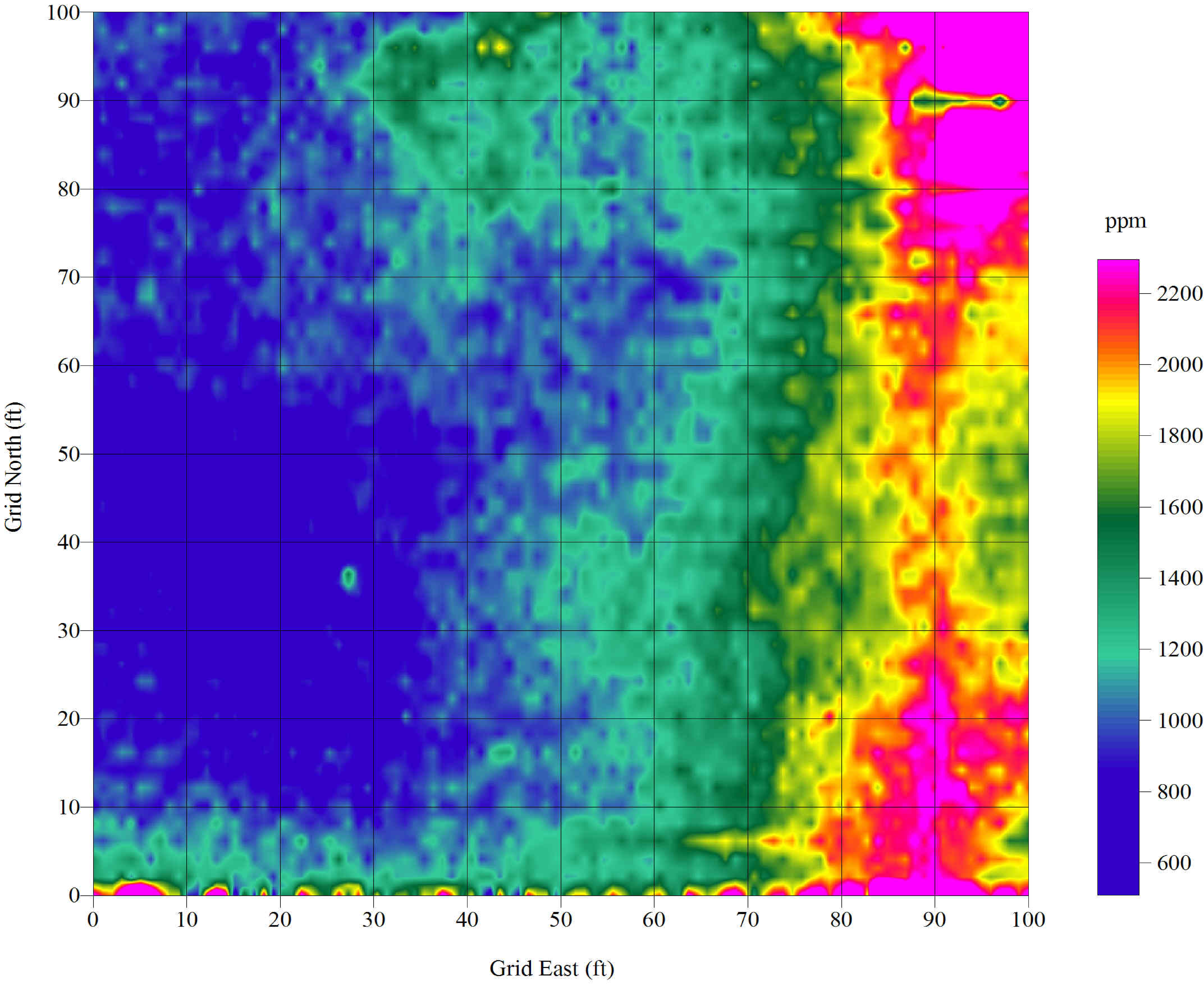


Figure B1-e

18270 Hz Quadrature, Grid 1

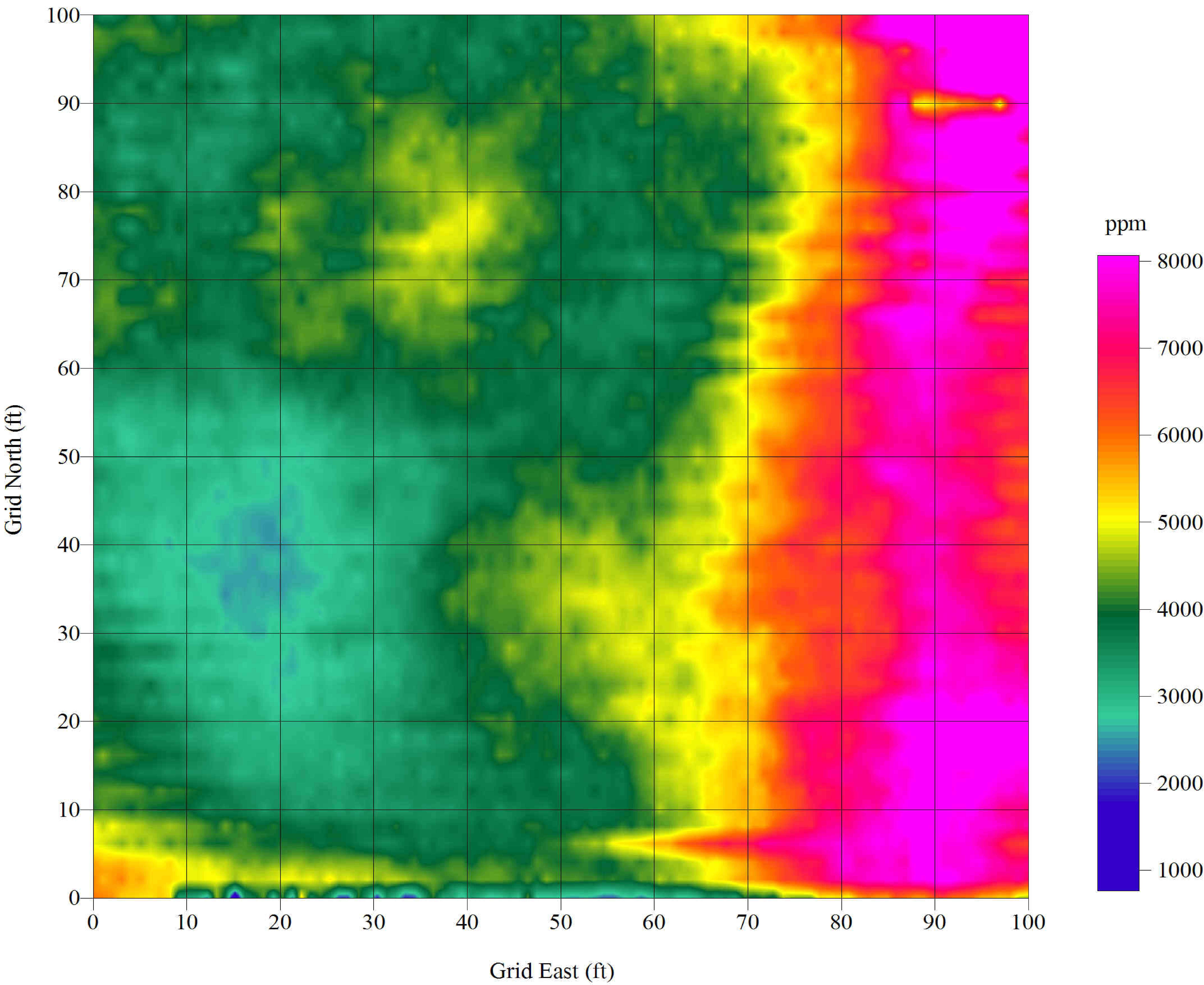
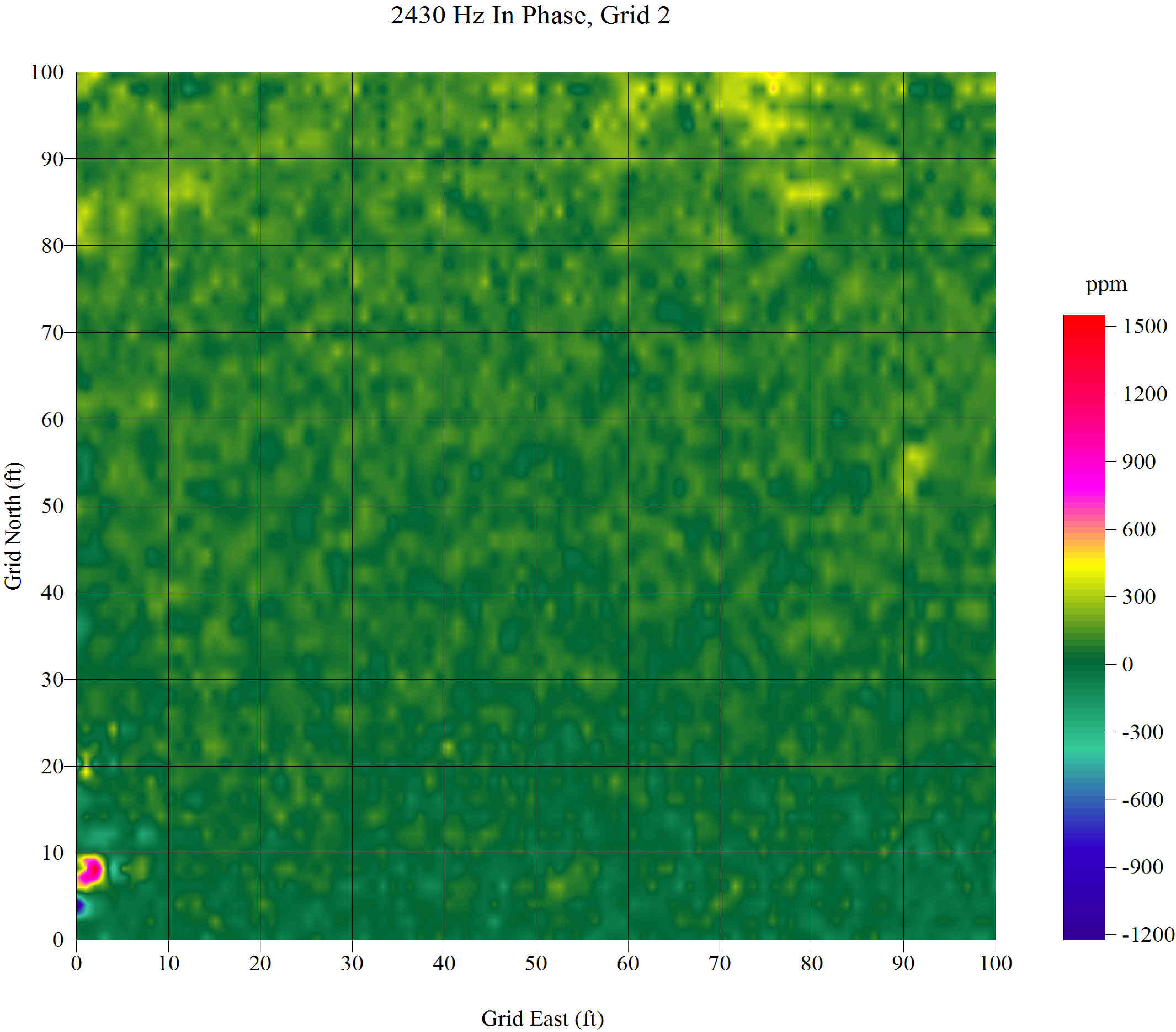


Figure B1-f



2430 Hz In Phase, Grid 2
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
1500
1200
900
600
300
0
-300
-600
-900
-1200

Figure B2-a

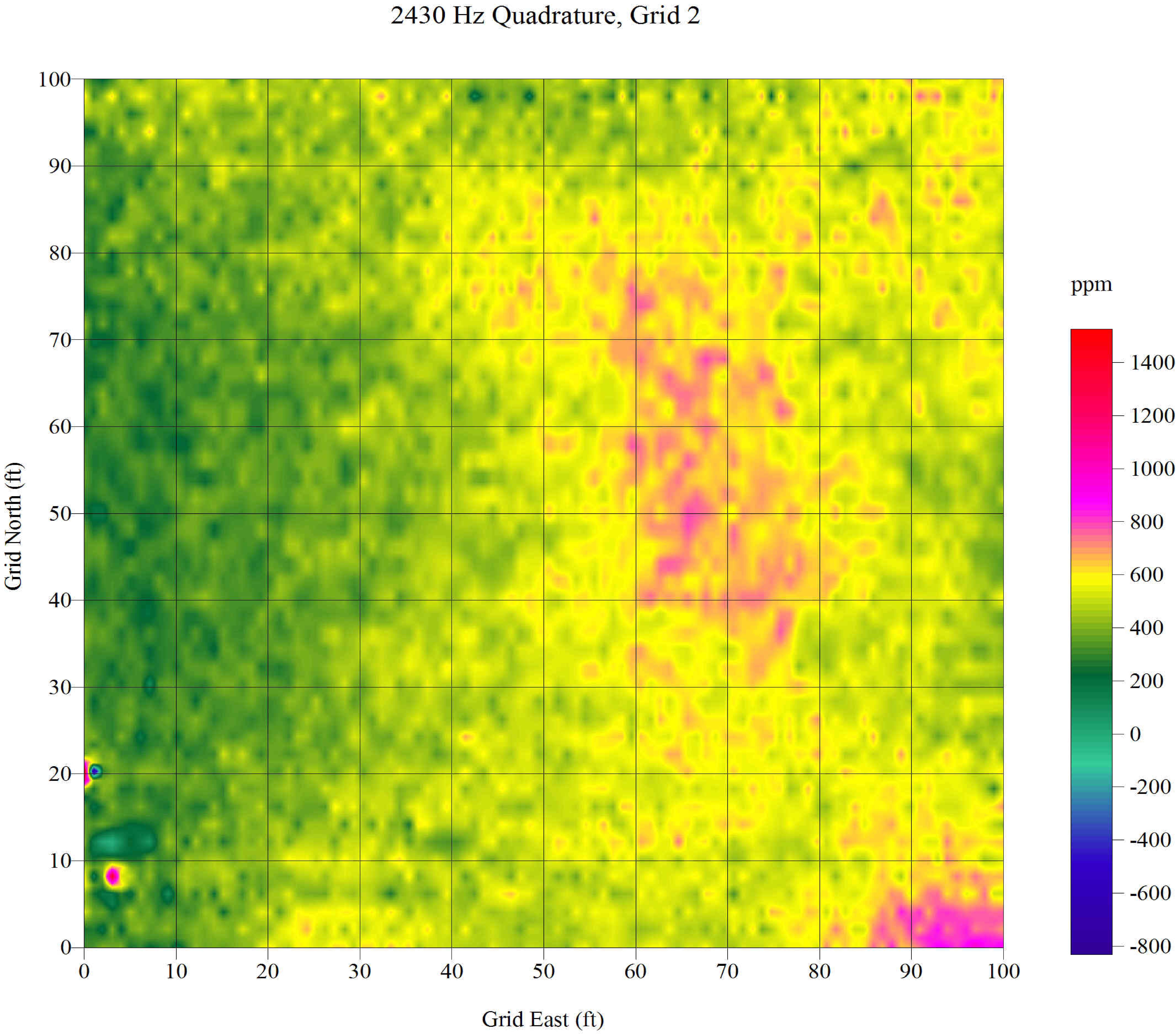

2430 Hz Quadrature, Grid 2
Grid North (ft)
Grid East (ft)
ppm
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
0
10
20
30
40
50
60
70
80
90
100

Figure B2-b

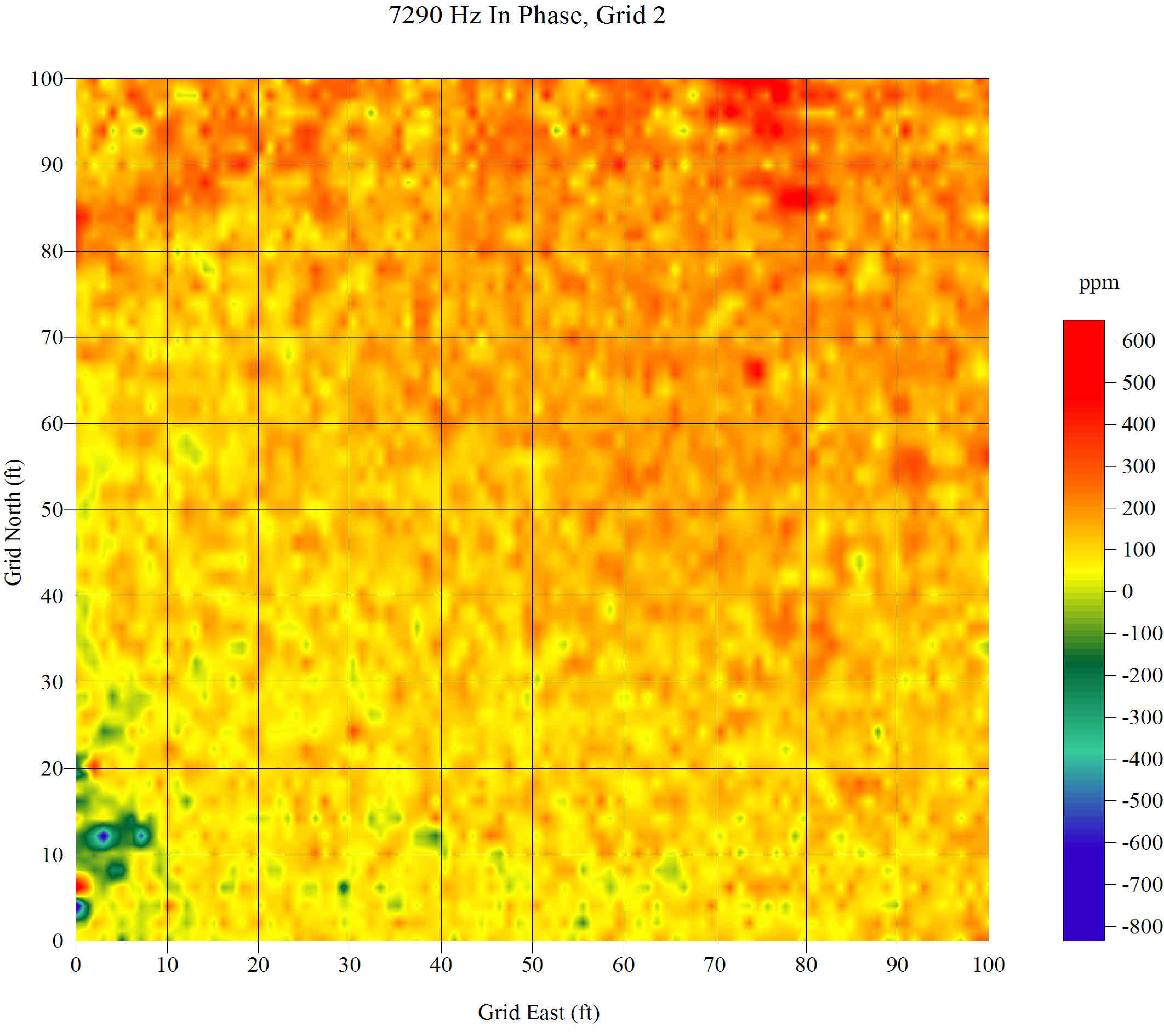

7290 Hz In Phase, Grid 2
Grid North (ft)
Grid East (ft)
ppm
600
500
400
300
200
100
0
-100
-200
-300
-400
-500
-600
-700
-800
0
10
20
30
40
50
60
70
80
90
100

Figure B2-c

7290 Hz Quadrature, Grid 2

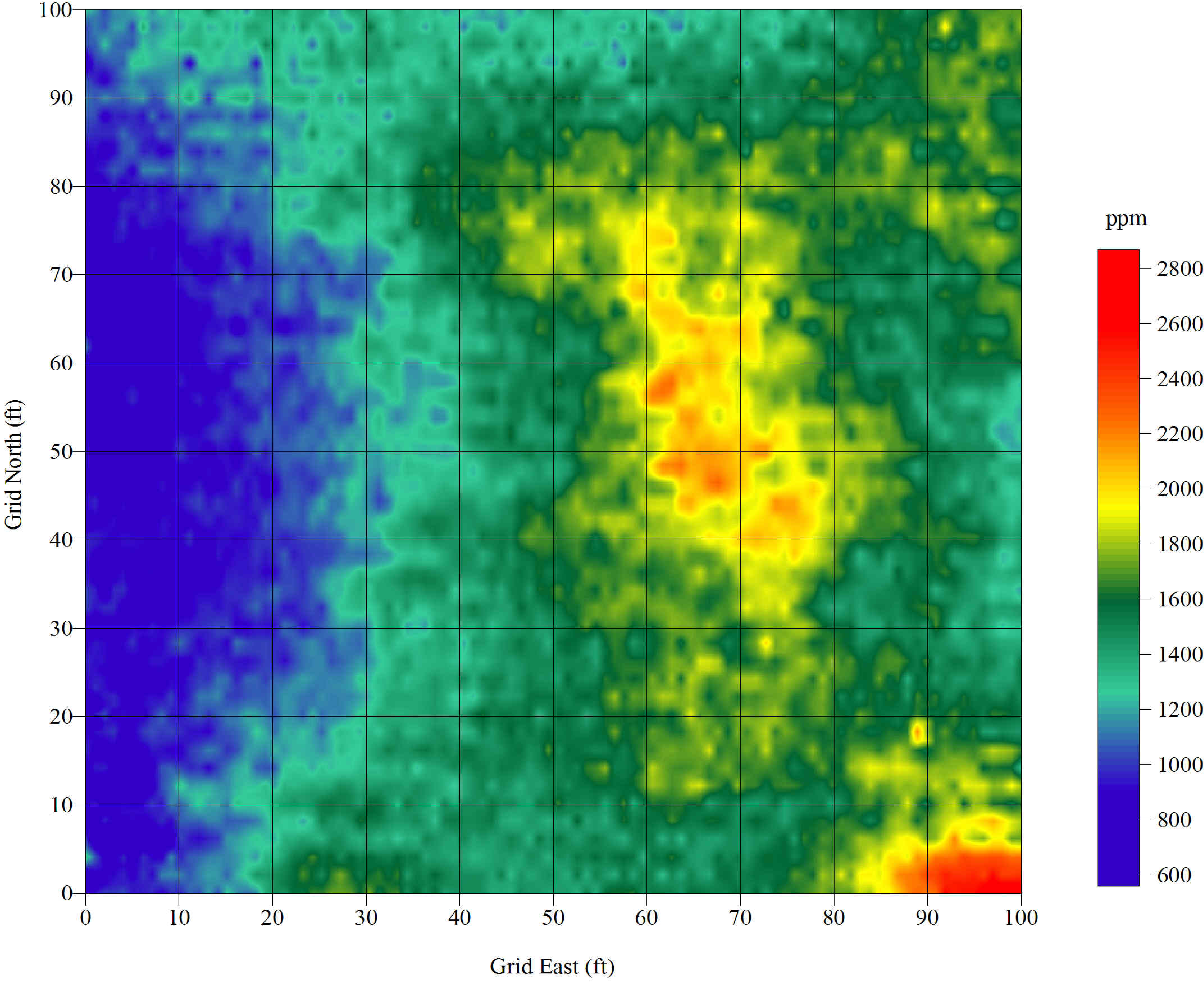


Figure B2-d

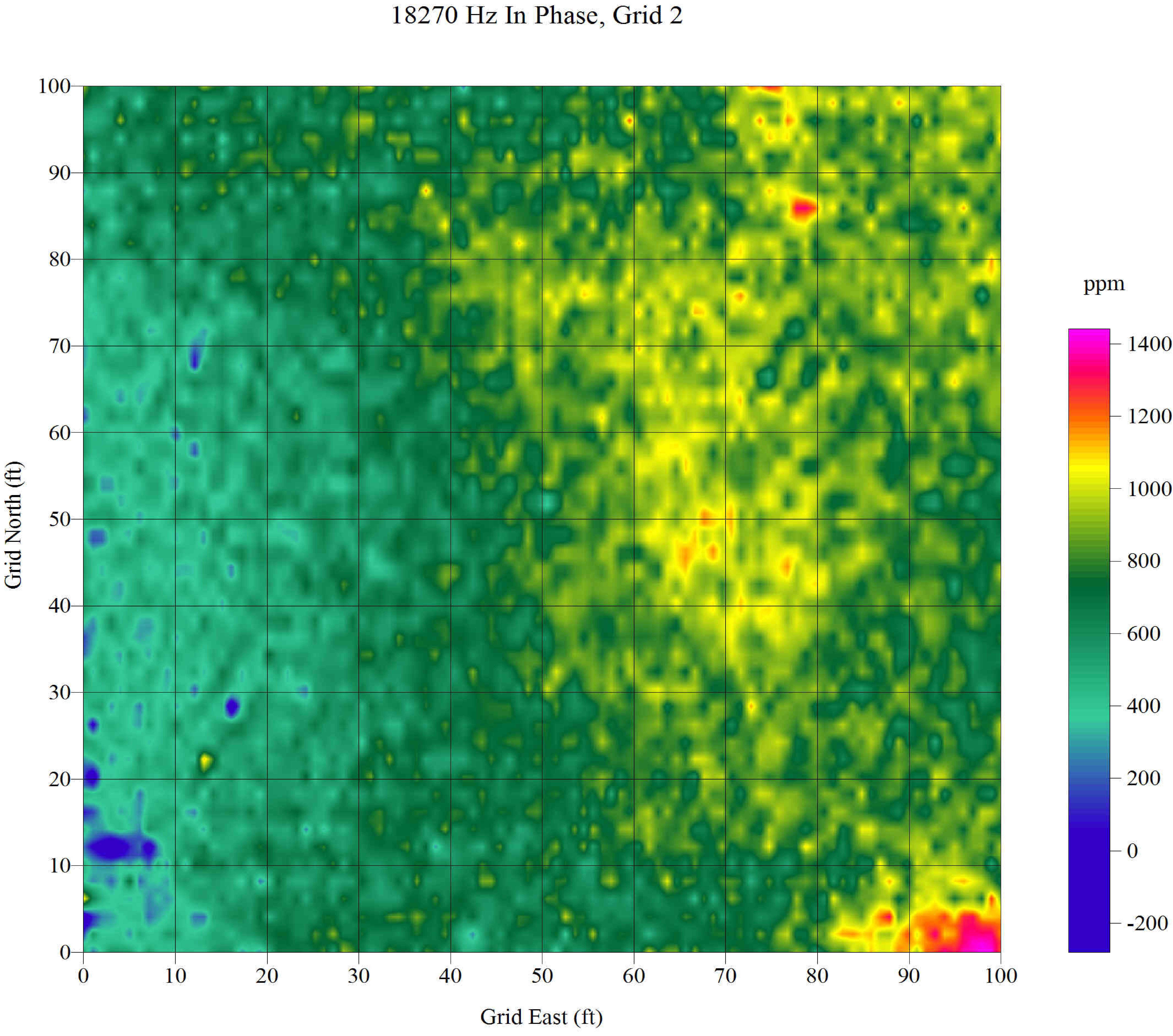

18270 Hz In Phase, Grid 2
Grid North (ft)
Grid East (ft)
ppm
1400
1200
1000
800
600
400
200
0
-200
0
10
20
30
40
50
60
70
80
90
100

Figure B2-e

18270 Hz Quadrature, Grid 2

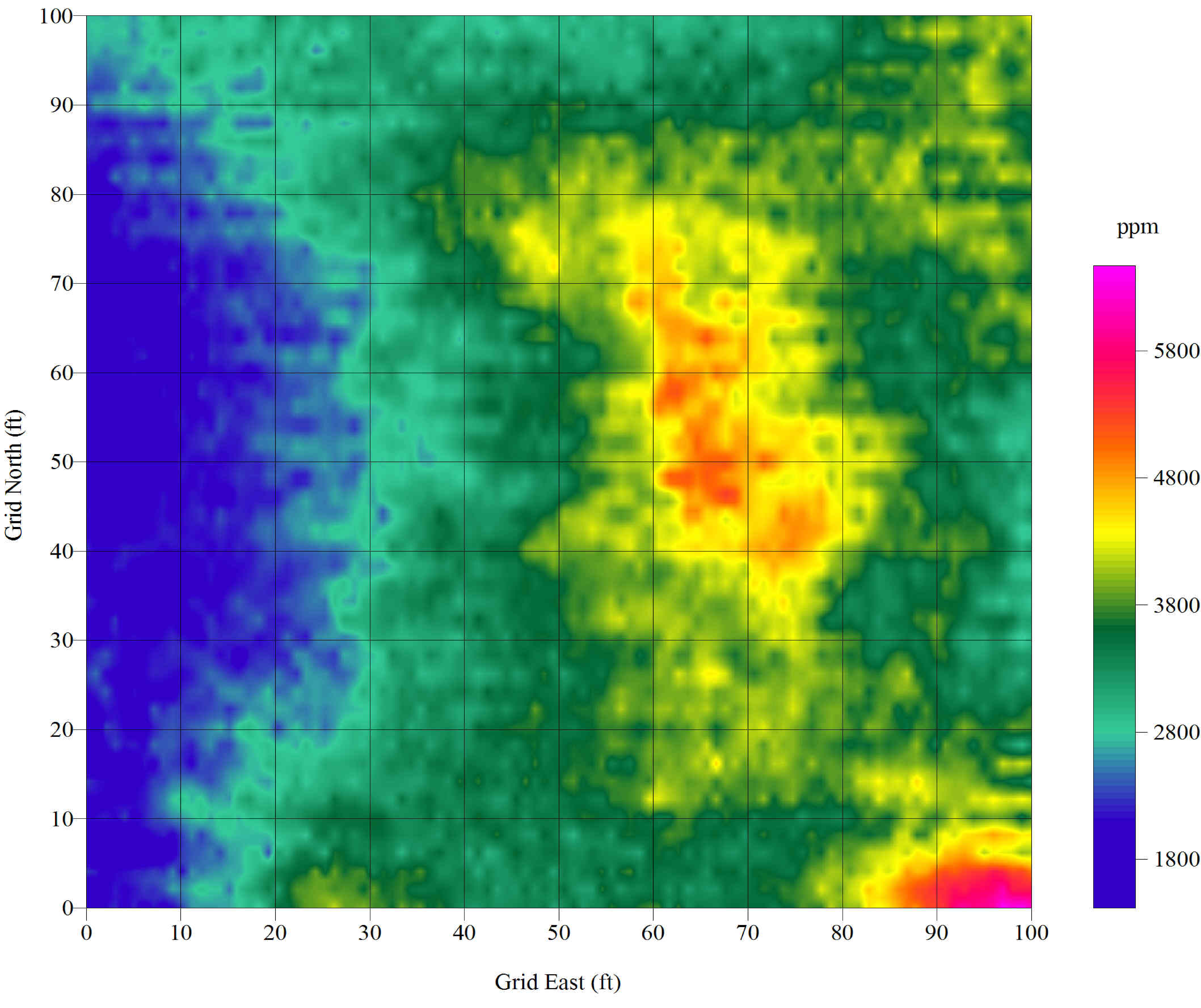


Figure B2-f

Figure B5-g

2430 Hz In Phase, Grid 3

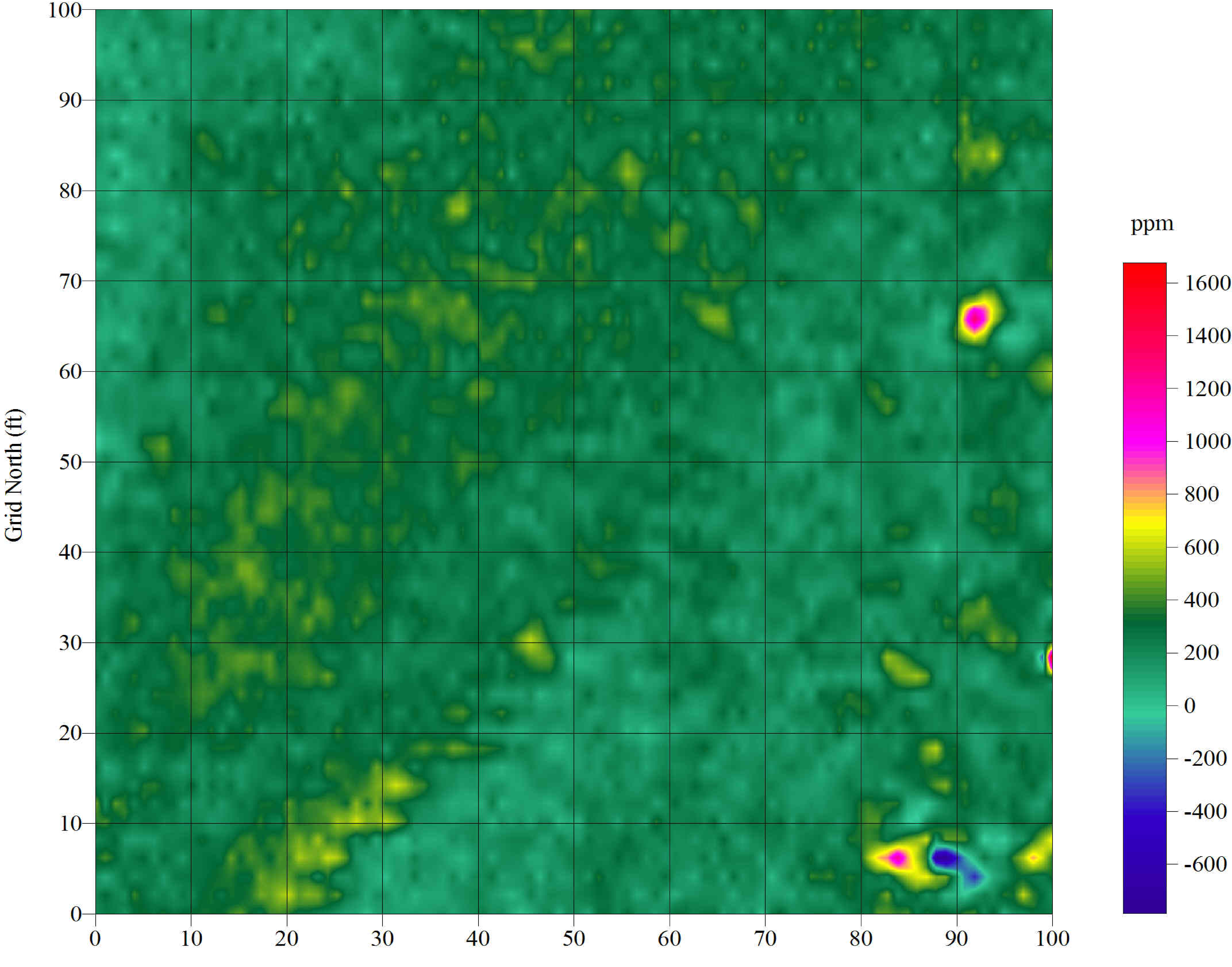


Figure B3-a

2430 Hz Quadrature, Grid 3

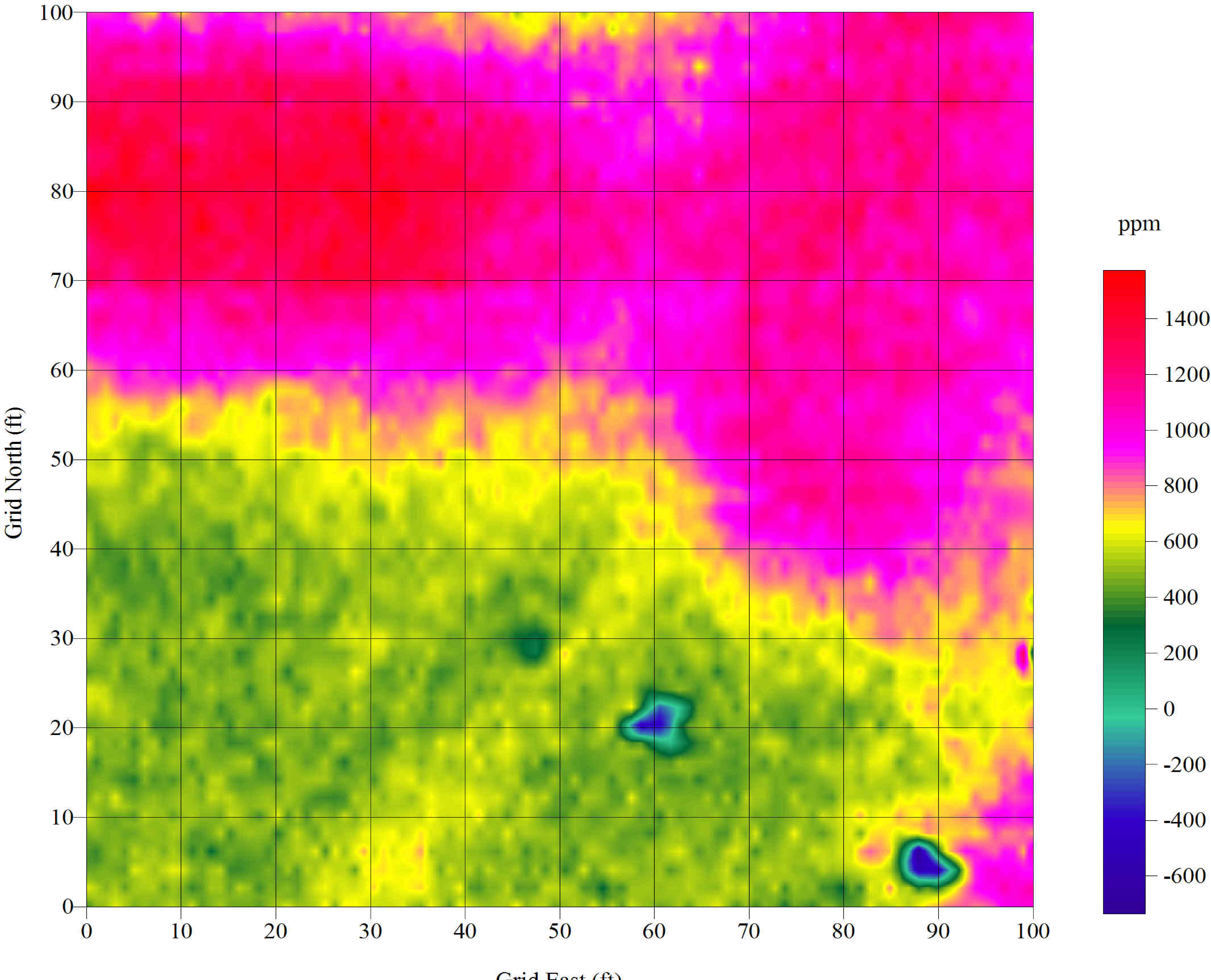


Figure B3-b

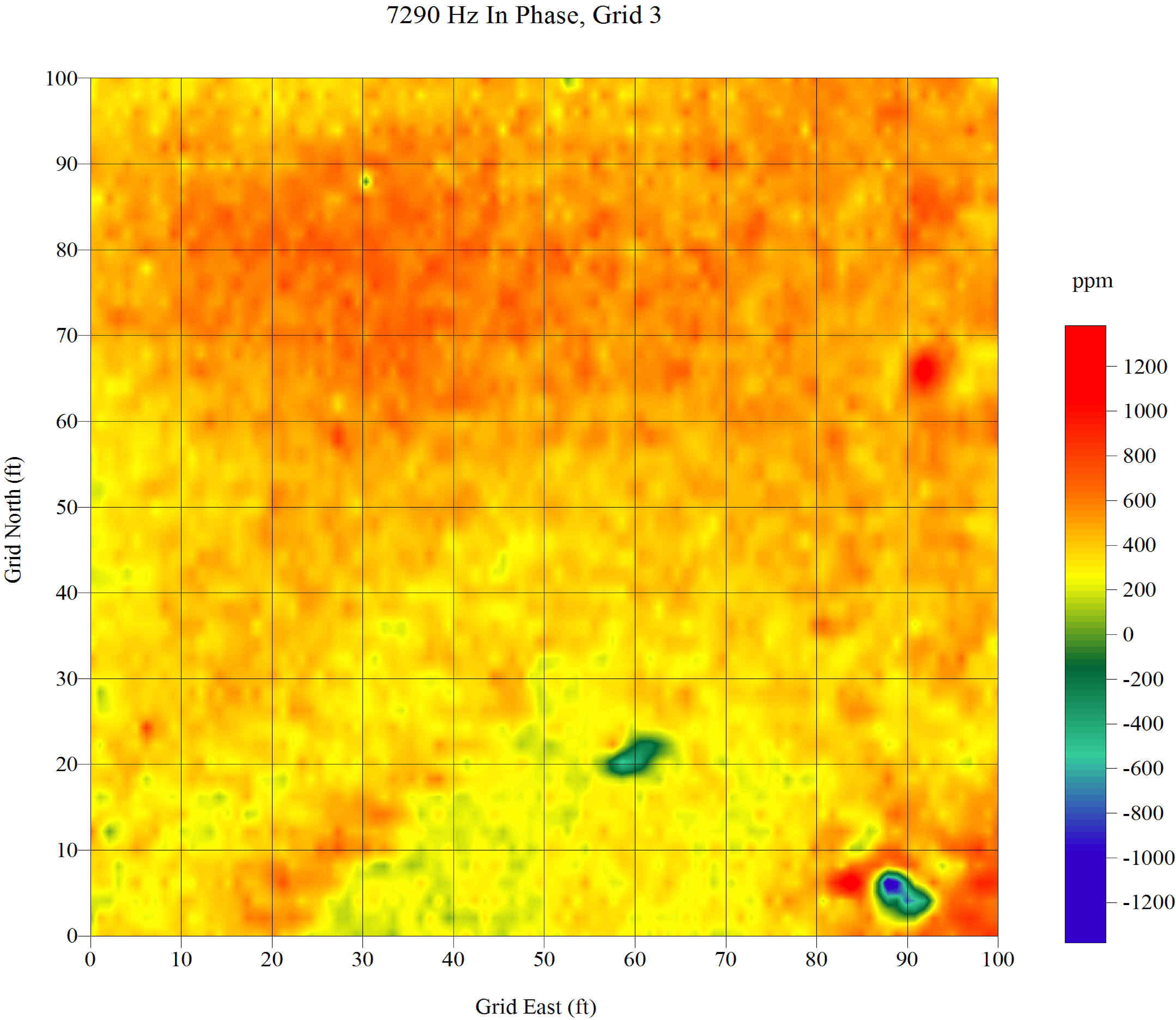

7290 Hz In Phase, Grid 3
ppm
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-1200
Grid North (ft)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)

Figure B3-c

7290 Hz Quadrature, Grid 3

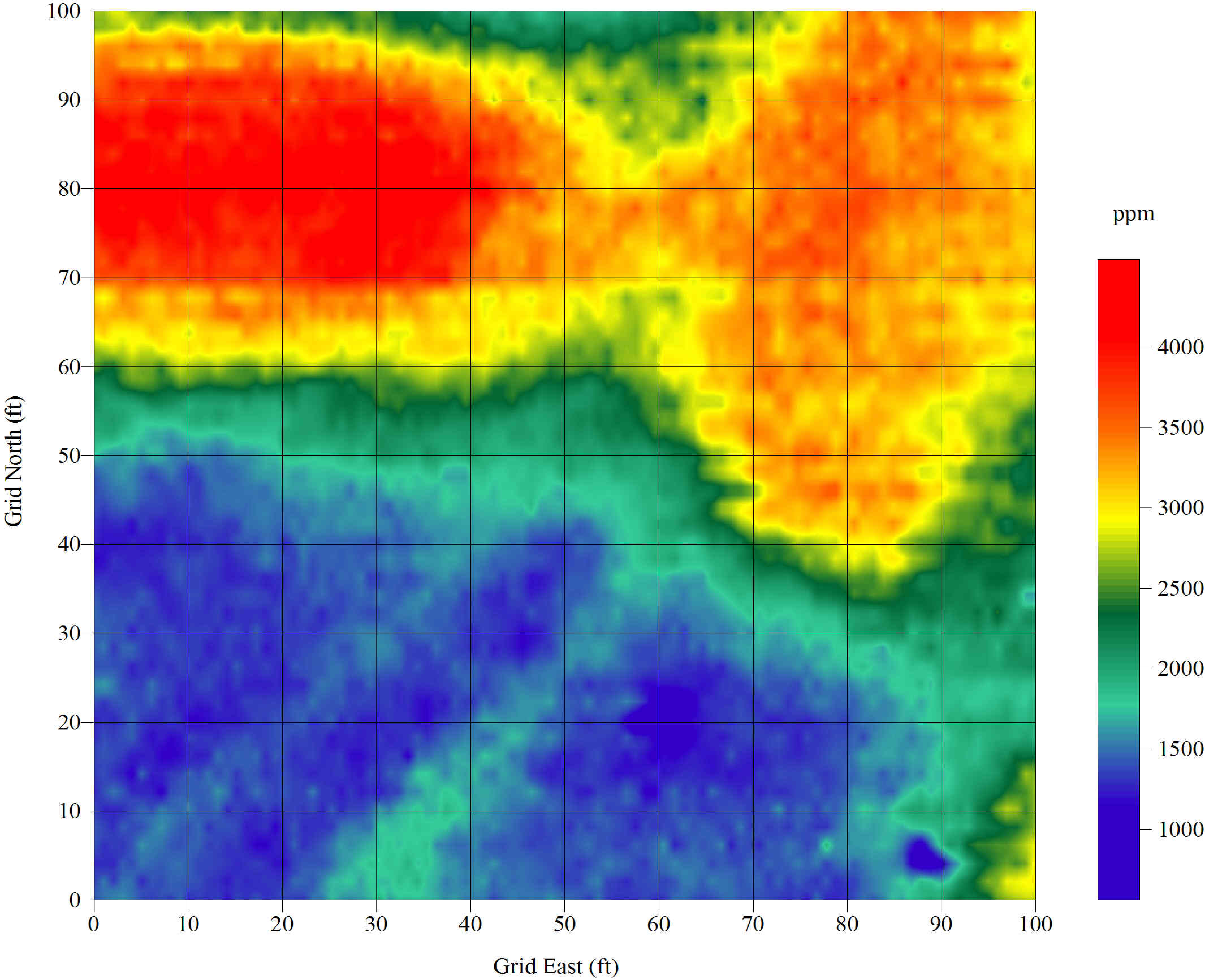


Figure B3-d

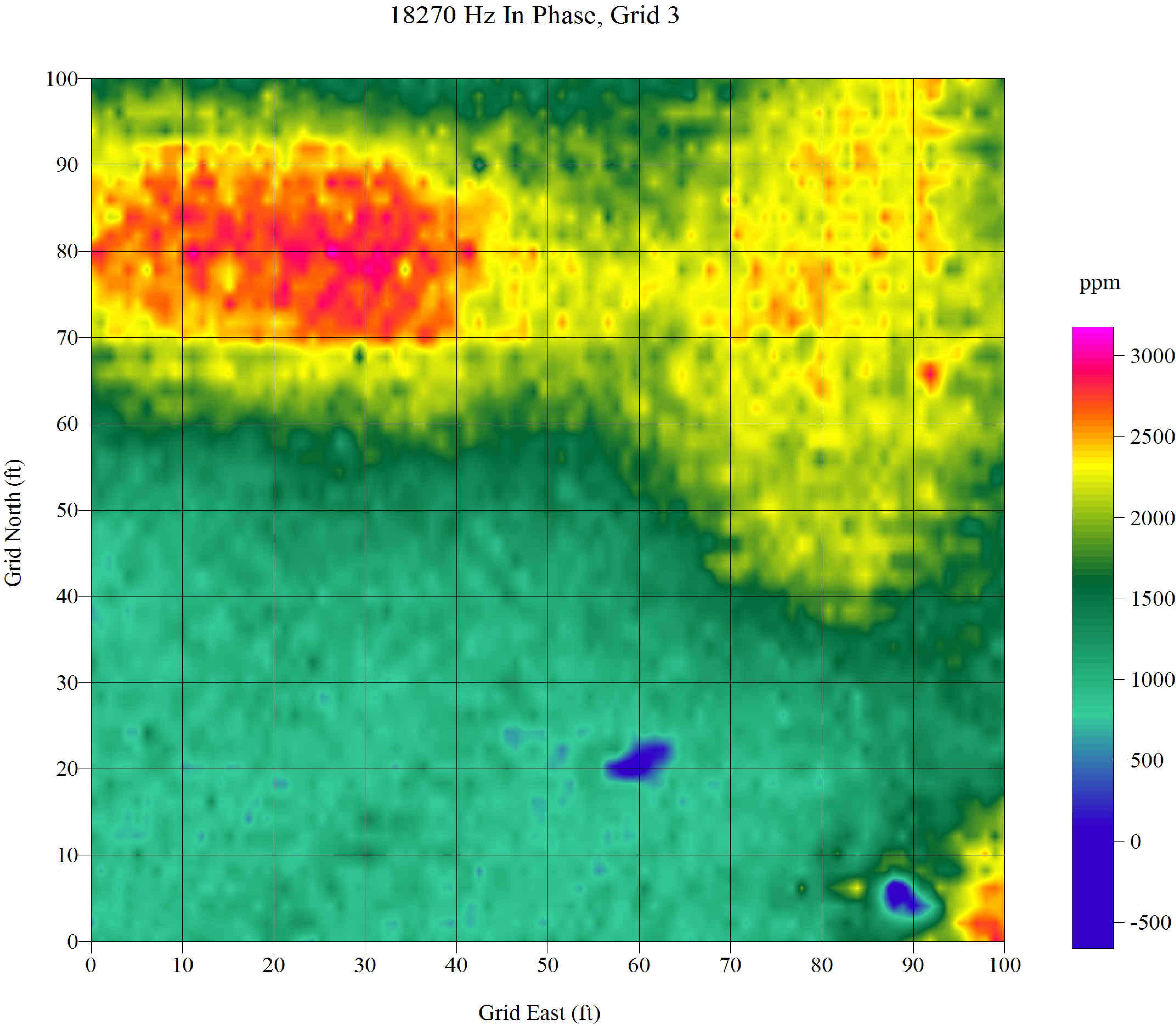

18270 Hz In Phase, Grid 3
Grid North (ft)
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
-500
0
10
20
30
40
50
60
70
80
90
100

Figure B3-e

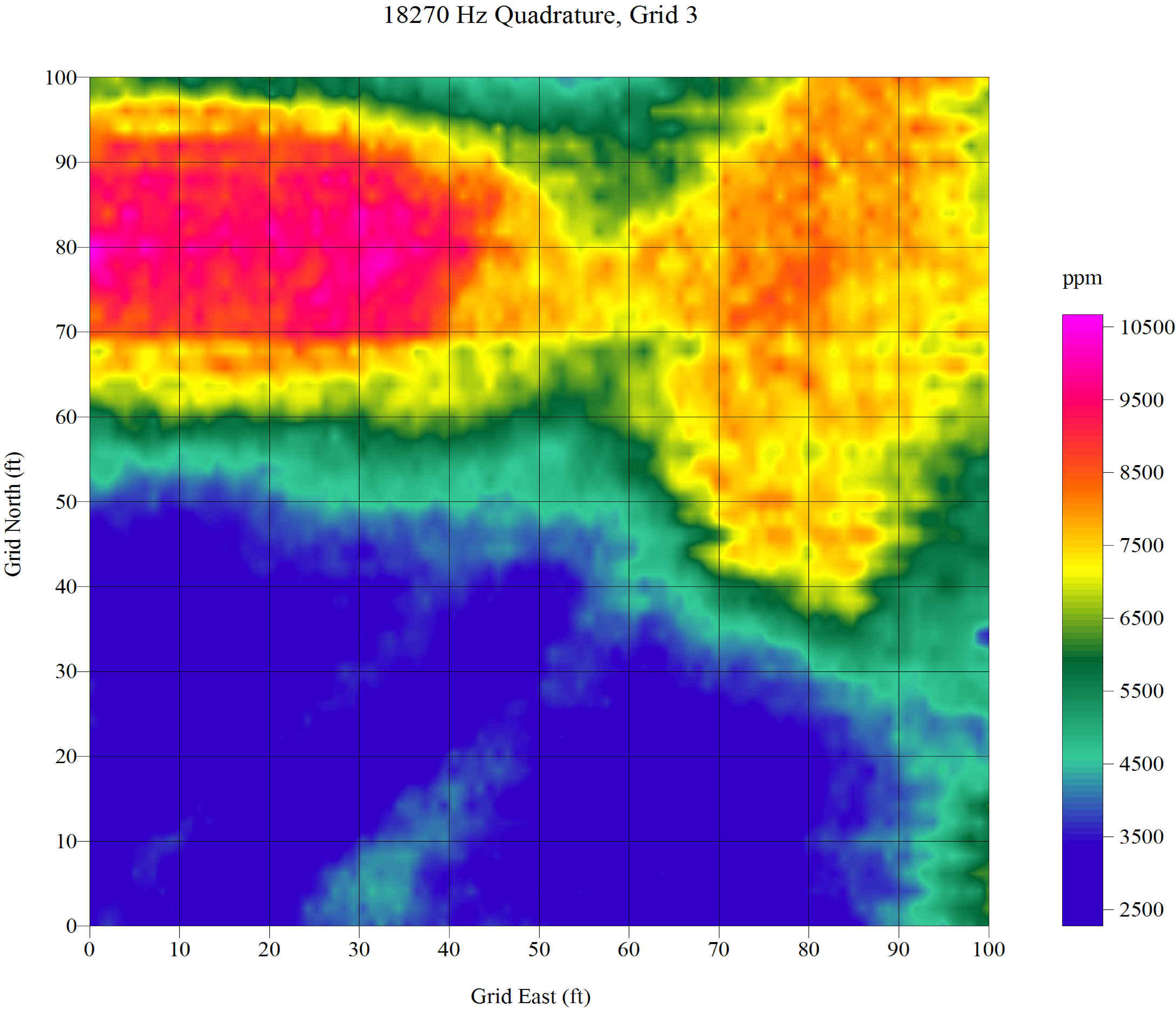

18270 Hz Quadrature, Grid 3
Grid North (ft)
Grid East (ft)
ppm
10500
9500
8500
7500
6500
5500
4500
3500
2500
0
10
20
30
40
50
60
70
80
90
100

Figure B3-f

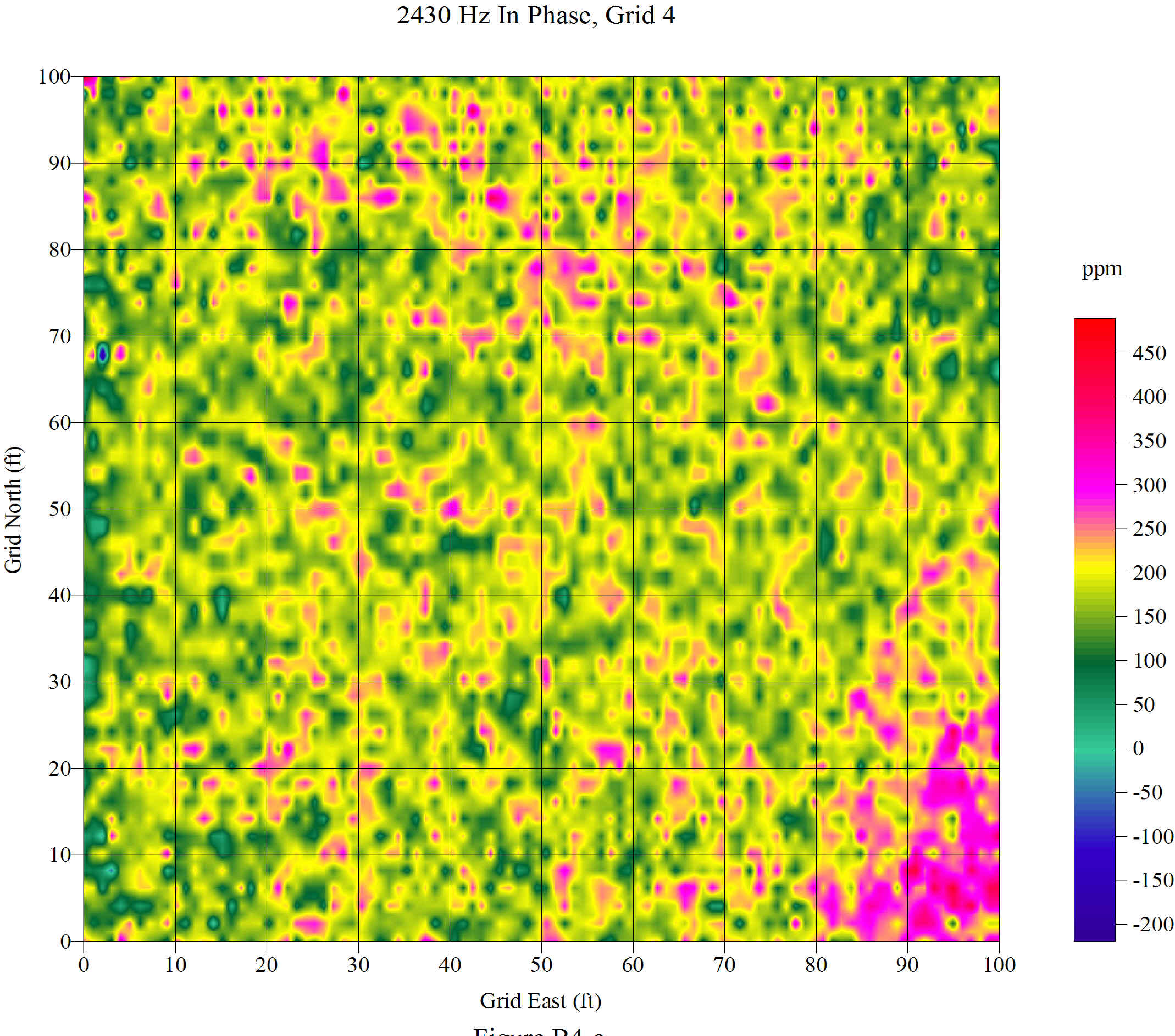

2430 Hz In Phase, Grid 4
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
450
400
350
300
250
200
150
100
50
0
-50
-100
-150
-200

Figure B4-a

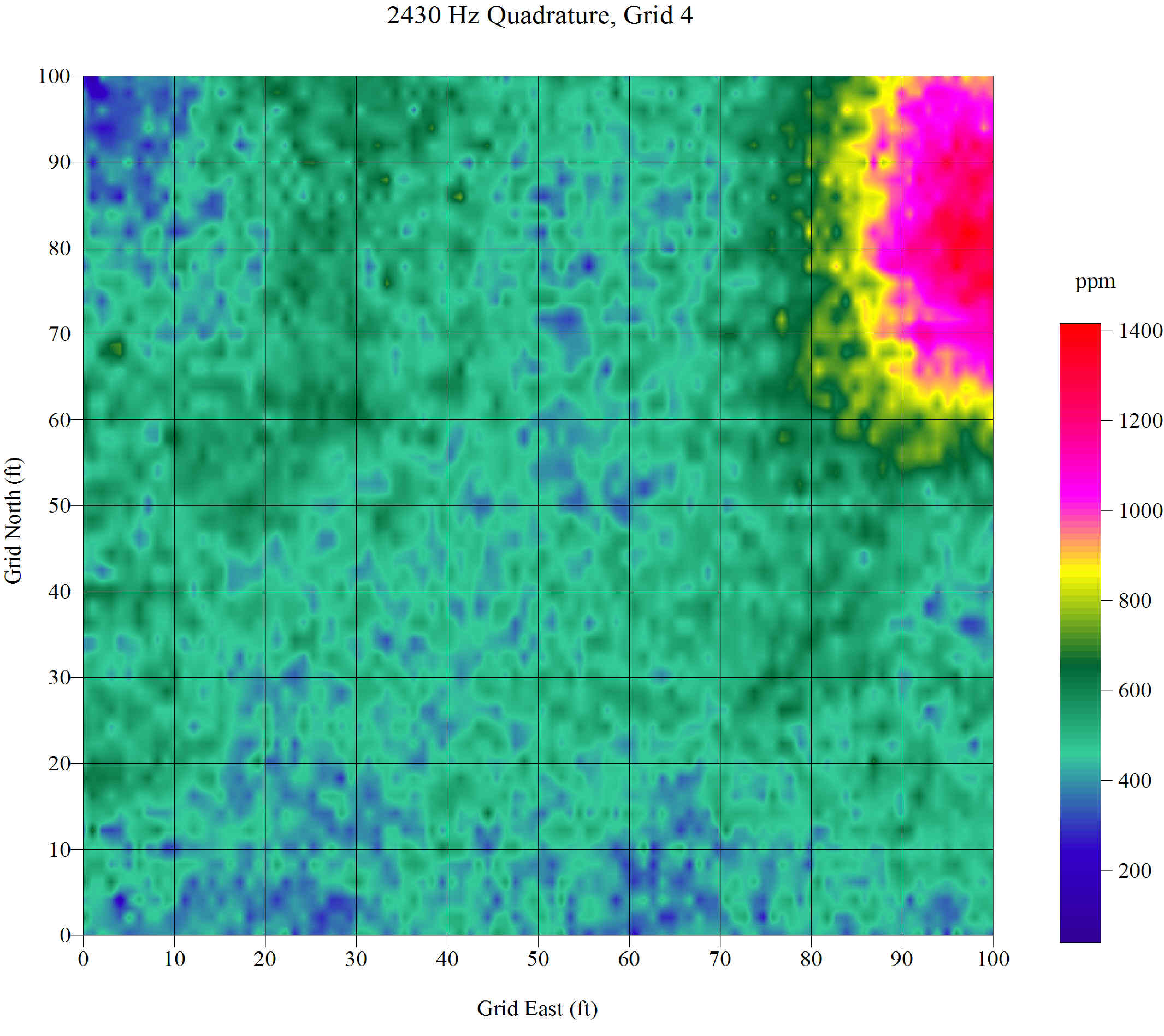

2430 Hz Quadrature, Grid 4
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
200
400
600
800
1000
1200
1400

Figure B4-b

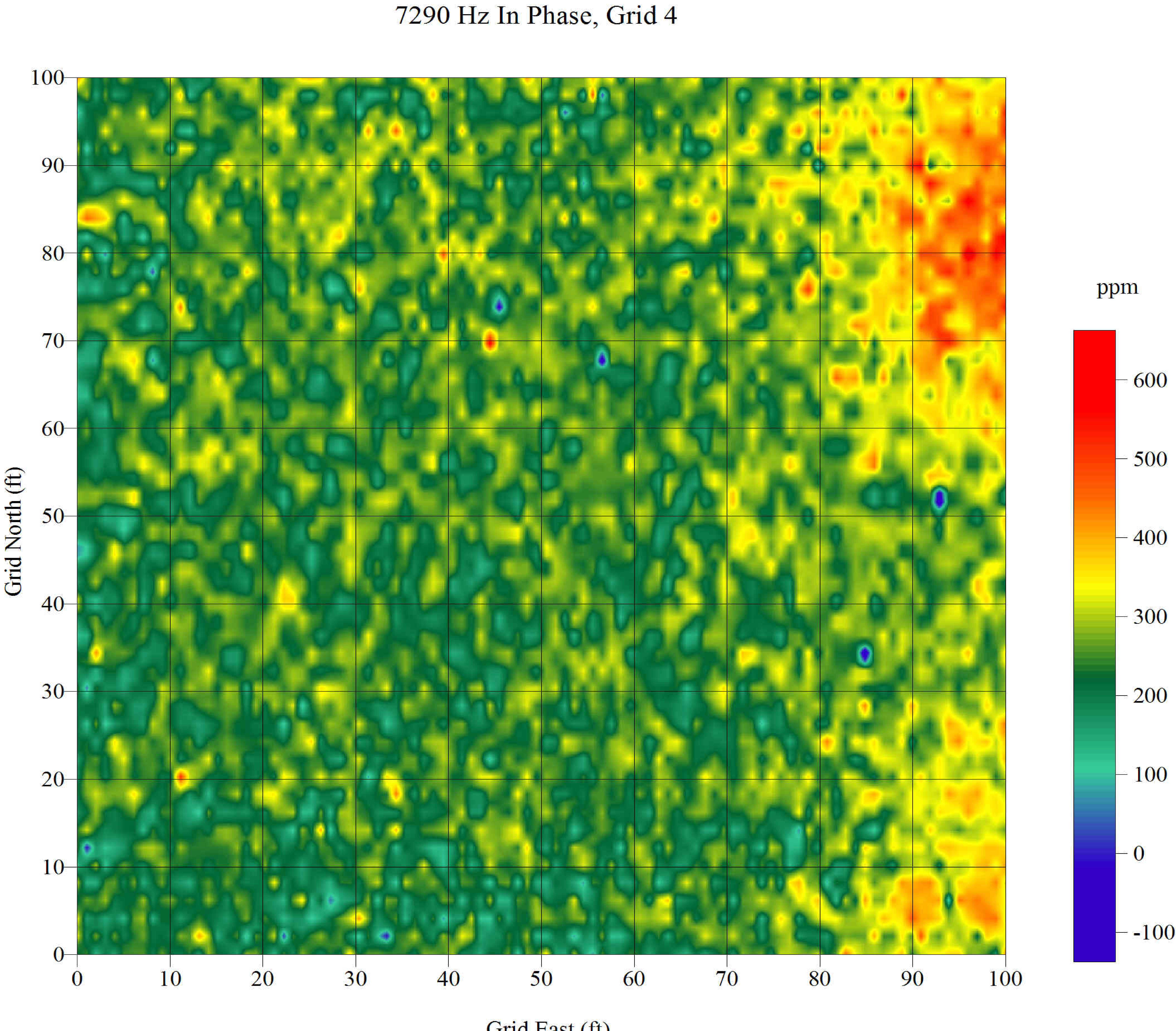

7290 Hz In Phase, Grid 4
Grid North (ft)
Grid East (ft)
ppm
600
500
400
300
200
100
0
-100
0
10
20
30
40
50
60
70
80
90
100

Figure B4-c

7290 Hz Quadrature, Grid 4

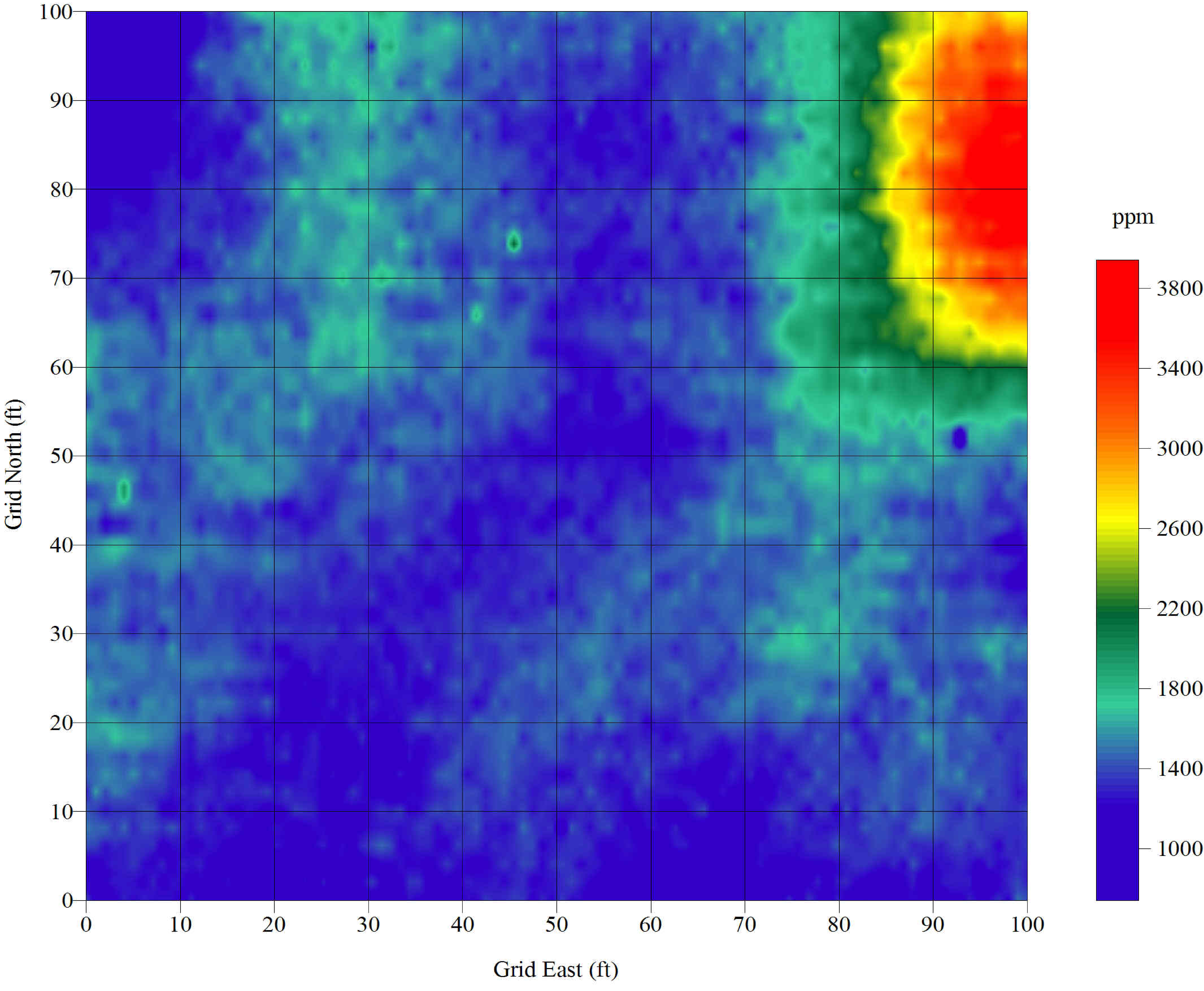


Figure B4-d

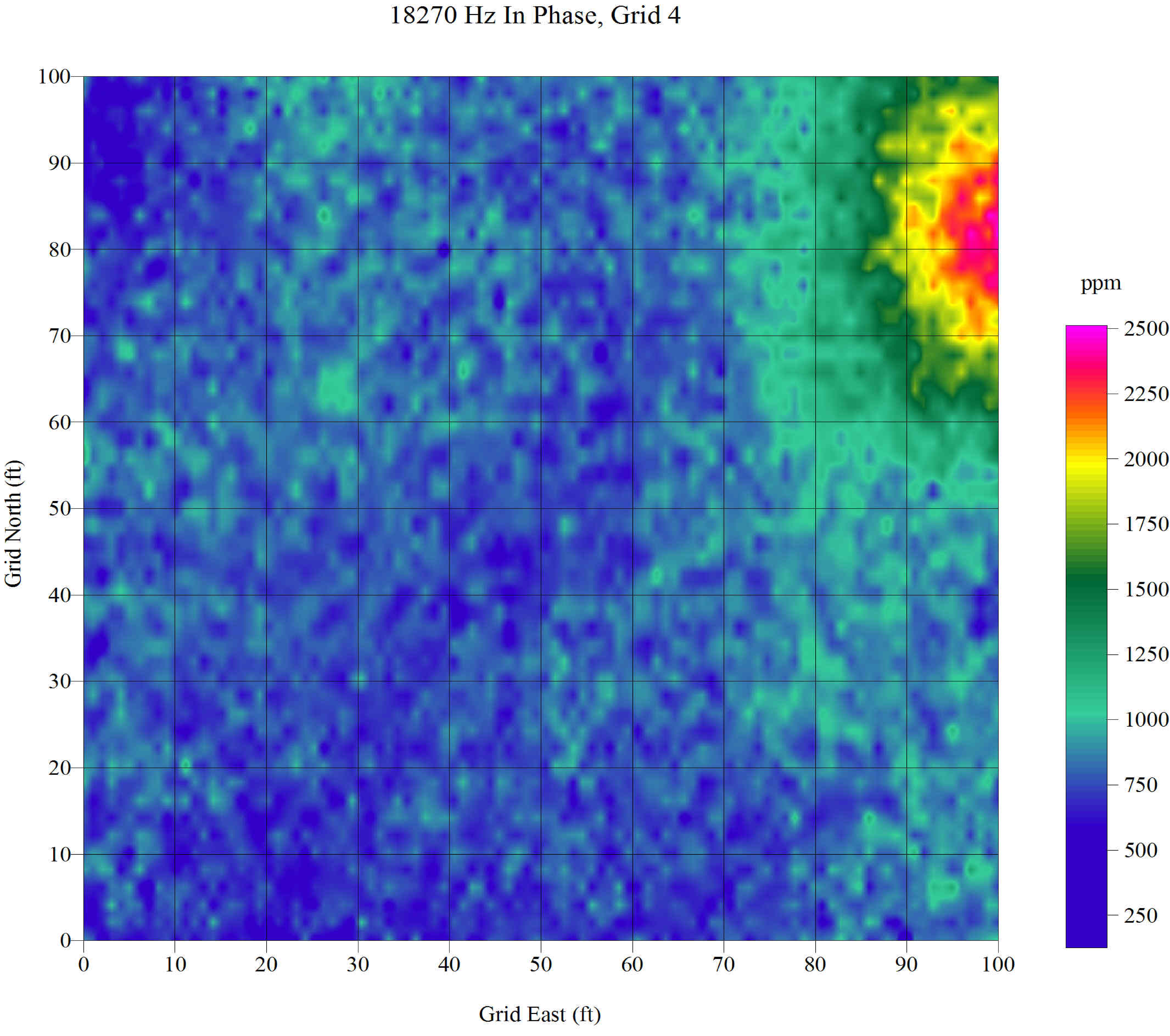

18270 Hz In Phase, Grid 4
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2500
2250
2000
1750
1500
1250
1000
750
500
250

Figure B4-e

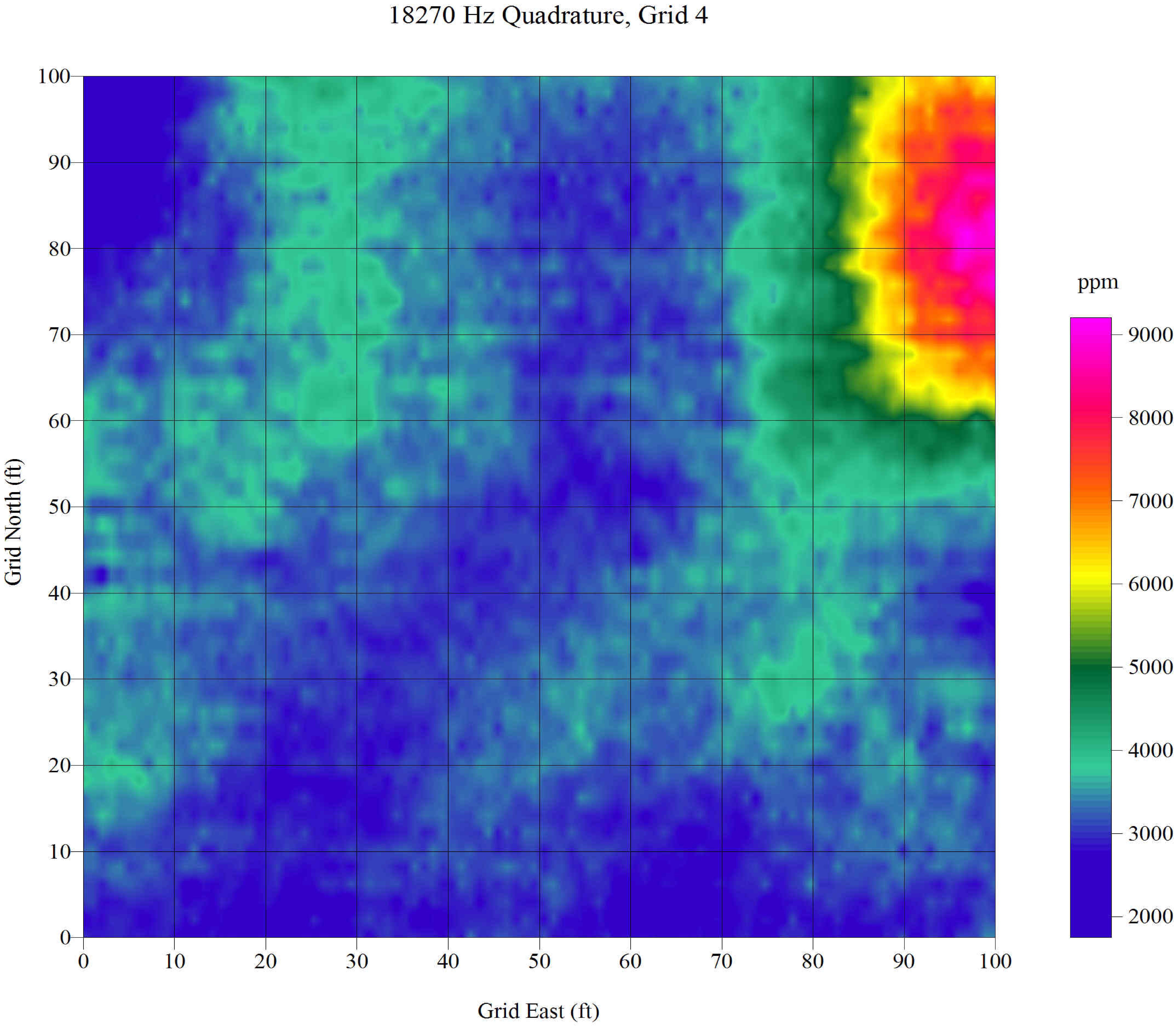

18270 Hz Quadrature, Grid 4
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2000
3000
4000
5000
6000
7000
8000
9000

Figure B4-f

2430 Hz In Phase, Grid 5

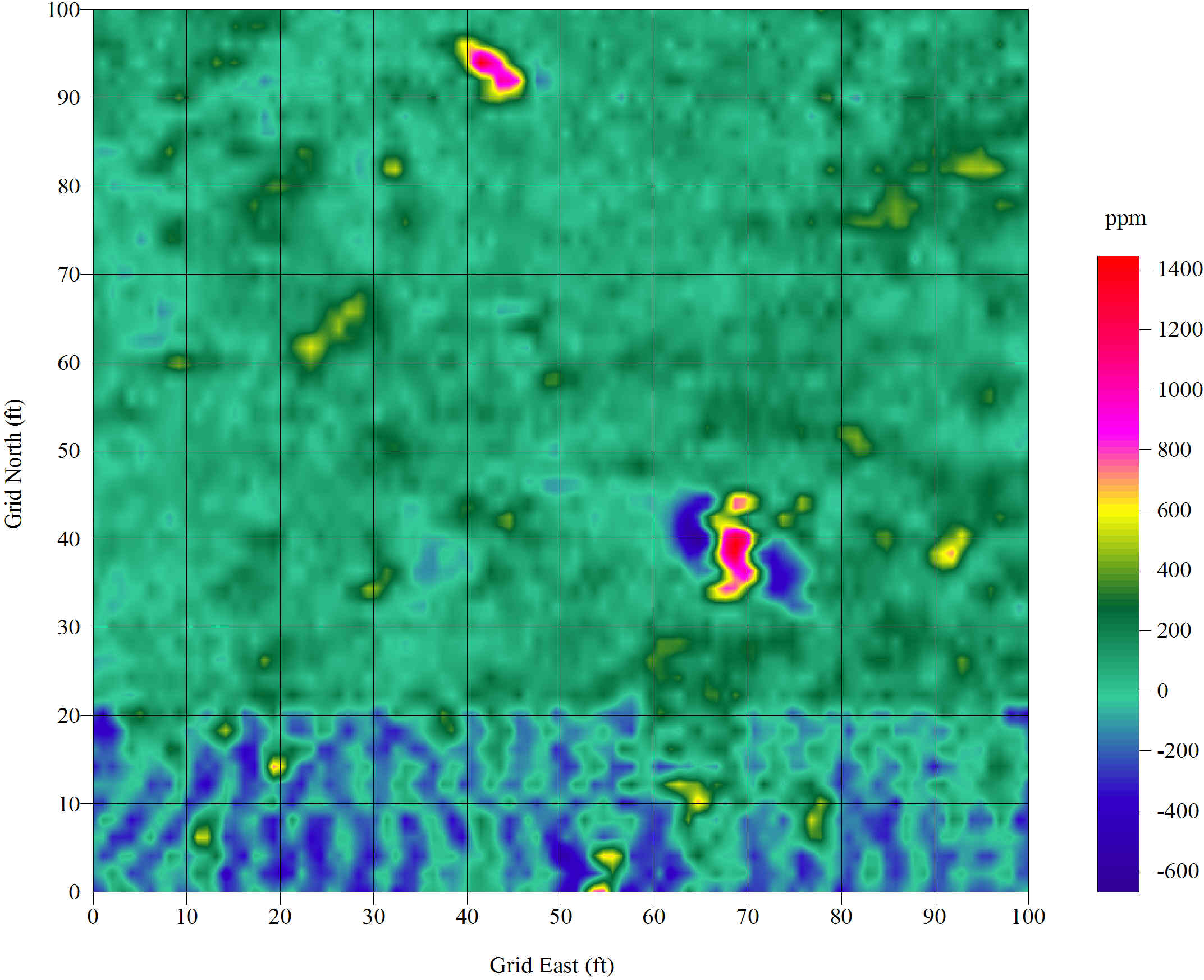


Figure B5-a

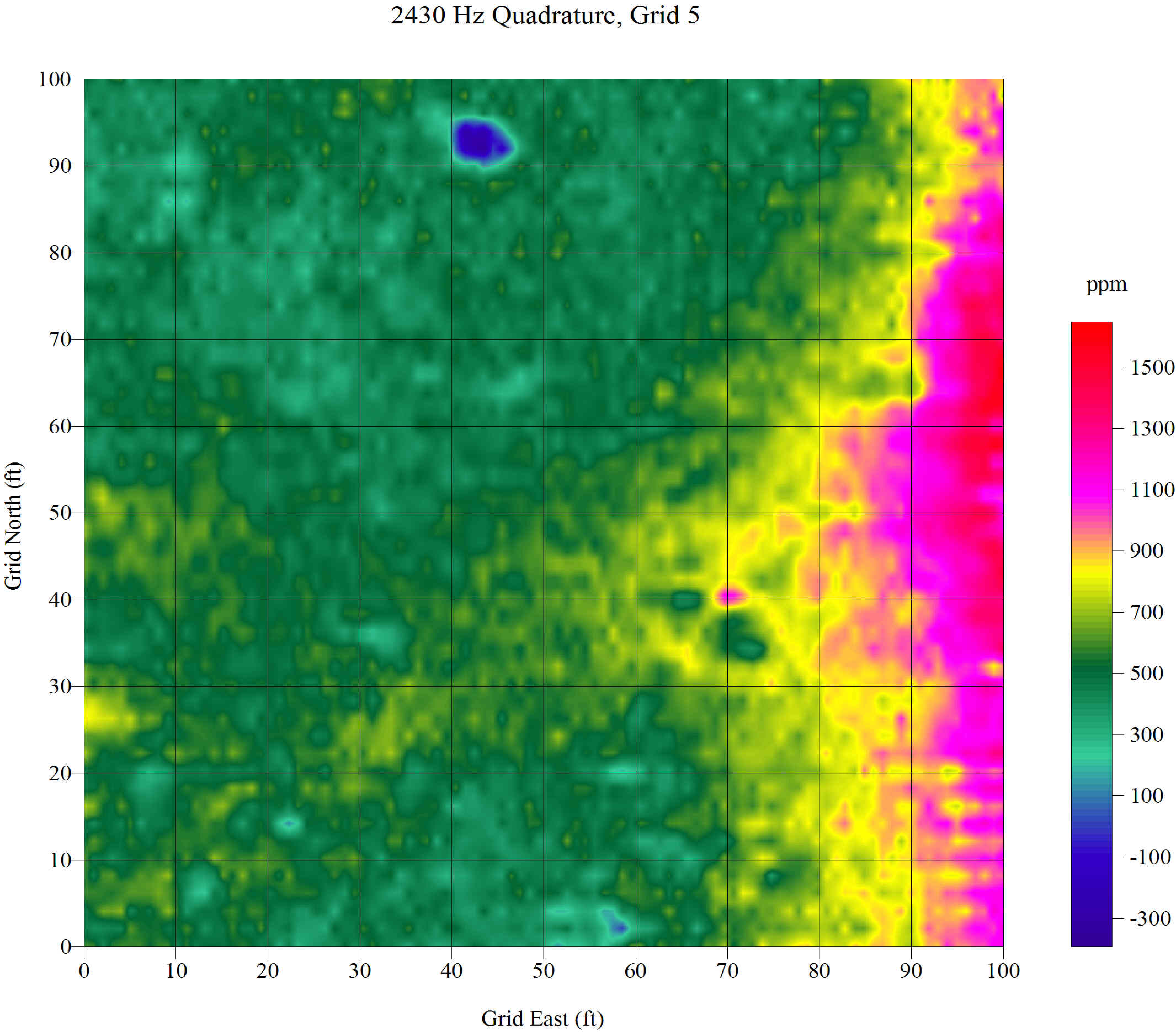

2430 Hz Quadrature, Grid 5
Grid North (ft)
Grid East (ft)
ppm
1500
1300
1100
900
700
500
300
100
-100
-300
0
10
20
30
40
50
60
70
80
90
100

Figure B5-b

7290 Hz In Phase, Grid 5

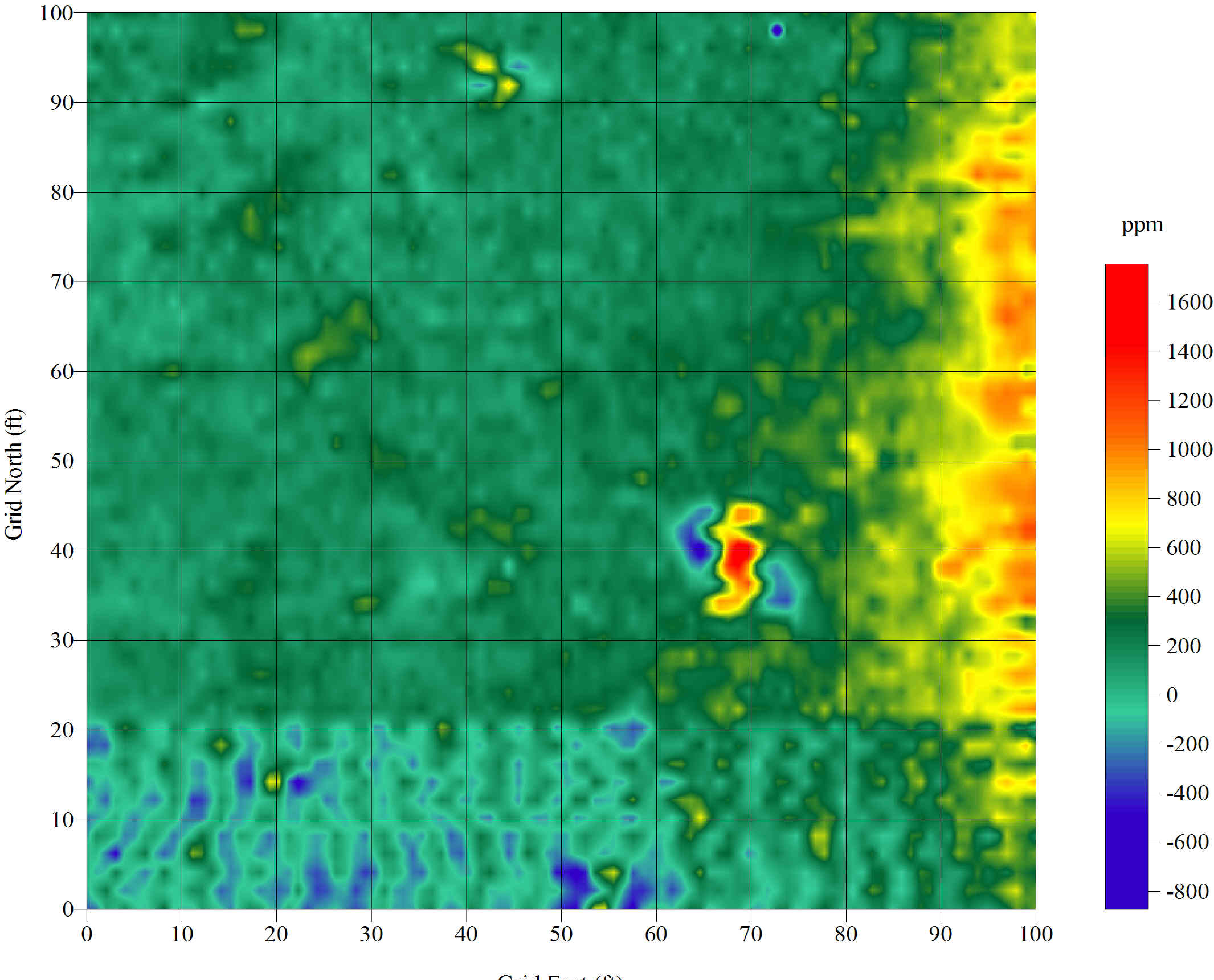


Figure B5-c

7290 Hz Quadrature, Grid 5

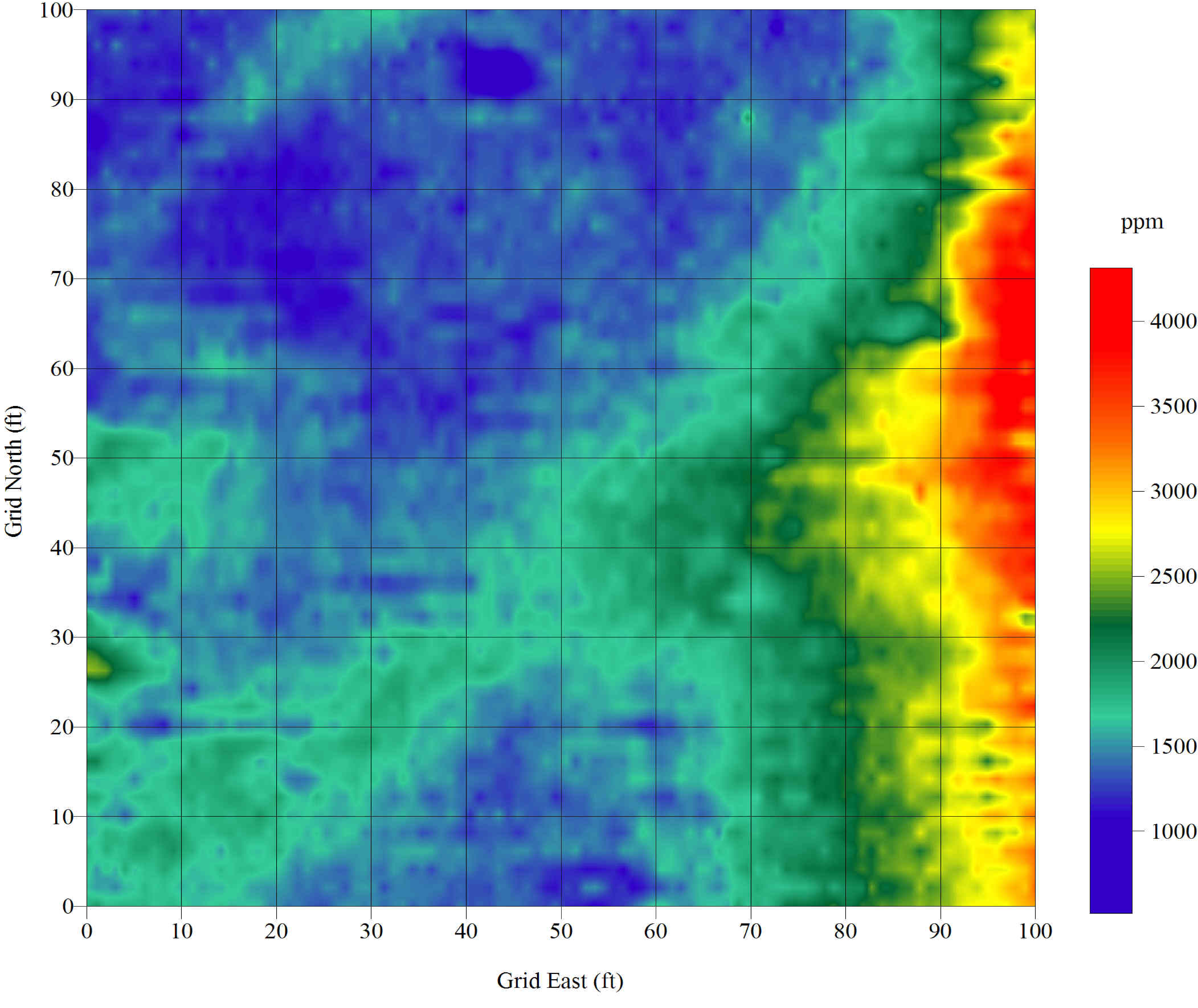


Figure B5-d

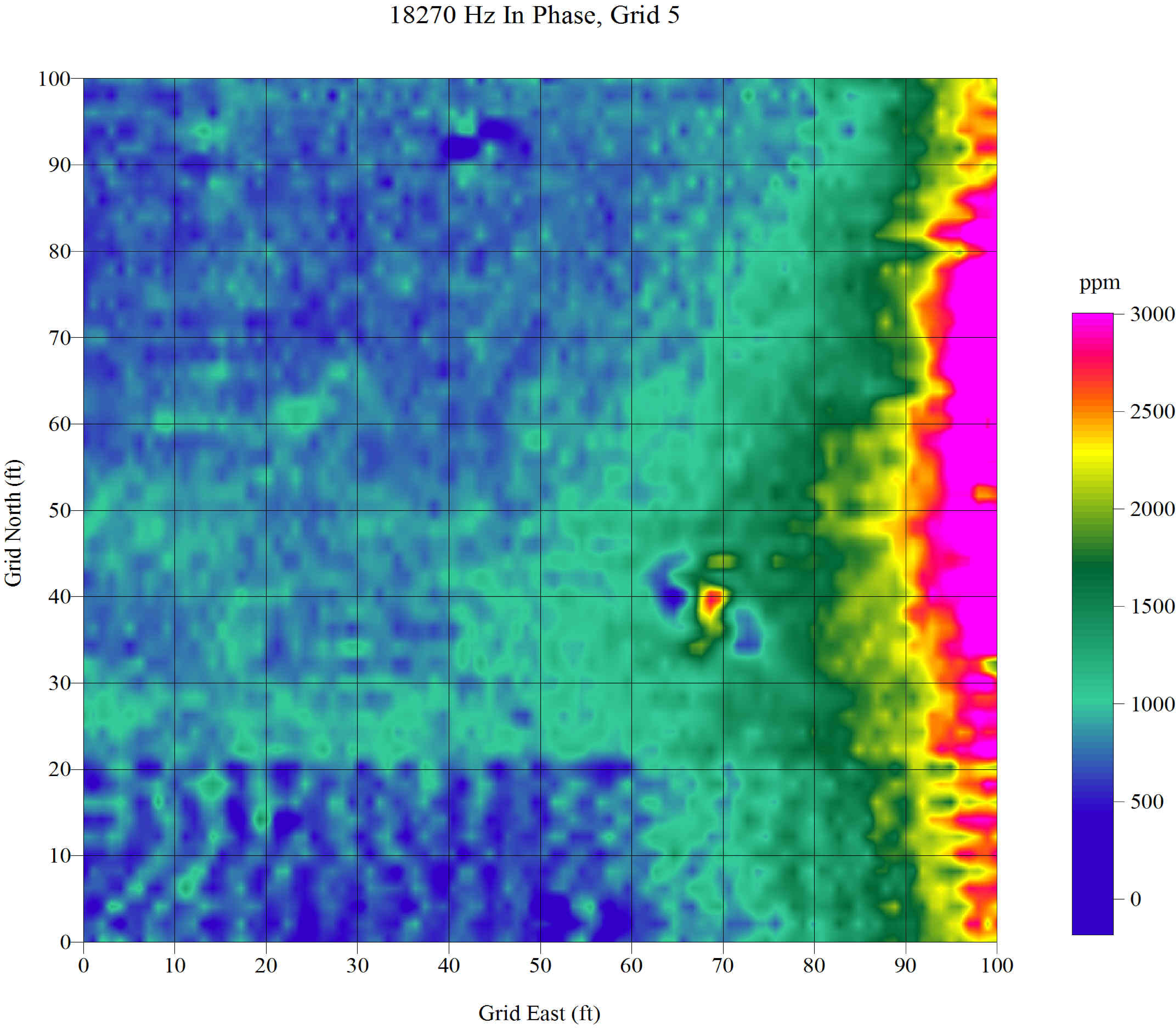

18270 Hz In Phase, Grid 5
Grid North (ft)
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
100
90
80
70
60
50
40
30
20
10
0

Figure B5-e

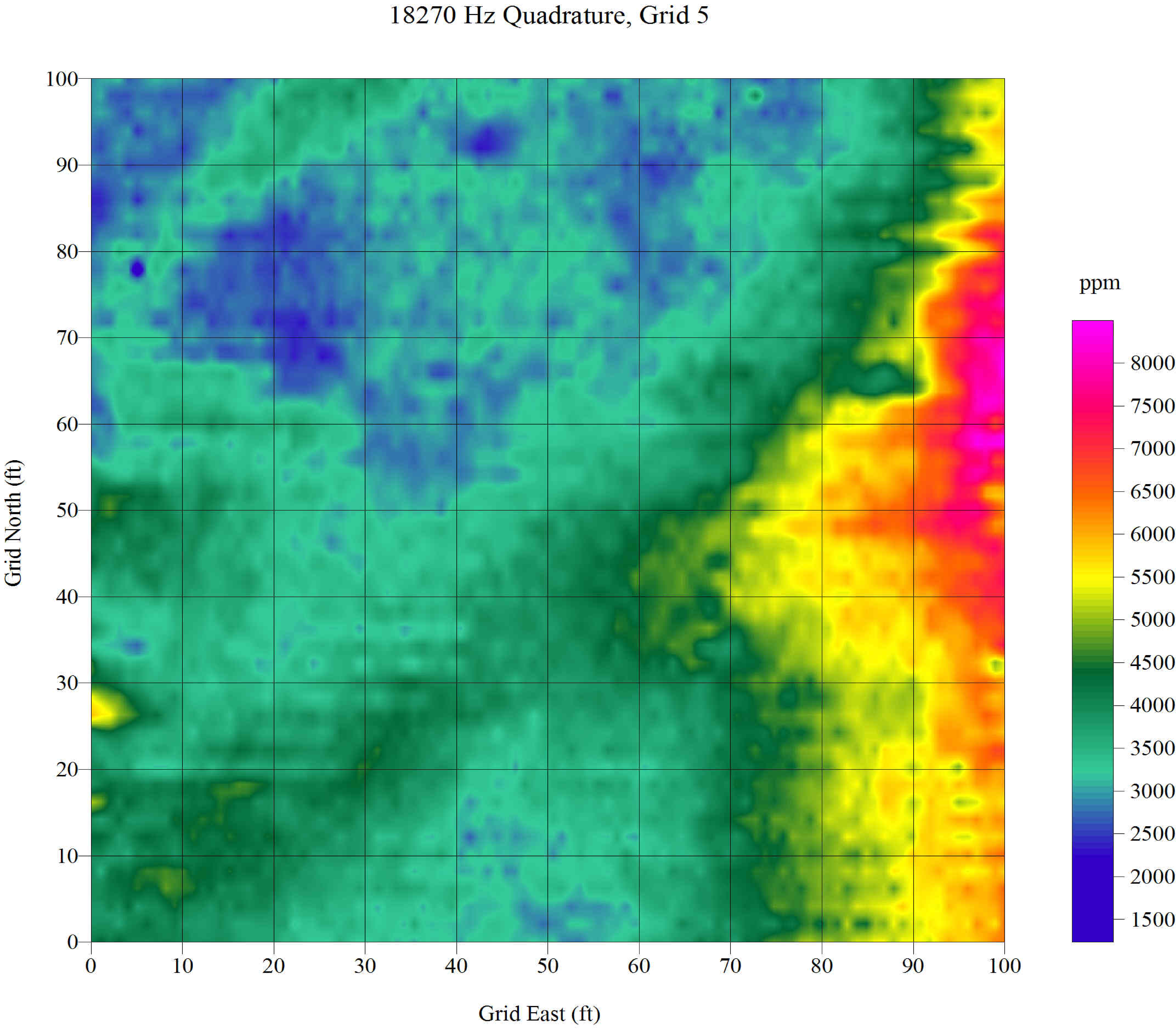

18270 Hz Quadrature, Grid 5
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000

Figure B5-f

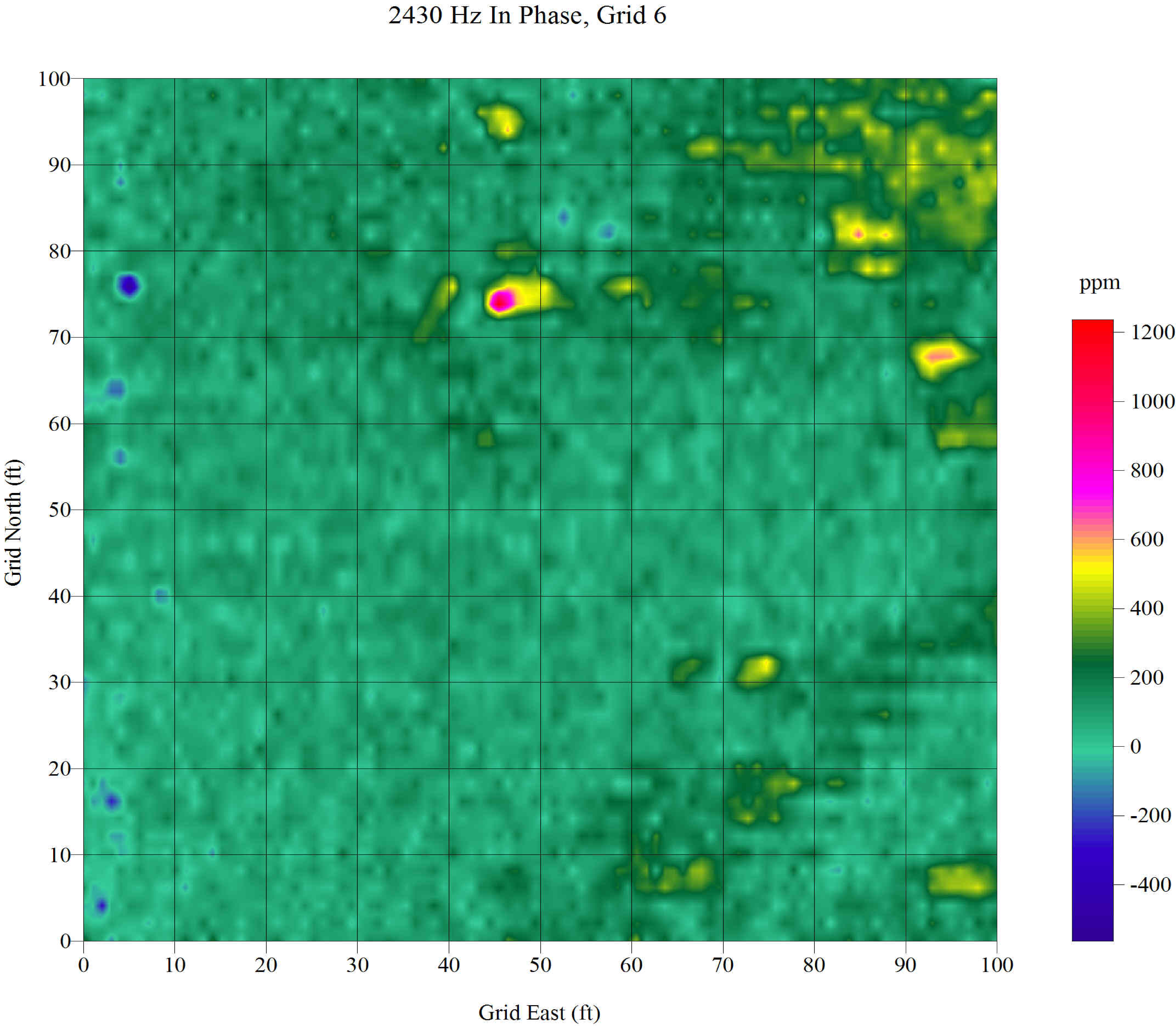

2430 Hz In Phase, Grid 6
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
1200
1000
800
600
400
200
0
-200
-400

Figure B6-a

2430 Hz Quadrature, Grid 6

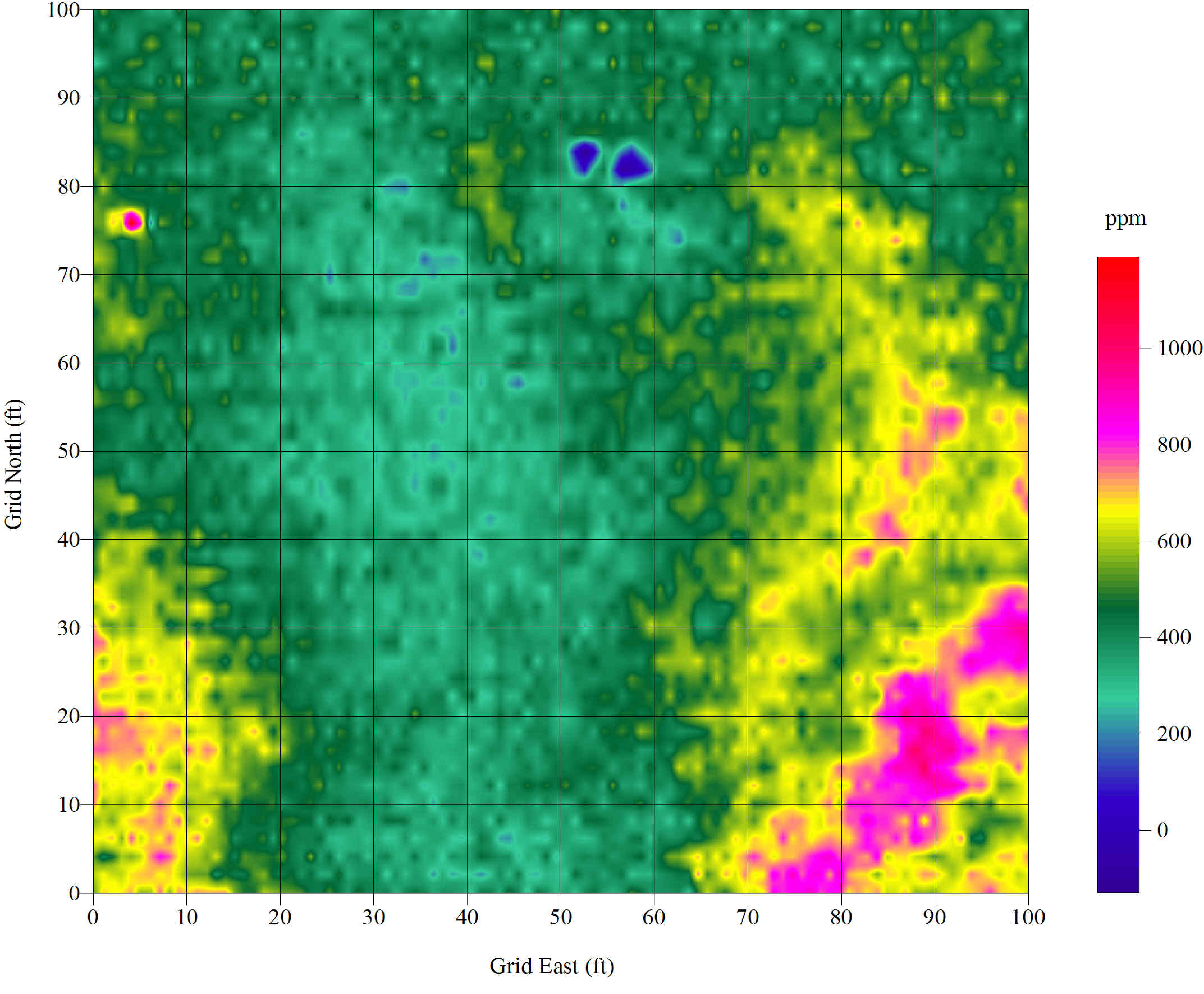


Figure B6-b

7290 Hz In Phase, Grid 6

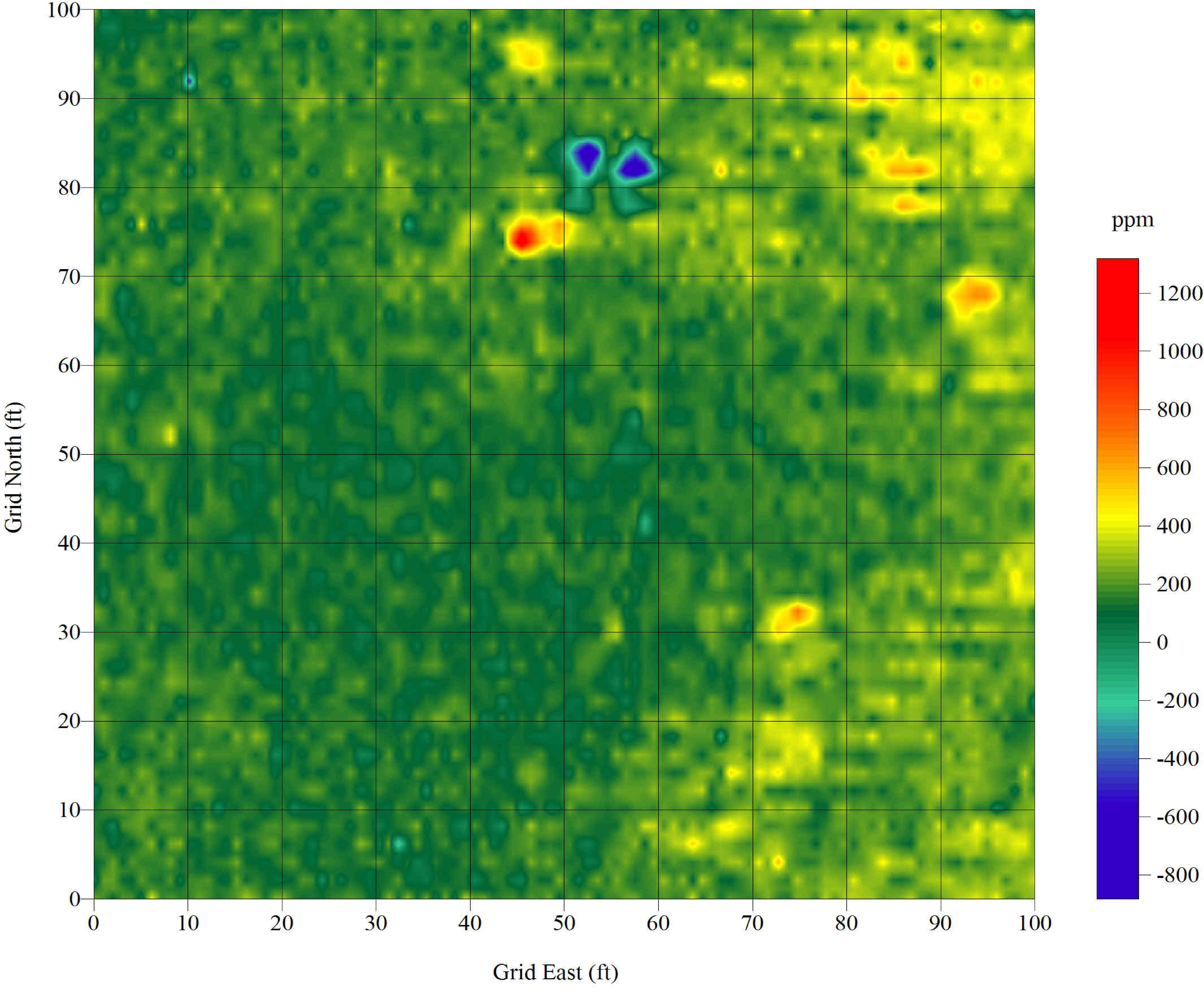


Figure B6-c

7290 Hz Quadrature, Grid 6

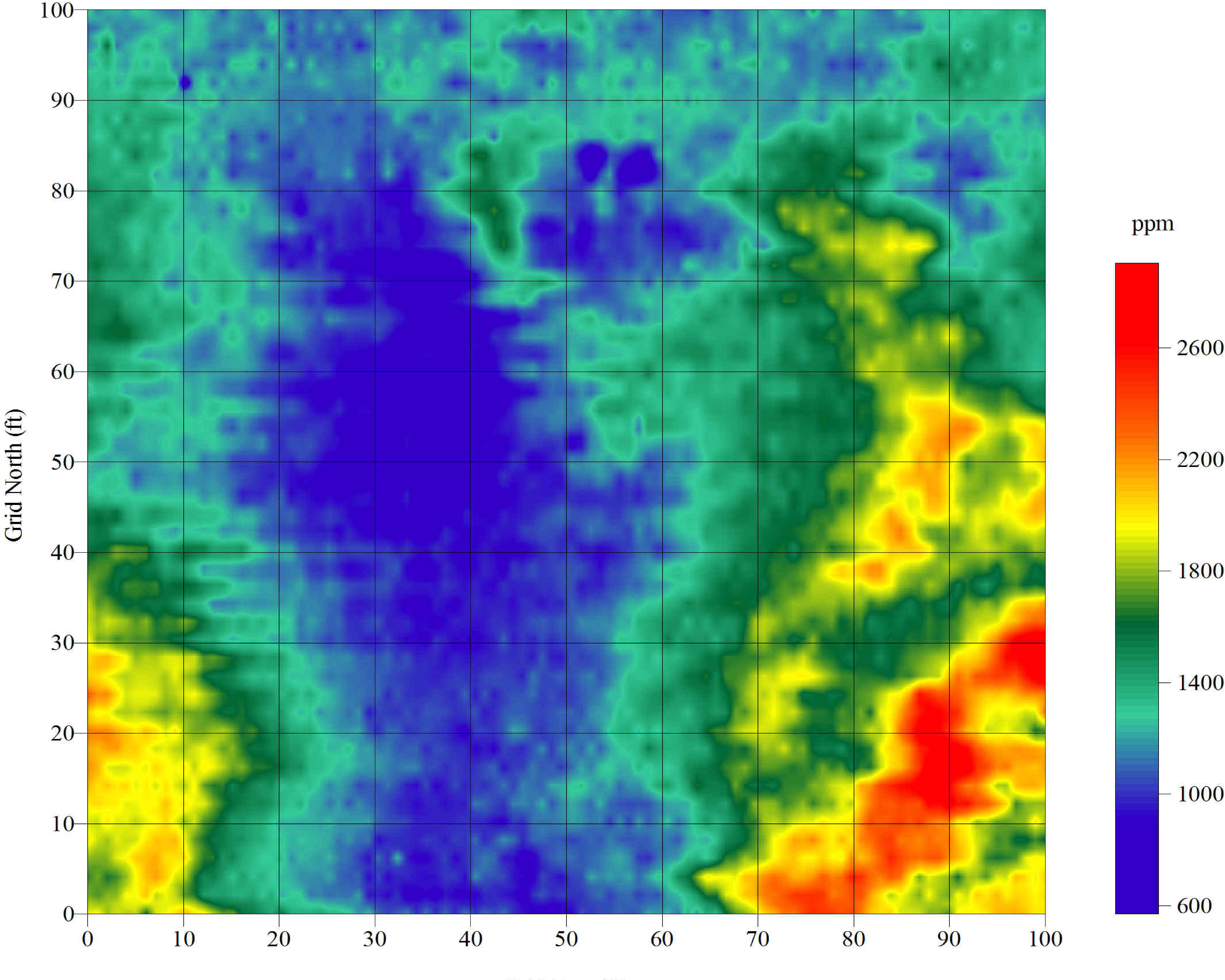


Figure B6-d

18270 Hz In Phase, Grid 6

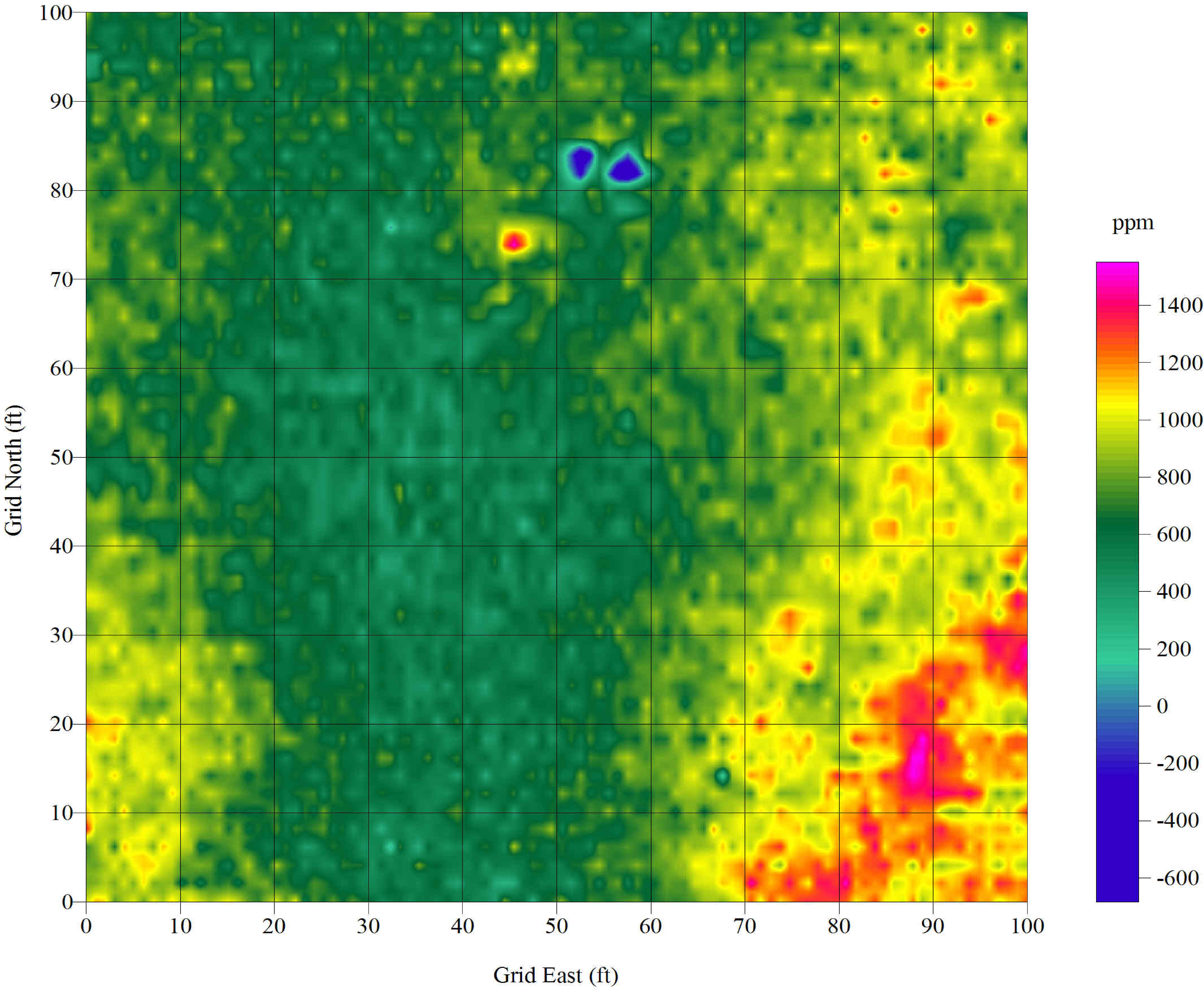


Figure B6-e

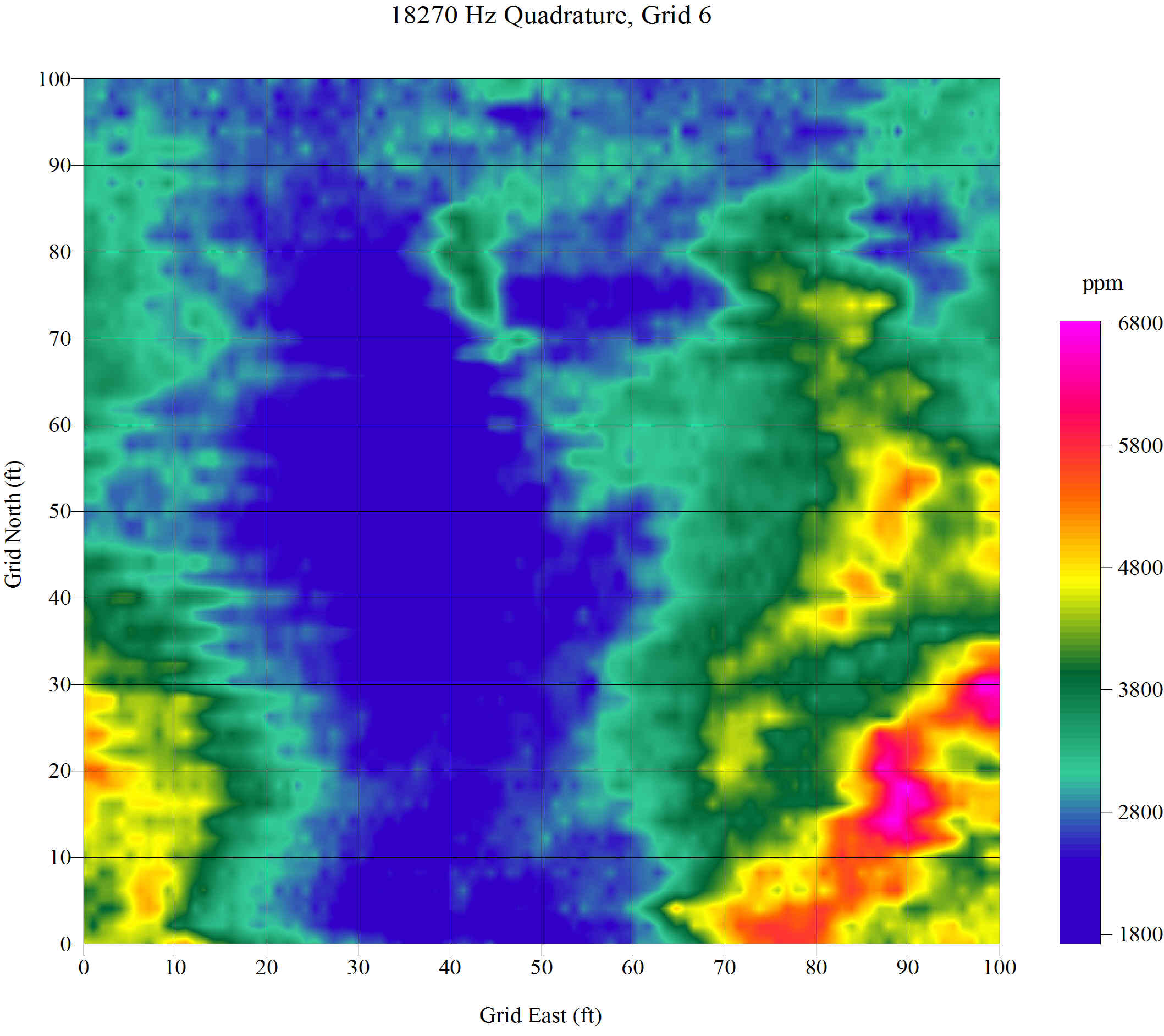
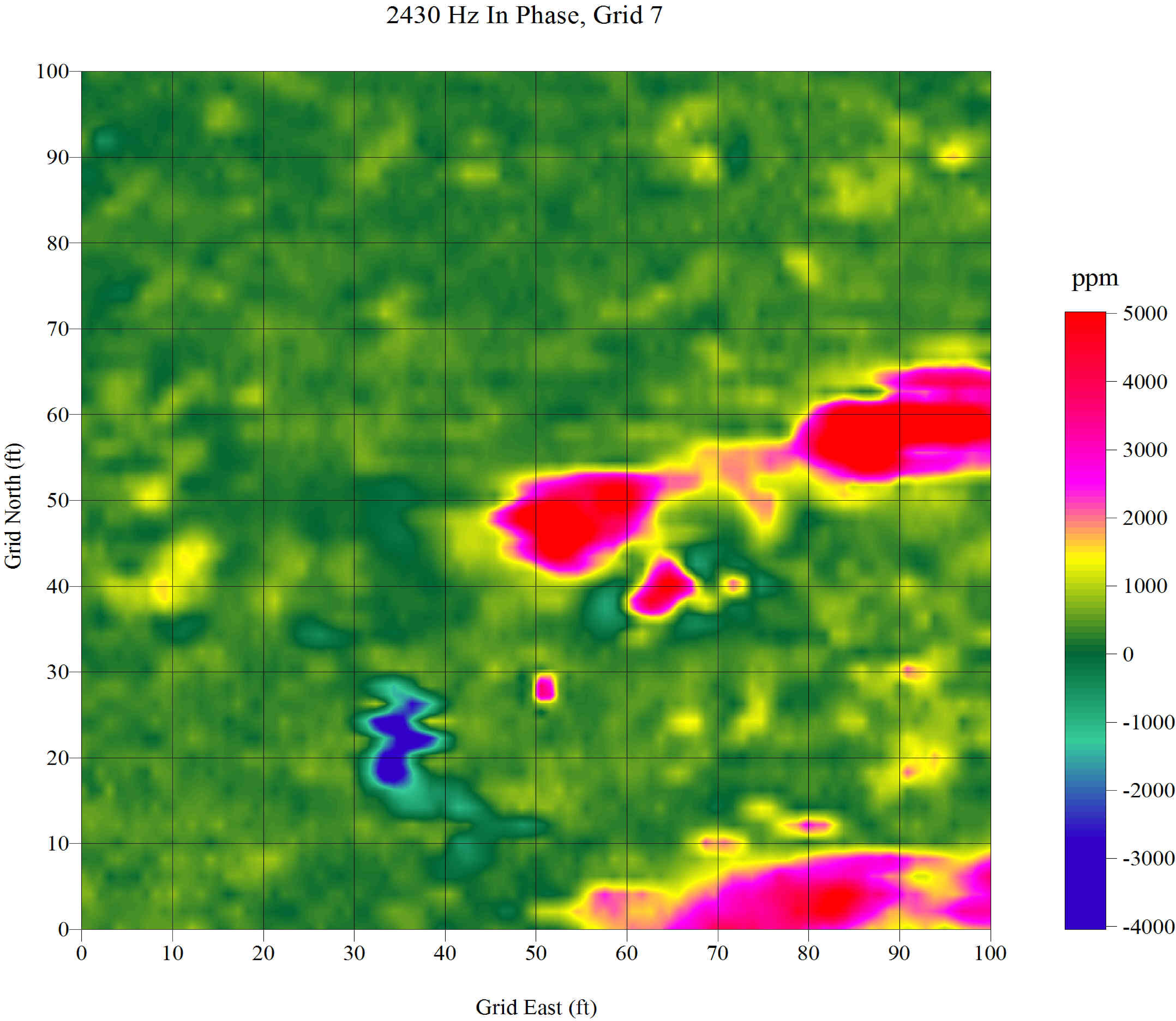

18270 Hz Quadrature, Grid 6
Grid North (ft)
Grid East (ft)
ppm
6800
5800
4800
3800
2800
1800
0
10
20
30
40
50
60
70
80
90
100

Figure B6-f



2430 Hz In Phase, Grid 7
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000

Figure B7-a

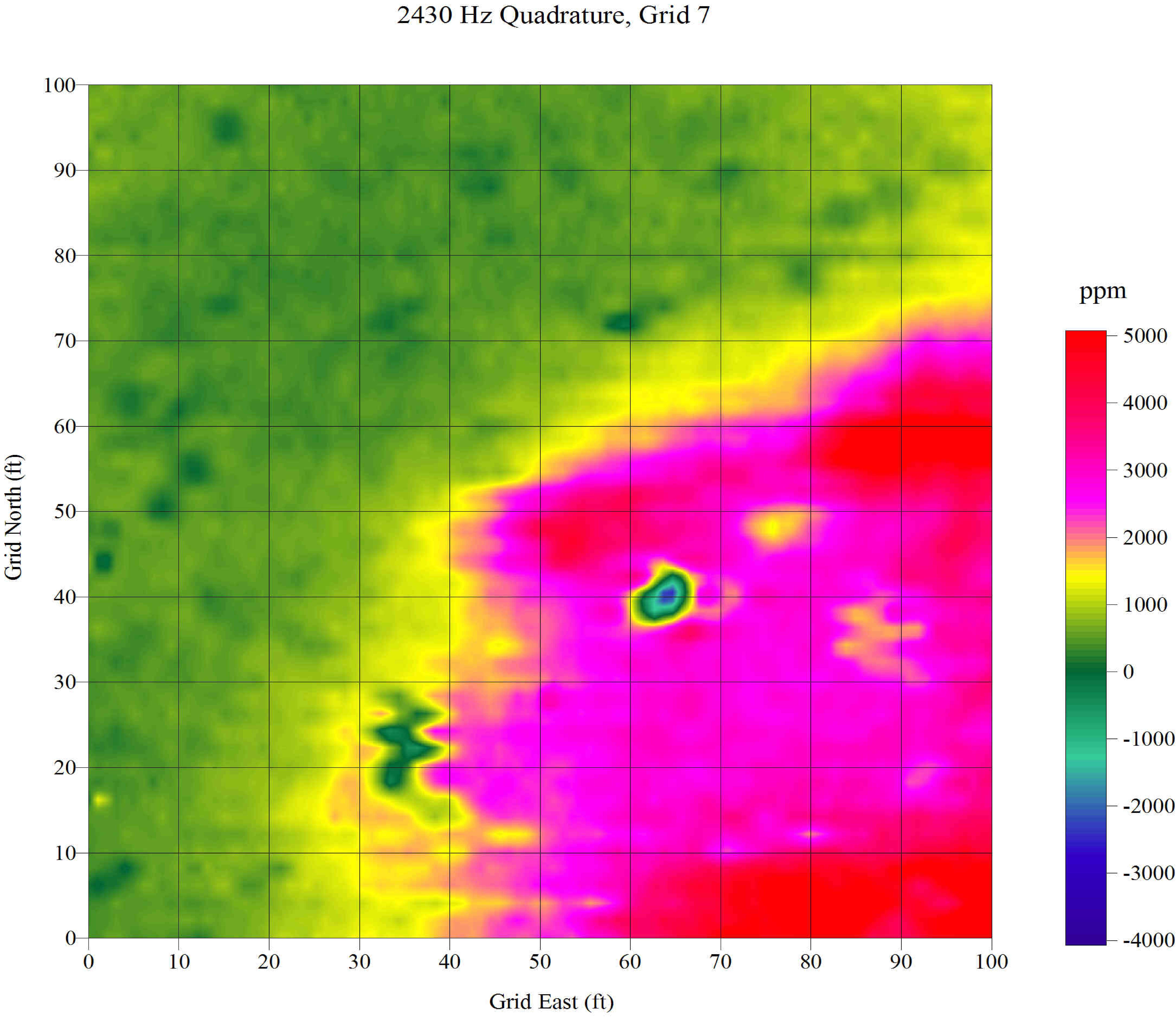

2430 Hz Quadrature, Grid 7
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000

Figure B7-b

7290 Hz In Phase, Grid 7

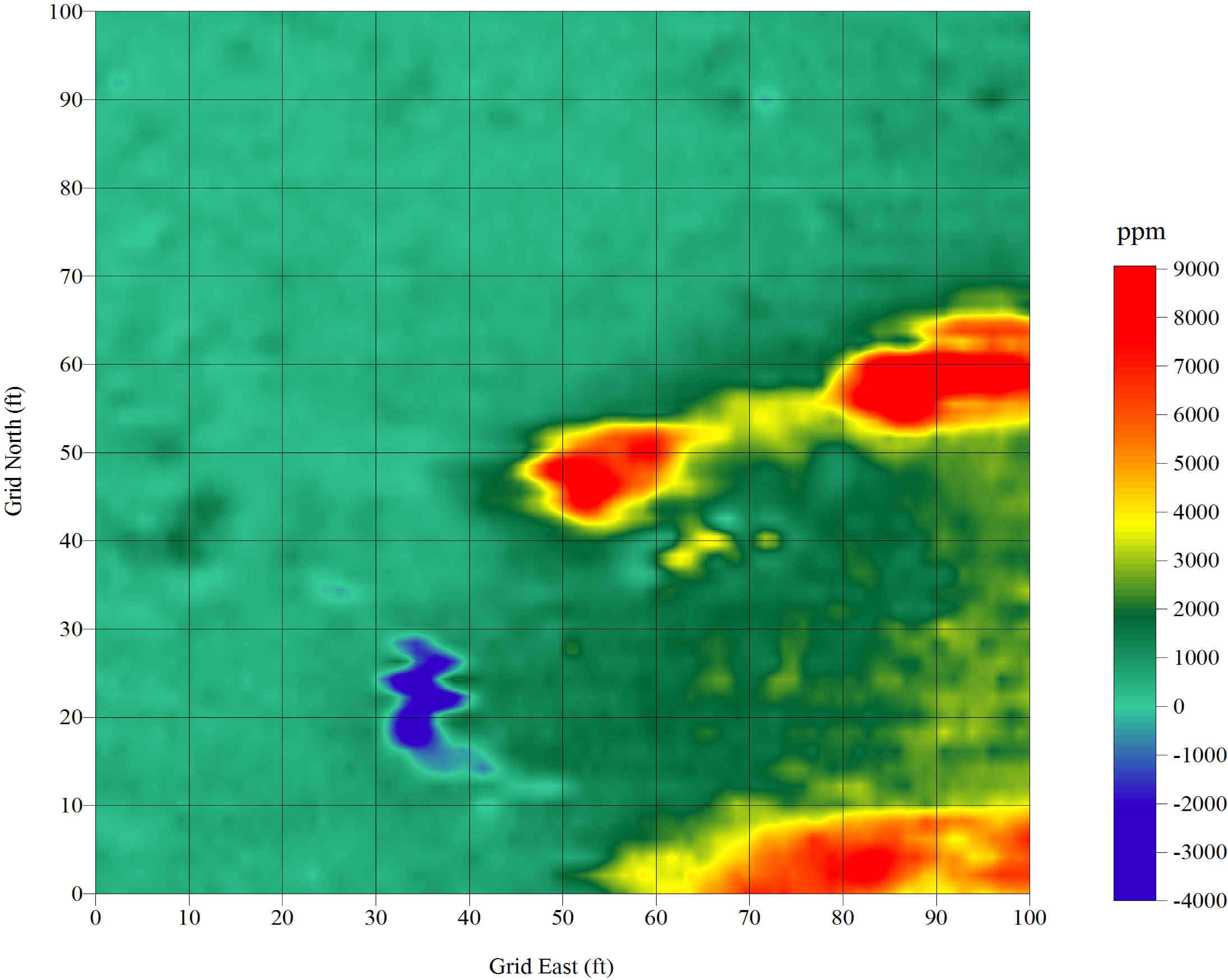


Figure B7-c

7290 Hz Quadrature, Grid 7

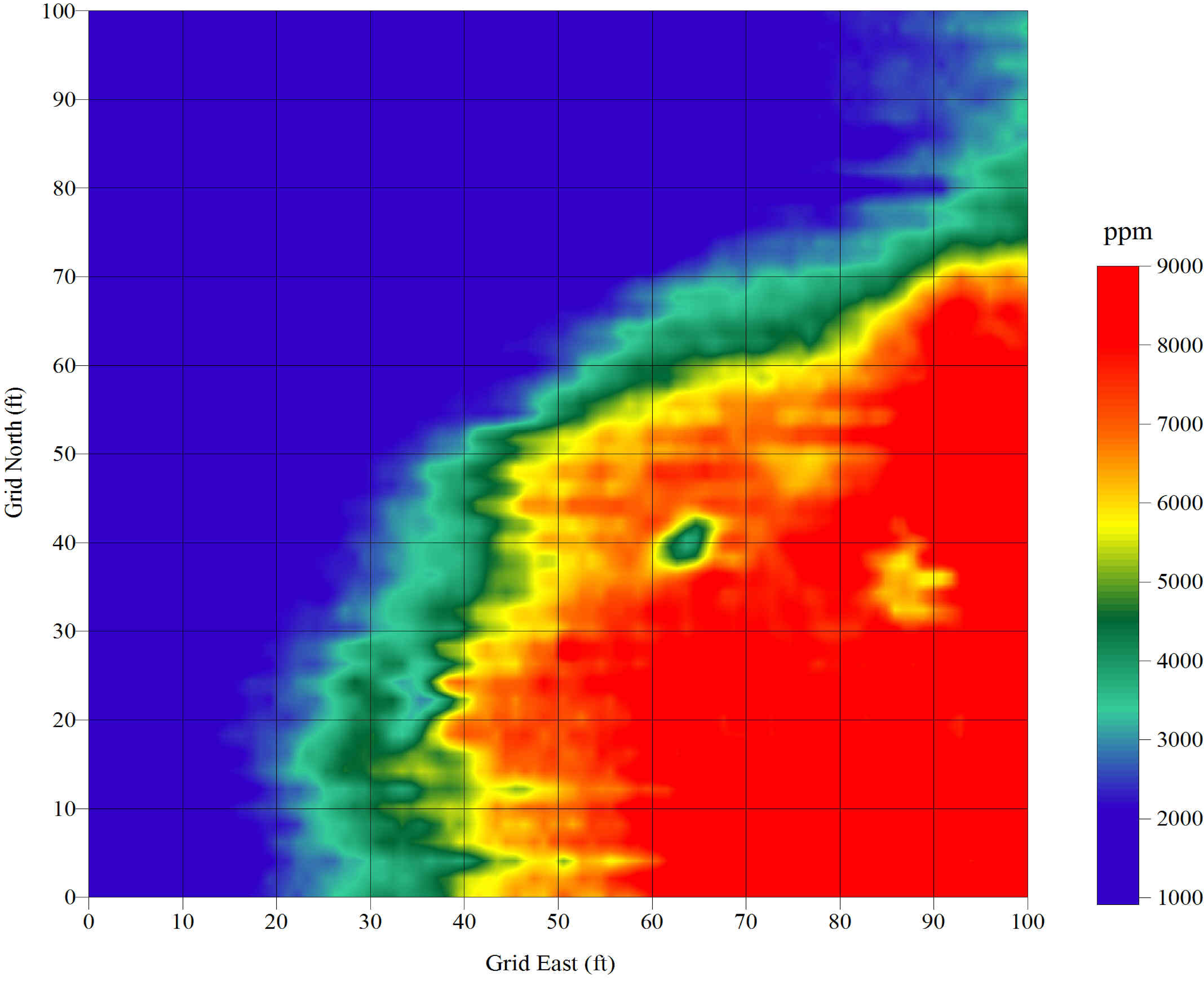


Figure B7-d

18270 Hz In Phase, Grid 7

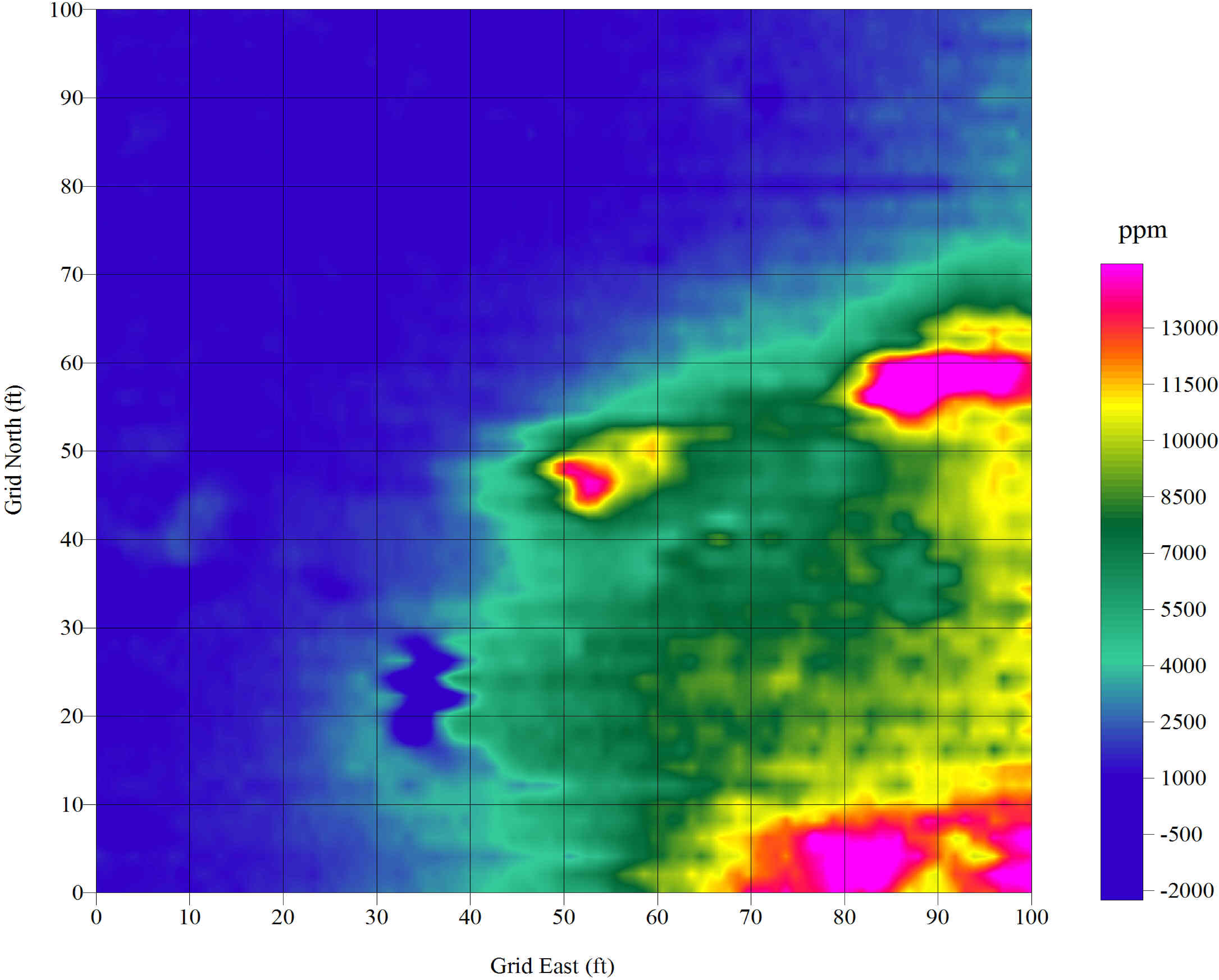


Figure B7-e

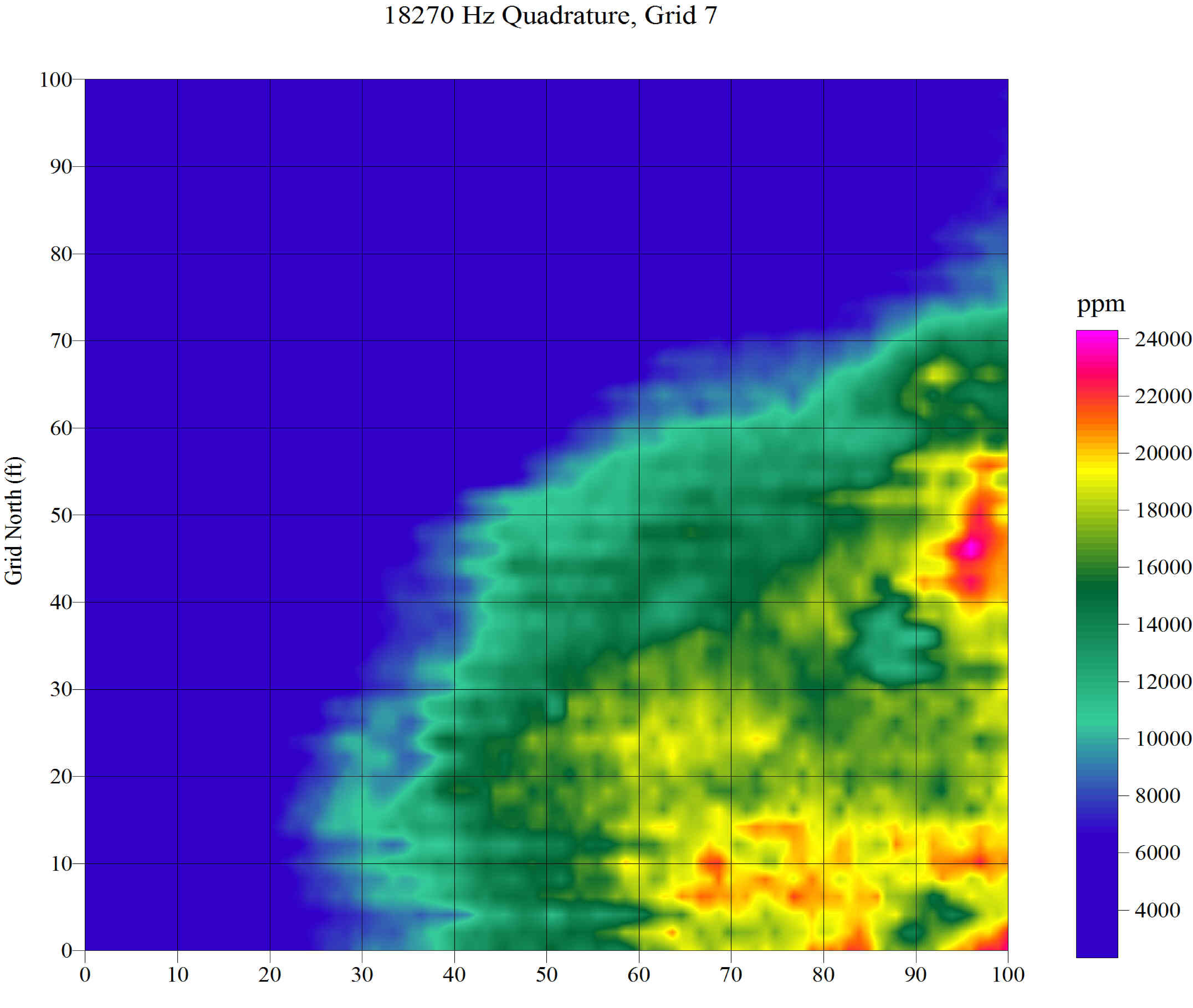
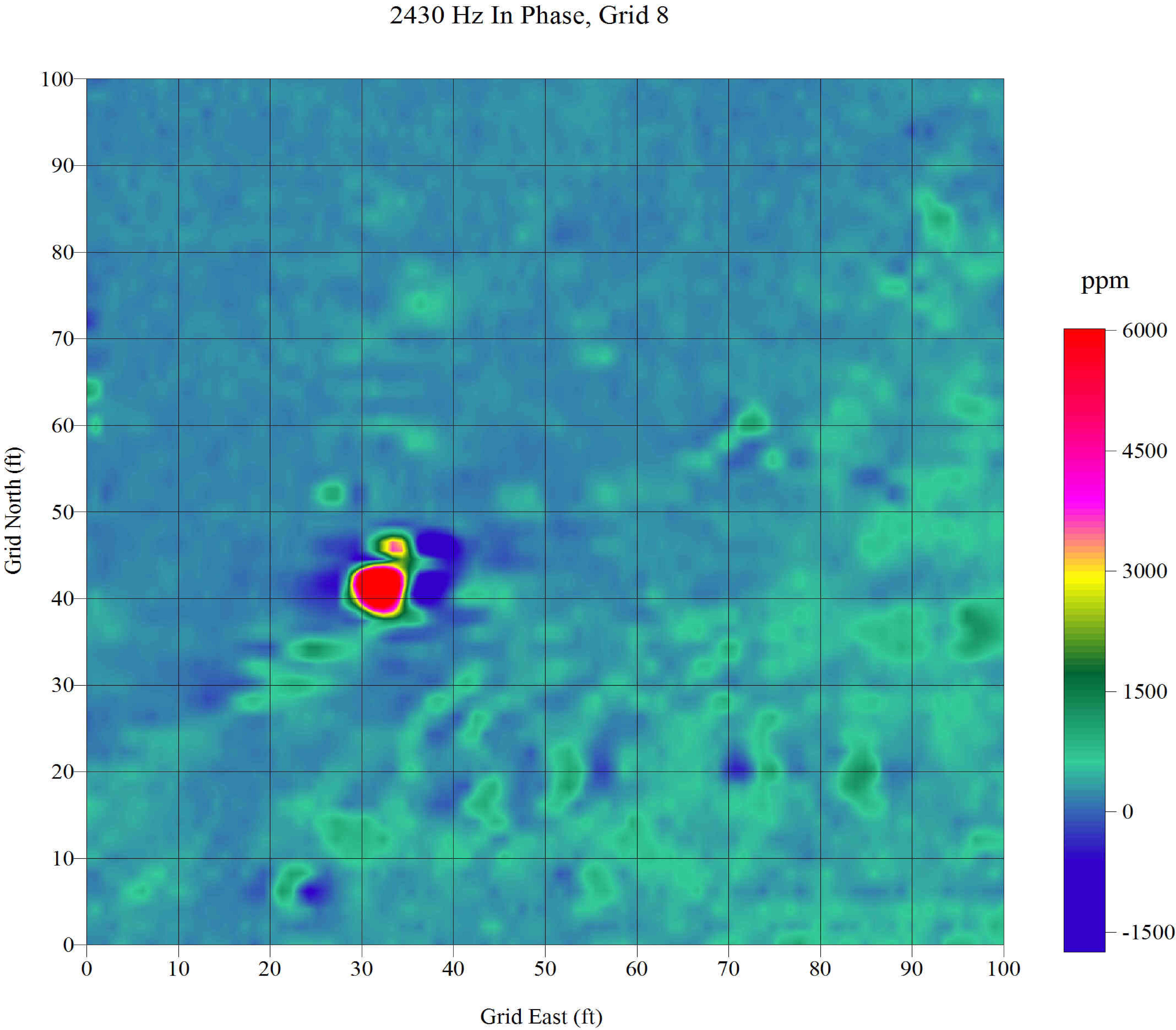

18270 Hz Quadrature, Grid 7
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000

Figure B7-f


2430 Hz In Phase, Grid 8
Grid North (ft)
Grid East (ft)
ppm
6000
4500
3000
1500
0
-1500
0
10
20
30
40
50
60
70
80
90
100
Figure B8-a

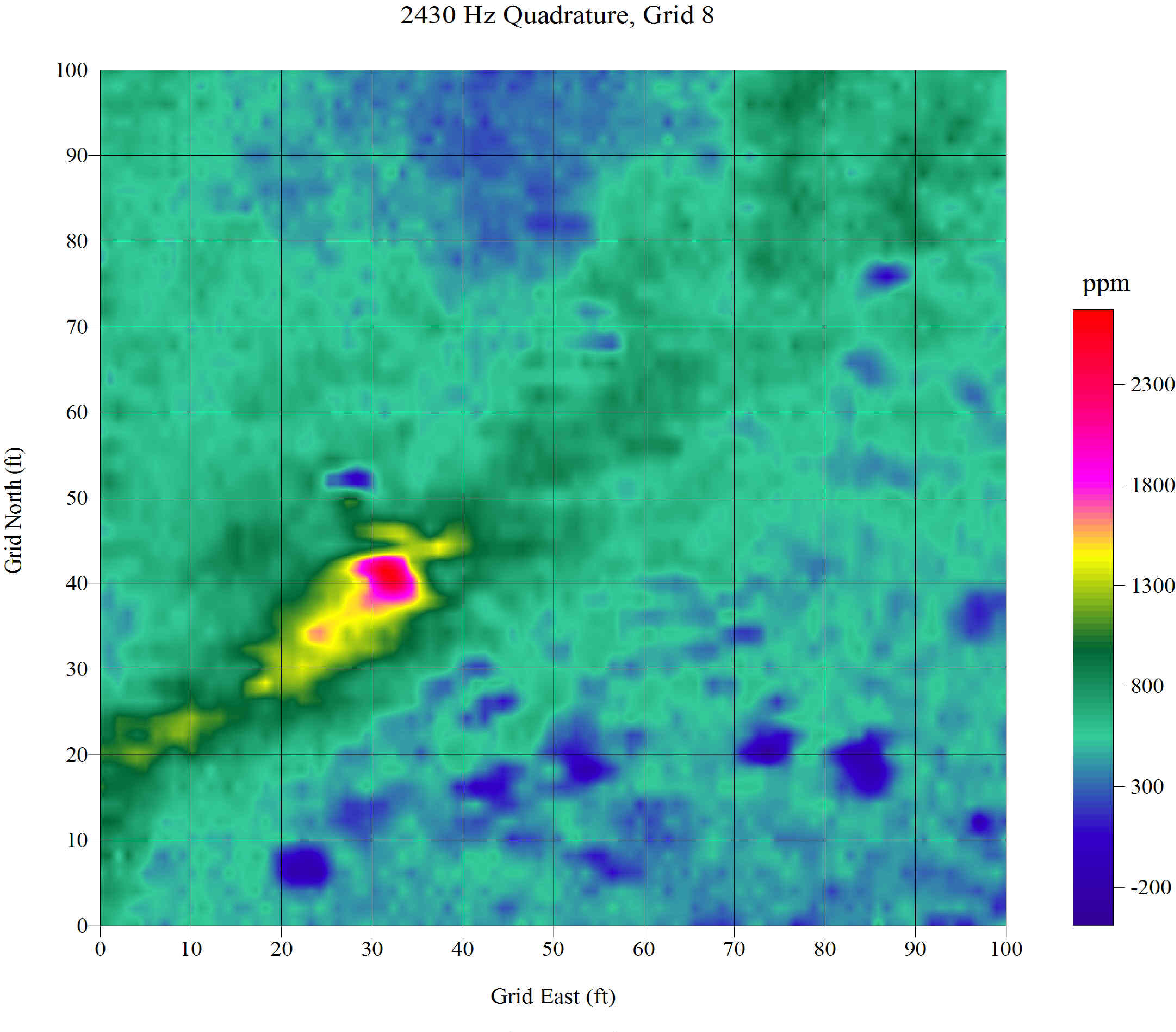

2430 Hz Quadrature, Grid 8
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
2300
1800
1300
800
300
-200

Figure B8-b

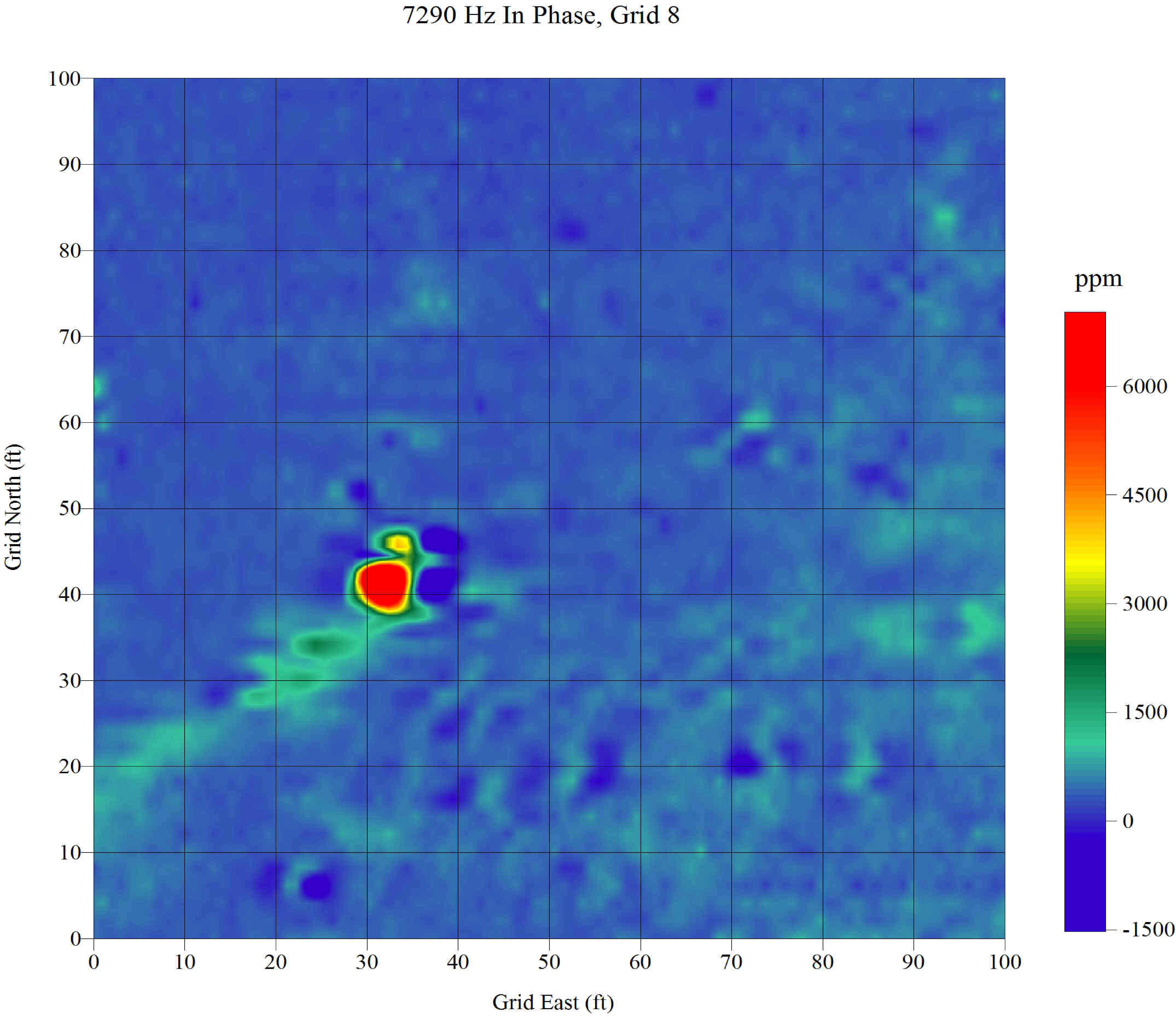

7290 Hz In Phase, Grid 8
Grid North (ft)
Grid East (ft)
ppm
6000
4500
3000
1500
0
-1500
0
10
20
30
40
50
60
70
80
90
100

Figure B8-c

7290 Hz Quadrature, Grid 8

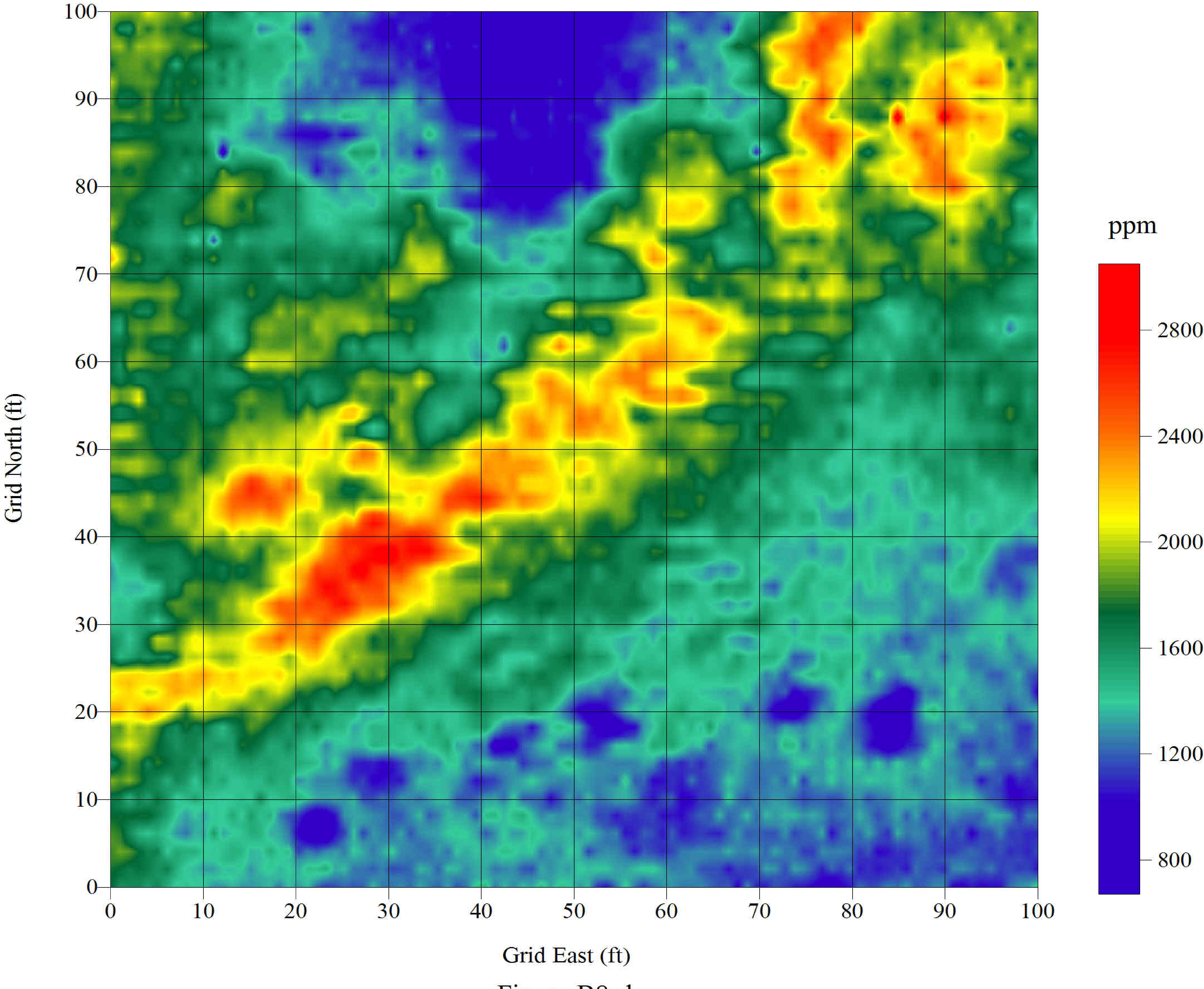


Figure B8-d

18270 Hz In Phase, Grid 8

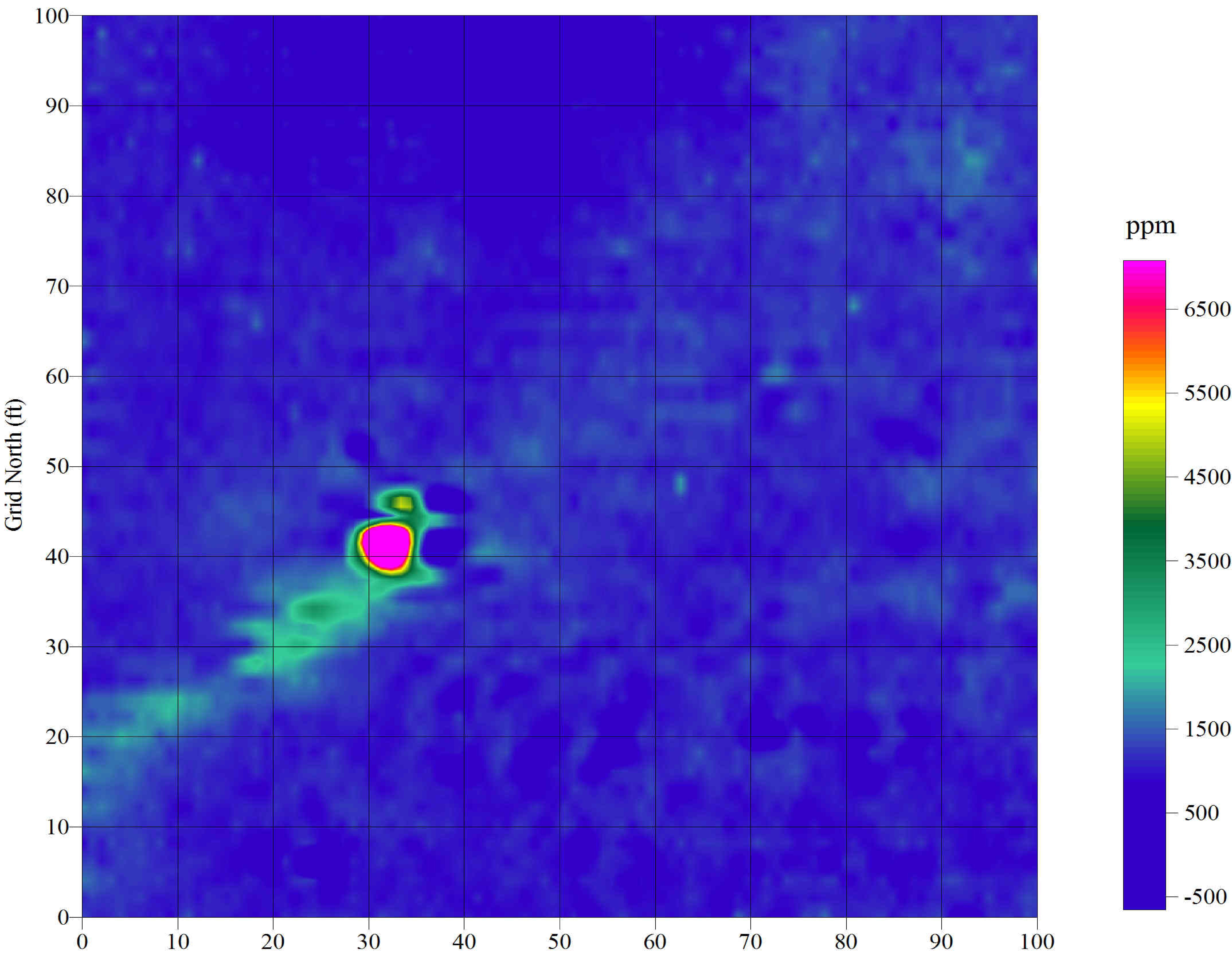


Figure B8-e

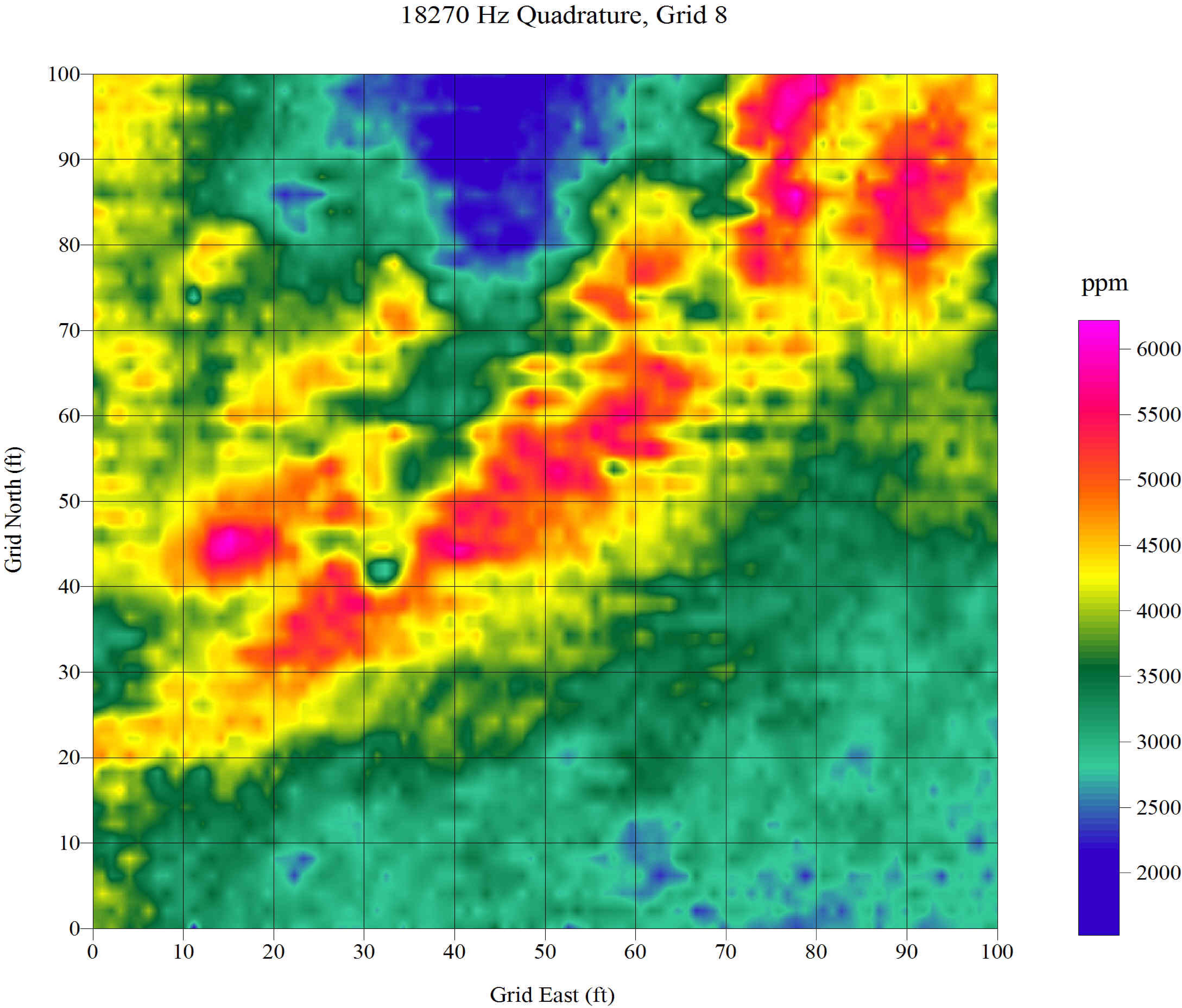
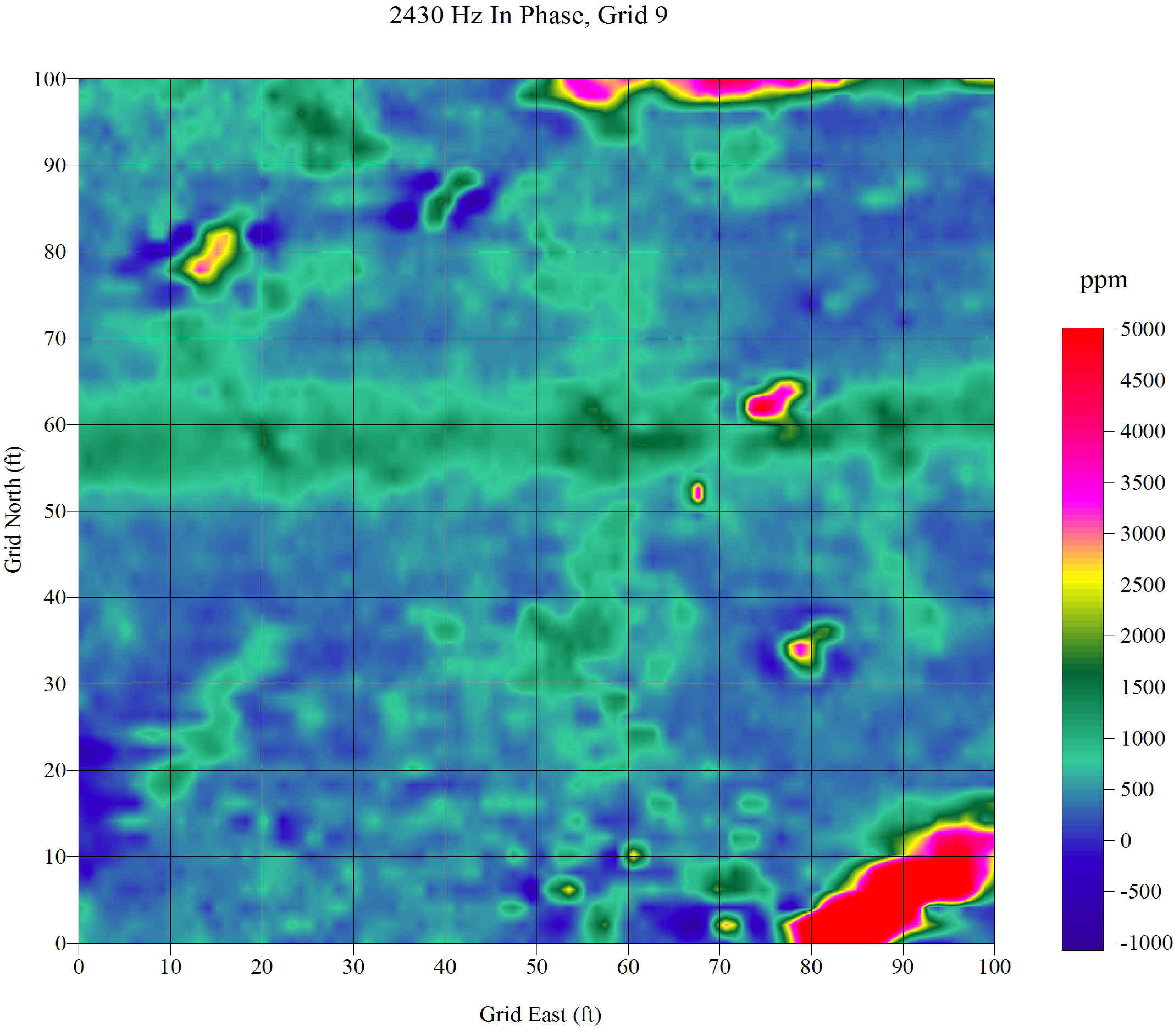

18270 Hz Quadrature, Grid 8
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2000
2500
3000
3500
4000
4500
5000
5500
6000

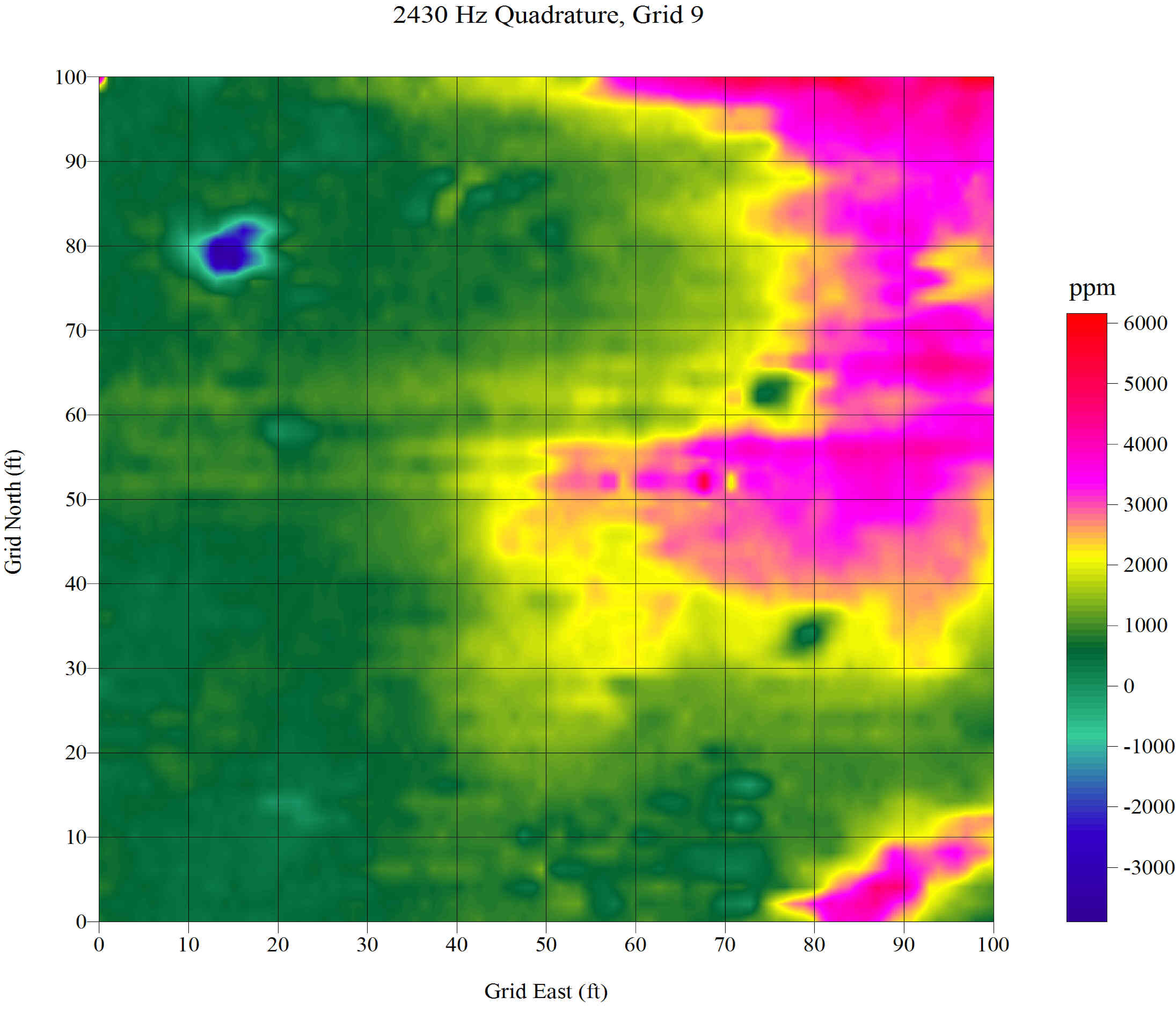
Figure B8-f

Figure B8-g



2430 Hz In Phase, Grid 9
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
-500
-1000

Figure B9-a



2430 Hz Quadrature, Grid 9
Grid North (ft)
Grid East (ft)
ppm
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
0
10
20
30
40
50
60
70
80
90
100

Figure B9-b

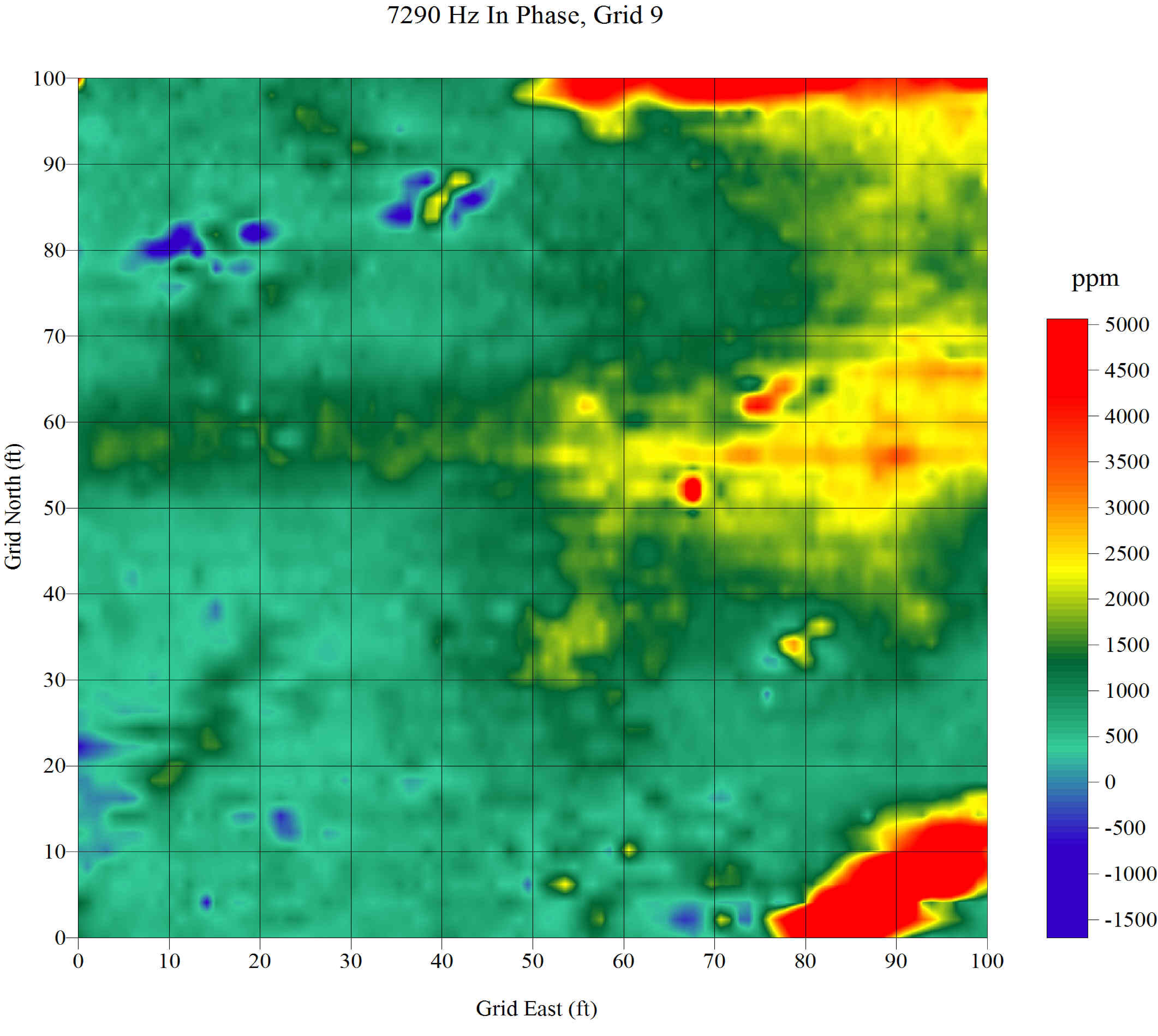

7290 Hz In Phase, Grid 9
Grid North (ft)
Grid East (ft)
ppm
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
0
10
20
30
40
50
60
70
80
90
100

Figure B9-c

7290 Hz Quadrature, Grid 9

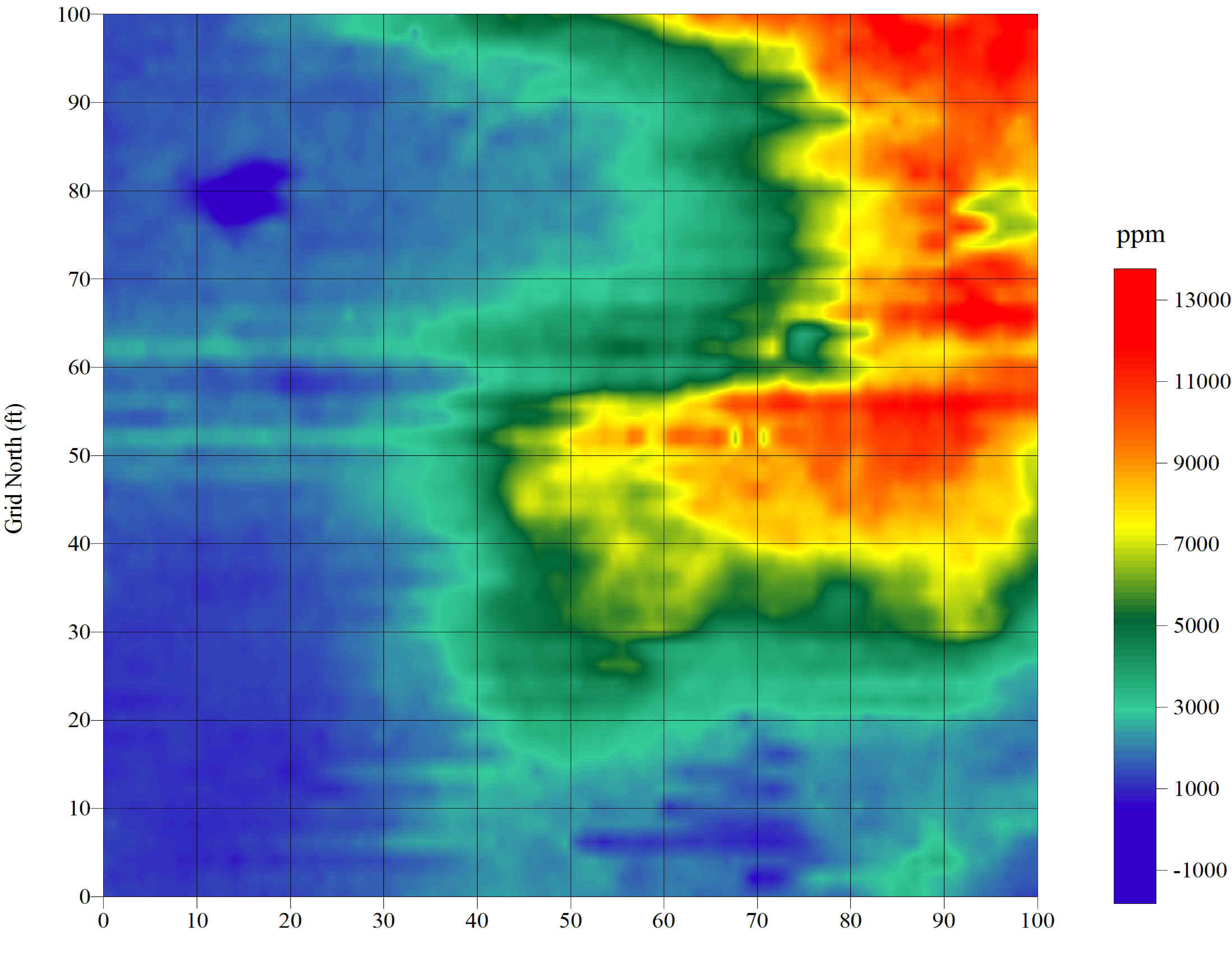


Figure B9-d

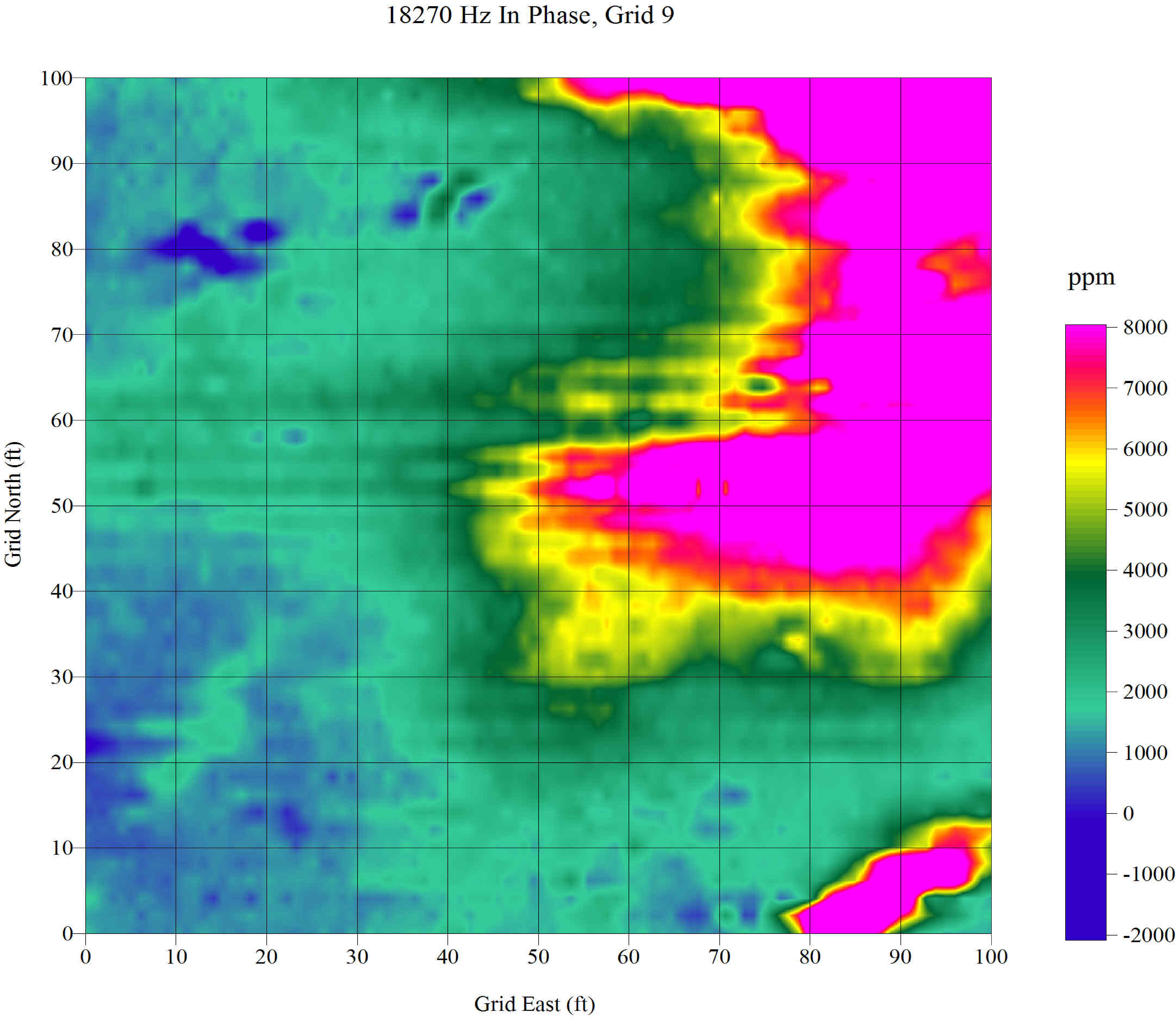

18270 Hz In Phase, Grid 9
Grid North (ft)
Grid East (ft)
ppm
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B9-e

18270 Hz Quadrature, Grid 9

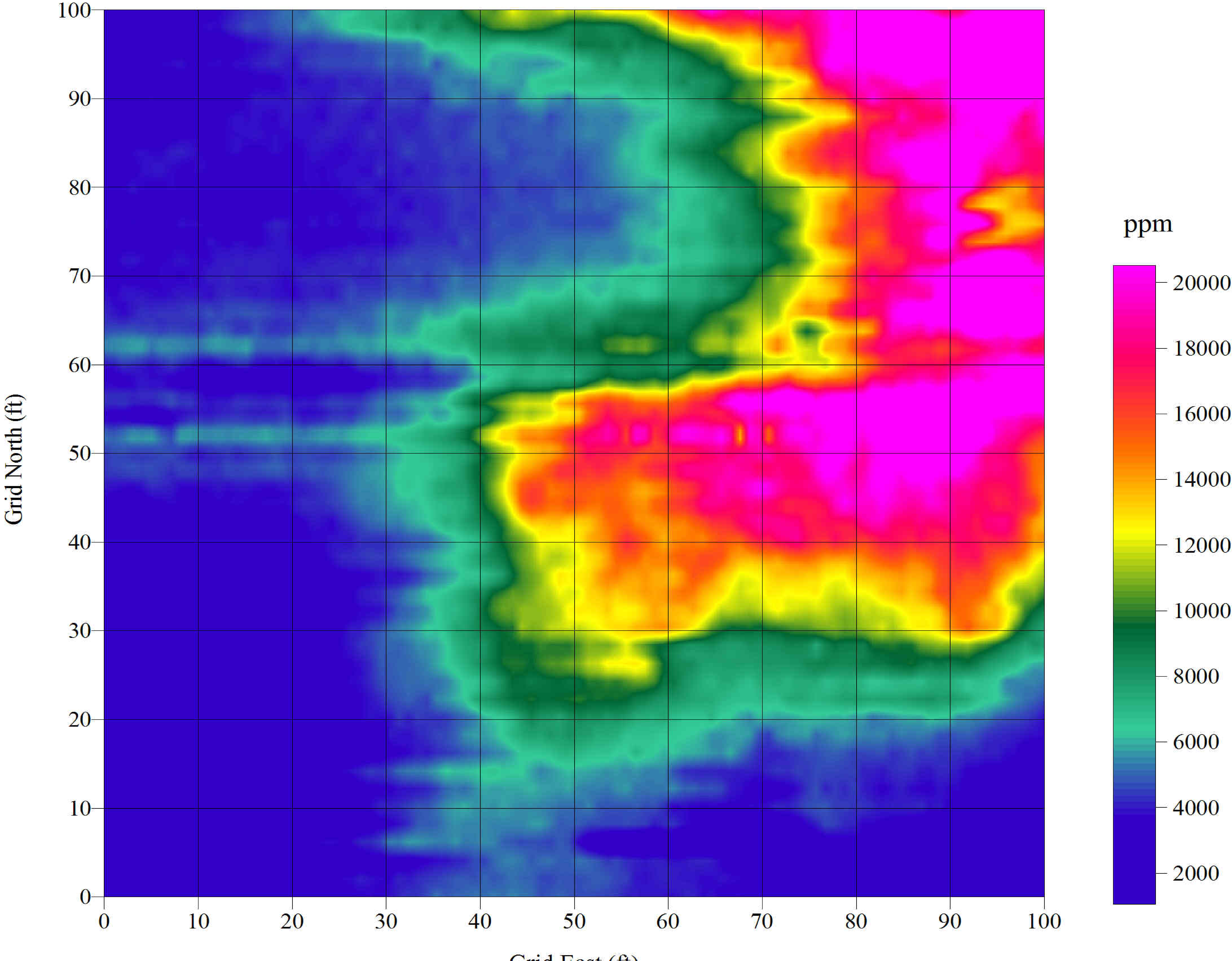


Figure B9-f

2430 Hz In Phase, Grid 10

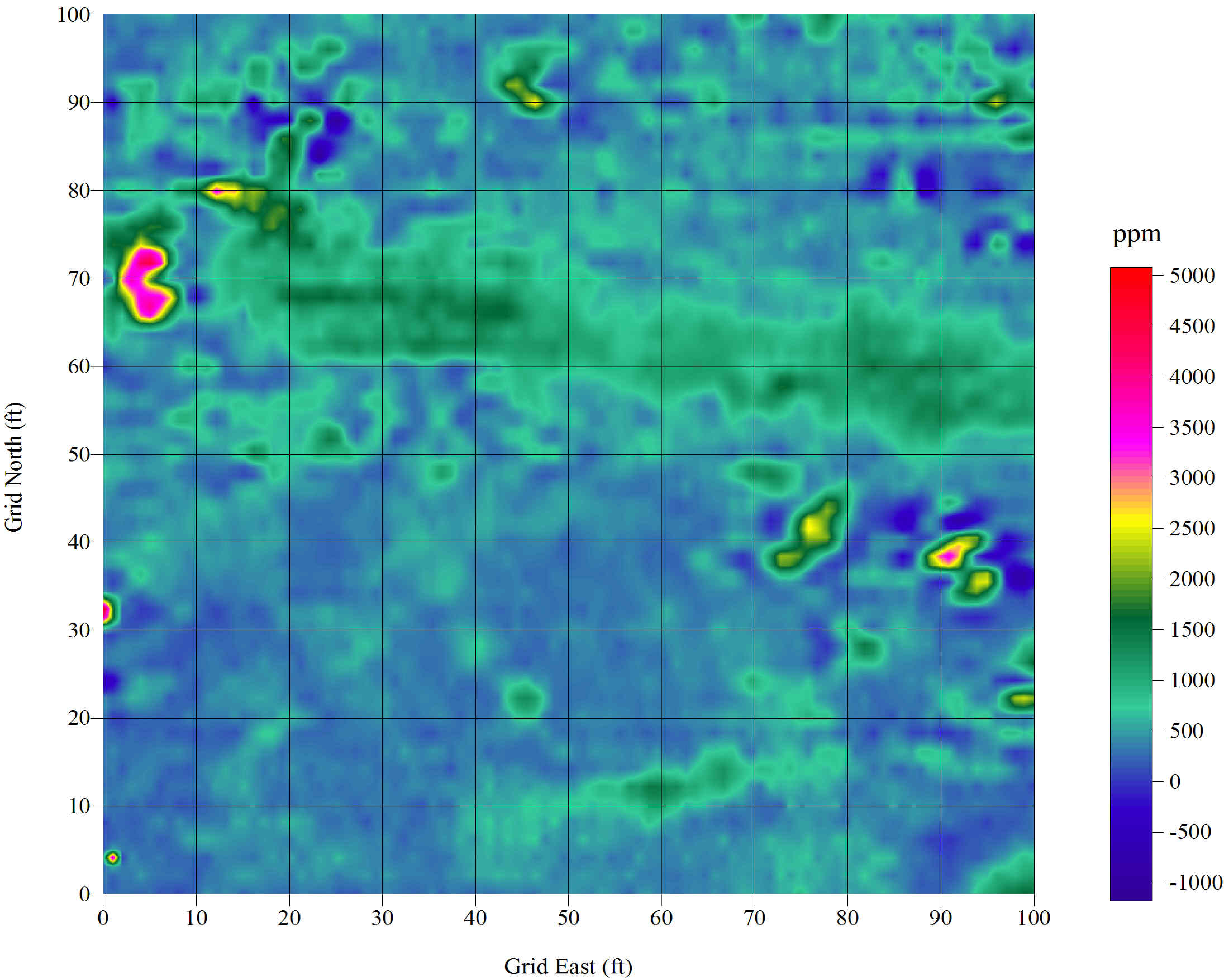


Figure B10-a

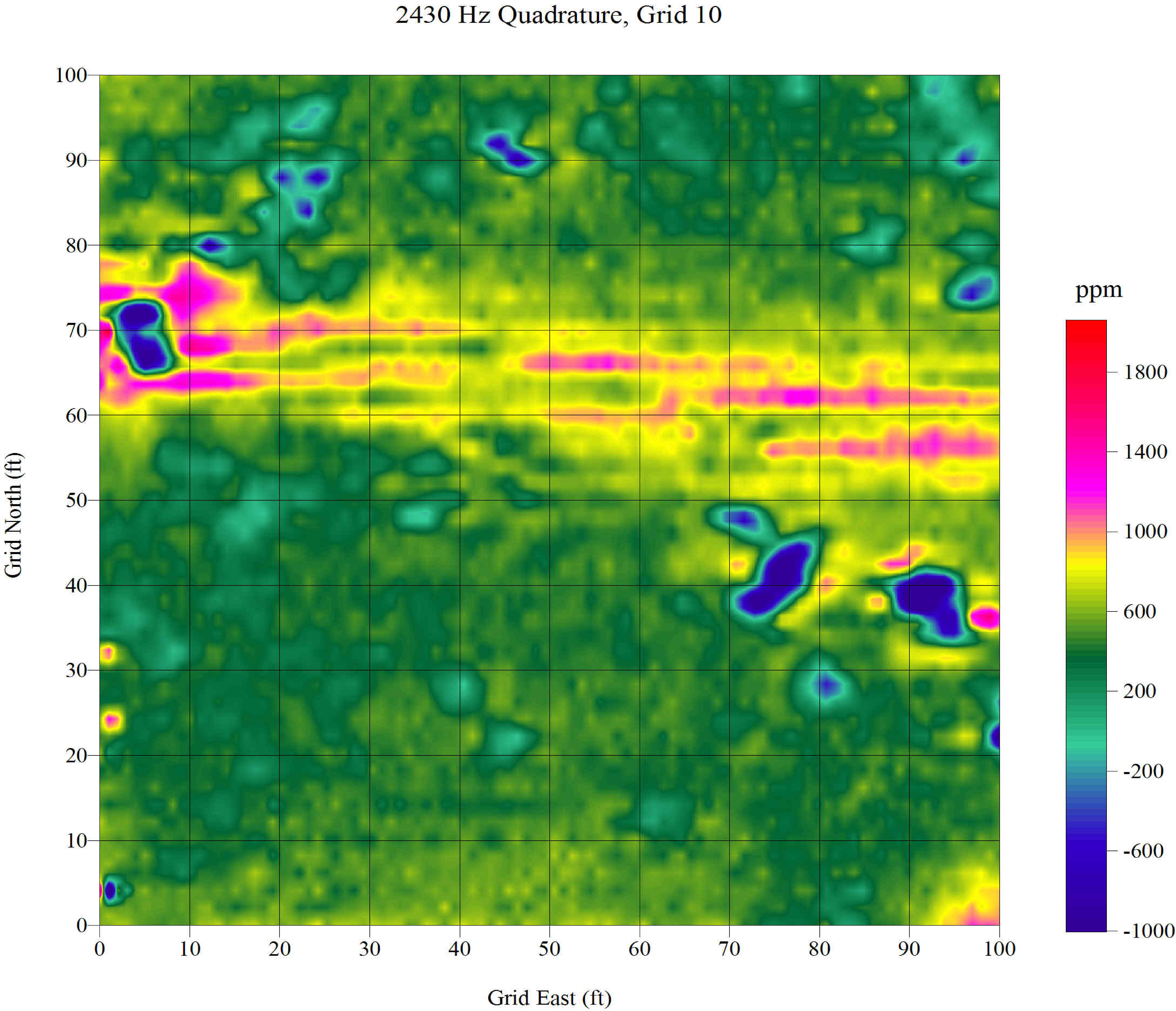
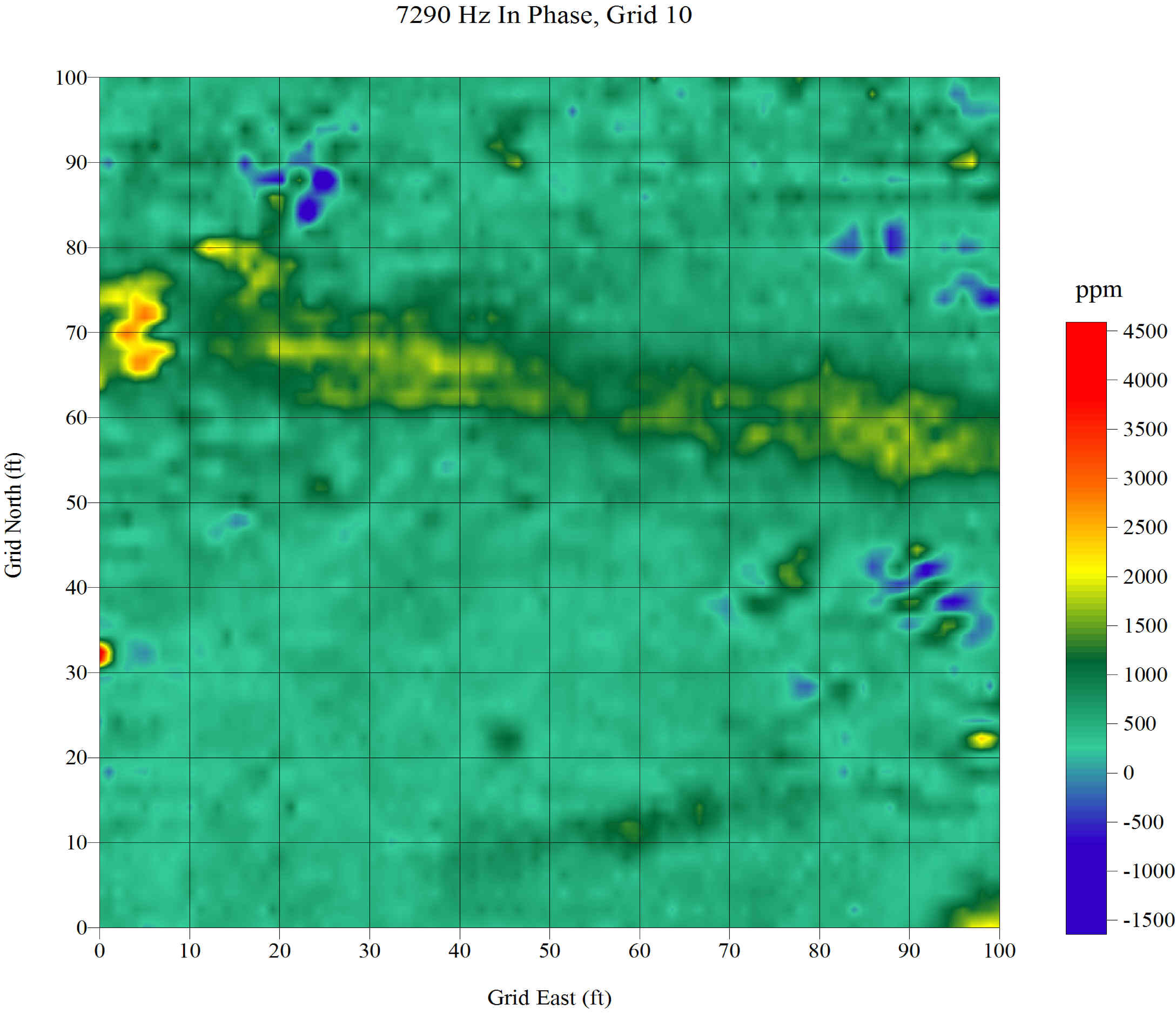

2430 Hz Quadrature, Grid 10
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1800
1400
1000
600
200
-200
-600
-1000

Figure B10-b



7290 Hz In Phase, Grid 10
Grid North (ft)
Grid East (ft)
ppm
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
0
10
20
30
40
50
60
70
80
90
100

Figure B10-c

7290 Hz Quadrature, Grid 10

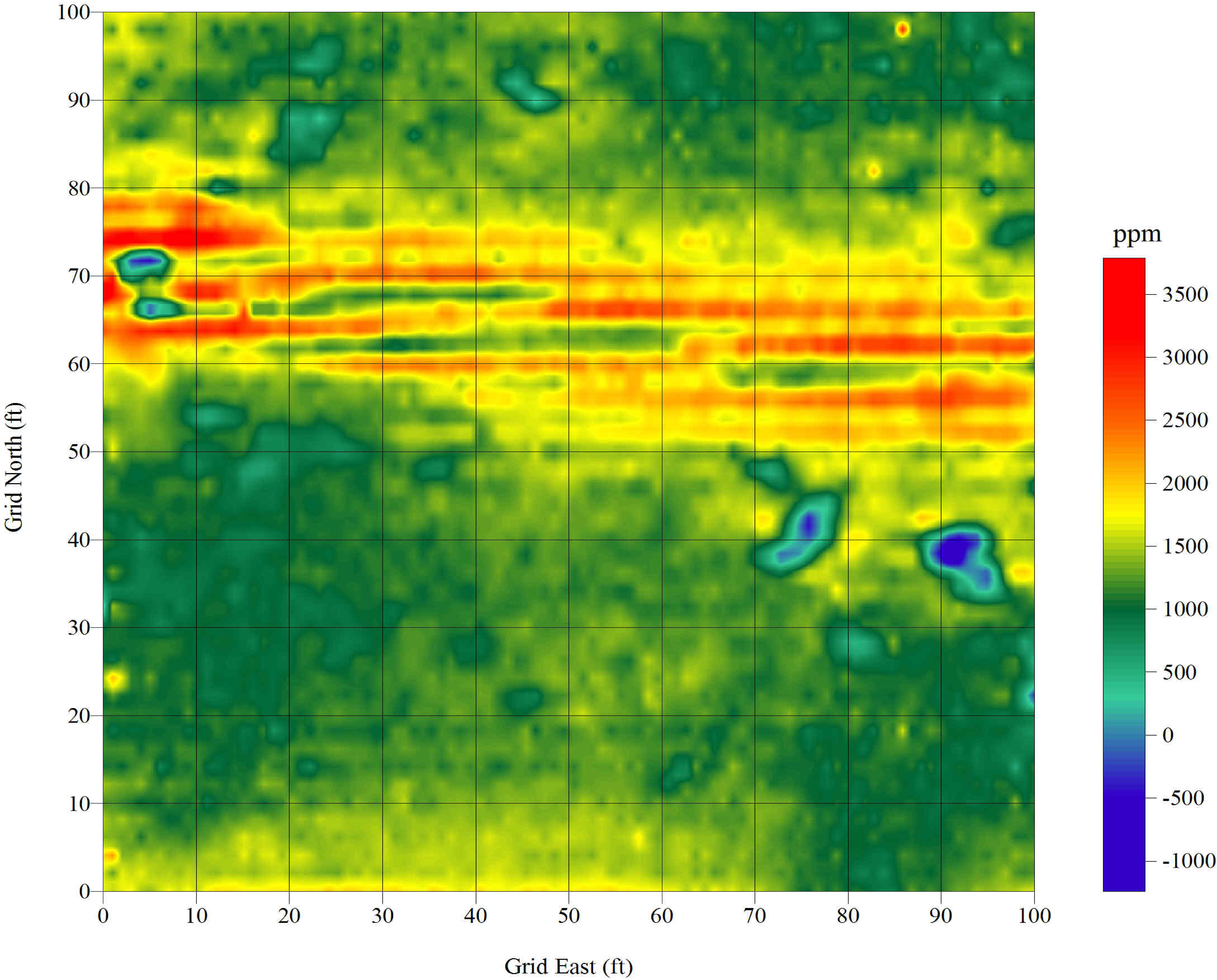


Figure B10-d

18270 Hz In Phase, Grid 10

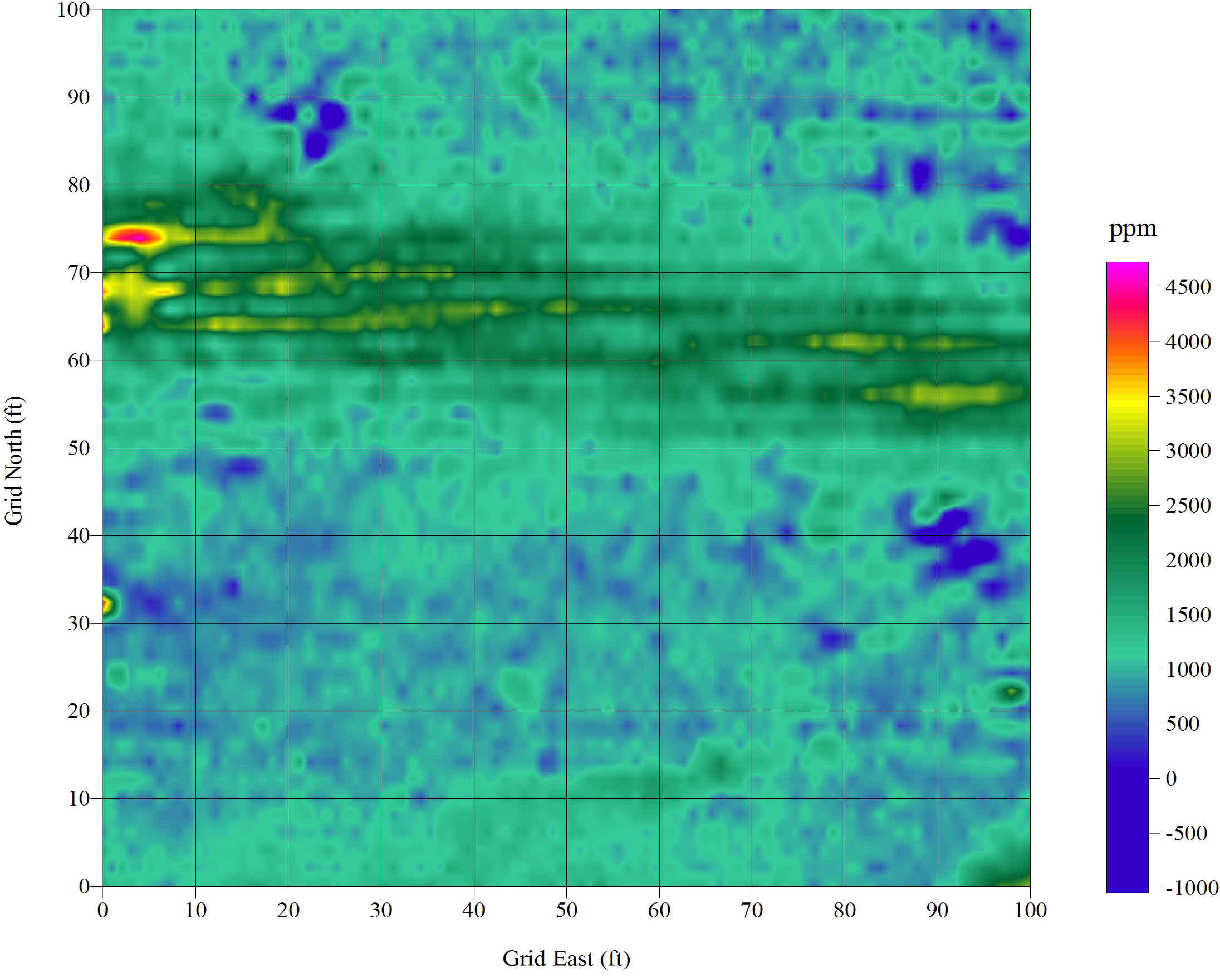


Figure B10-e

18270 Hz Quadrature, Grid 10

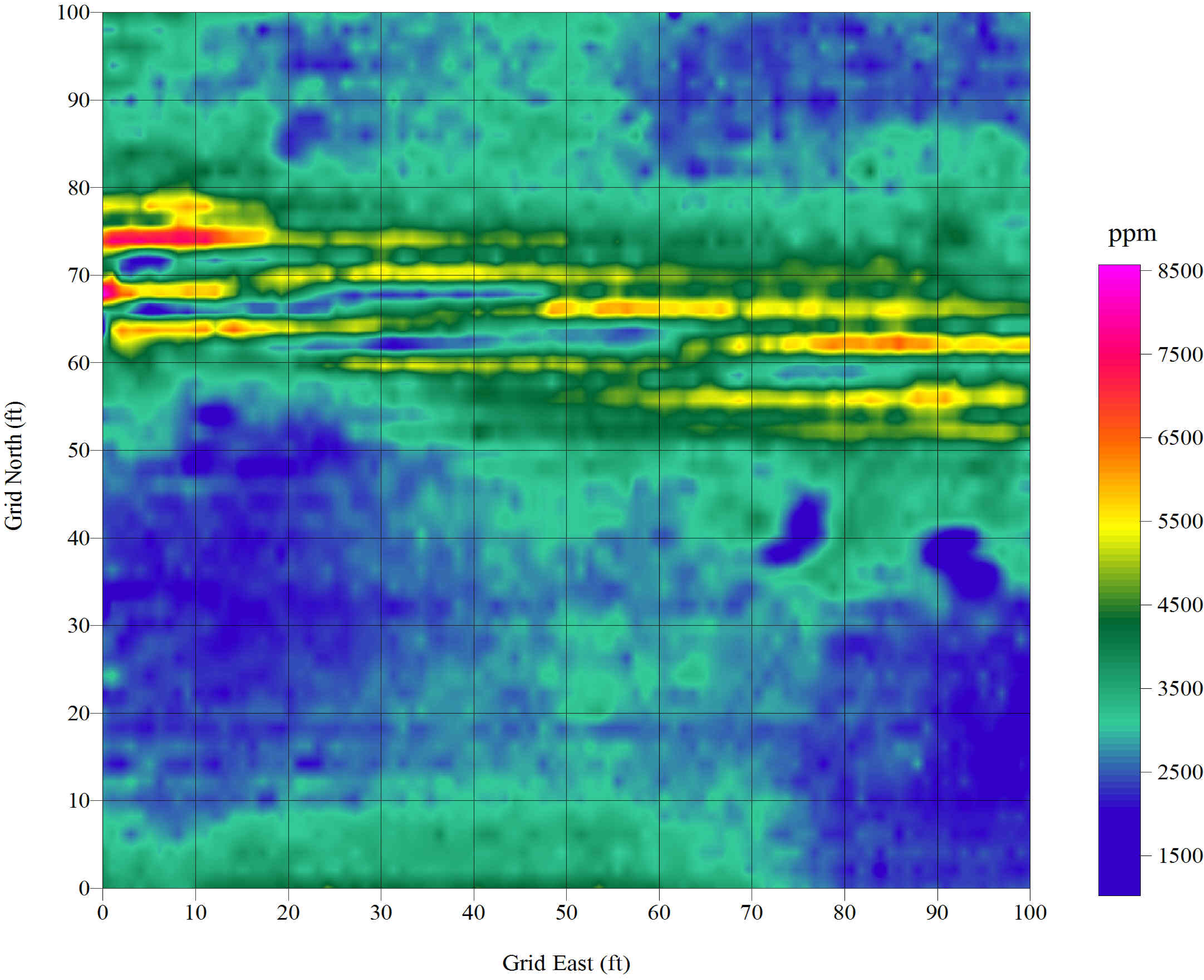


Figure B10-f

2430 Hz In Phase, Grid 11

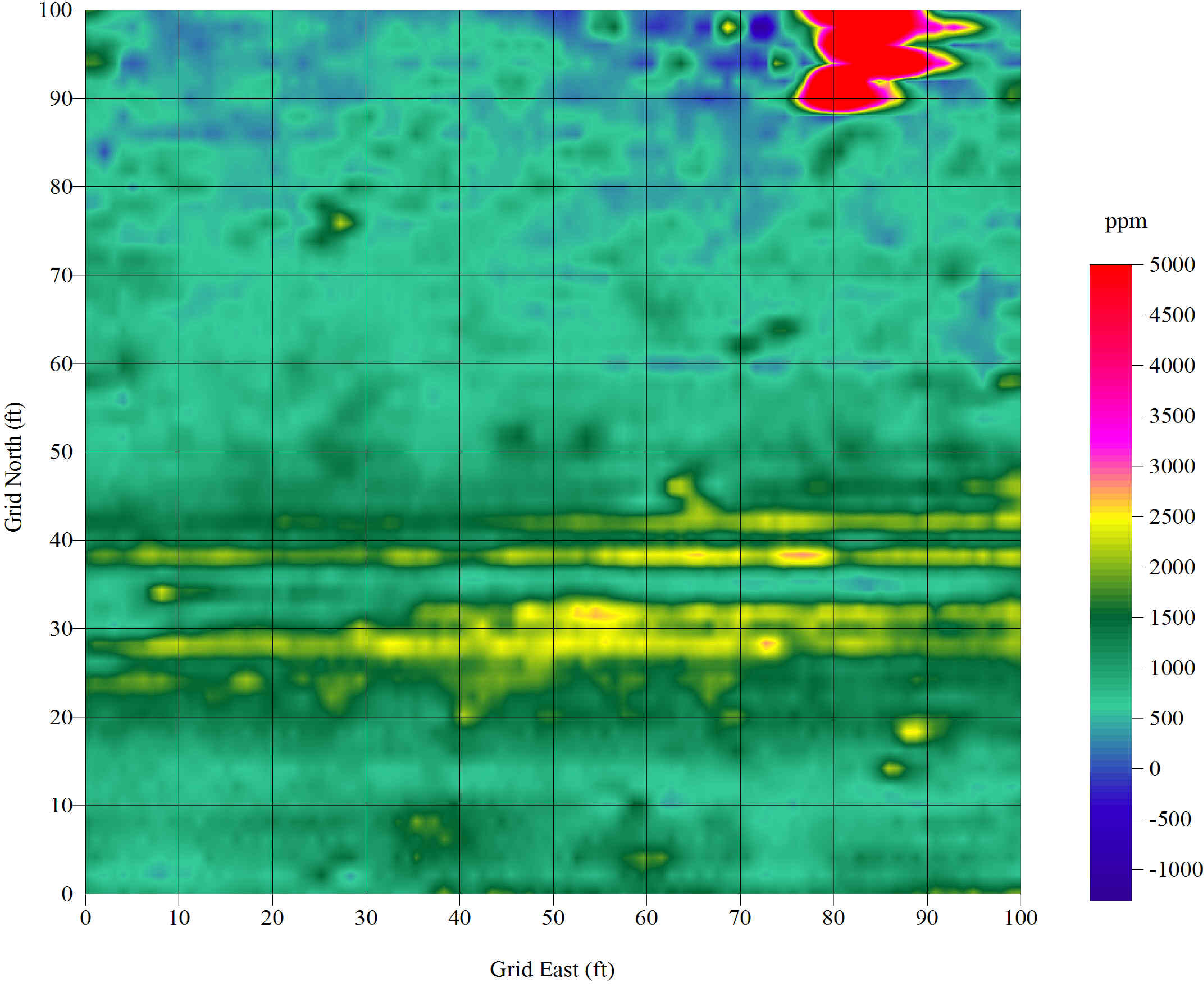


Figure B11-a

2430 Hz Quadrature, Grid 11

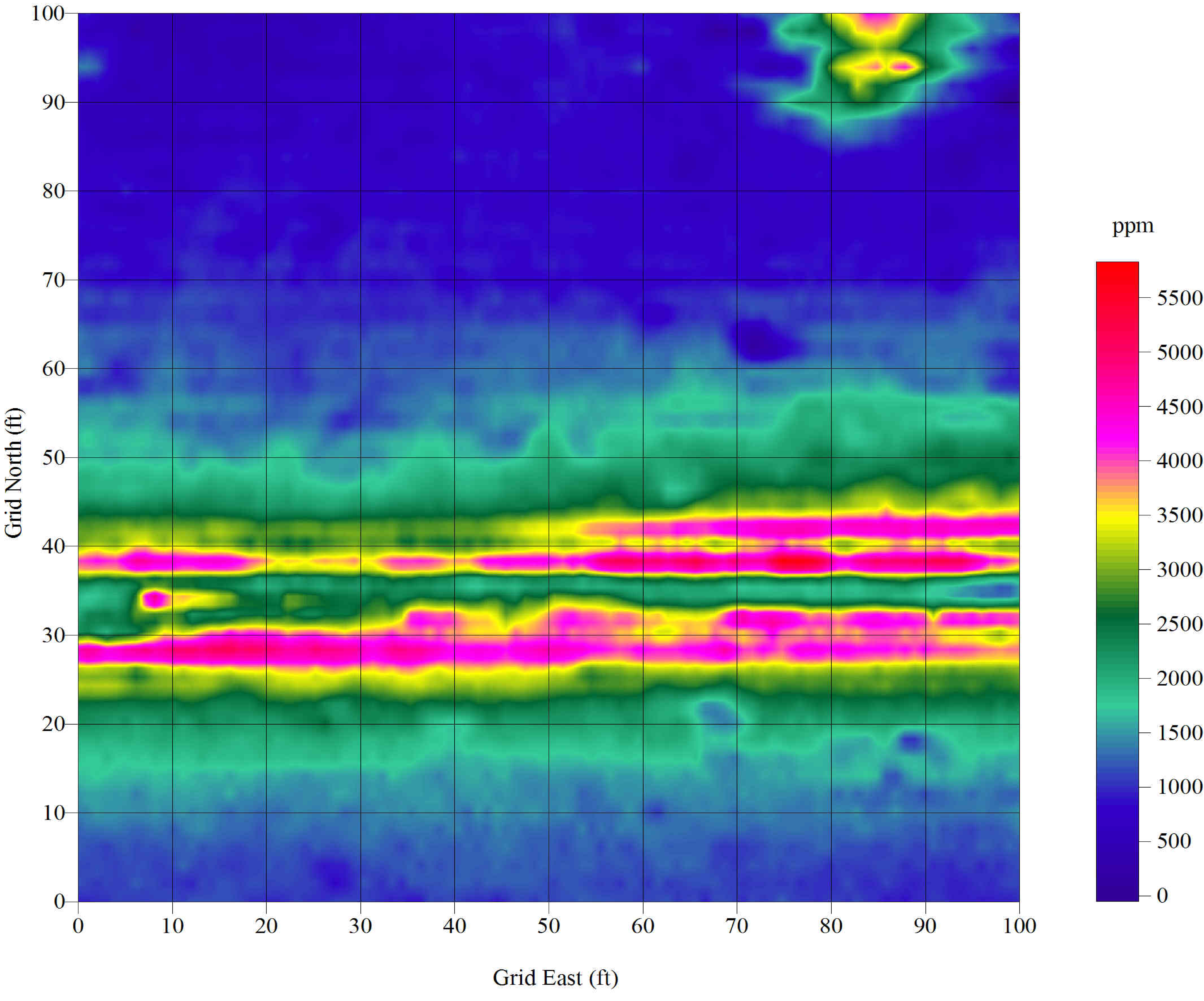


Figure B11-b

7290 Hz In Phase, Grid 11

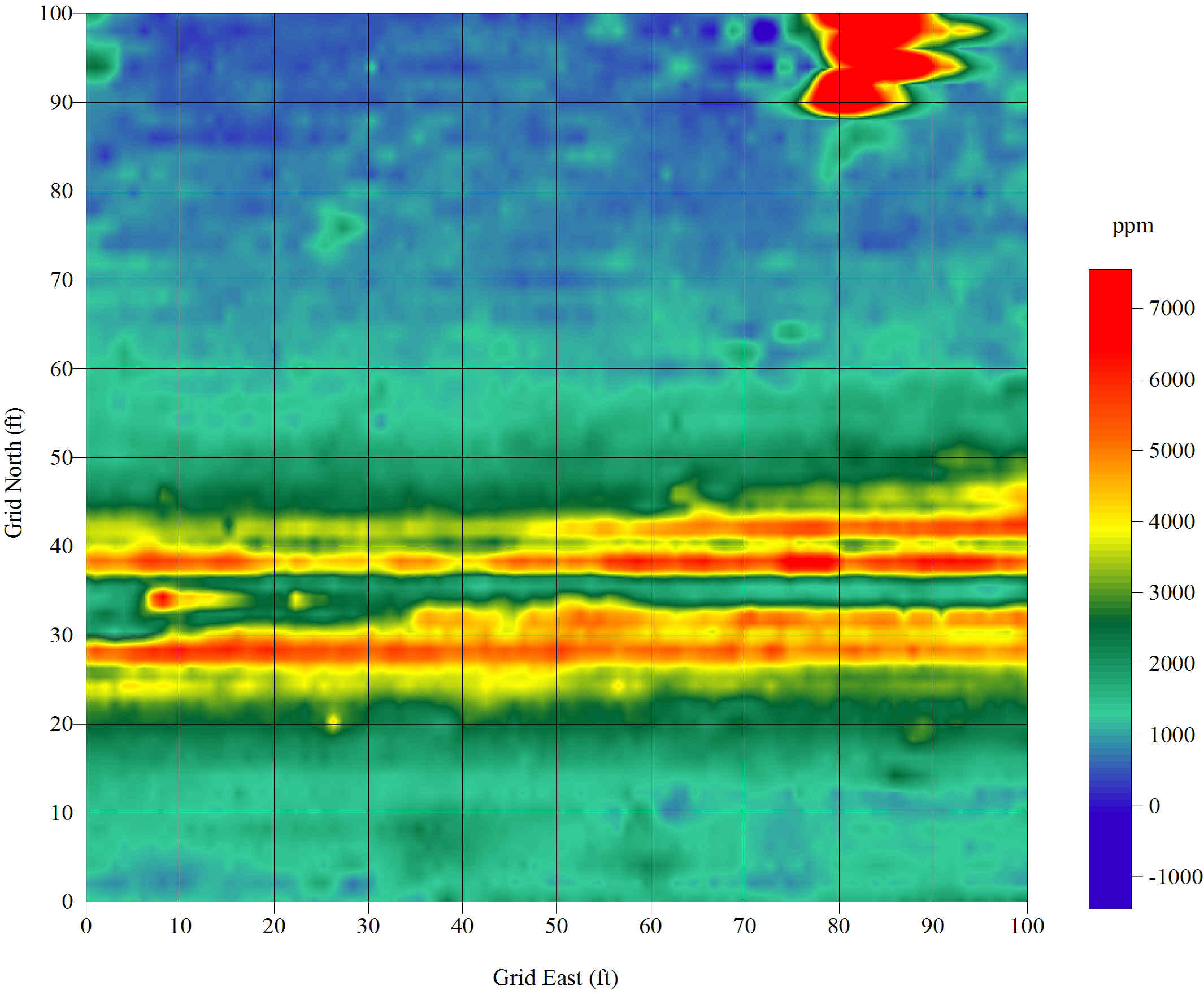


Figure B11-c

7290 Hz Quadrature, Grid 11

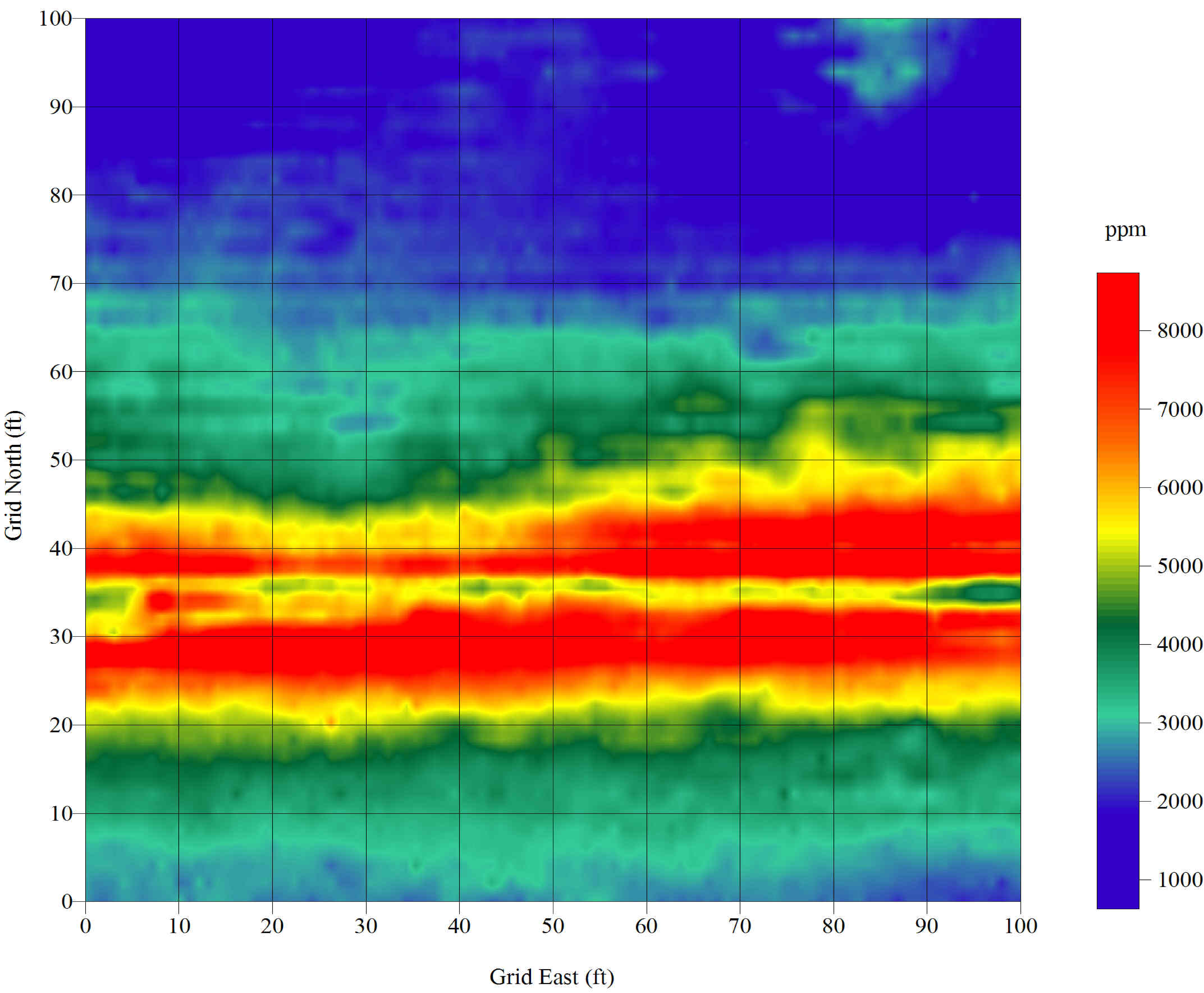


Figure B11-d

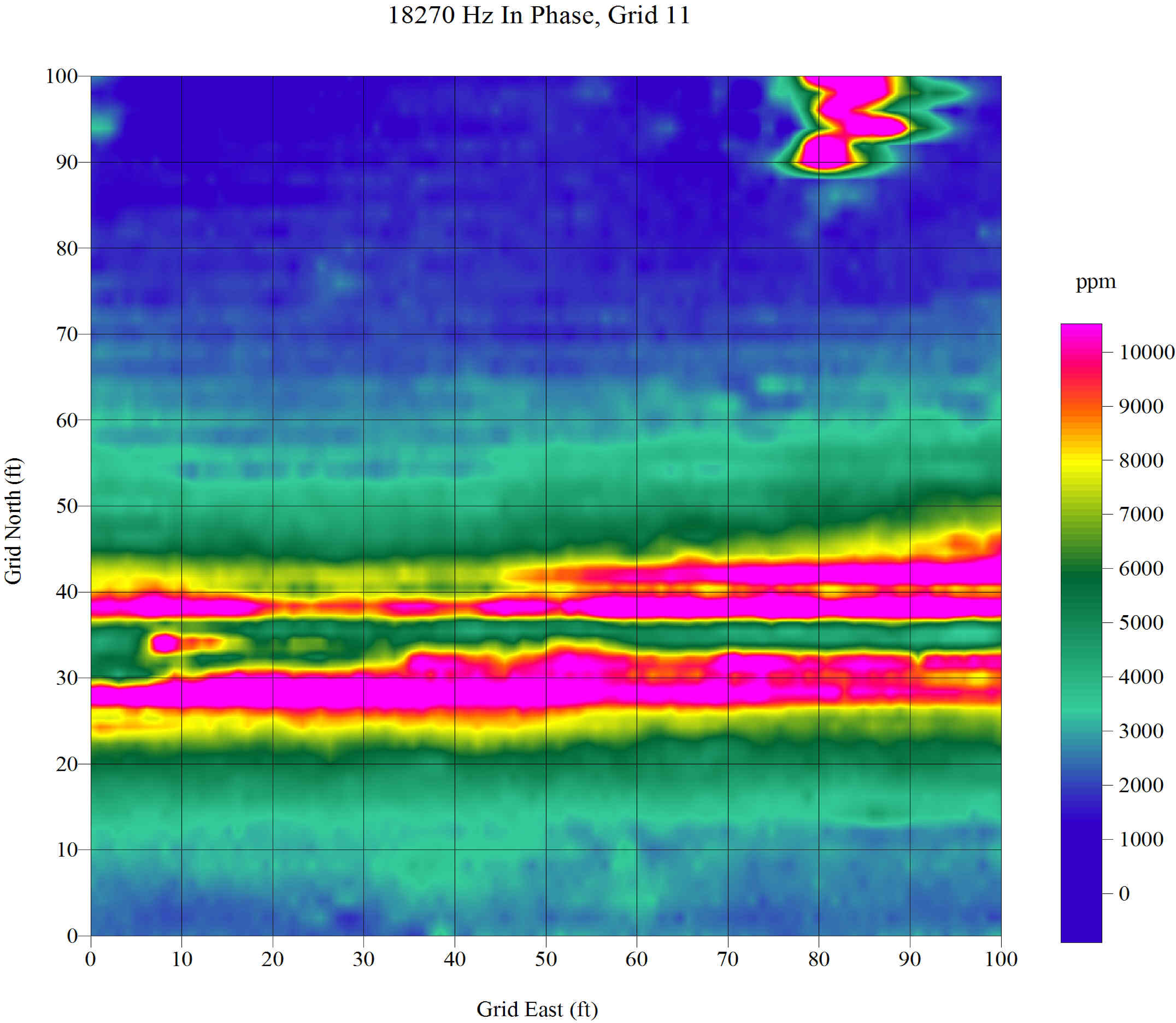

18270 Hz In Phase, Grid 11
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000

Figure B11-e

18270 Hz Quadrature, Grid 11

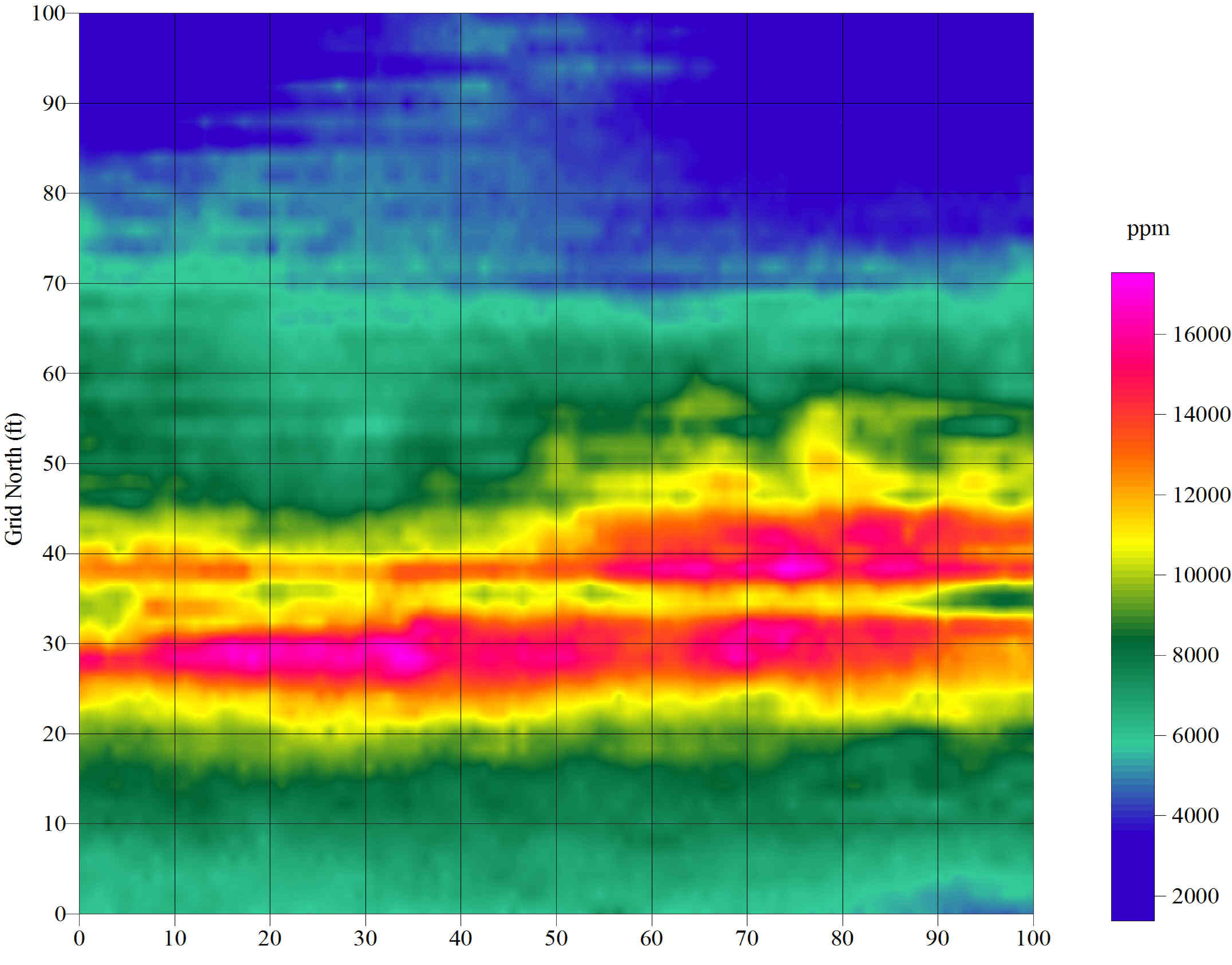


Figure B11-f

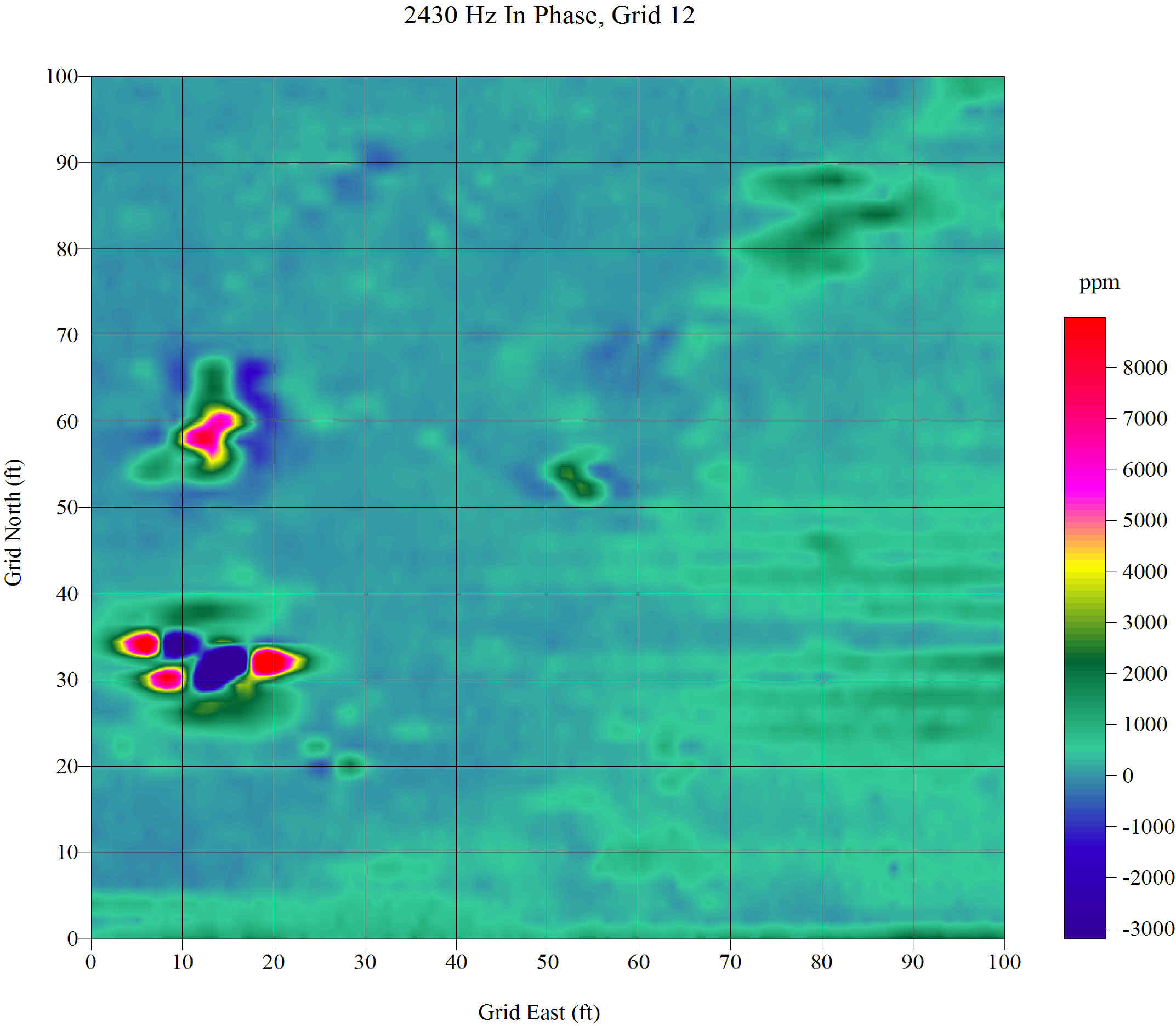

2430 Hz In Phase, Grid 12
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000

Figure B12-a

2430 Hz Quadrature, Grid 12

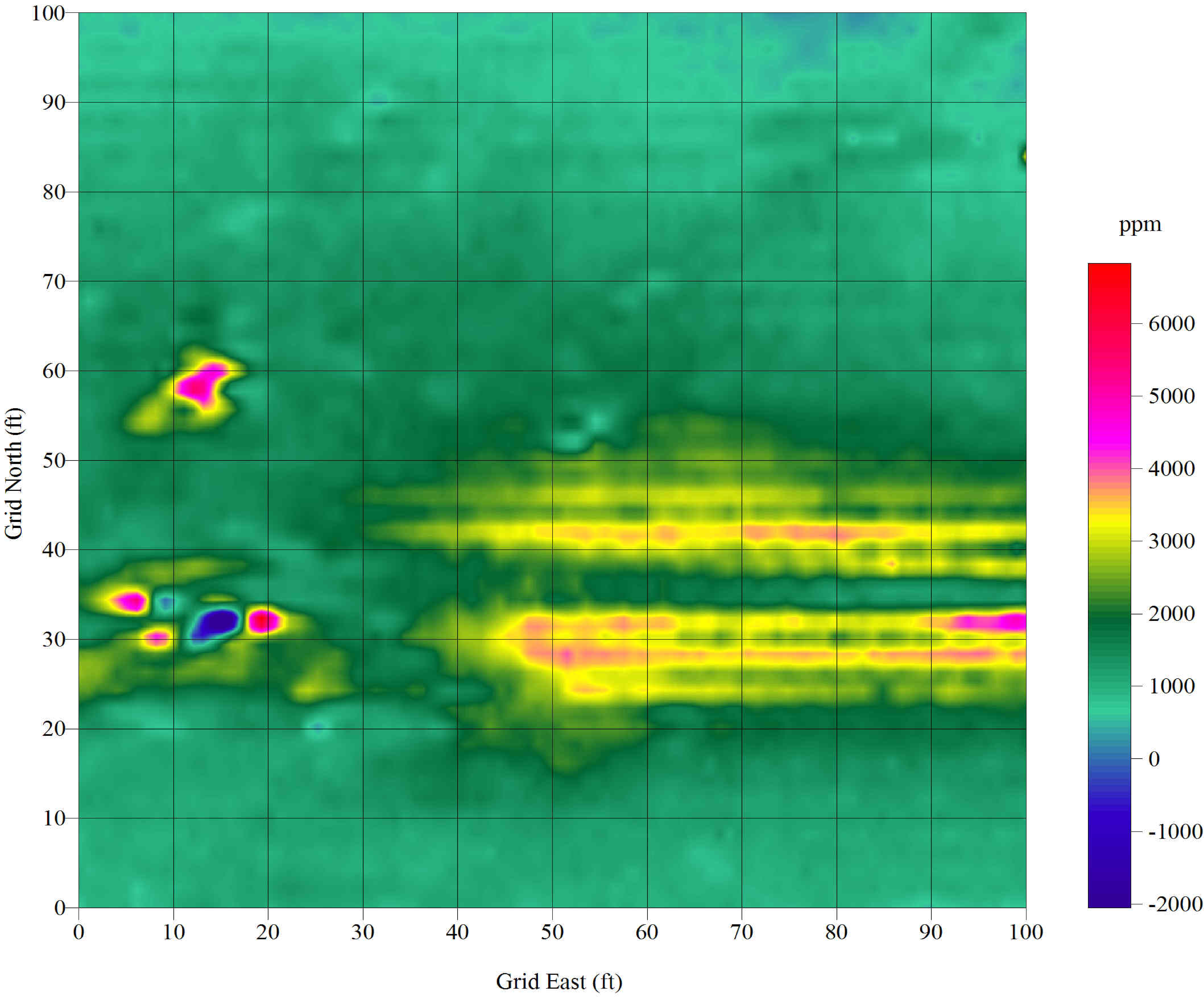


Figure B12-b

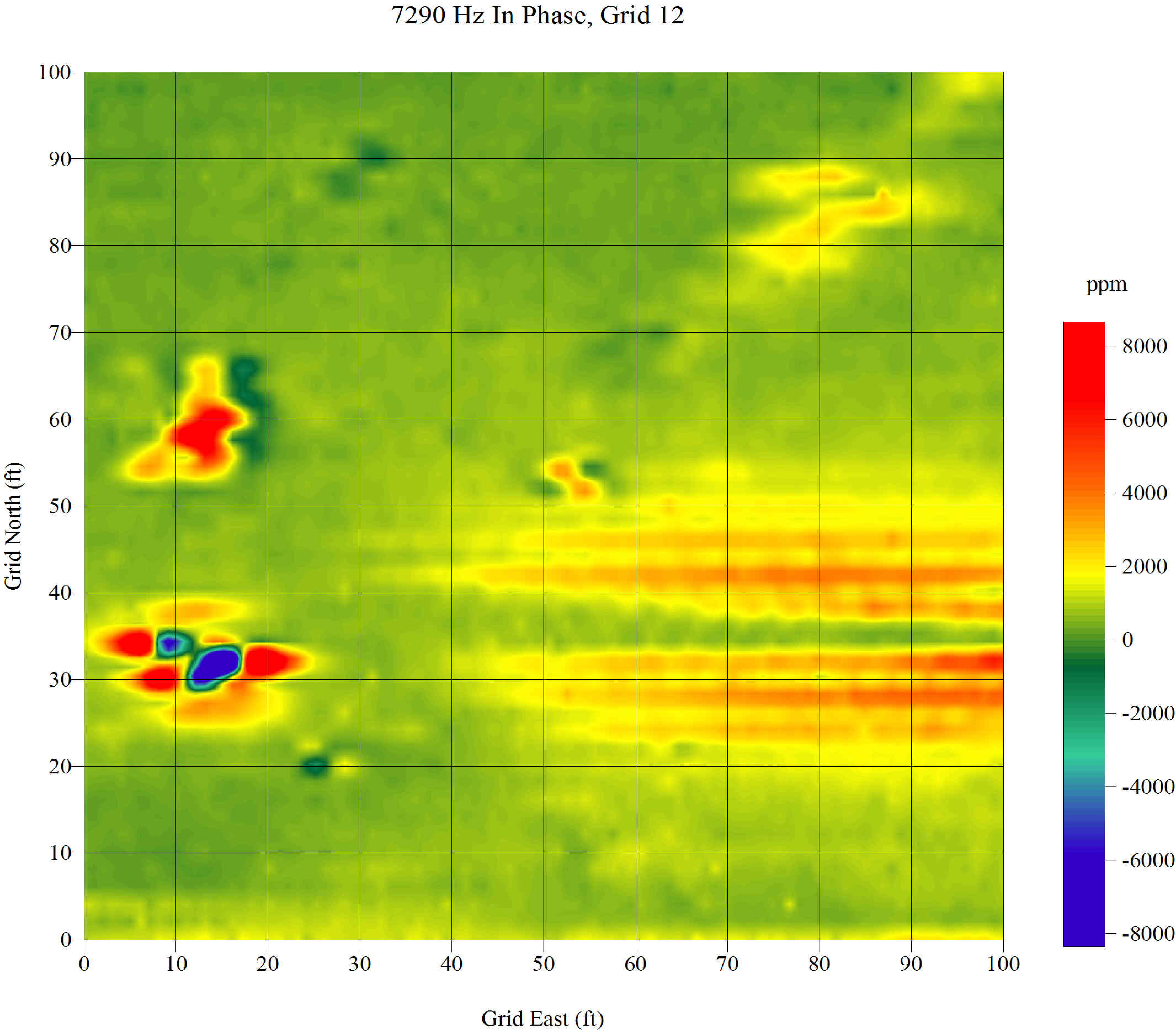

7290 Hz In Phase, Grid 12
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
8000
6000
4000
2000
-2000
-4000
-6000
-8000

Figure B12-c

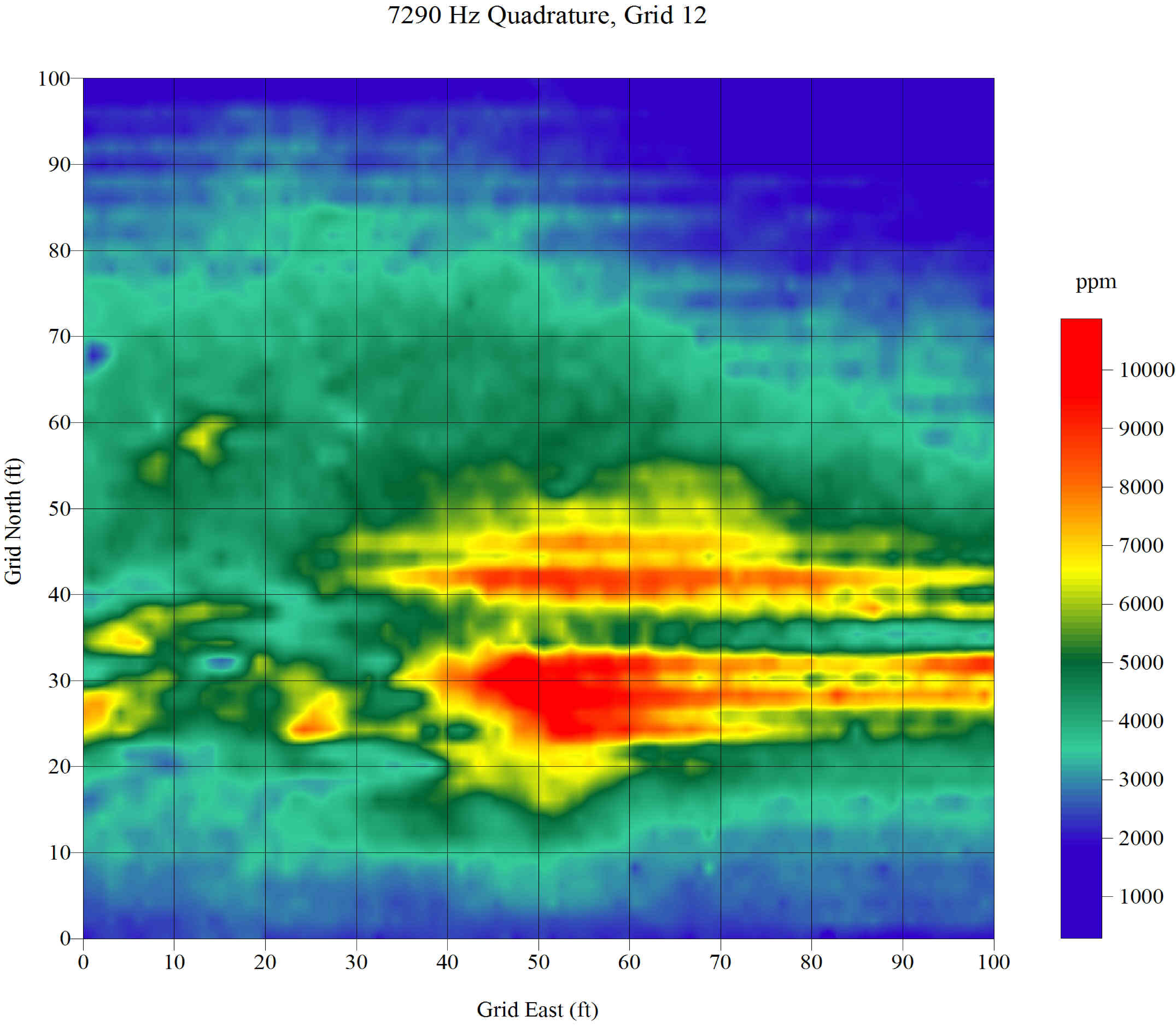

7290 Hz Quadrature, Grid 12
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Figure B12-d

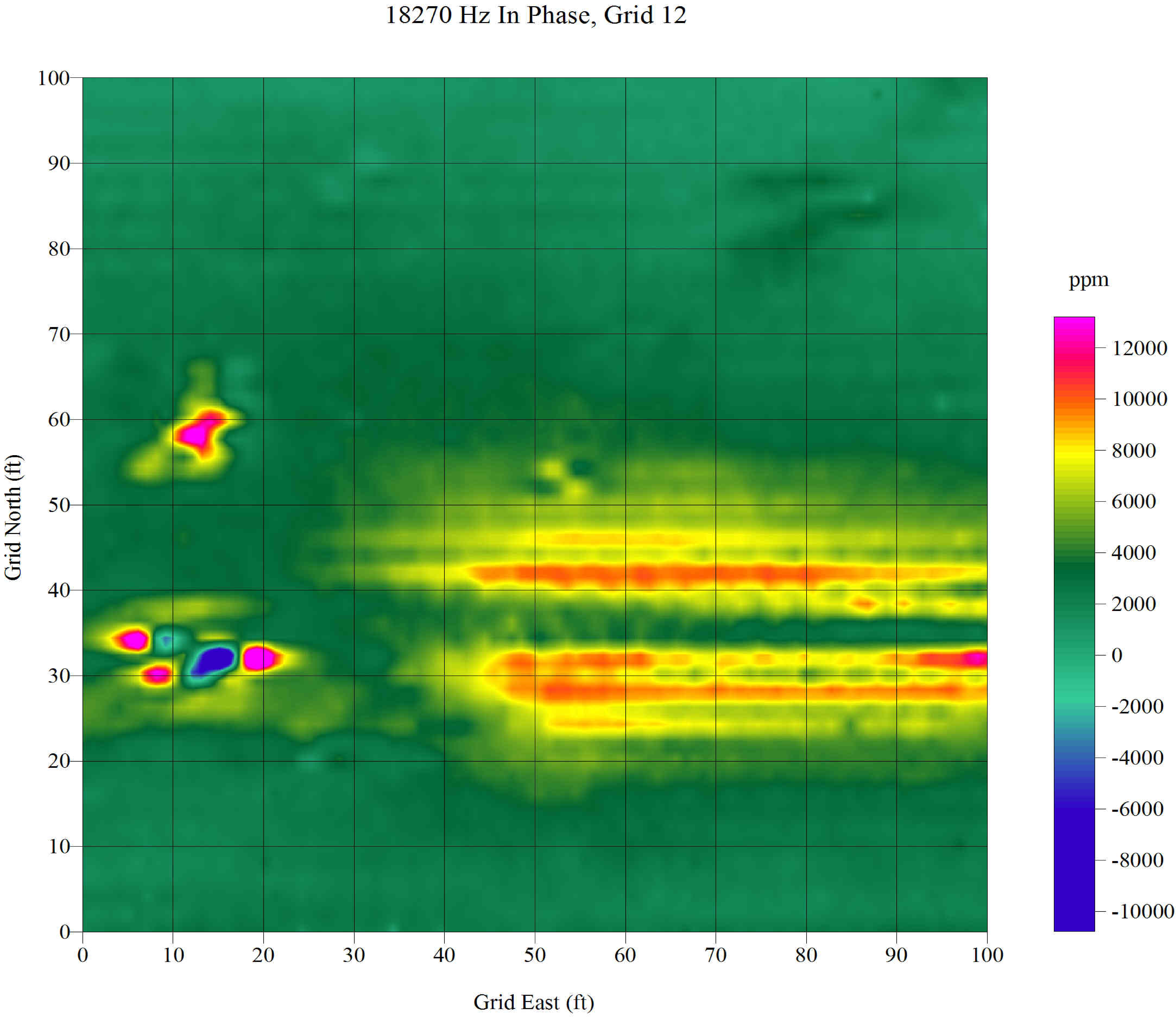

18270 Hz In Phase, Grid 12
ppm
12000
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100

Figure B12-e

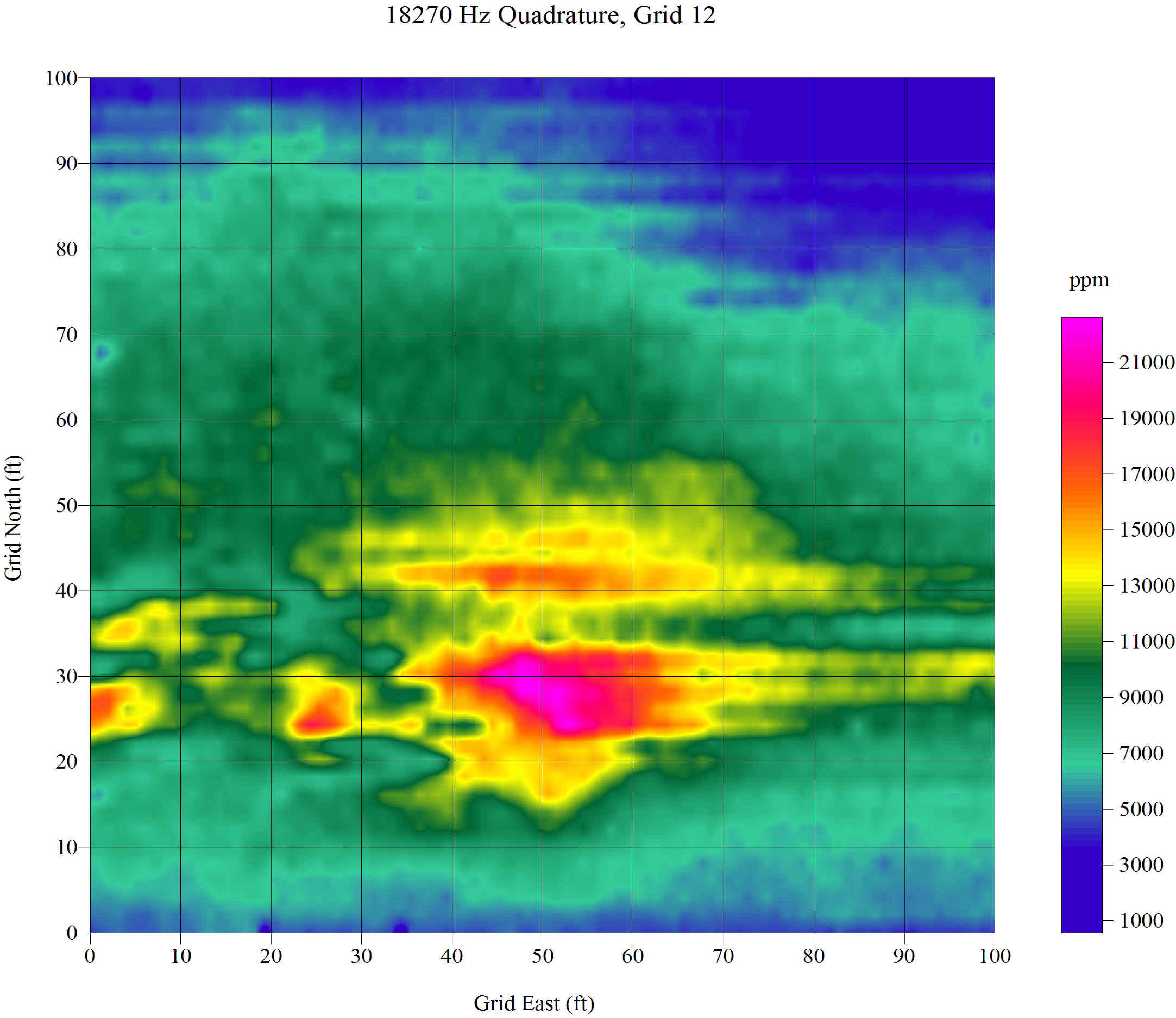

18270 Hz Quadrature, Grid 12
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1000
3000
5000
7000
9000
11000
13000
15000
17000
19000
21000

Figure B12-f

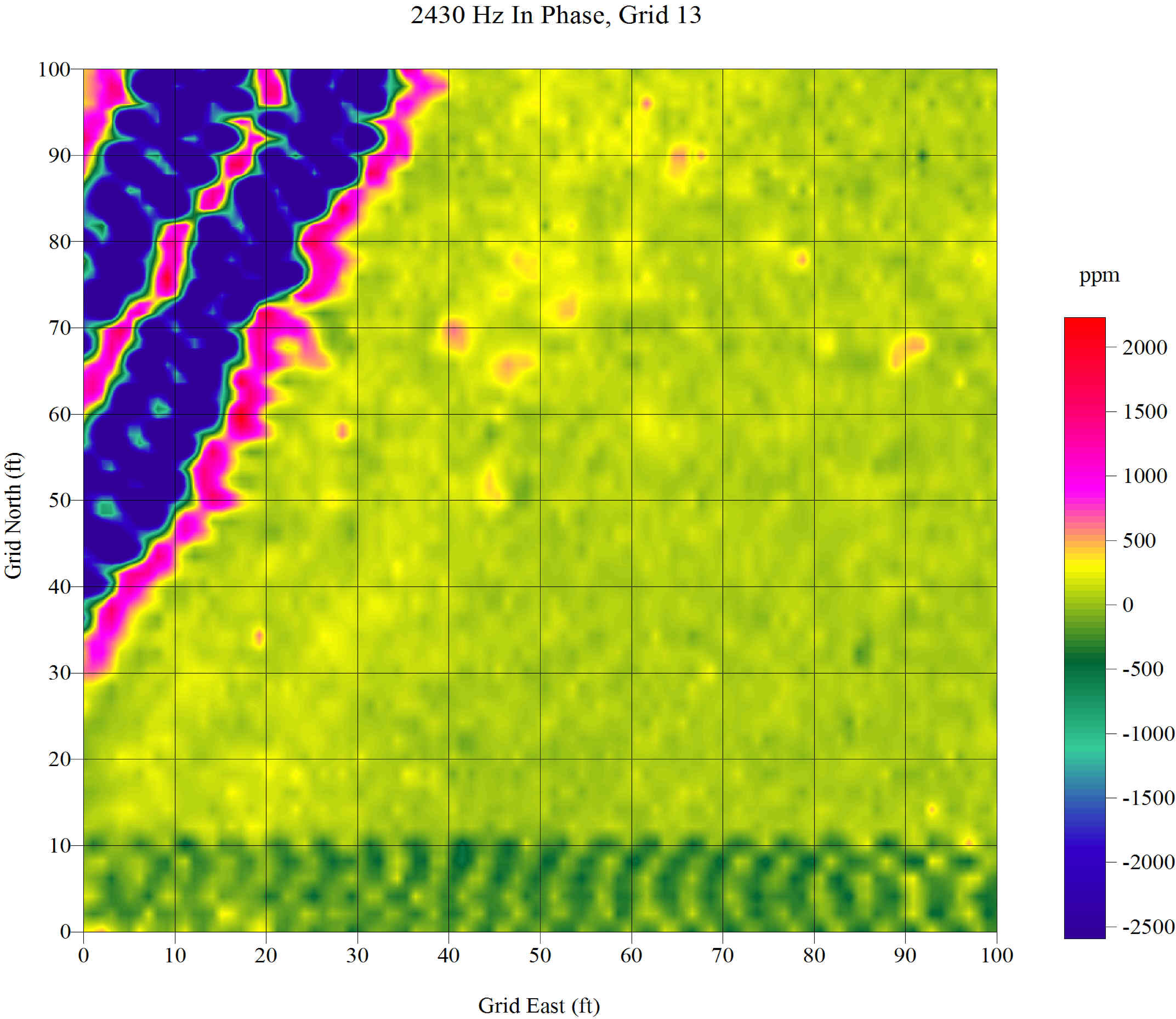

2430 Hz In Phase, Grid 13
Grid North (ft)
Grid East (ft)
ppm
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
0
10
20
30
40
50
60
70
80
90
100

Figure B13-a

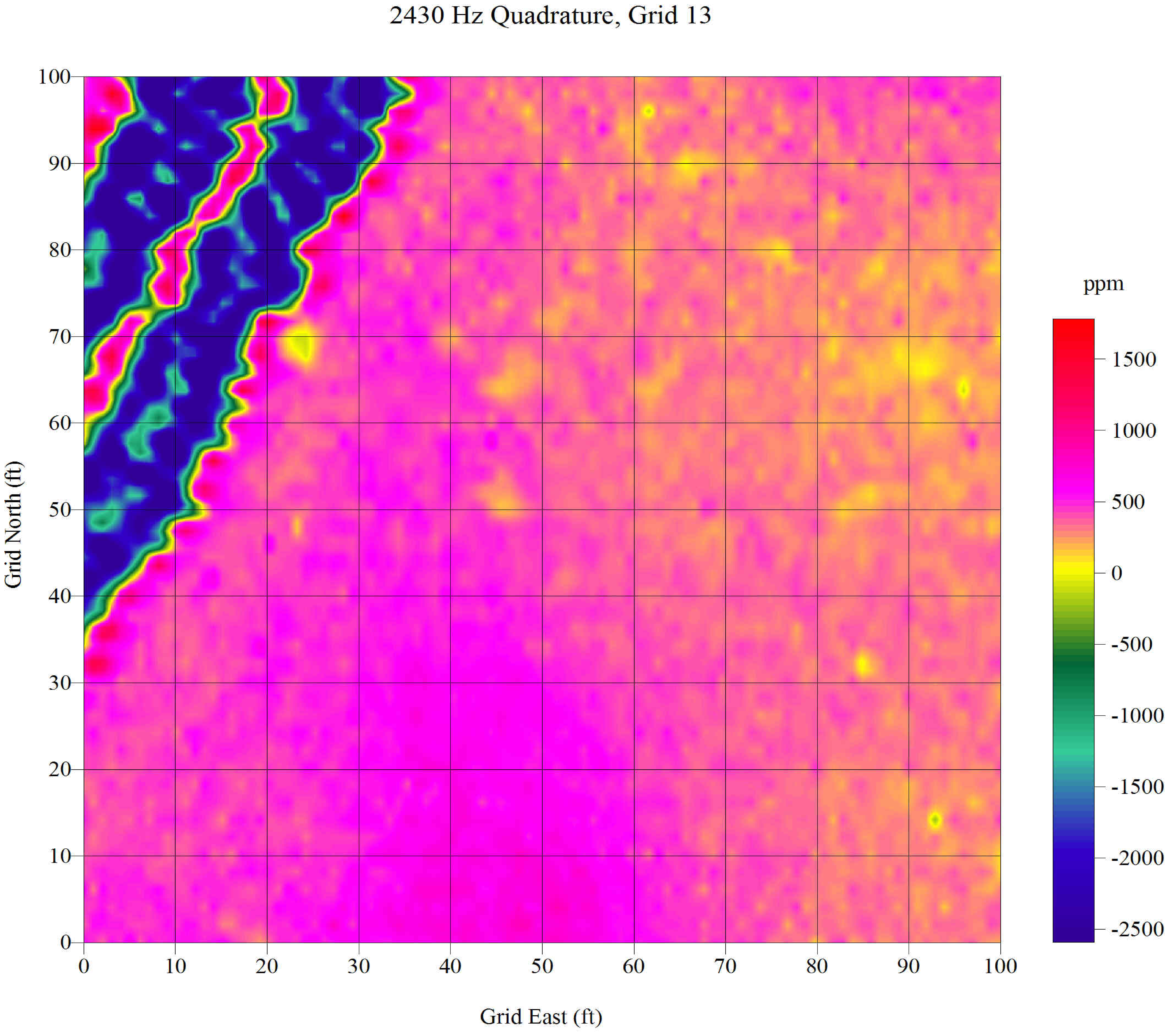

2430 Hz Quadrature, Grid 13
Grid North (ft)
Grid East (ft)
ppm
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
0
10
20
30
40
50
60
70
80
90
100

Figure B13-b

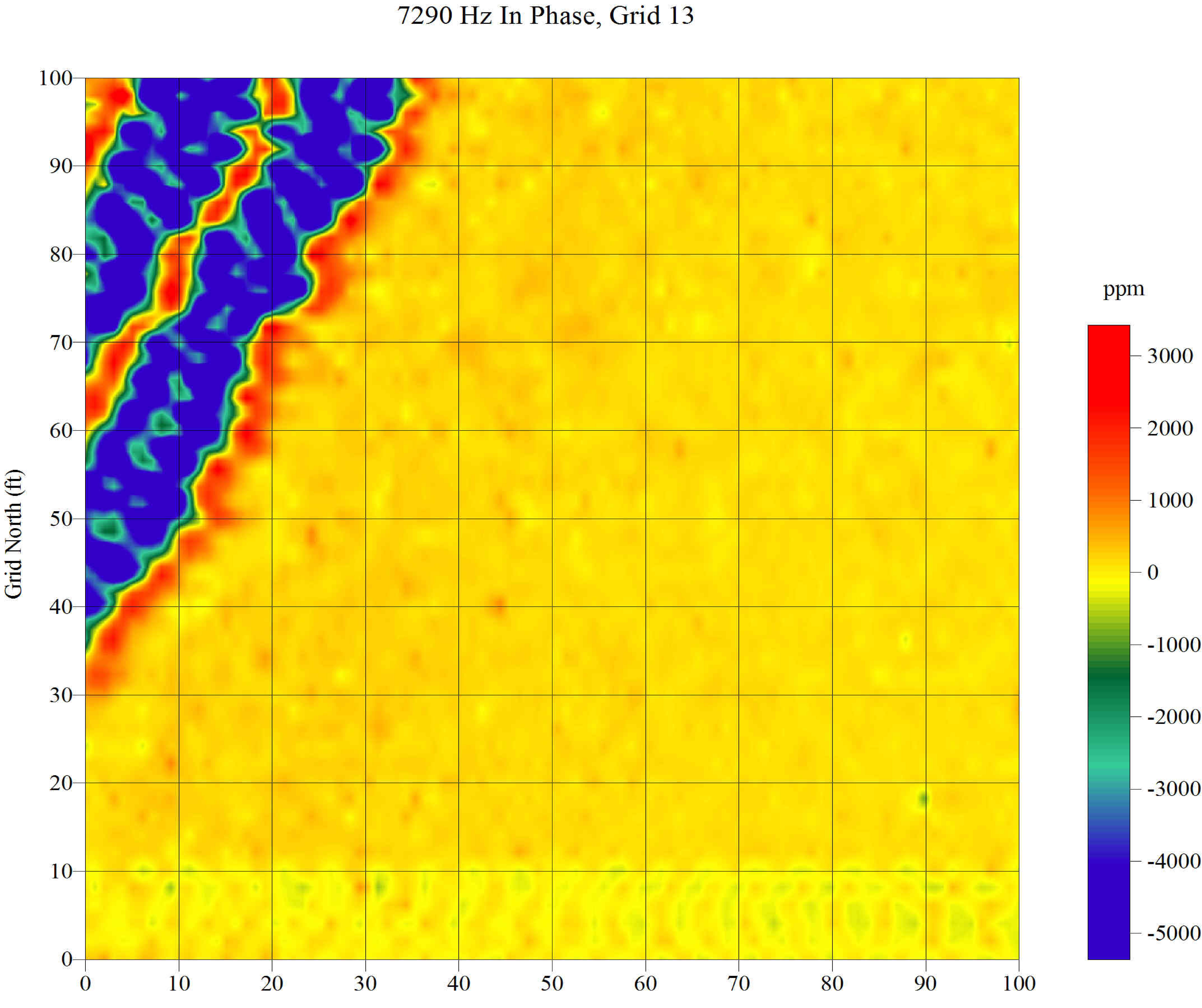

7290 Hz In Phase, Grid 13
Grid North (ft)
Grid East (ft)
ppm
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100

Figure B13-c

7290 Hz Quadrature, Grid 13

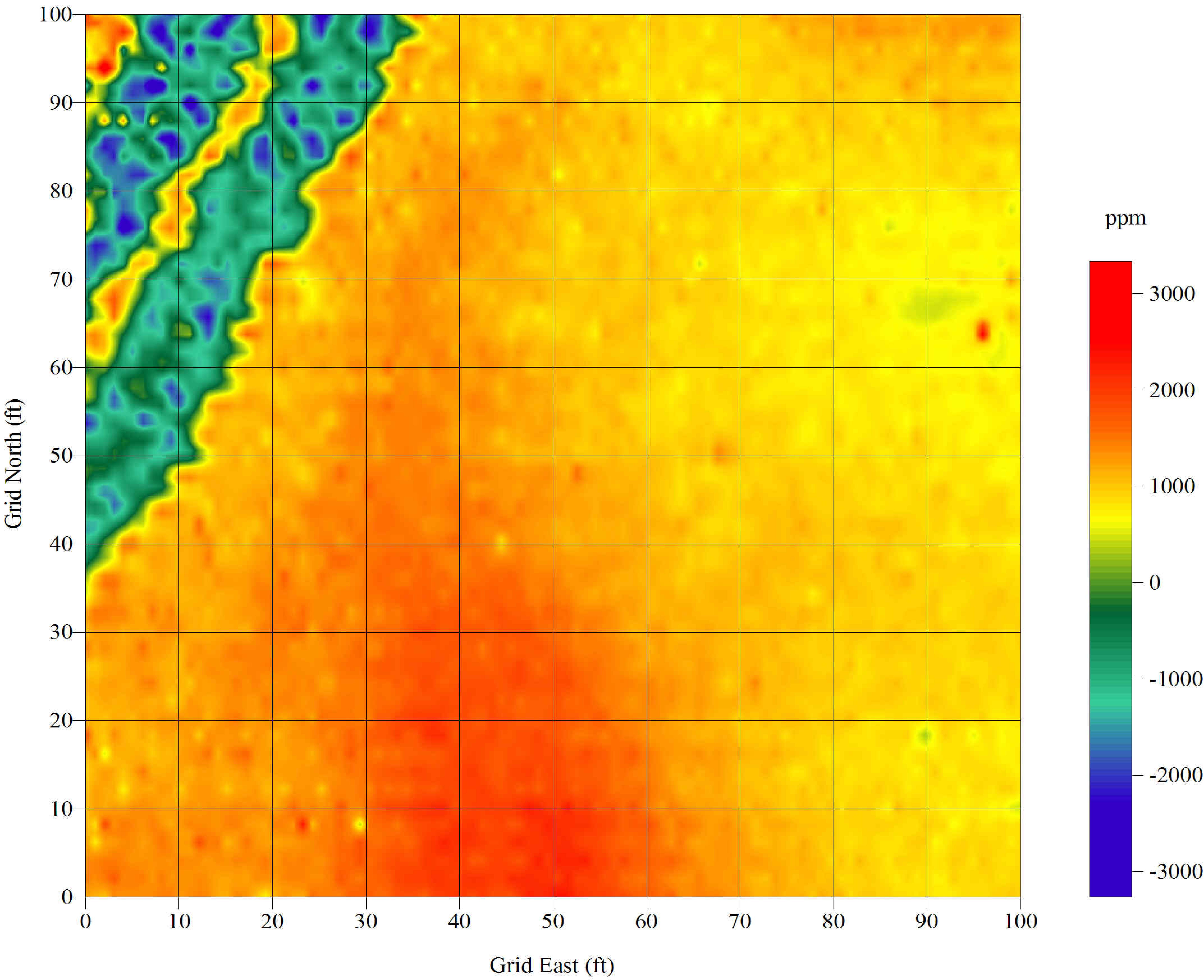


Figure B13-d

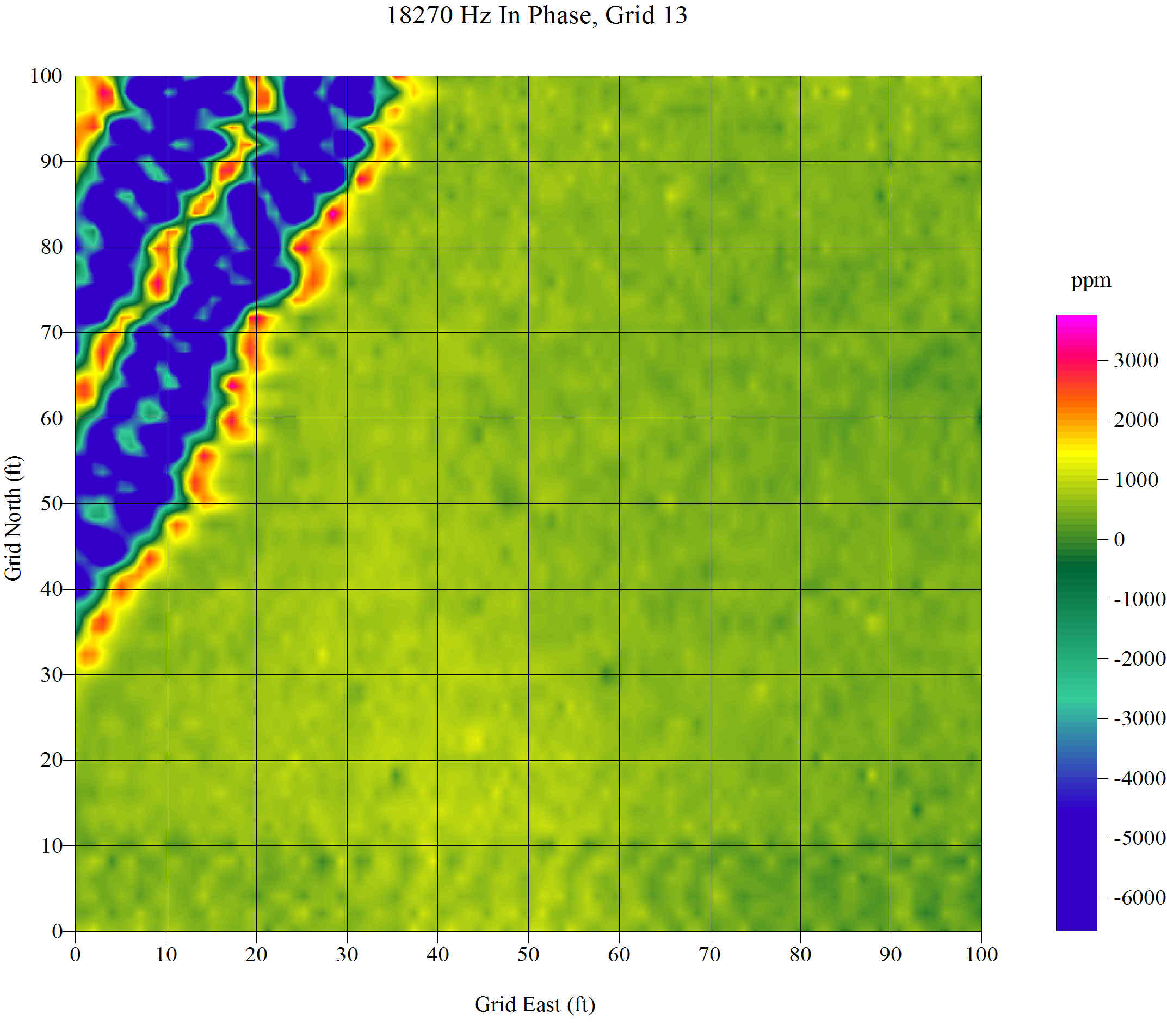
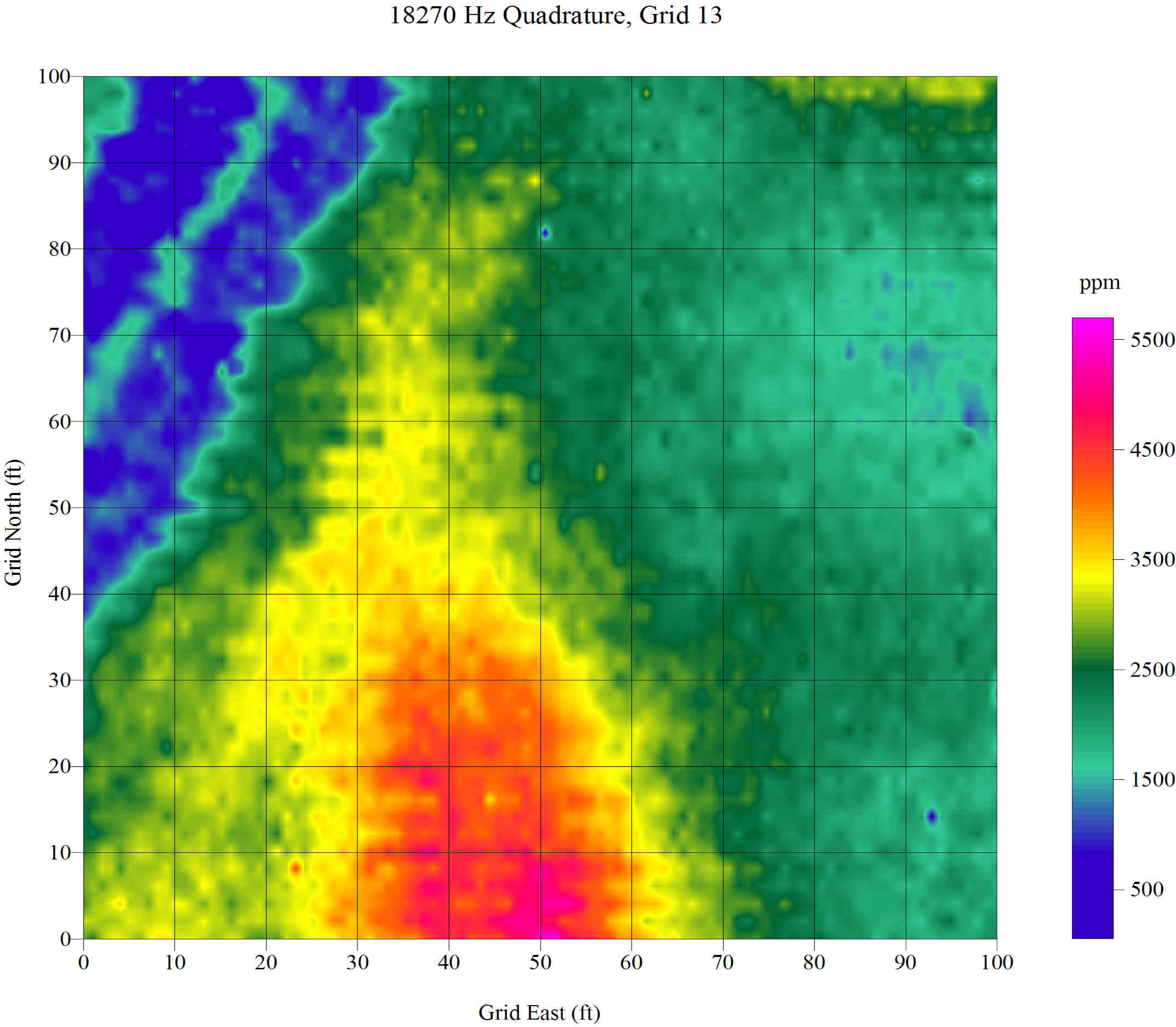

18270 Hz In Phase, Grid 13
Grid North (ft)
Grid East (ft)
ppm
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
0
10
20
30
40
50
60
70
80
90
100

Figure B13-e



18270 Hz Quadrature, Grid 13
Grid North (ft)
Grid East (ft)
ppm
5500
4500
3500
2500
1500
500
0
10
20
30
40
50
60
70
80
90
100

Figure B13-f

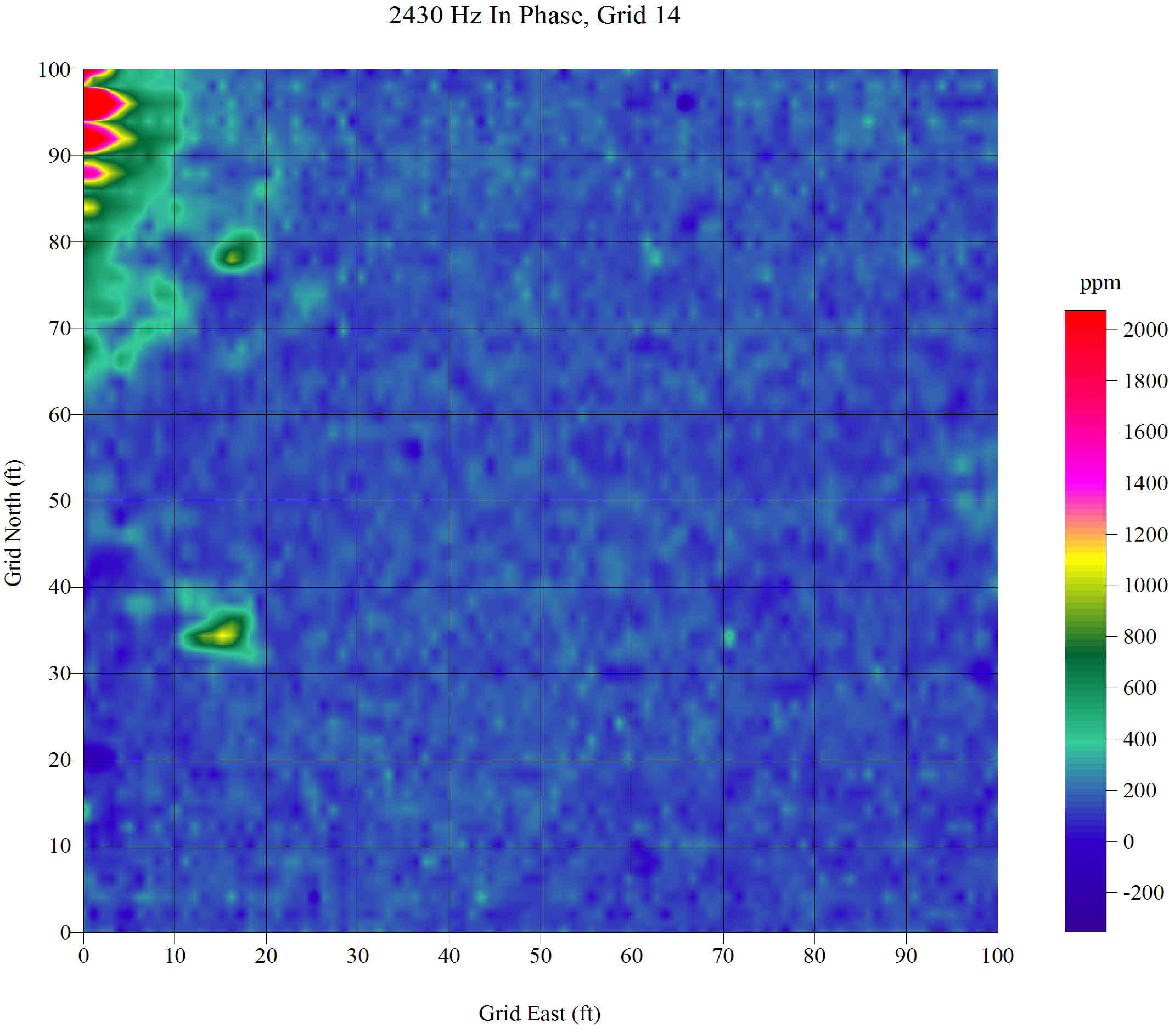

2430 Hz In Phase, Grid 14
Grid North (ft)
Grid East (ft)
ppm
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
0
10
20
30
40
50
60
70
80
90
100

Figure B14-a

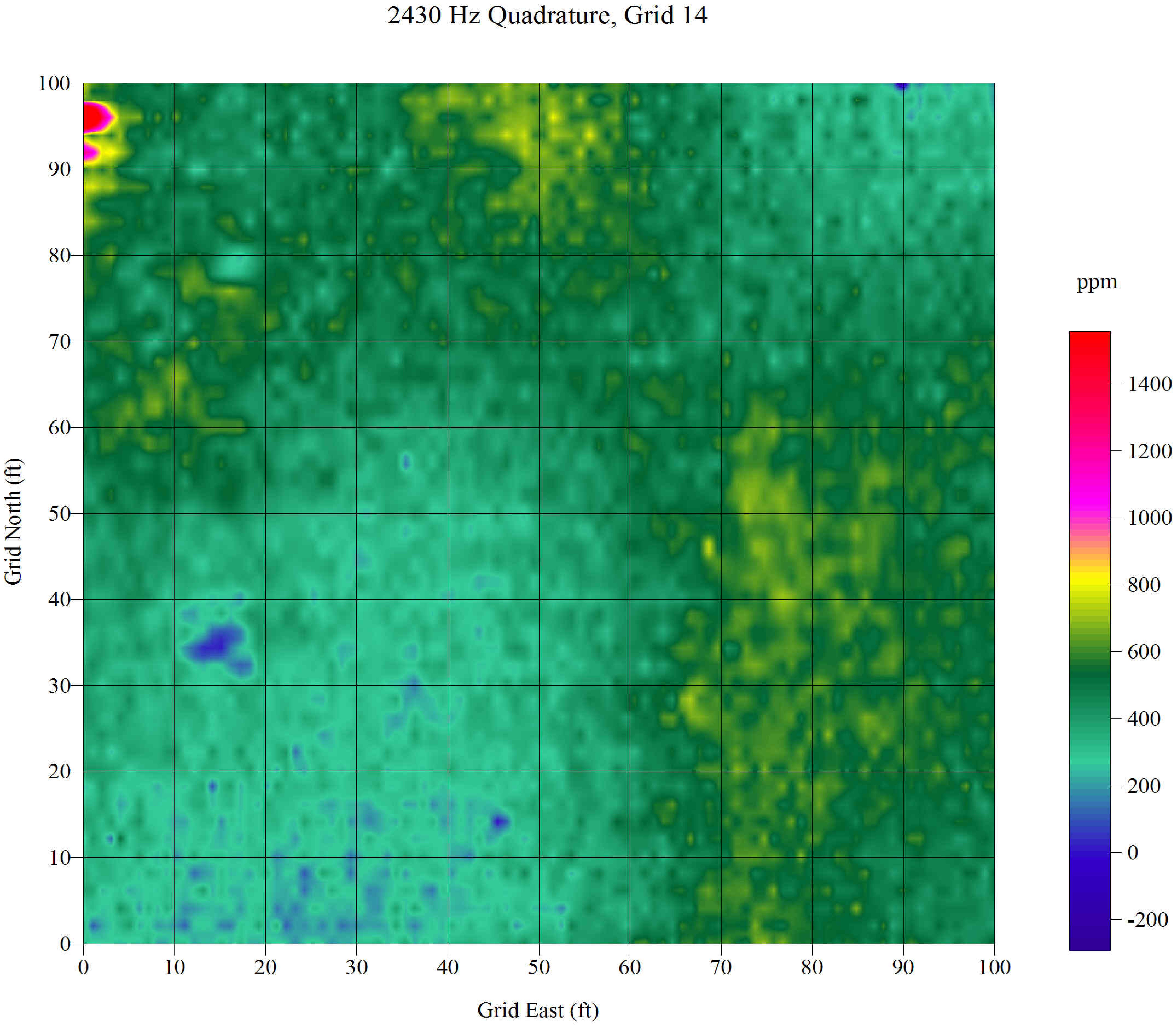

2430 Hz Quadrature, Grid 14
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1400
1200
1000
800
600
400
200
0
-200

Figure B14-b

7290 Hz In Phase, Grid 14

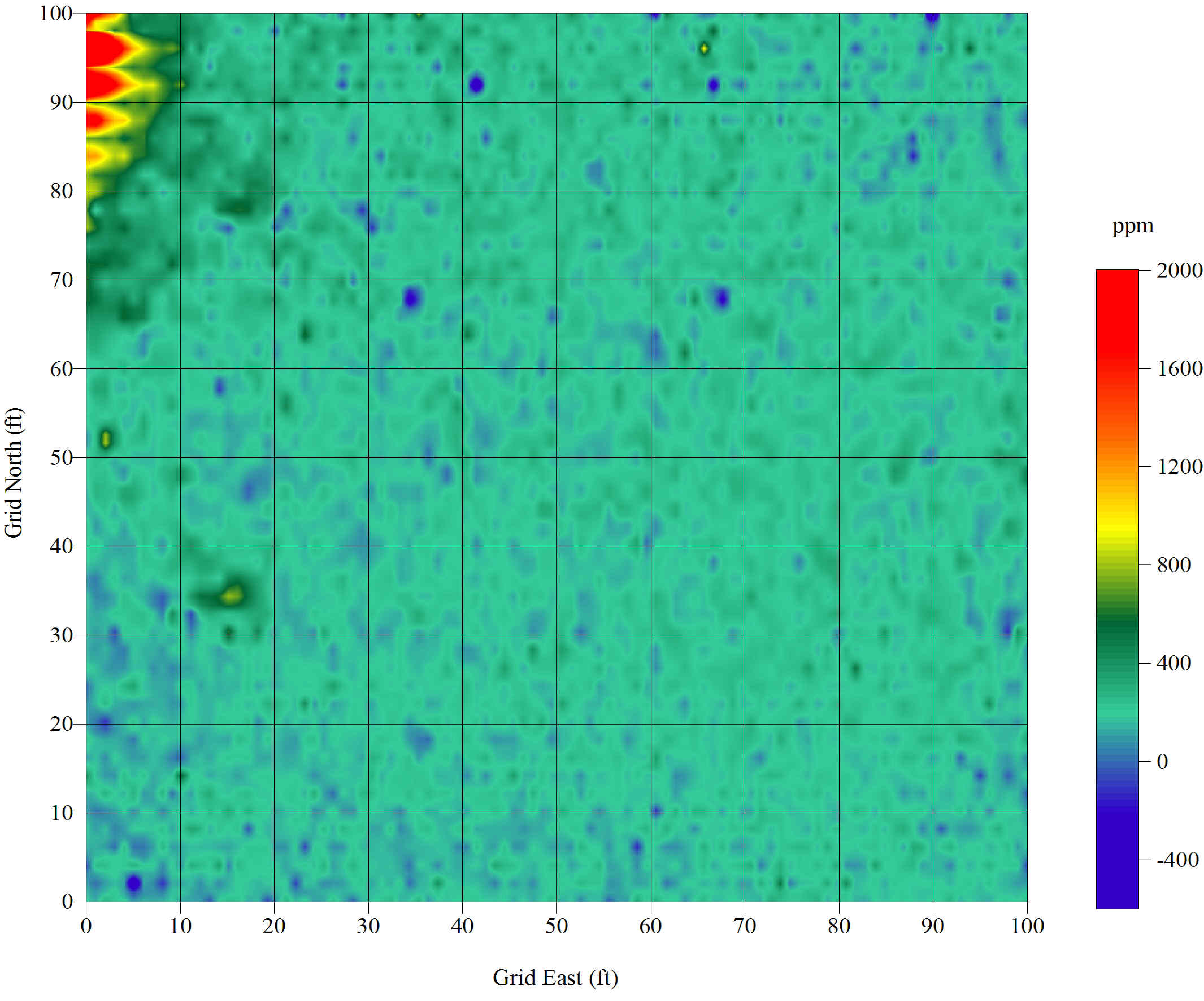


Figure B14-c

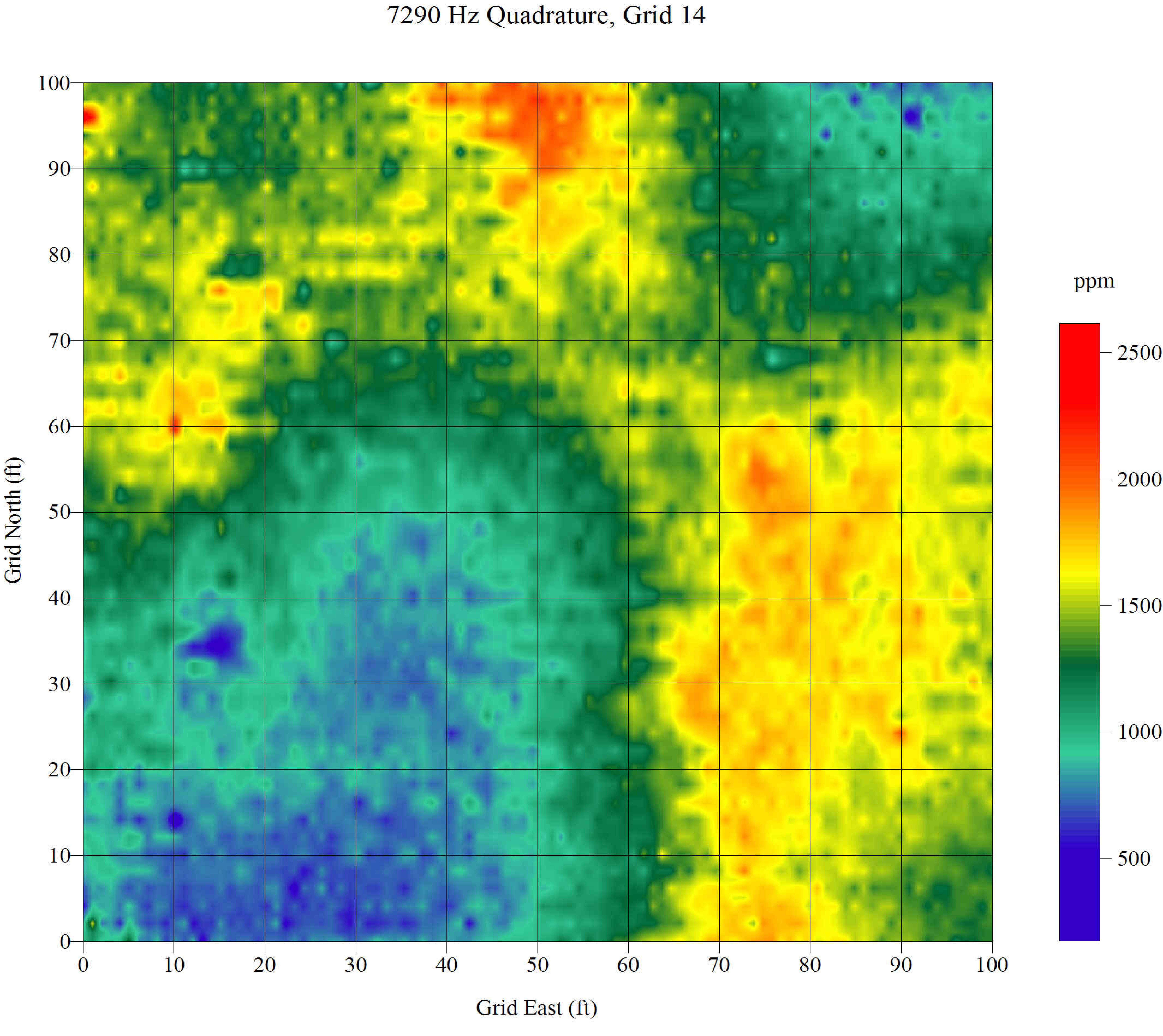

7290 Hz Quadrature, Grid 14
Grid North (ft)
Grid East (ft)
ppm
2500
2000
1500
1000
500
0
10
20
30
40
50
60
70
80
90
100

Figure B14-d

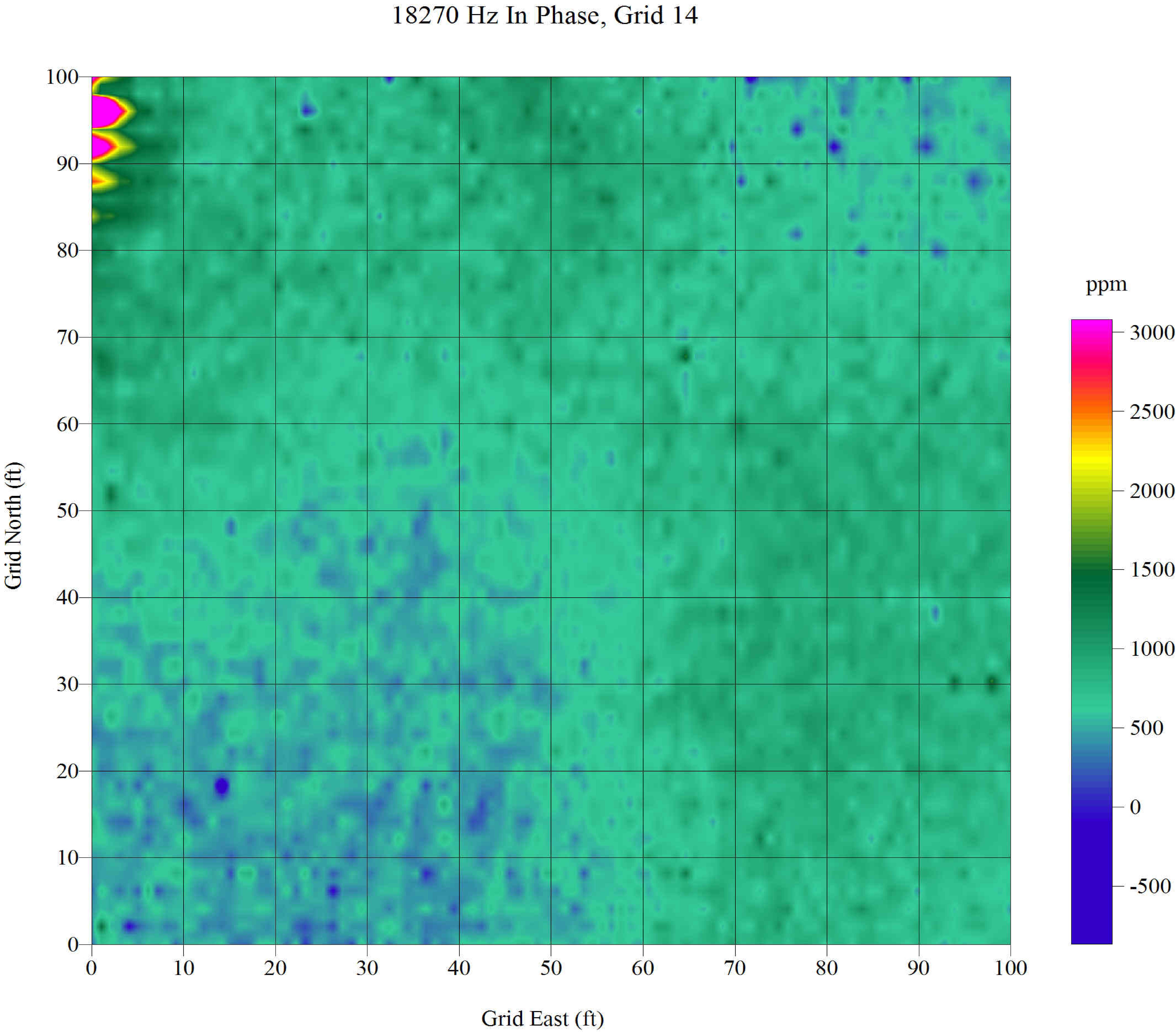
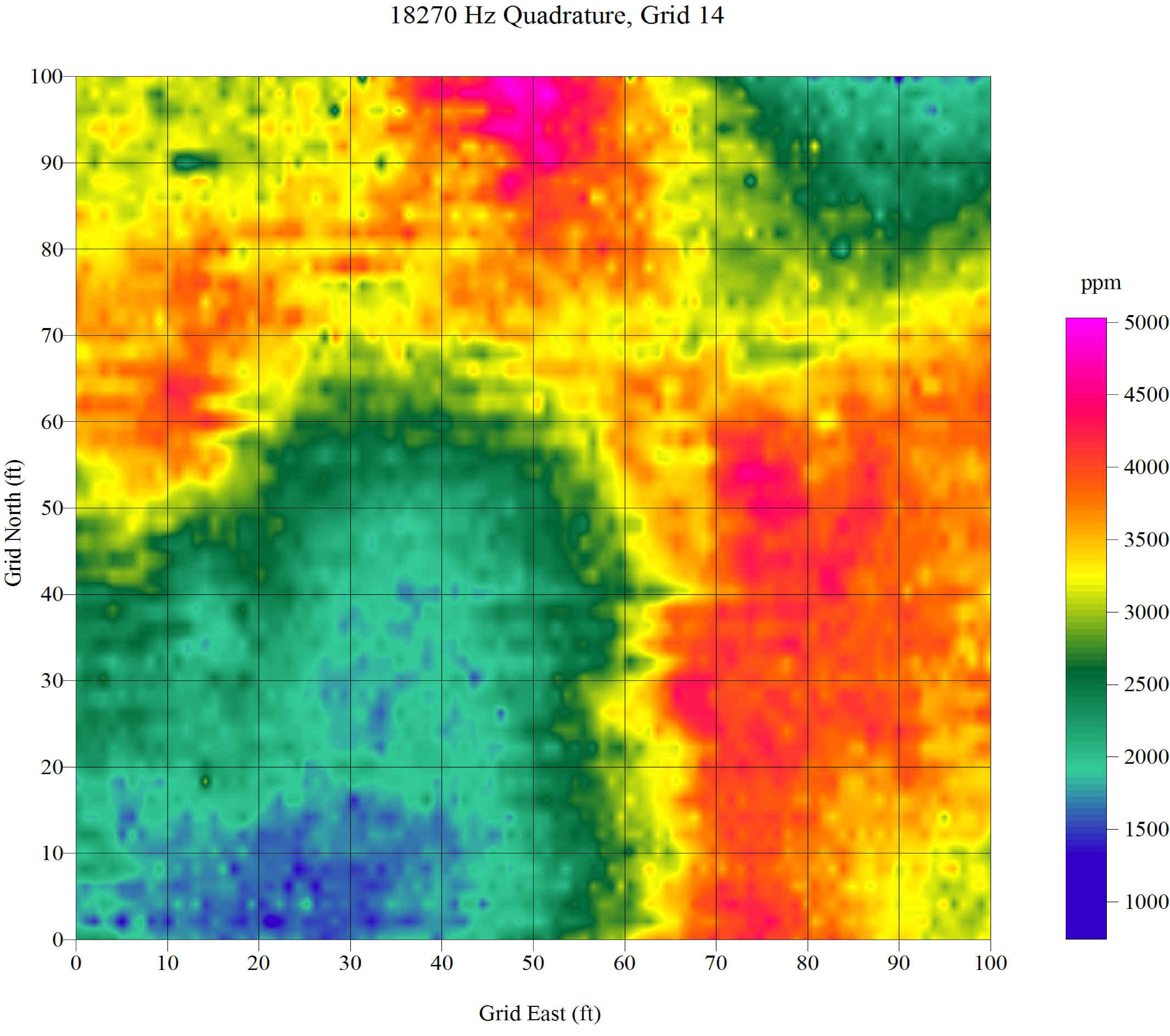

18270 Hz In Phase, Grid 14
Grid North (ft)
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
-500
0
10
20
30
40
50
60
70
80
90
100

Figure B14-e



18270 Hz Quadrature, Grid 14
ppm
5000
4500
4000
3500
3000
2500
2000
1500
1000
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100

Figure B14-f

2430 Hz In Phase, Grid 15

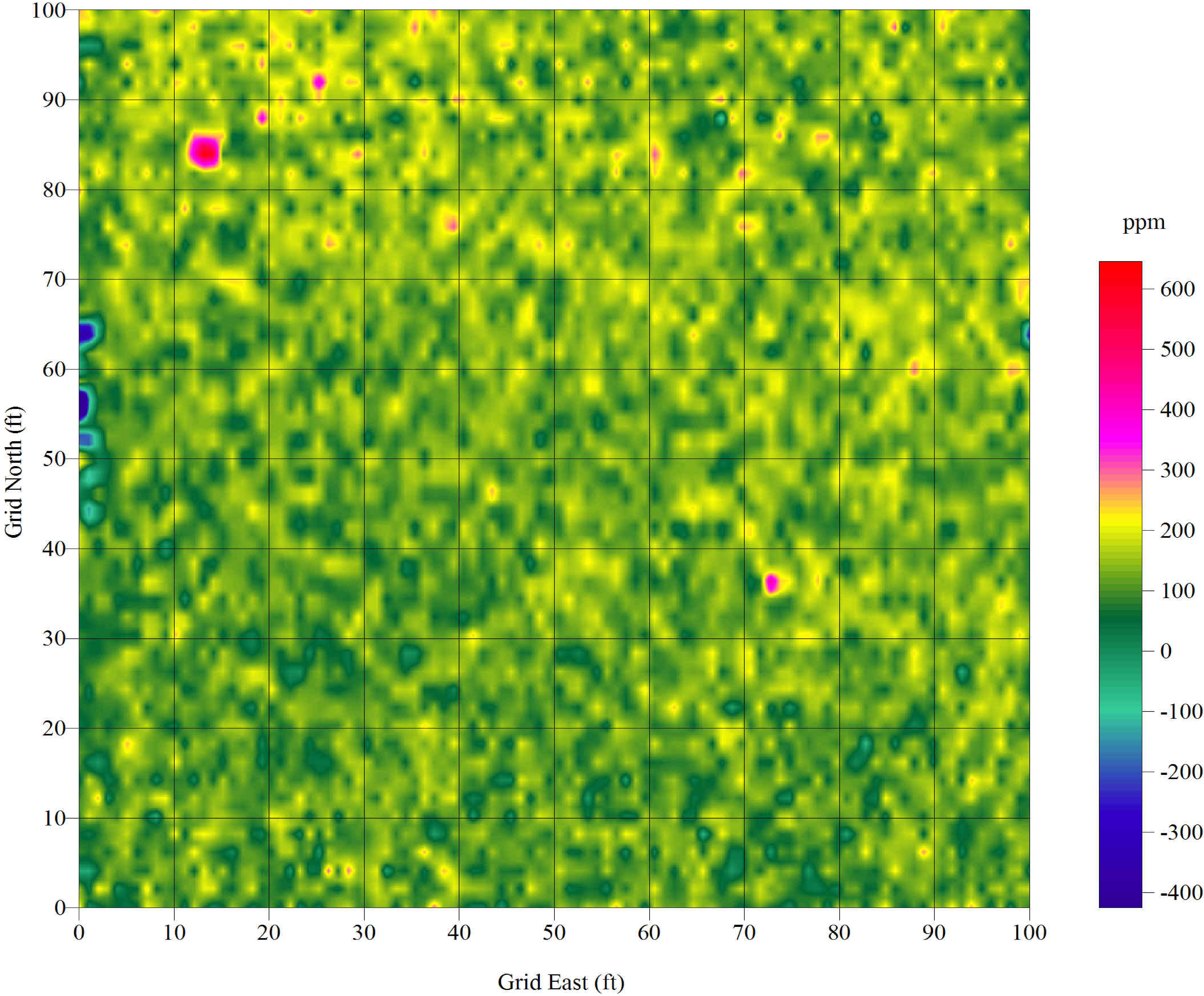


Figure B15-a

2430 Hz Quadrature, Grid 15

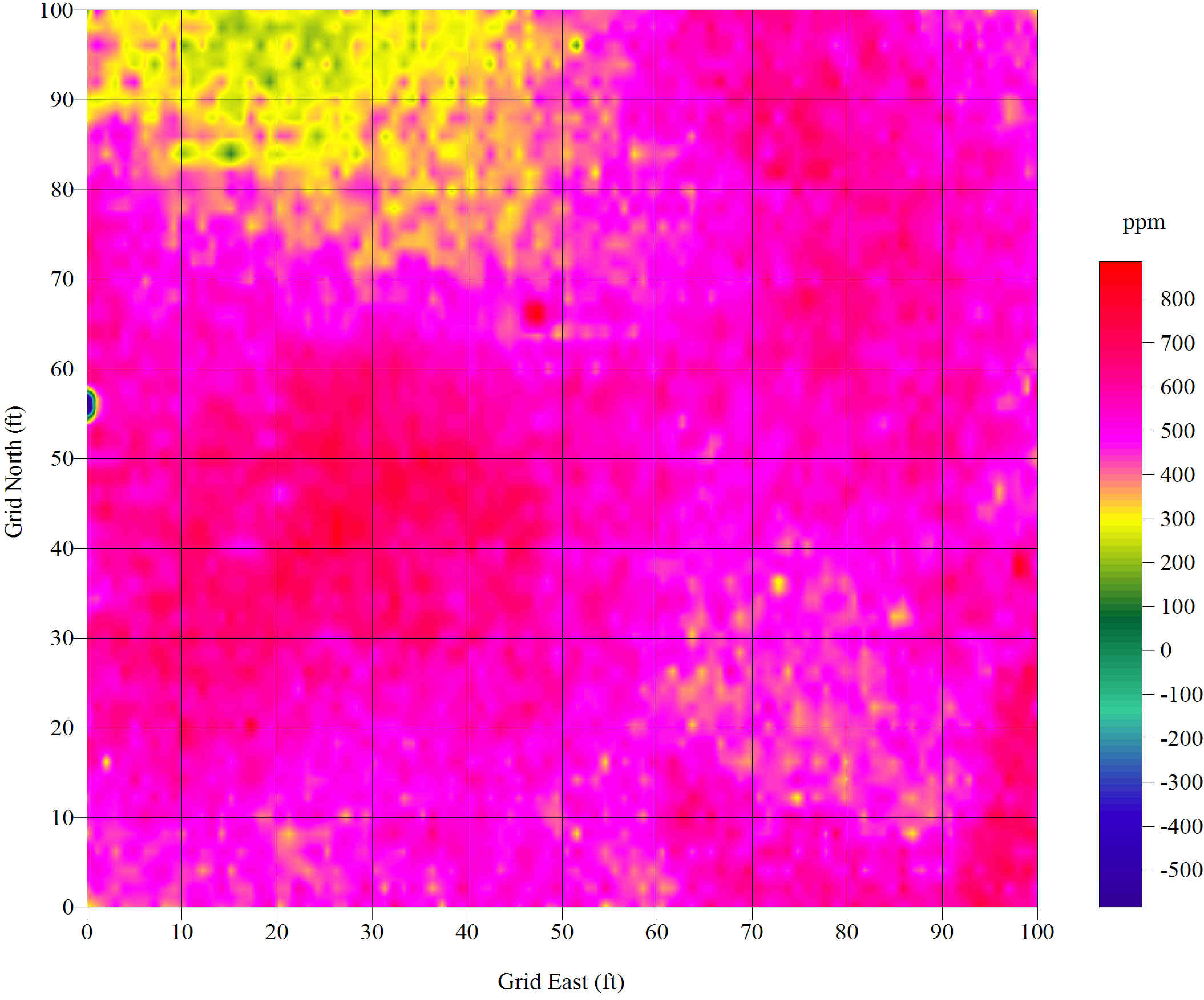


Figure B15-b

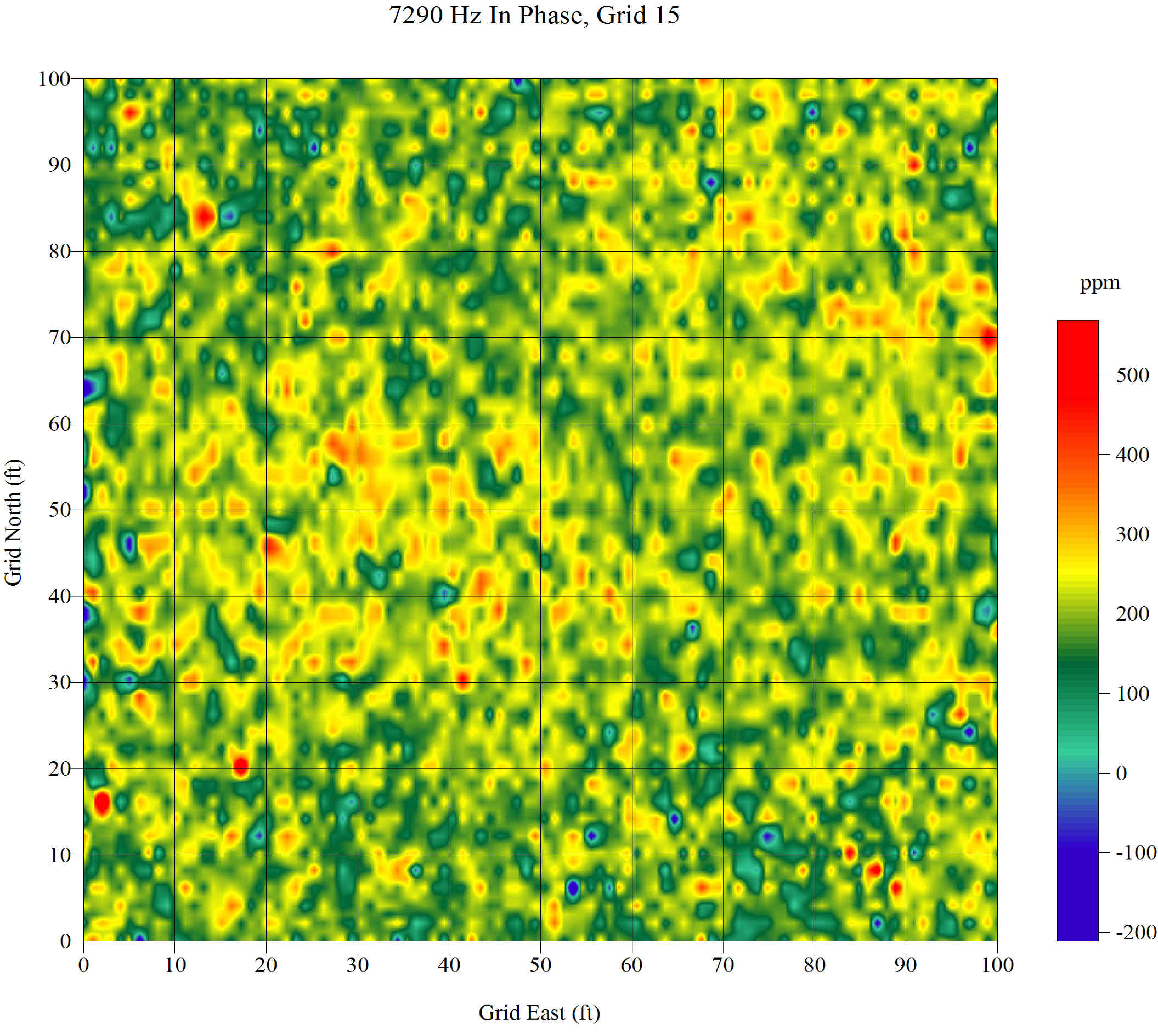

7290 Hz In Phase, Grid 15
Grid North (ft)
Grid East (ft)
ppm
500
400
300
200
100
0
-100
-200
0
10
20
30
40
50
60
70
80
90
100

Figure B15-c

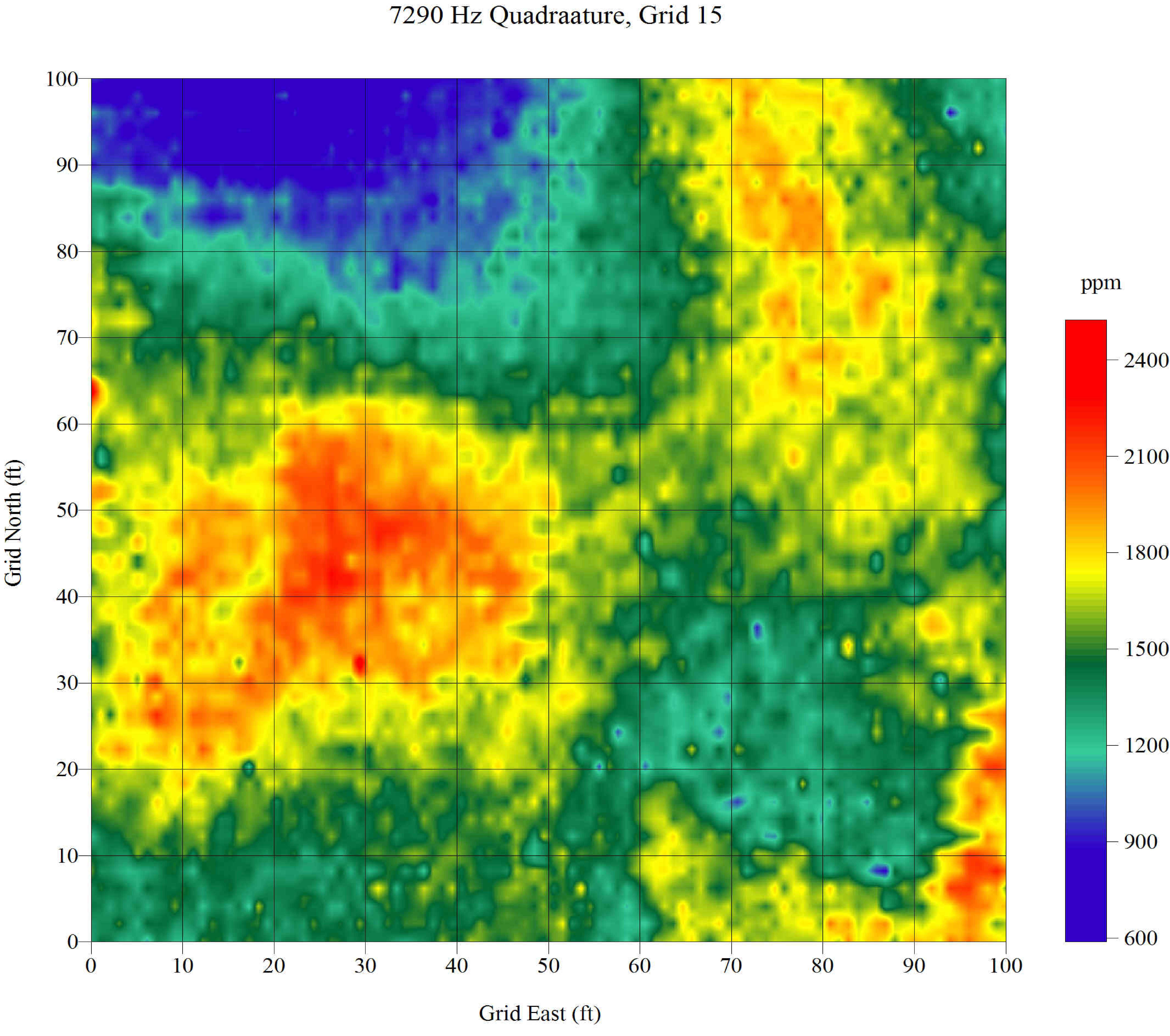

7290 Hz Quadraature, Grid 15
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2400
2100
1800
1500
1200
900
600

Figure B15-d

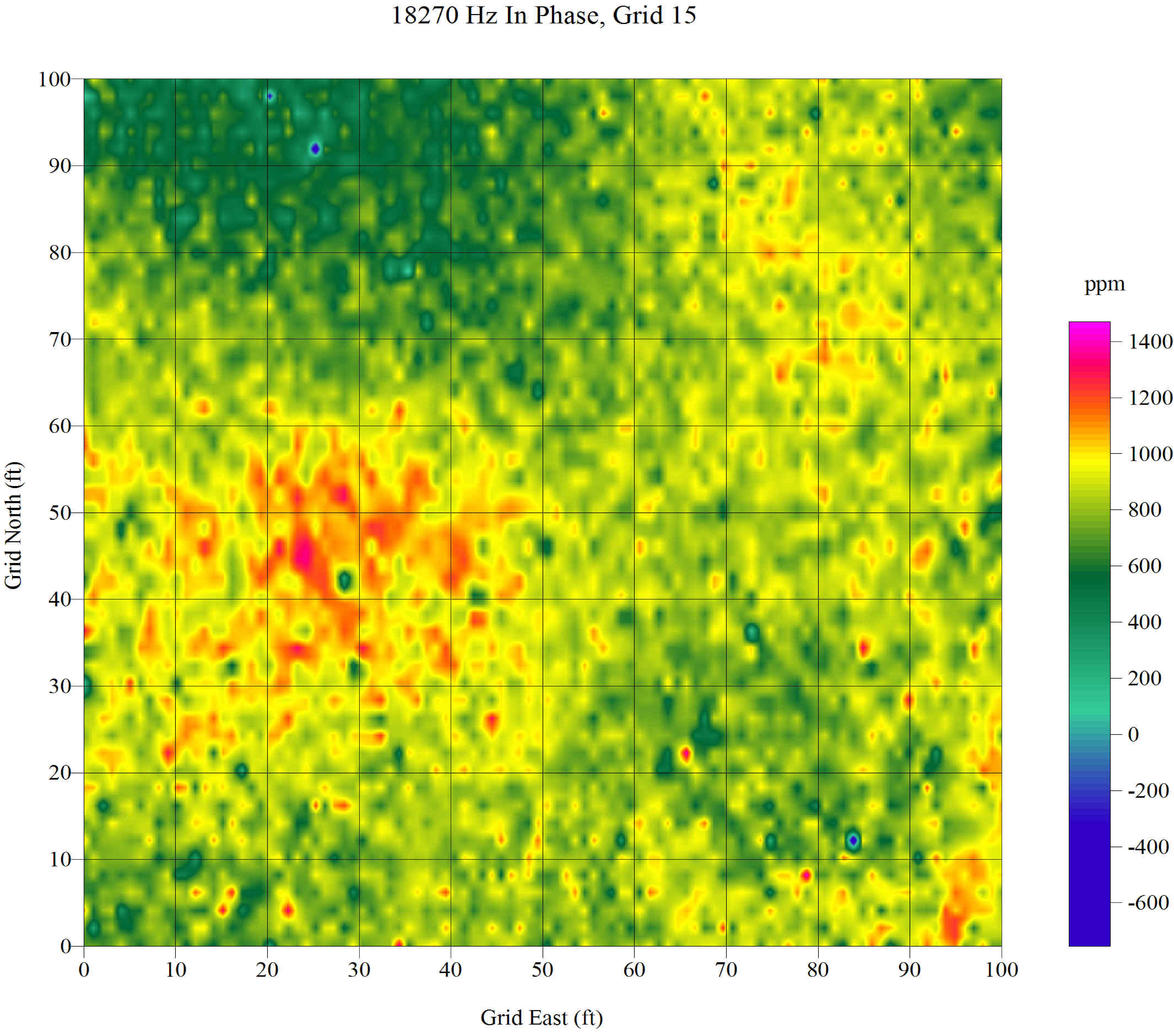

18270 Hz In Phase, Grid 15
Grid North (ft)
Grid East (ft)
ppm
1400
1200
1000
800
600
400
200
0
-200
-400
-600
0
10
20
30
40
50
60
70
80
90
100

Figure B15-e

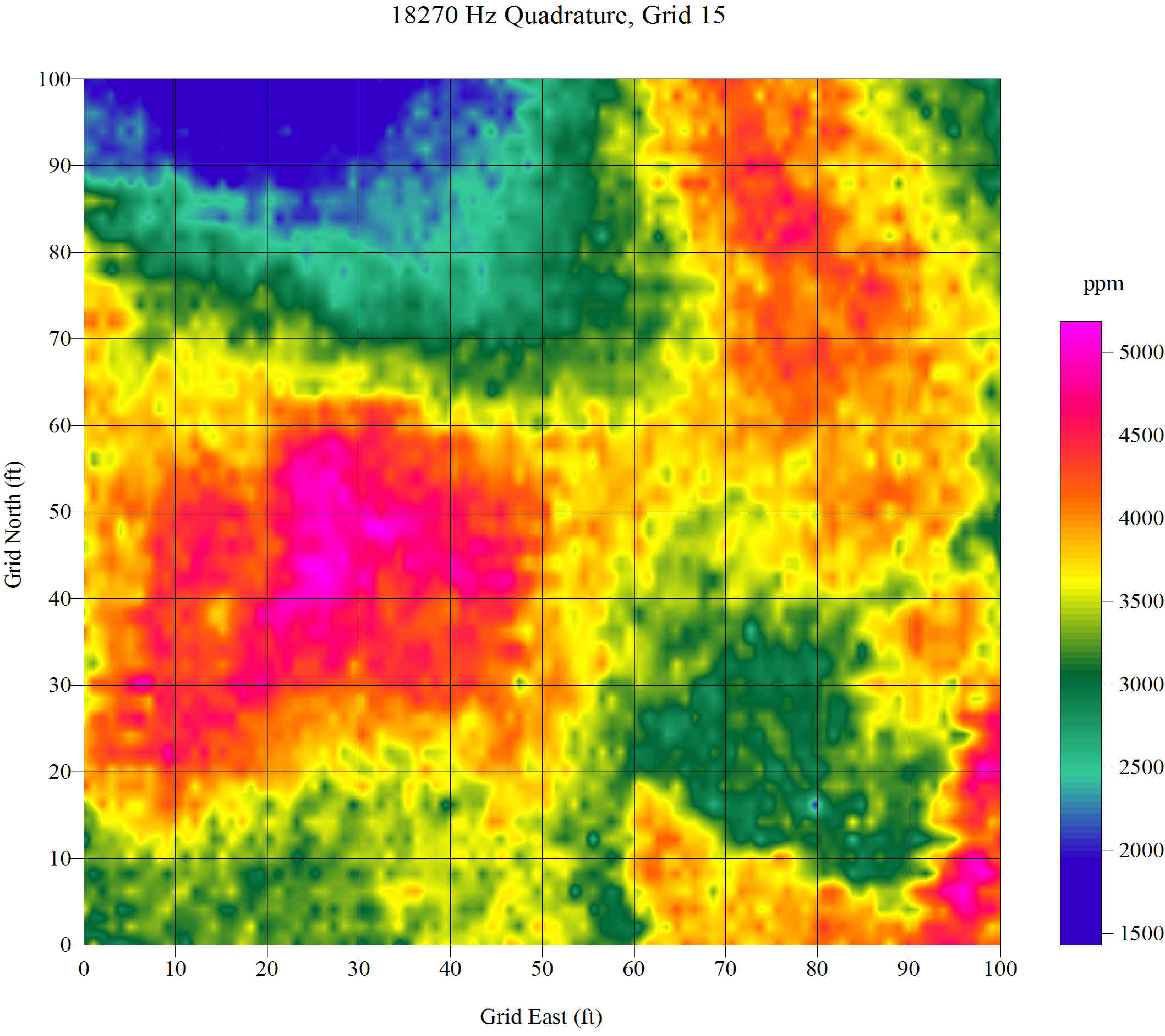

18270 Hz Quadrature, Grid 15
ppm
5000
4500
4000
3500
3000
2500
2000
1500
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)

Figure B15-f

2430 Hz In Phase, Grid 16

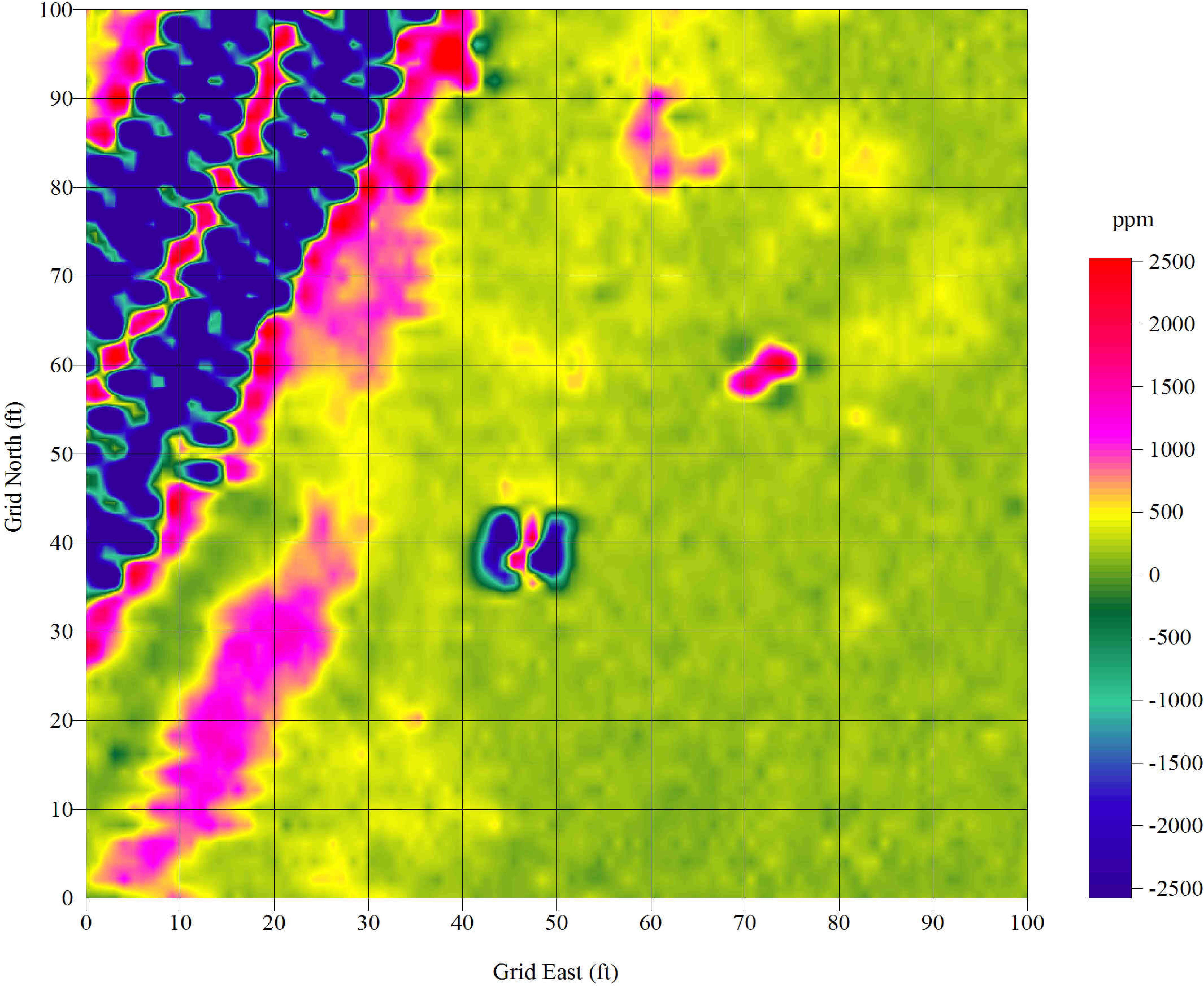


Figure B16-a

2430 Hz Quadrature, Grid 16

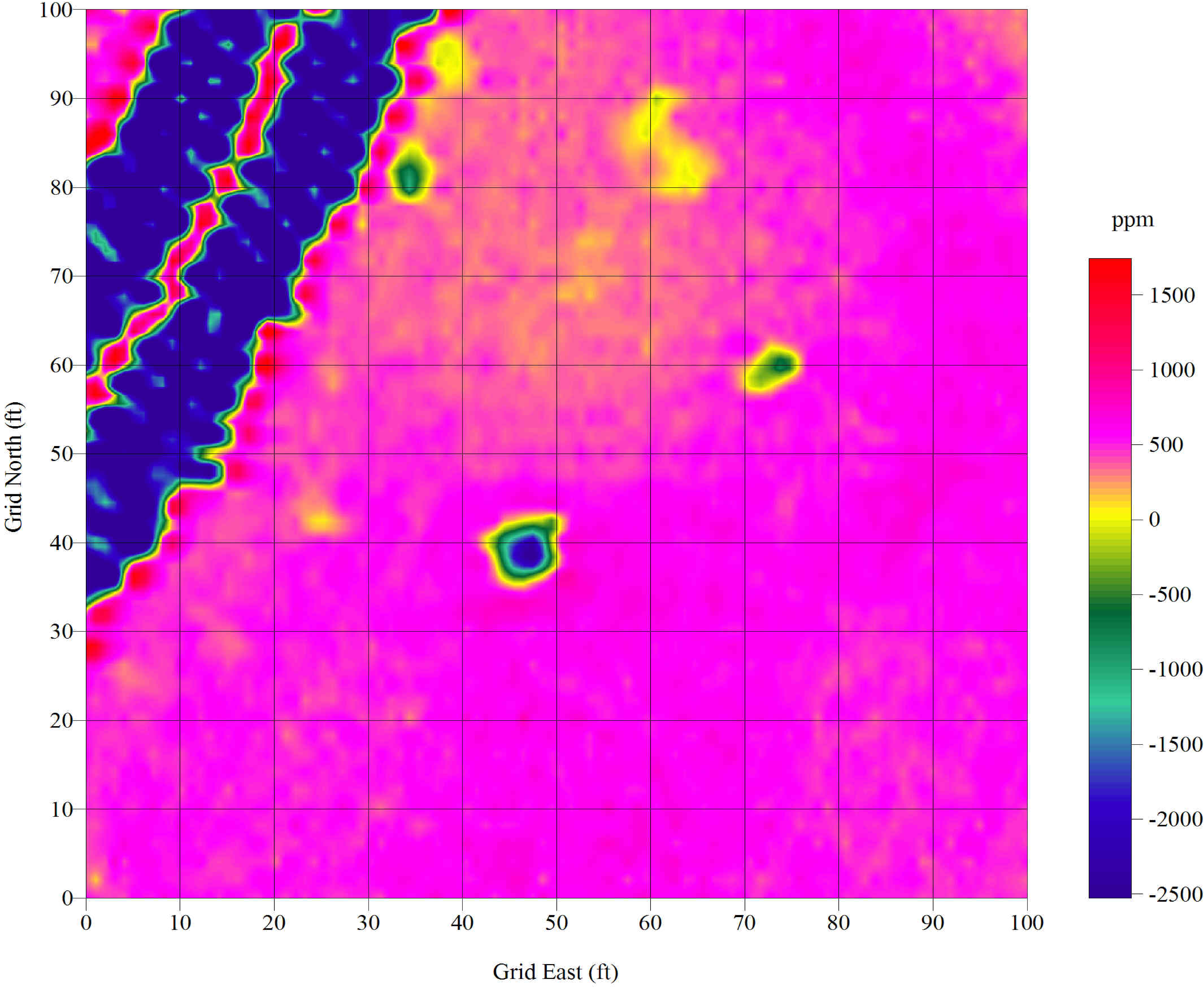
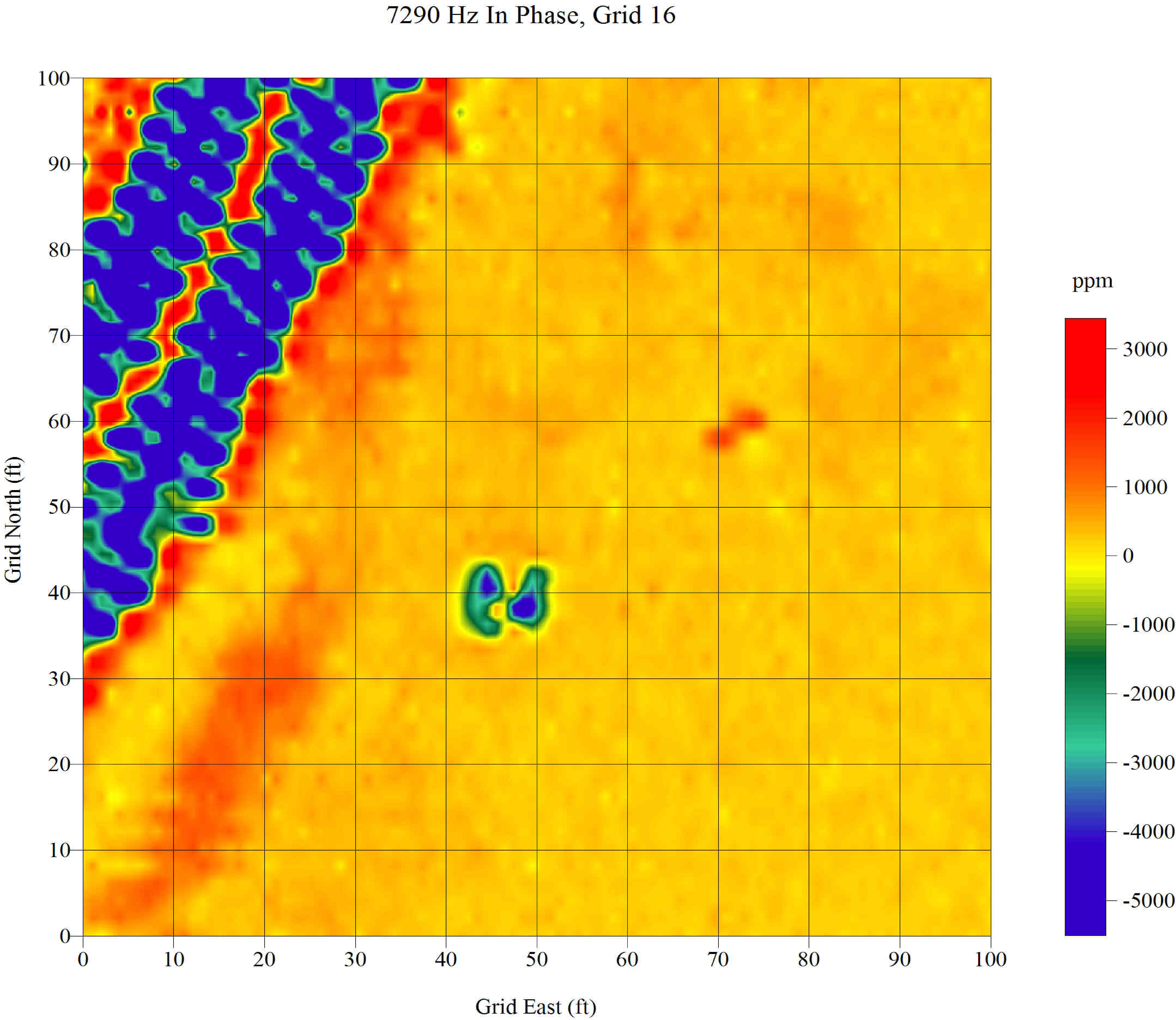


Figure B16-b



7290 Hz In Phase, Grid 16
ppm
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100

Figure B16-c

7290 Hz Quadrature, Grid 16

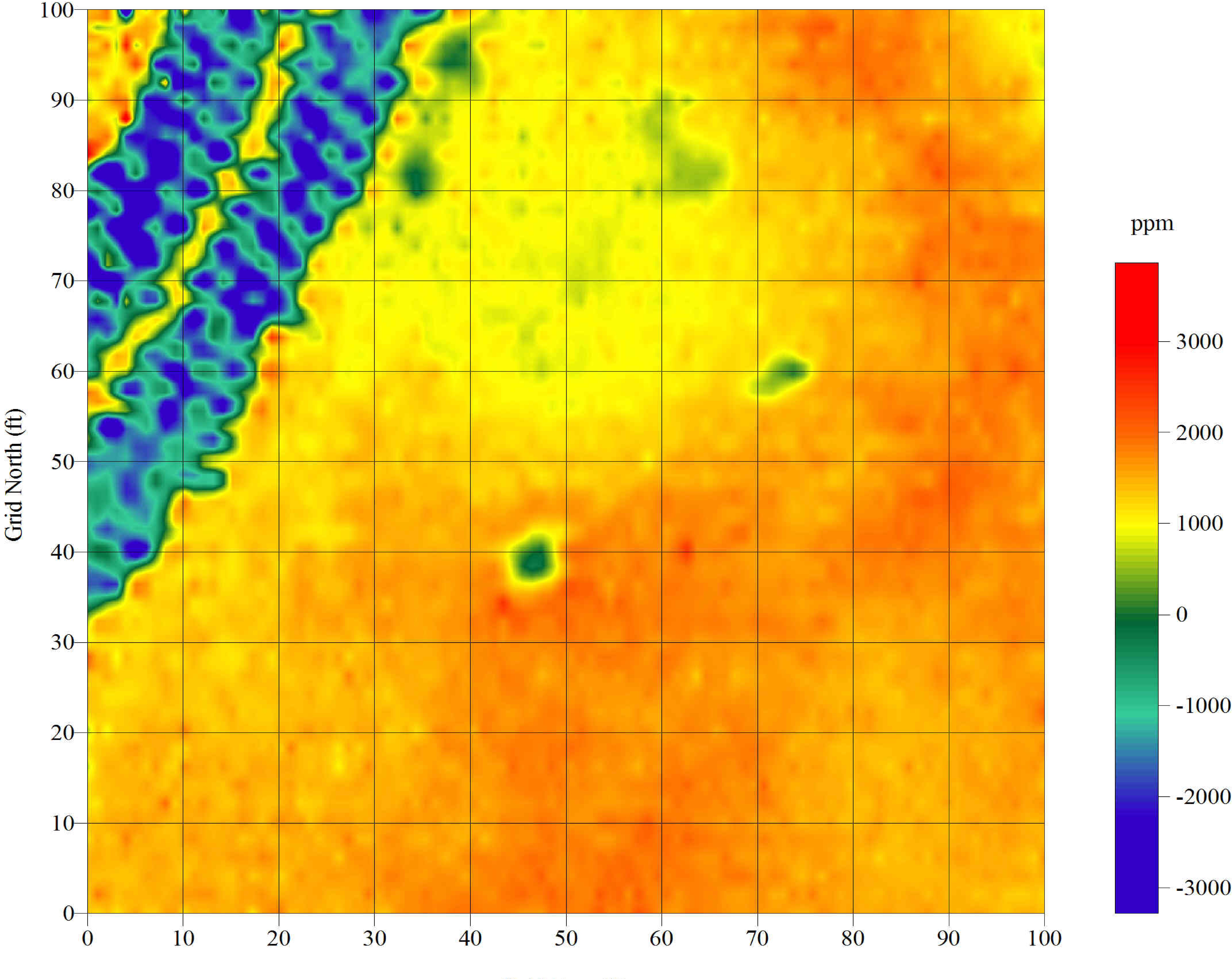


Figure B16-d

18270 Hz In Phase, Grid 16

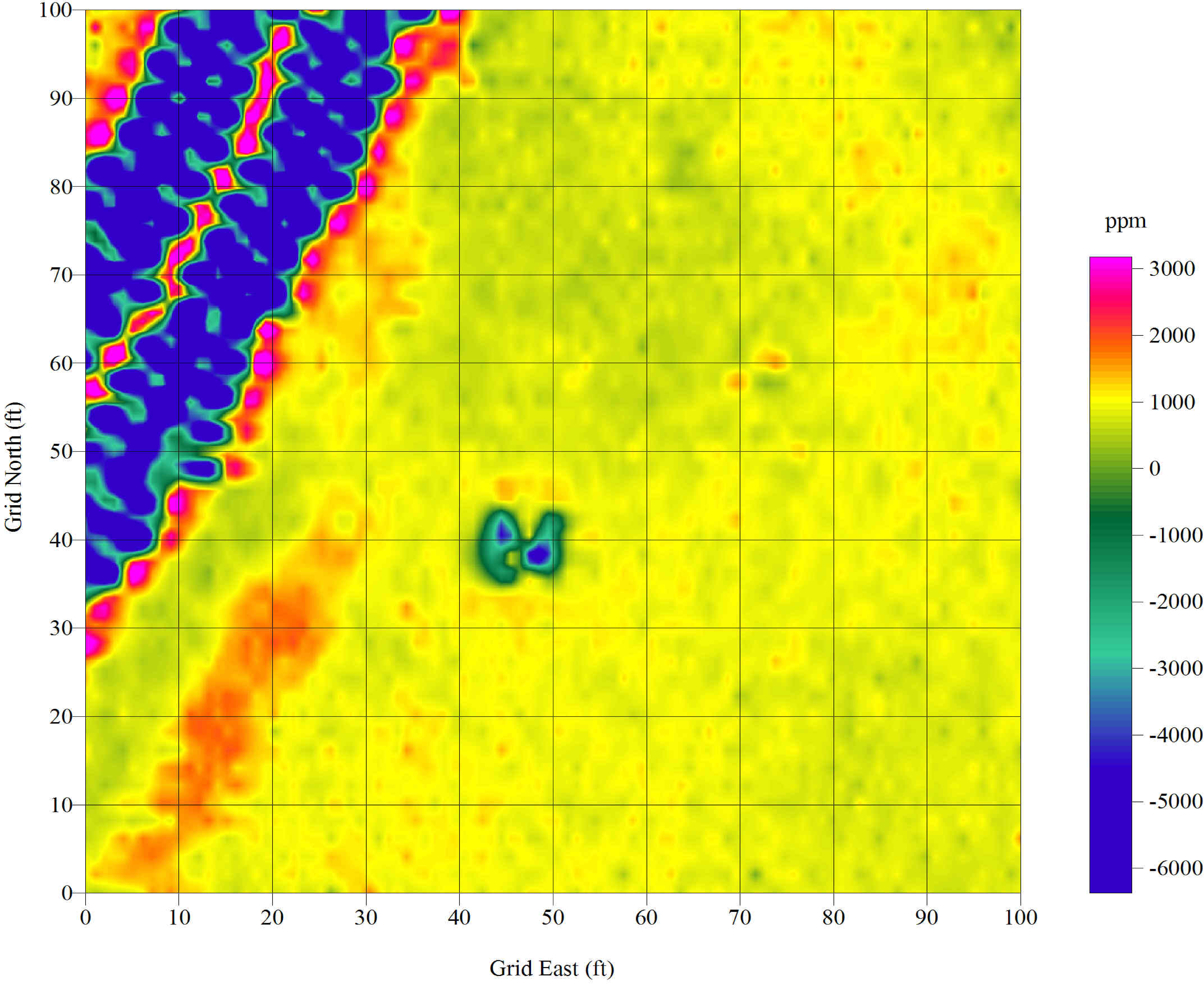


Figure B16-e

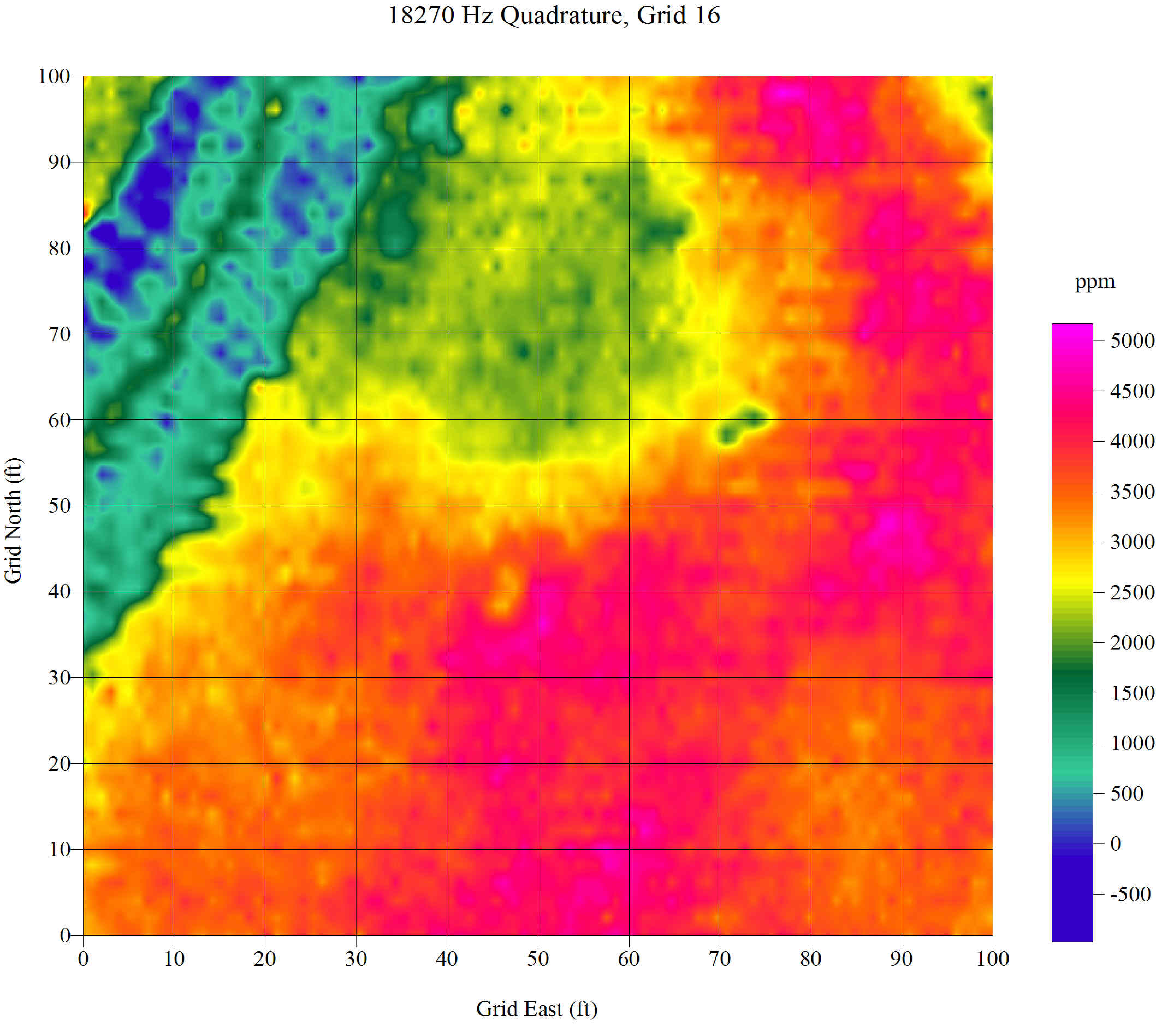

18270 Hz Quadrature, Grid 16
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000

Figure B16-f

Figure B16-g

Figure B16-h

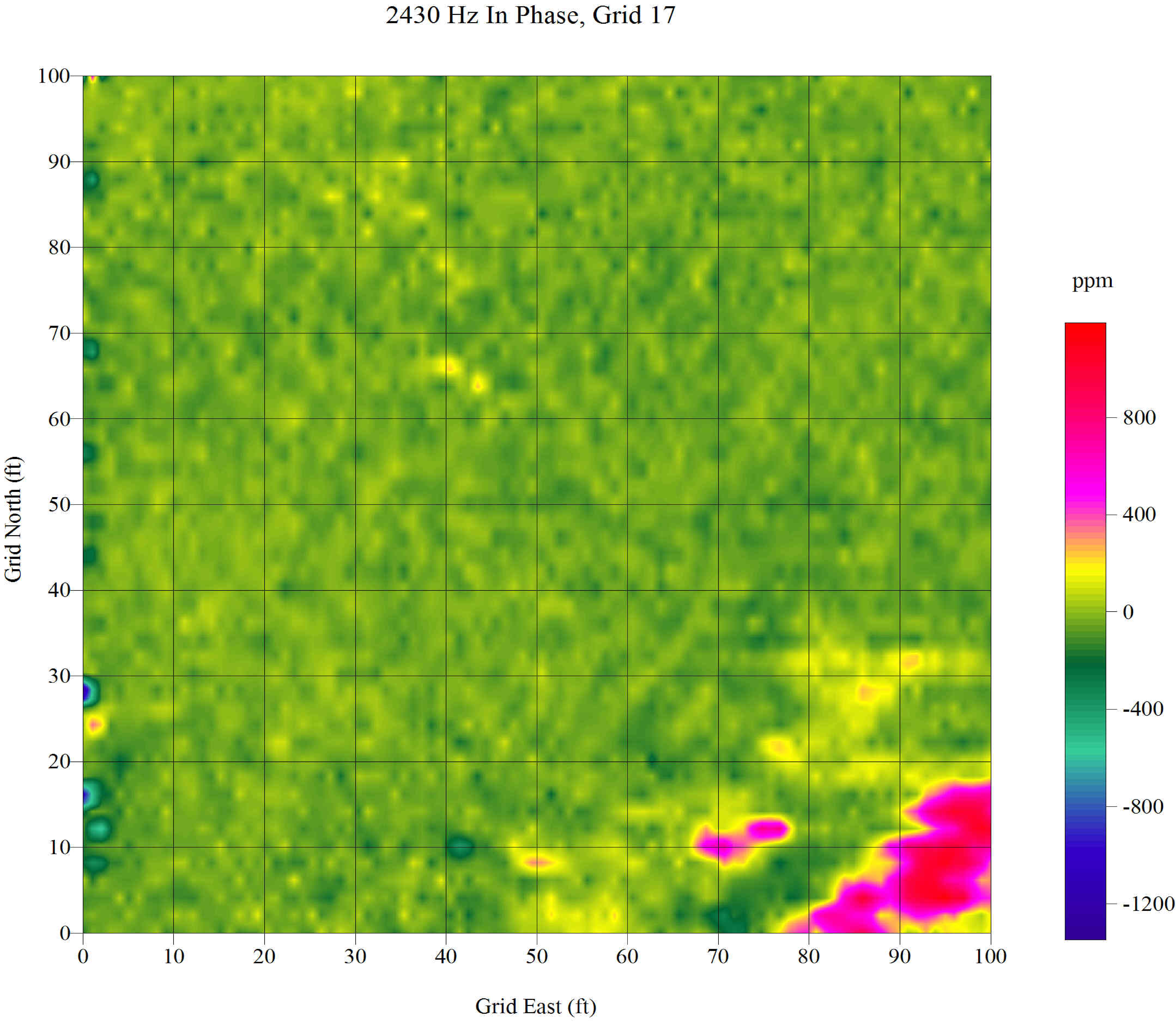

2430 Hz In Phase, Grid 17
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
800
400
0
-400
-800
-1200

Figure B17-a

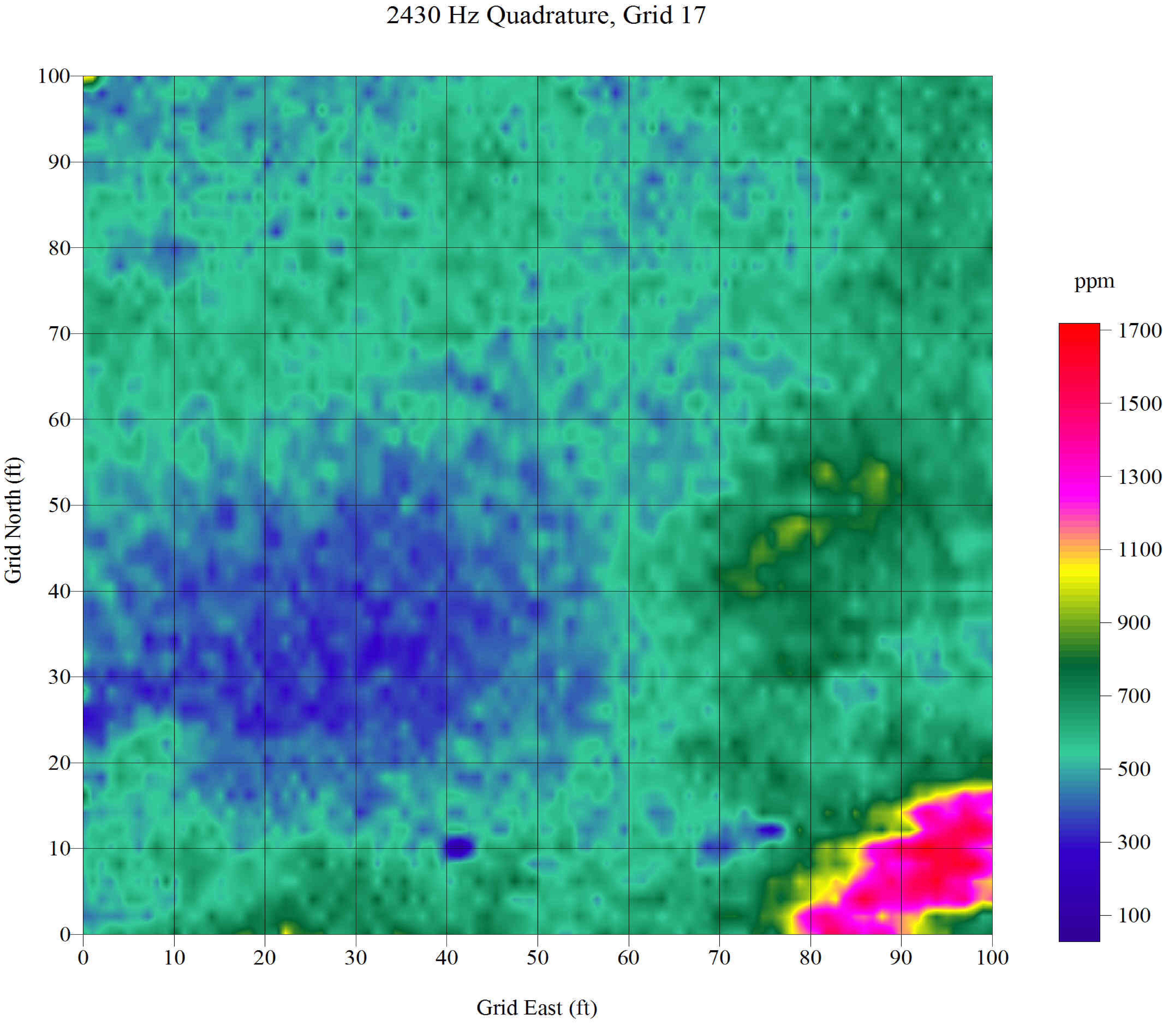

2430 Hz Quadrature, Grid 17
Grid North (ft)
Grid East (ft)
ppm
1700
1500
1300
1100
900
700
500
300
100
0
10
20
30
40
50
60
70
80
90
100

Figure B17-b

7290 Hz In Phase, Grid 17

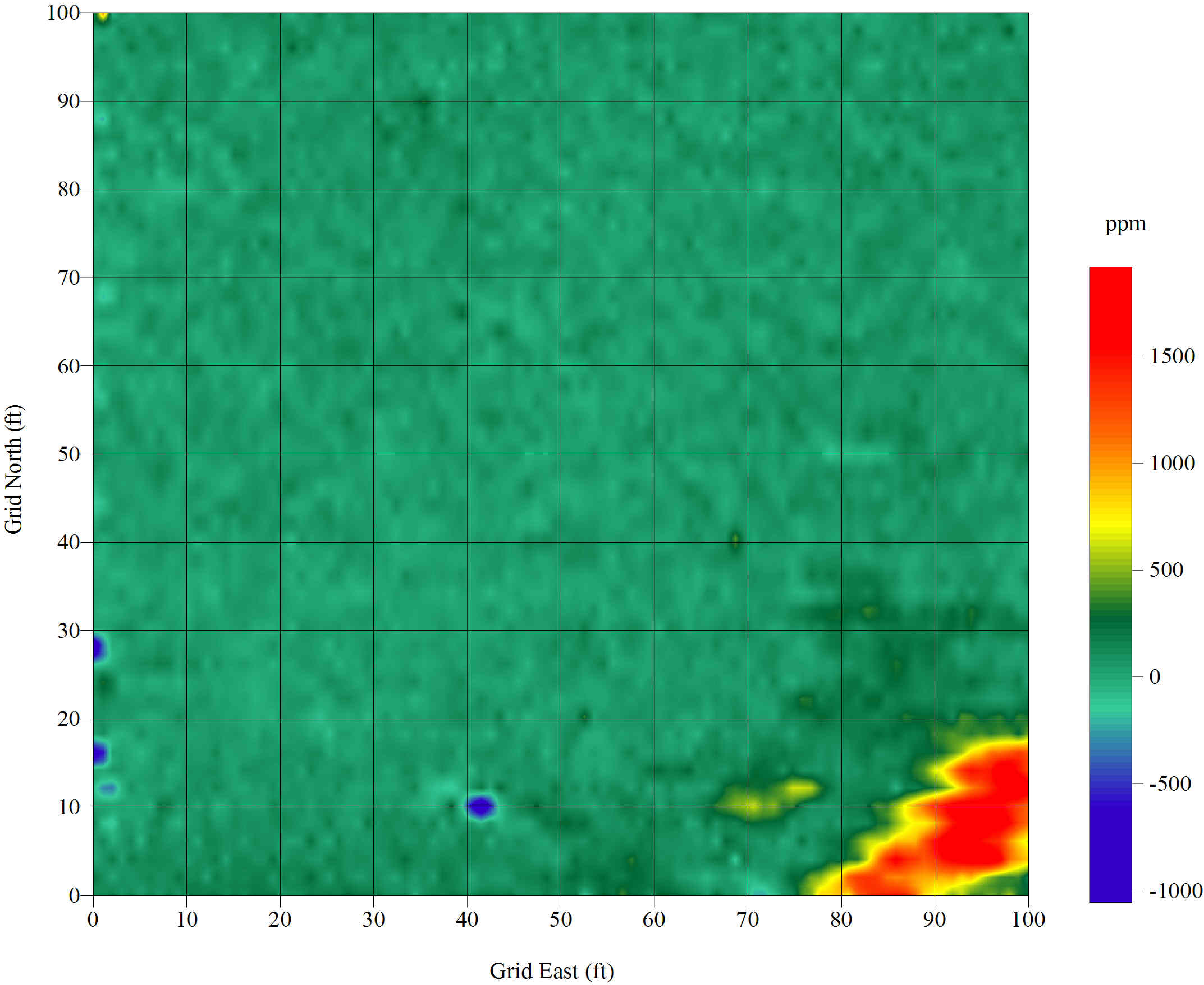


Figure B17-c

7290 Hz Quadrature, Grid 17

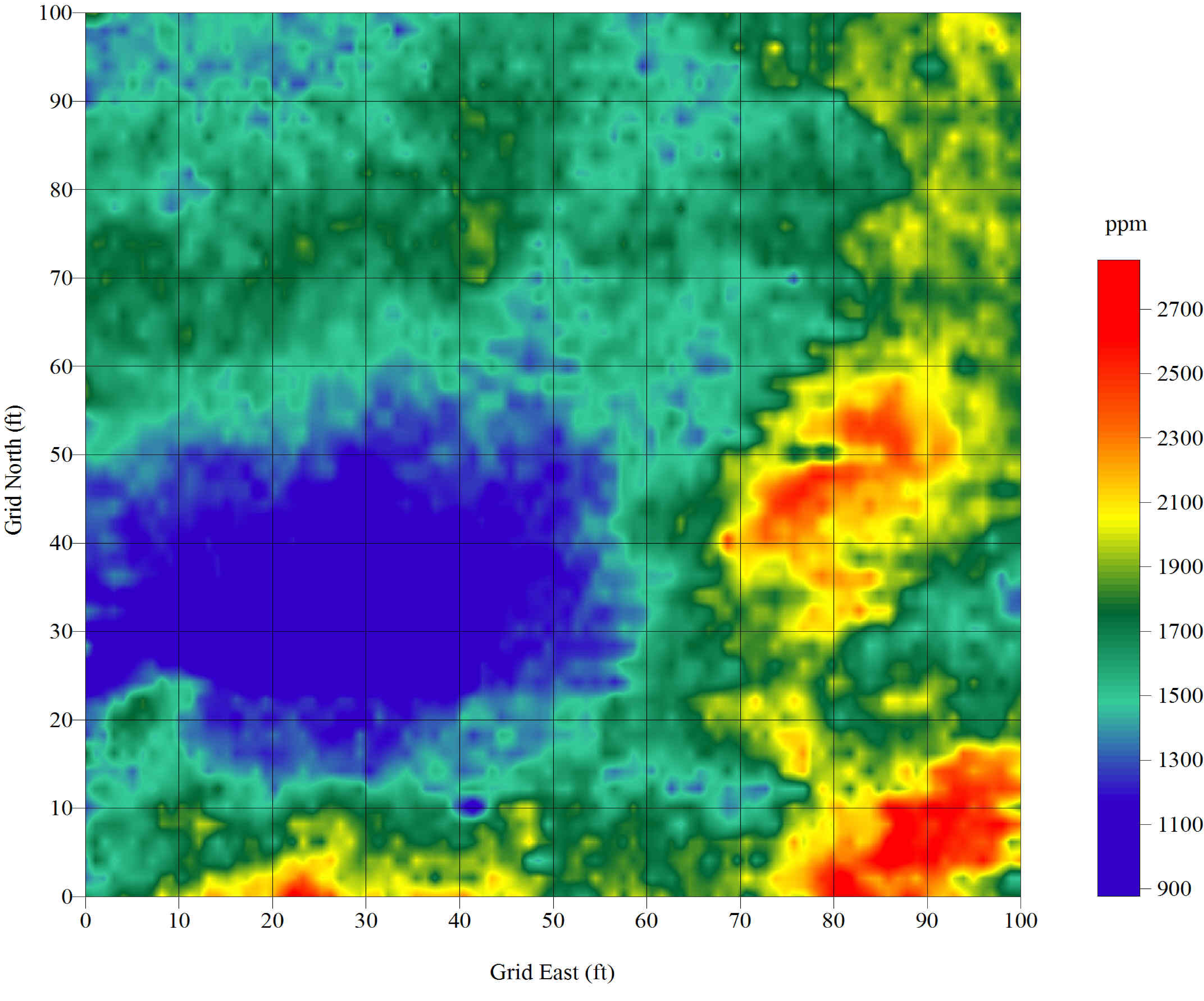


Figure B17-d

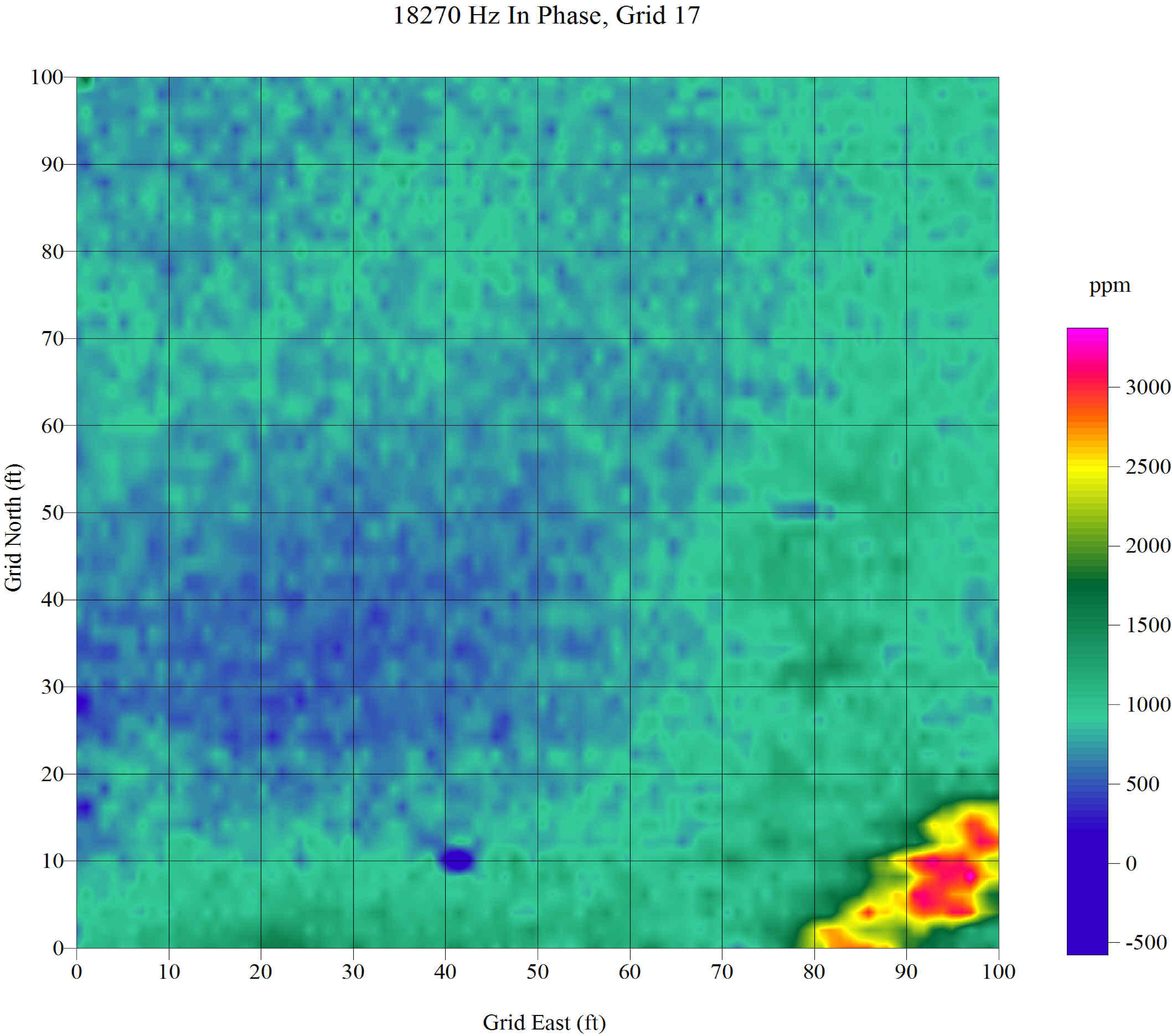

18270 Hz In Phase, Grid 17
Grid North (ft)
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
-500
0
10
20
30
40
50
60
70
80
90
100

Figure B17-e

18270 Hz Quadrature, Grid 17

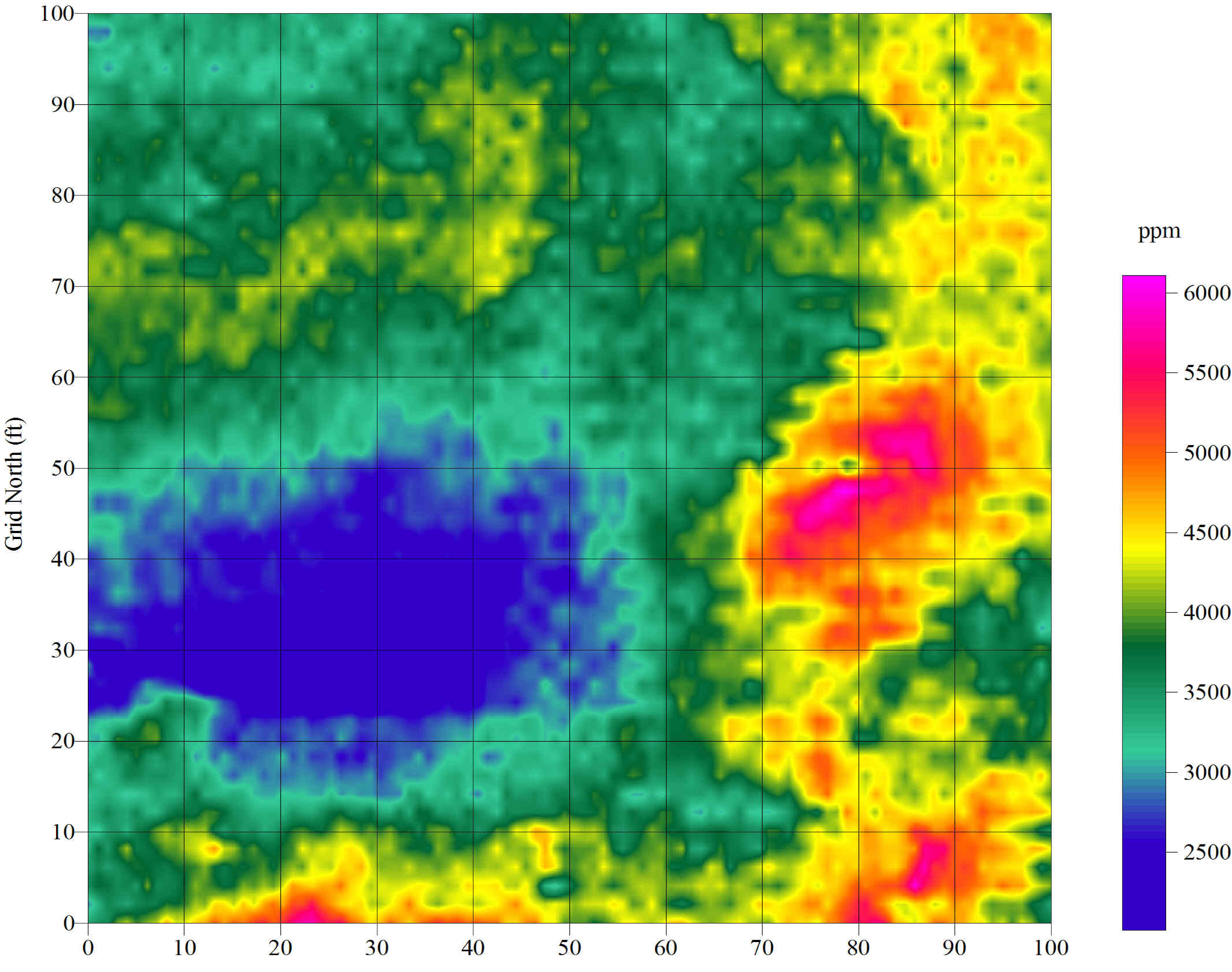


Figure B17-f

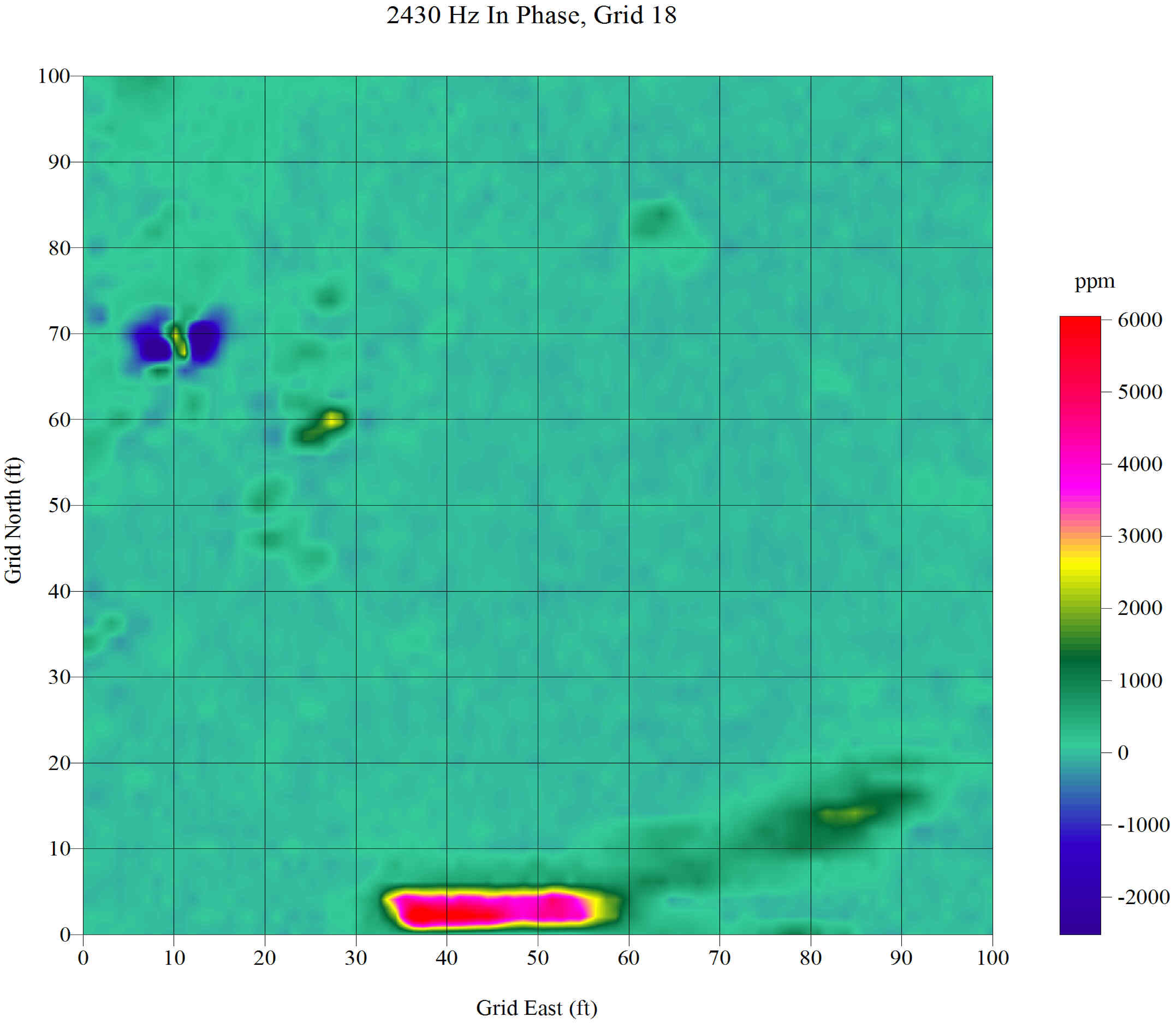

2430 Hz In Phase, Grid 18
Grid North (ft)
Grid East (ft)
ppm
6000
5000
4000
3000
2000
1000
0
-1000
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B18-a

2430 Hz Quadrature, Grid 18

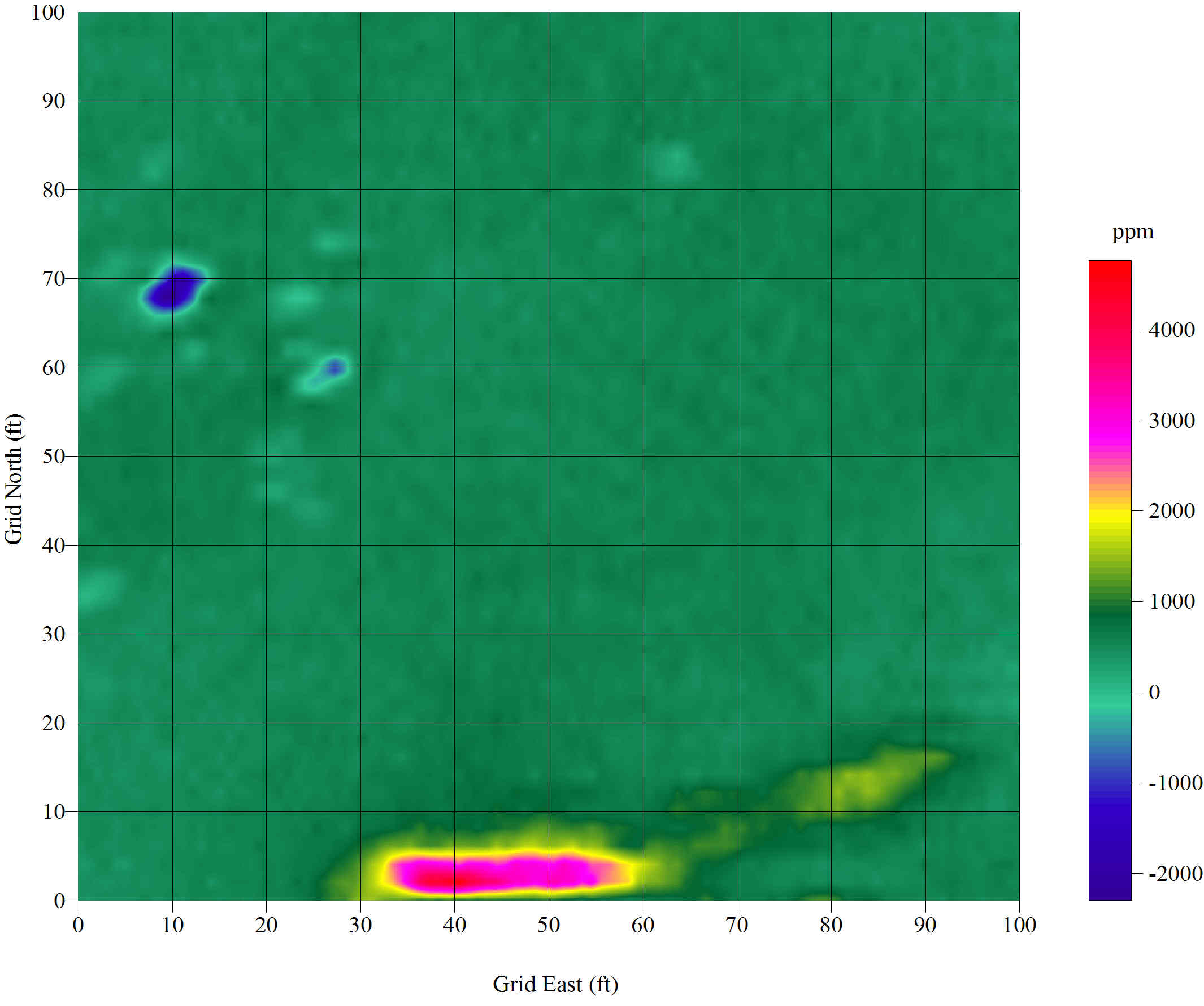


Figure B18-b

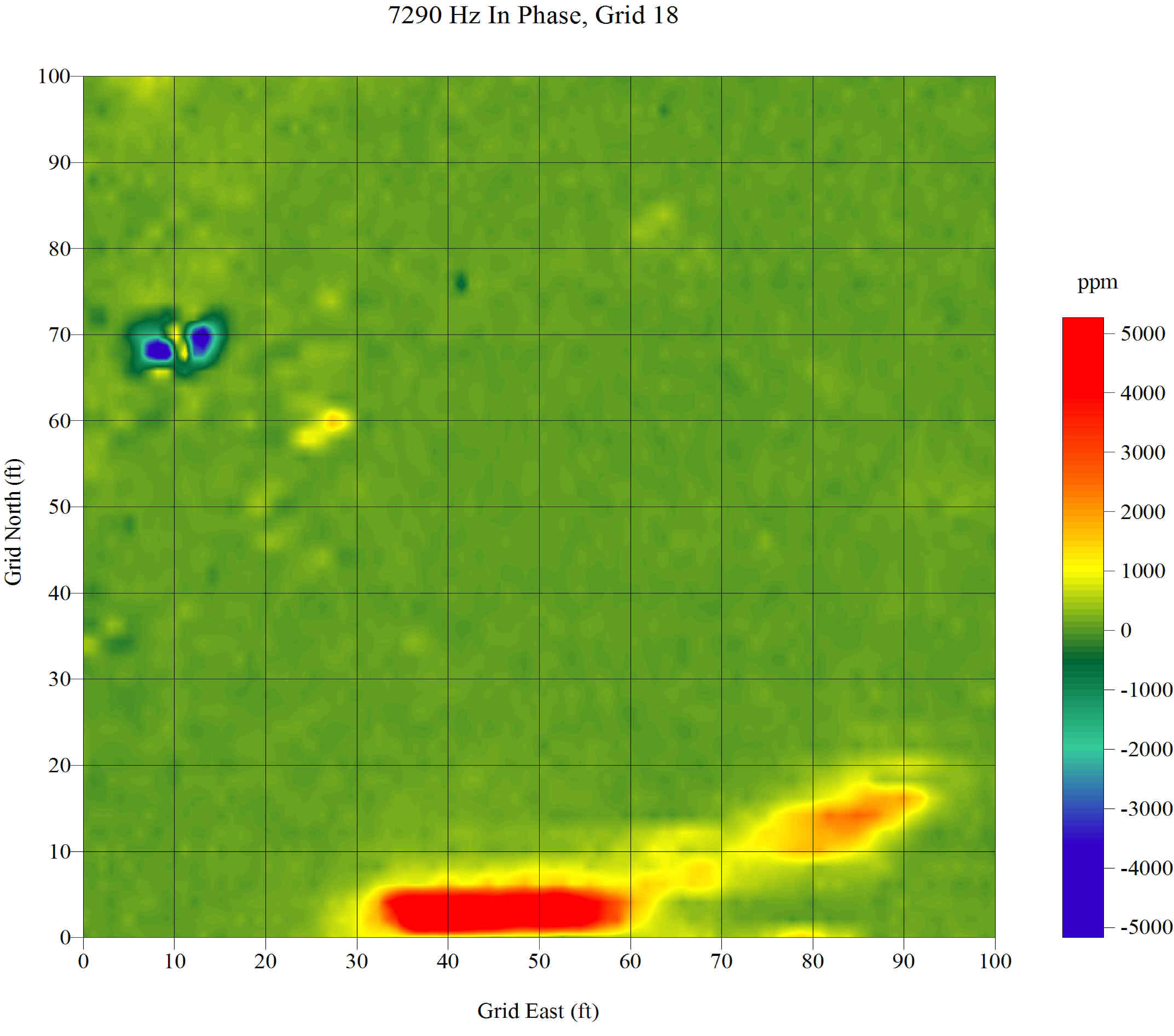

7290 Hz In Phase, Grid 18
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100

Figure B18-c

7290 Hz Quadrature, Grid 18

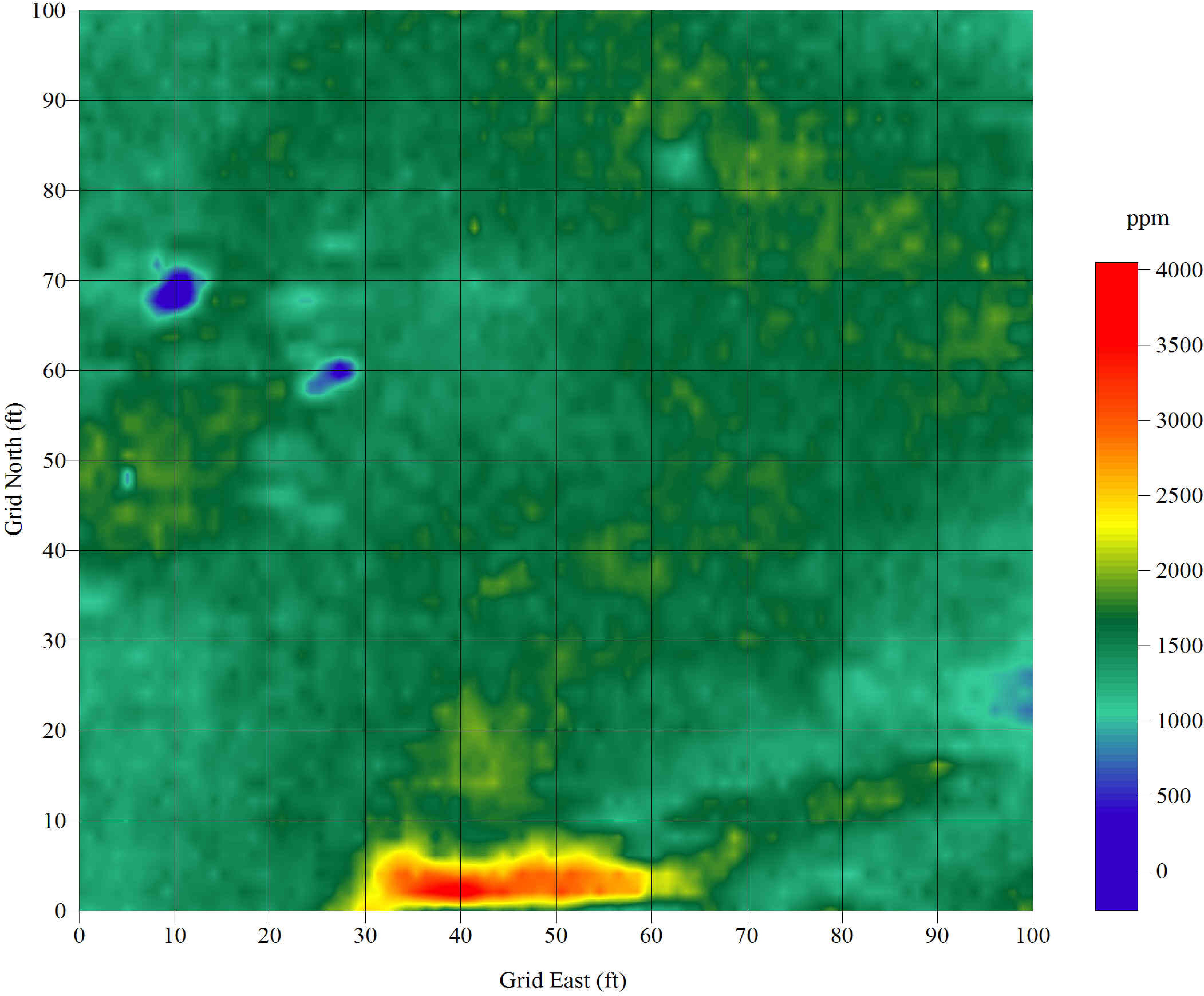


Figure B18-d

18270 Hz In Phase, Grid 18

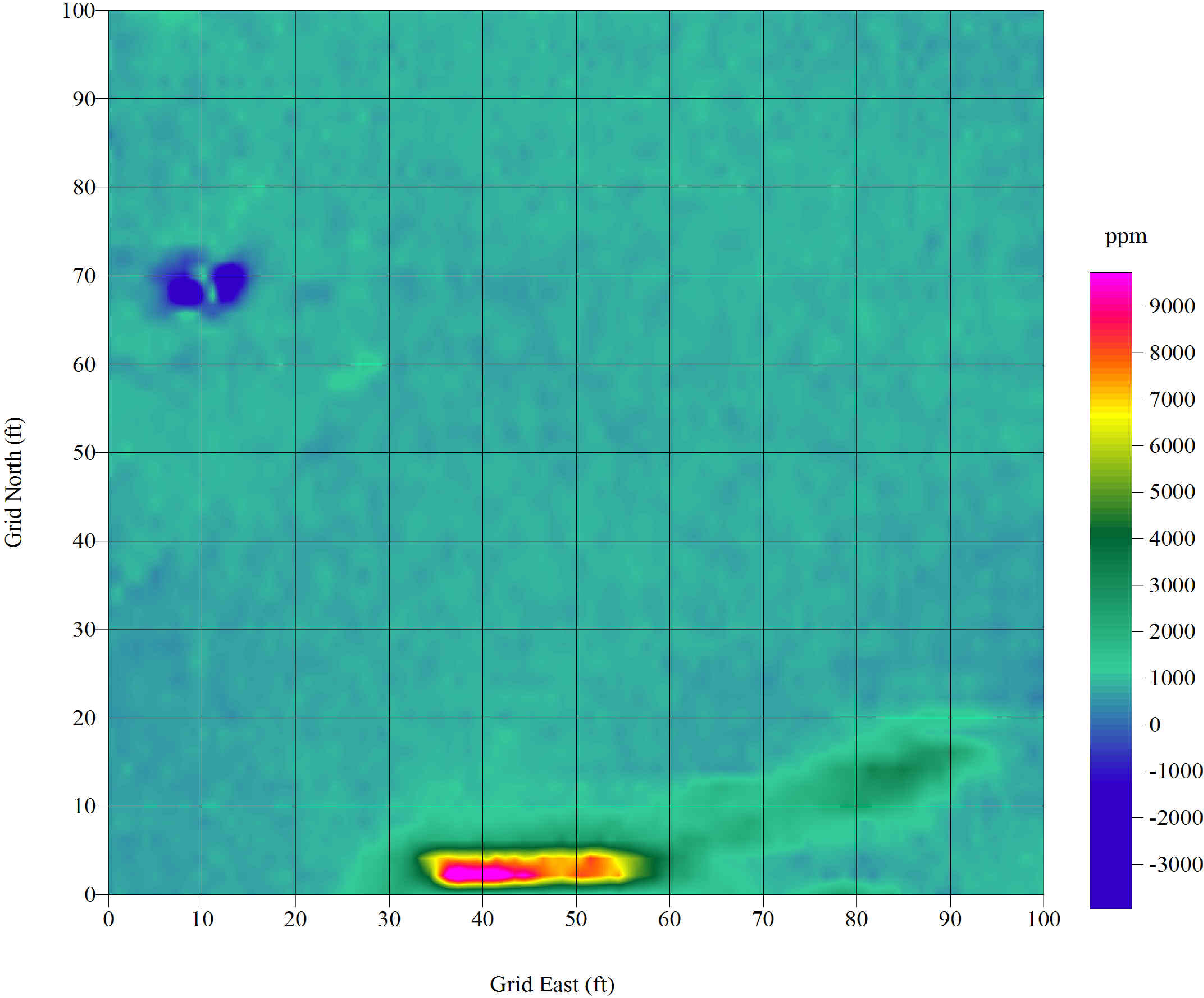
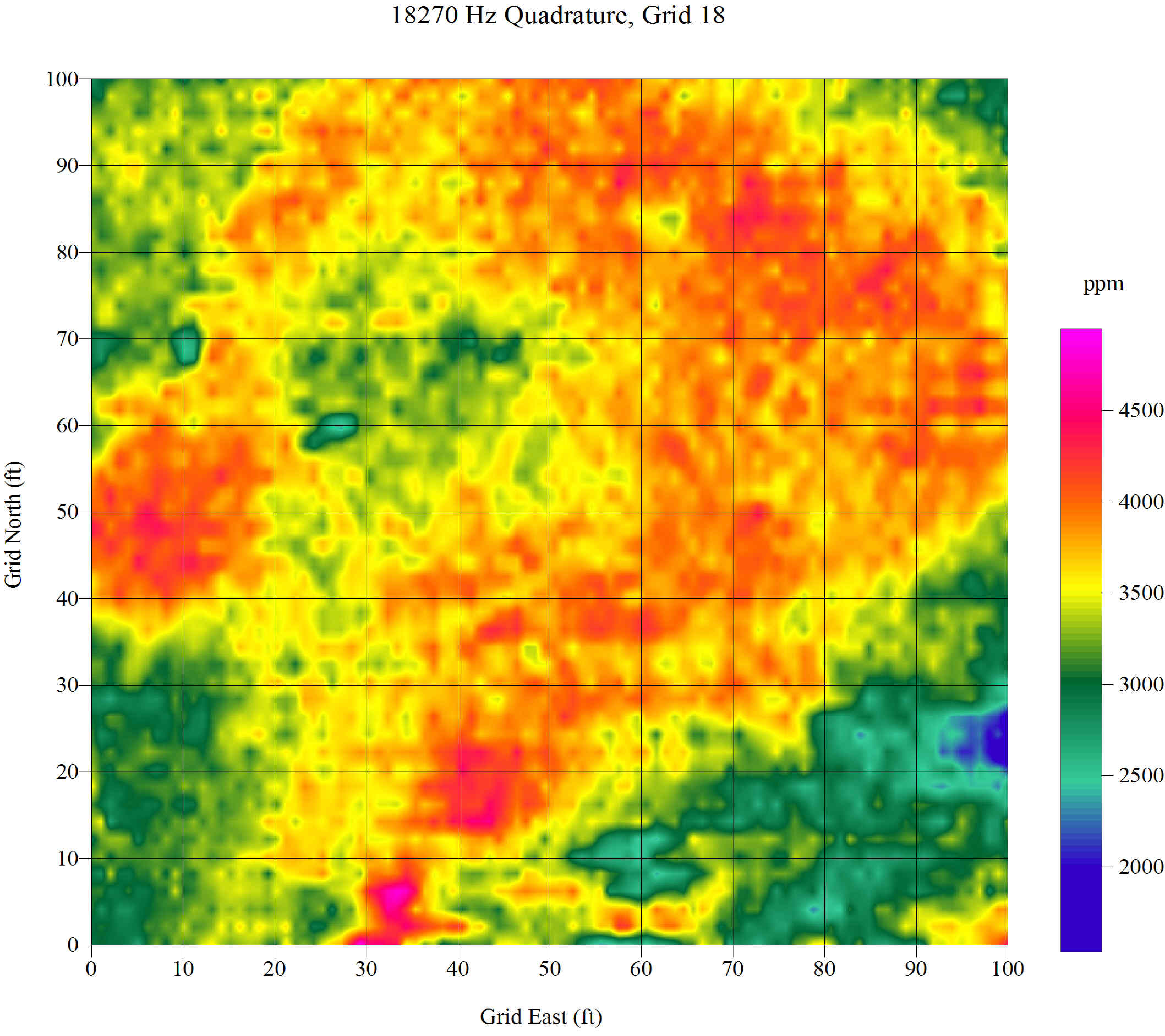


Figure B18-e



18270 Hz Quadrature, Grid 18
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
4500
4000
3500
3000
2500
2000

Figure B18-f

Figure B18-g

2430 Hz In Phase, Grid 19

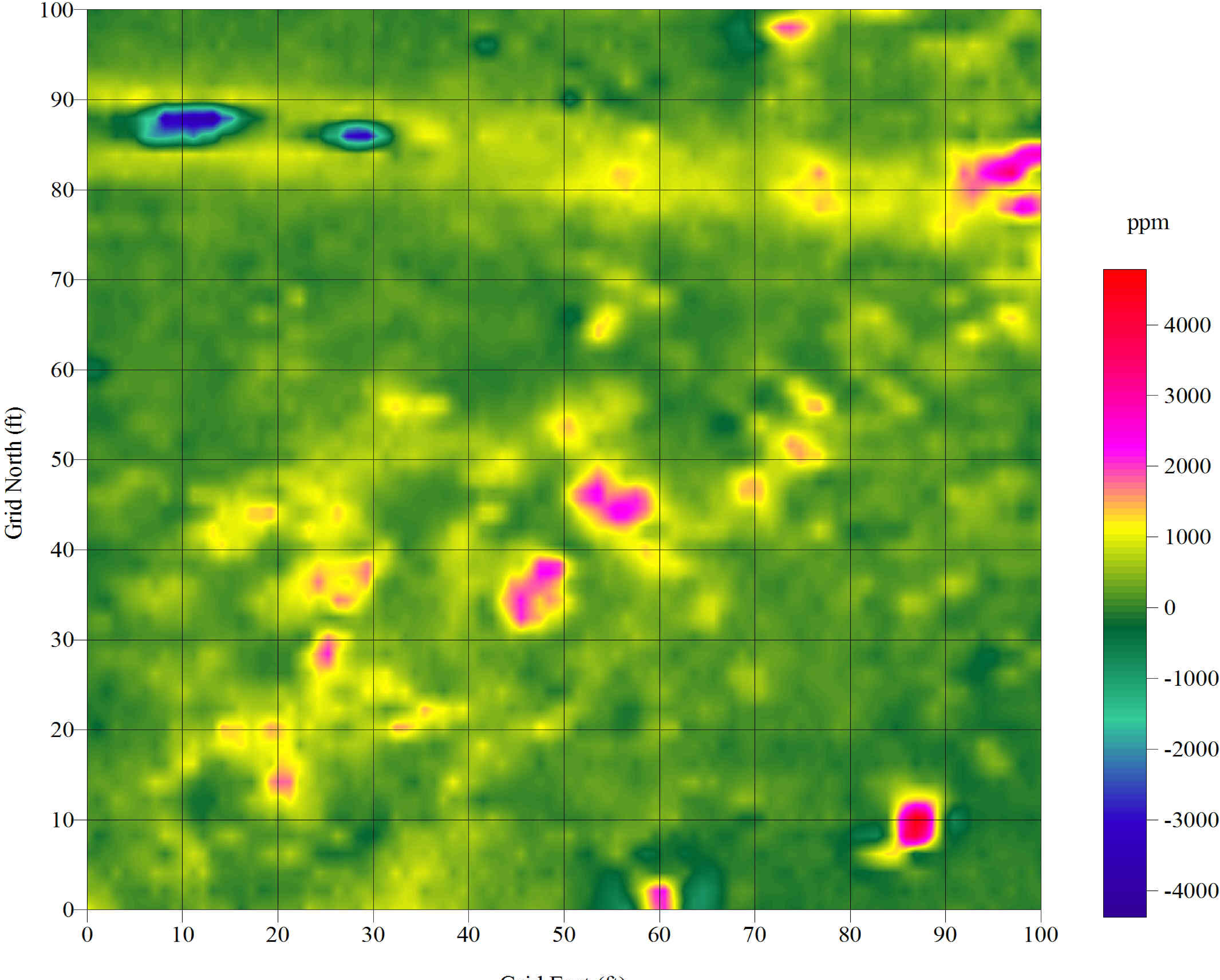


Figure B19-a

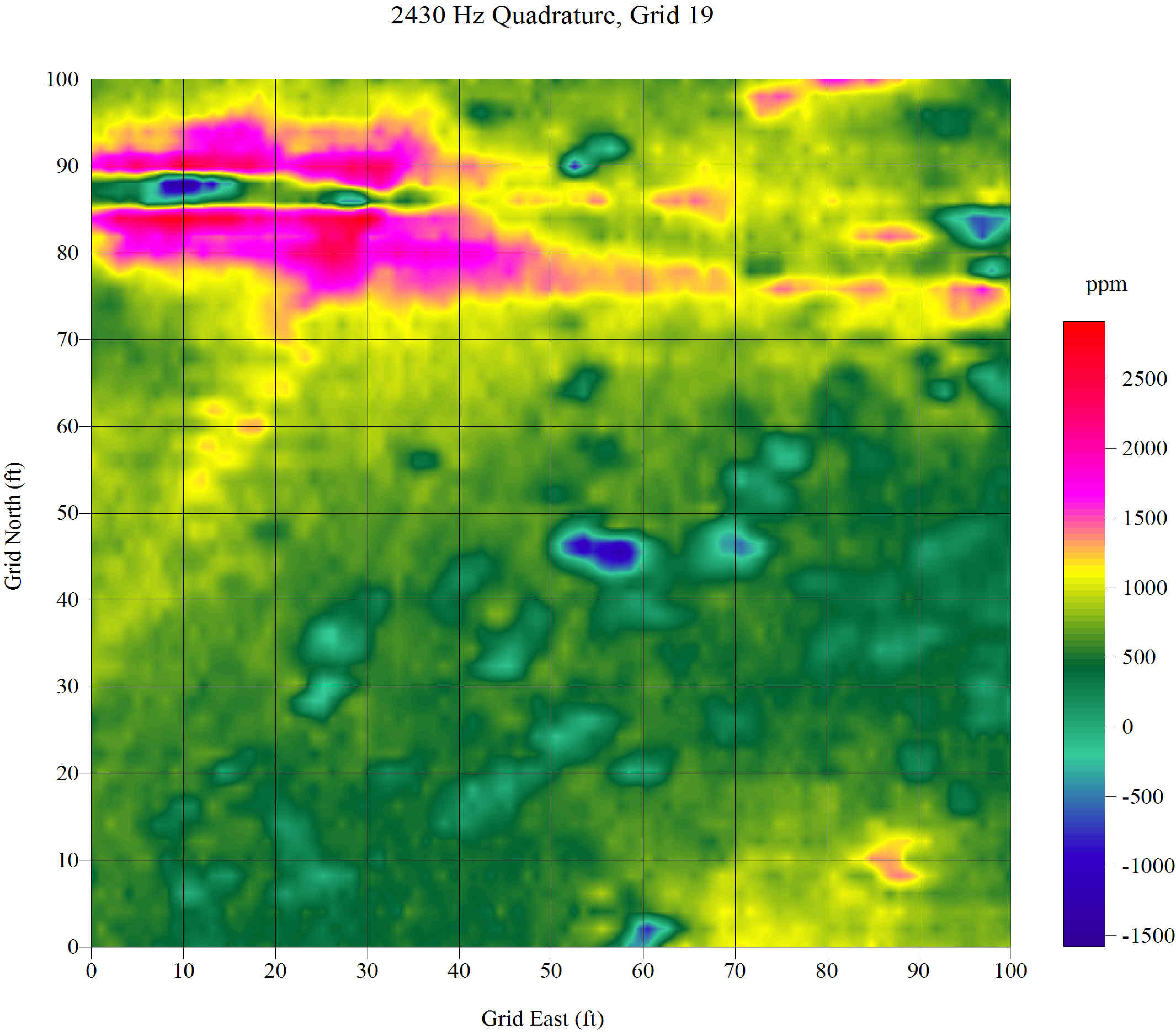

2430 Hz Quadrature, Grid 19
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2500
2000
1500
1000
500
0
-500
-1000
-1500

Figure B19-b

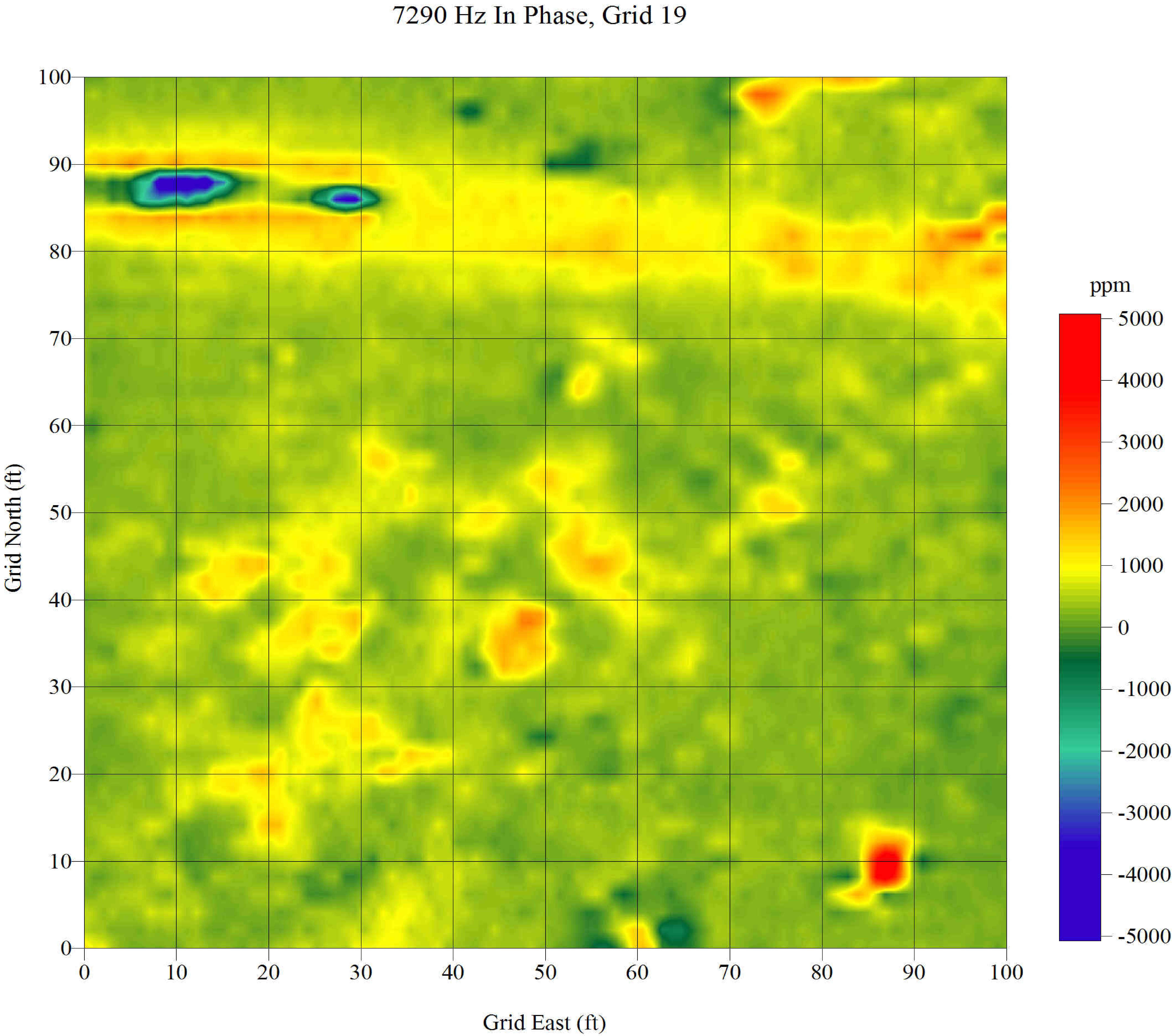

7290 Hz In Phase, Grid 19
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100

Figure B19-c

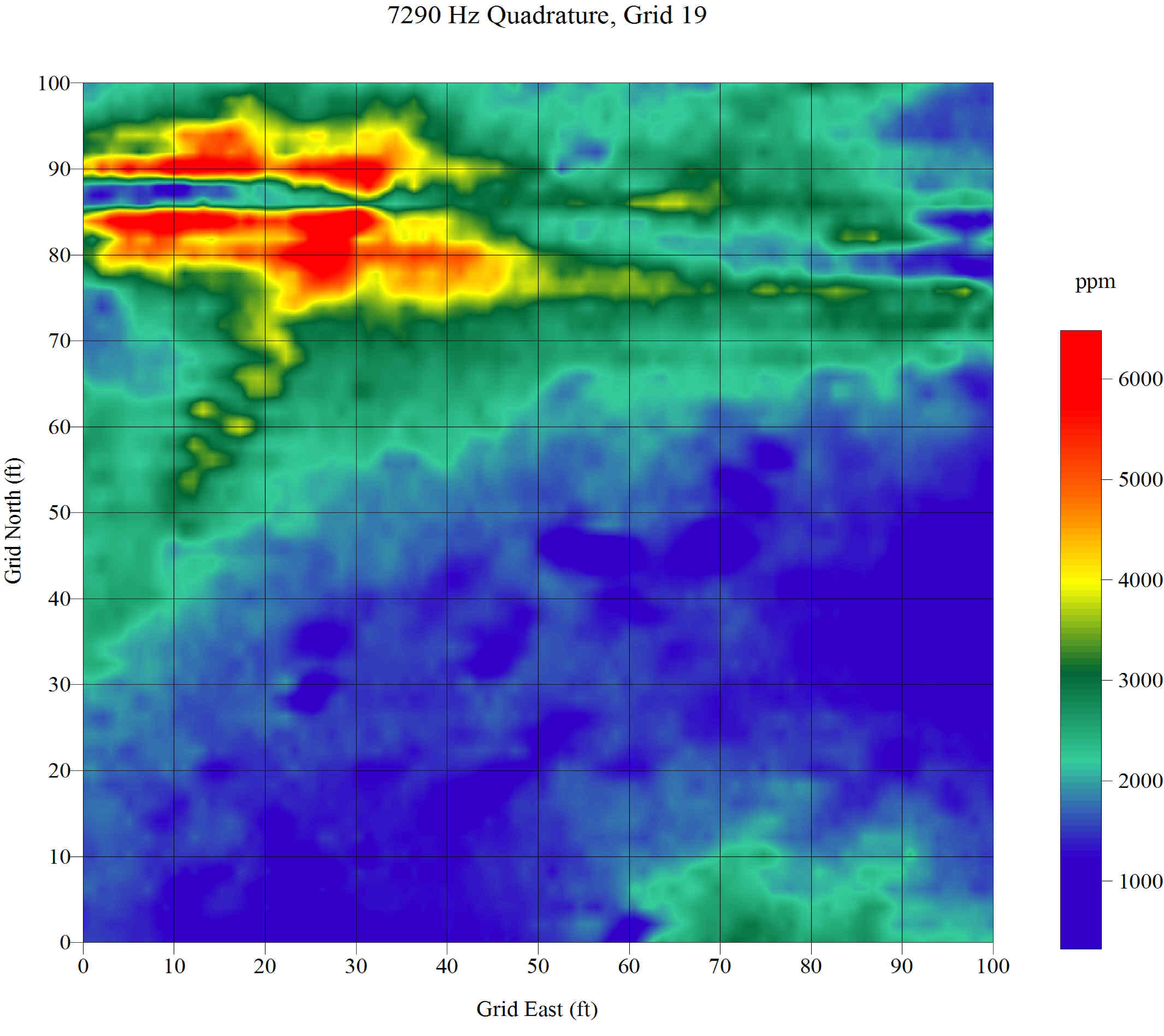

7290 Hz Quadrature, Grid 19
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1000
2000
3000
4000
5000
6000

Figure B19-d

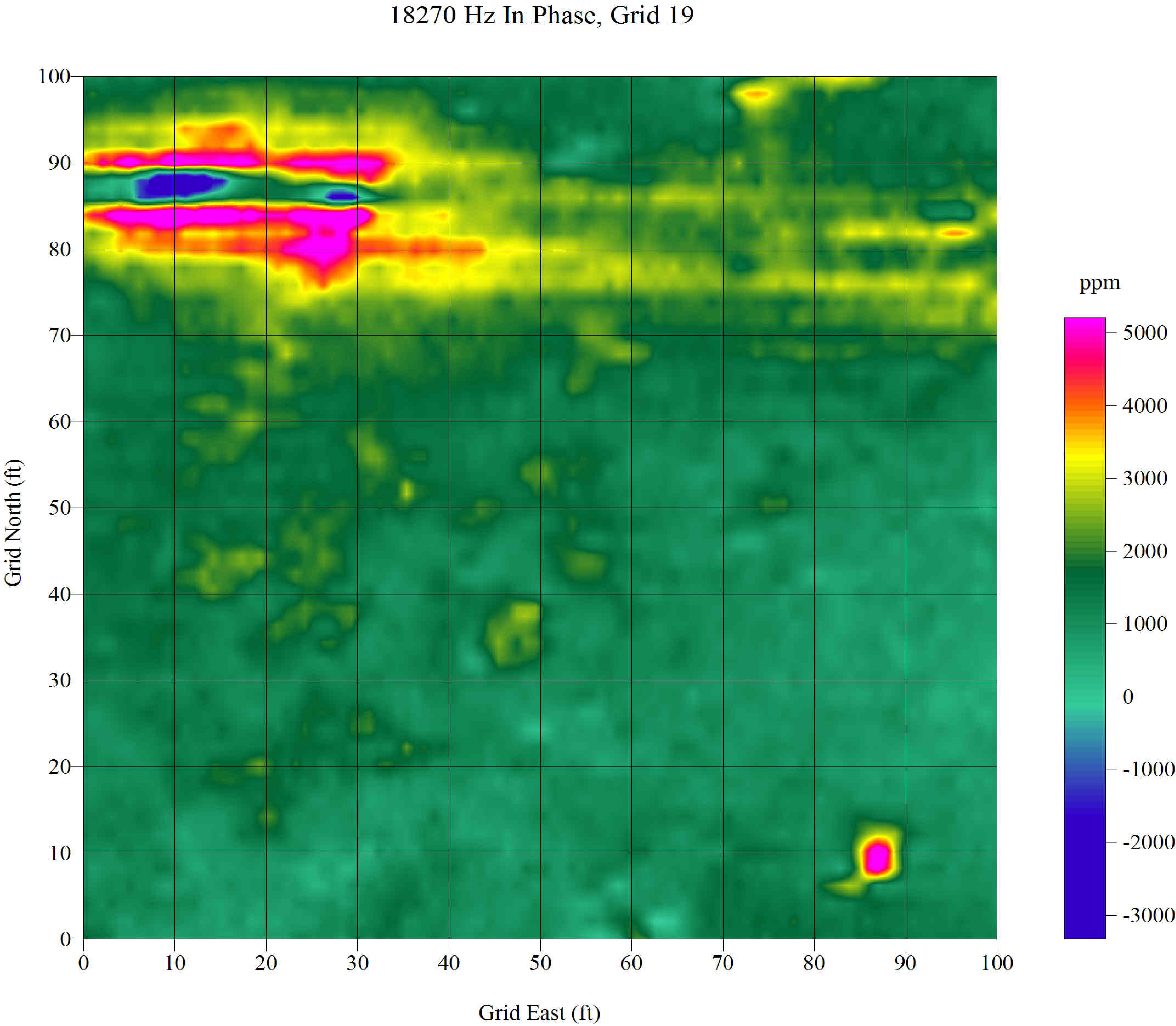

18270 Hz In Phase, Grid 19
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
0
10
20
30
40
50
60
70
80
90
100

Figure B19-e

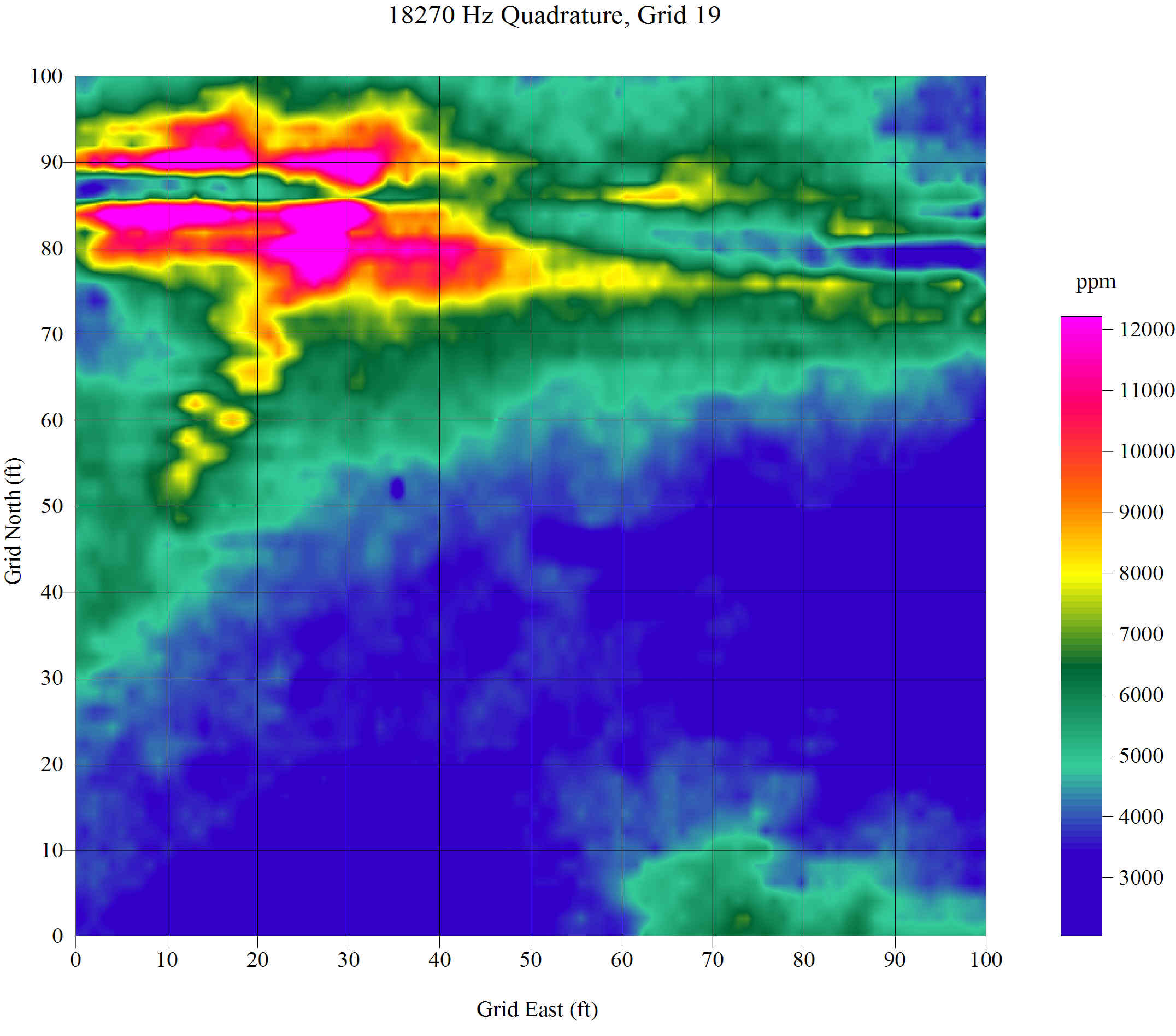
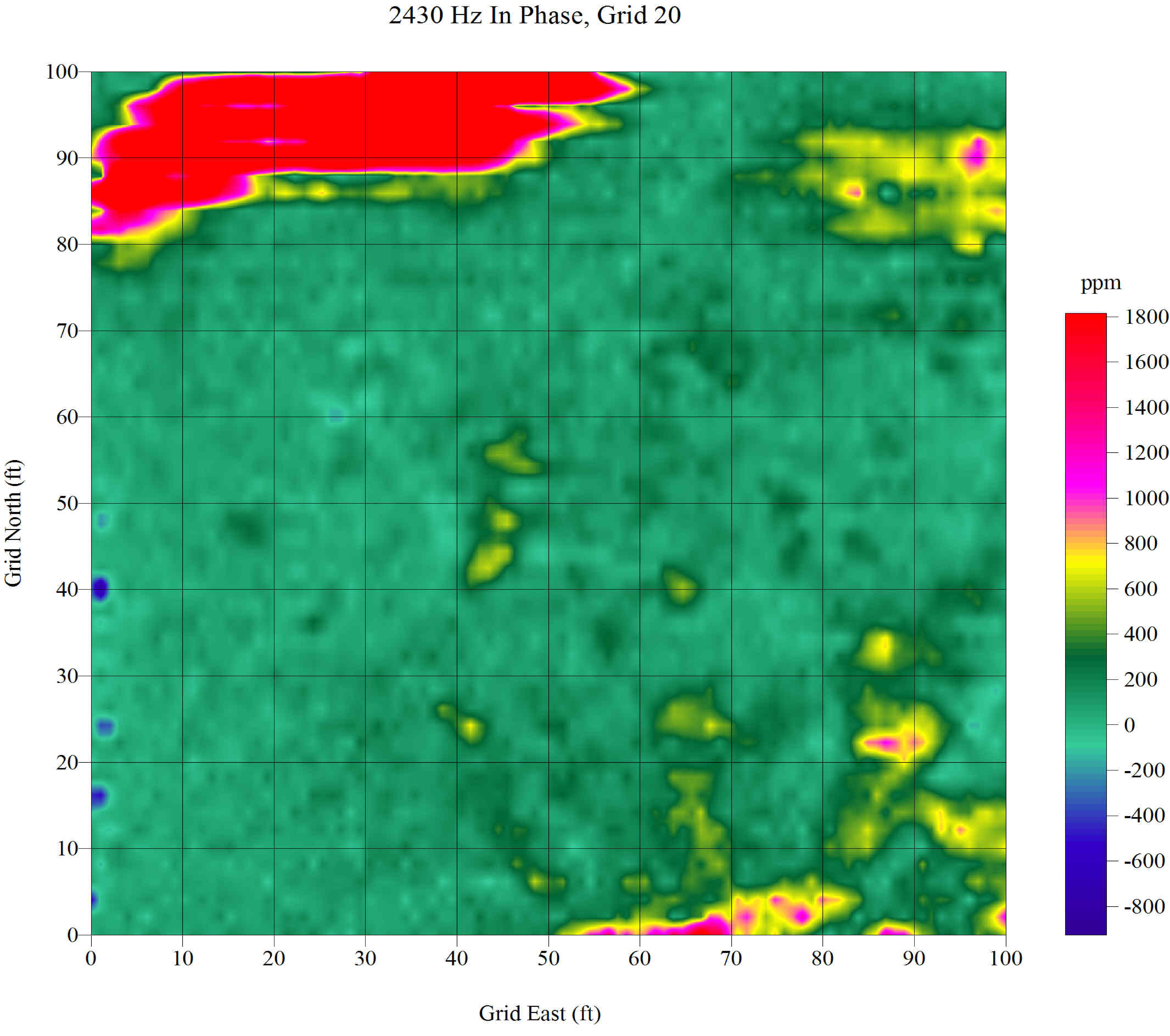

18270 Hz Quadrature, Grid 19
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000

Figure B19-f

Figure B19-g



2430 Hz In Phase, Grid 20
Grid North (ft)
Grid East (ft)
ppm
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
0
10
20
30
40
50
60
70
80
90
100

Figure B20-a

2430 Hz Quadrature, Grid 20

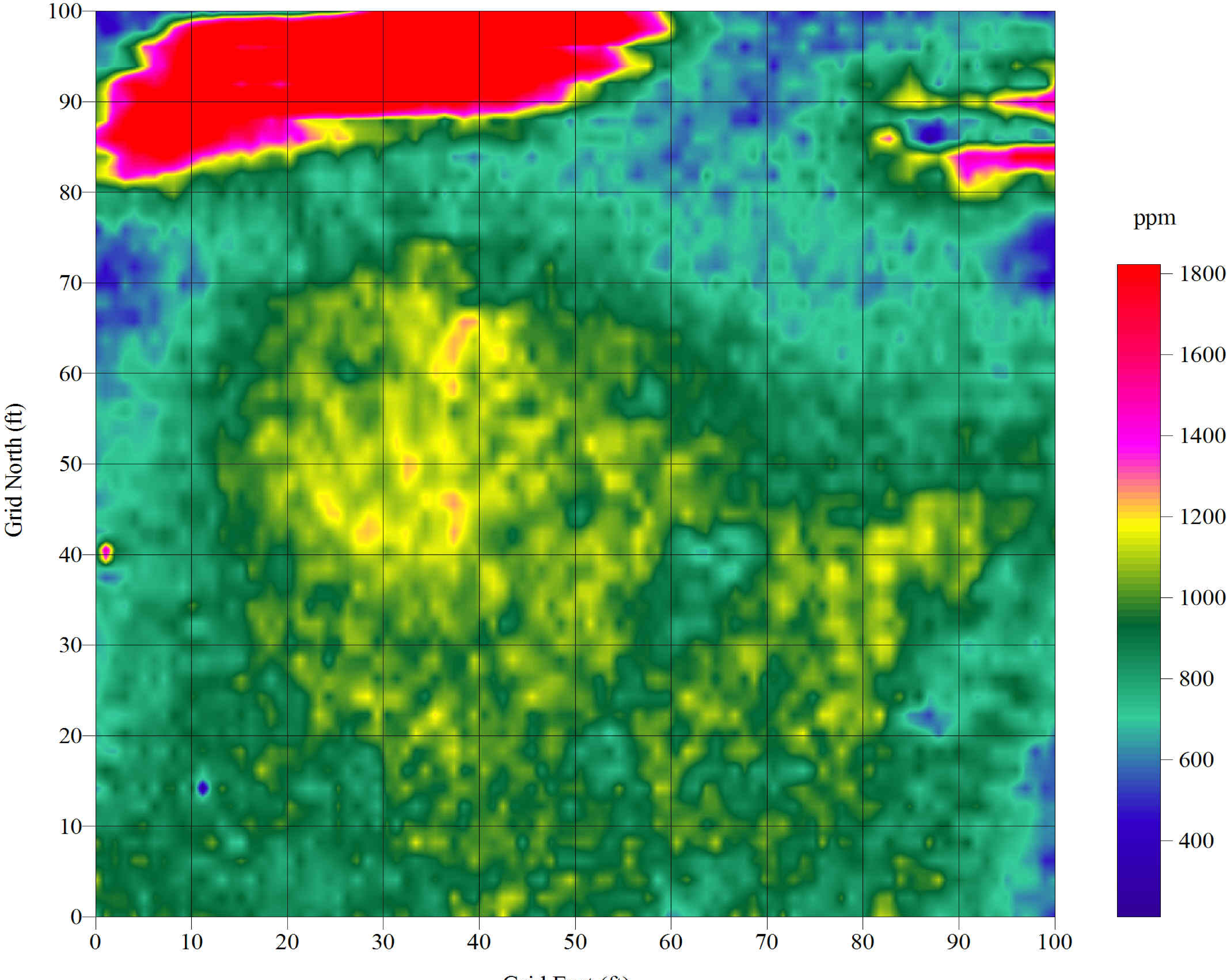


Figure B20-b

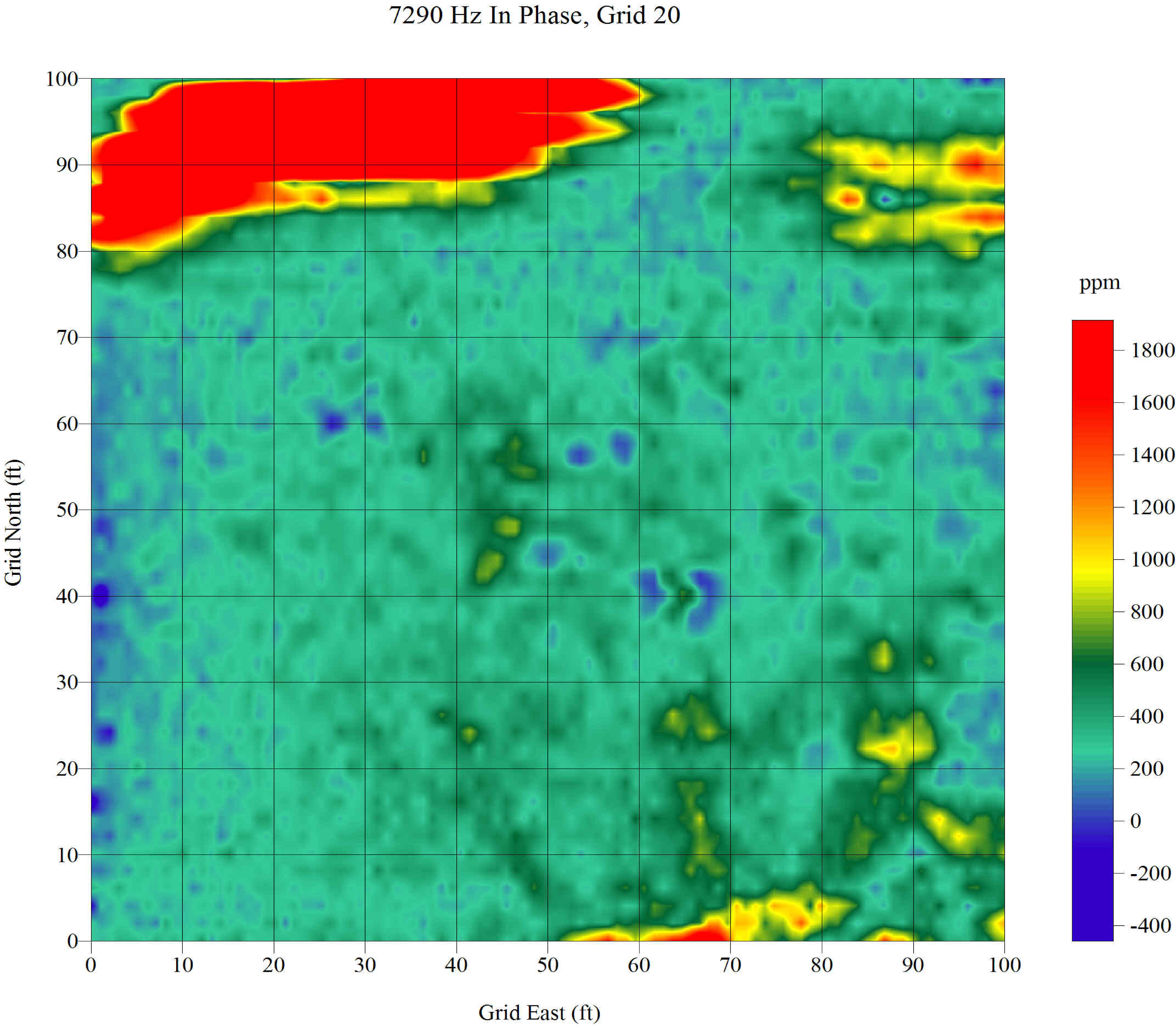

7290 Hz In Phase, Grid 20
Grid North (ft)
Grid East (ft)
ppm
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400

Figure B20-c

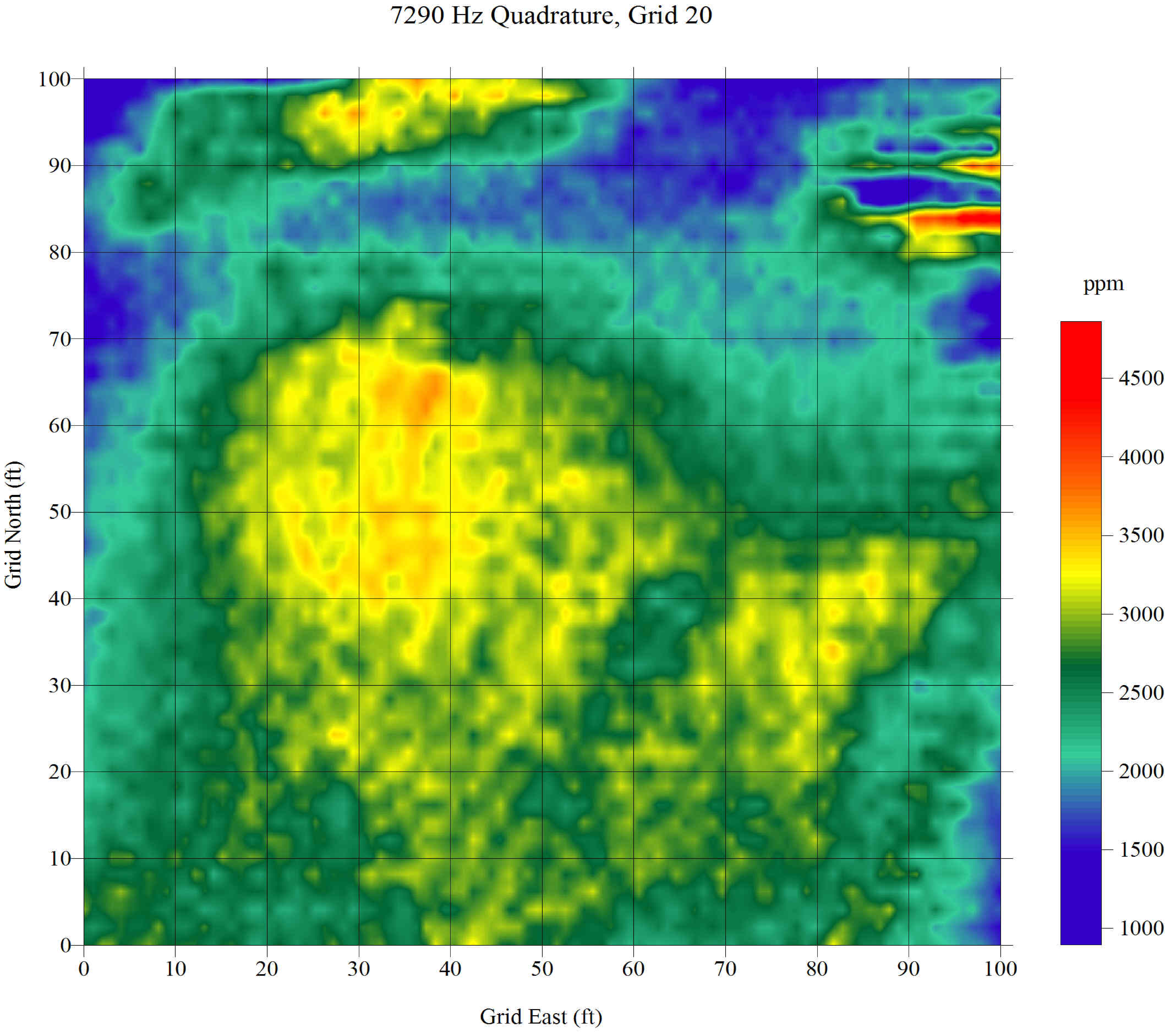

7290 Hz Quadrature, Grid 20
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
1000
1500
2000
2500
3000
3500
4000
4500

Figure B20-d

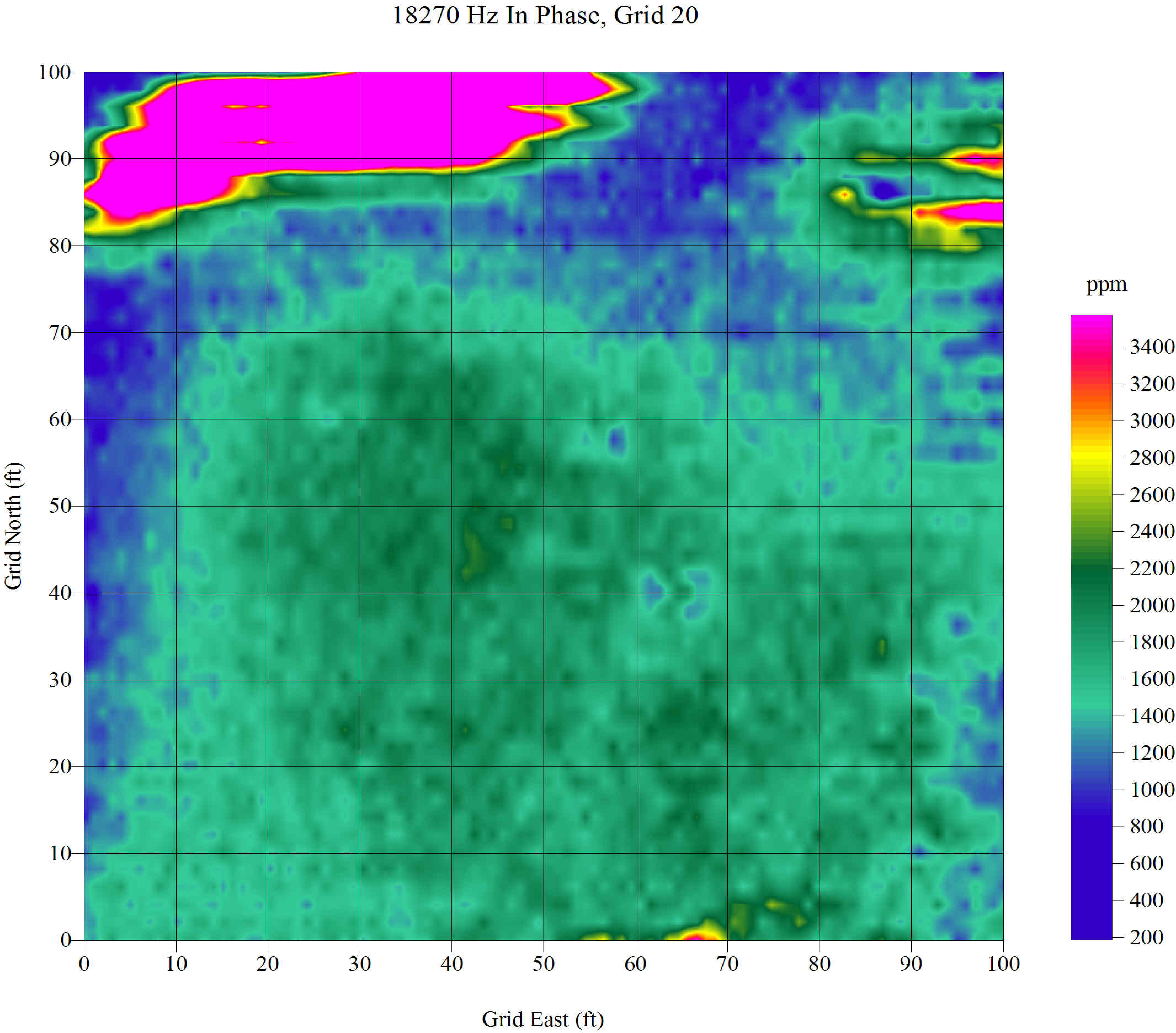

18270 Hz In Phase, Grid 20
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400

Figure B20-e

18270 Hz Quadrature, Grid 20

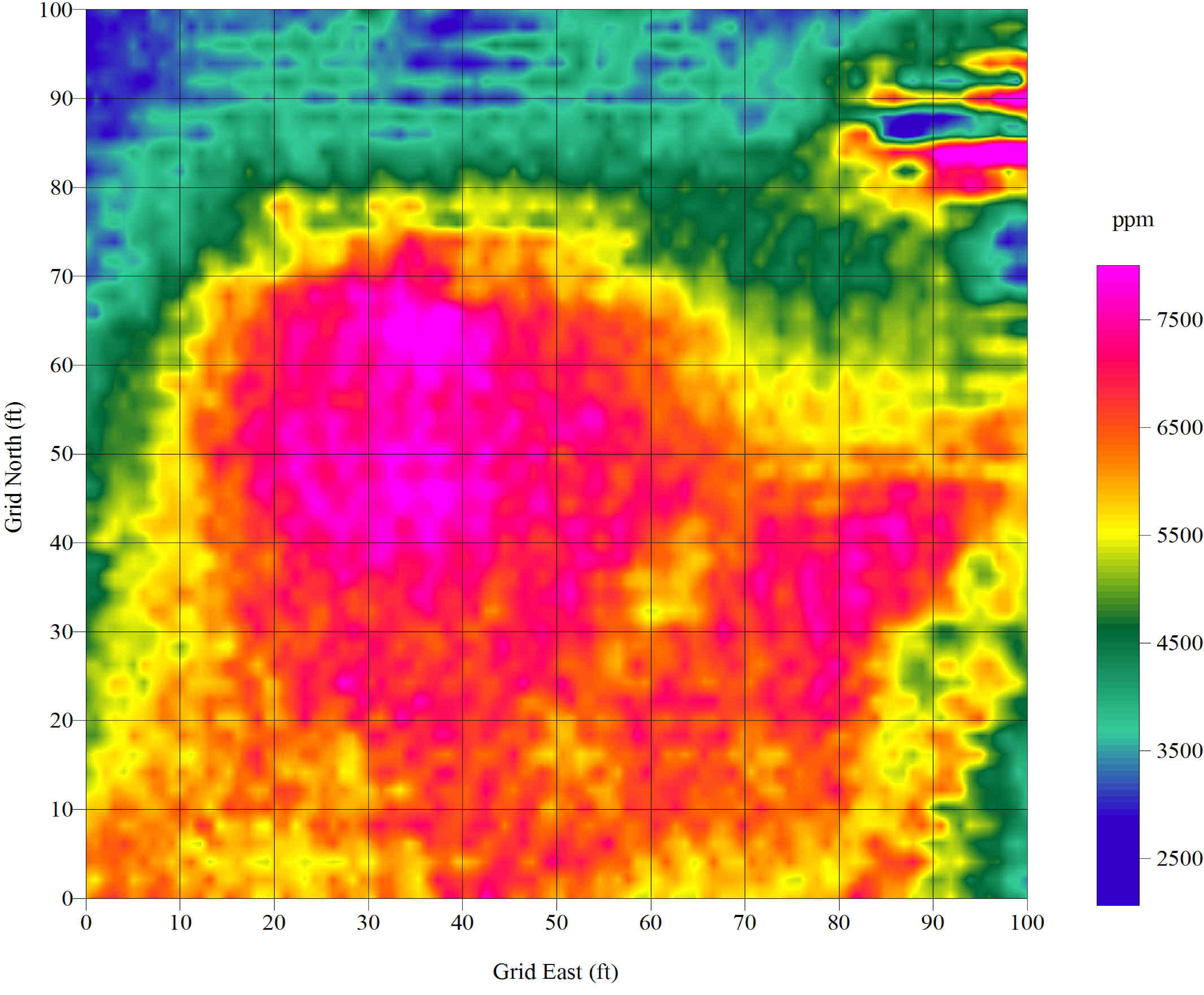


Figure B20-f

2430 Hz In Phase, Grid 21

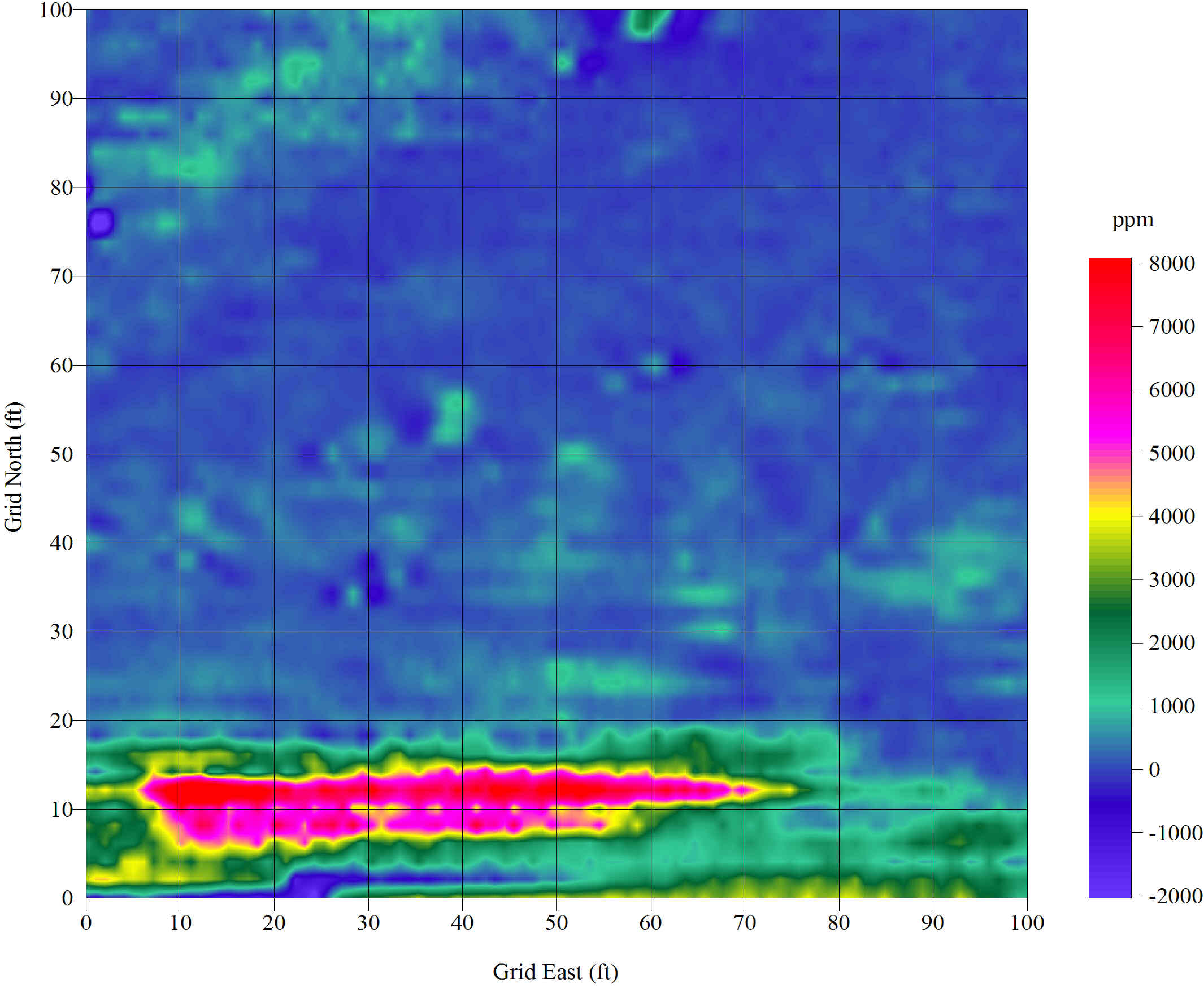


Figure B21-a

2430 Hz Quadrature, Grid 21

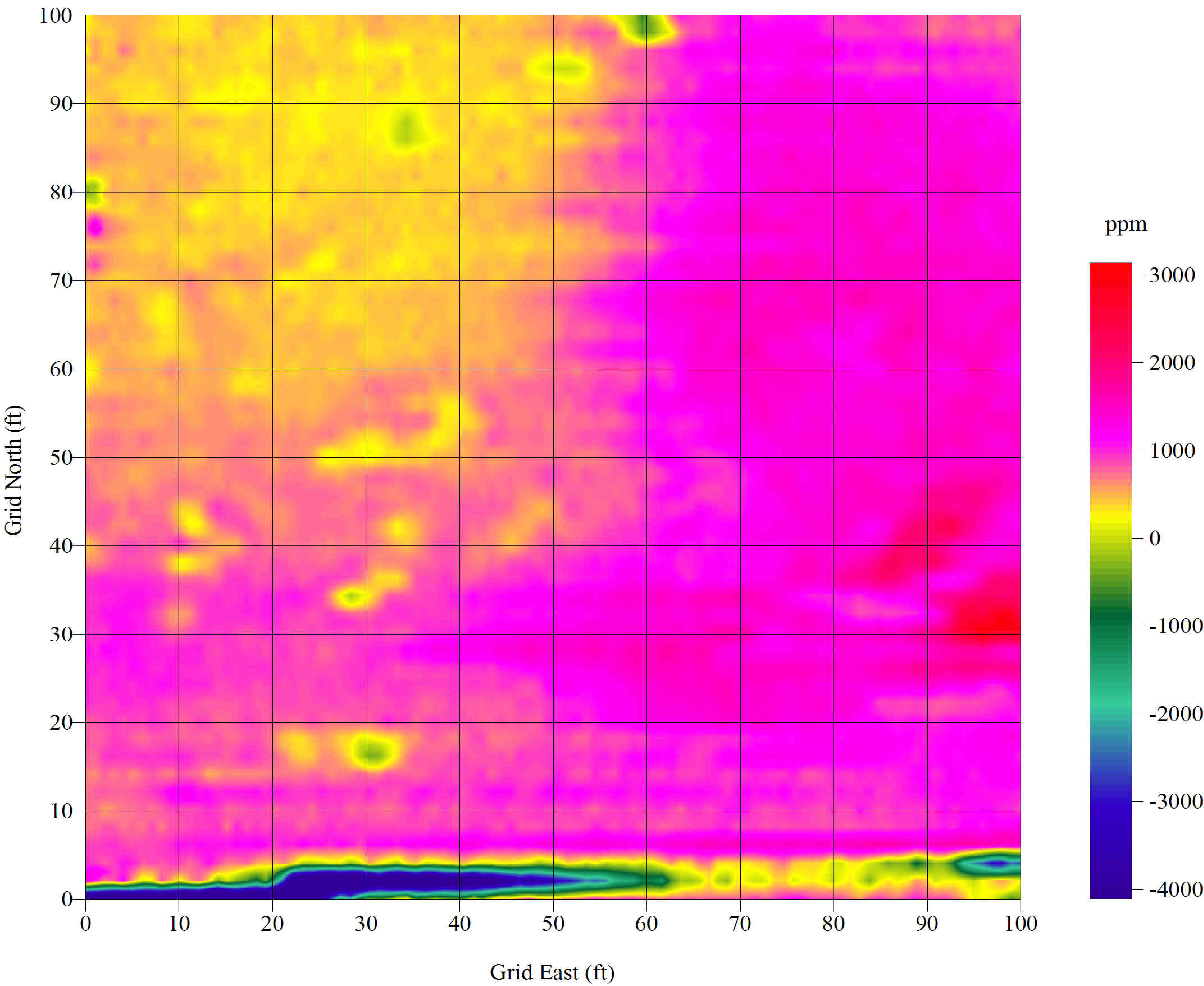


Figure B21-b

7290 Hz In Phase, Grid 21

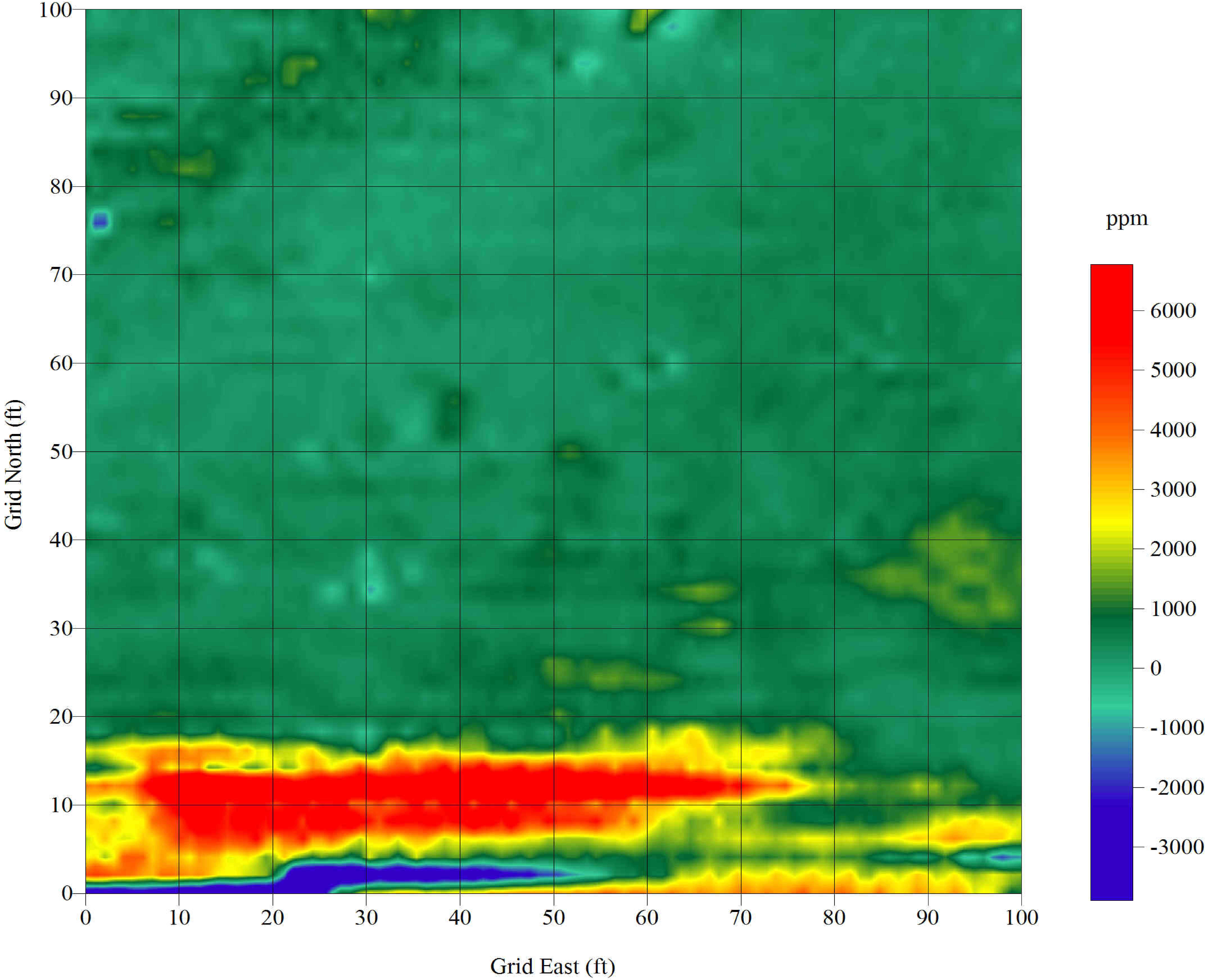


Figure B21-c

7290 Hz Quadrature, Grid 21

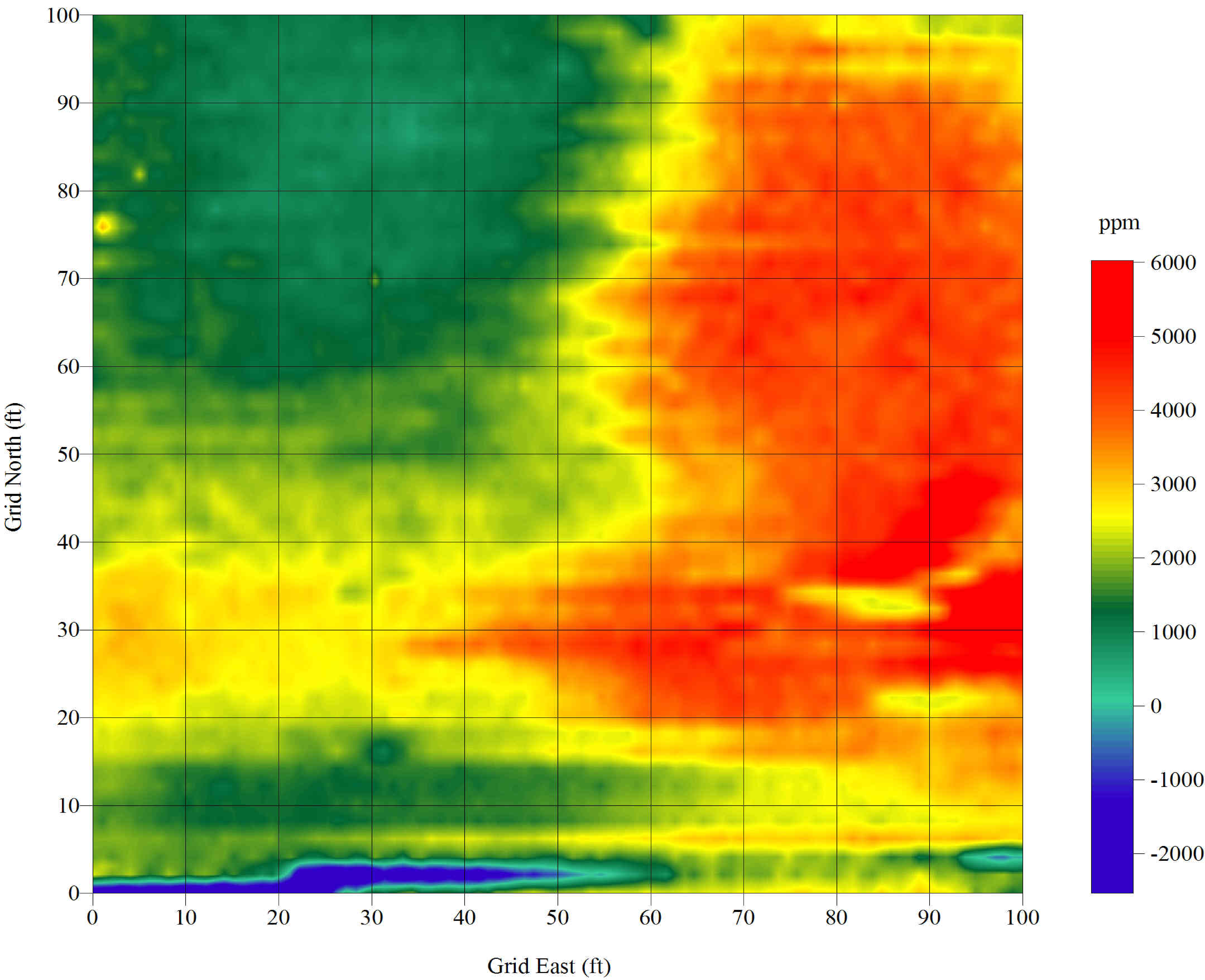


Figure B21-d

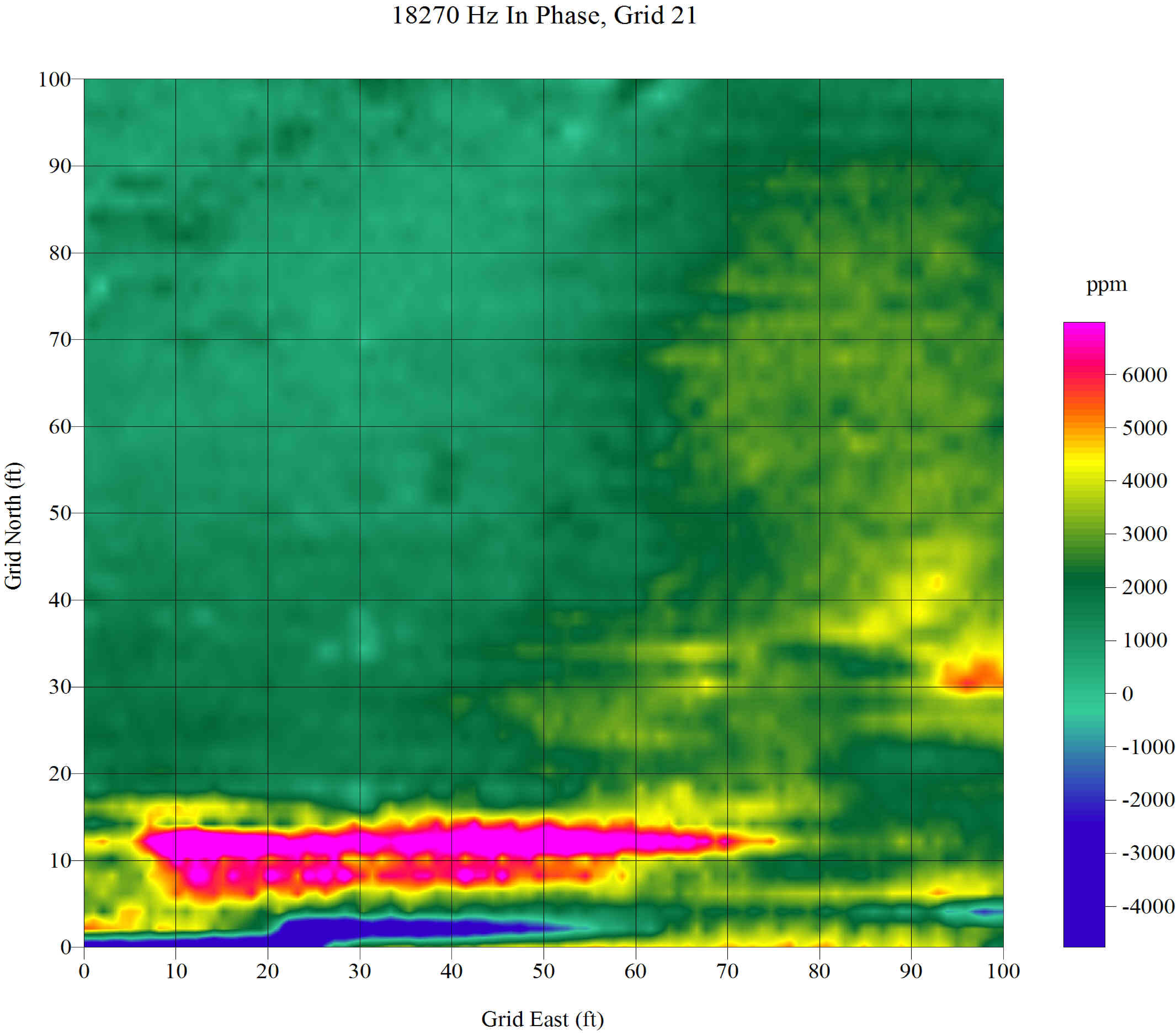
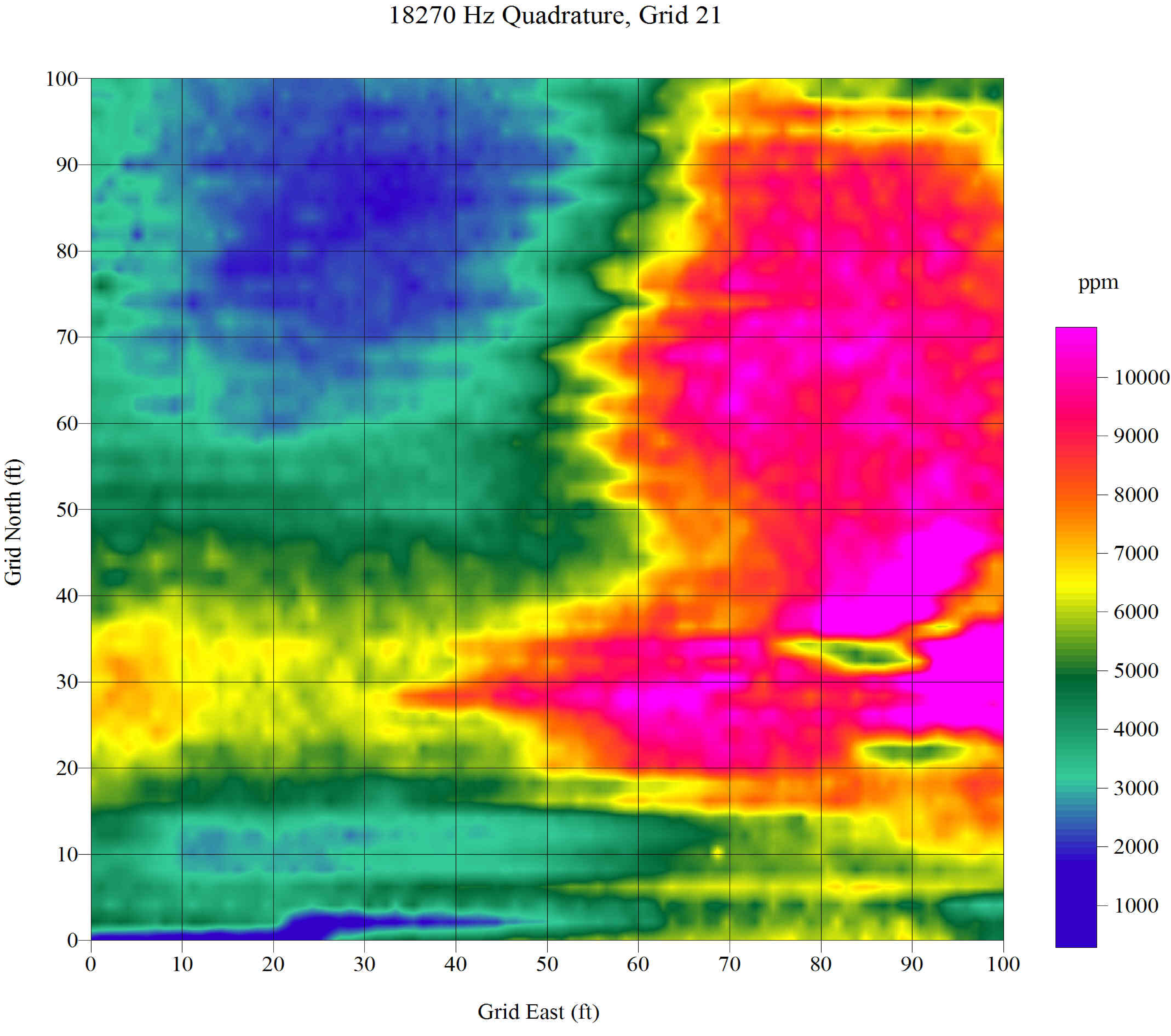

18270 Hz In Phase, Grid 21
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
ppm
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000

Figure B21-e



18270 Hz Quadrature, Grid 21
ppm
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)

Figure B21-f

2430 Hz In Phase, Grid 22

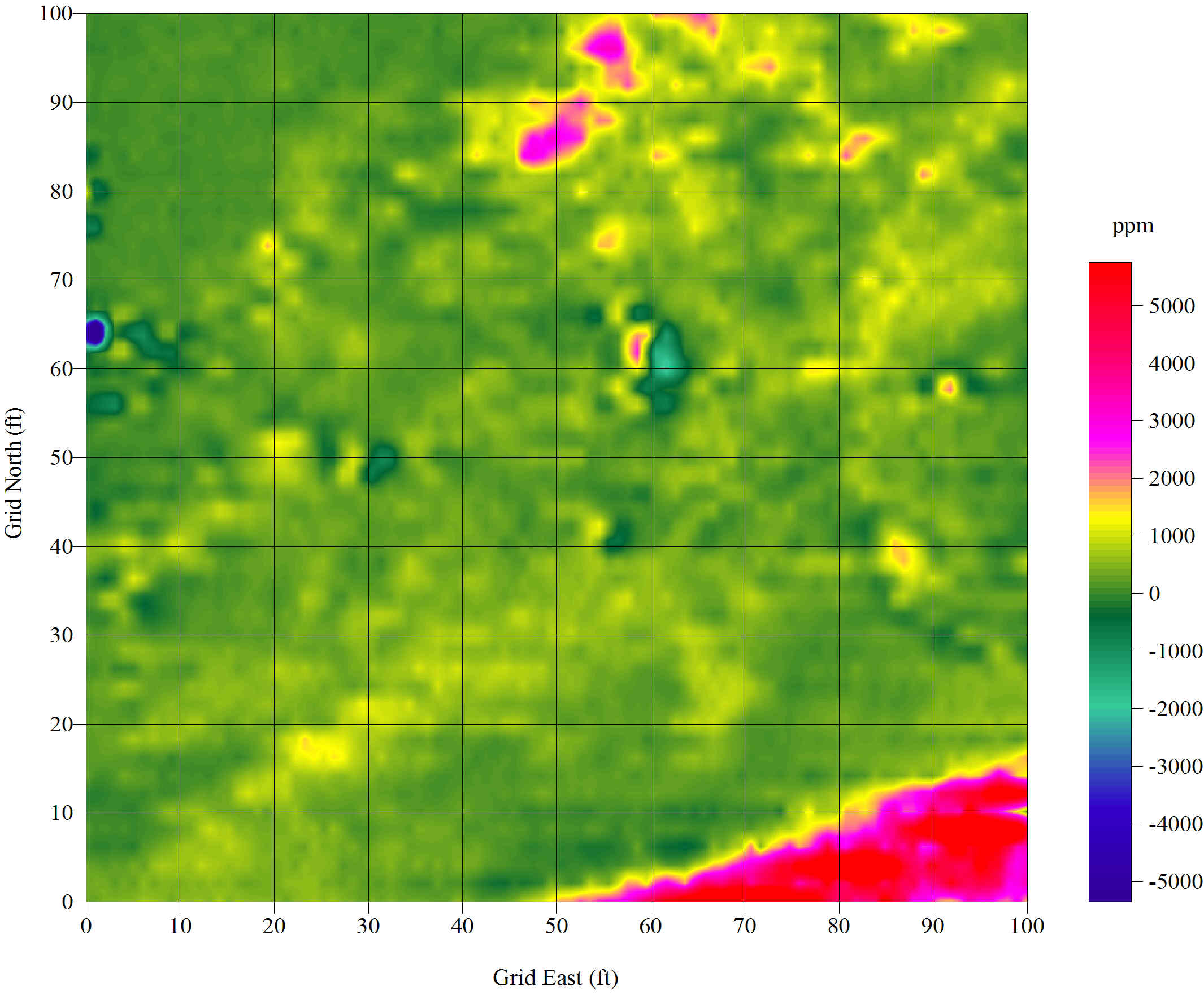


Figure B22-a

2430 Hz Quadrature, Grid 22

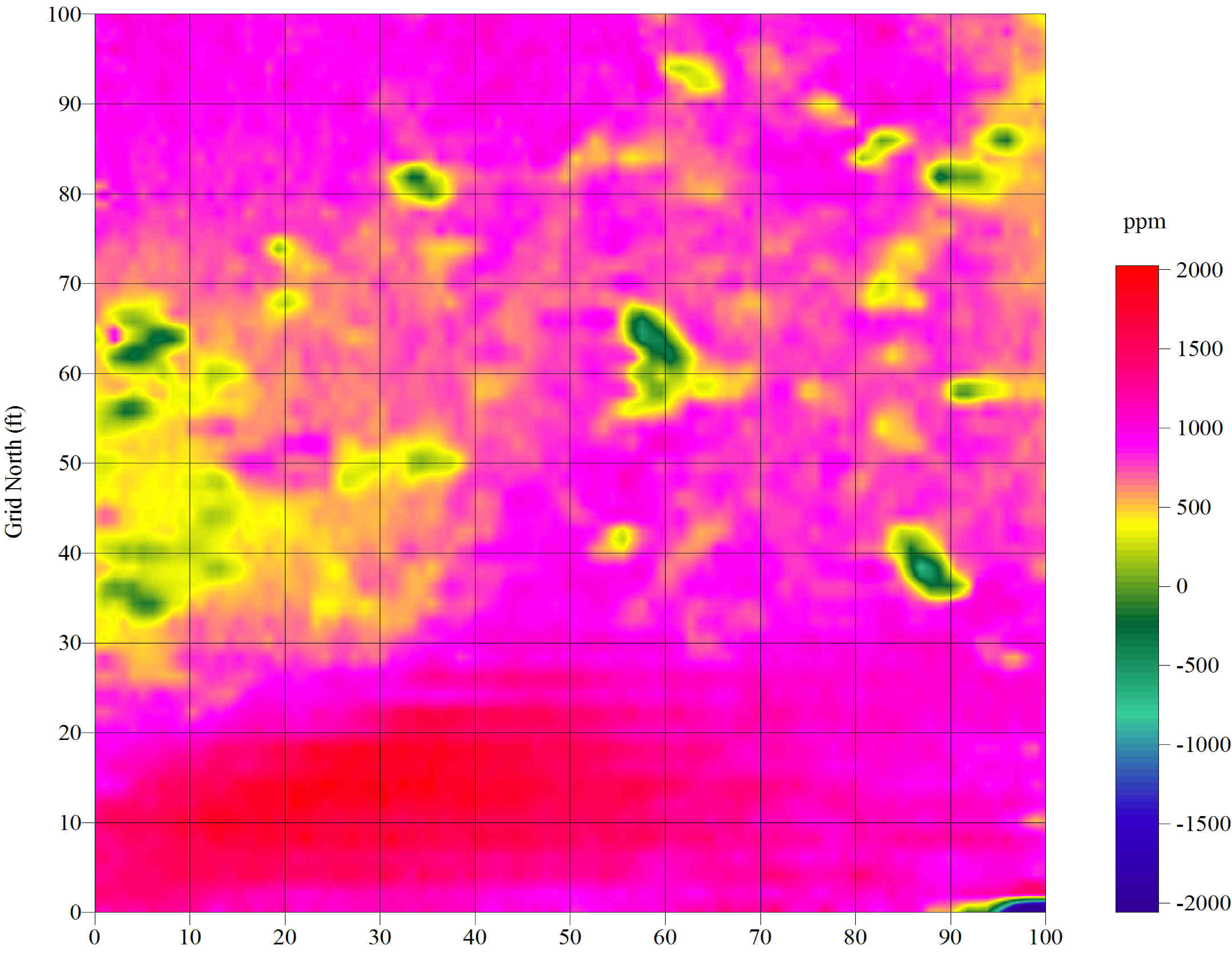


Figure B22-b

7290 Hz In Phase, Grid 22

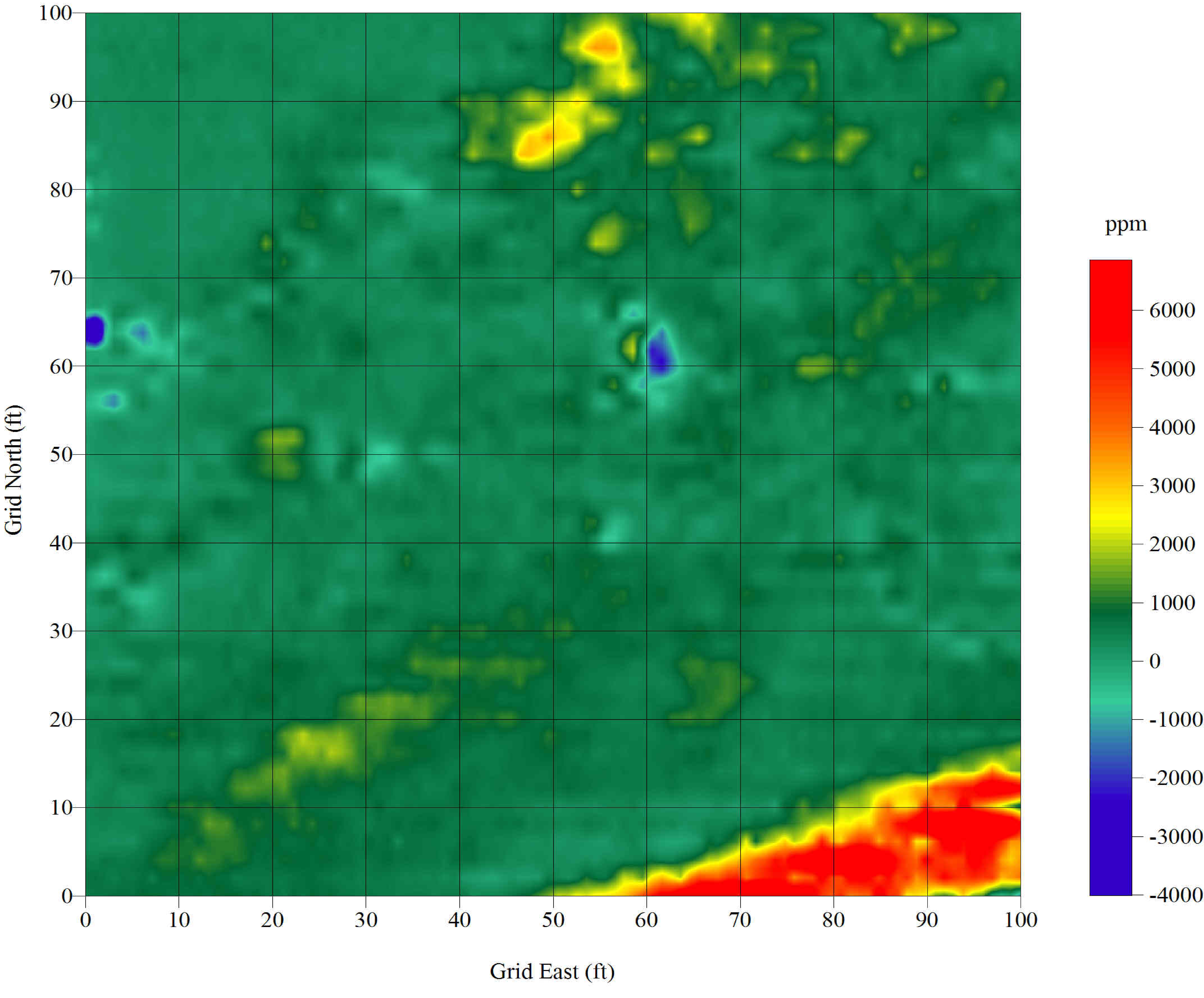


Figure B22-c

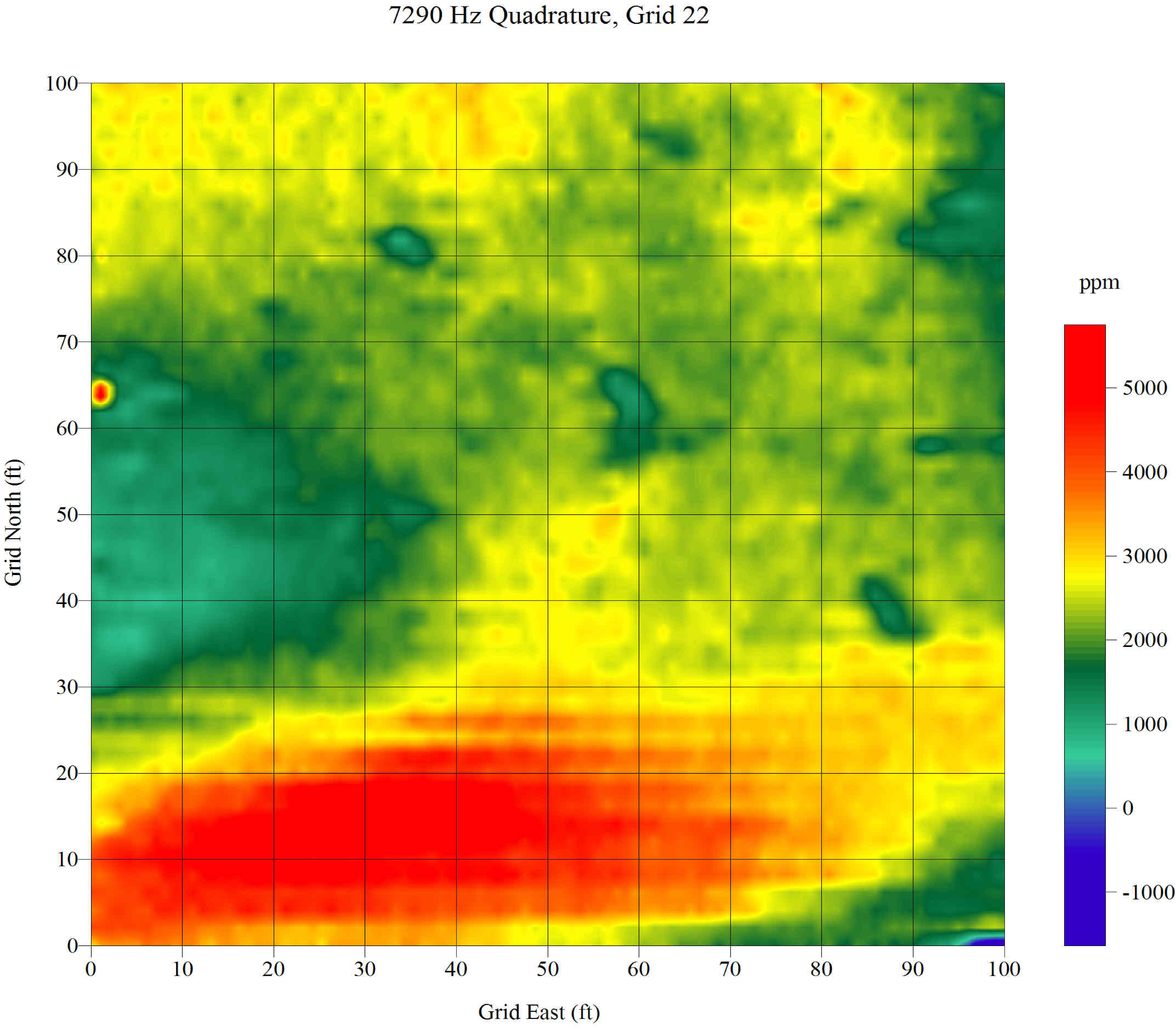

7290 Hz Quadrature, Grid 22
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
60
70
80
90
100

Figure B22-d

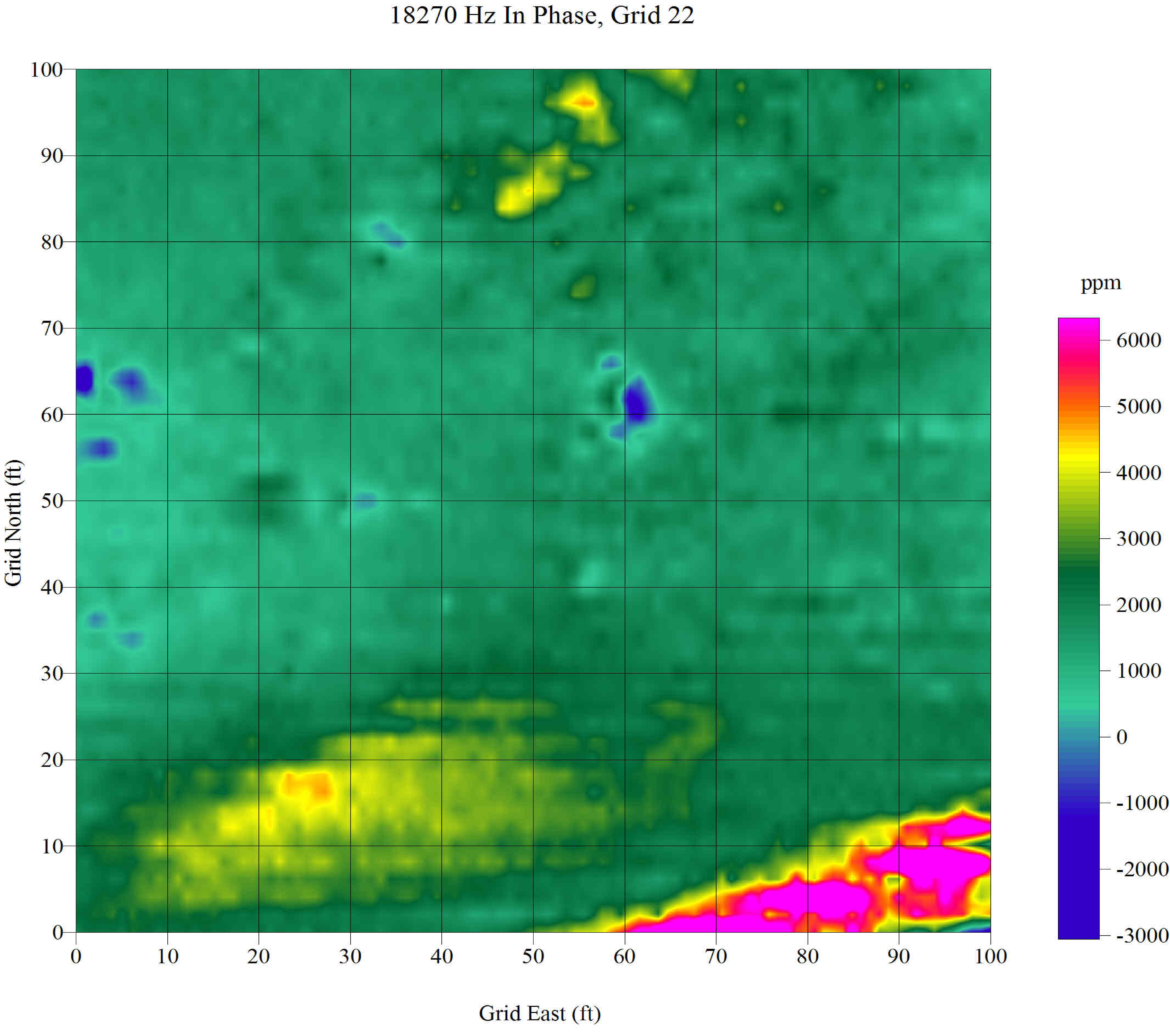

18270 Hz In Phase, Grid 22
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000

Figure B22-e

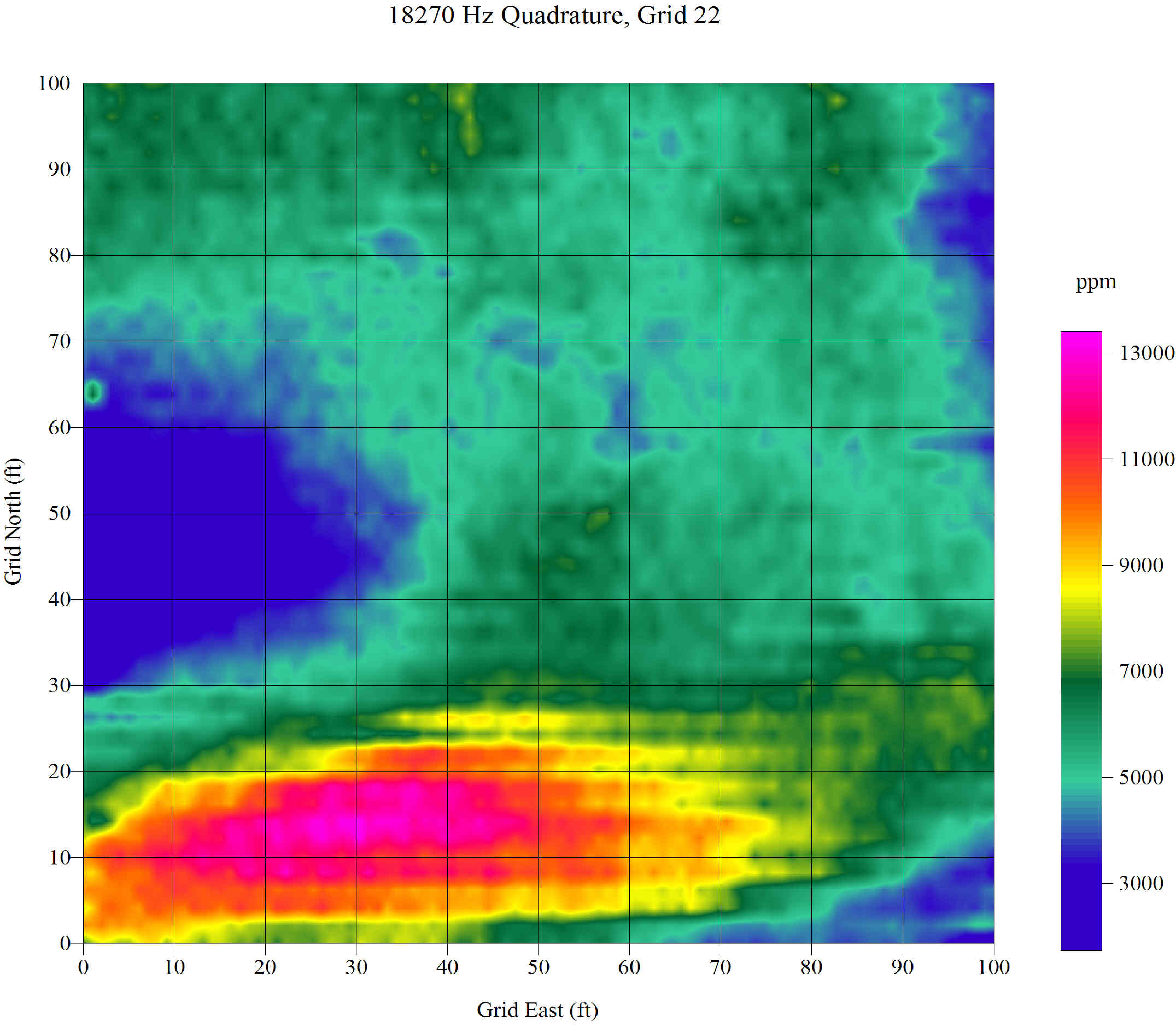

18270 Hz Quadrature, Grid 22
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
3000
5000
7000
9000
11000
13000

Figure B22-f

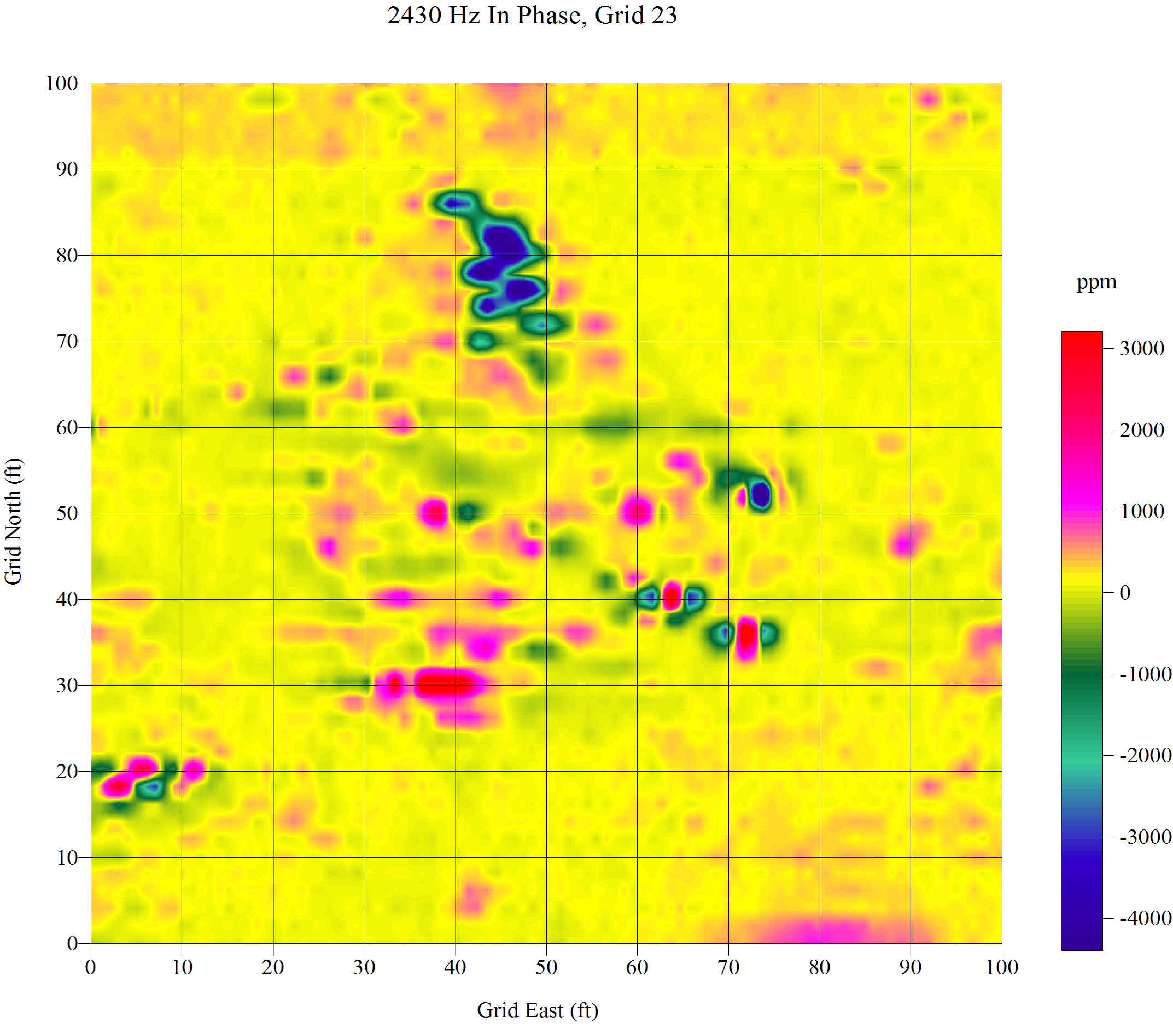

2430 Hz In Phase, Grid 23
Grid North (ft)
Grid East (ft)
ppm
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100

Figure B23-a

2430 Hz Quadrature, Grid 23

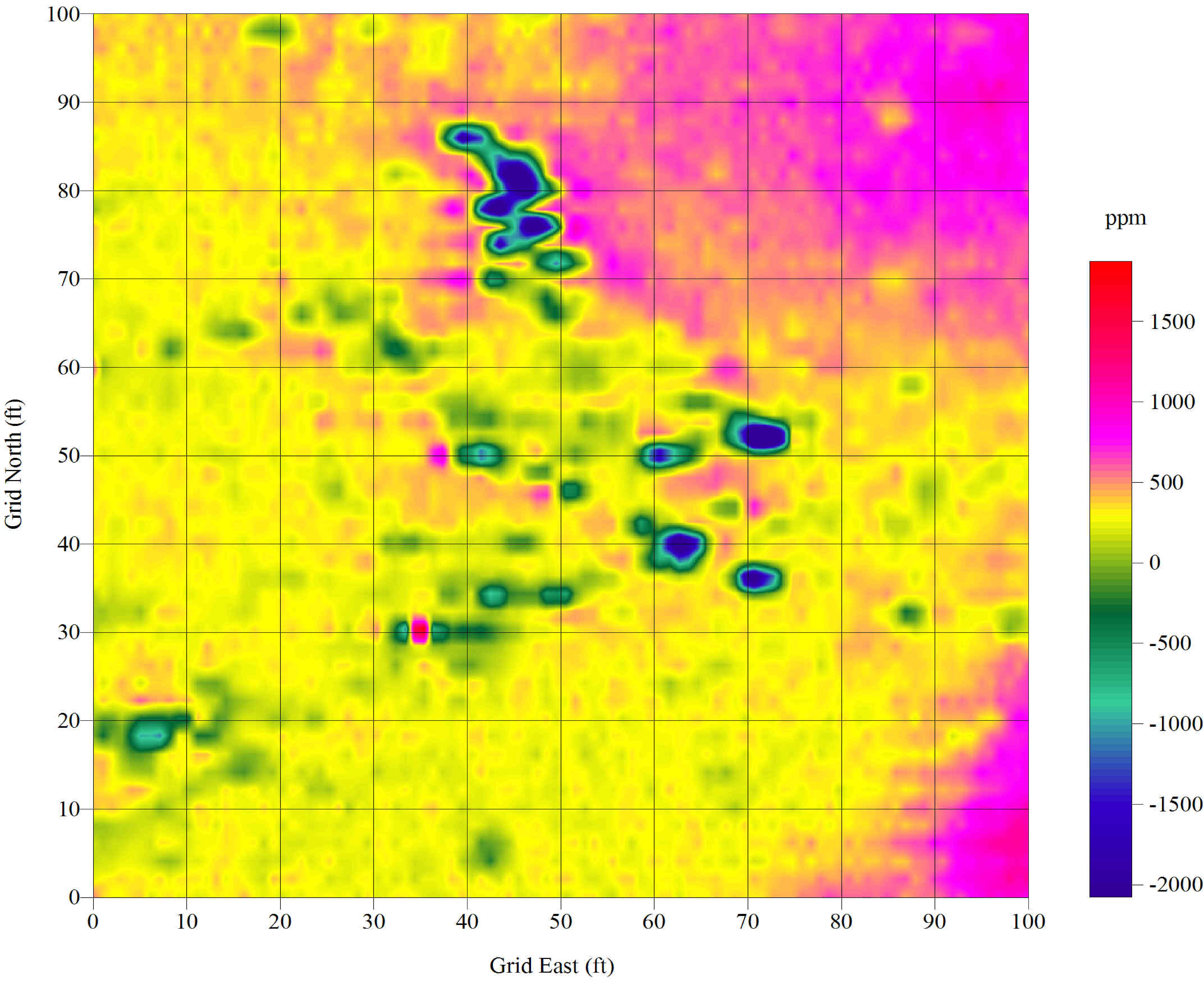


Figure B23-b

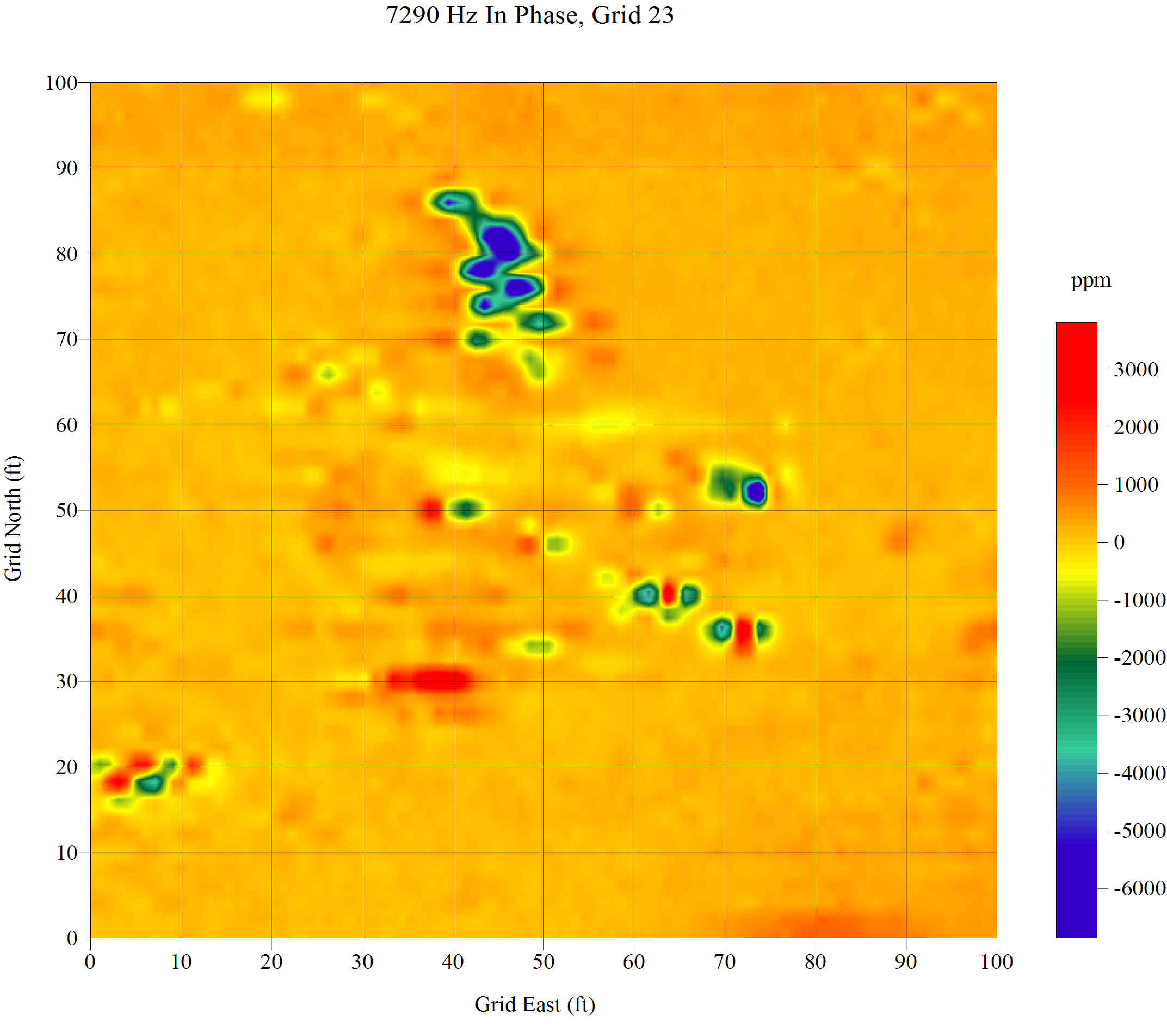

7290 Hz In Phase, Grid 23
Grid North (ft)
Grid East (ft)
ppm
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
0
10
20
30
40
50
60
70
80
90
100

Figure B23-c

7290 Hz Quadrature, Grid 23

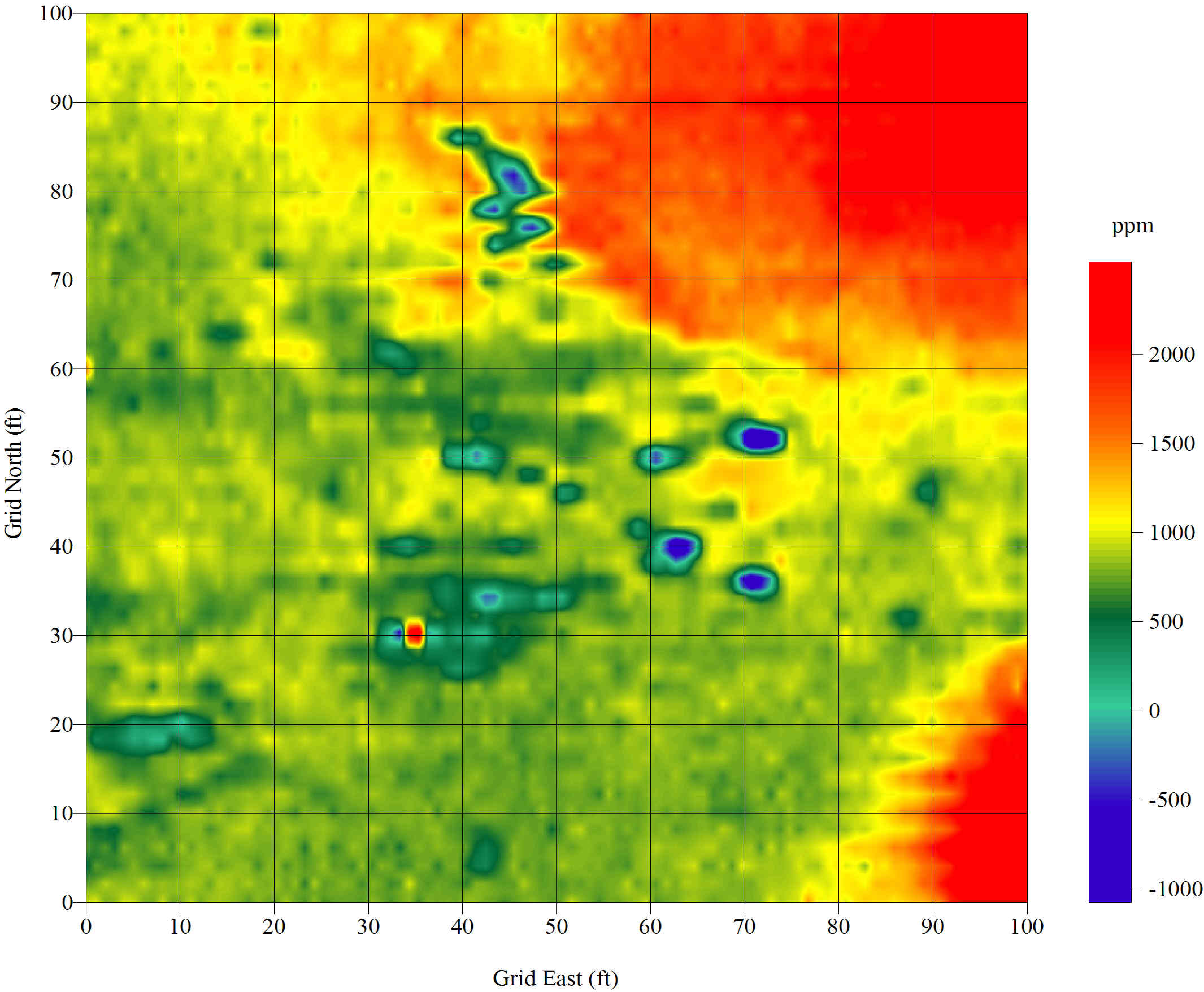
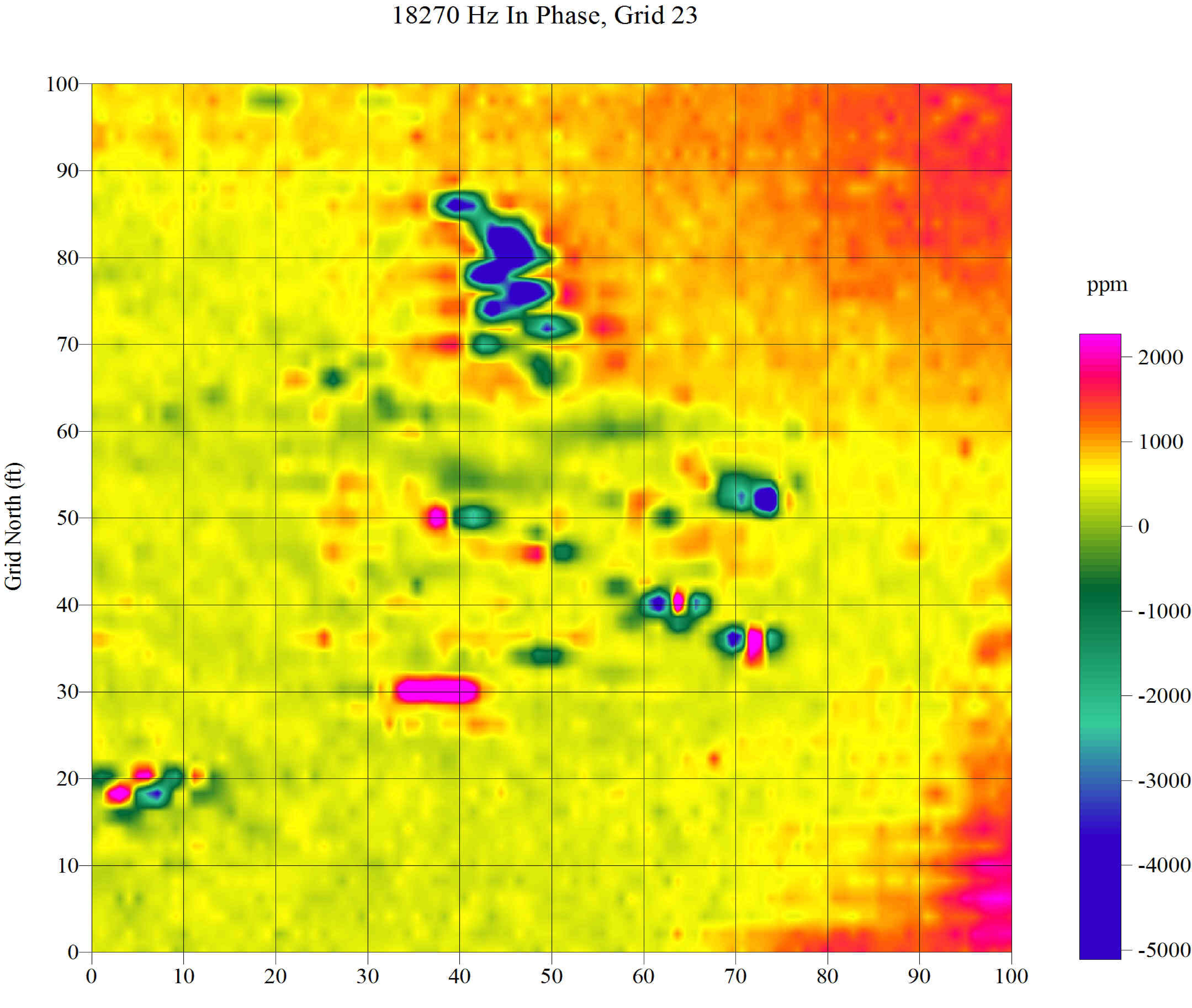


Figure B23-d



18270 Hz In Phase, Grid 23
Grid North (ft)
Grid East (ft)
ppm
2000
1000
0
-1000
-2000
-3000
-4000
-5000
100
90
80
70
60
50
40
30
20
10
0

Figure B23-e

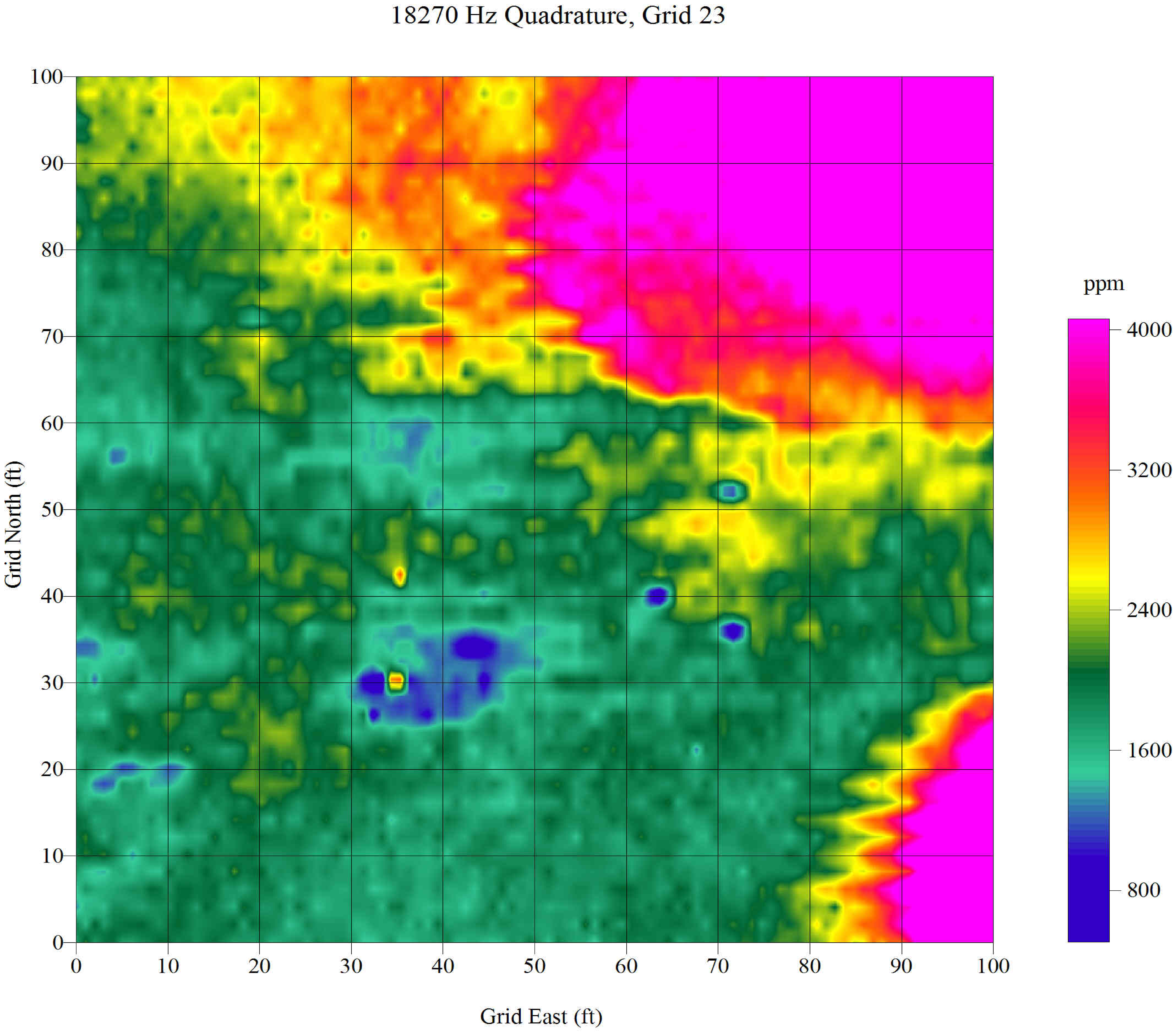

18270 Hz Quadrature, Grid 23
Grid North (ft)
Grid East (ft)
ppm
4000
3200
2400
1600
800
0
10
20
30
40
50
60
70
80
90
100

Figure B23-f

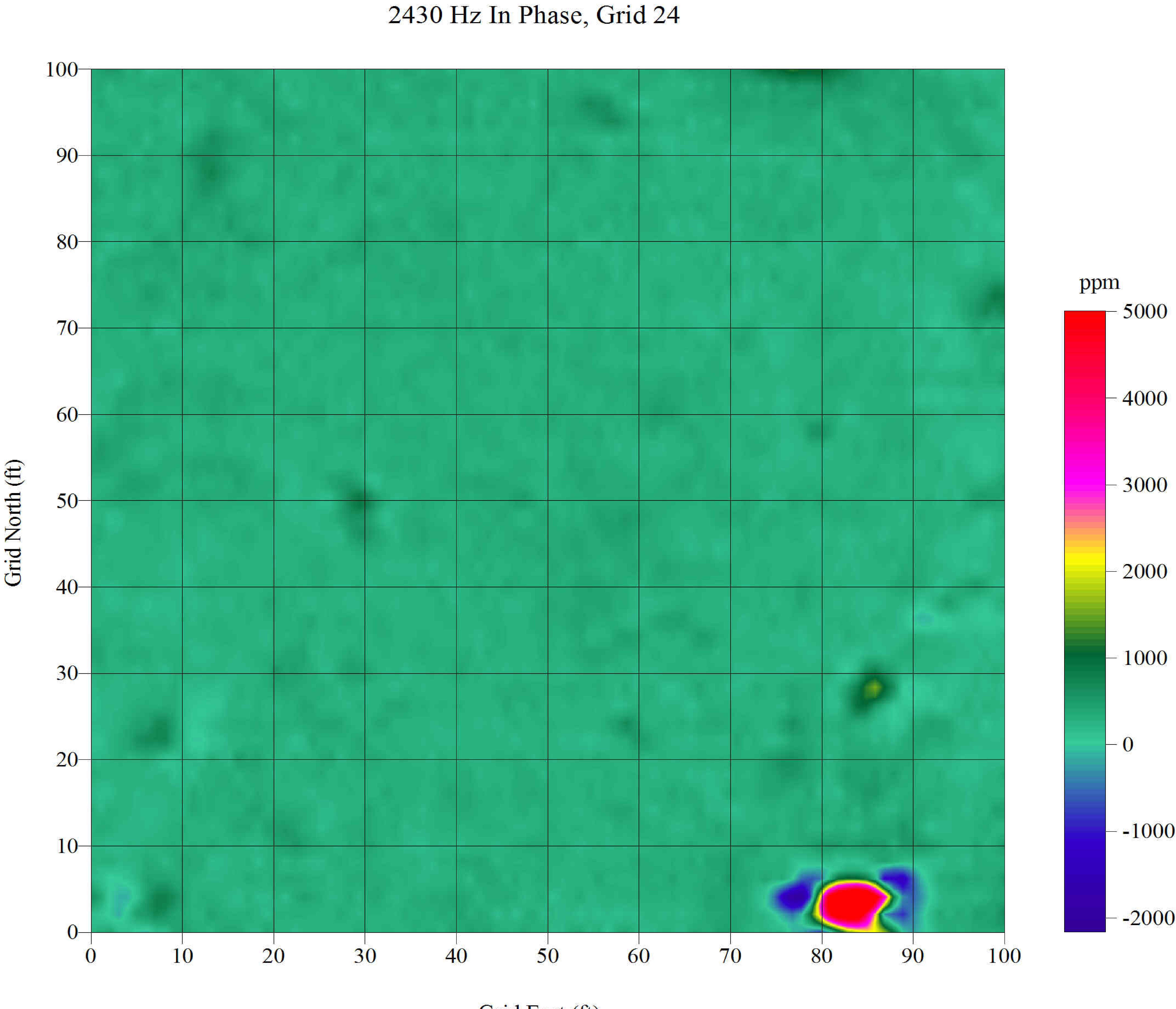

2430 Hz In Phase, Grid 24
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B24-a

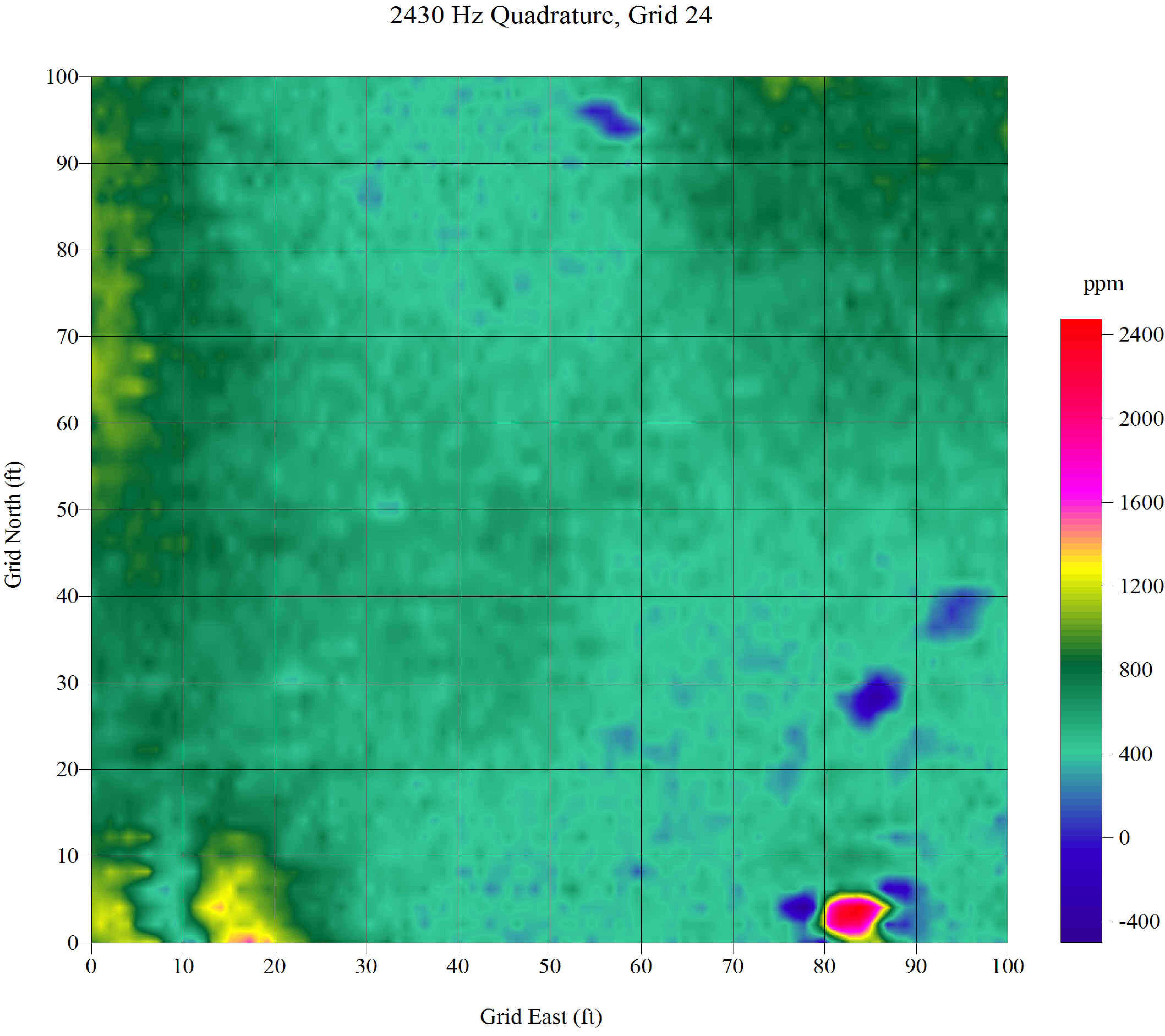

2430 Hz Quadrature, Grid 24
Grid North (ft)
Grid East (ft)
ppm
2400
2000
1600
1200
800
400
0
-400
0
10
20
30
40
50
60
70
80
90
100

Figure B24-b

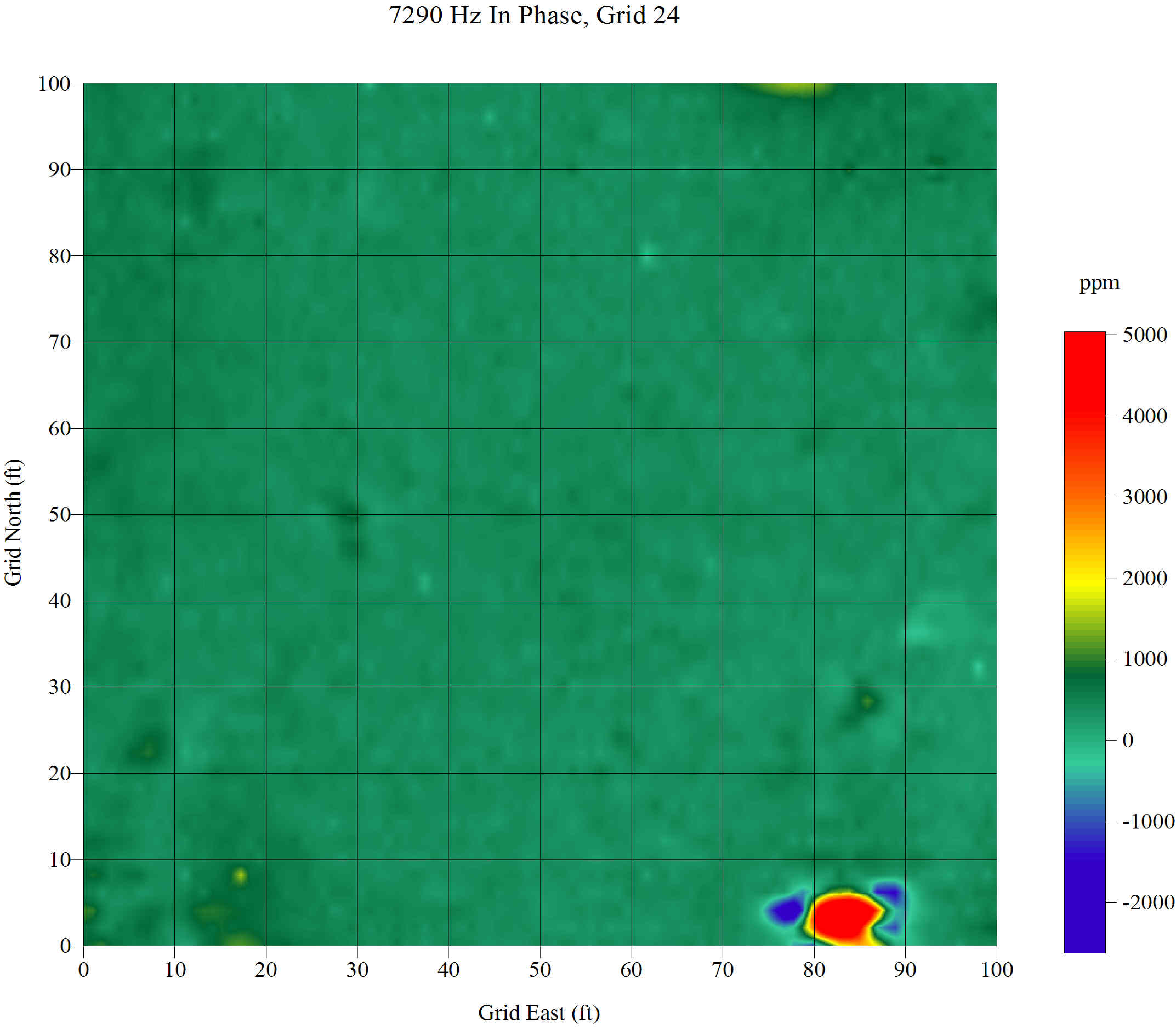

7290 Hz In Phase, Grid 24
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B24-c

7290 Hz Quadrature, Grid 24

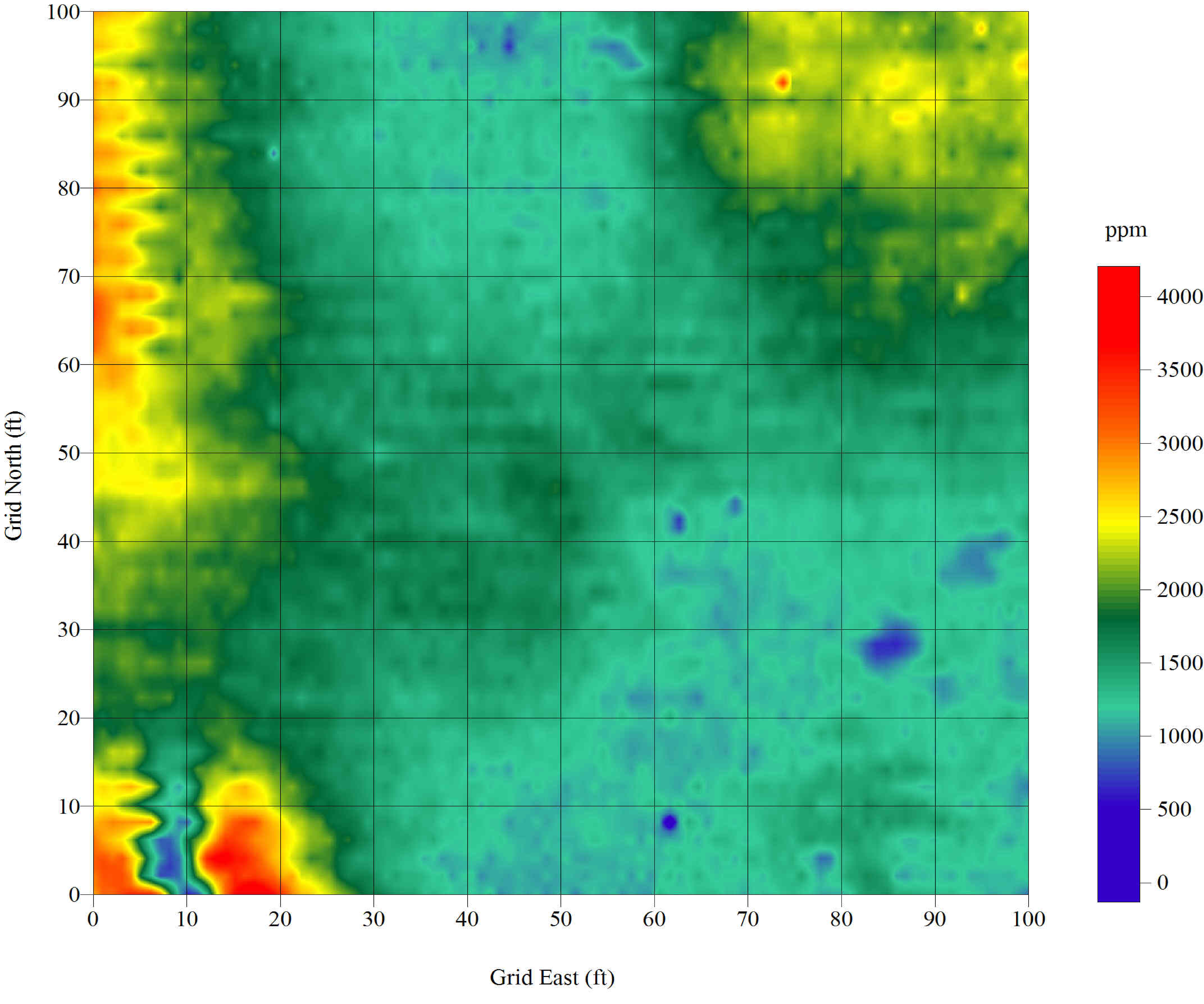
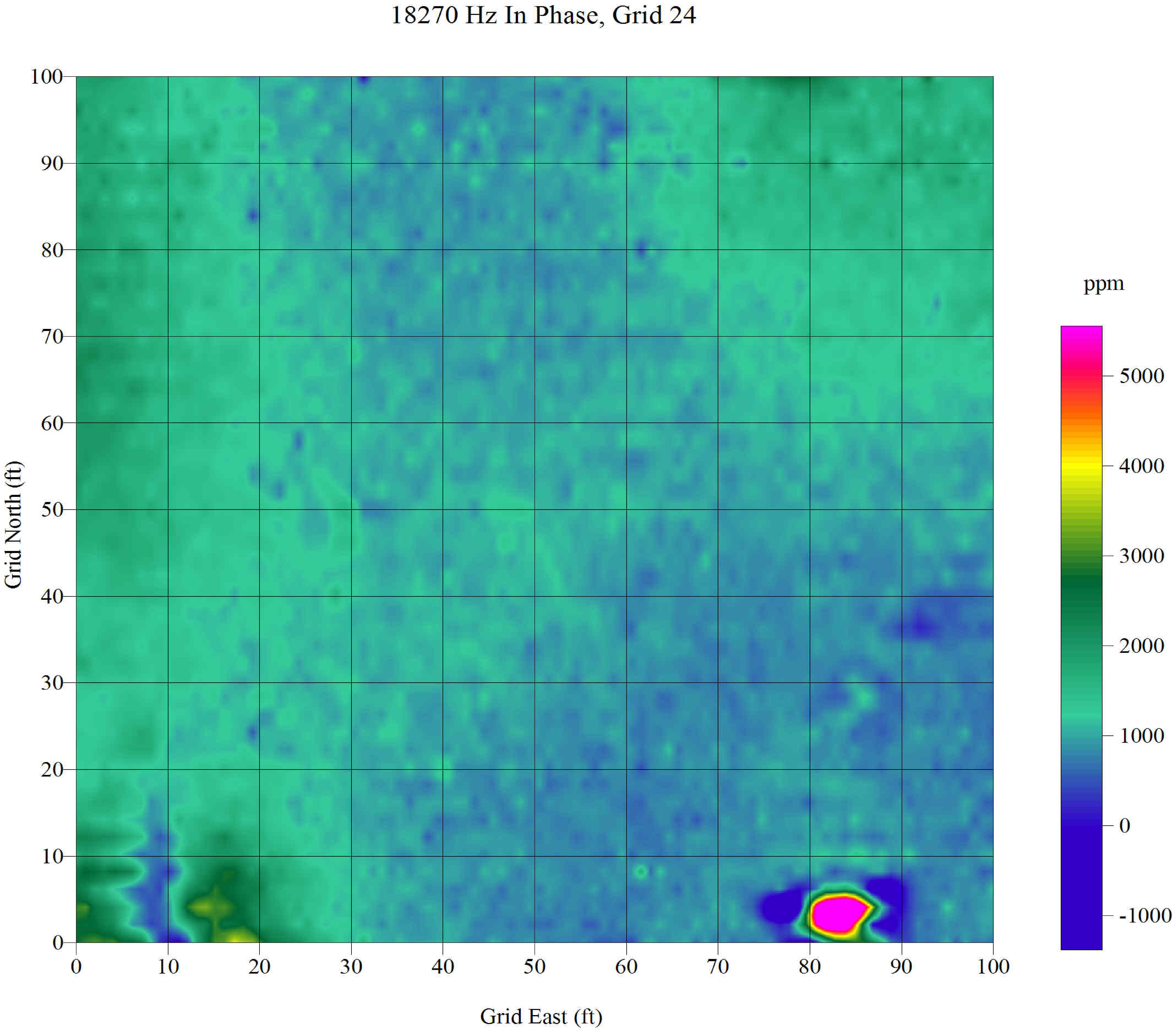


Figure B24-d



18270 Hz In Phase, Grid 24
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
5000
4000
3000
2000
1000
0
-1000

Figure B24-e

18270 Hz Quadrature, Grid 24

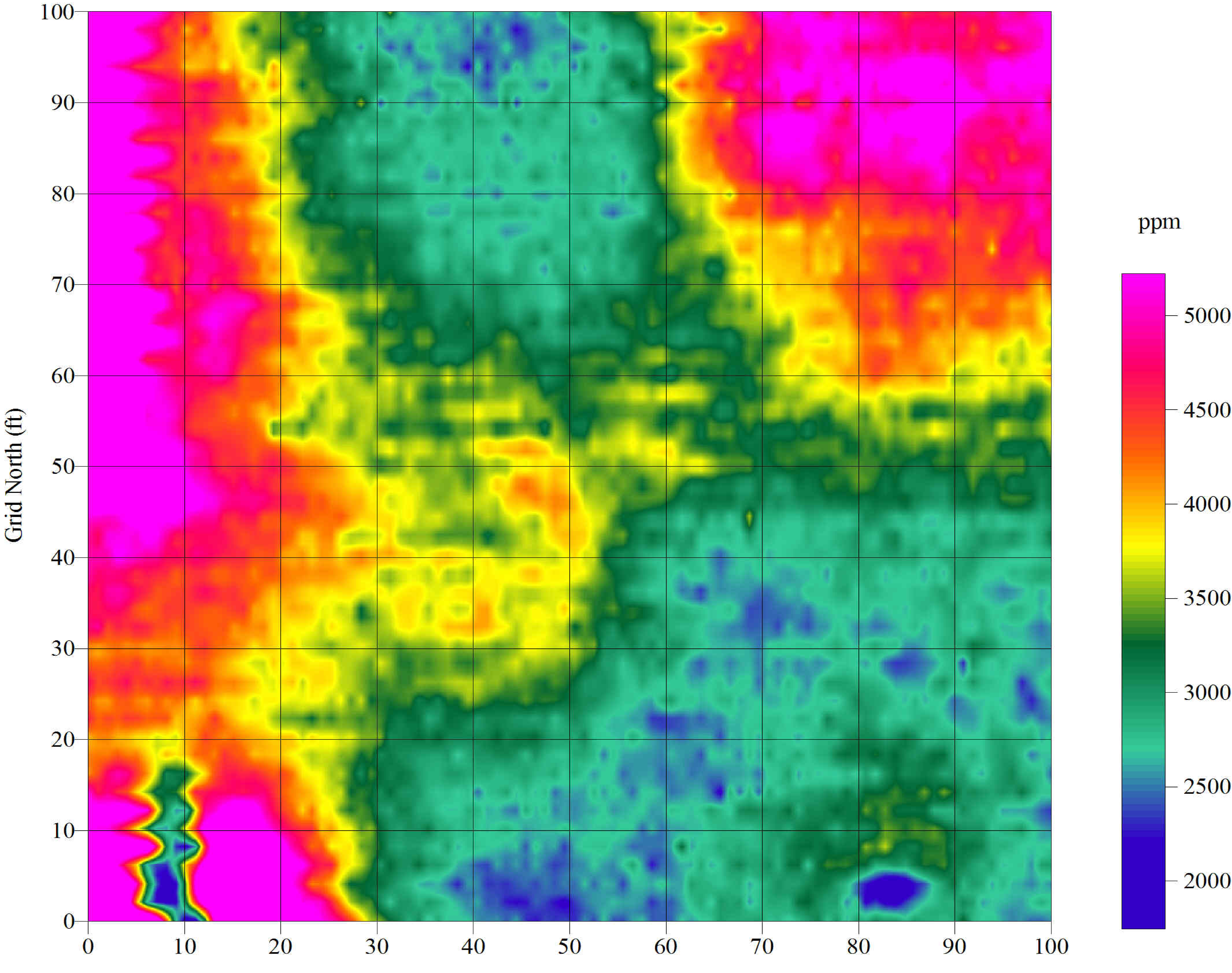


Figure B24-f

Figure B24-g

2430 Hz In Phase, Grid 25

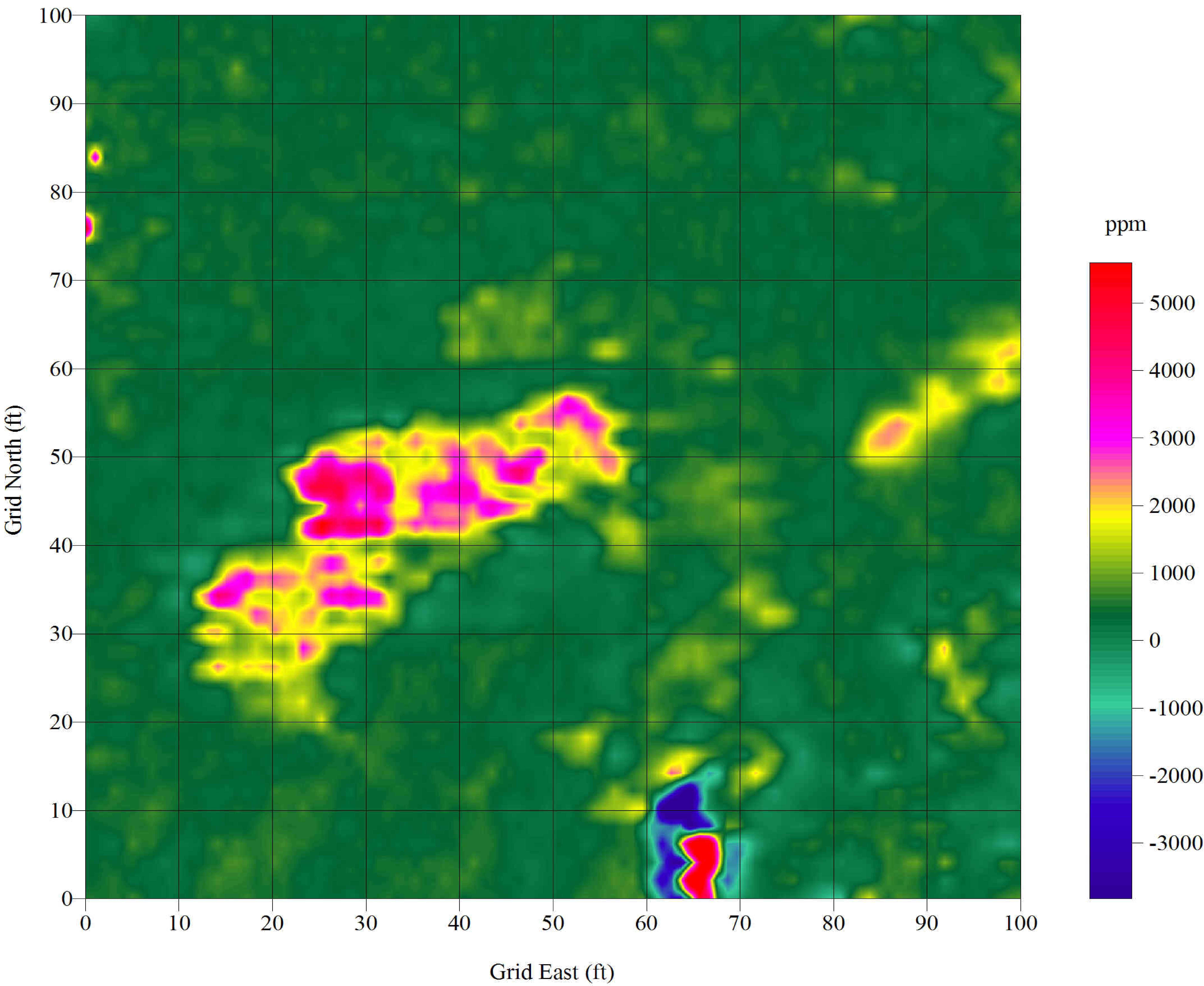
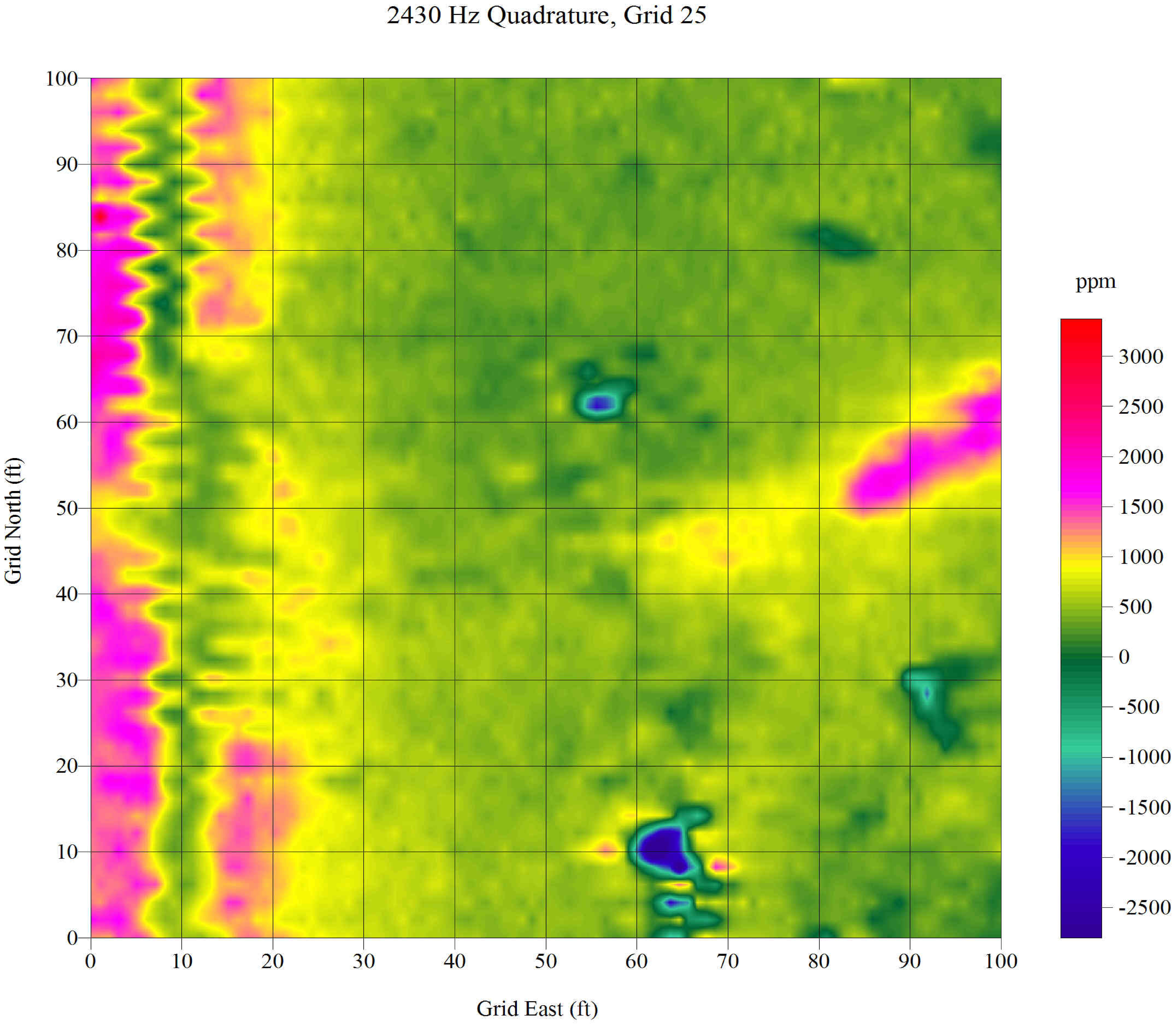


Figure B25-a



2430 Hz Quadrature, Grid 25
Grid North (ft)
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500

Figure B25-b

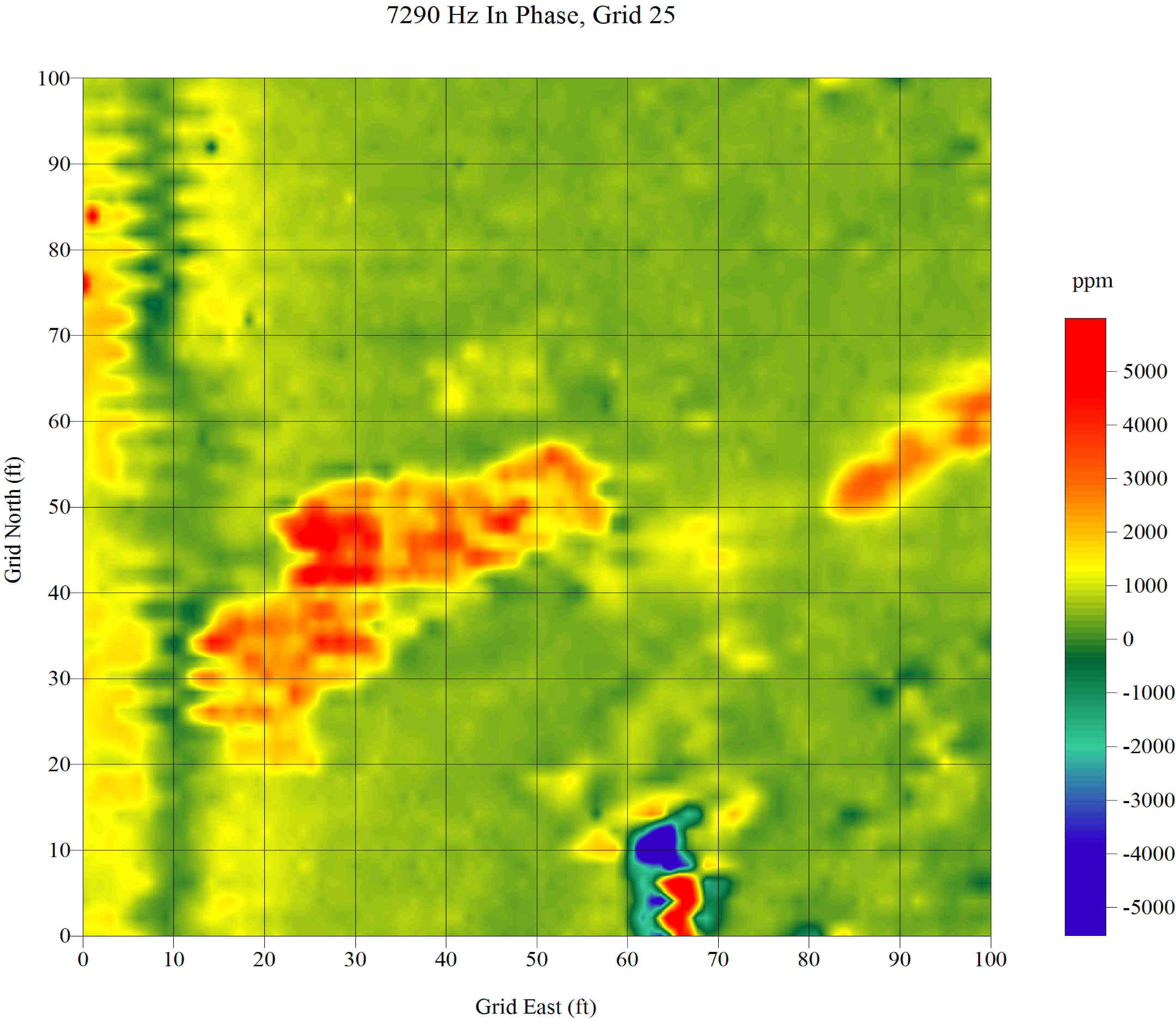

7290 Hz In Phase, Grid 25
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000

Figure B25-c

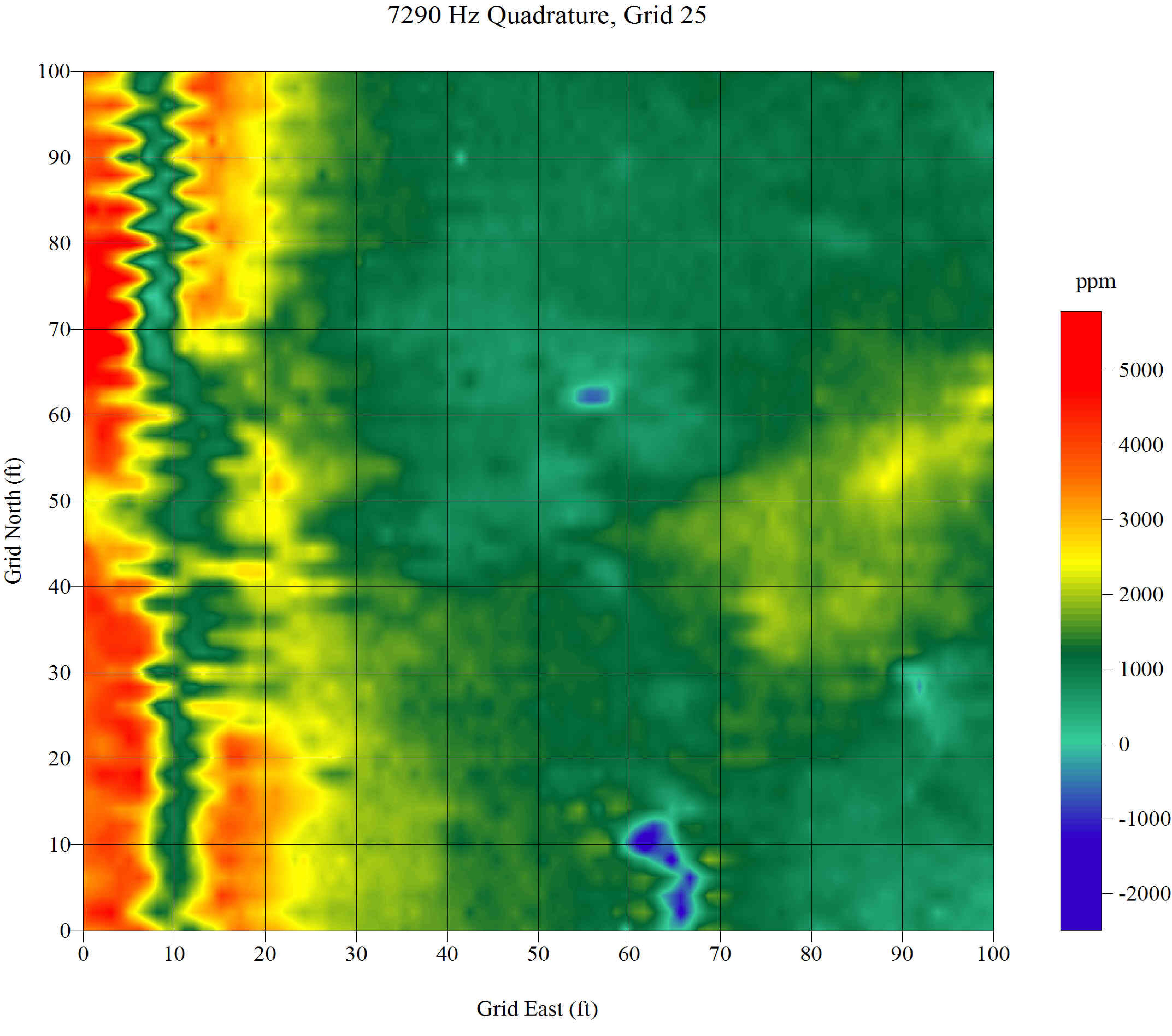

7290 Hz Quadrature, Grid 25
Grid North (ft)
Grid East (ft)
ppm
100
90
80
70
60
50
40
30
20
10
0
5000
4000
3000
2000
1000
-1000
-2000

Figure B25-d

18270 Hz In Phase, Grid 25

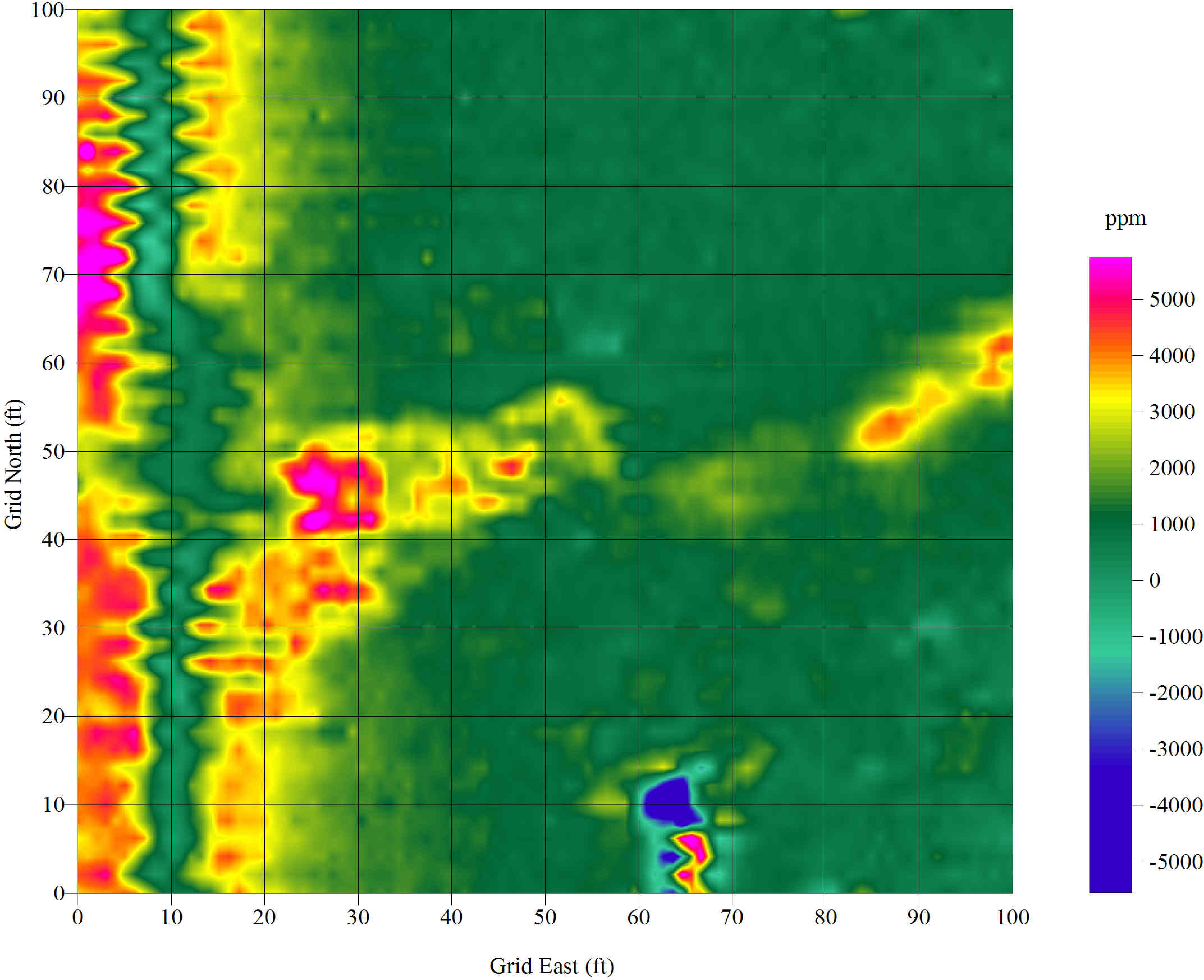


Figure B25-e

18270 Hz Quadrature, Grid 25

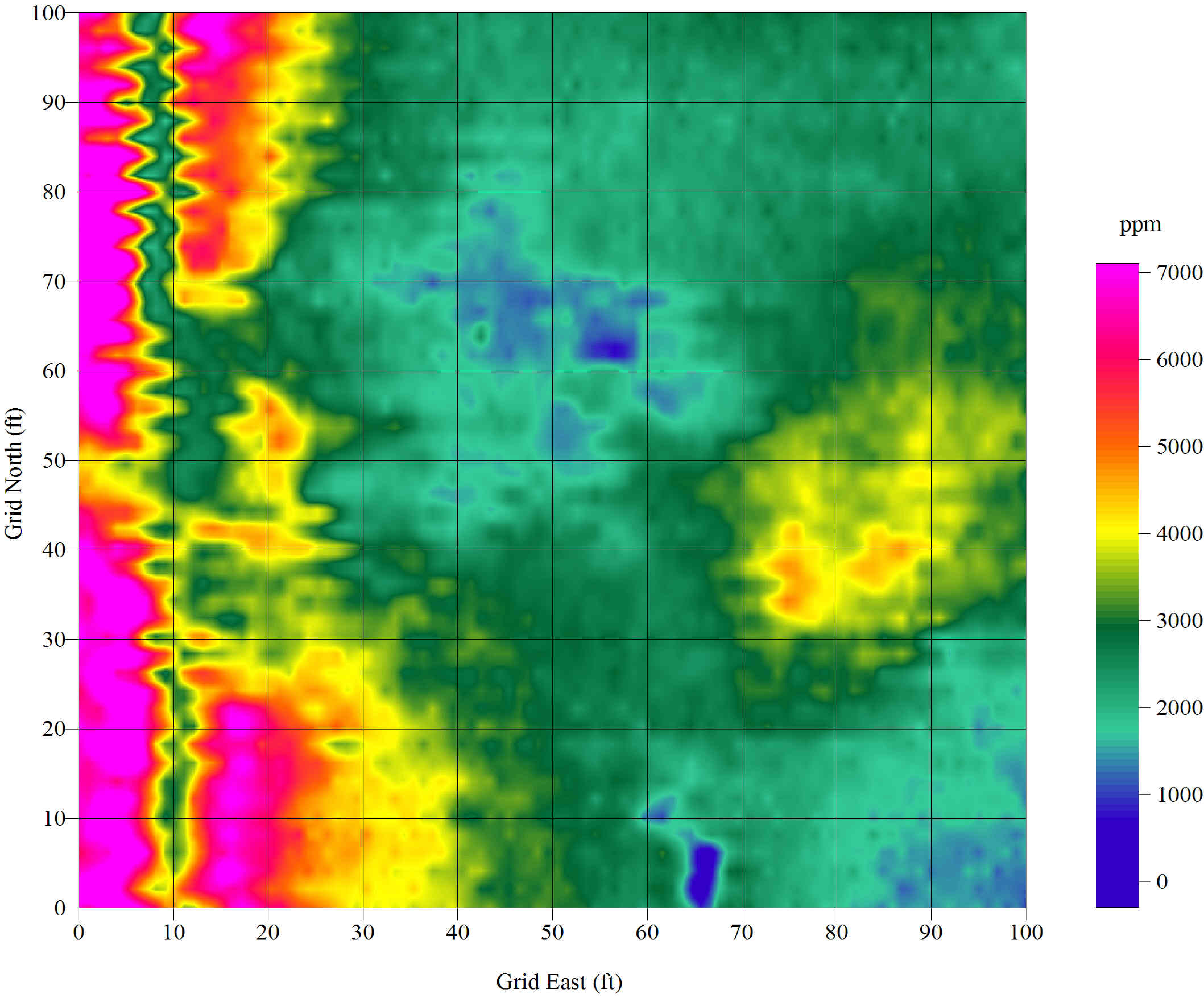


Figure B25-f

2430 Hz In Phase, Grid 26

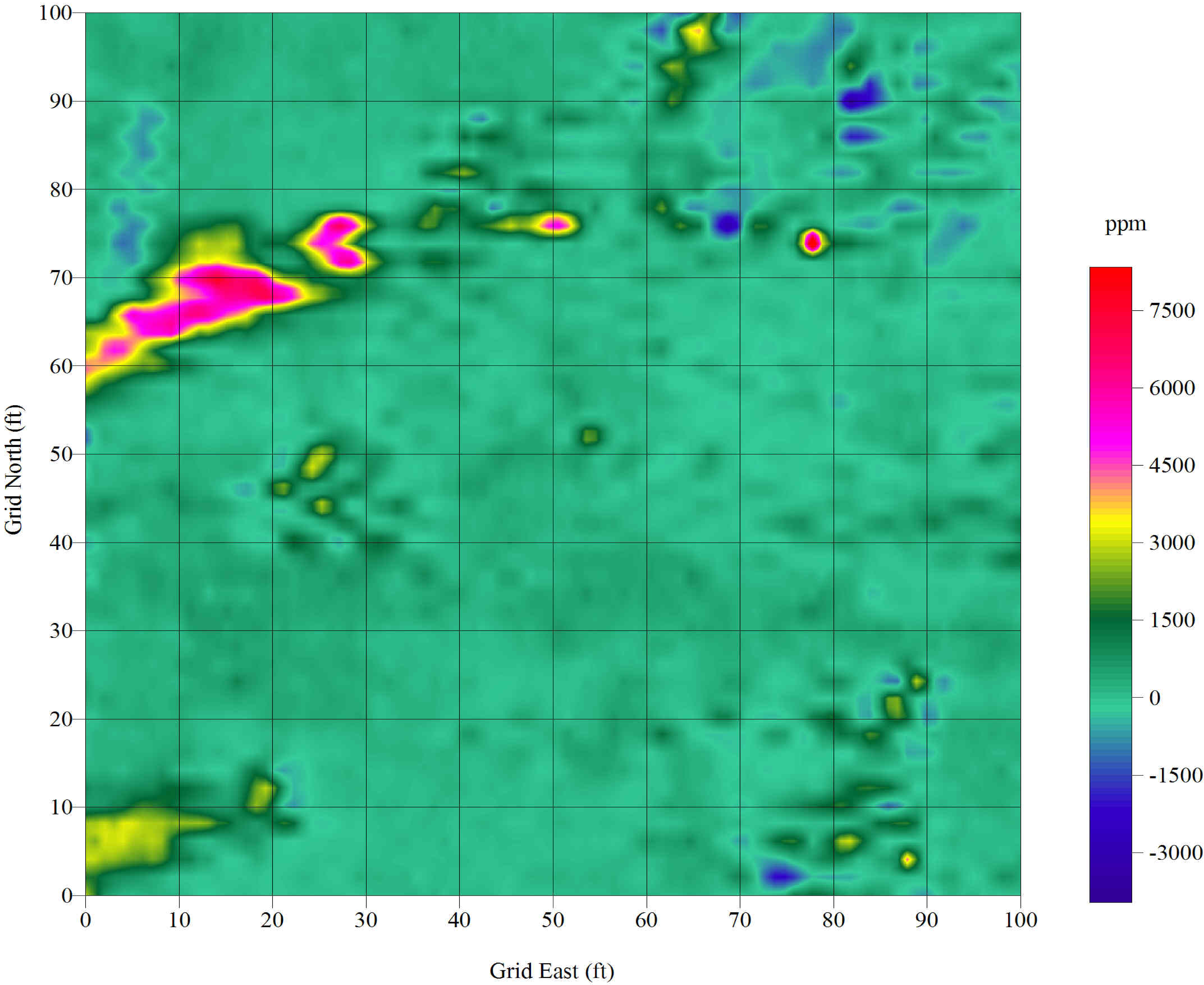


Figure B26-a

2430 Hz Quadrature, Grid 26

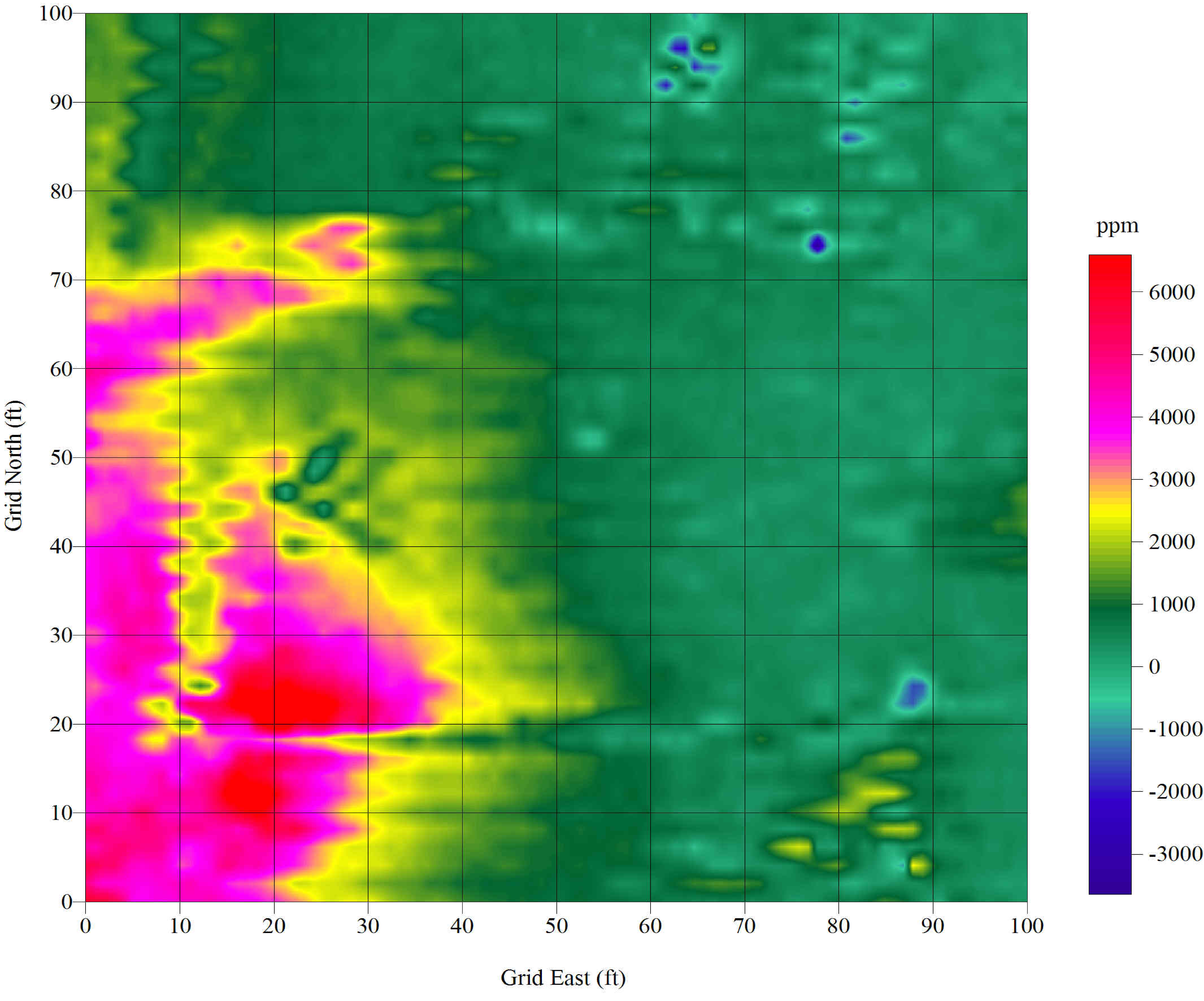


Figure B26-b

7290 Hz In Phase, Grid 26

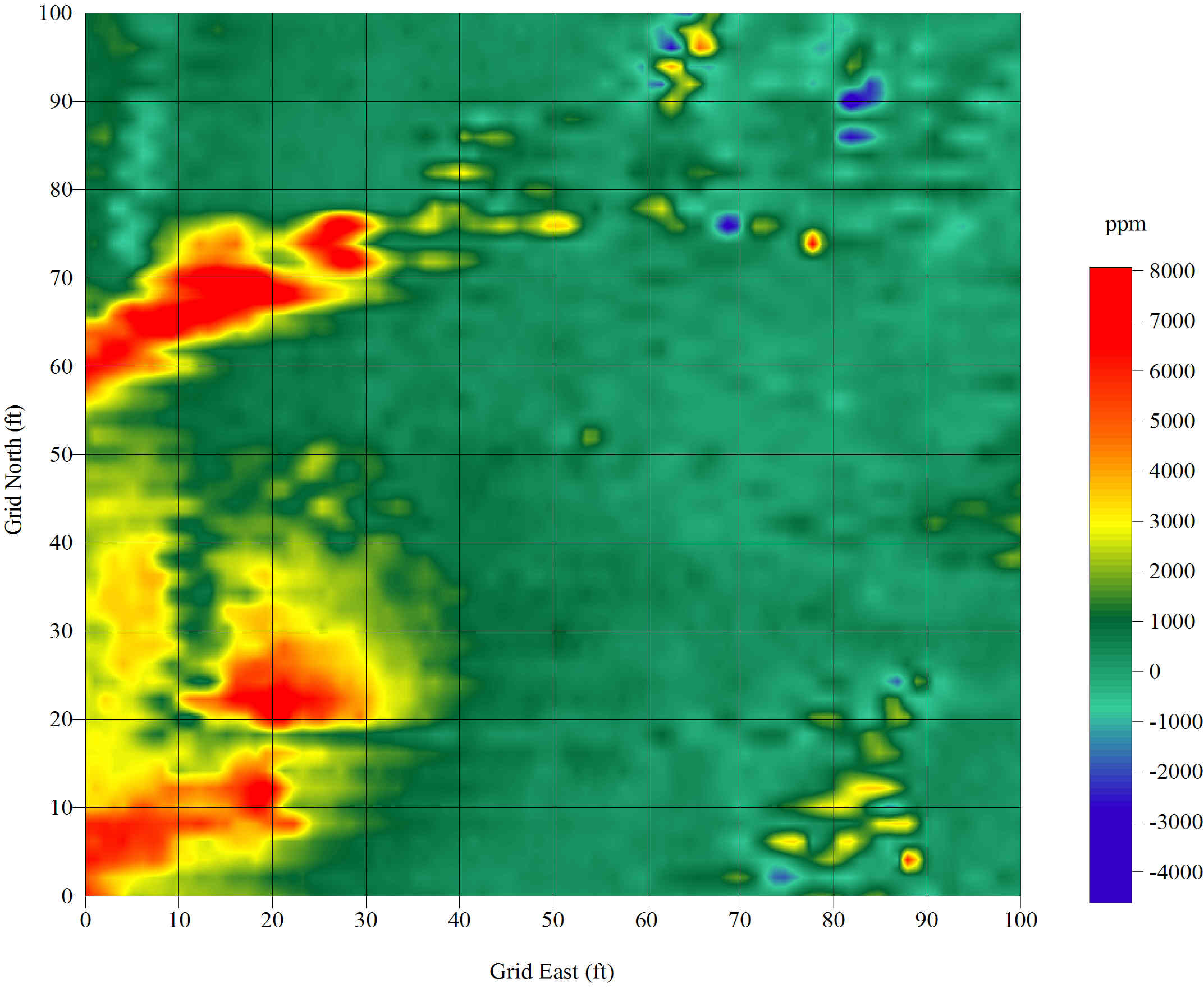


Figure B26-c

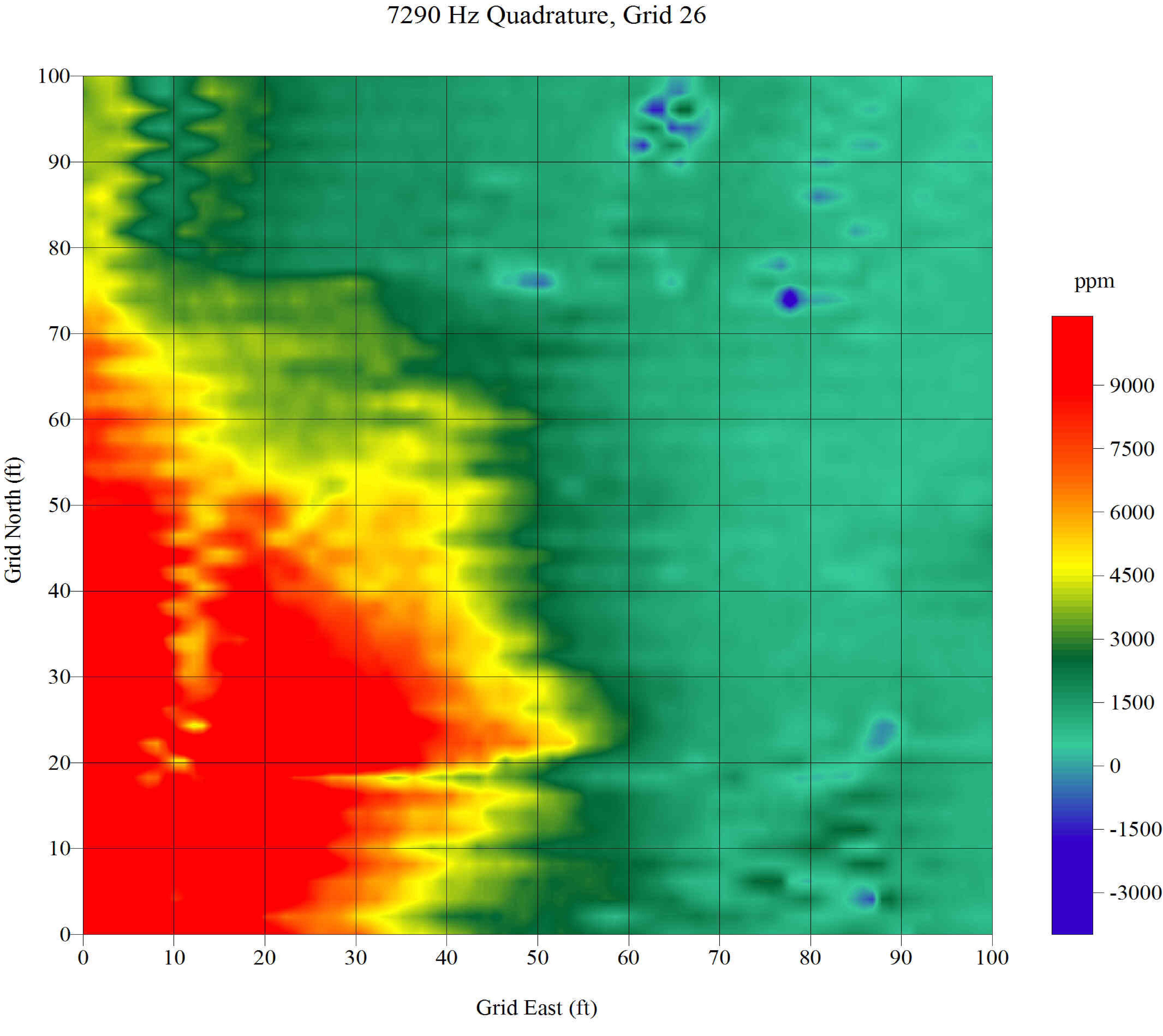

7290 Hz Quadrature, Grid 26
Grid North (ft)
Grid East (ft)
ppm
9000
7500
6000
4500
3000
1500
0
-1500
-3000
0
10
20
30
40
50
60
70
80
90
100

Figure B26-d

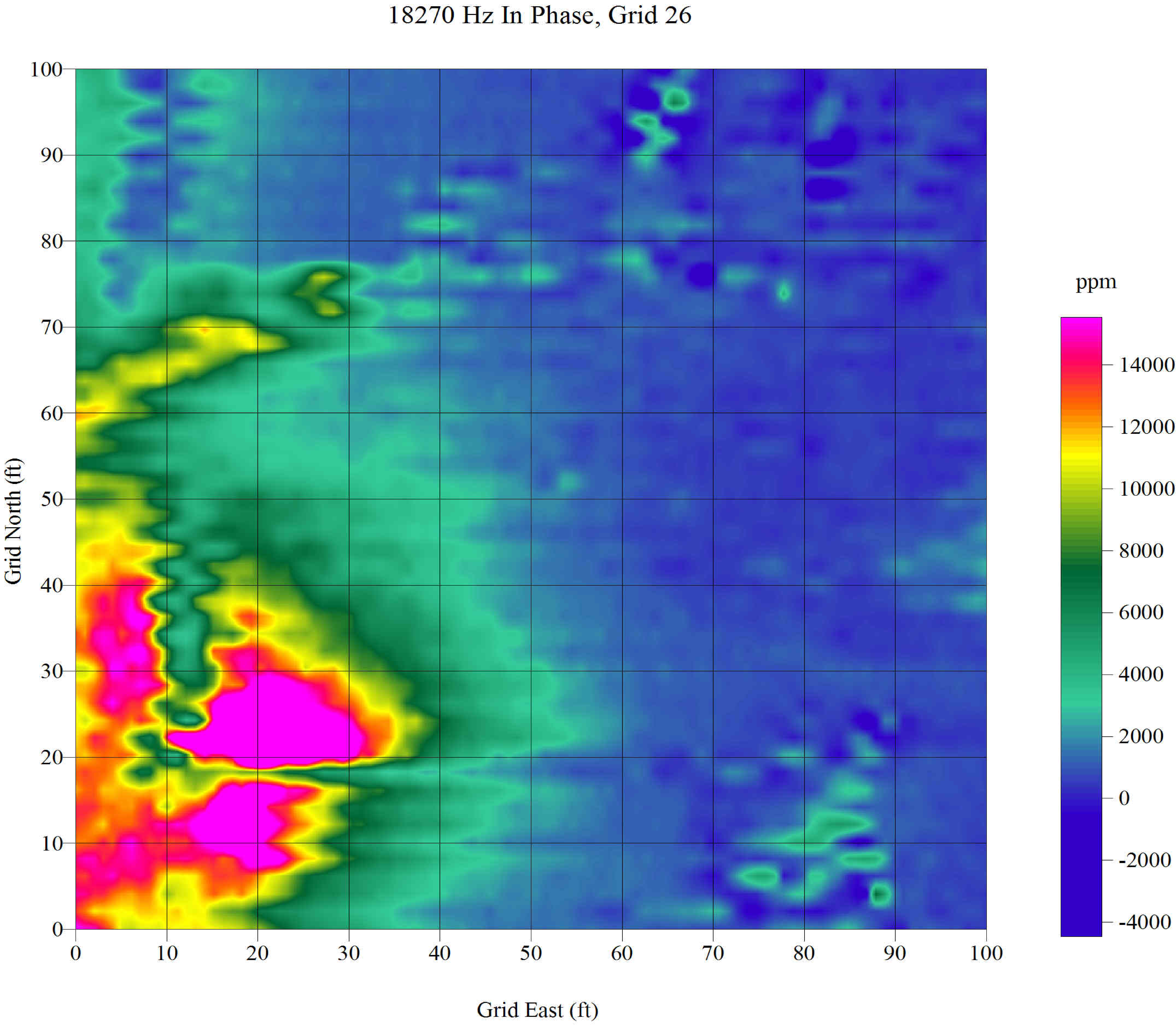

18270 Hz In Phase, Grid 26
Grid North (ft)
100
90
80
70
60
50
40
30
20
10
0
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
14000
12000
10000
8000
6000
4000
2000
0
-2000
-4000

Figure B26-e

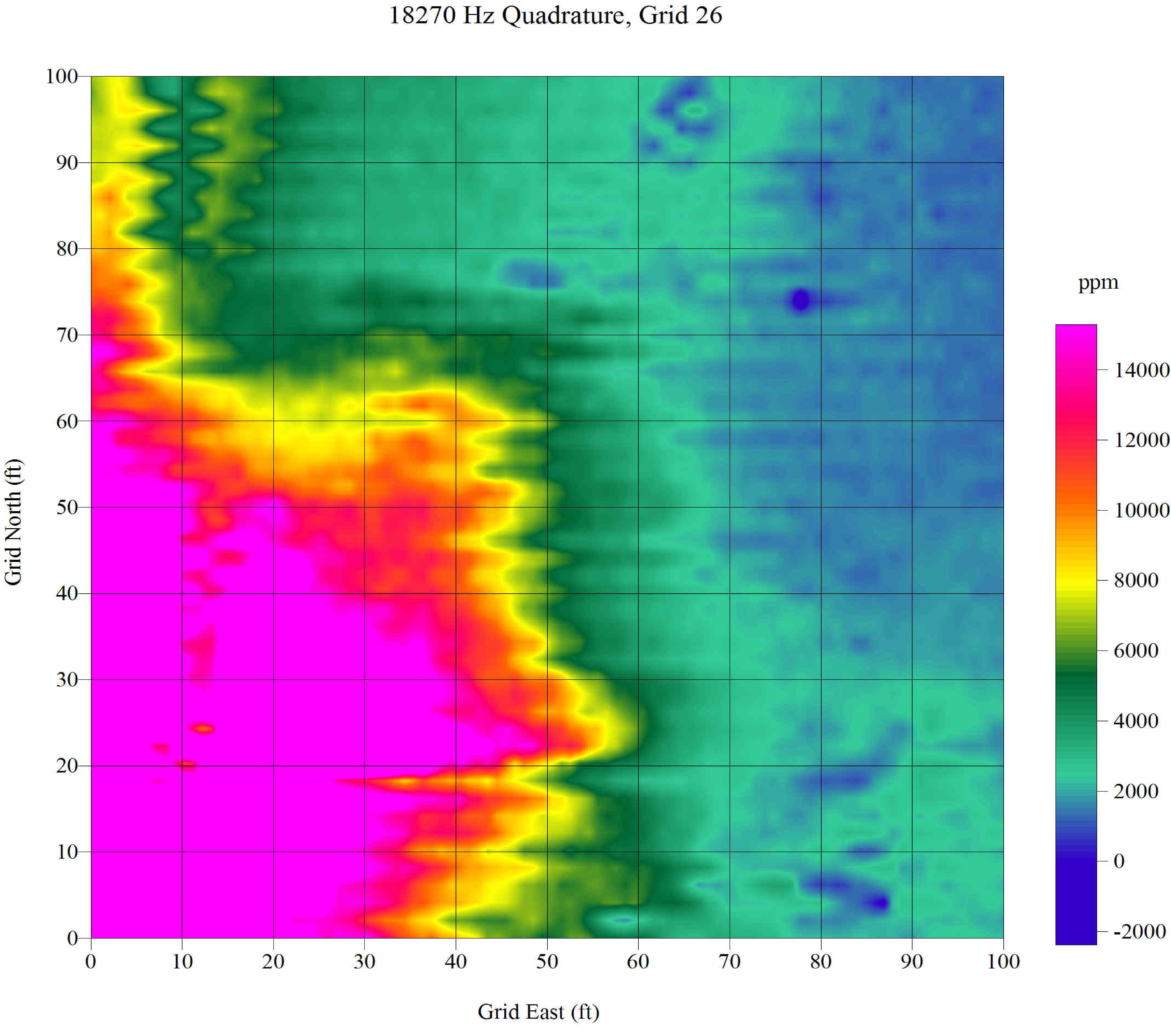

18270 Hz Quadrature, Grid 26
Grid North (ft)
Grid East (ft)
ppm
14000
12000
10000
8000
6000
4000
2000
0
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B26-f

2430 Hz in Phase, Grid 27

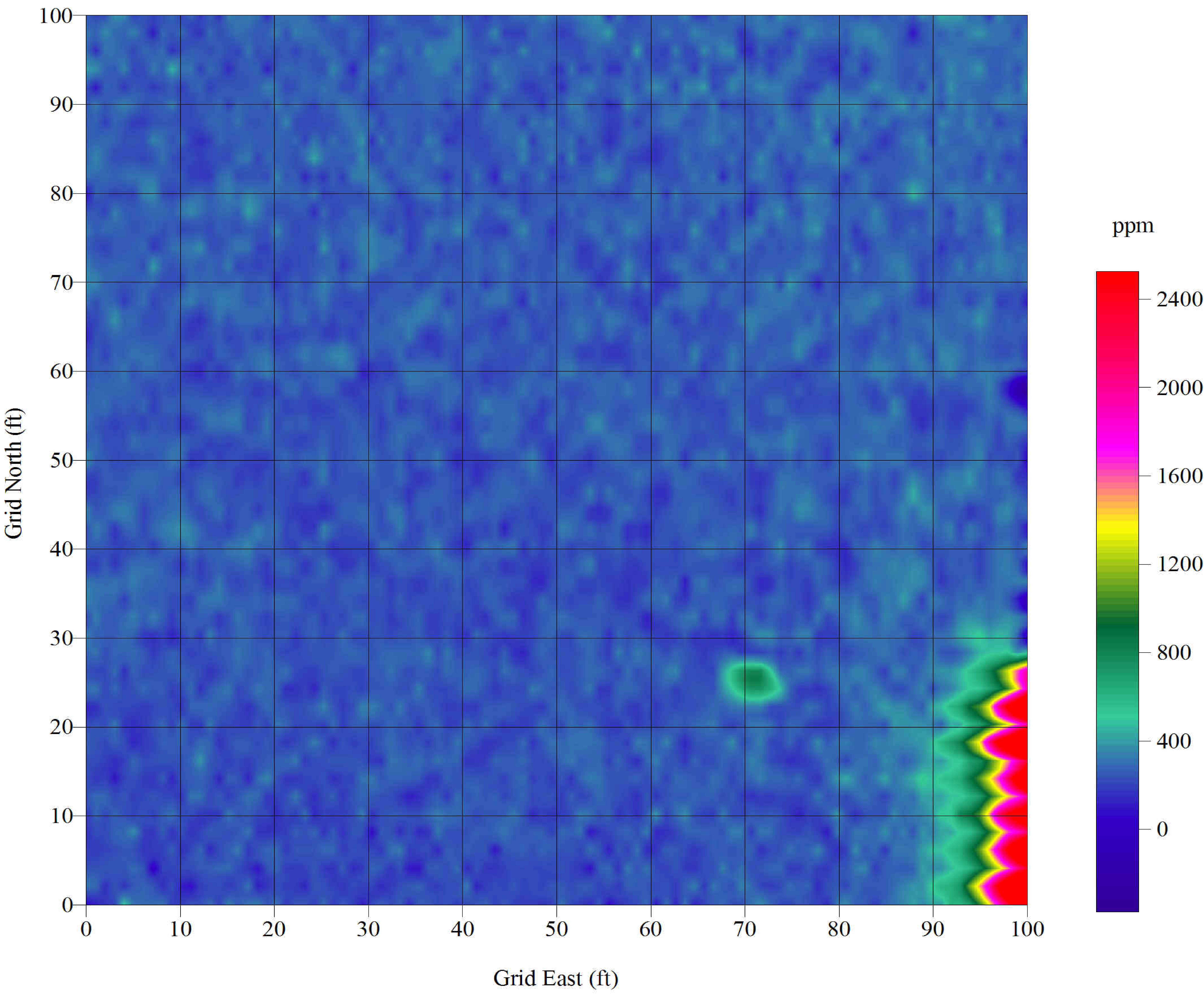


Figure B27-a

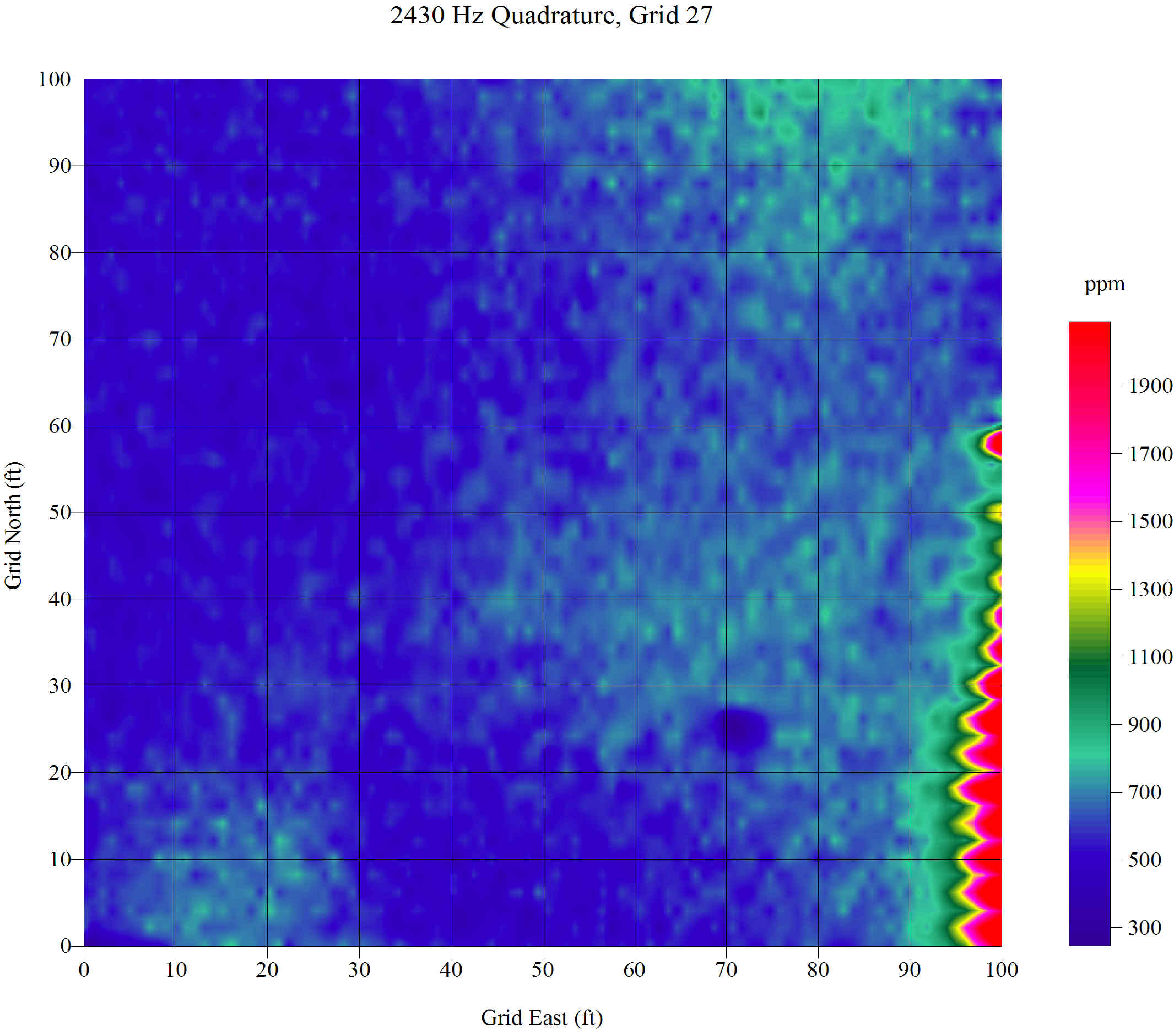

2430 Hz Quadrature, Grid 27
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
300
500
700
900
1100
1300
1500
1700
1900

Figure B27-b

7290 Hz In Phase, Grid 27

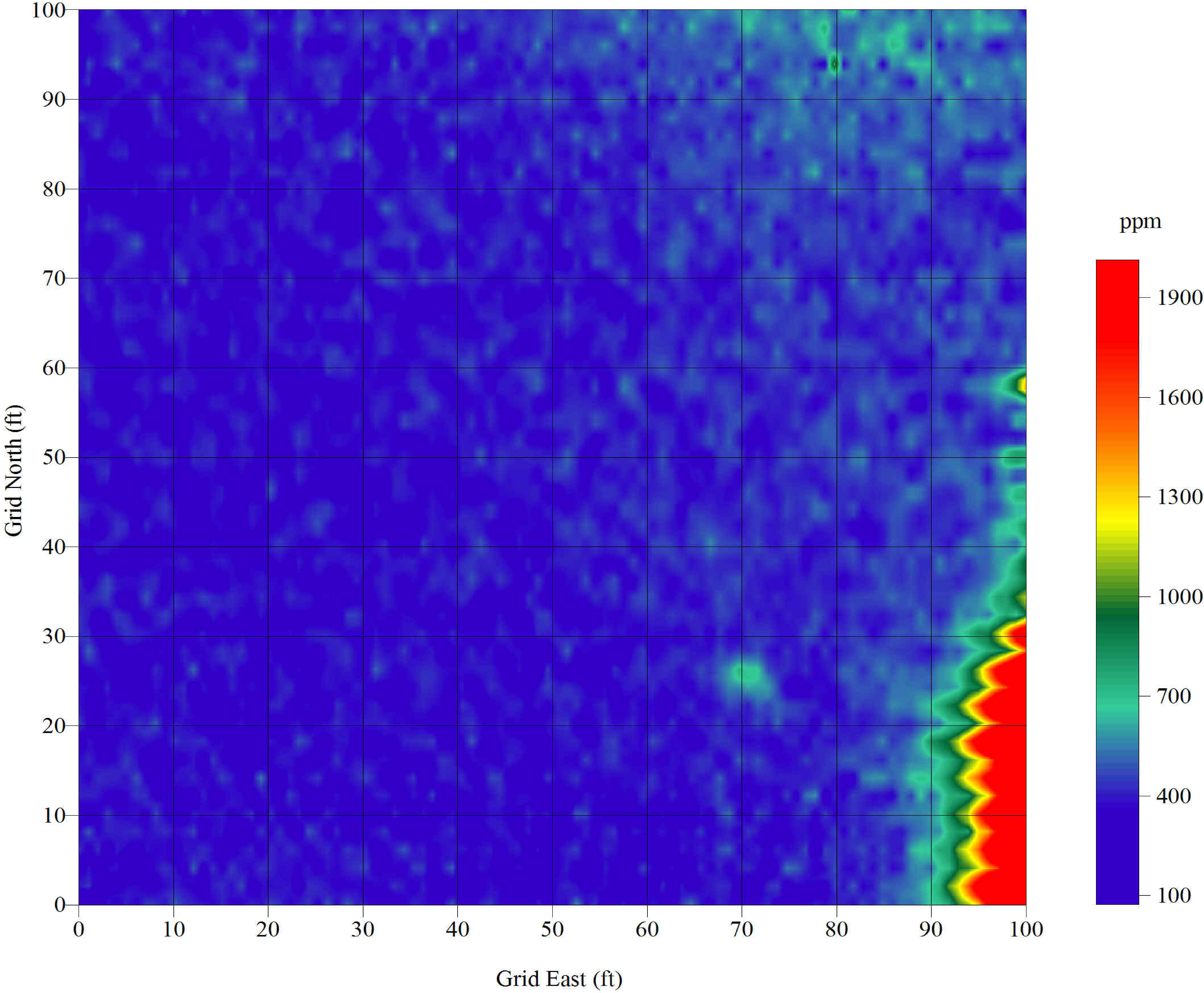


Figure B27-c

7290 Hz Quadrature, Grid 27

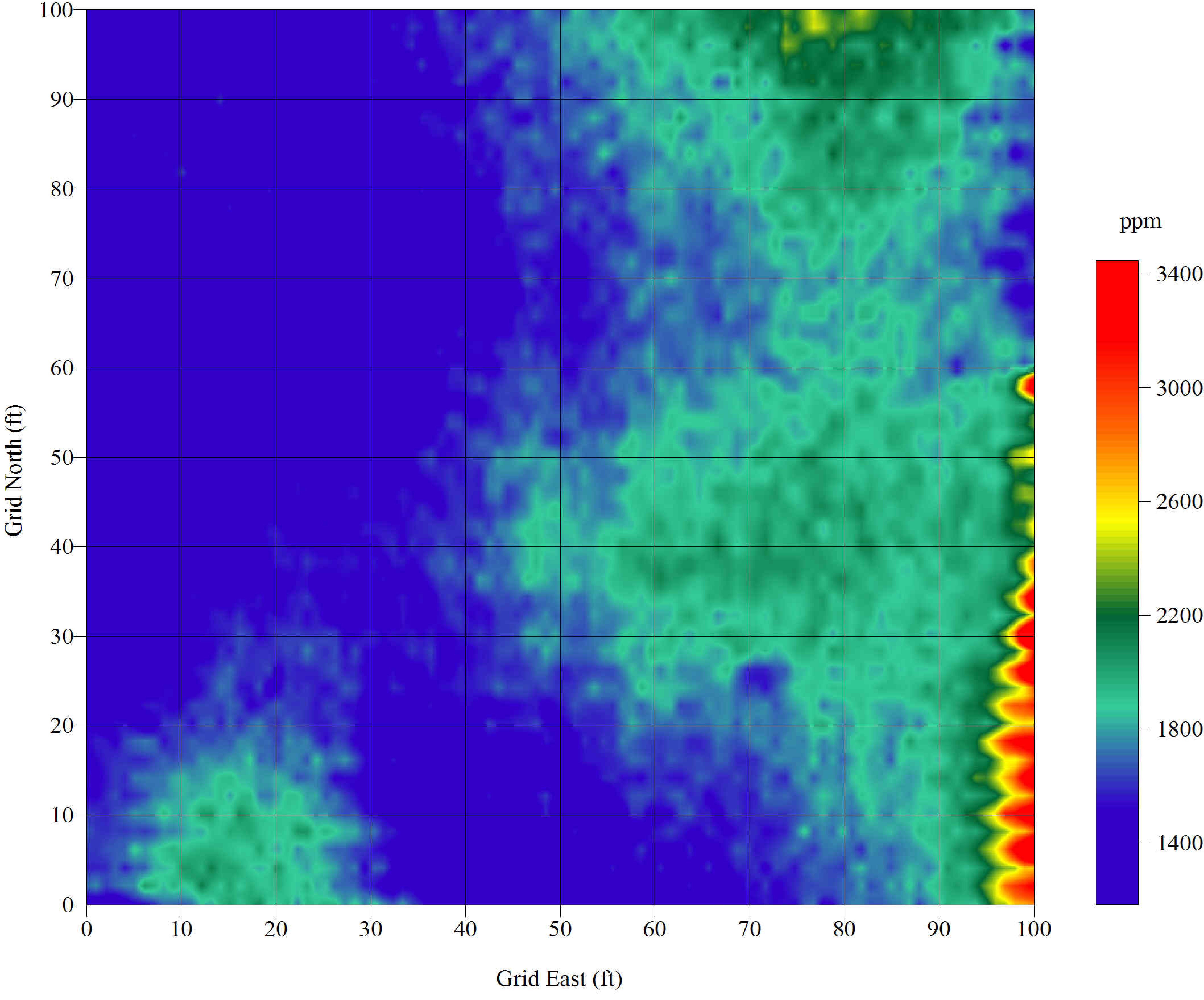


Figure B27-d

18270 Hz In Phase, Grid 27

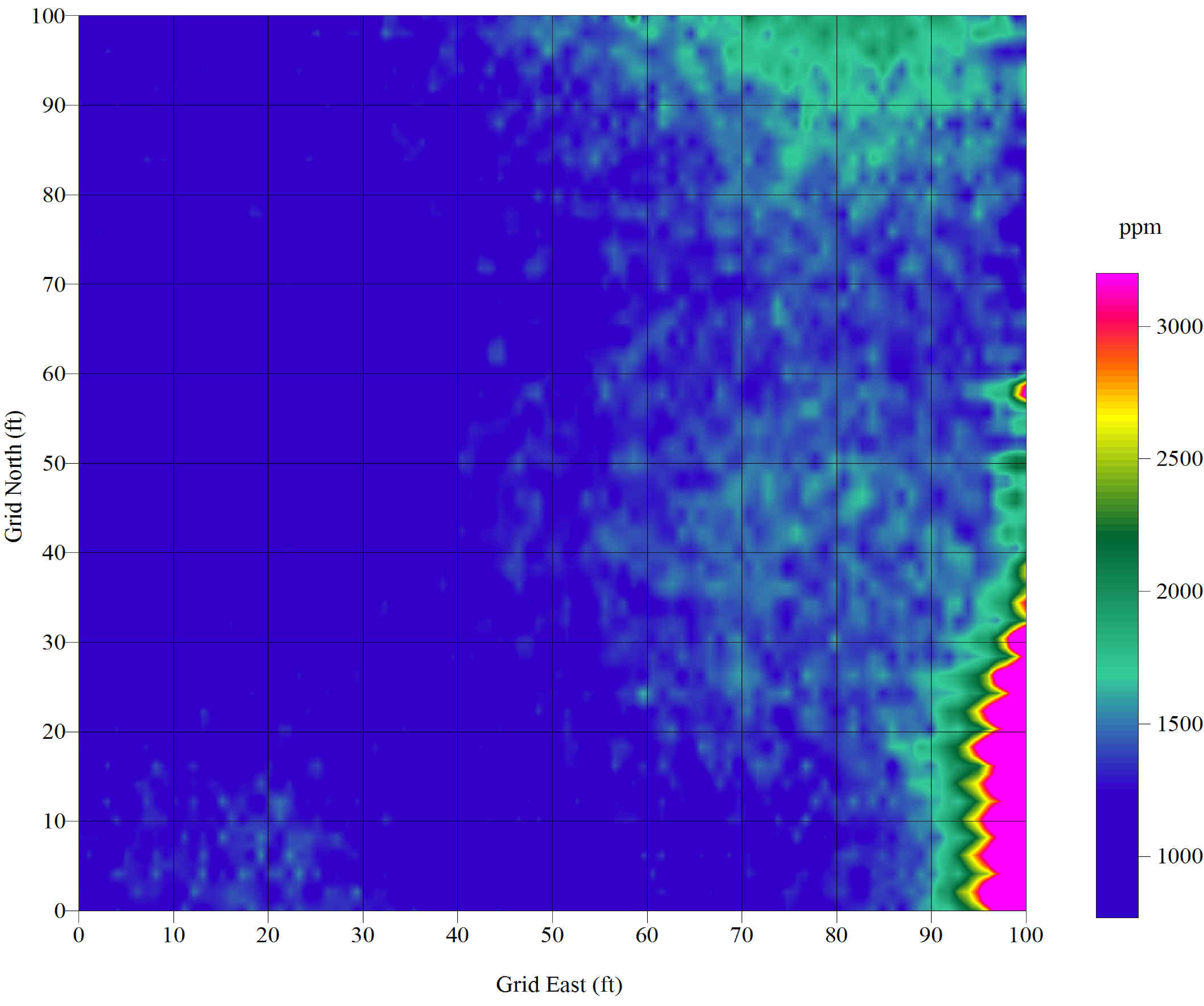


Figure B27-e

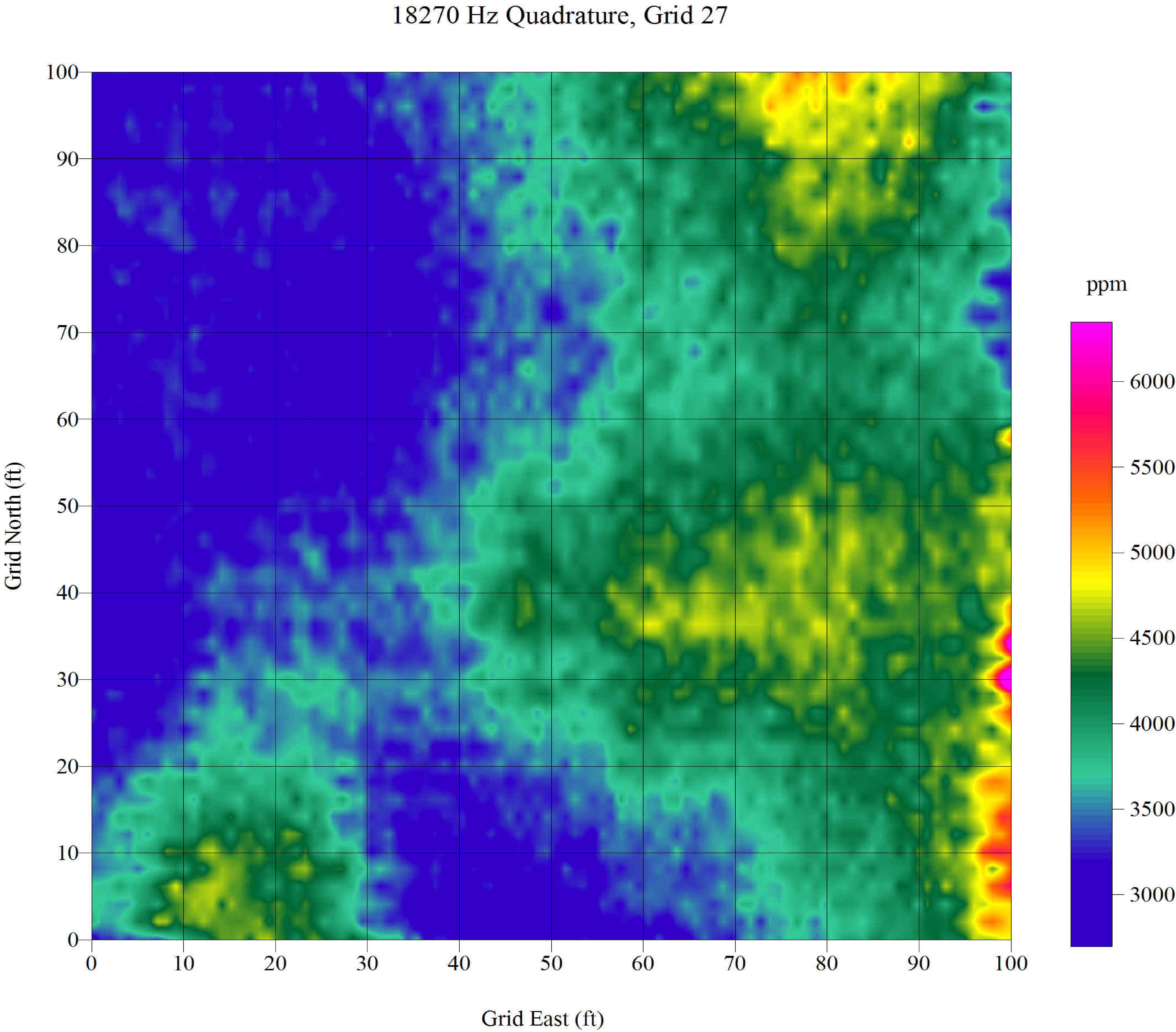

18270 Hz Quadrature, Grid 27
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
3000
3500
4000
4500
5000
5500
6000

Figure B27-f

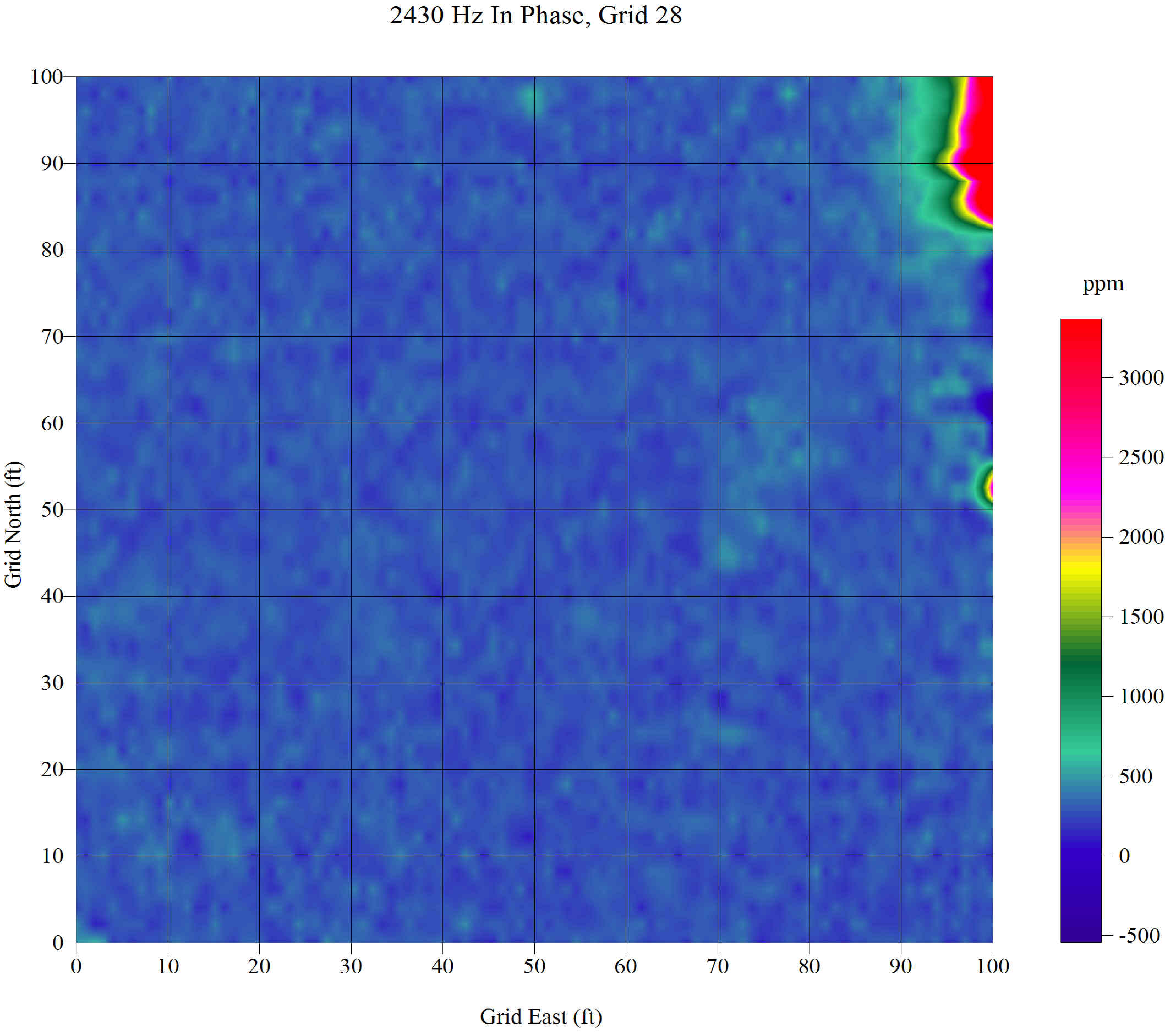

2430 Hz In Phase, Grid 28
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
-500
0
500
1000
1500
2000
2500
3000

Figure B28-a

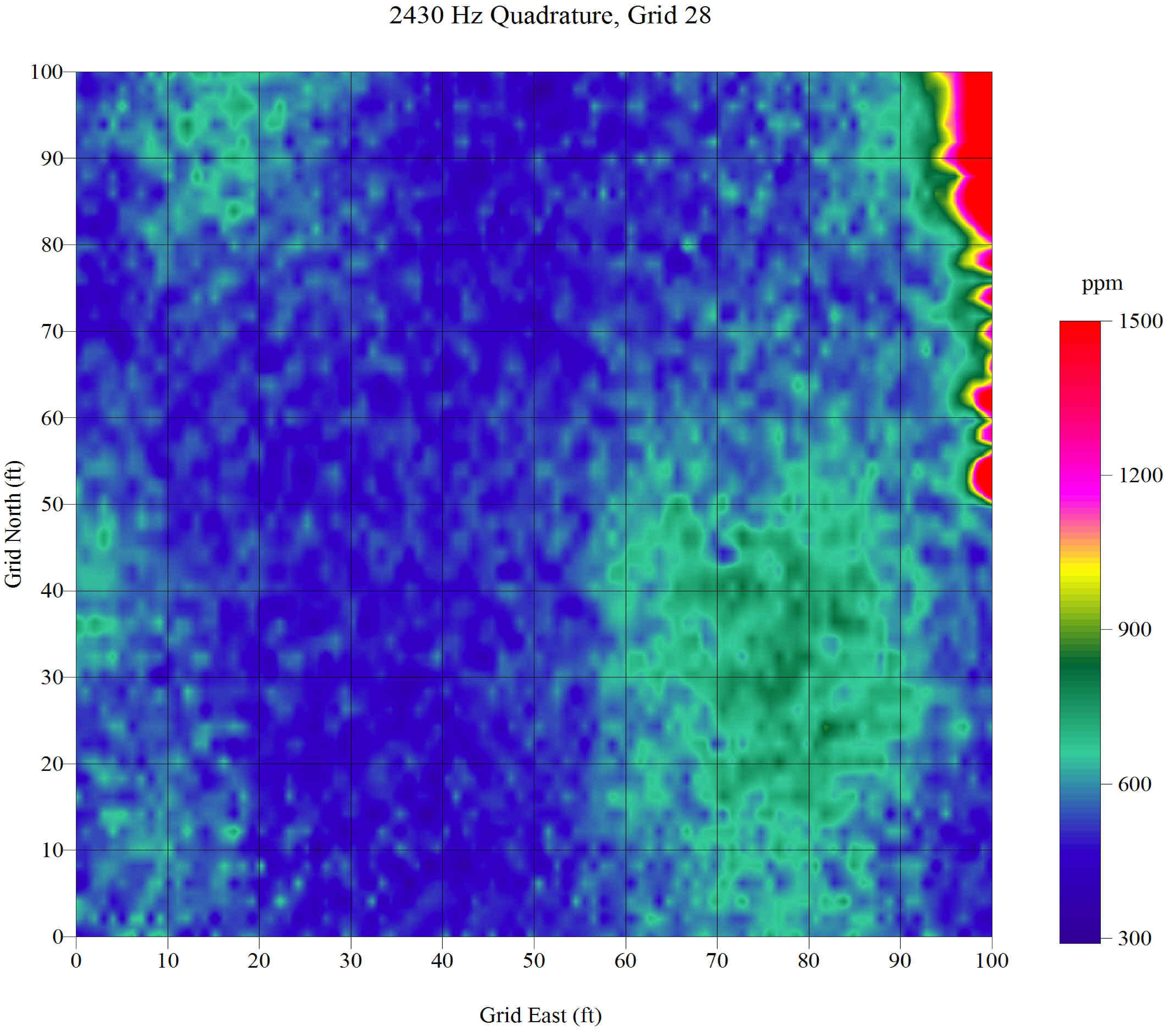

2430 Hz Quadrature, Grid 28
Grid North (ft)
Grid East (ft)
ppm
1500
1200
900
600
300
0
10
20
30
40
50
60
70
80
90
100

Figure B28-b

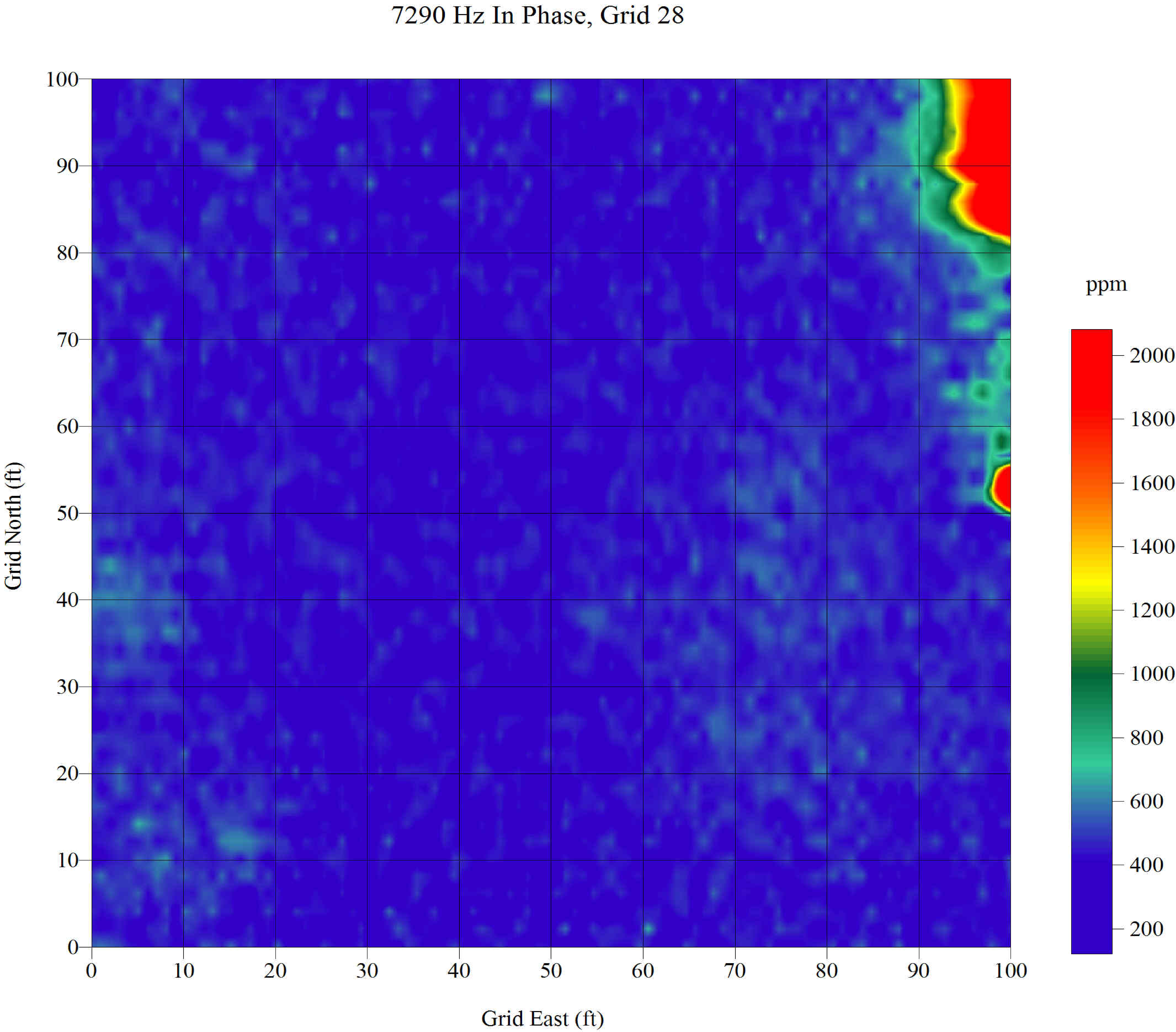

7290 Hz In Phase, Grid 28
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
200
400
600
800
1000
1200
1400
1600
1800
2000

Figure B28-c

7290 Hz Quadrature, Grid 28

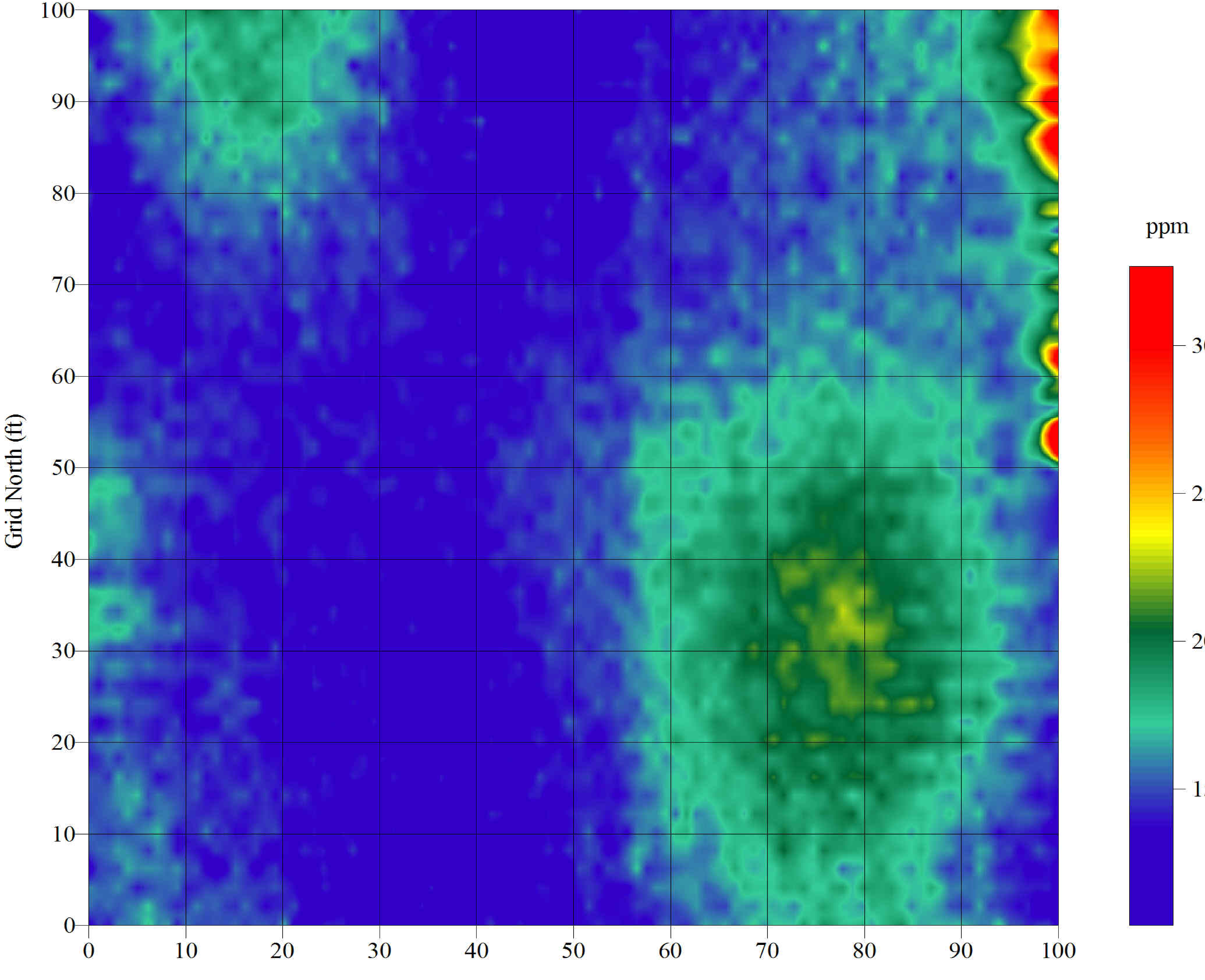


Figure B28-d

18270 Hz In Phase, Grid 28

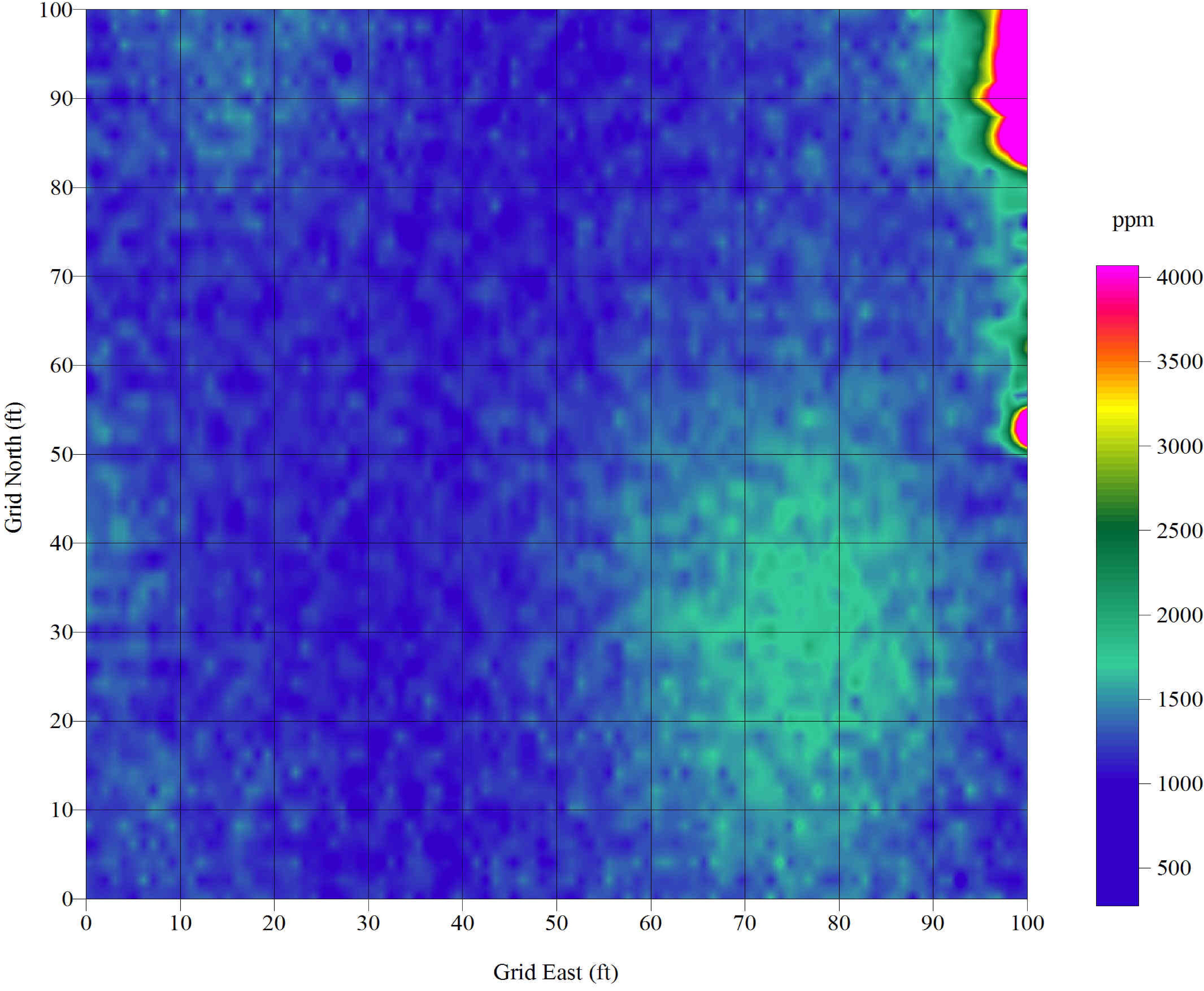


Figure B28-e

18270 Hz Quadrature, Grid 28

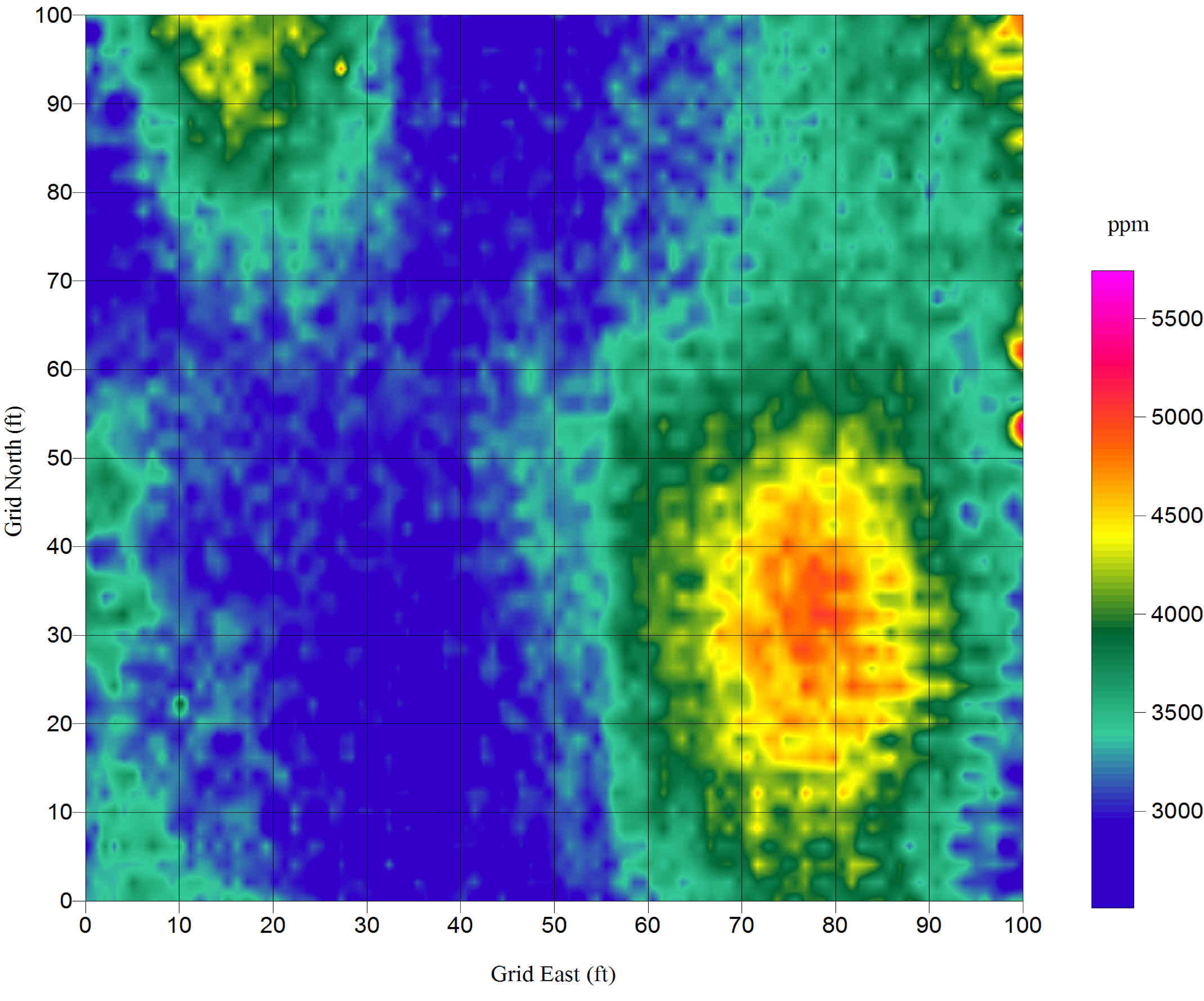


Figure B28-f

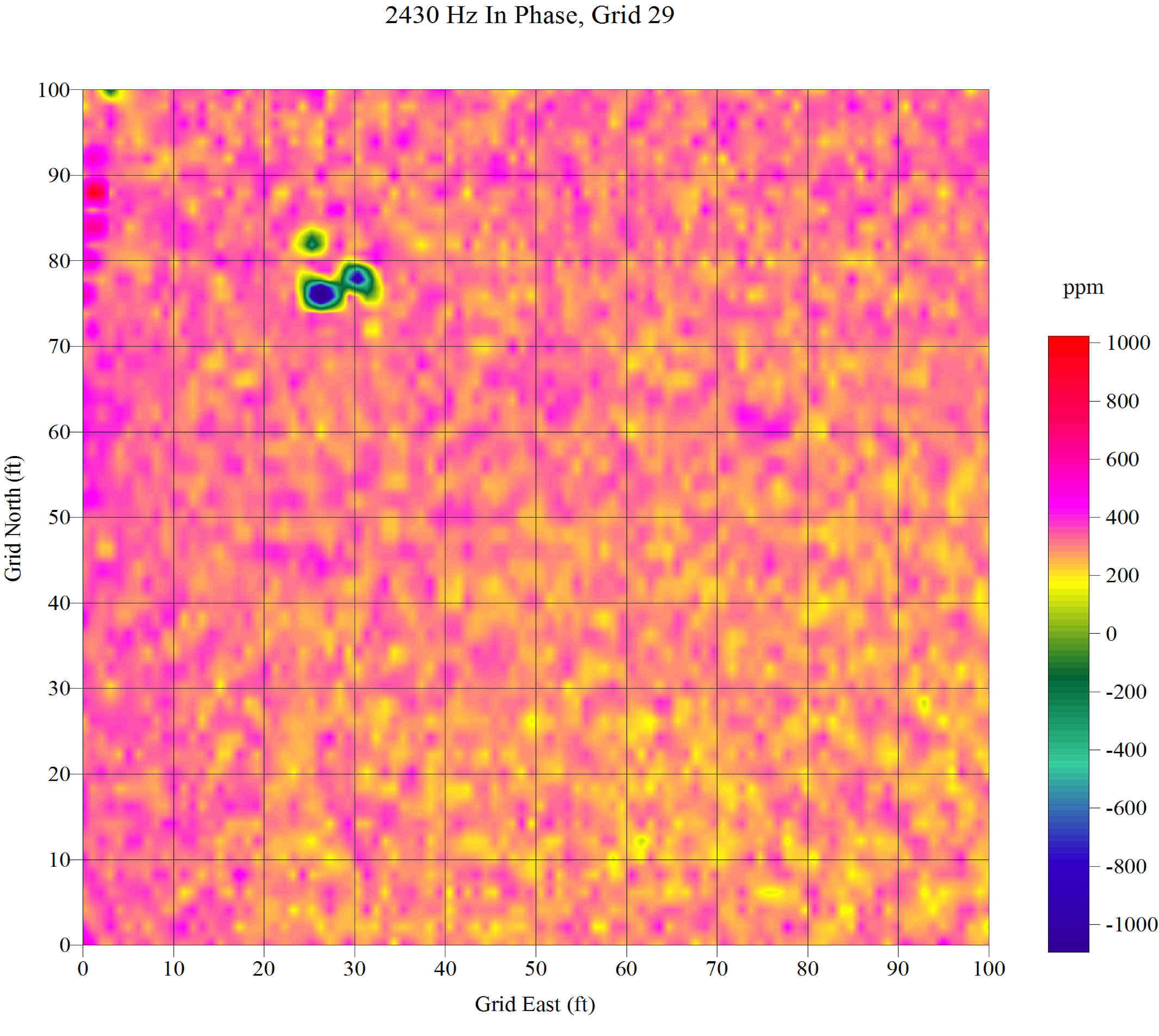

2430 Hz In Phase, Grid 29
Grid North (ft)
Grid East (ft)
ppm
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
0
10
20
30
40
50
60
70
80
90
100

Figure B29-a

2430 Hz Quadrature, Grid 29

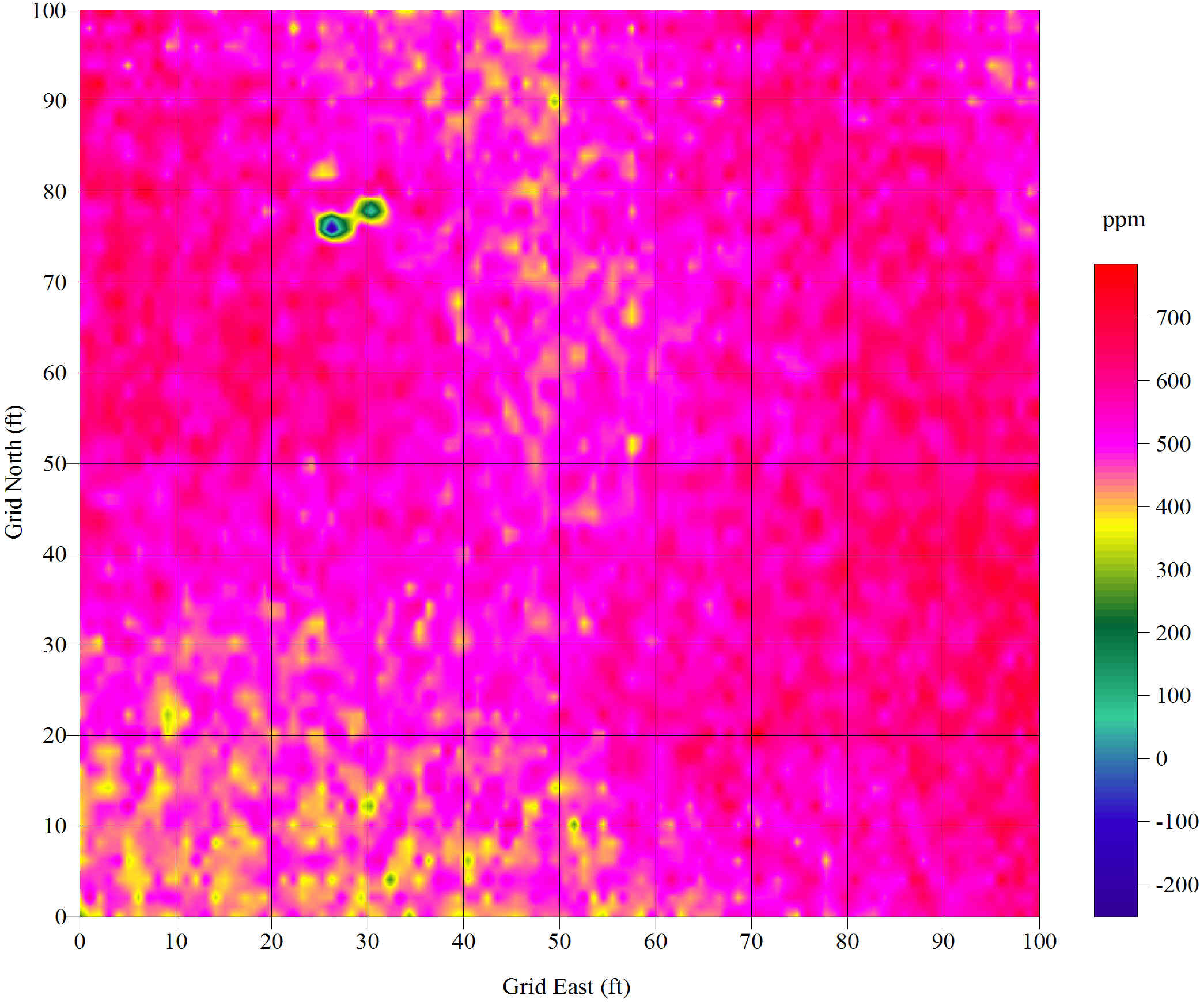


Figure B29-b

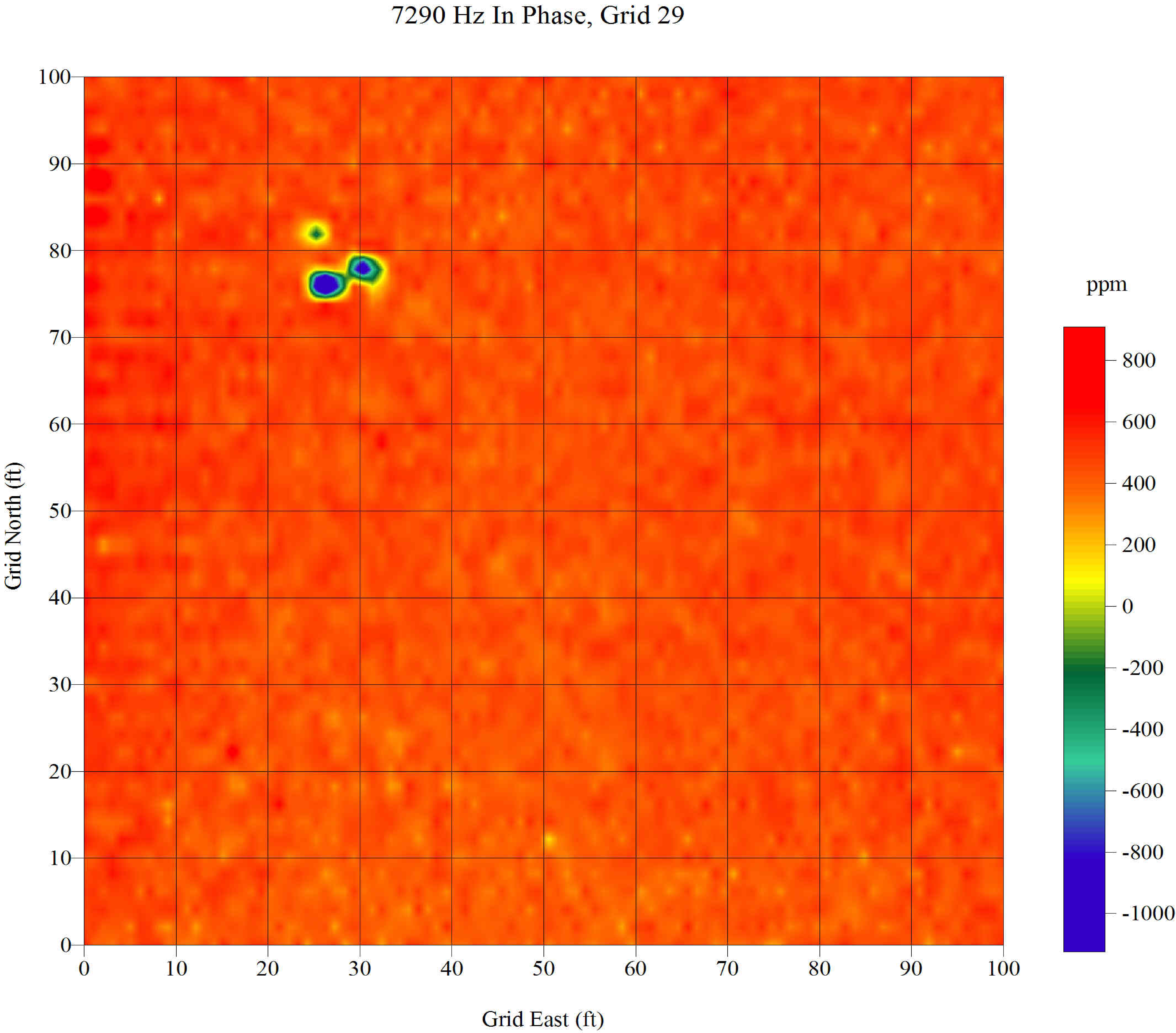

7290 Hz In Phase, Grid 29
Grid North (ft)
Grid East (ft)
ppm
800
600
400
200
0
-200
-400
-600
-800
-1000
0
10
20
30
40
50
60
70
80
90
100

Figure B29-c

7290 Hz Quadrature, Grid 29

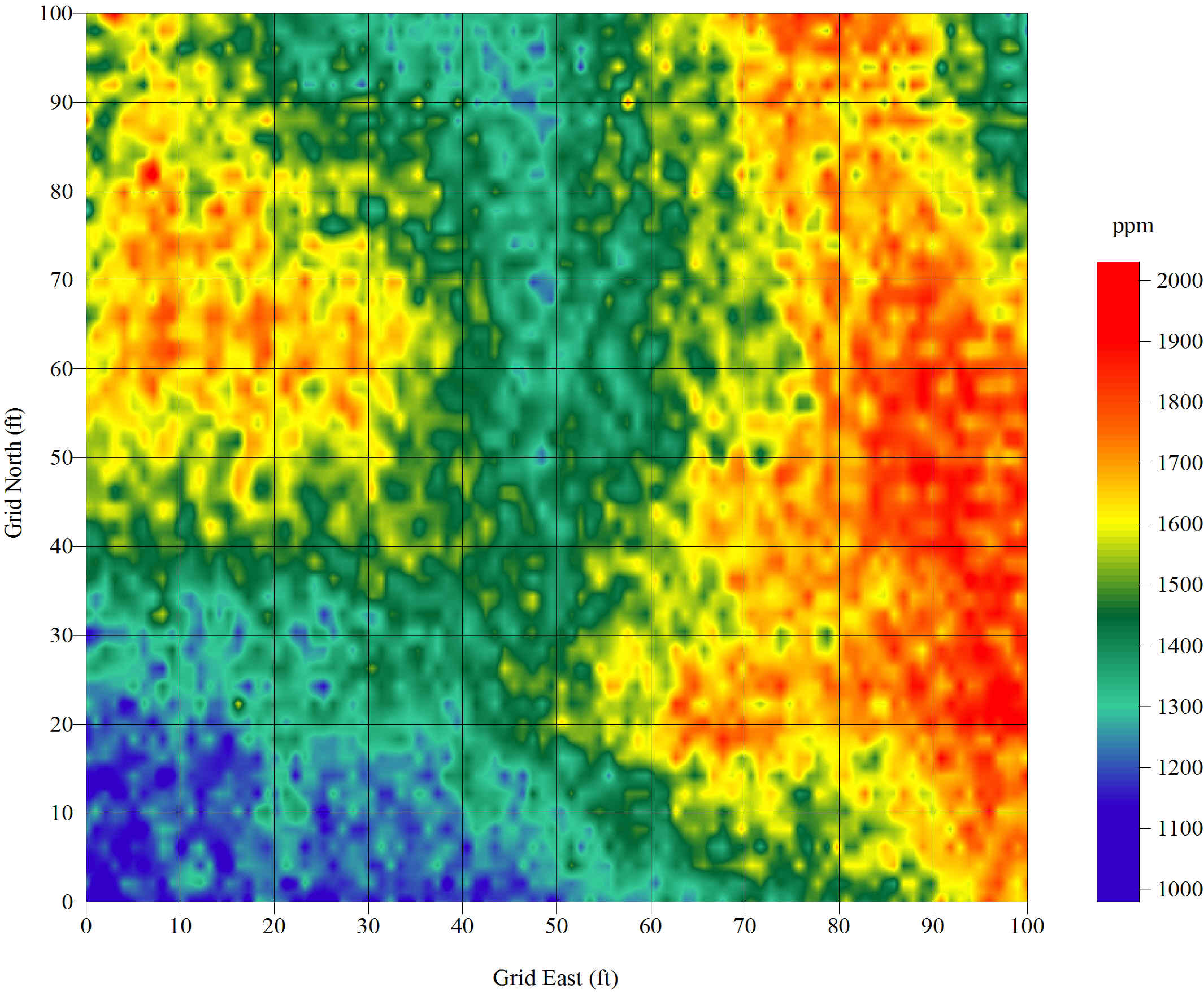


Figure B29-d

18270 Hz In Phase, Grid 29

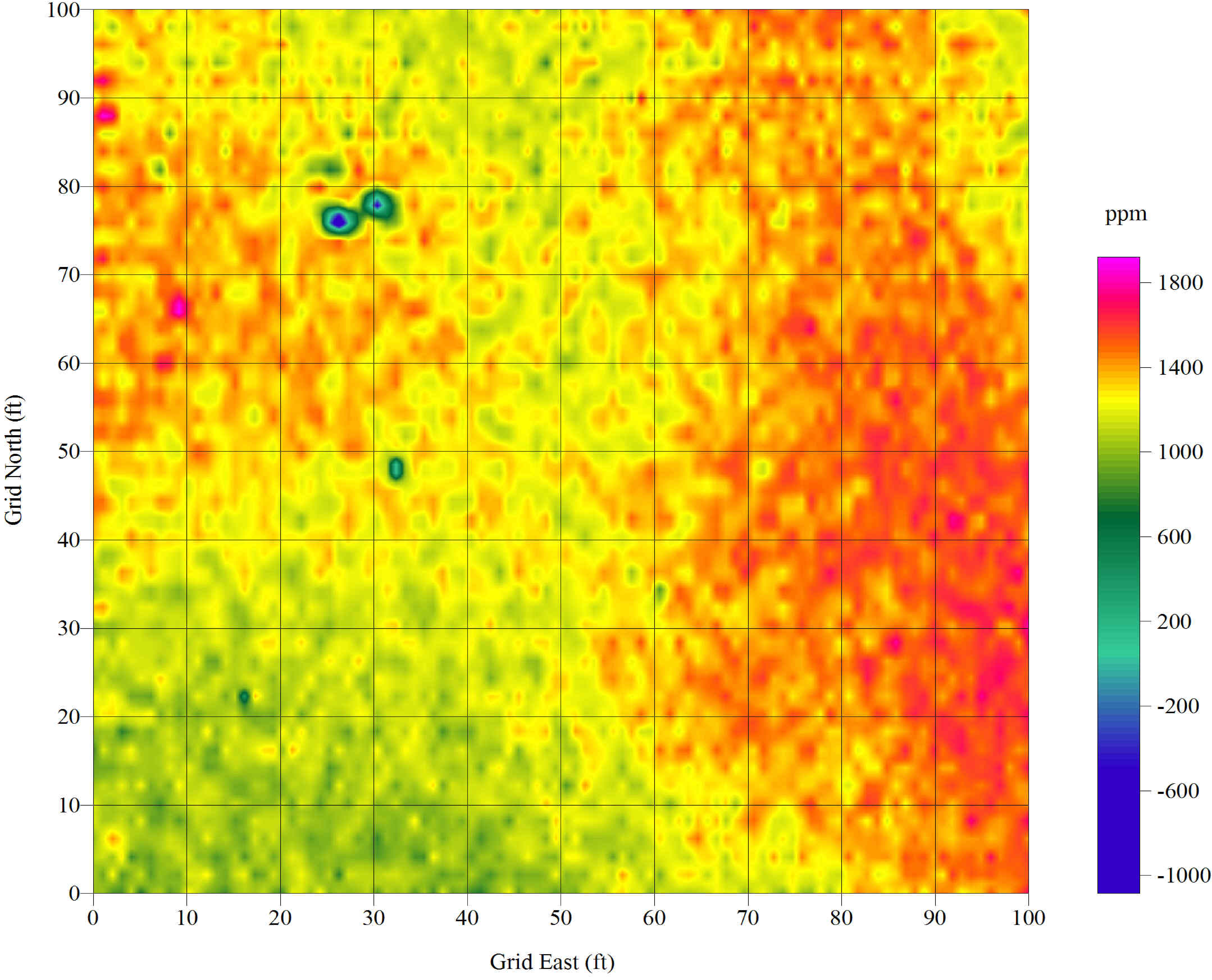


Figure B29-e

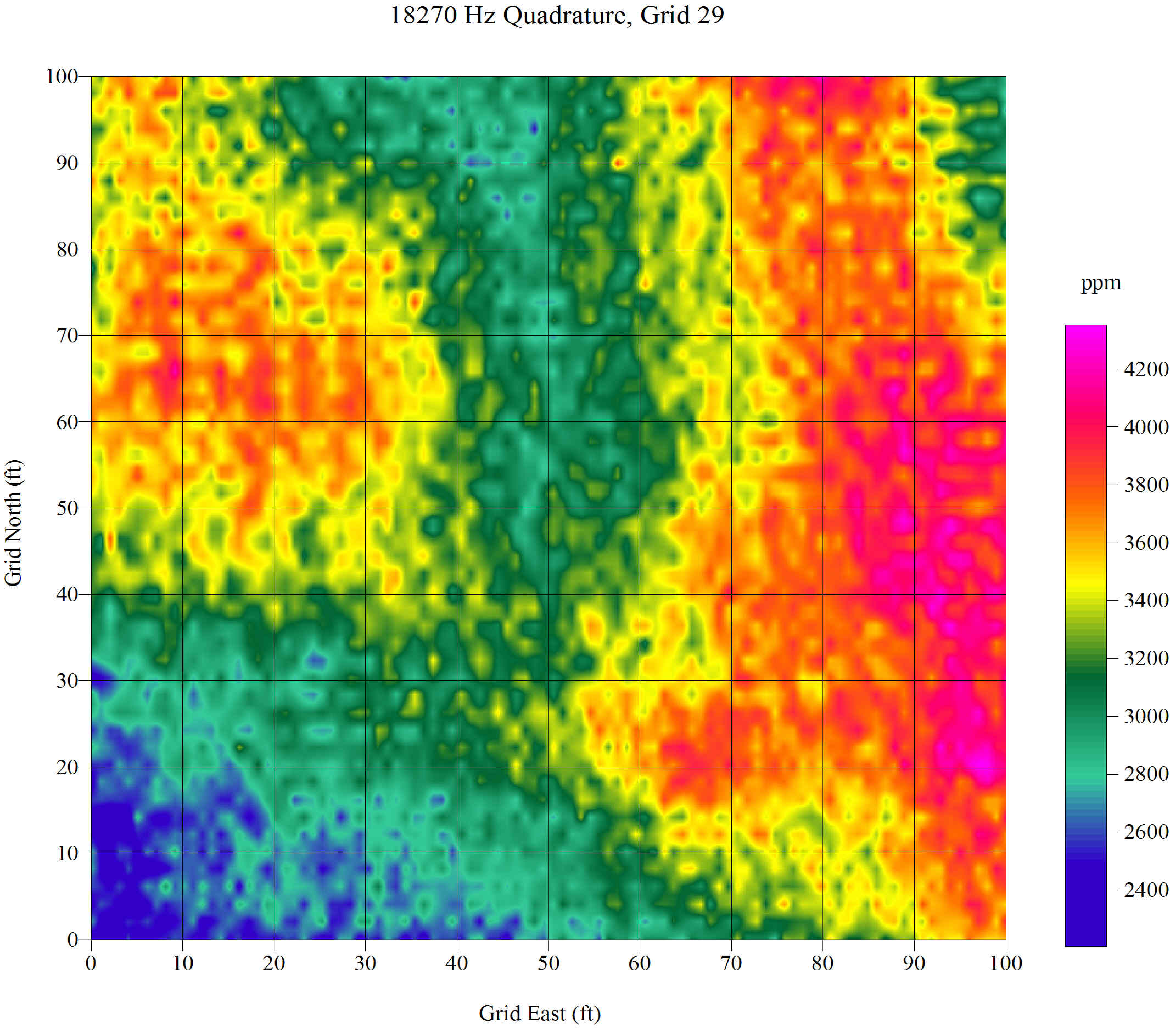
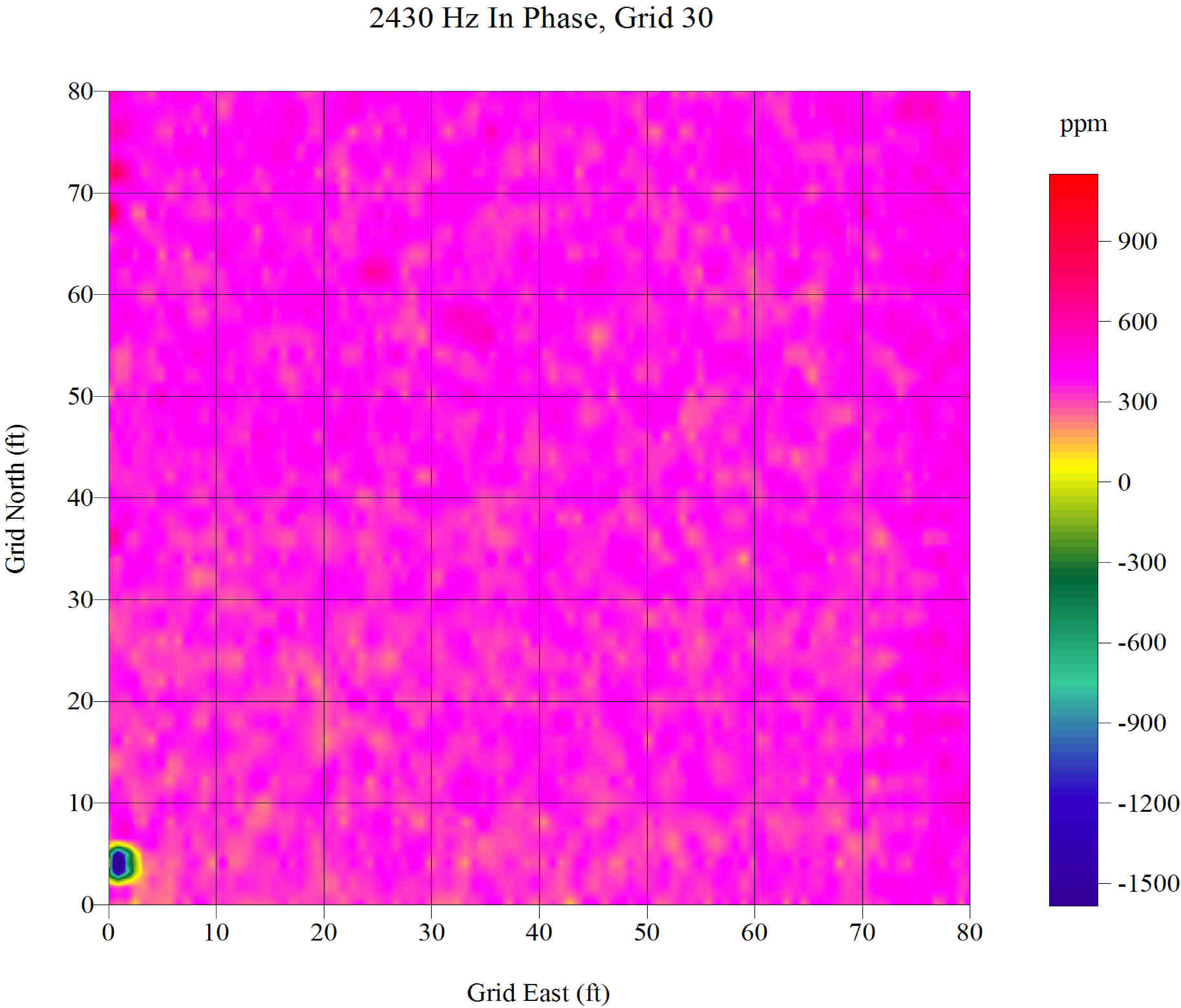

18270 Hz Quadrature, Grid 29
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200

Figure B29-f

Figure B29-g



2430 Hz In Phase, Grid 30
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
900
600
300
0
-300
-600
-900
-1200
-1500

Figure B30-a

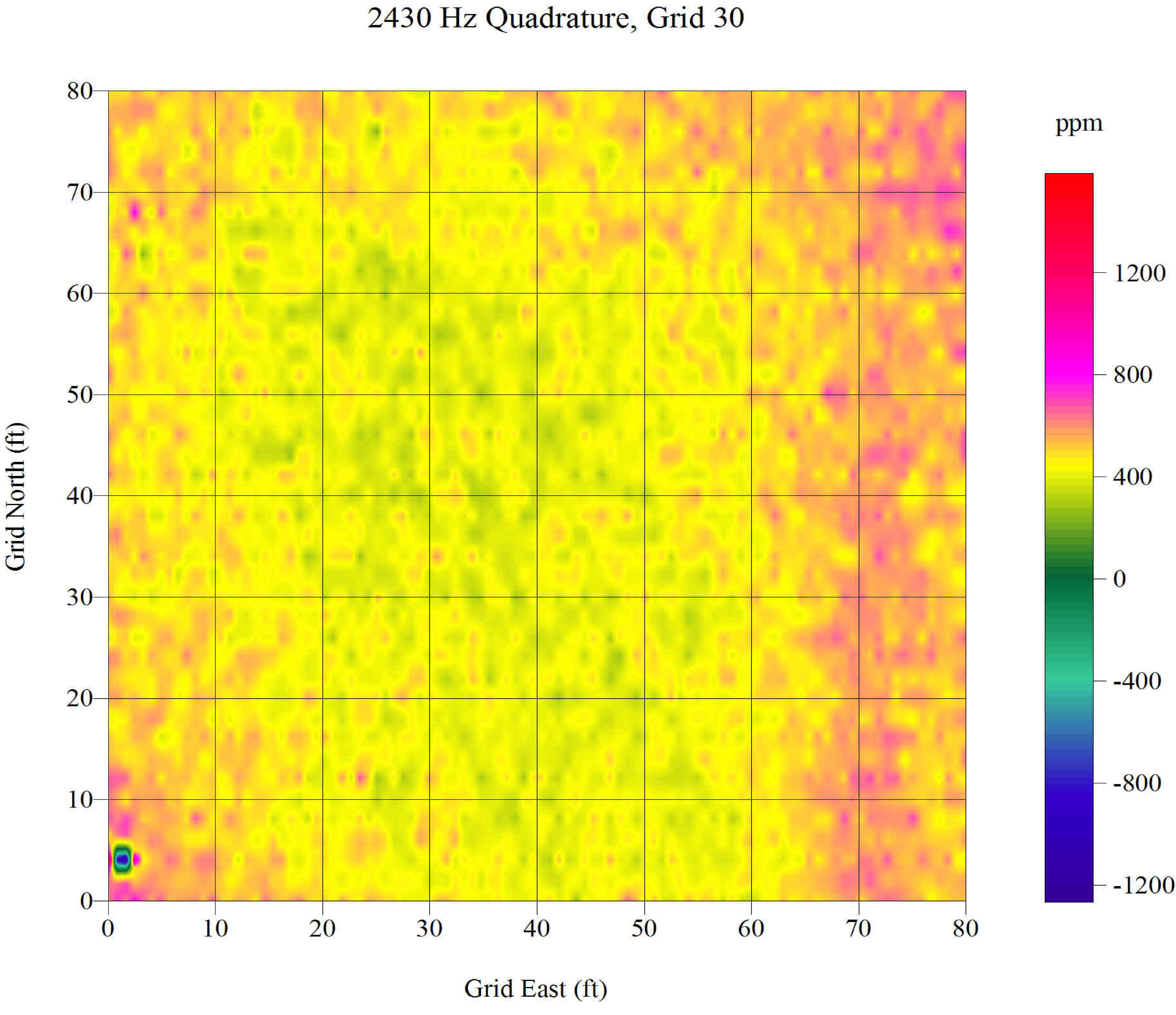

2430 Hz Quadrature, Grid 30
Grid North (ft)
Grid East (ft)
ppm
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
1200
800
400
0
-400
-800
-1200

Figure B30-b

7290 Hz In Phase, Grid 30

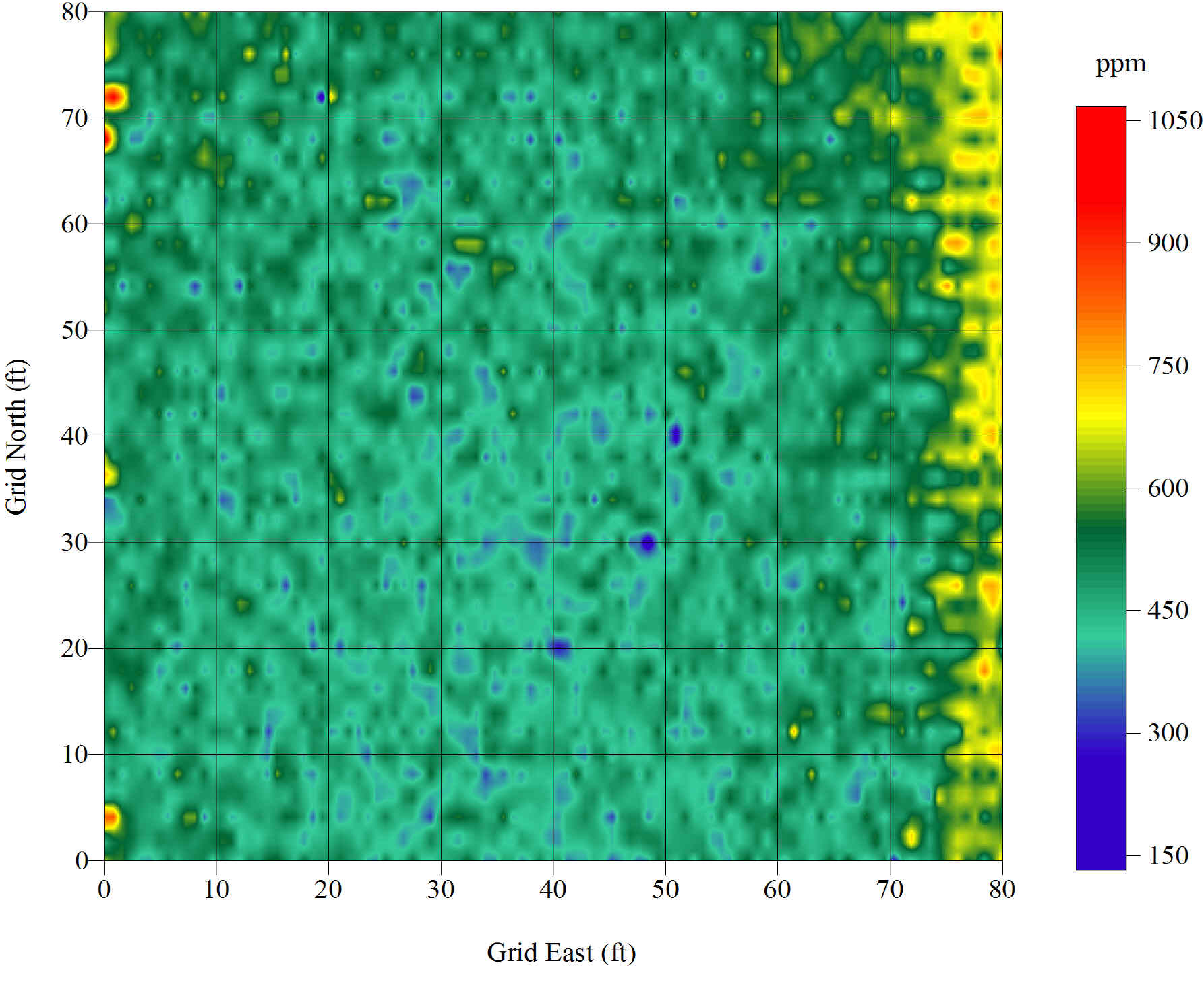


Figure B30-c

7290 Hz Quadrature, Grid 30

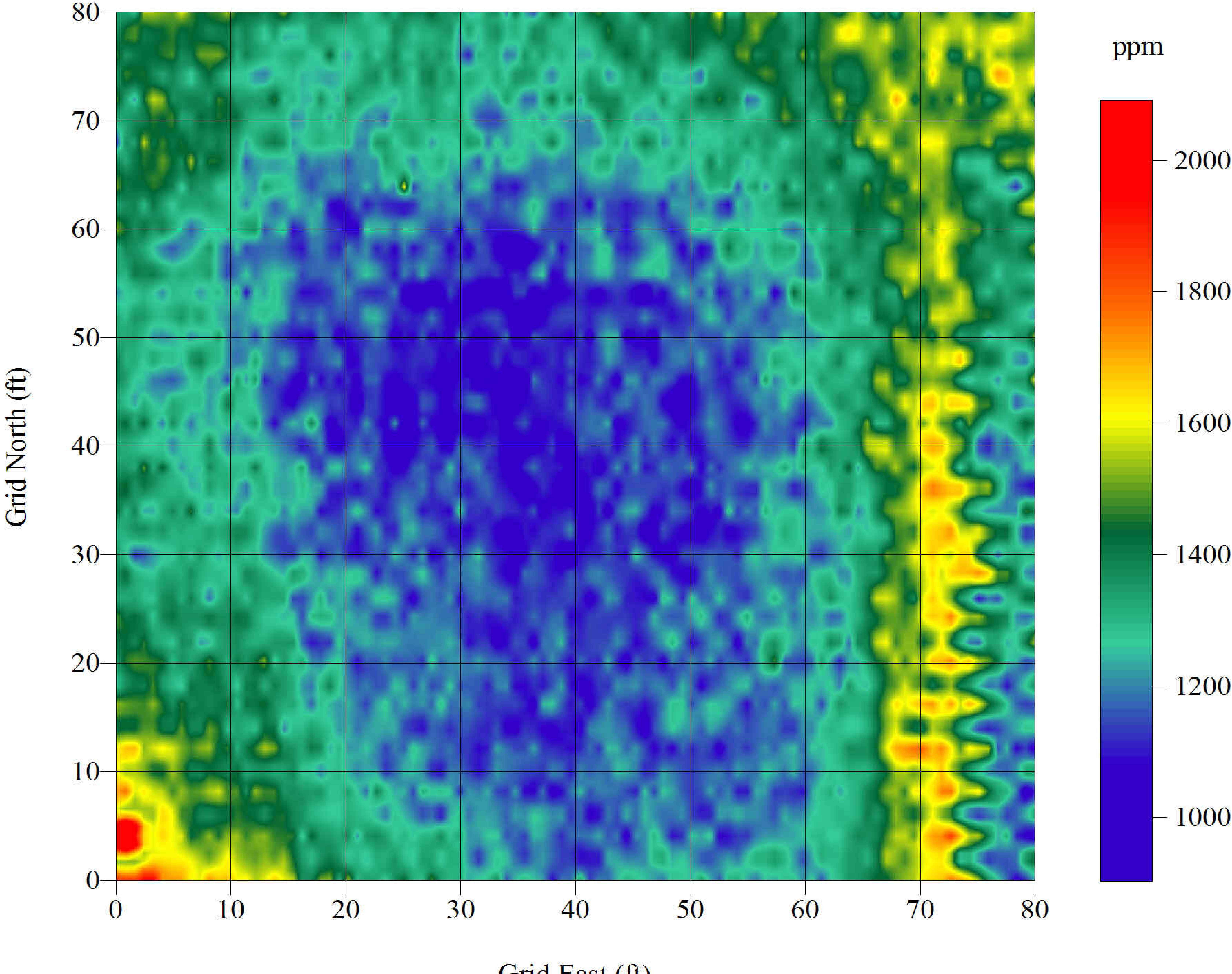


Figure B30-d

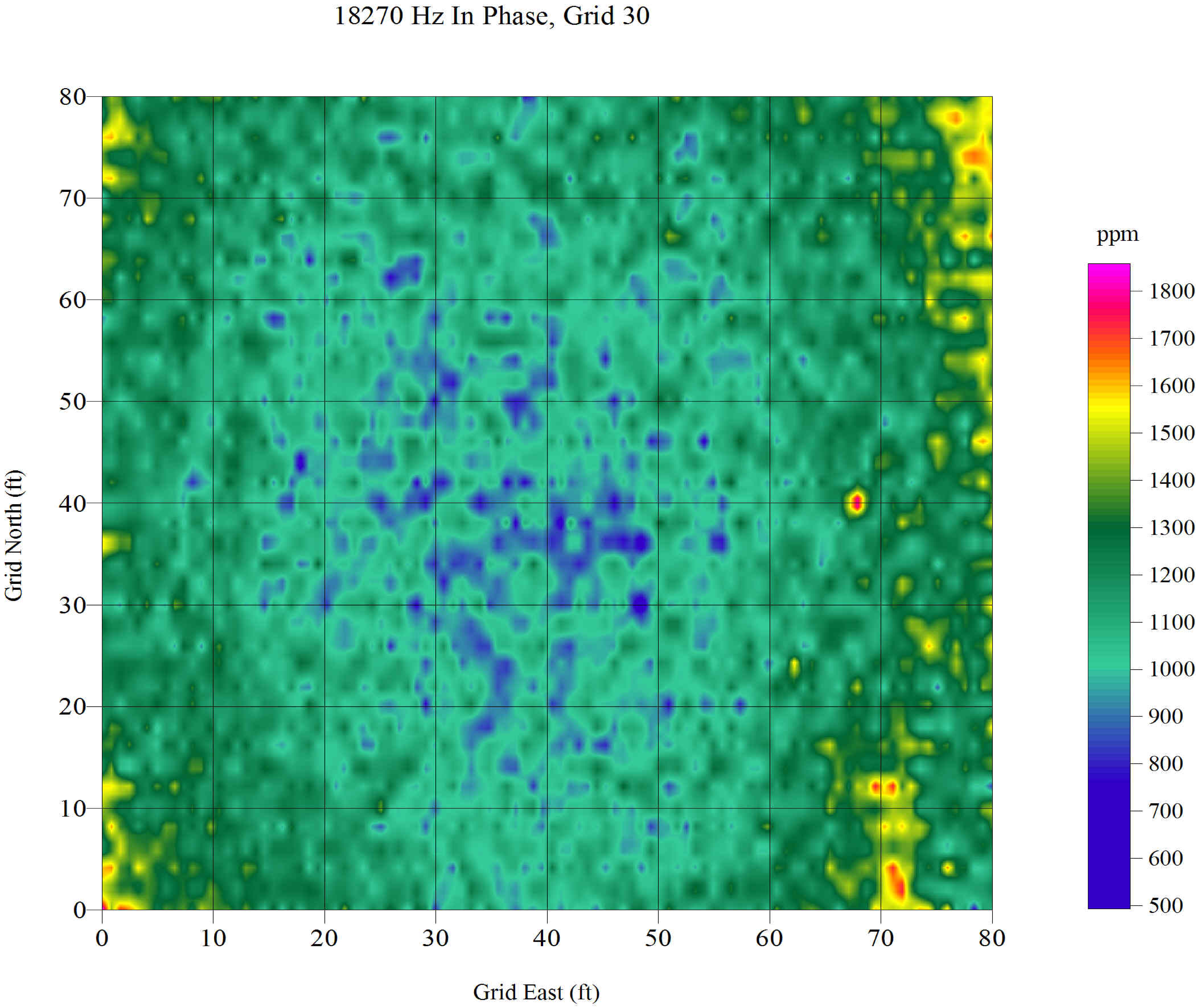

18270 Hz In Phase, Grid 30
ppm
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
Grid North (ft)
0
10
20
30
40
50
60
70
80
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B30-e

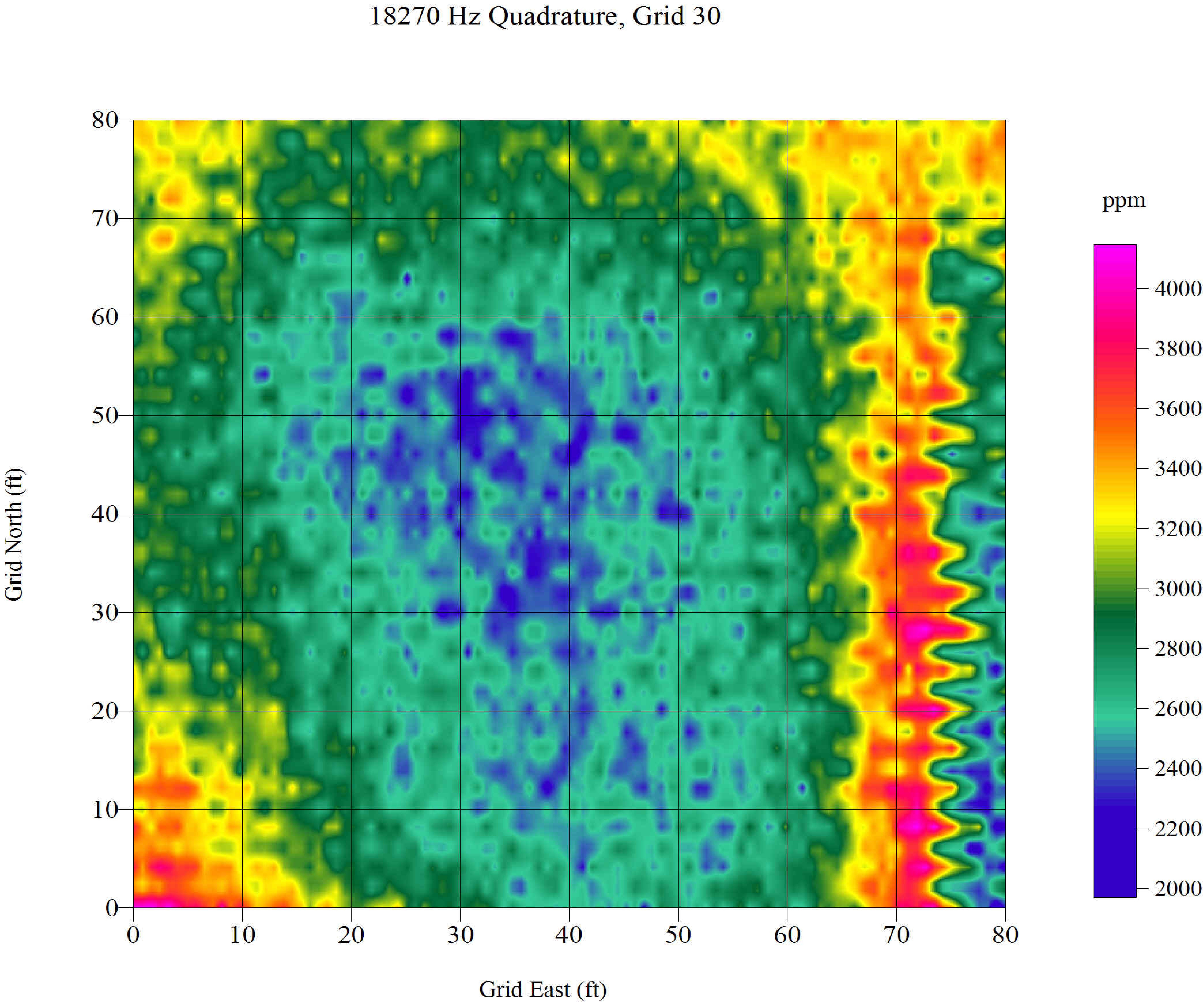

18270 Hz Quadrature, Grid 30
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000

Figure B30-f

2430 Hz In Phase, Grid 31

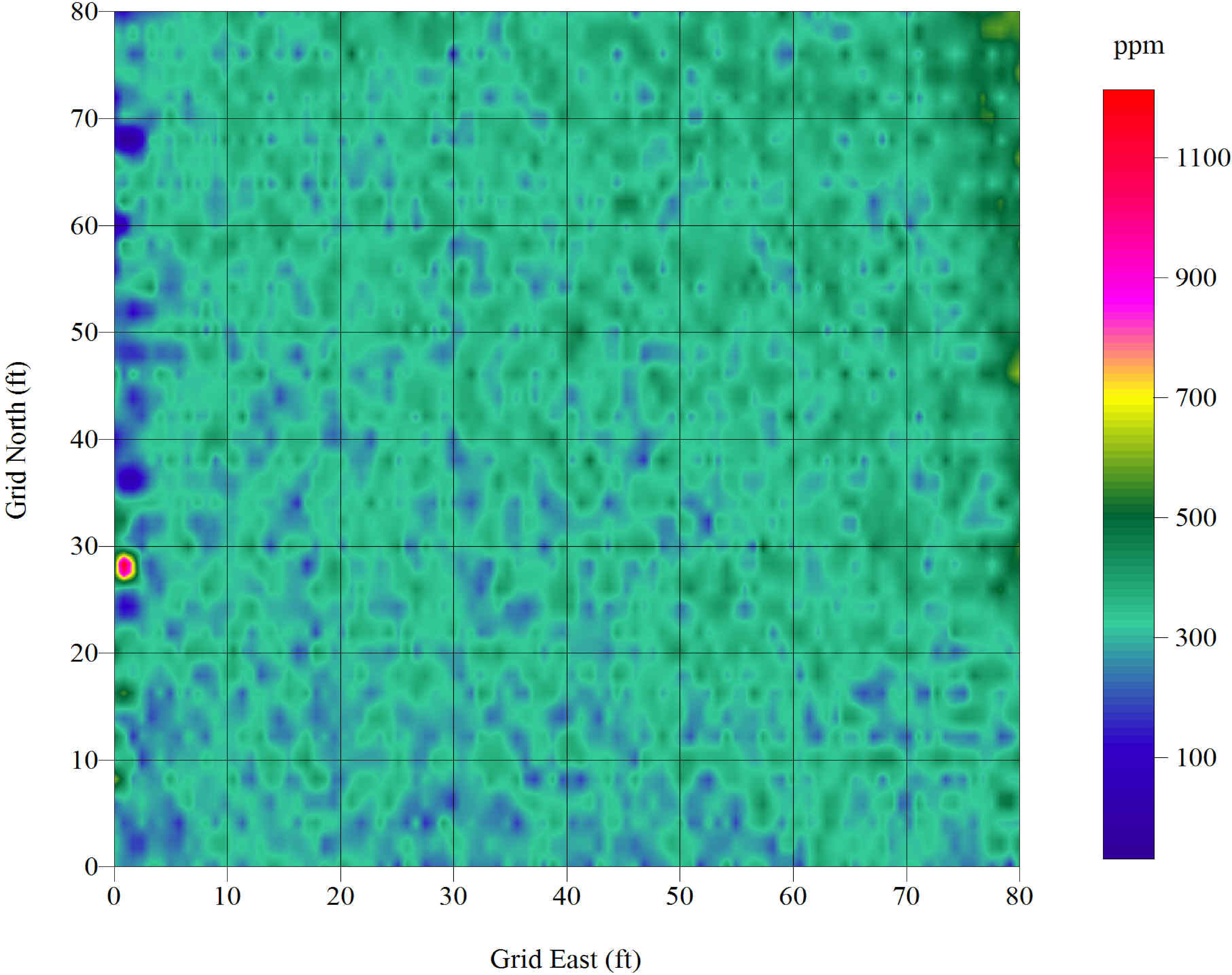


Figure B31-a

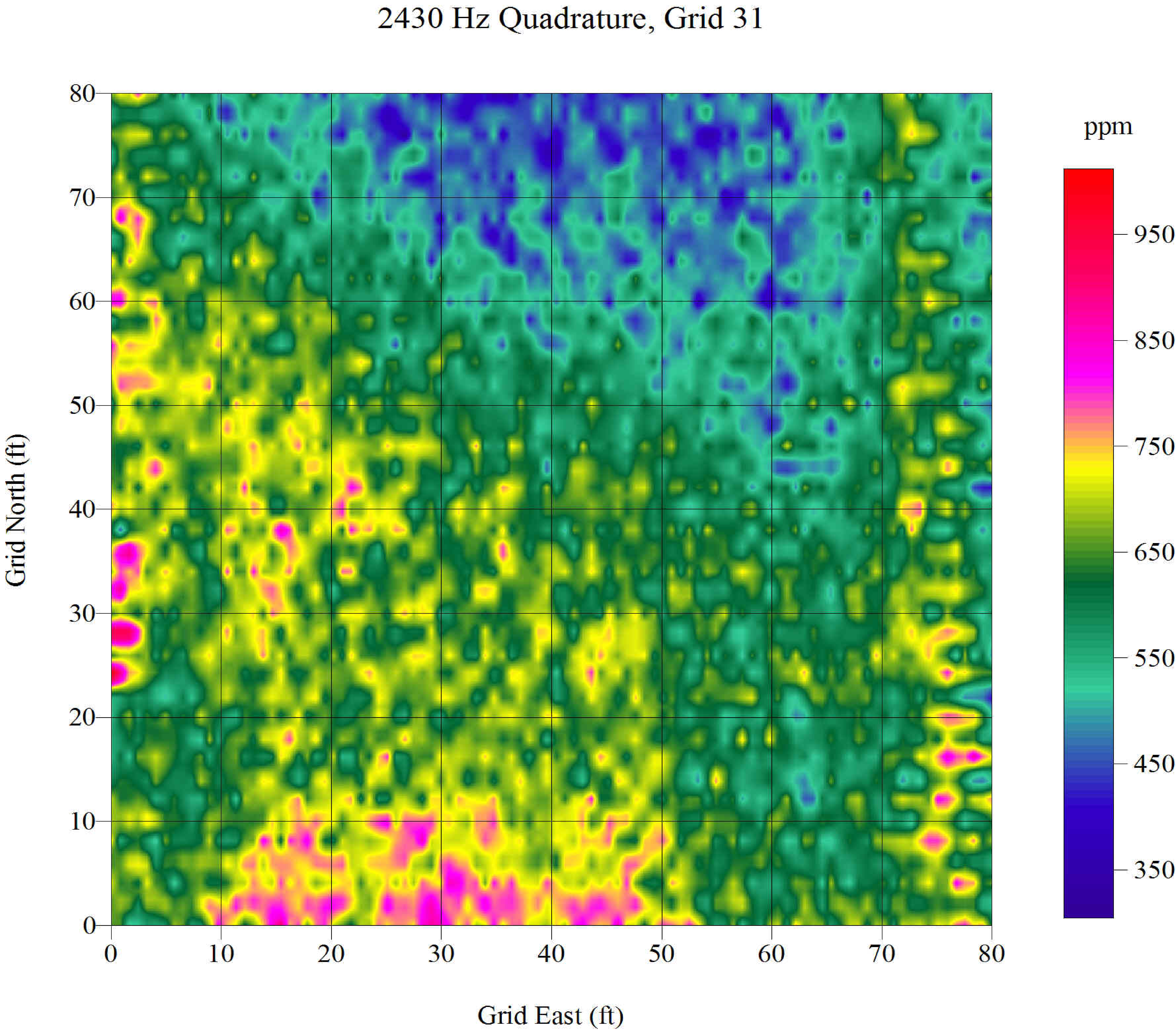

2430 Hz Quadrature, Grid 31
ppm
950
850
750
650
550
450
350
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B31-b

7290 Hz In Phase, Grid 31

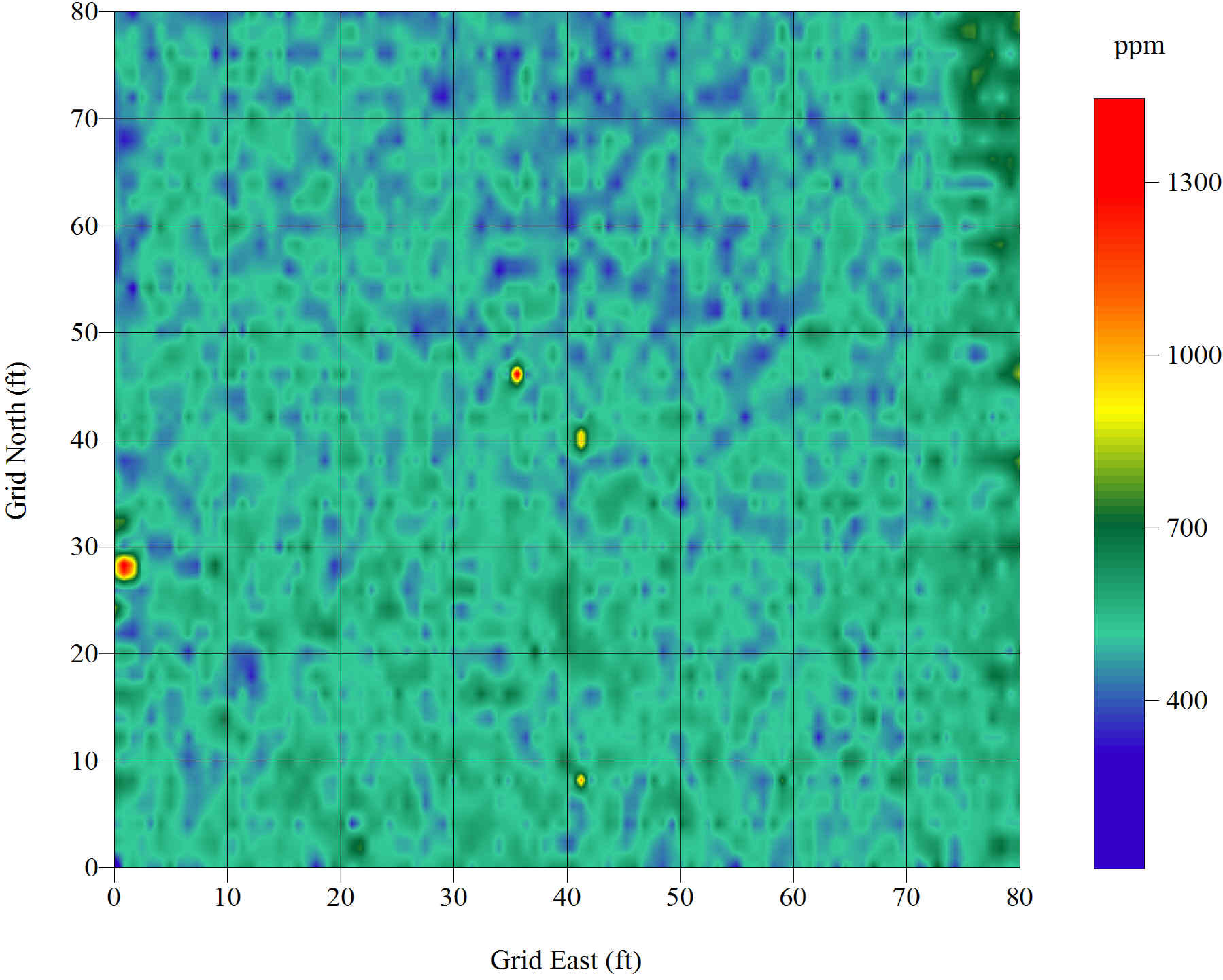


Figure B31-c

7290 Hz Quadrature, Grid 31

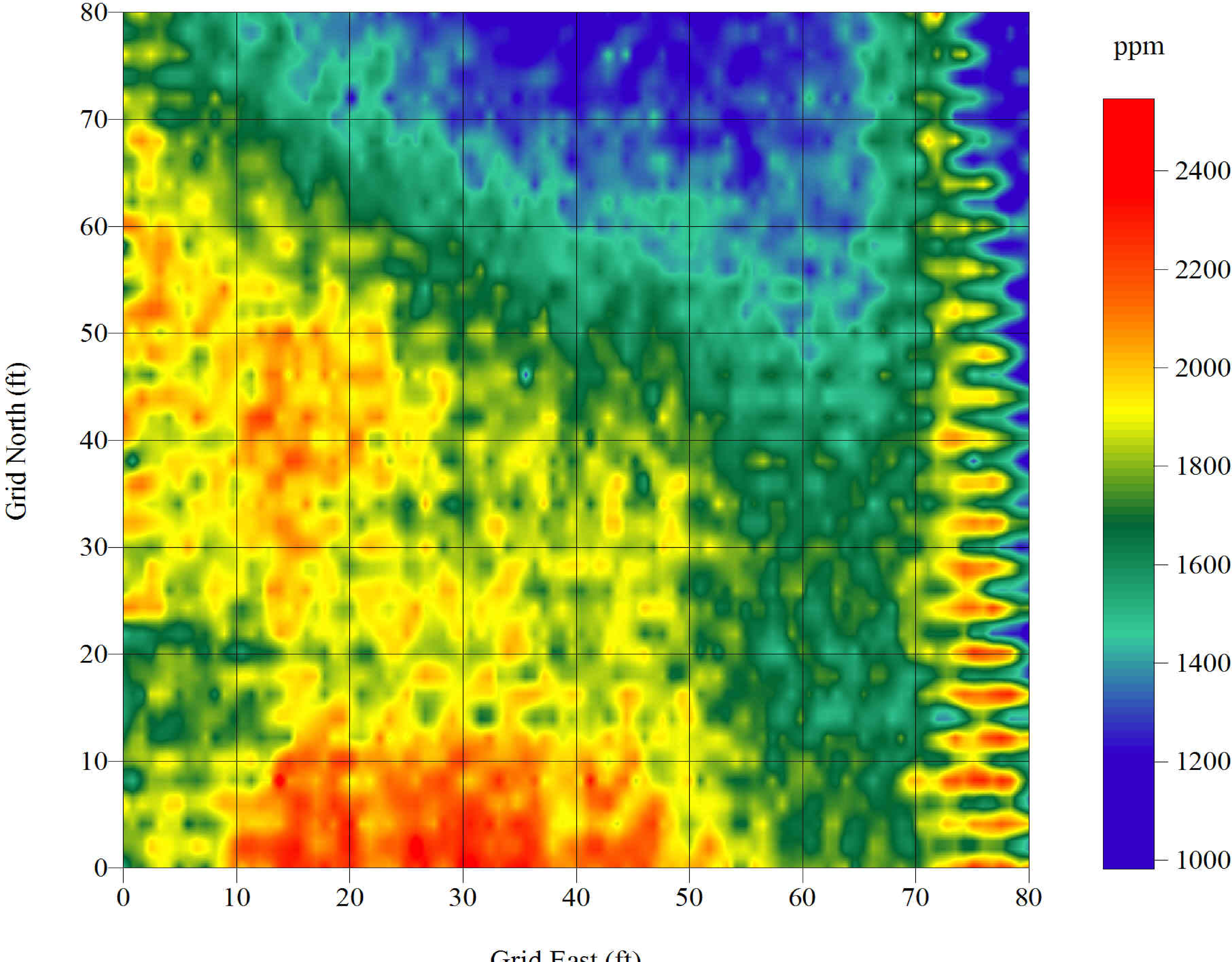


Figure B31-d

18270 Hz In Phase, Grid 31

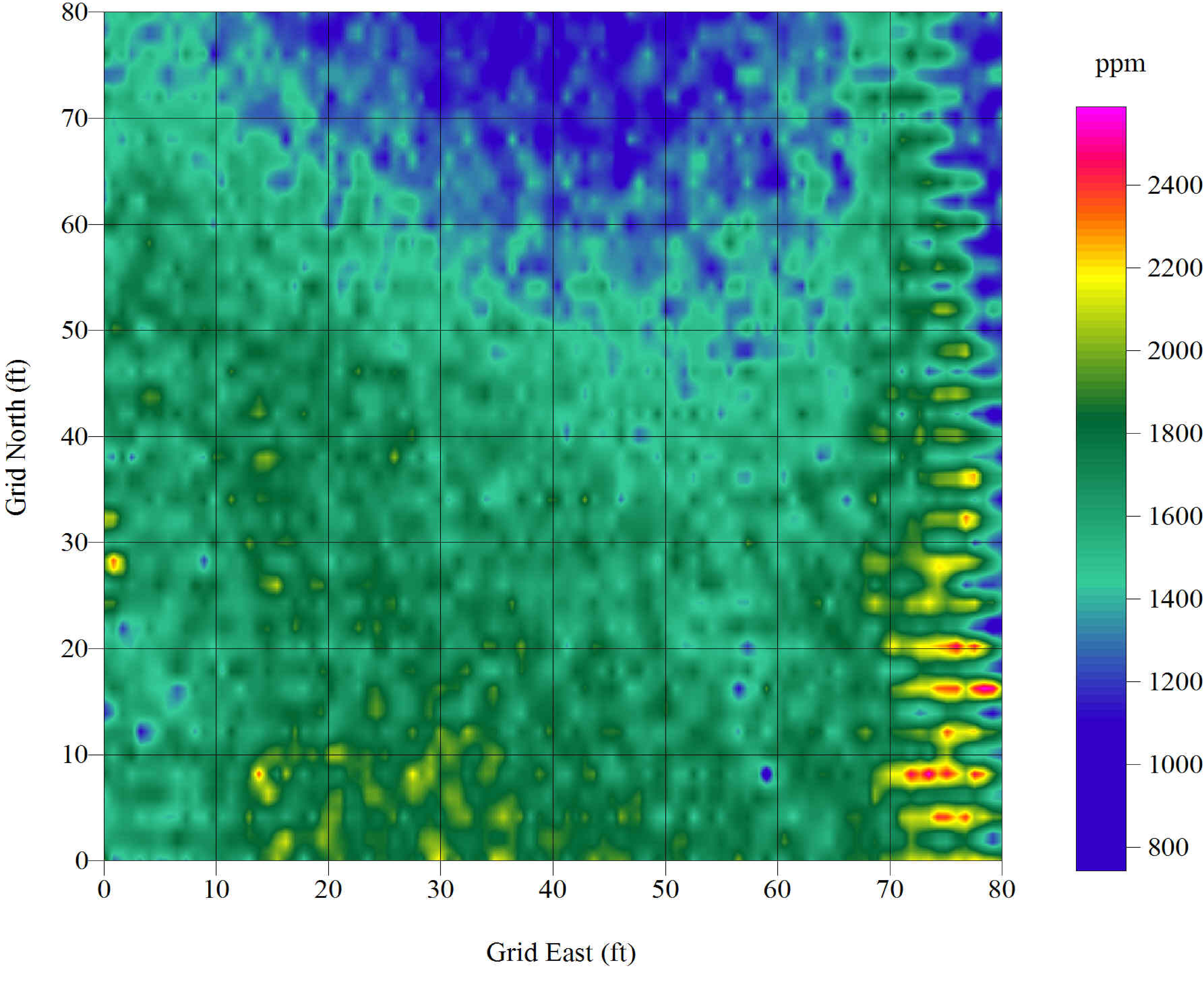


Figure B31-e

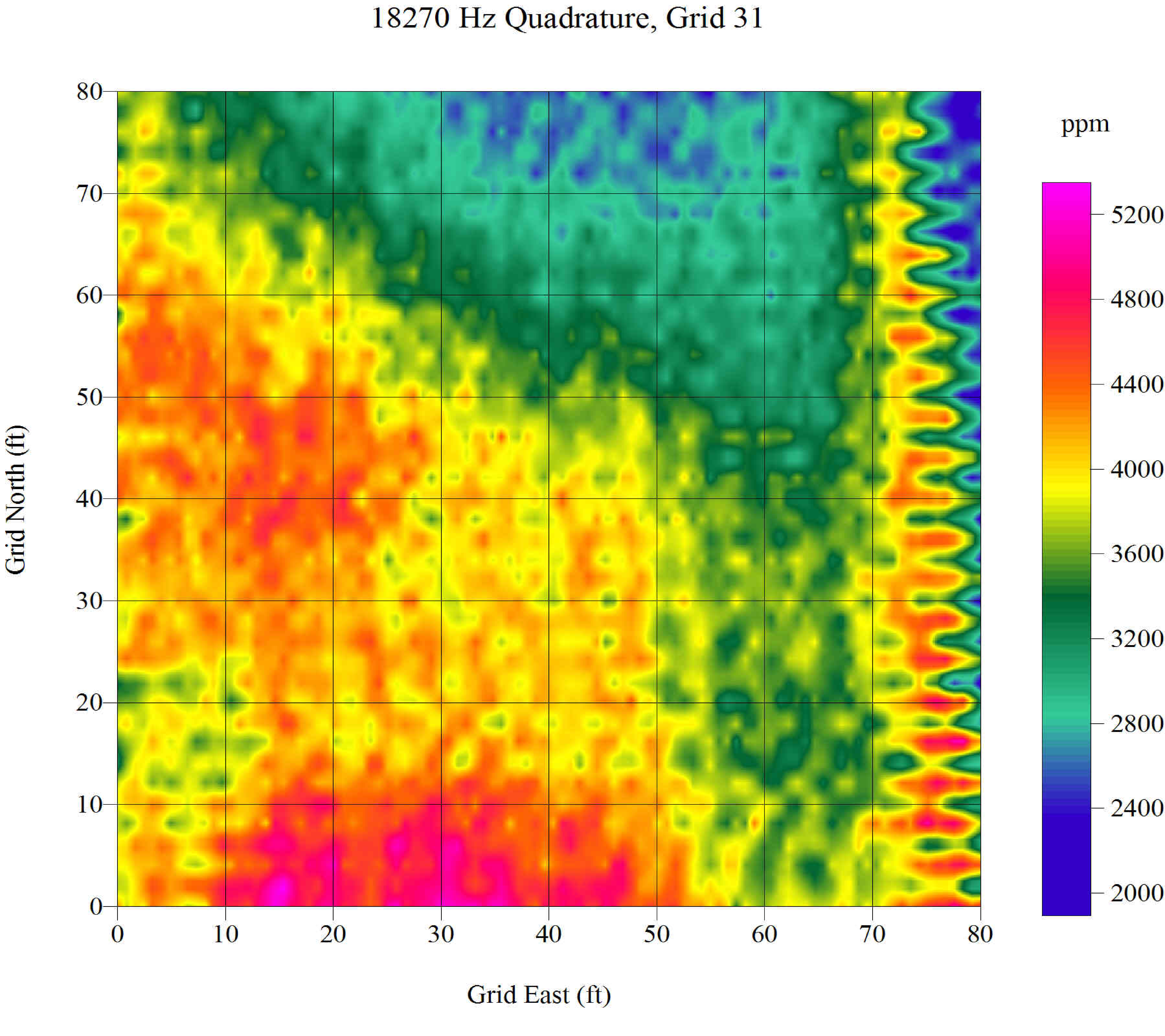

18270 Hz Quadrature, Grid 31
ppm
5200
4800
4400
4000
3600
3200
2800
2400
2000
Grid North (ft)
0
10
20
30
40
50
60
70
80
Grid East (ft)

Figure B31-f

2430 Hz In Phase, Grid 32

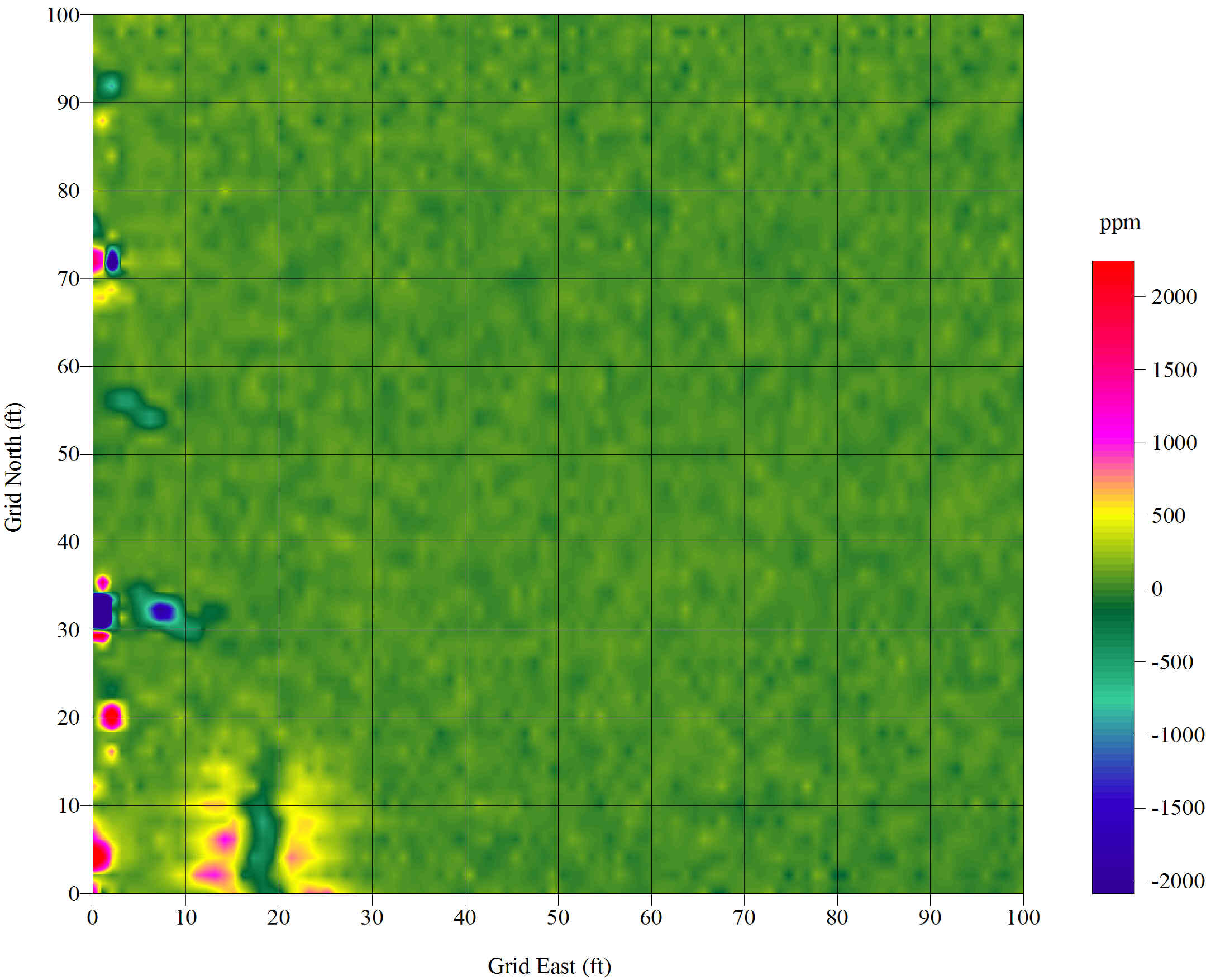


Figure B32-a

2430 Hz Quadrature, Grid 32

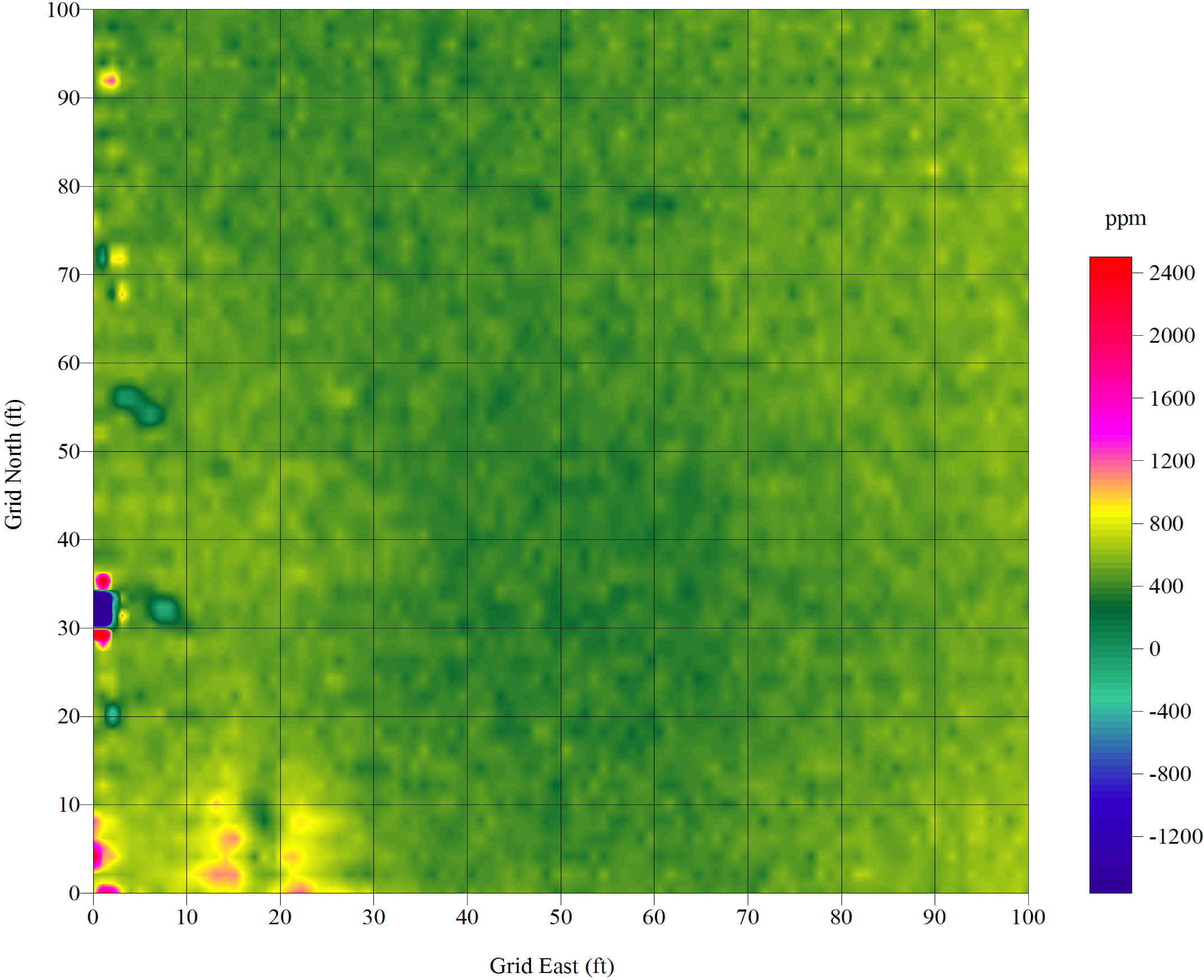


Figure B32-b

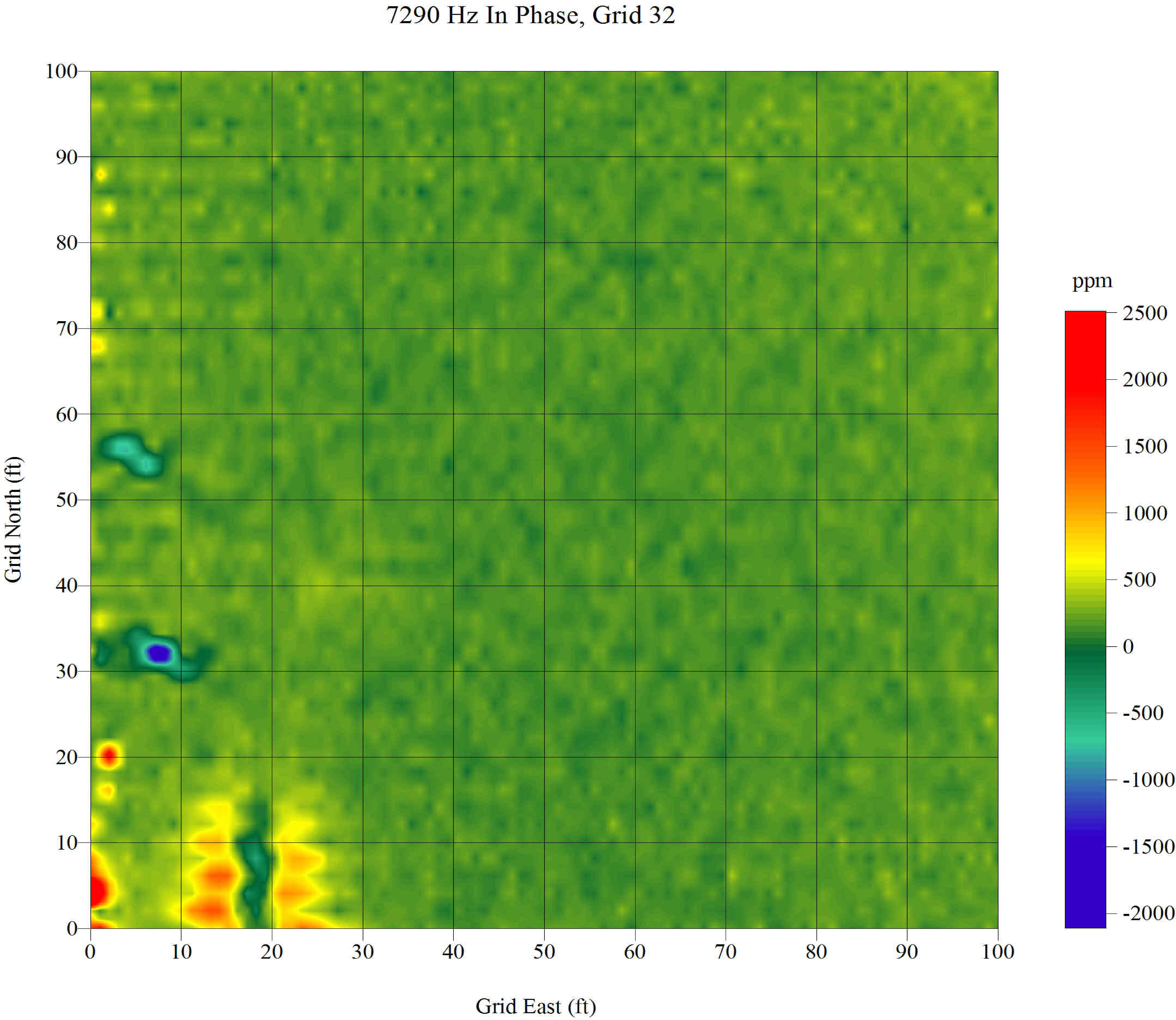

7290 Hz In Phase, Grid 32
Grid North (ft)
Grid East (ft)
ppm
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
0
10
20
30
40
50
60
70
80
90
100

Figure B32-c

7290 Hz Quadrature, Grid 32

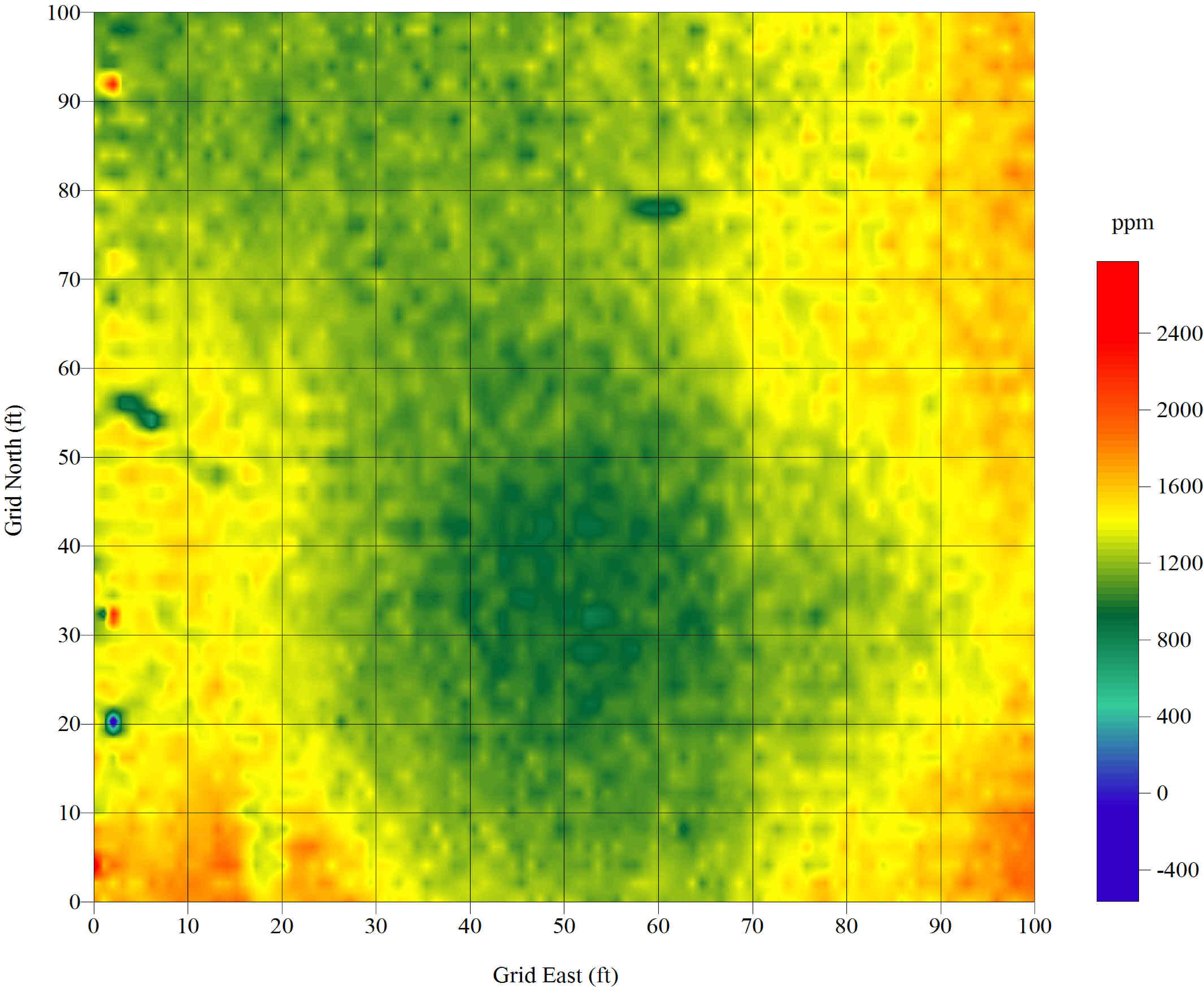


Figure B32-d

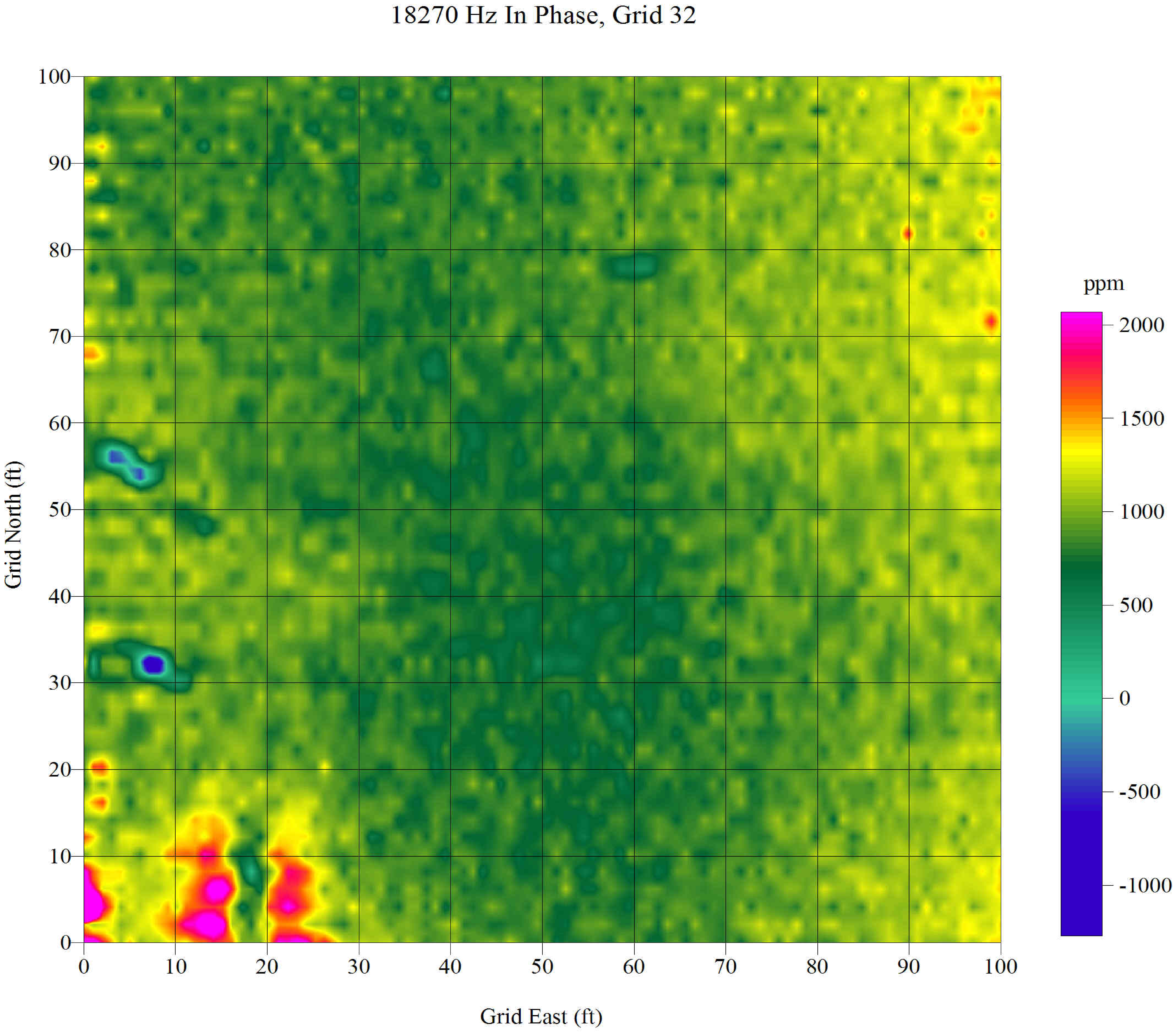
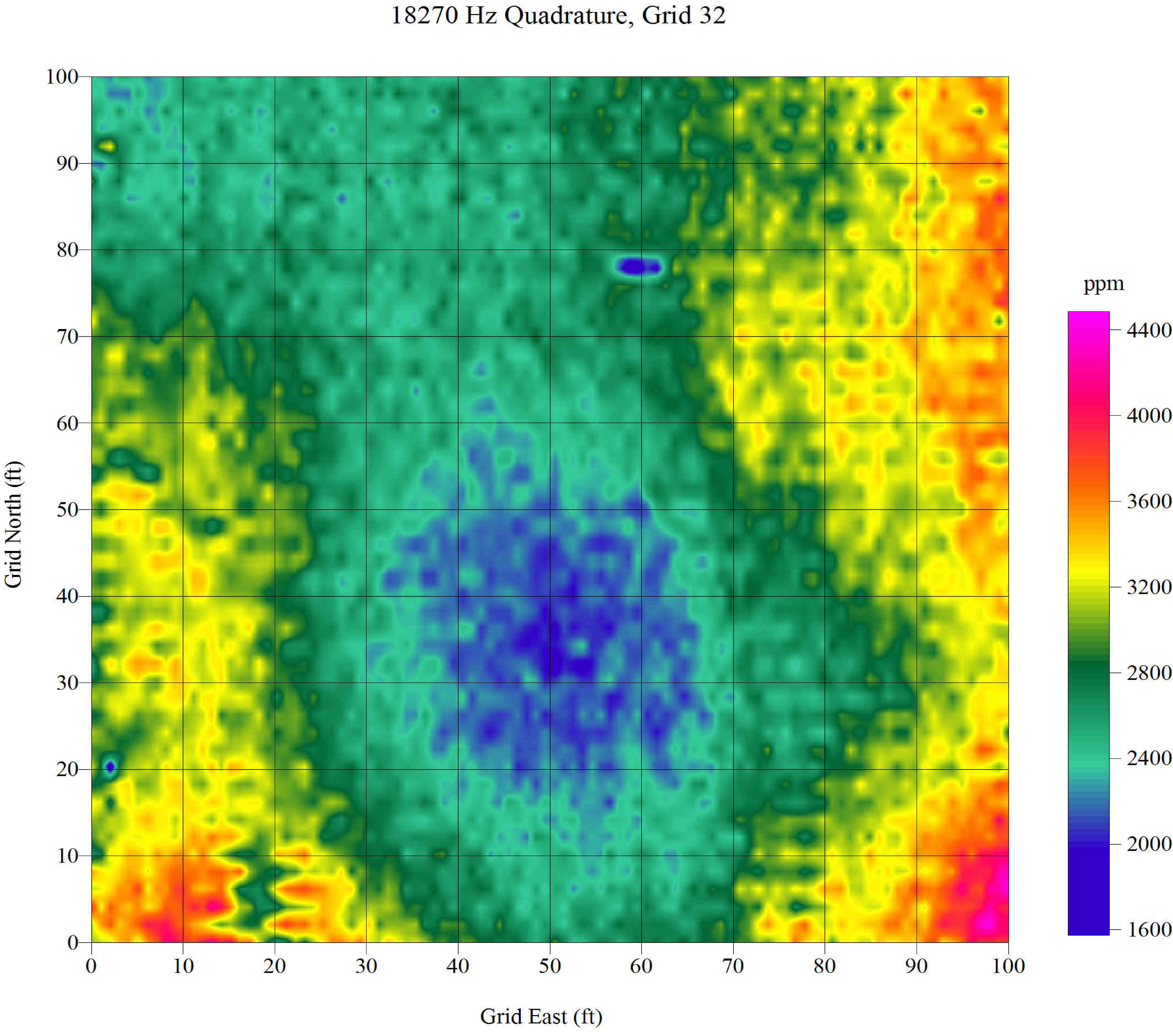

18270 Hz In Phase, Grid 32
Grid North (ft)
Grid East (ft)
ppm
2000
1500
1000
500
0
-500
-1000
0
10
20
30
40
50
60
70
80
90
100

Figure B32-e



18270 Hz Quadrature, Grid 32
Grid North (ft)
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
ppm
1600
2000
2400
2800
3200
3600
4000
4400

Figure B32-f

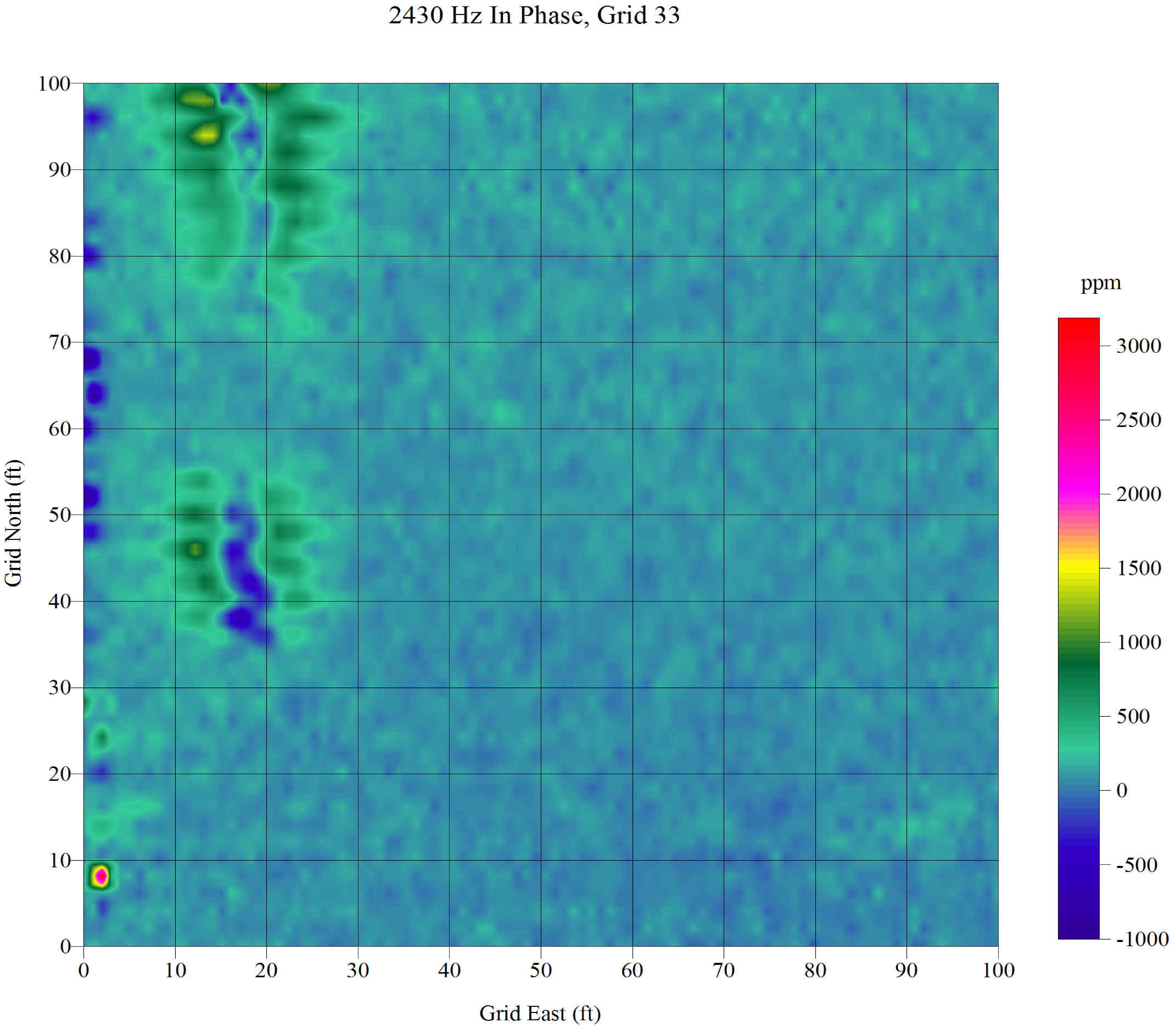

2430 Hz In Phase, Grid 33
Grid North (ft)
Grid East (ft)
ppm
3000
2500
2000
1500
1000
500
0
-500
-1000
0
10
20
30
40
50
60
70
80
90
100

Figure B33-a

2430 Hz Quadrature, Grid 33

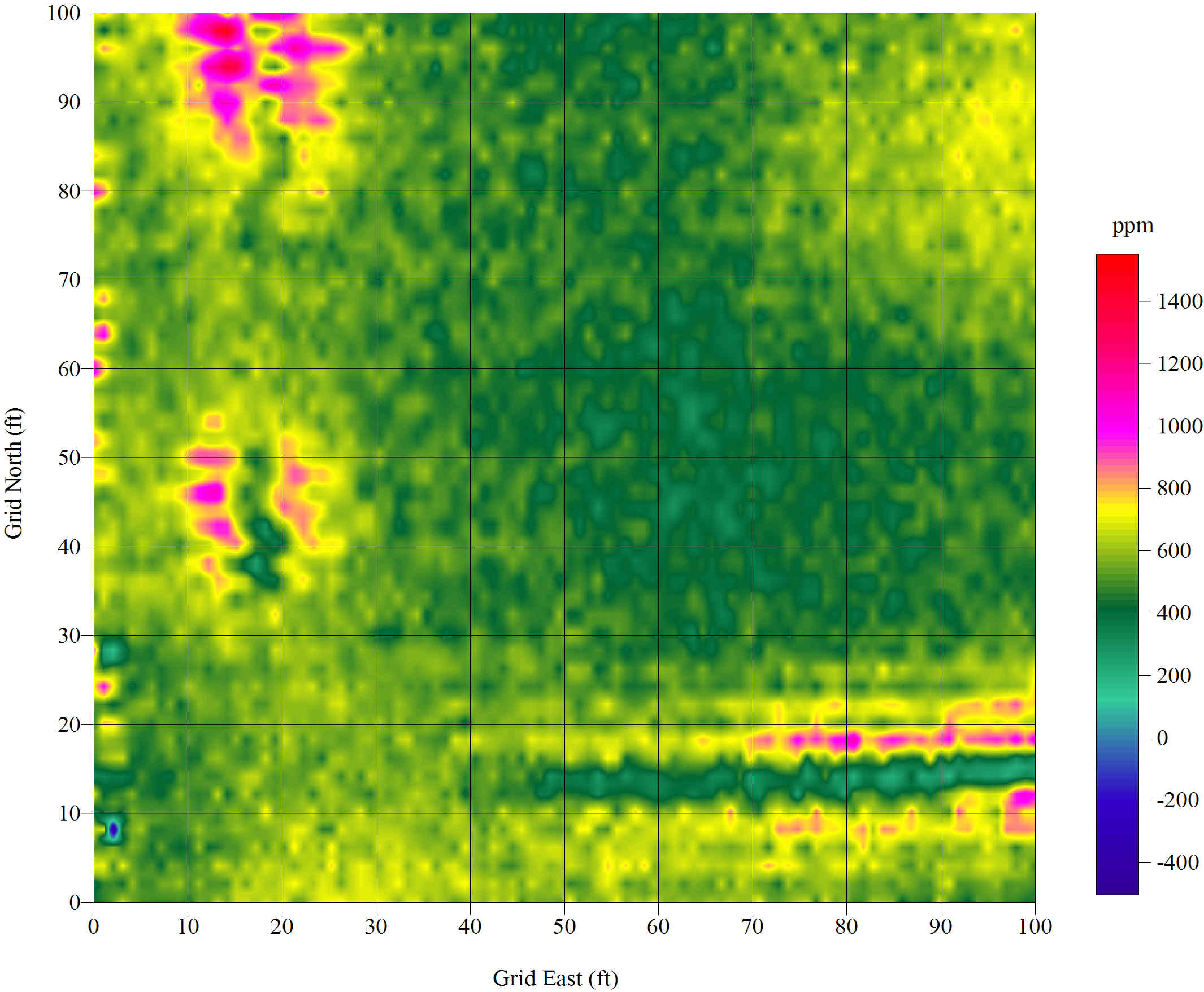


Figure B33-b

7290 Hz In Phase, Grid 33

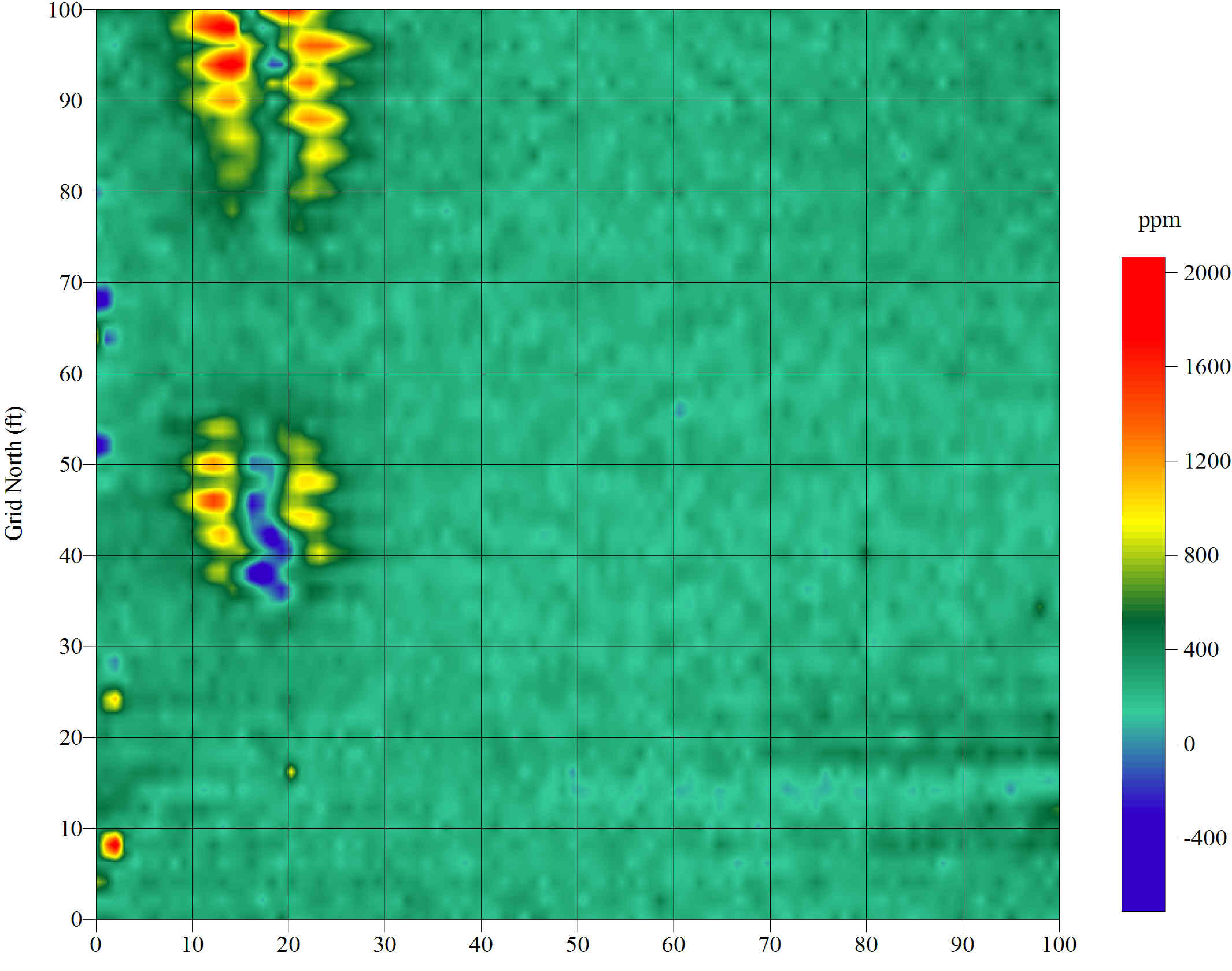


Figure B33-c

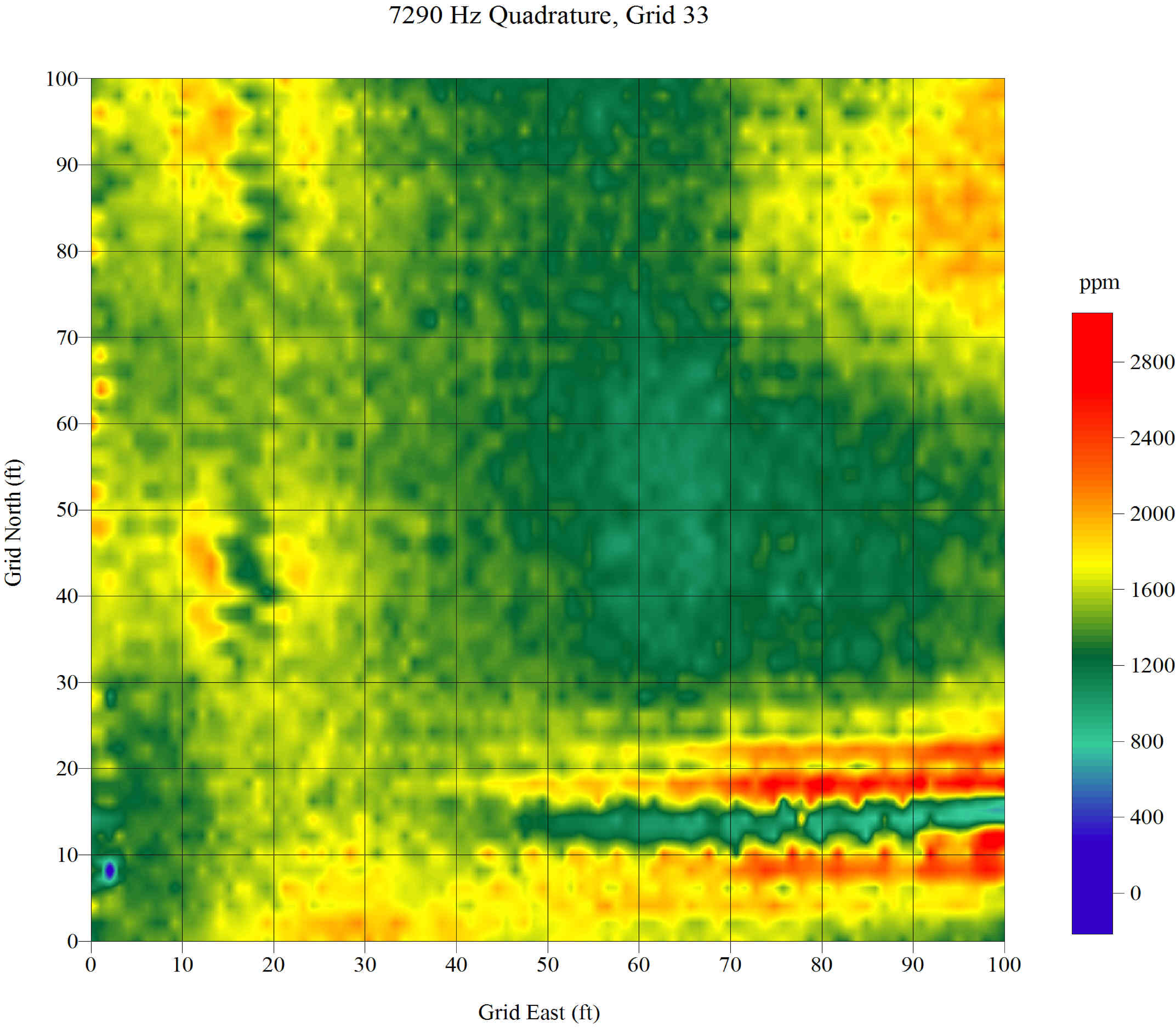

7290 Hz Quadrature, Grid 33
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
400
800
1200
1600
2000
2400
2800

Figure B33-d

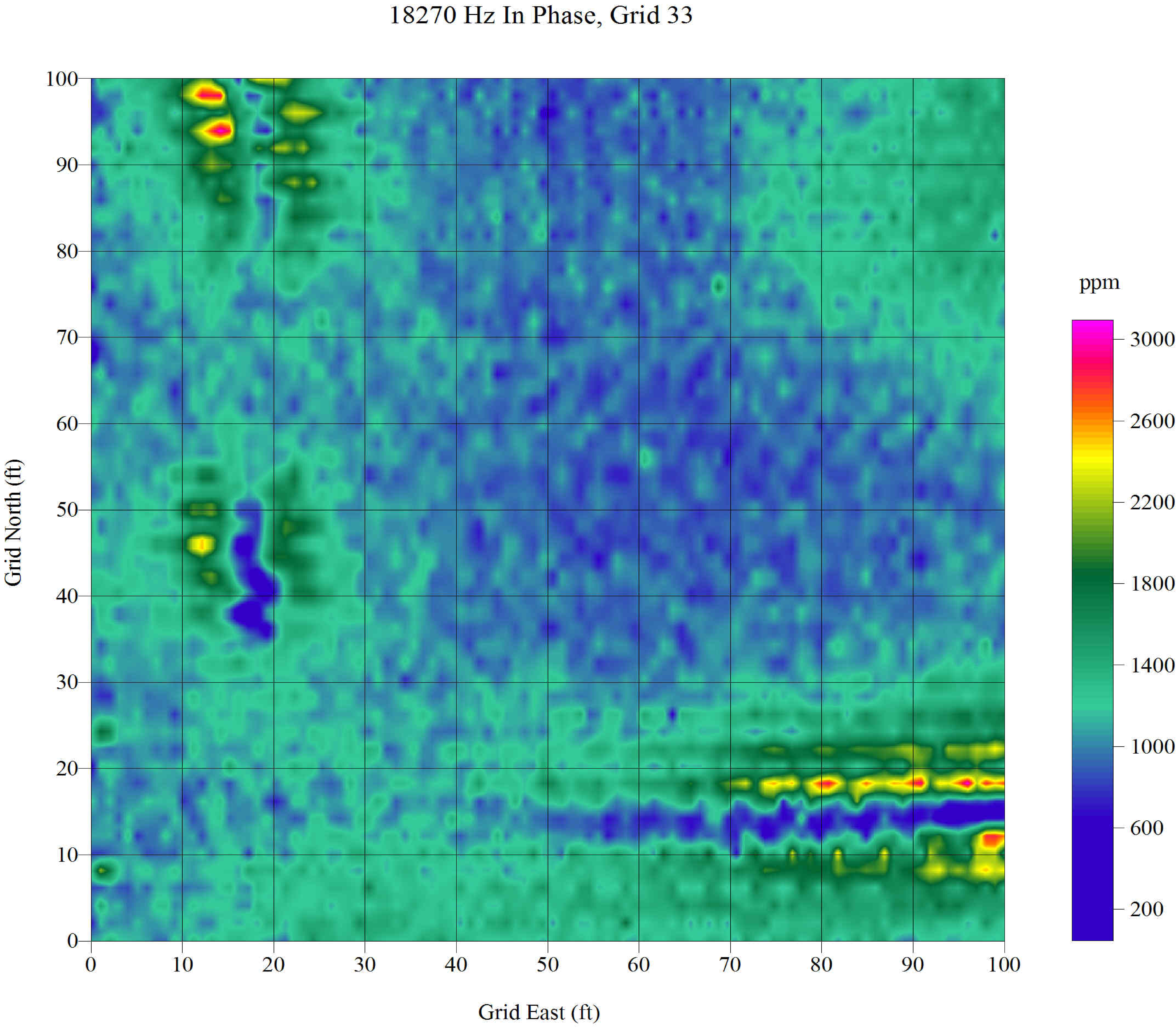

18270 Hz In Phase, Grid 33
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
200
600
1000
1400
1800
2200
2600
3000

Figure B33-e

18270 Hz Quadrature, Grid 33

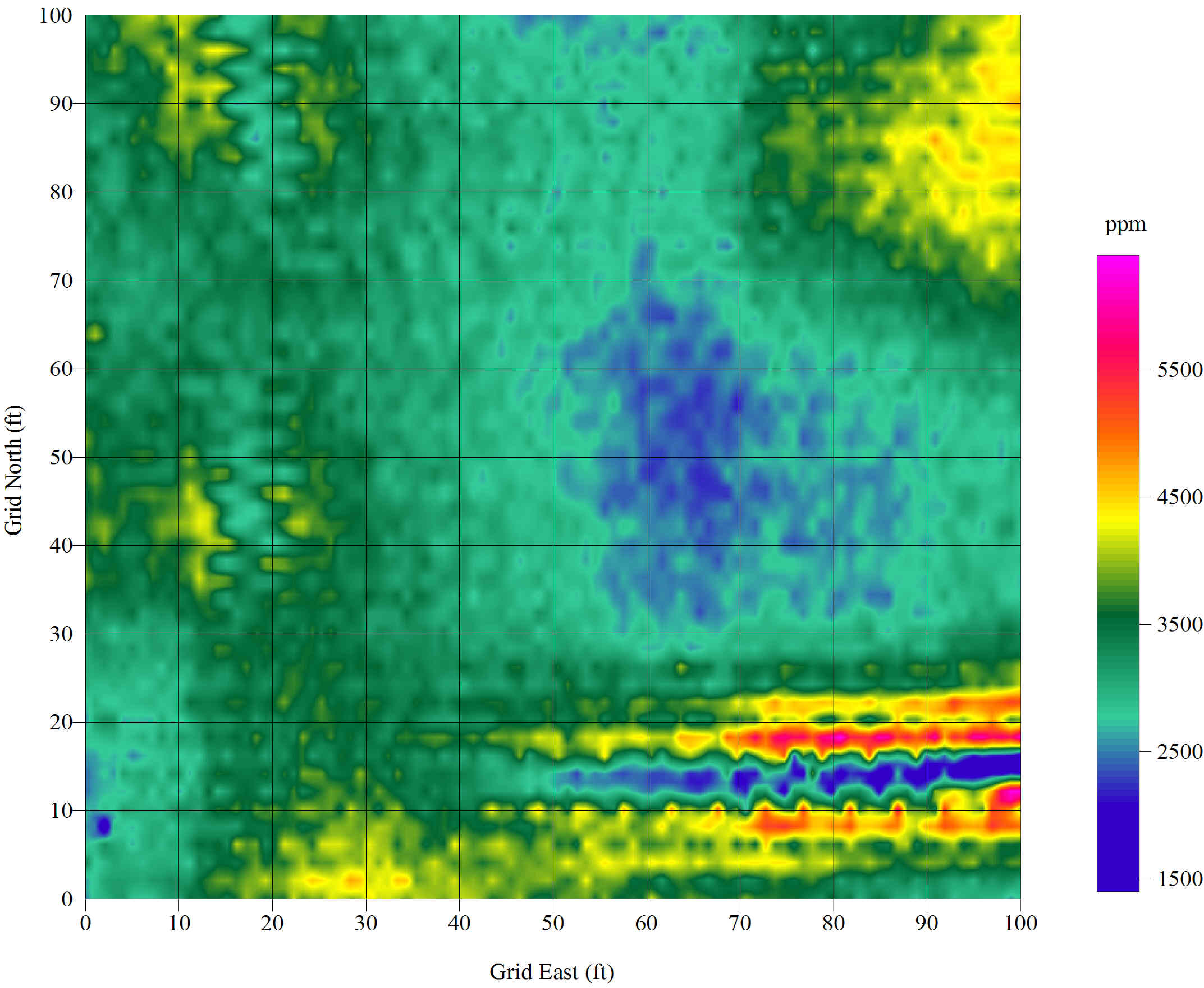


Figure B33-f

2430 Hz In Phase, Grid 34

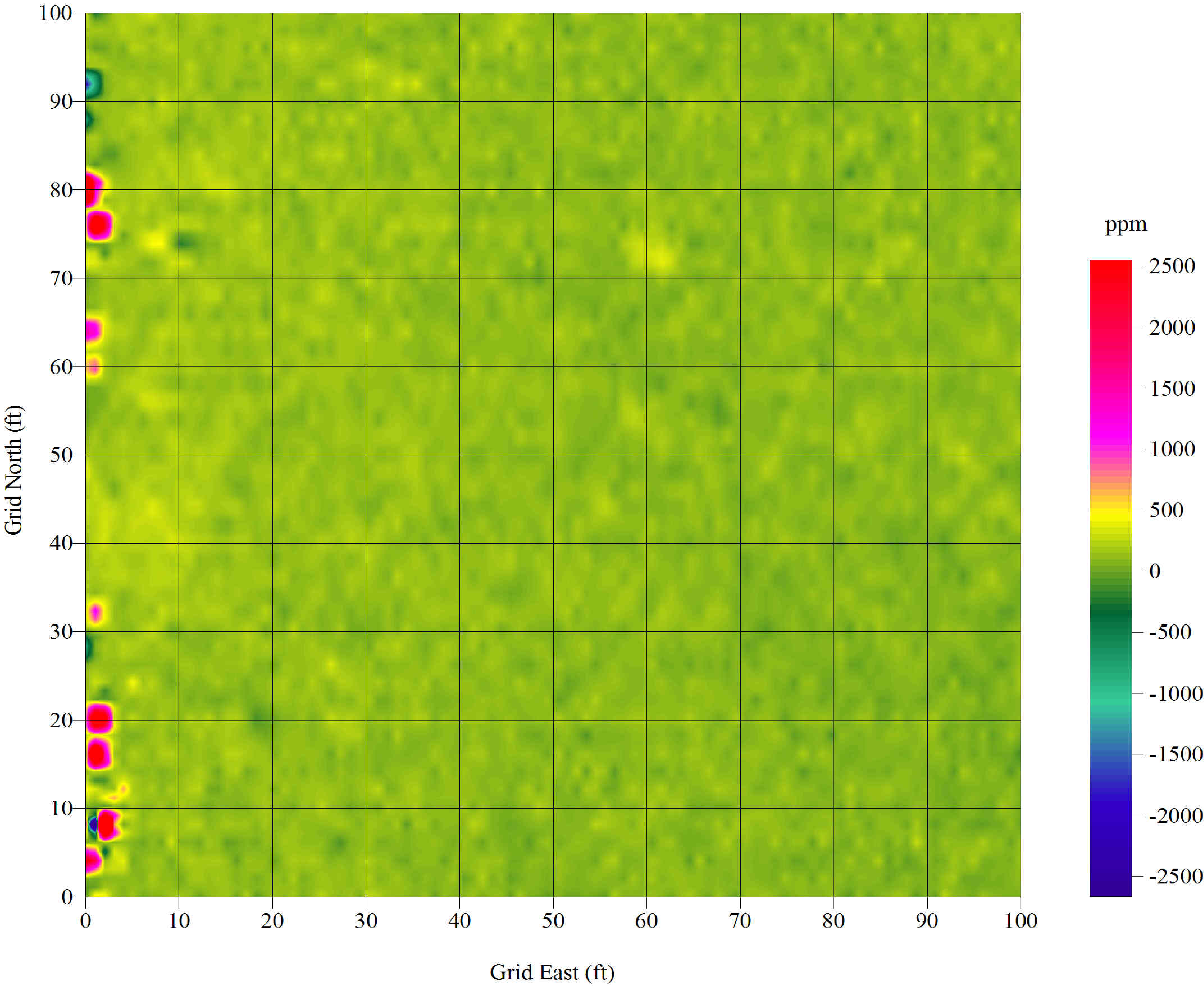


Figure B34-a

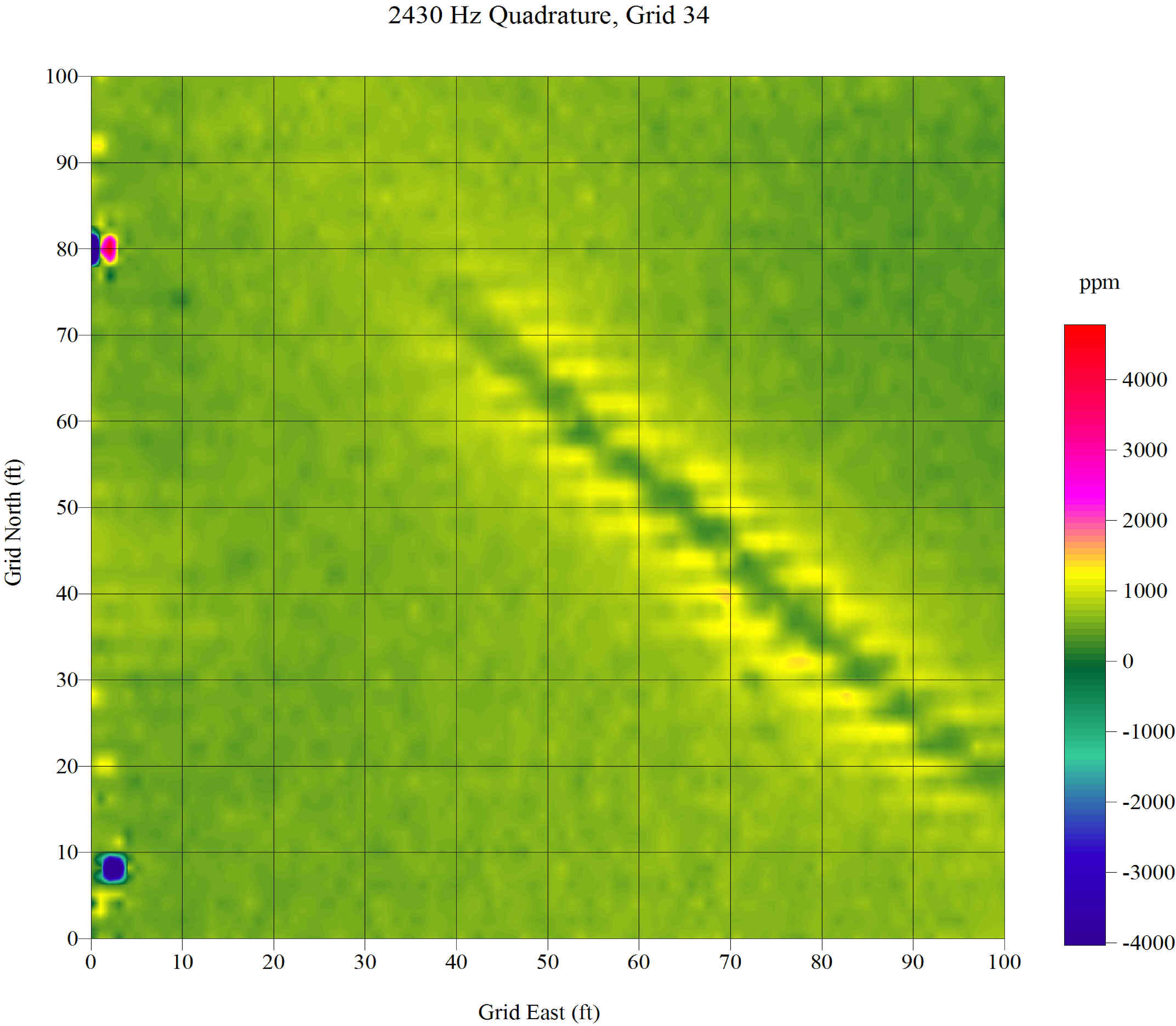

2430 Hz Quadrature, Grid 34
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100
ppm
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000

Figure B34-b

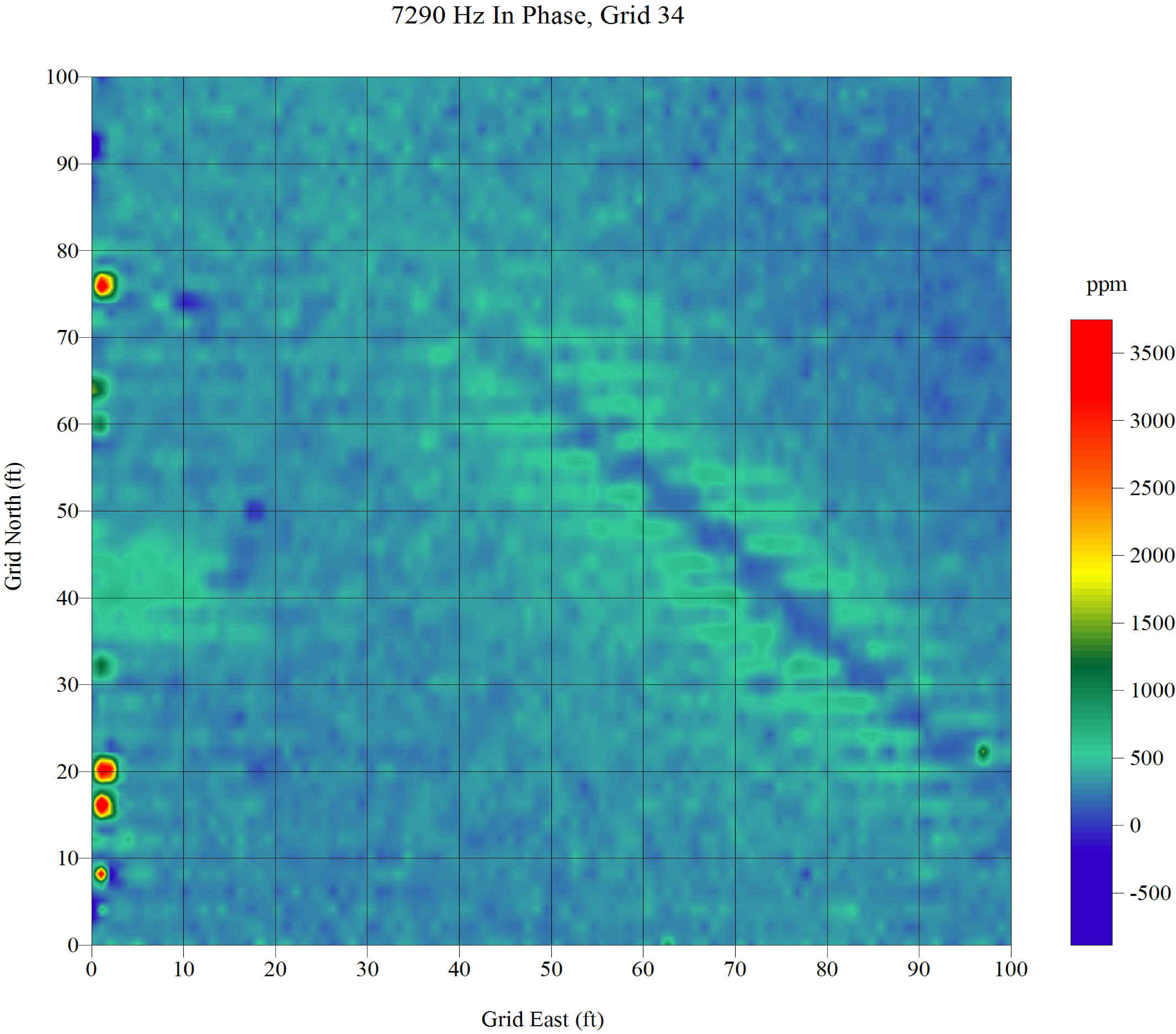

7290 Hz In Phase, Grid 34
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
3500
3000
2500
2000
1500
1000
500
0
-500

Figure B34-c

7290 Hz Quadrature, Grid 34

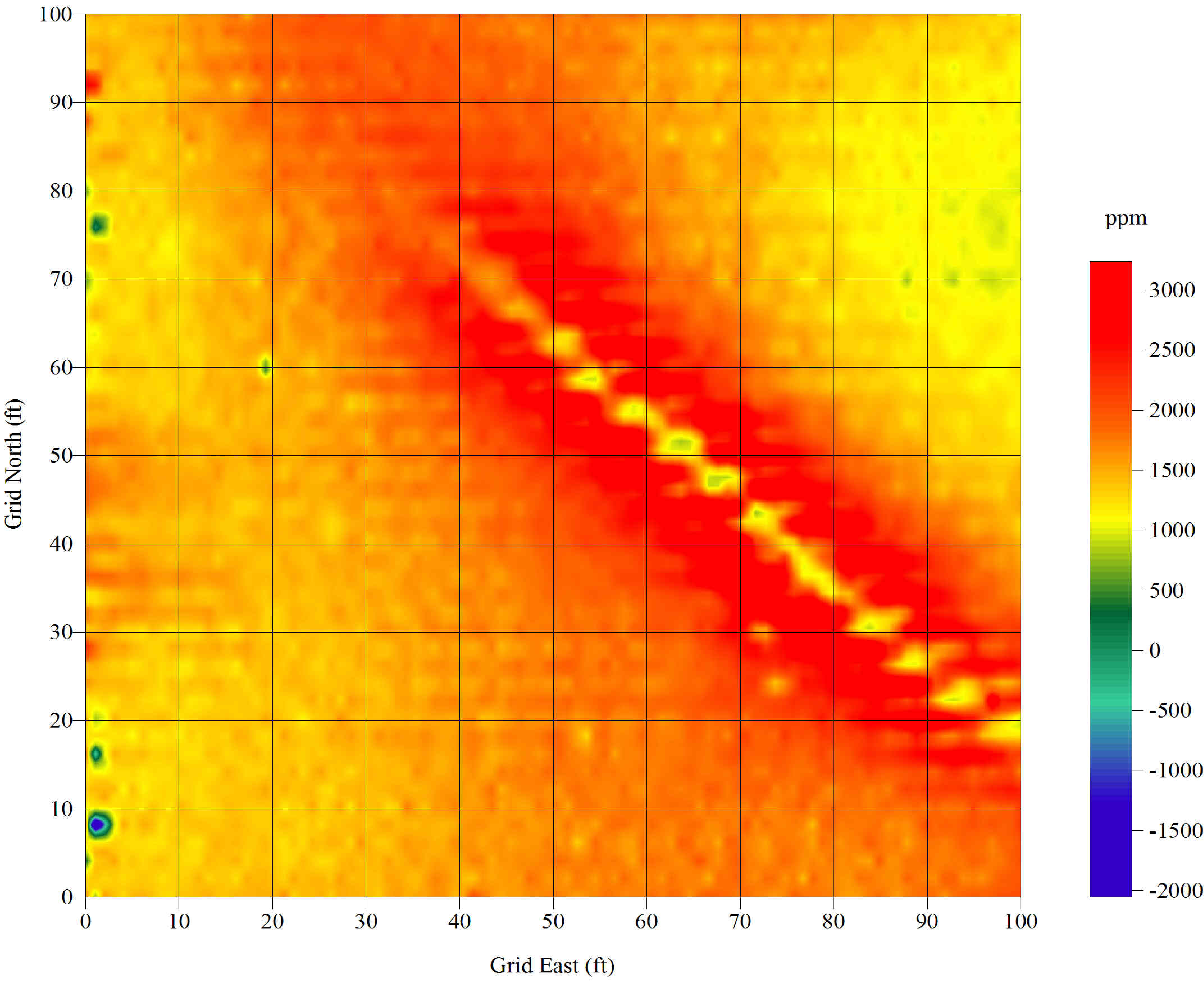


Figure B34-d

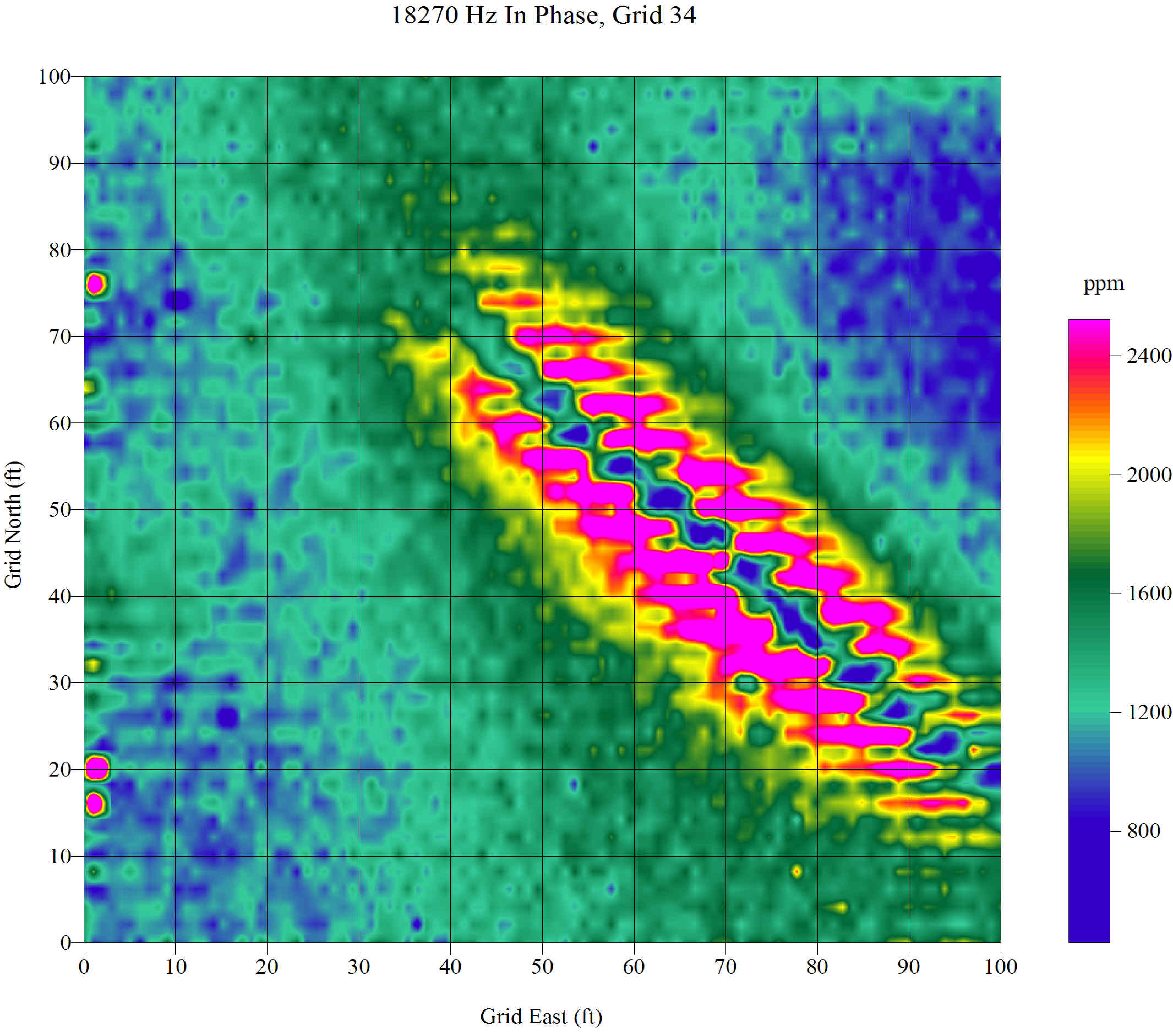

18270 Hz In Phase, Grid 34
Grid North (ft)
Grid East (ft)
ppm
2400
2000
1600
1200
800
0
10
20
30
40
50
60
70
80
90
100

Figure B34-e

18270 Hz Quadrature, Grid 34

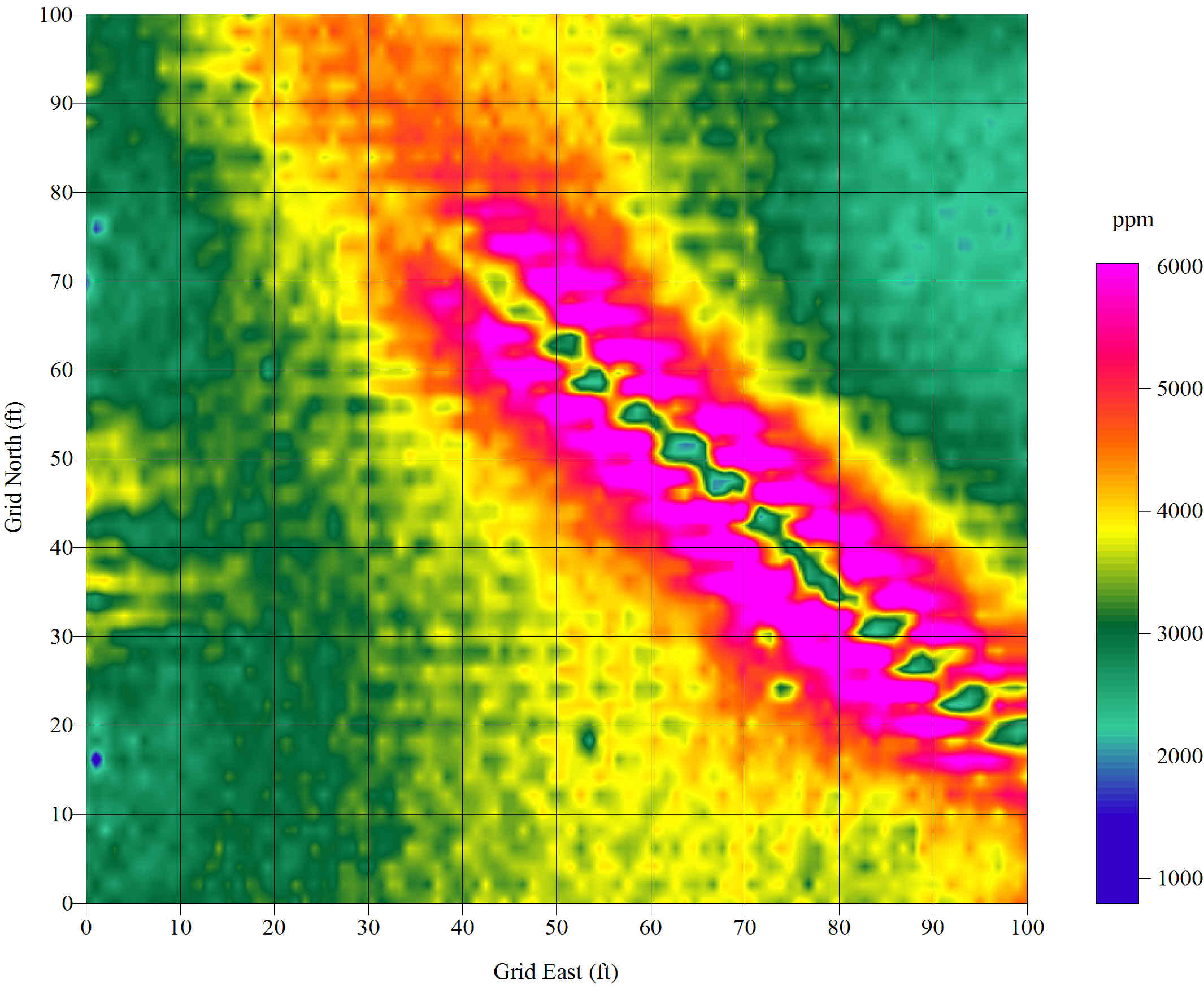
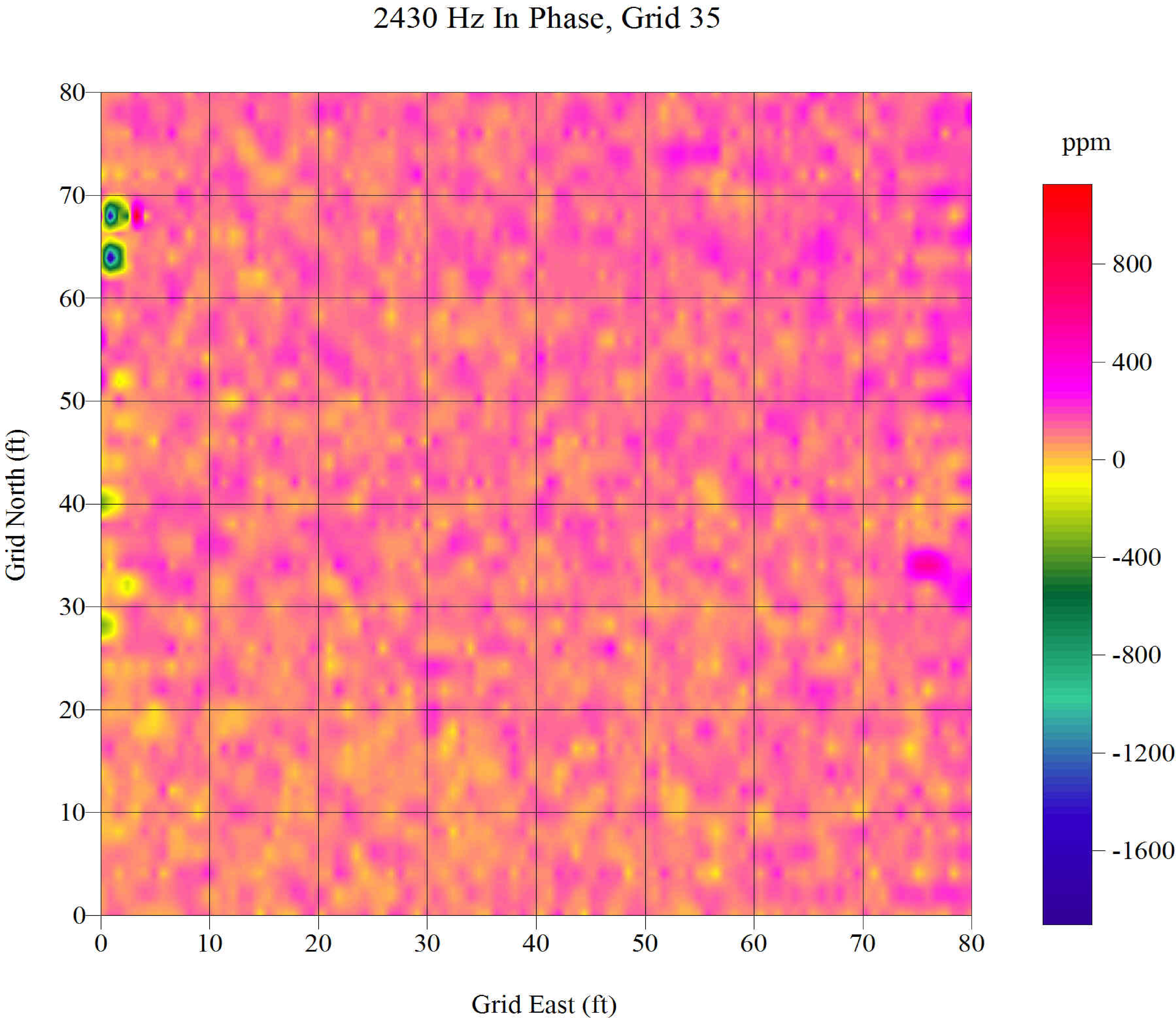


Figure B34-f



2430 Hz In Phase, Grid 35
ppm
800
400
0
-400
-800
-1200
-1600
Grid North (ft)
80
70
60
50
40
30
20
10
0
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B35-a

2430 Hz Quadrature, Grid 35

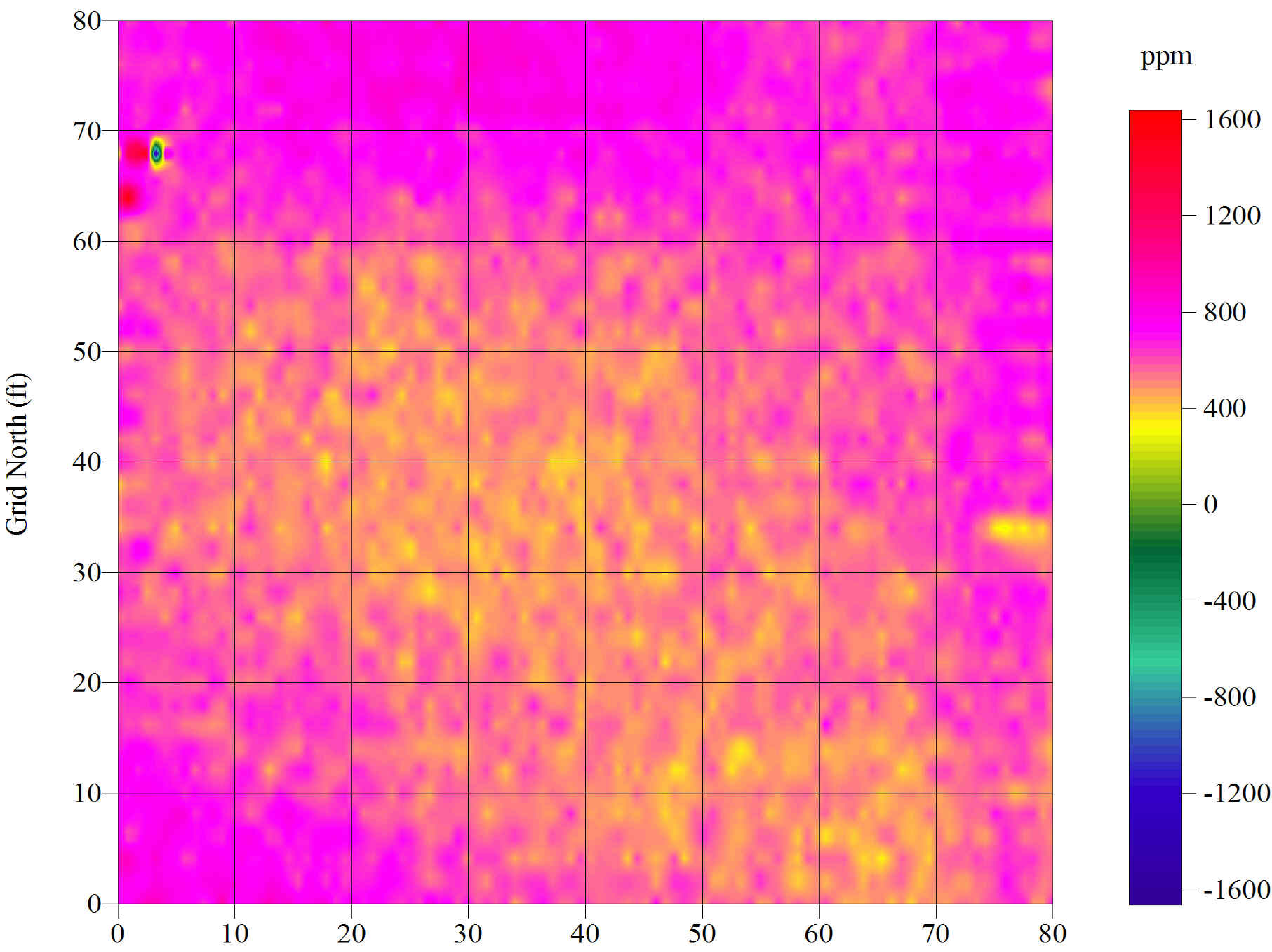


Figure B35-b

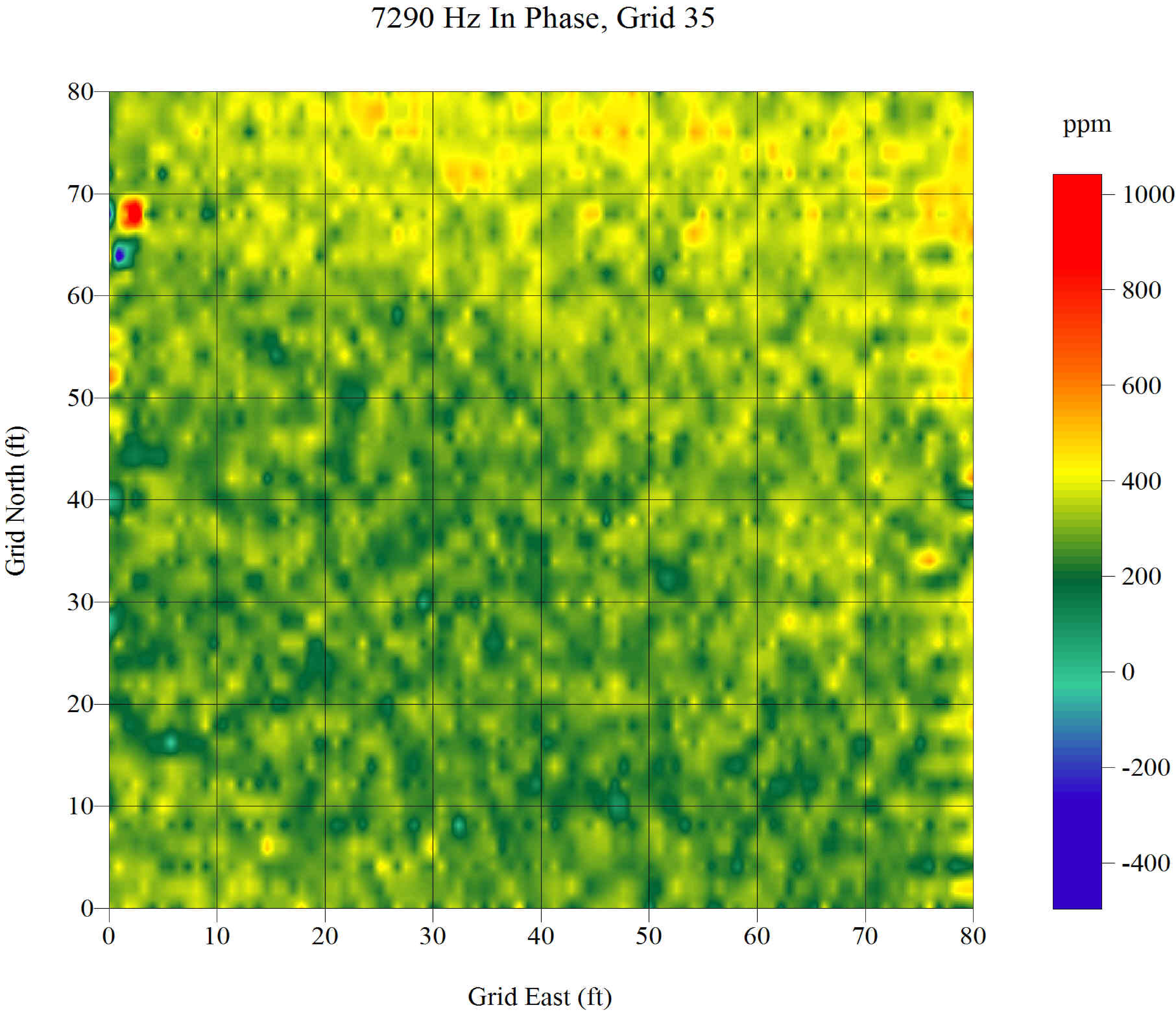

7290 Hz In Phase, Grid 35
ppm
1000
800
600
400
200
0
-200
-400
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B35-c

7290 Hz Quadrature, Grid 35

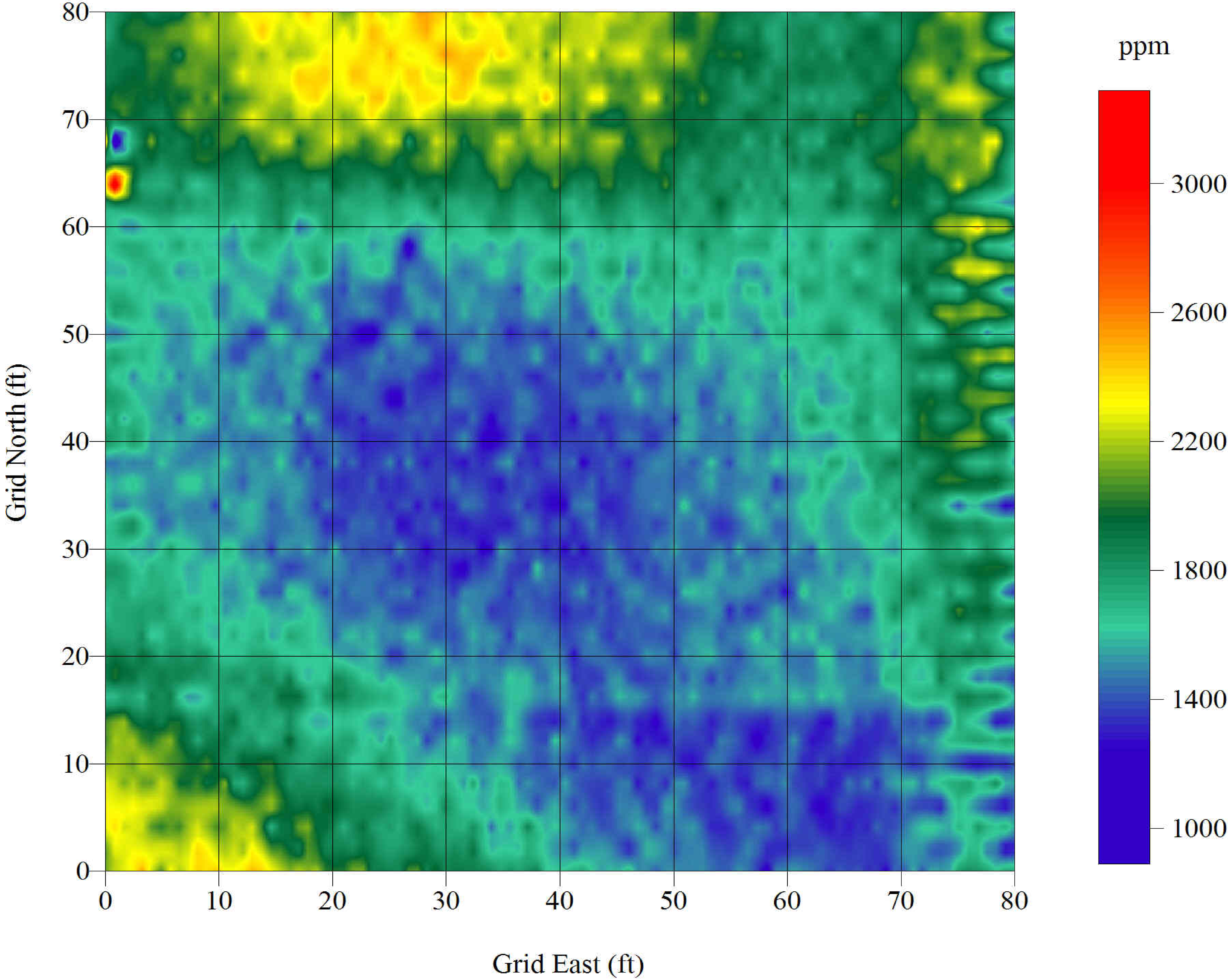


Figure B35-d

18270 Hz In Phase, Grid 35

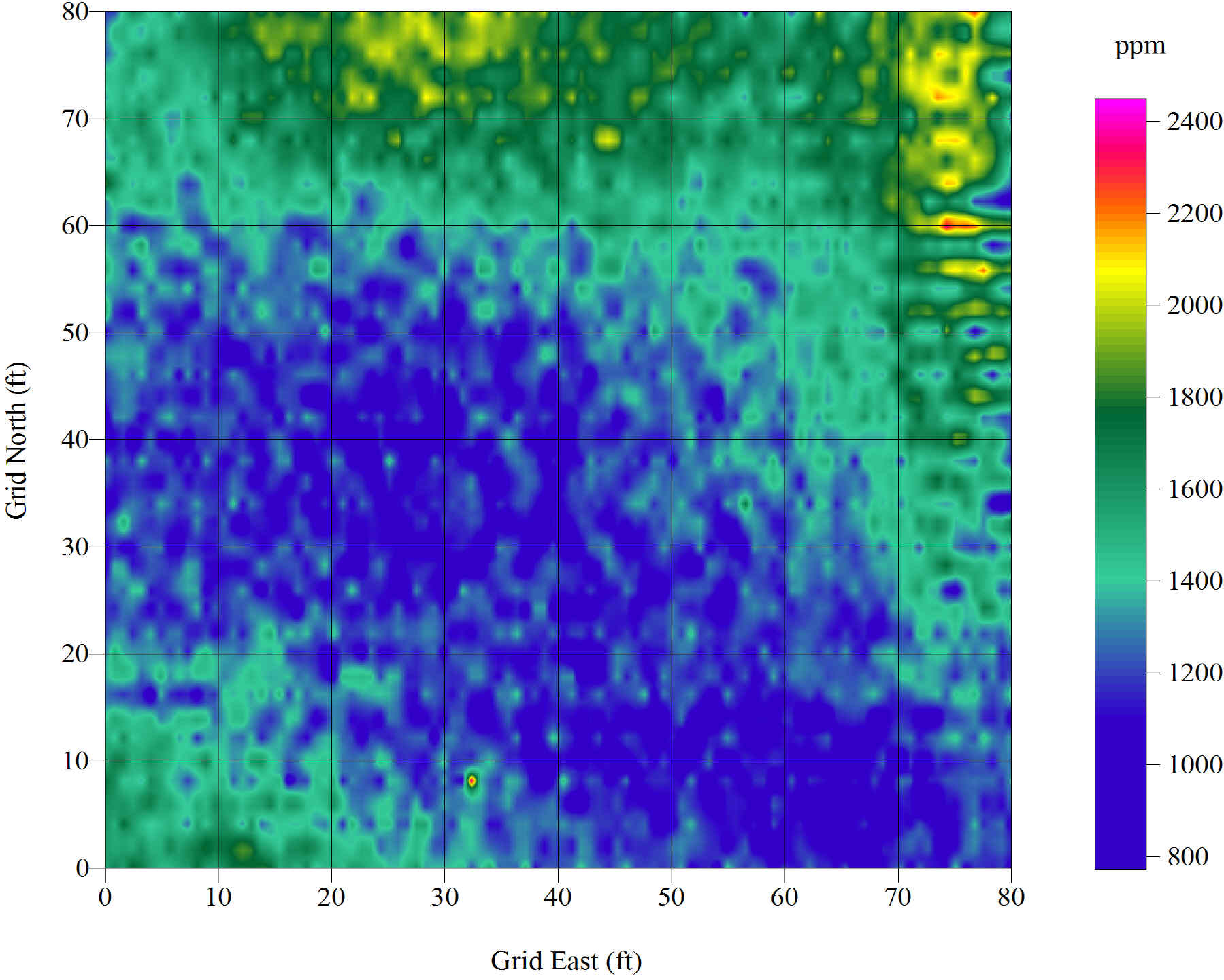


Figure B35-e

18270 Hz Quadrature, Grid 35

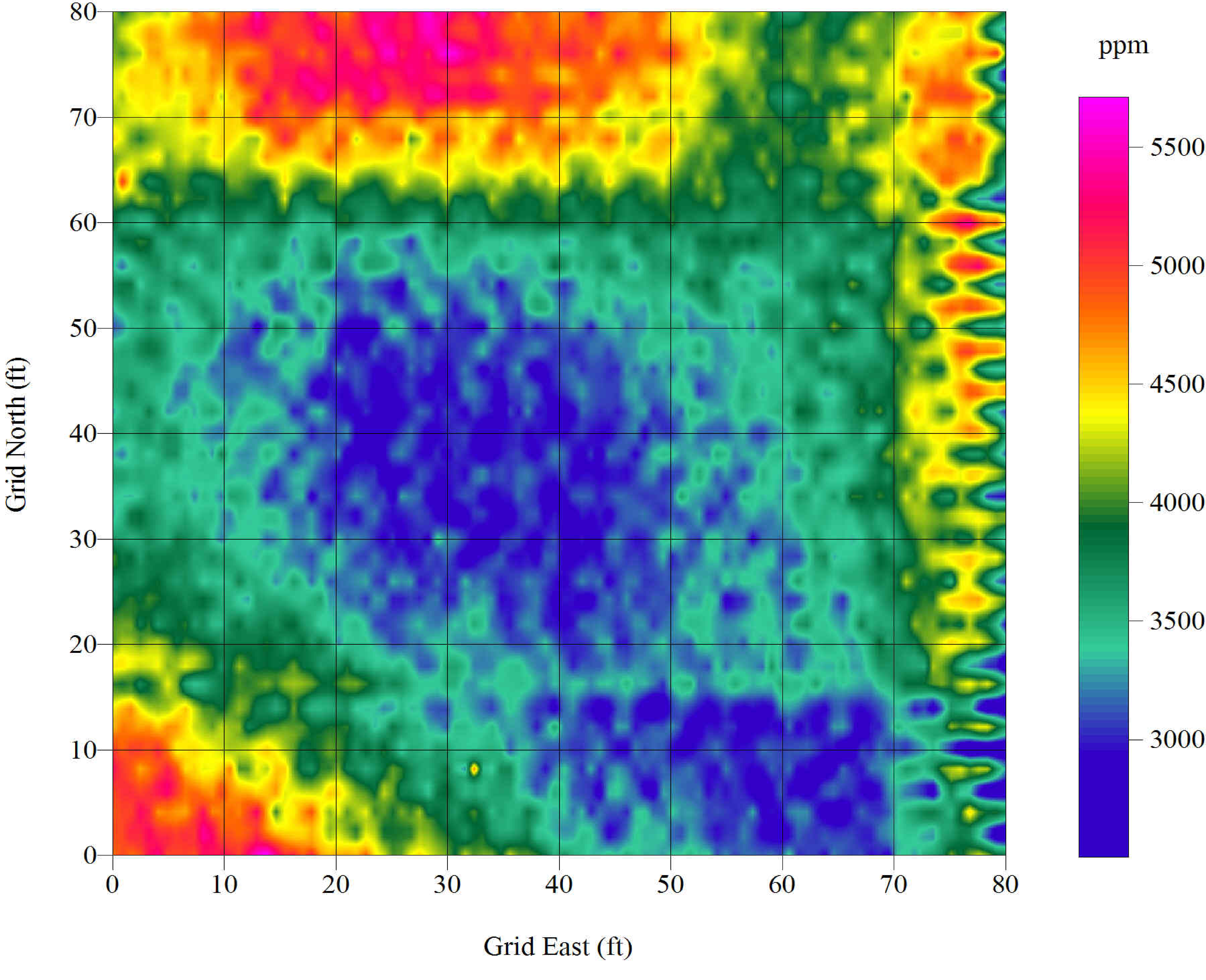


Figure B35-f

2430 Hz In Phase, Grid 36

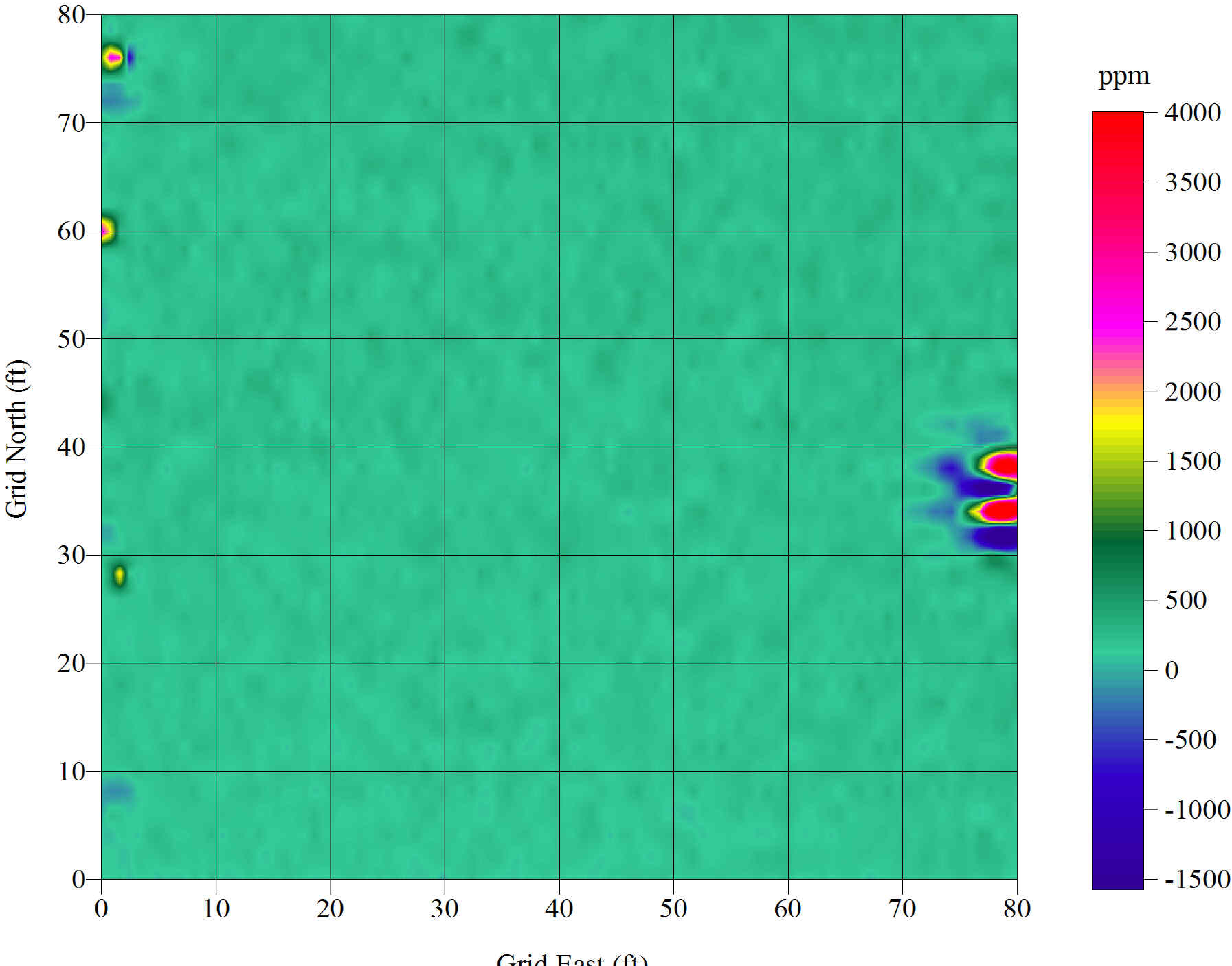


Figure B36-a

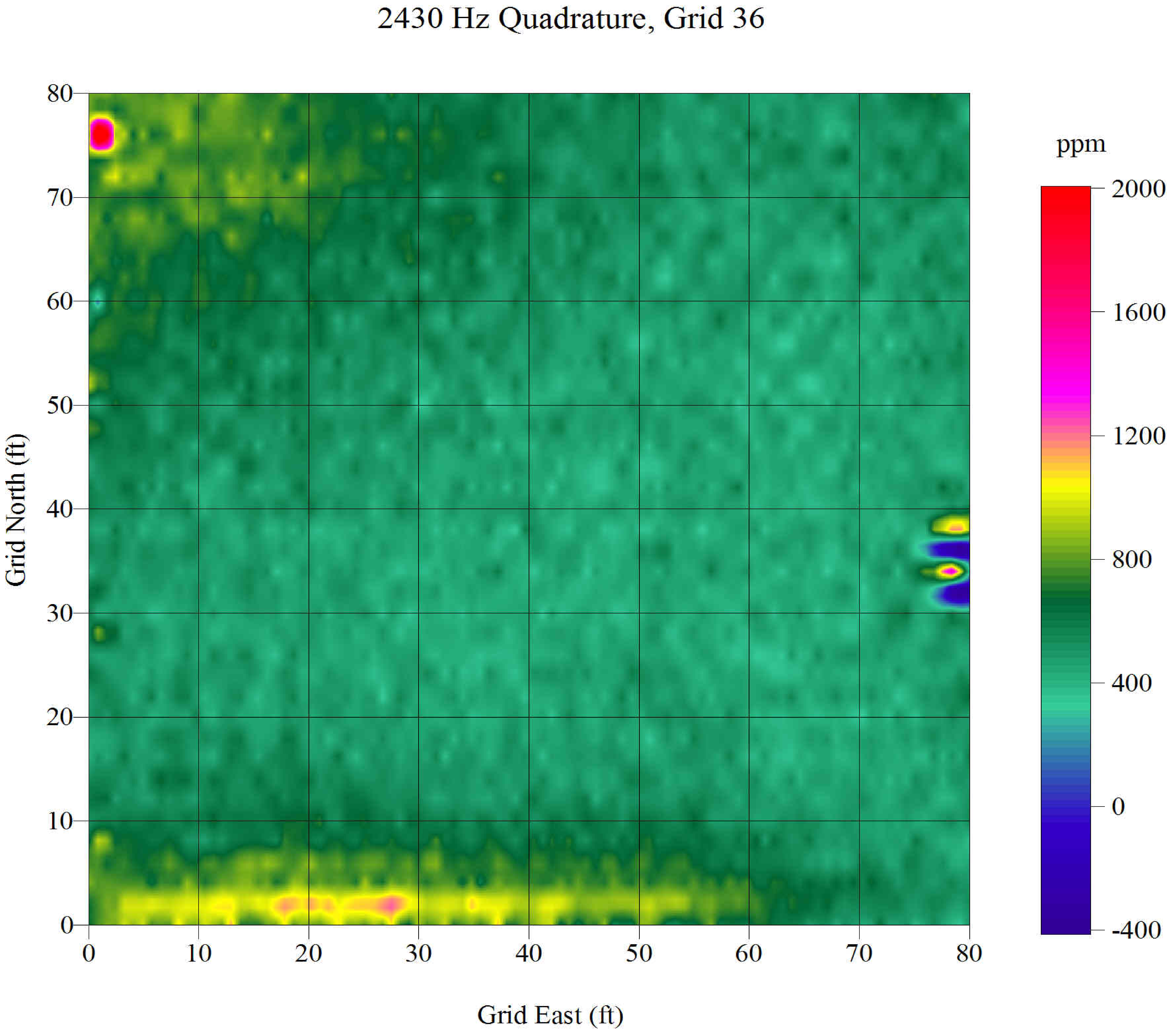

2430 Hz Quadrature, Grid 36
Grid North (ft)
80
70
60
50
40
30
20
10
0
Grid East (ft)
0
10
20
30
40
50
60
70
80
ppm
2000
1600
1200
800
400
0
-400

Figure B36-b

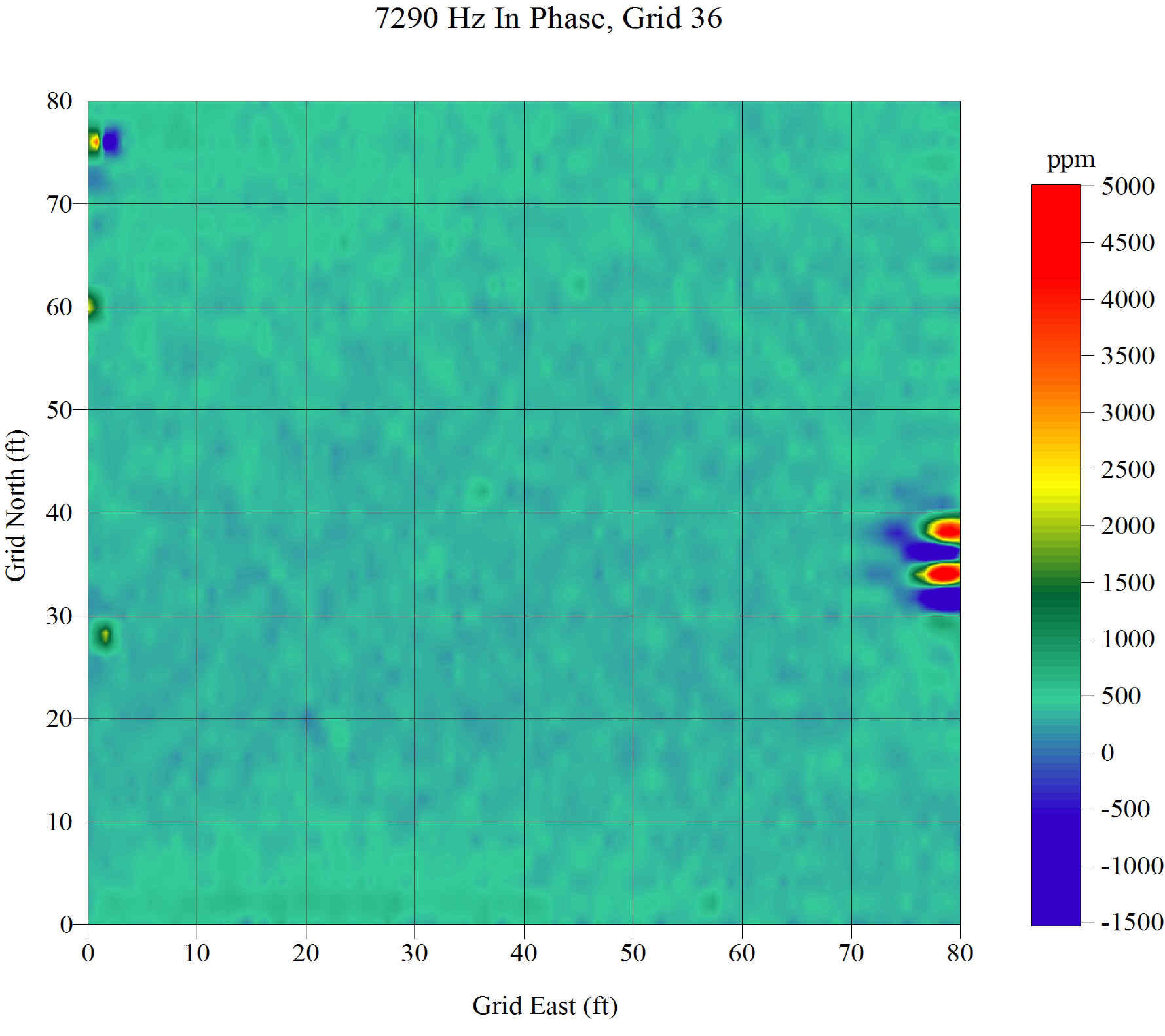

7290 Hz In Phase, Grid 36
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500

Figure B36-c

7290 Hz Quadrature, Grid 36

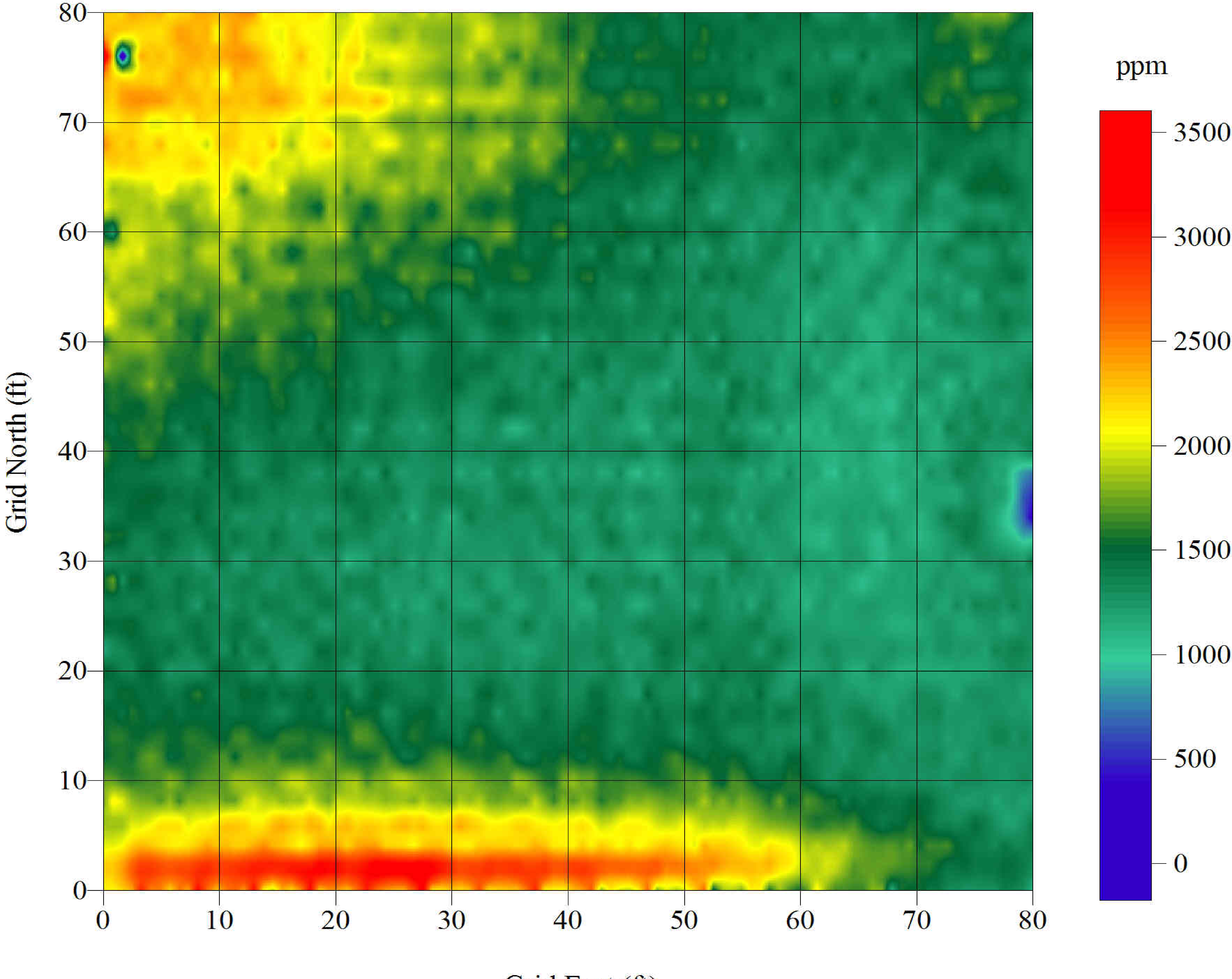


Figure B36-d

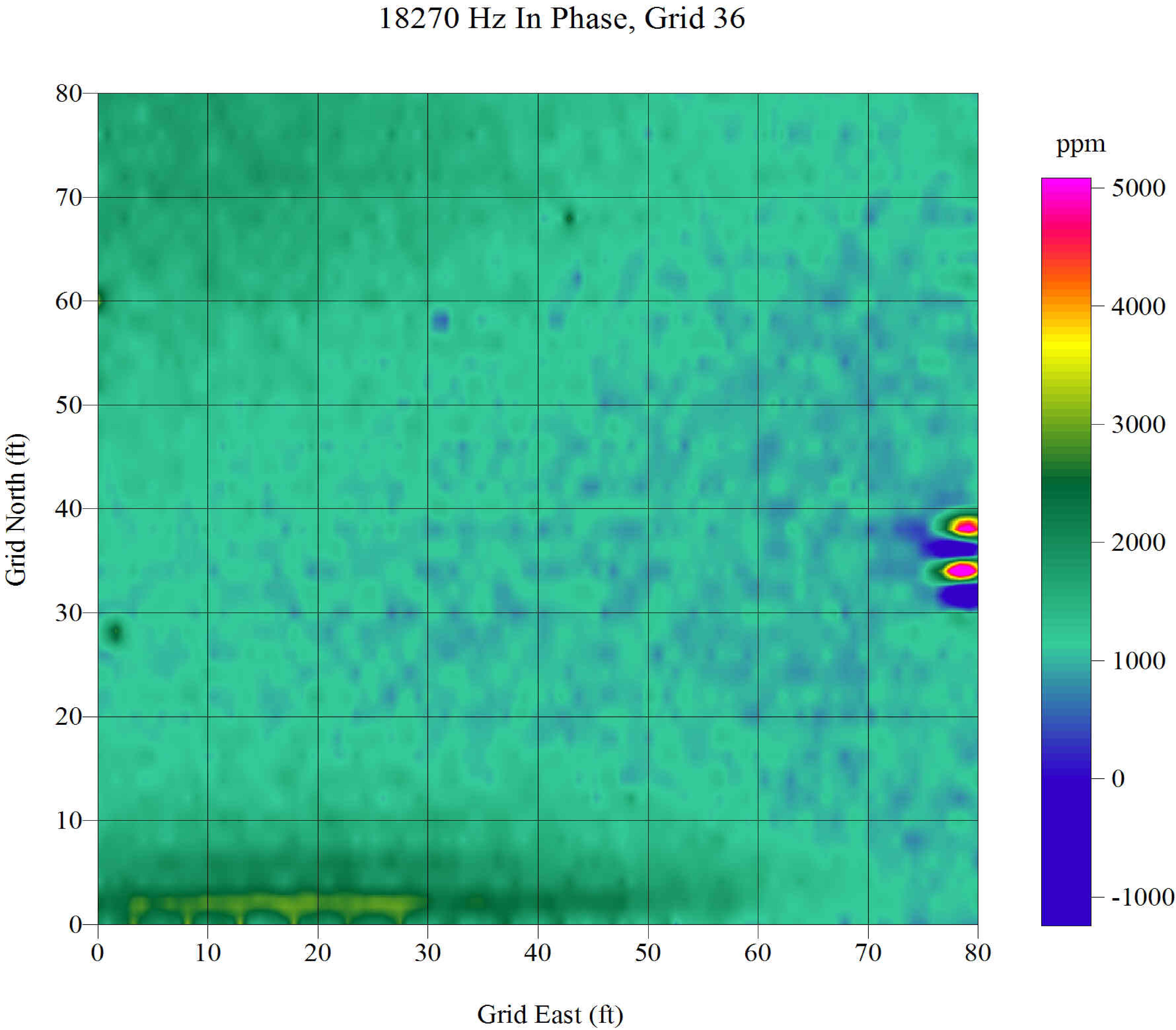
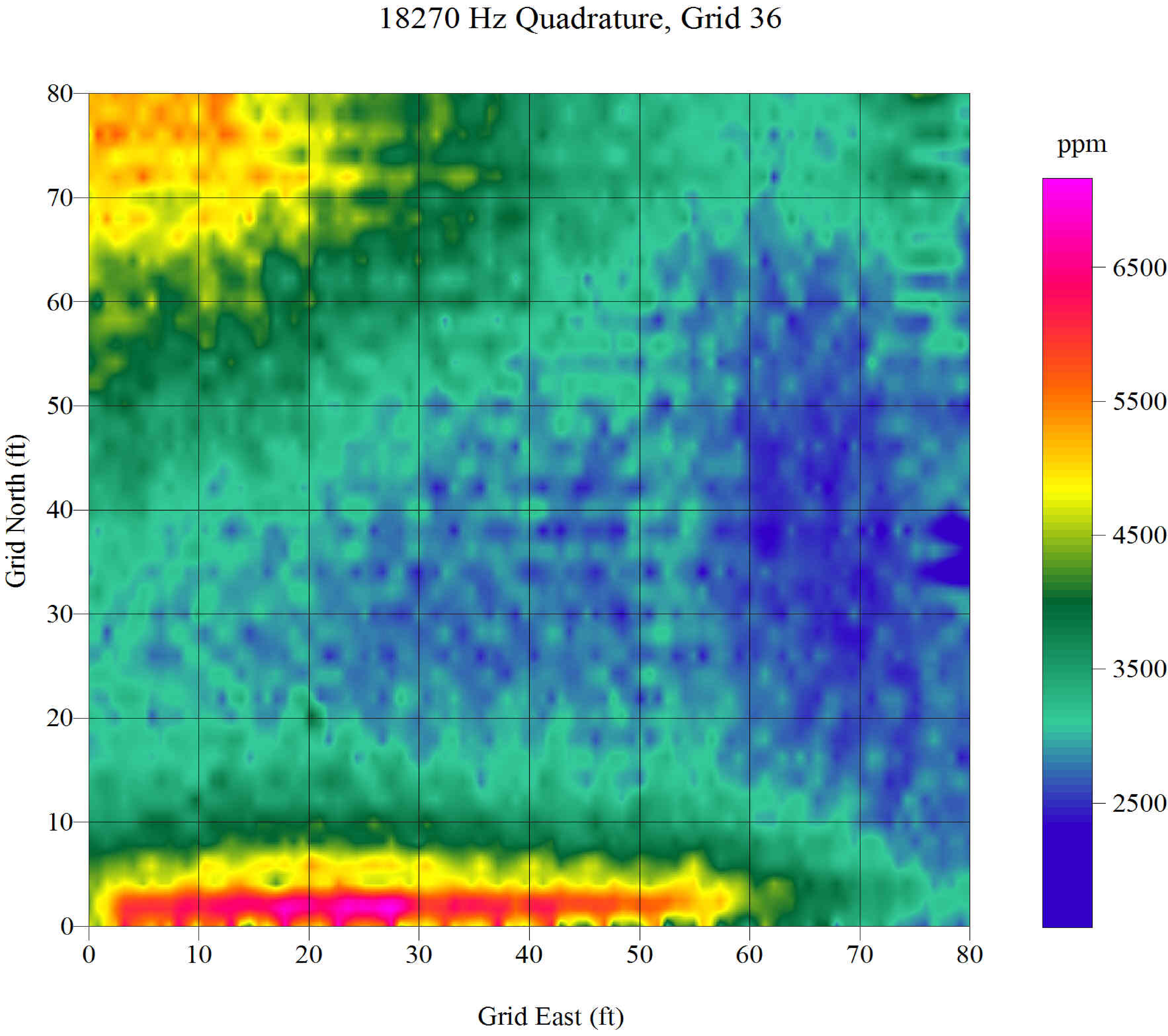

18270 Hz In Phase, Grid 36
Grid North (ft)
Grid East (ft)
ppm
5000
4000
3000
2000
1000
0
-1000
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

Figure B36-e



18270 Hz Quadrature, Grid 36
ppm
6500
5500
4500
3500
2500
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B36-f

Figure B36-g

2430 Hz In Phase, Grid 37

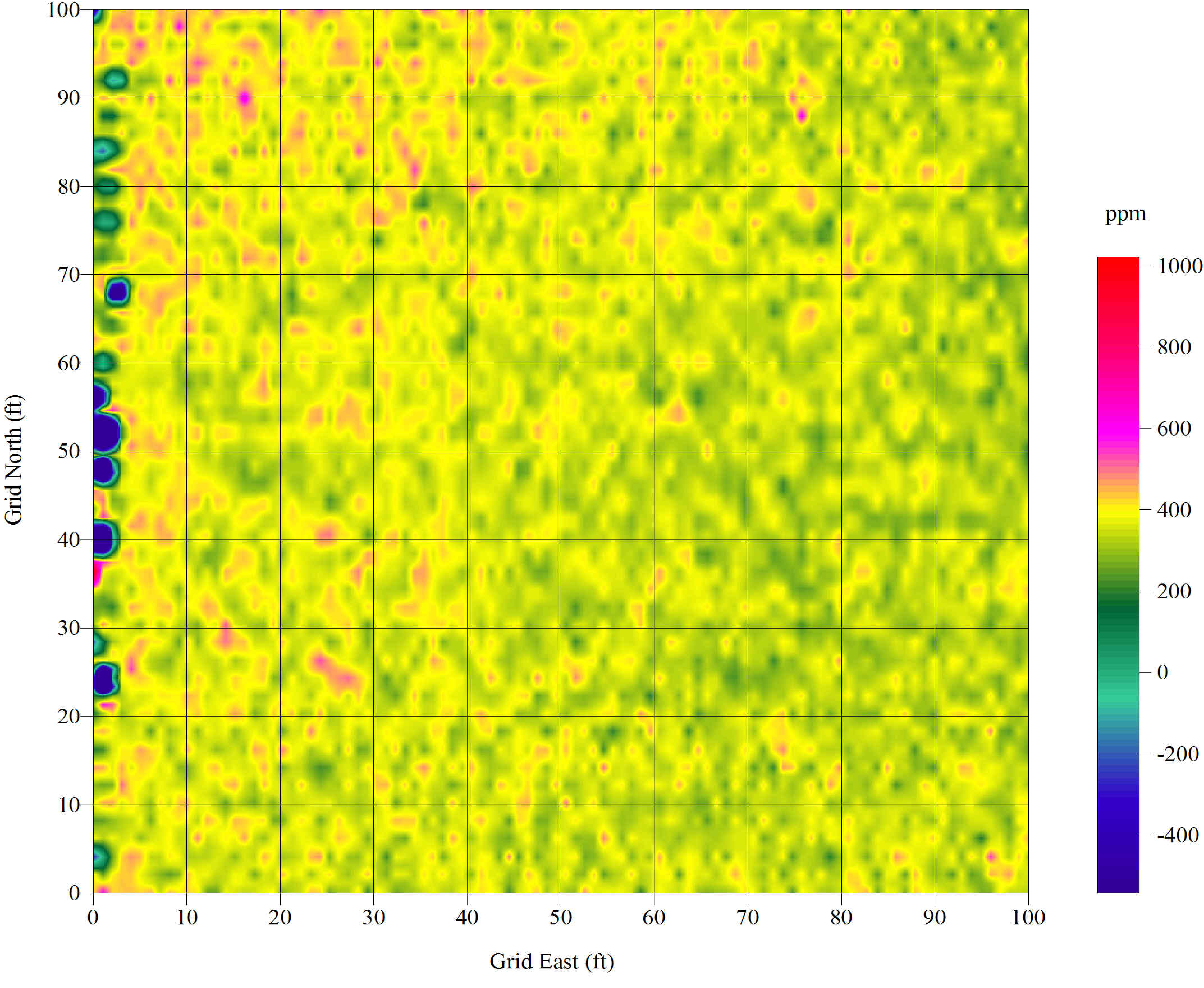


Figure B37-a

2430 Hz Quadrature, Grid 37

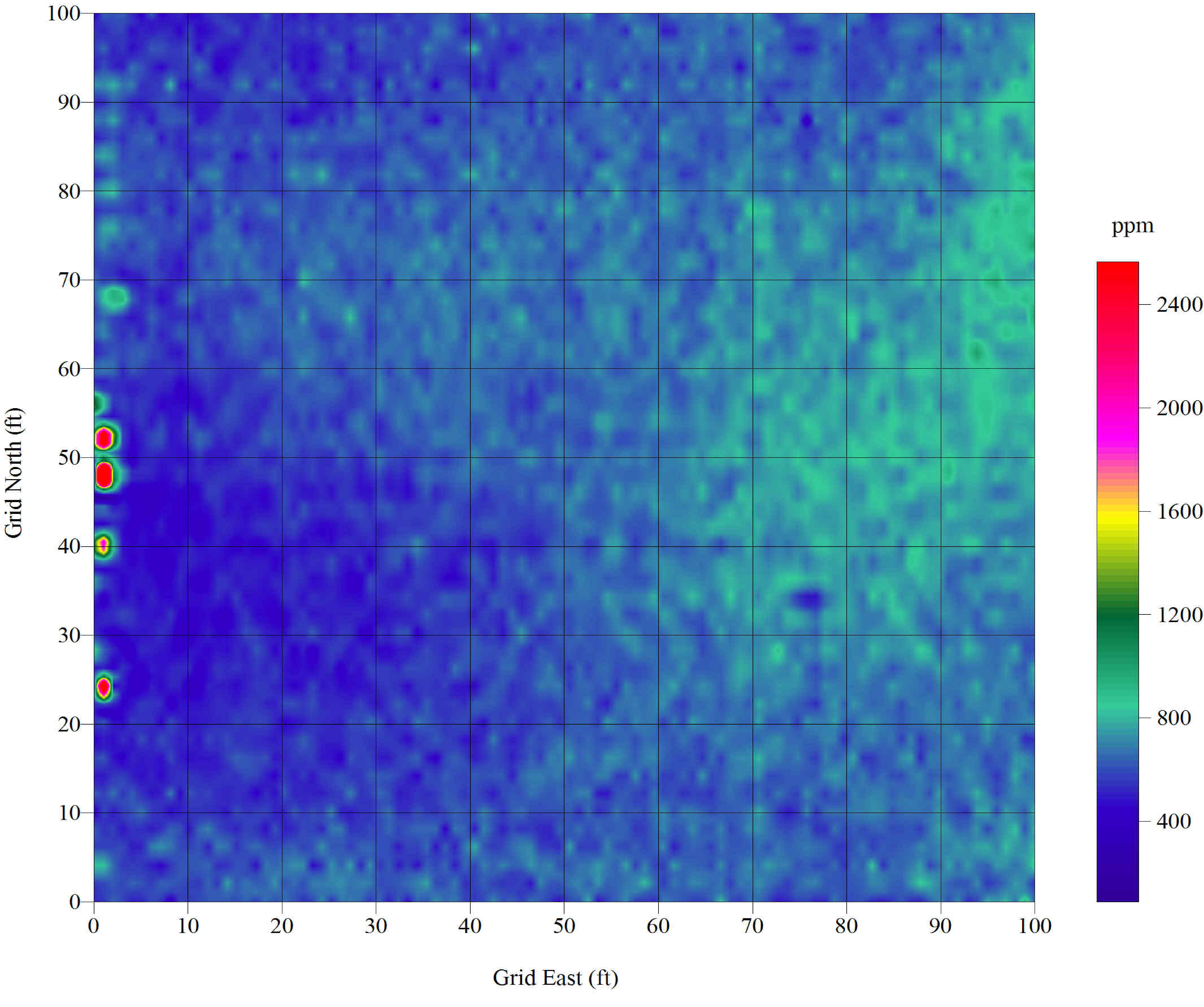


Figure B37-b

7290 HzIn Phase, Grid 37

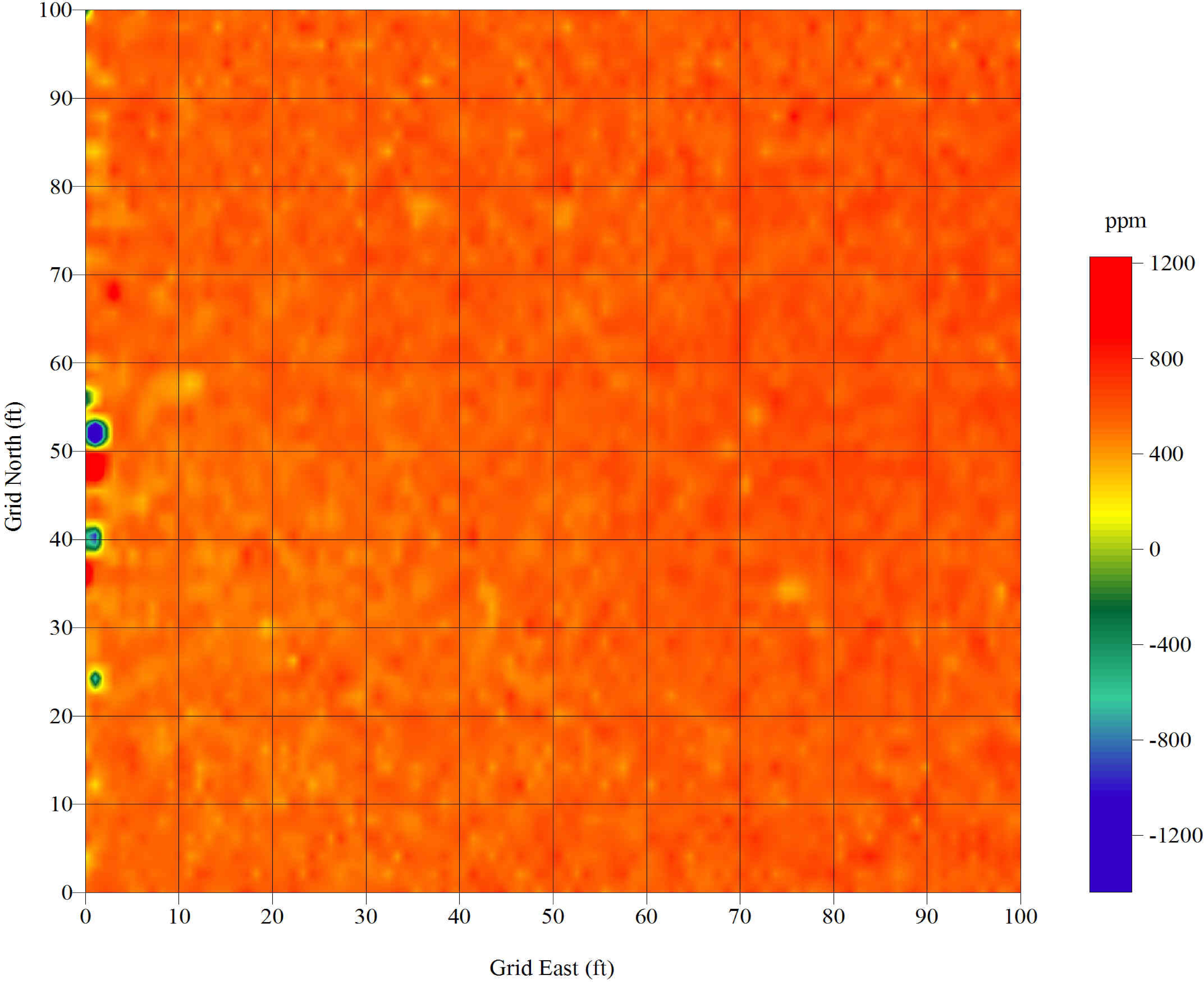


Figure B37-c

7290 Hz Quadrature, Grid 37

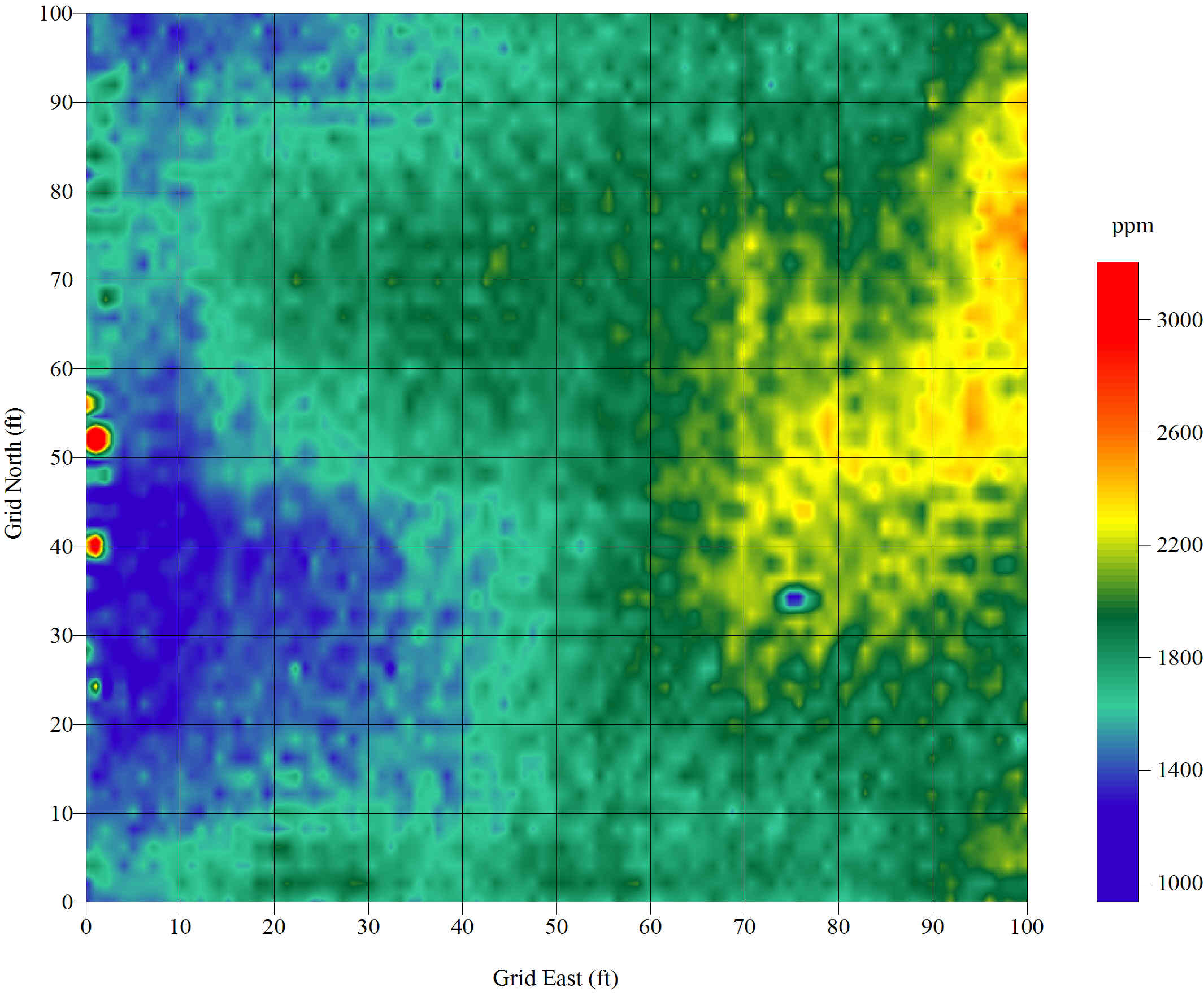


Figure B37-d

18270 Hz In Phase, Grid 37

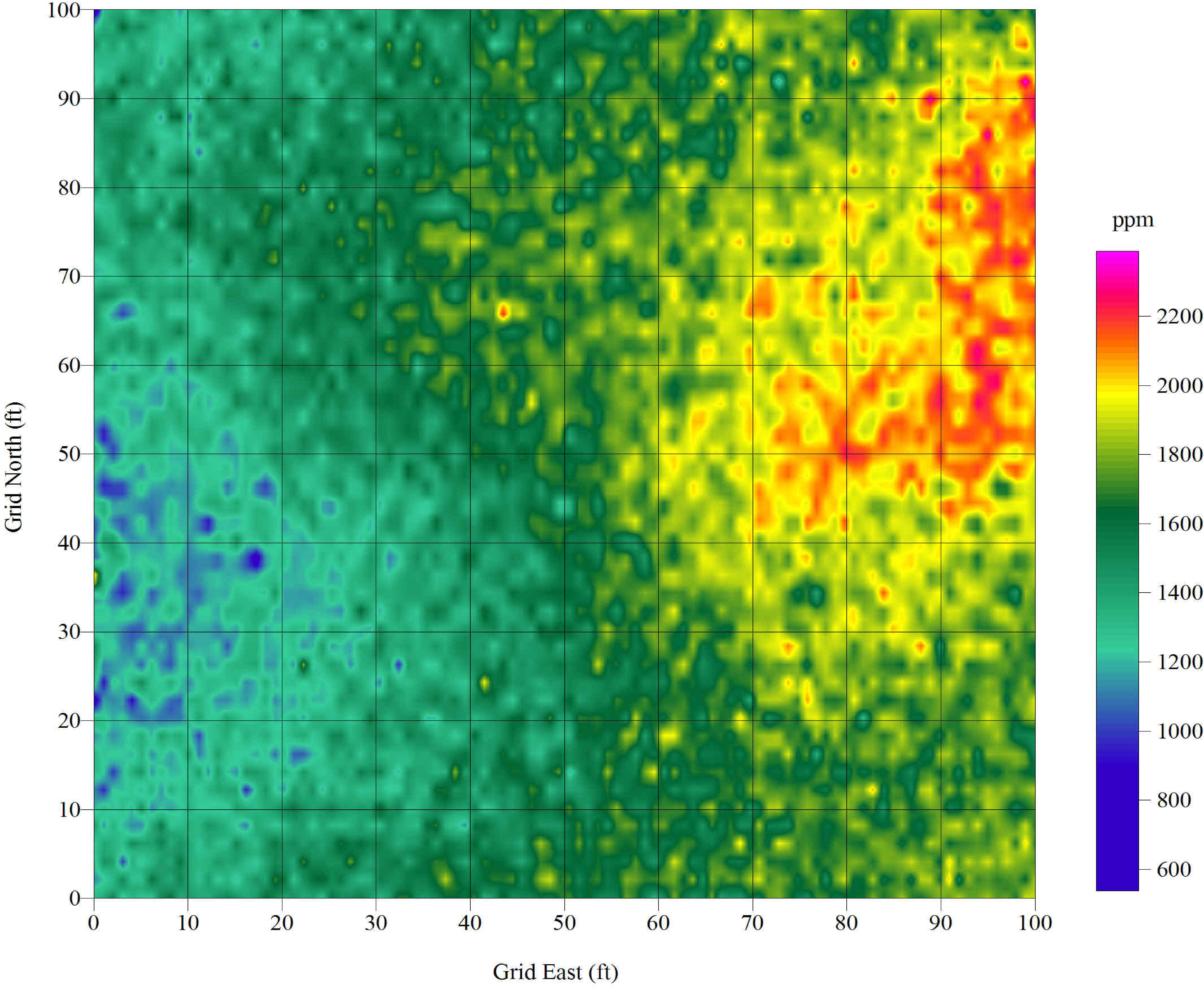


Figure B37-e

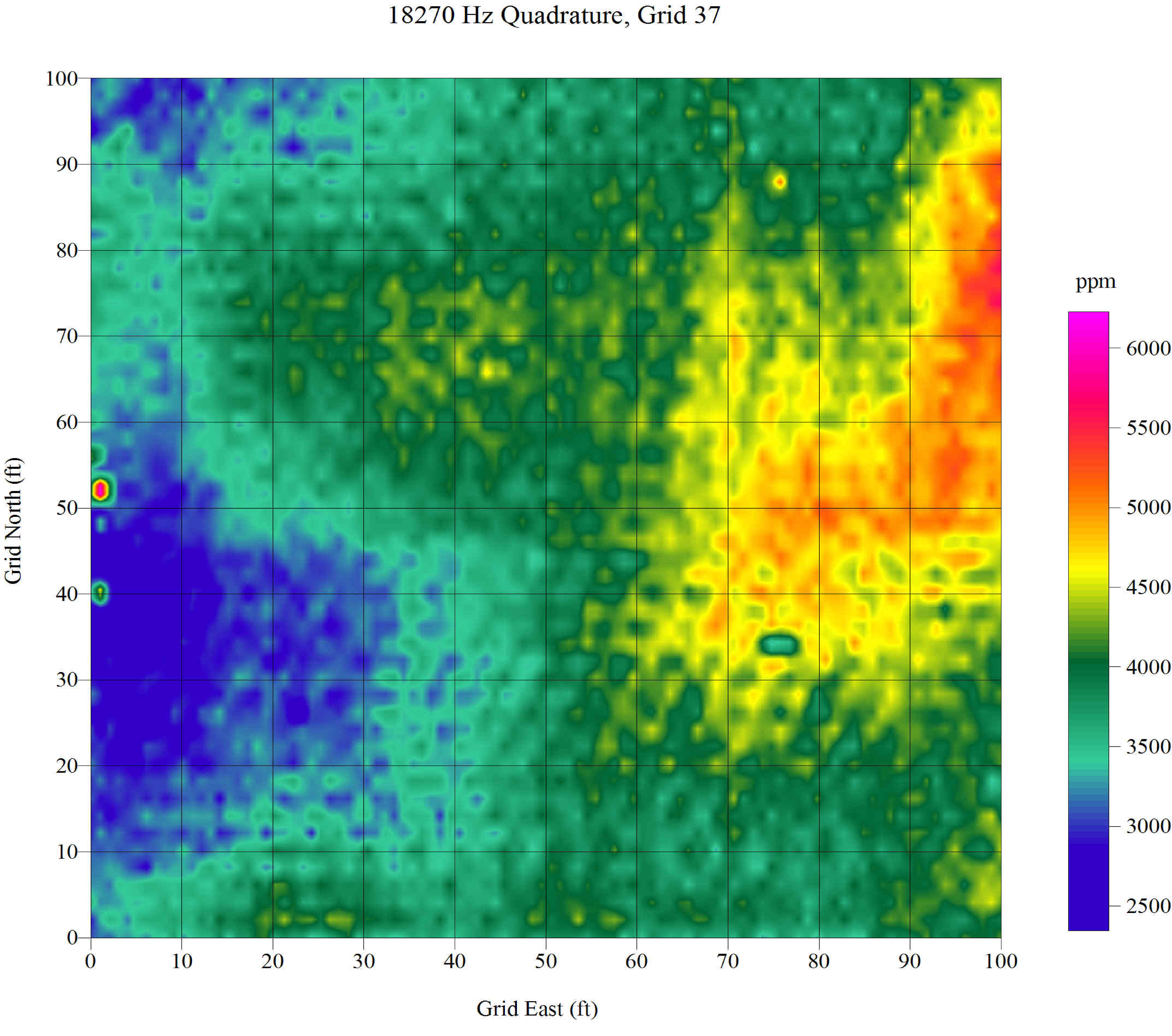

18270 Hz Quadrature, Grid 37
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
2500
3000
3500
4000
4500
5000
5500
6000

Figure B37-f

2430 Hz In Phase, Grid 38

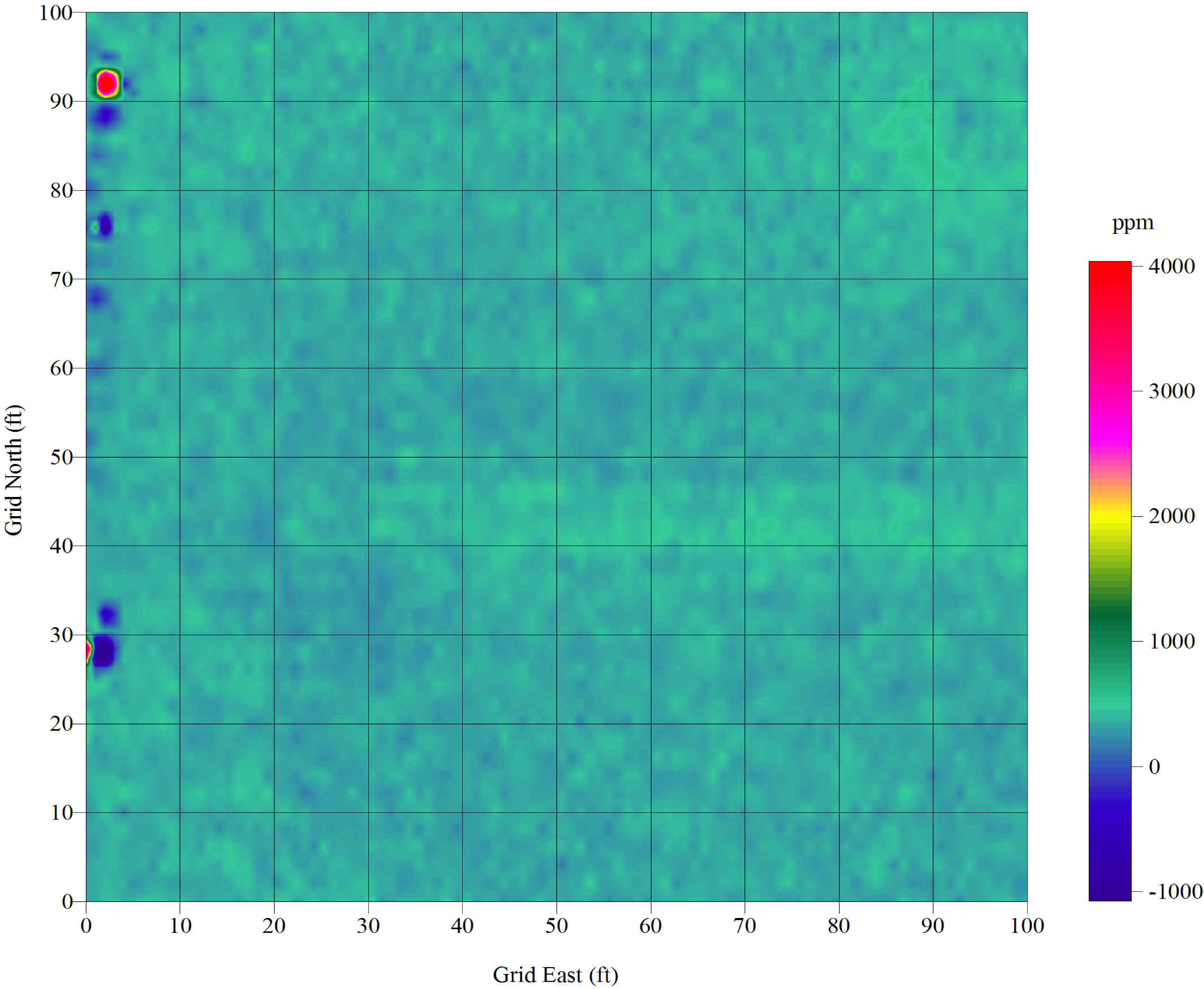


Figure B38-a

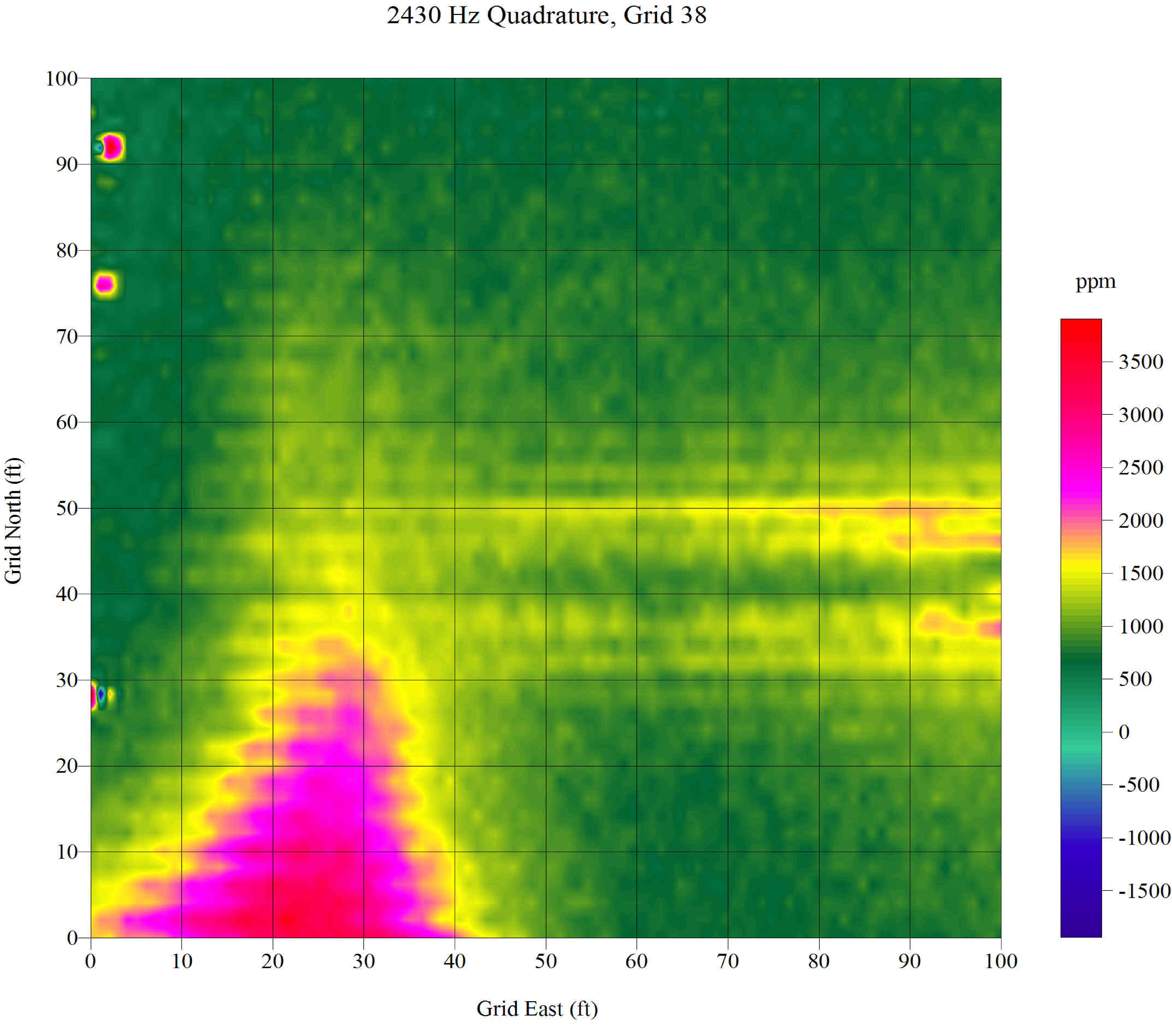

2430 Hz Quadrature, Grid 38
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500

Figure B38-b

7290 Hz In Phase, Grid 38

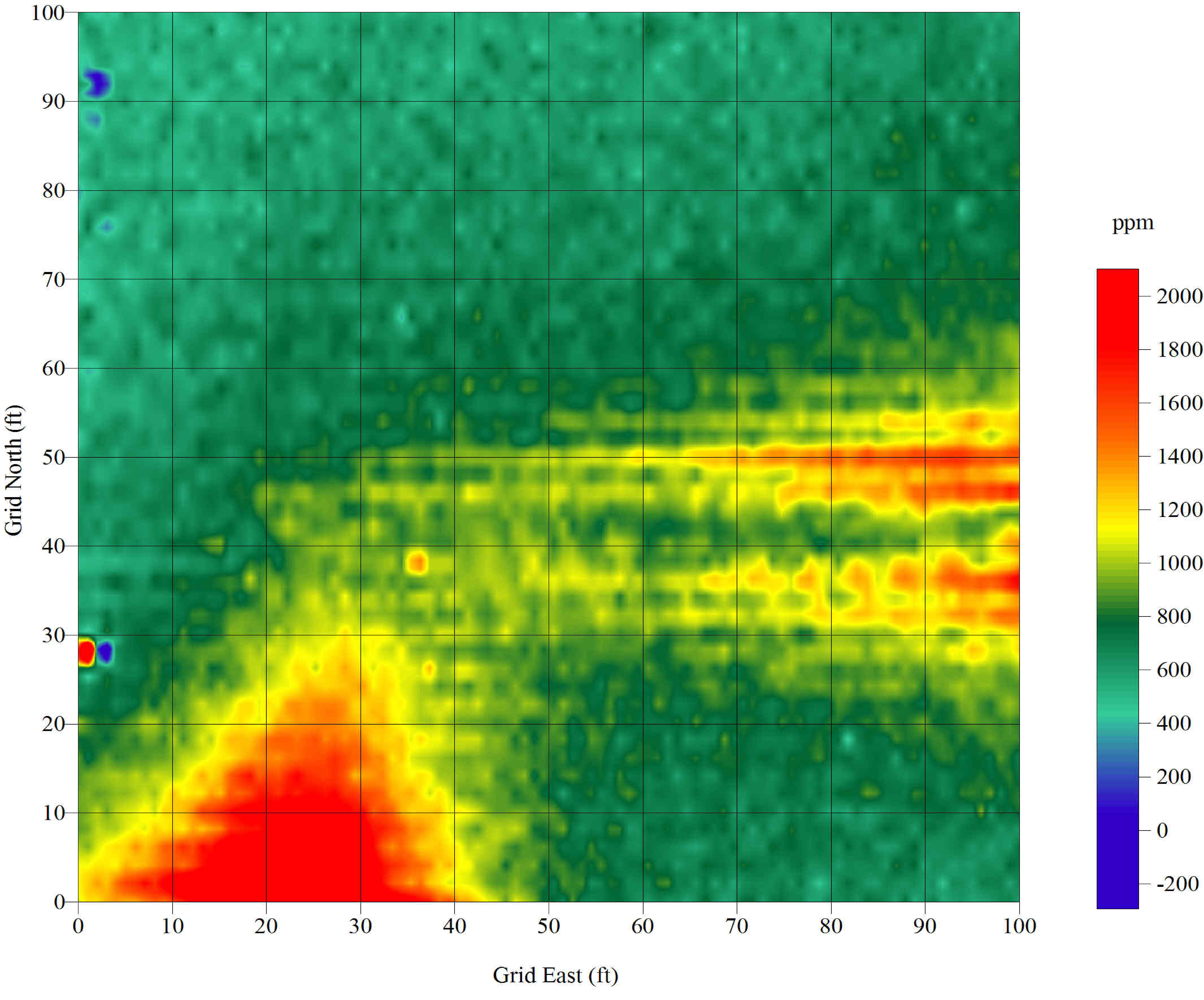


Figure B38-c

7290 Hz Quadrature, Grid 38

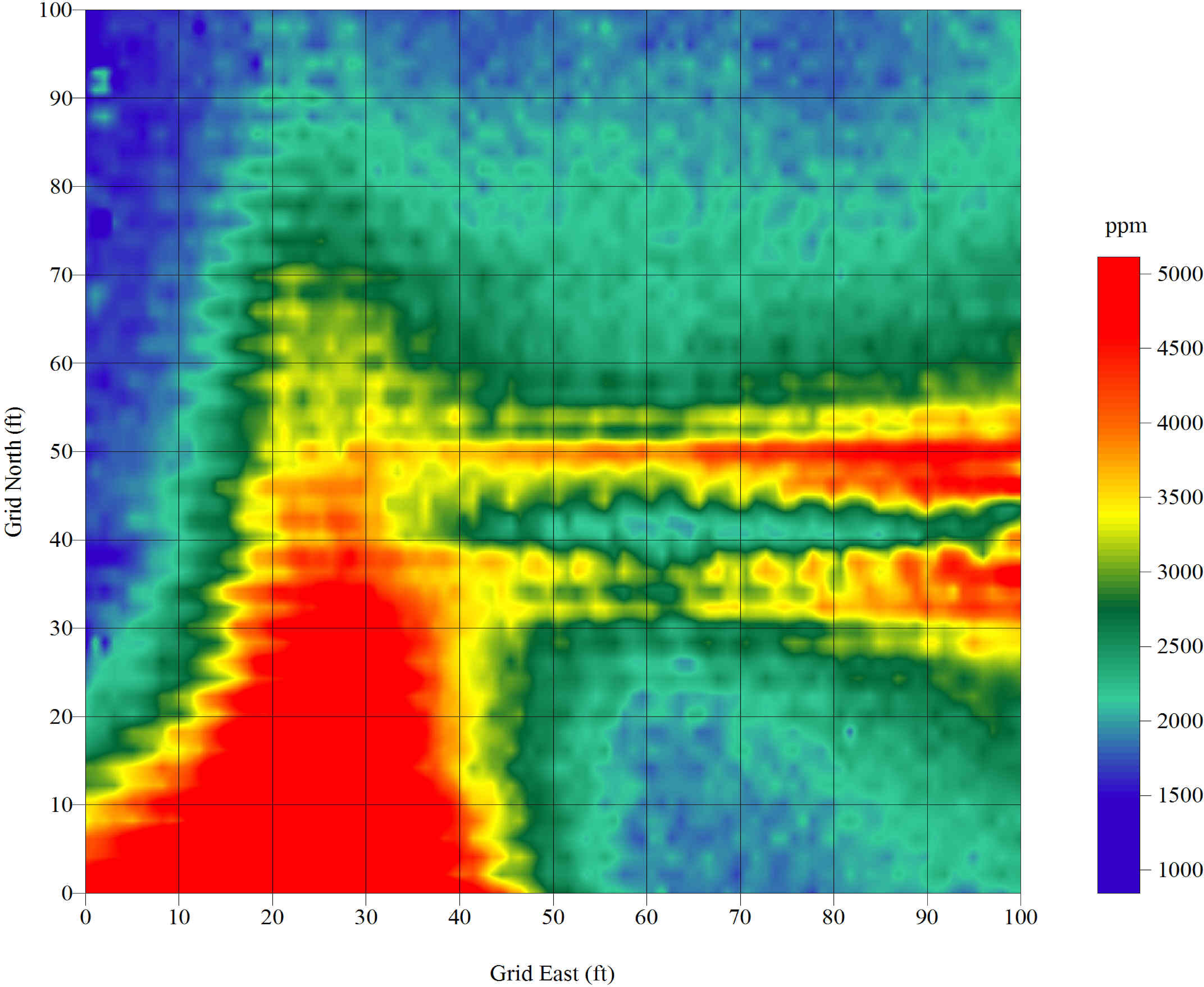


Figure B38-d

18270 Hz In Phase, Grid 38

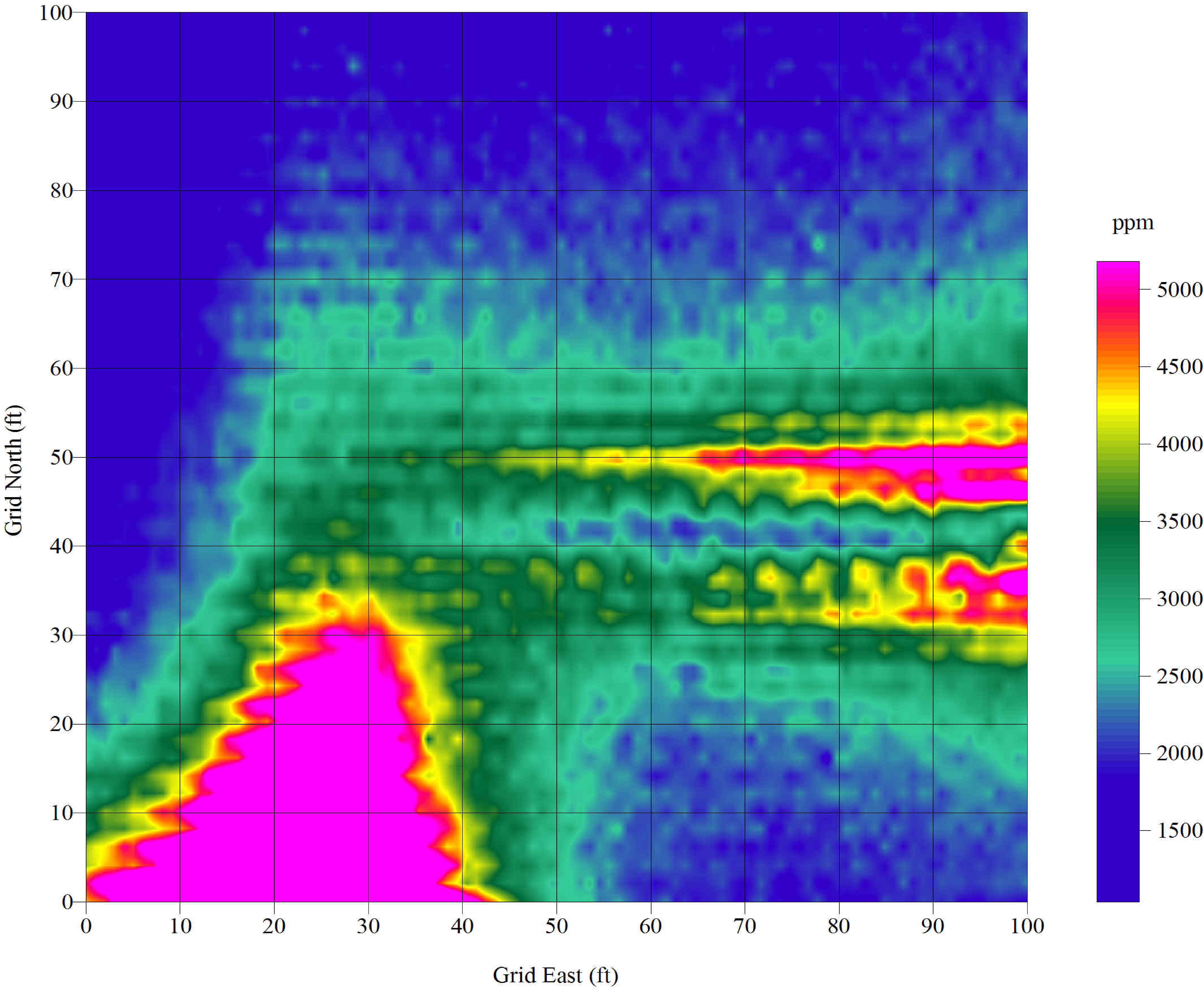
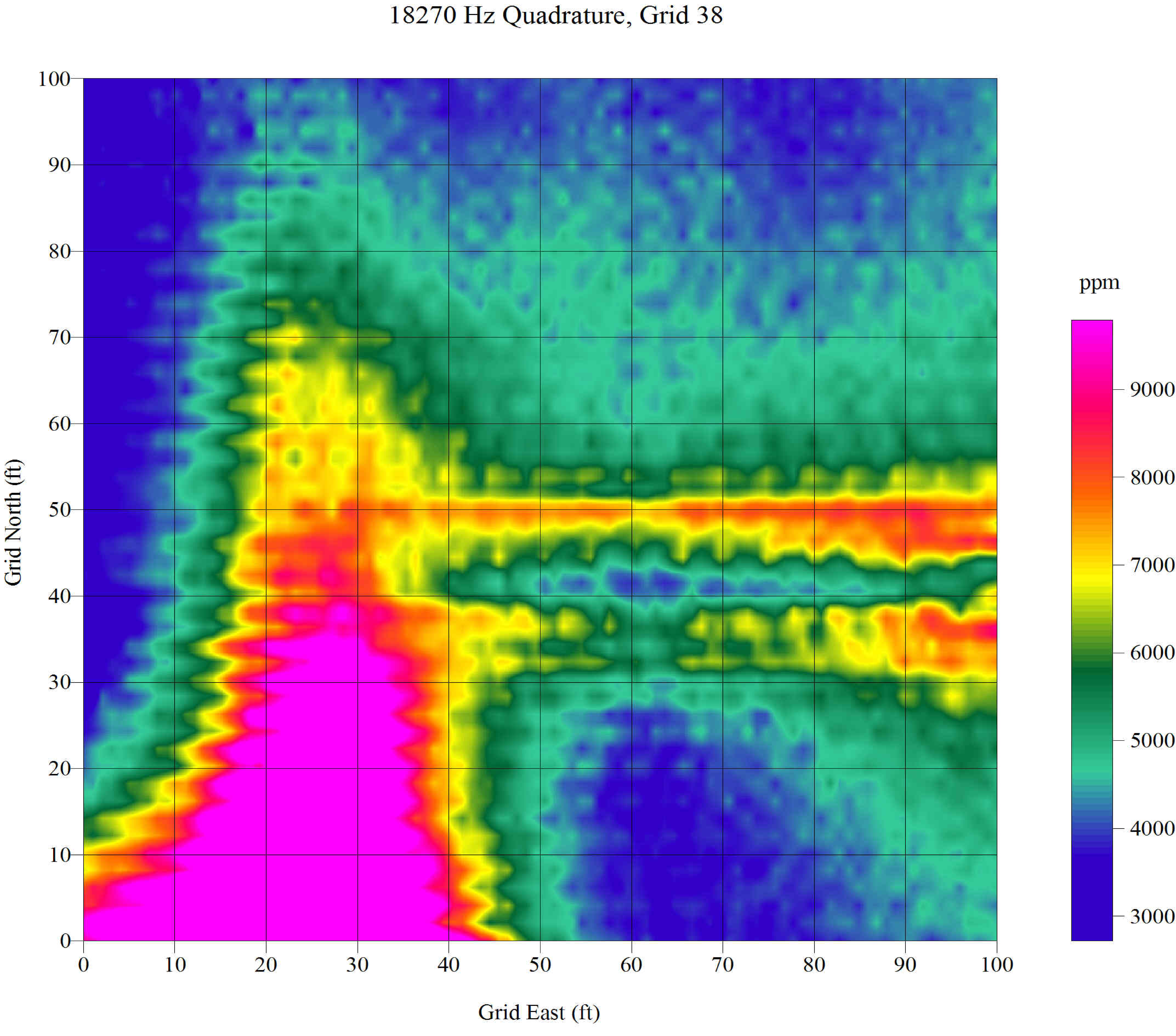


Figure B38-e



18270 Hz Quadrature, Grid 38
Grid North (ft)
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Grid East (ft)
ppm
9000
8000
7000
6000
5000
4000
3000

Figure B38-f

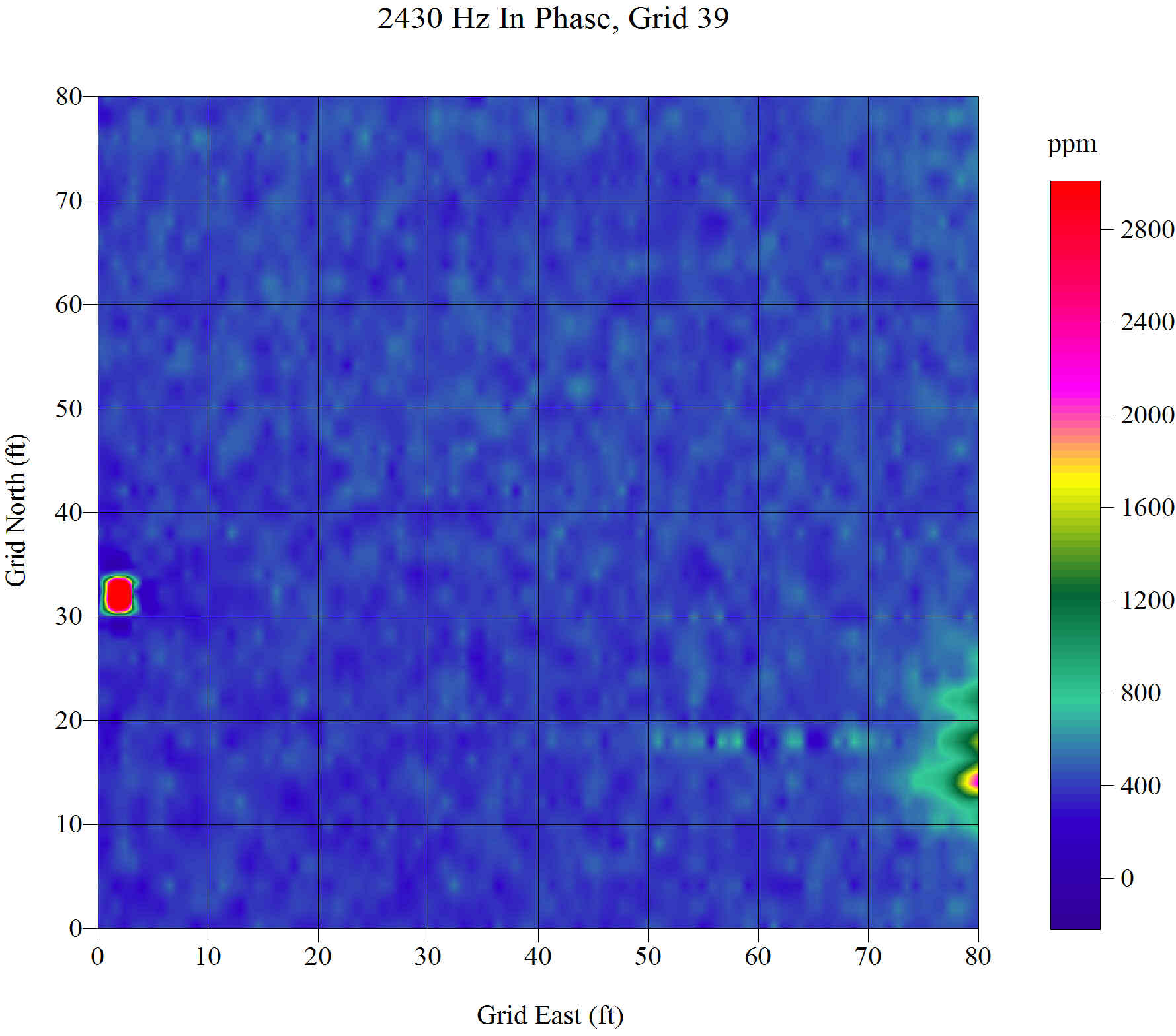

2430 Hz In Phase, Grid 39
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
400
800
1200
1600
2000
2400
2800

Figure B39-a

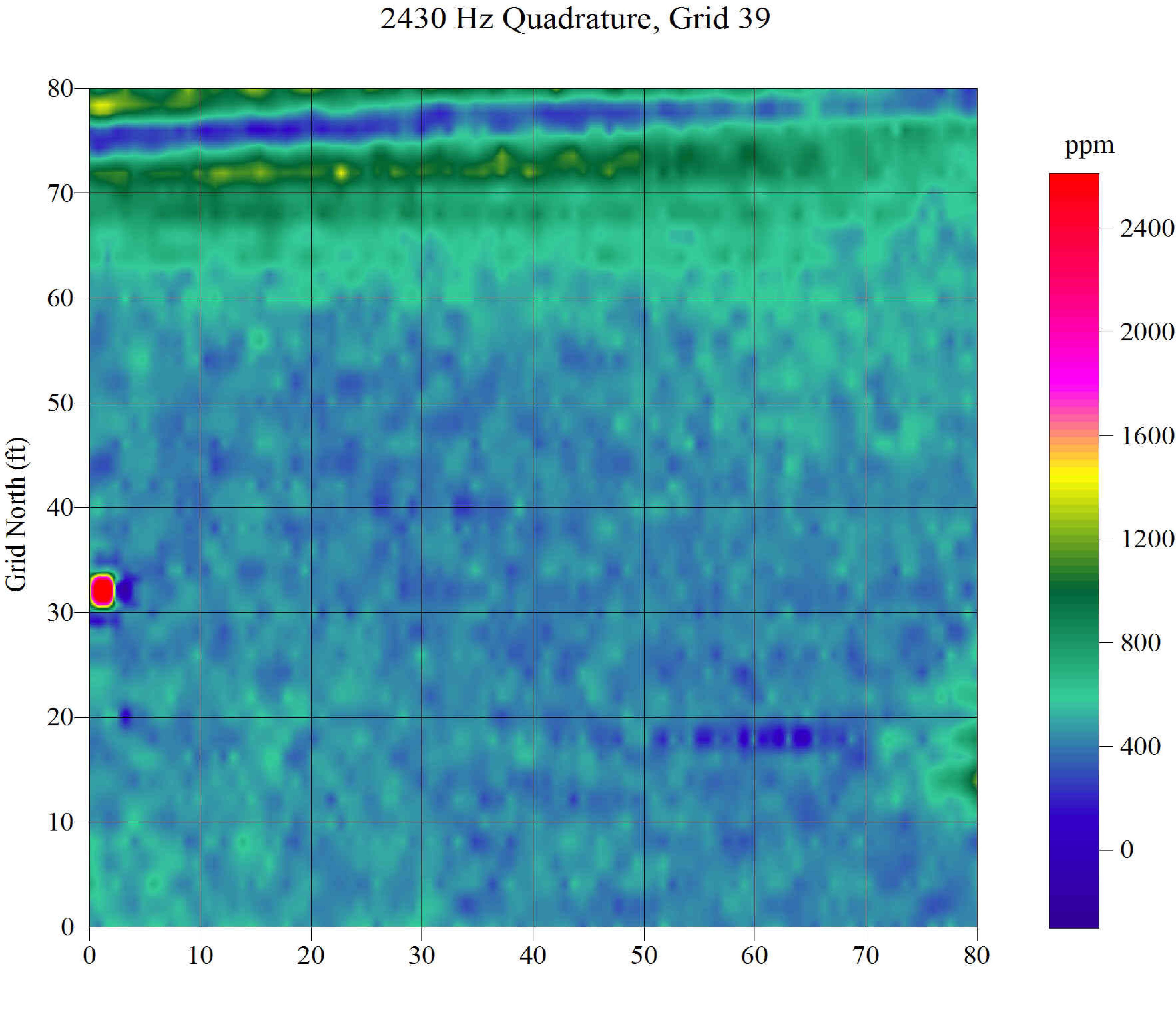
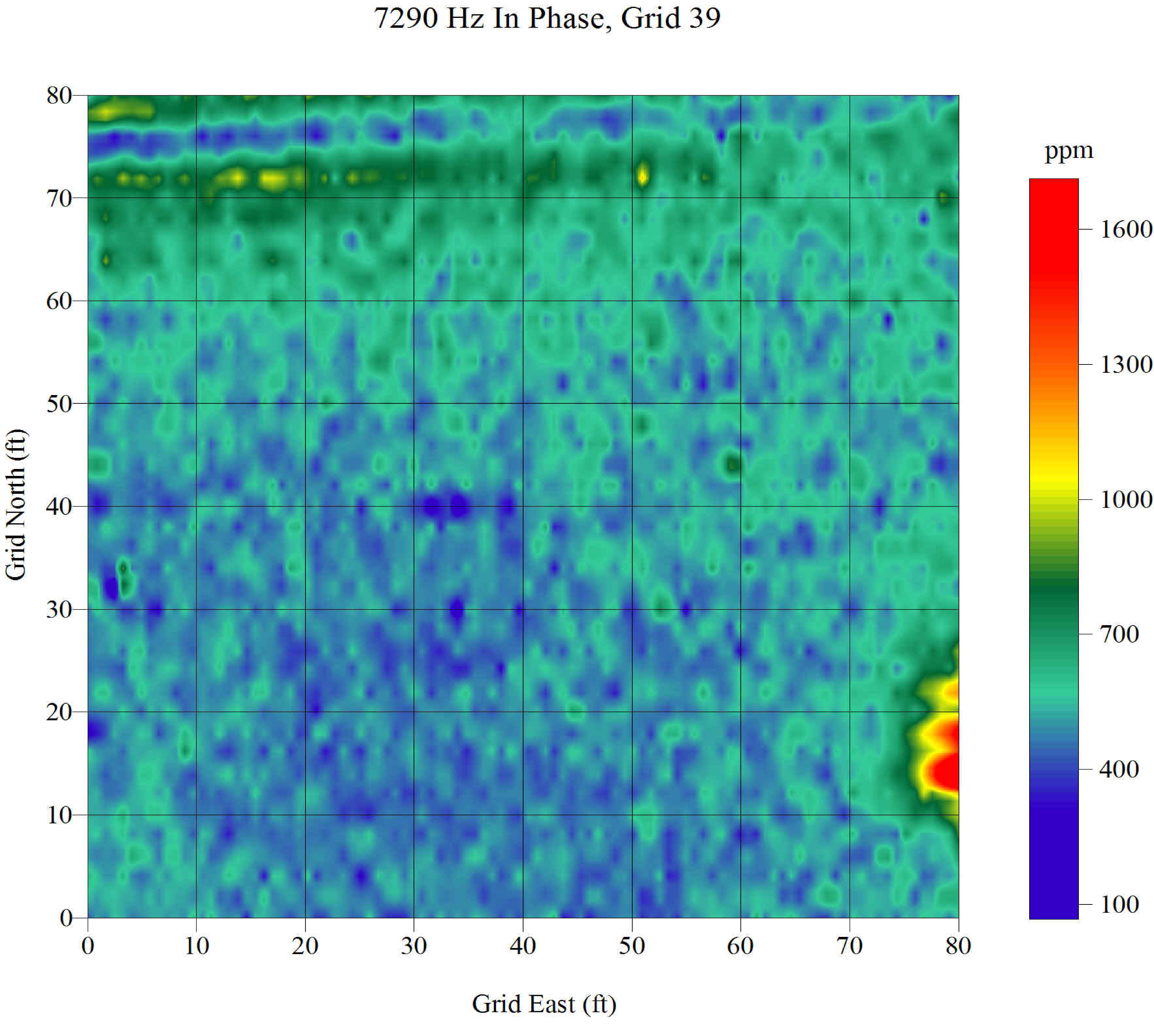
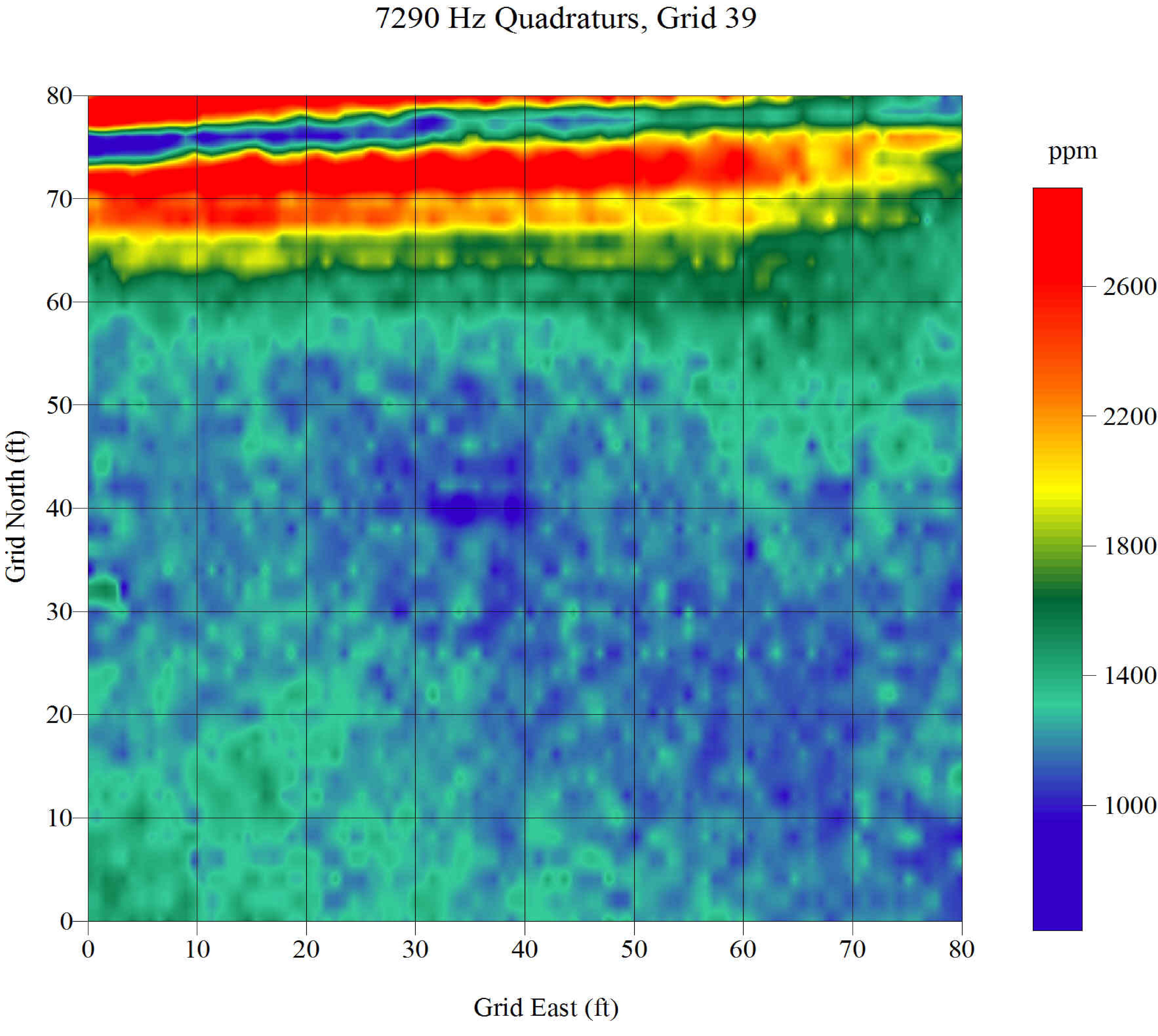

2430 Hz Quadrature, Grid 39
ppm
2400
2000
1600
1200
800
400
0
Grid North (ft)
80
70
60
50
40
30
20
10
0
Grid East (ft)
0
10
20
30
40
50
60
70
80

Figure B39-b



7290 Hz In Phase, Grid 39
ppm
1600
1300
1000
700
400
100
Grid North (ft)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Grid East (ft)

Figure B39-c



7290 Hz Quadraturs, Grid 39
ppm
2600
2200
1800
1400
1000
Grid North (ft)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Grid East (ft)

Figure B39-d

18270 Hz In Phase, Grid 39

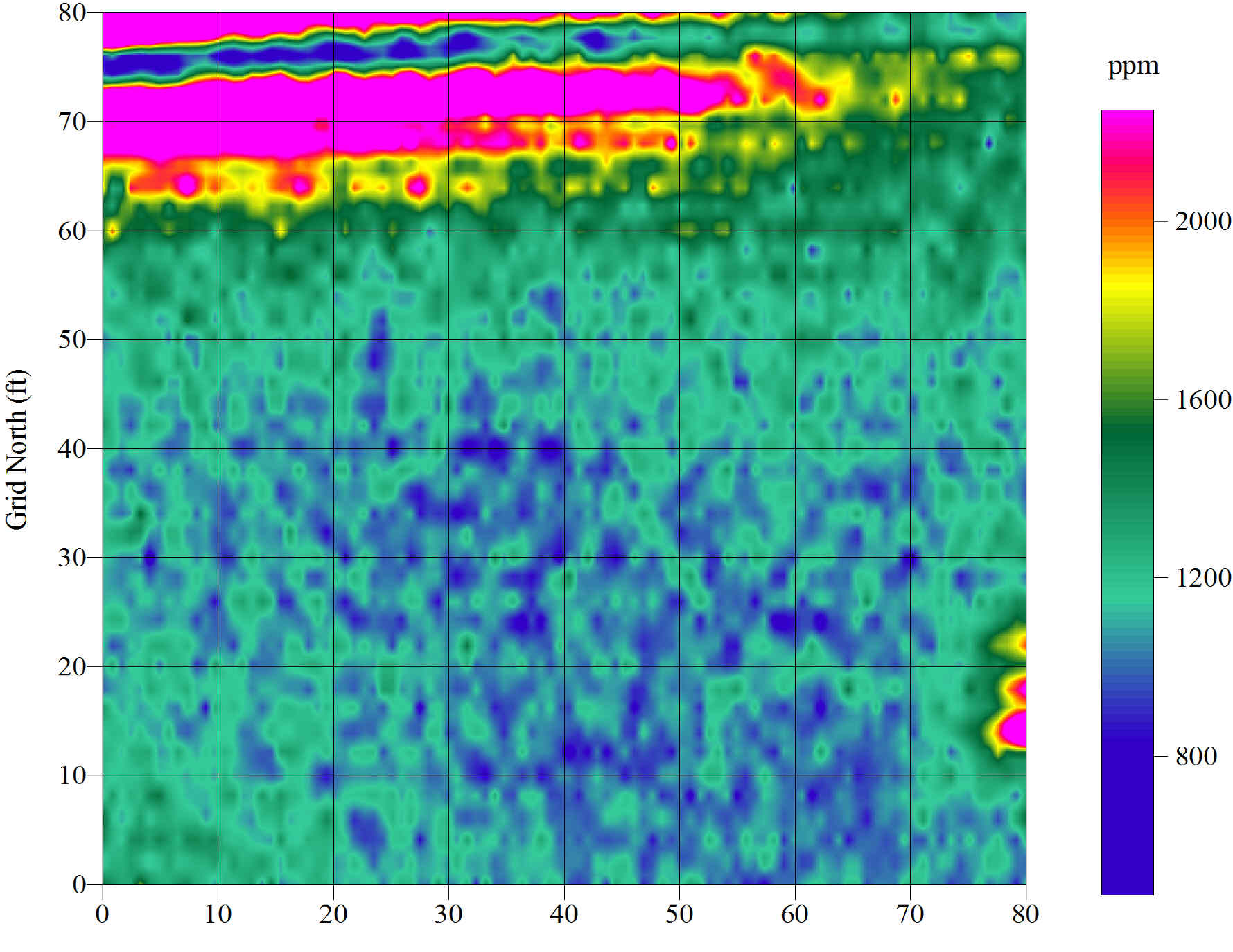


Figure B39-e

18270 Hz Quadrature, Grid 39

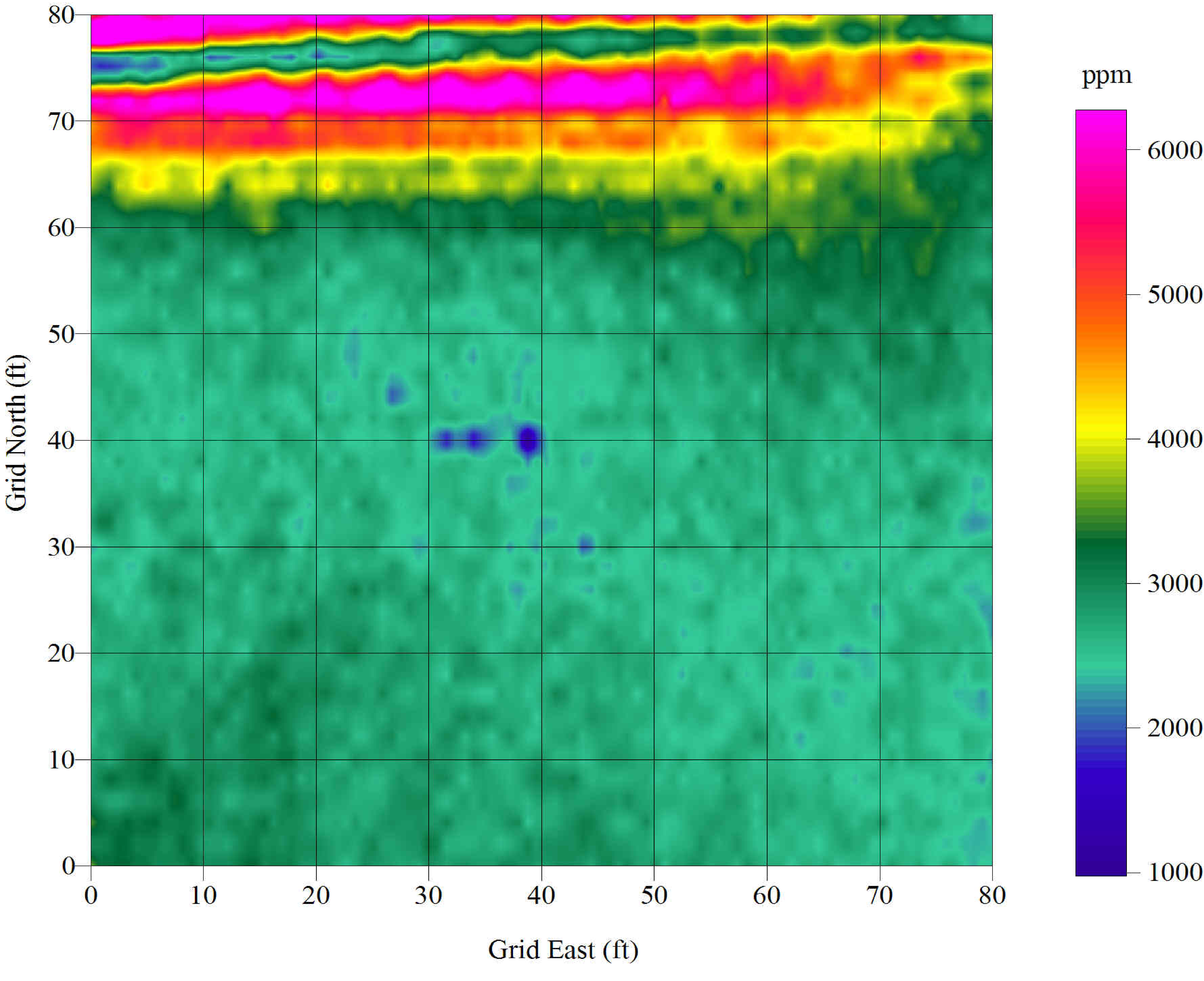


Figure B39-f

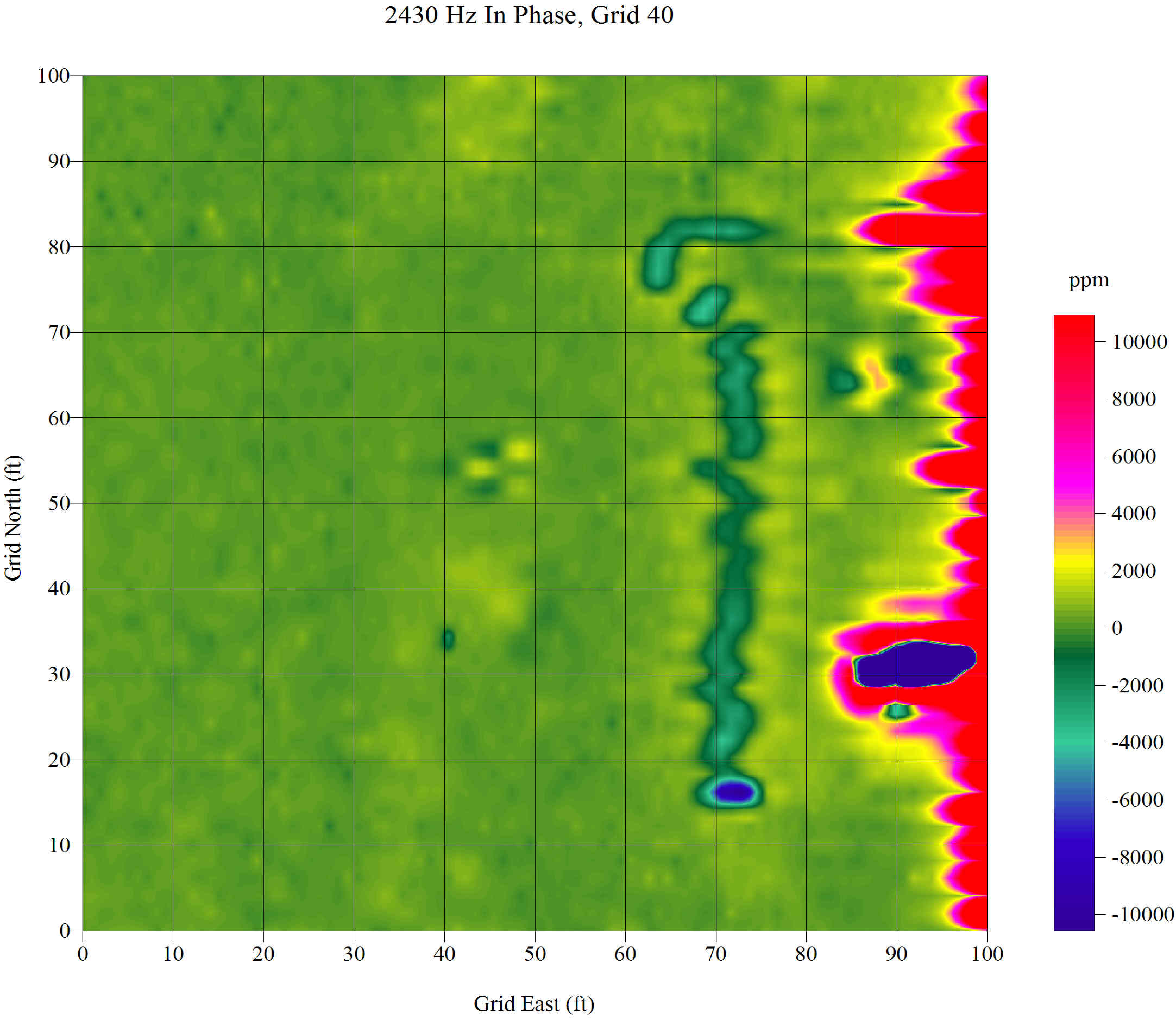

2430 Hz In Phase, Grid 40
ppm
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
Grid North (ft)
Grid East (ft)
0
10
20
30
40
50
60
70
80
90
100

Figure B40-a

2430 Hz Quadrature, Grid 40

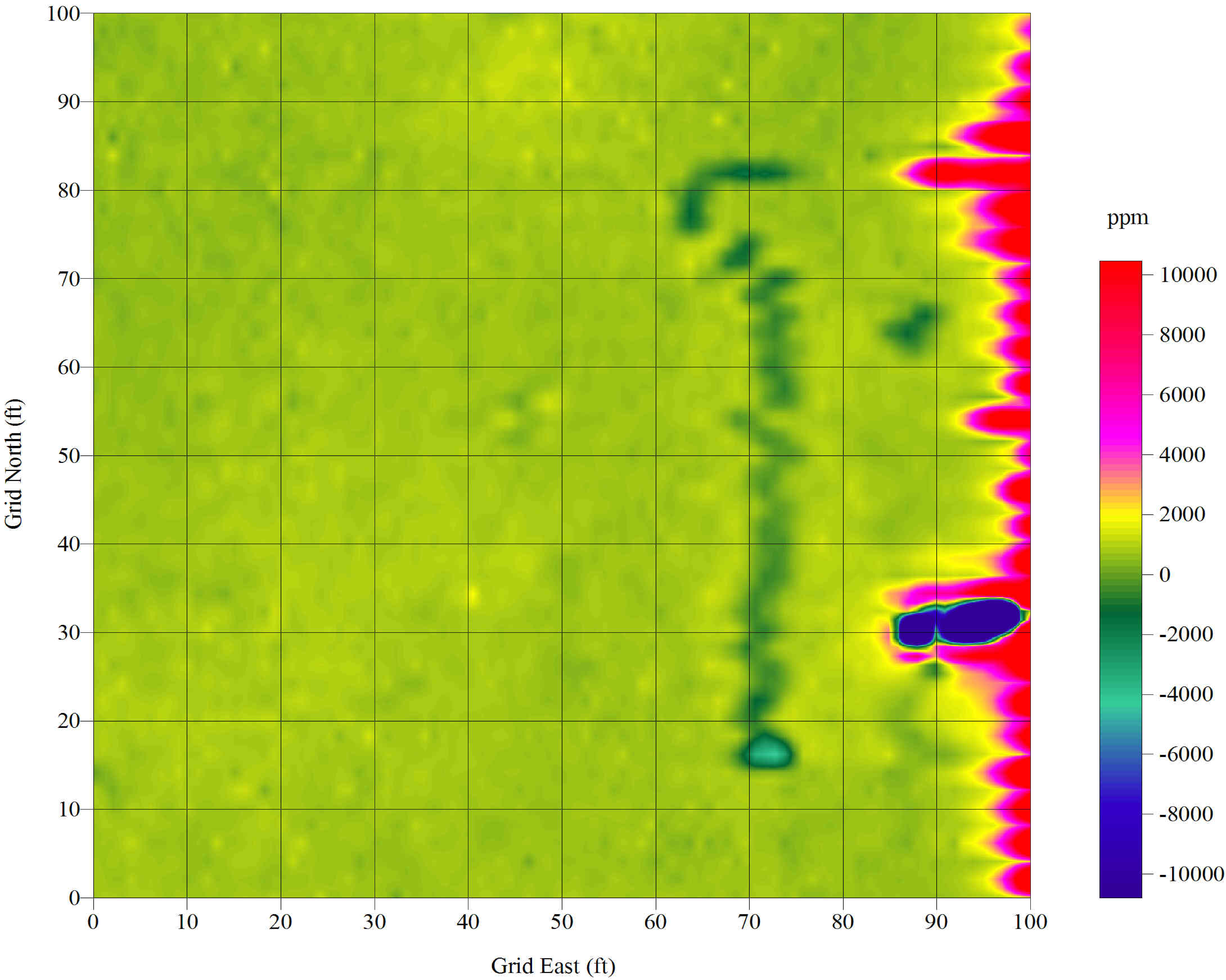


Figure B40-b

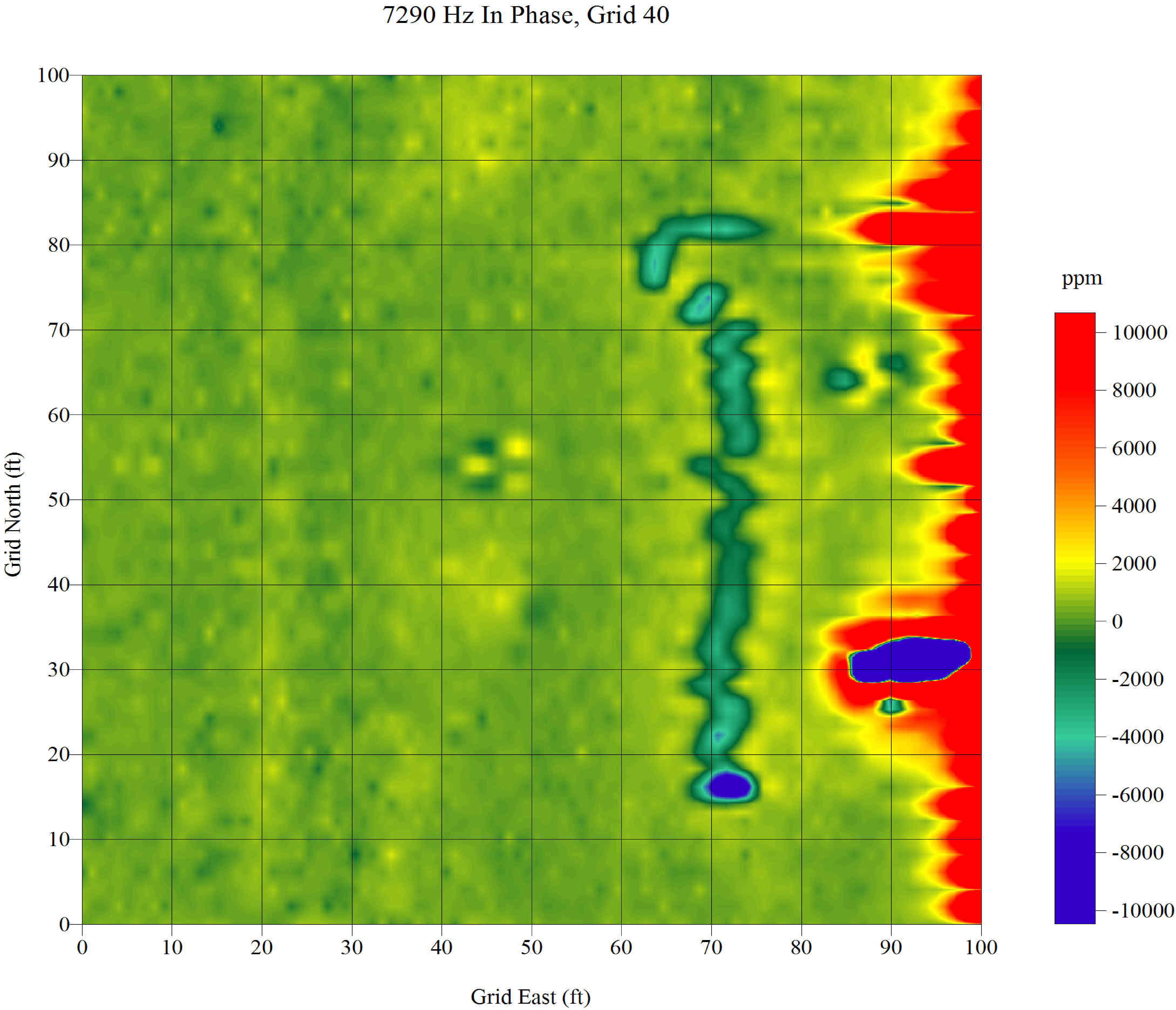

7290 Hz In Phase, Grid 40
Grid North (ft)
Grid East (ft)
ppm
0
10
20
30
40
50
60
70
80
90
100
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000

Figure B40-c

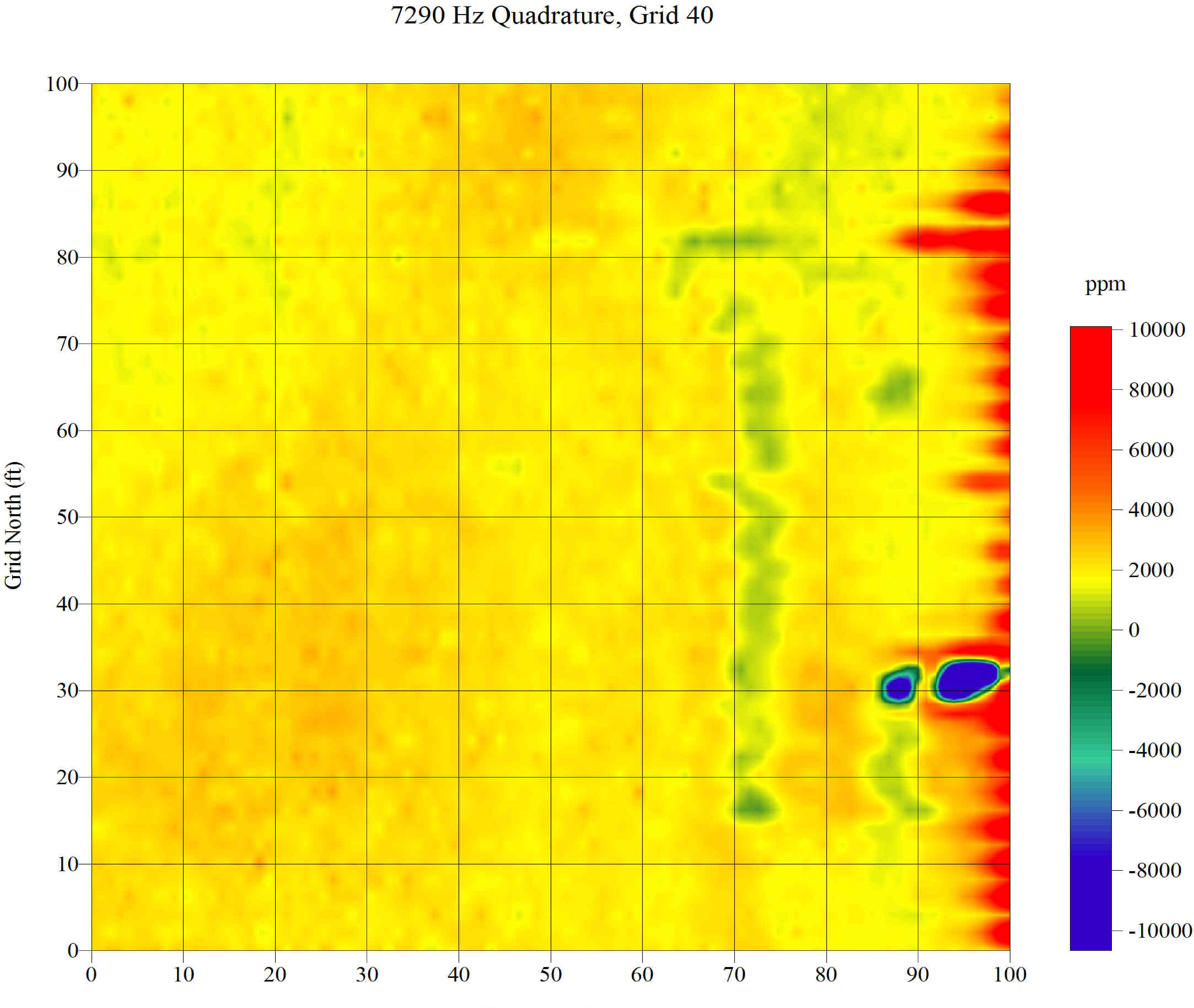

7290 Hz Quadrature, Grid 40
Grid North (ft)
Grid East (ft)
ppm
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
0
10
20
30
40
50
60
70
80
90
100

Figure B40-d

18270 Hz In Phase, Grid 40

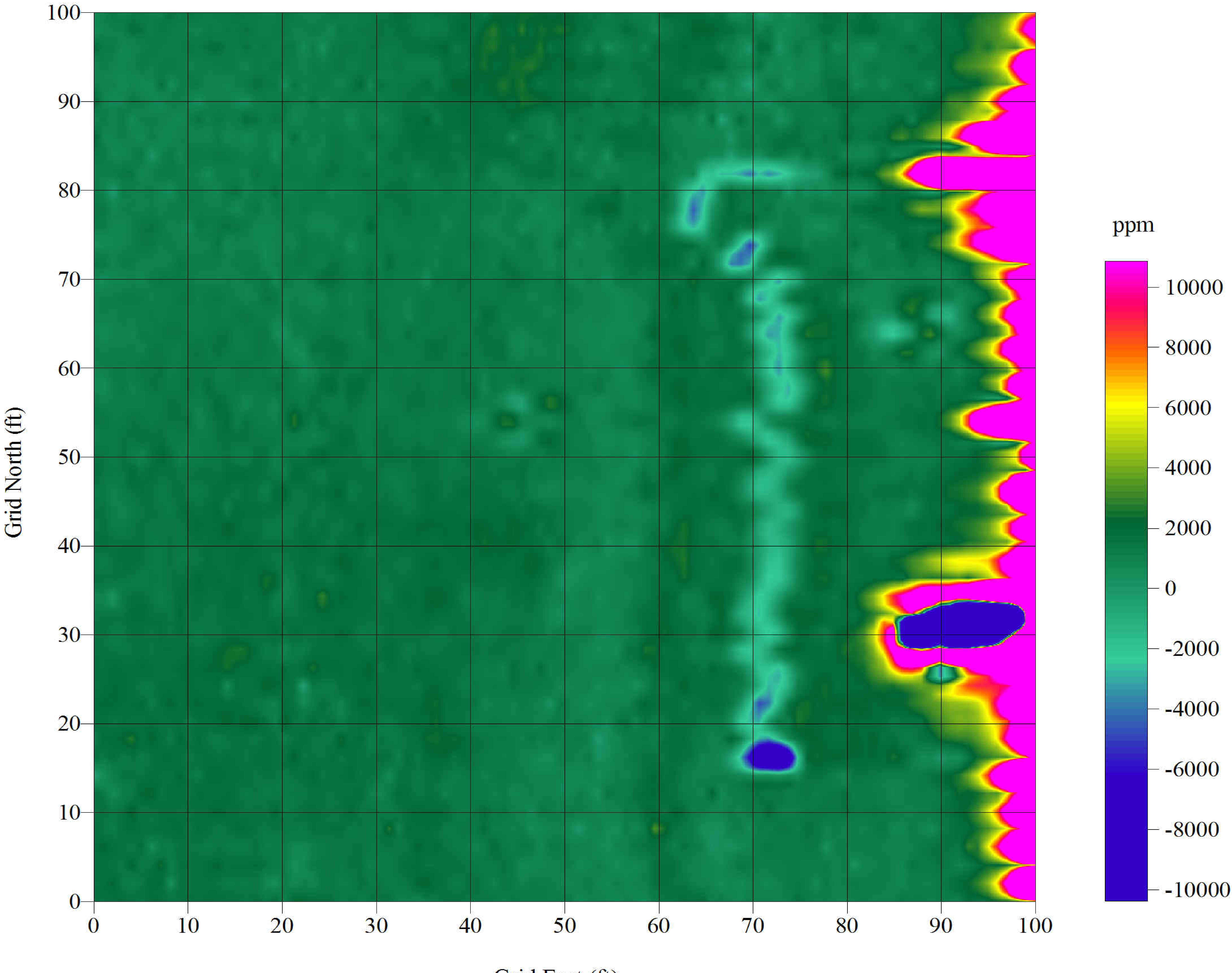


Figure B40-e

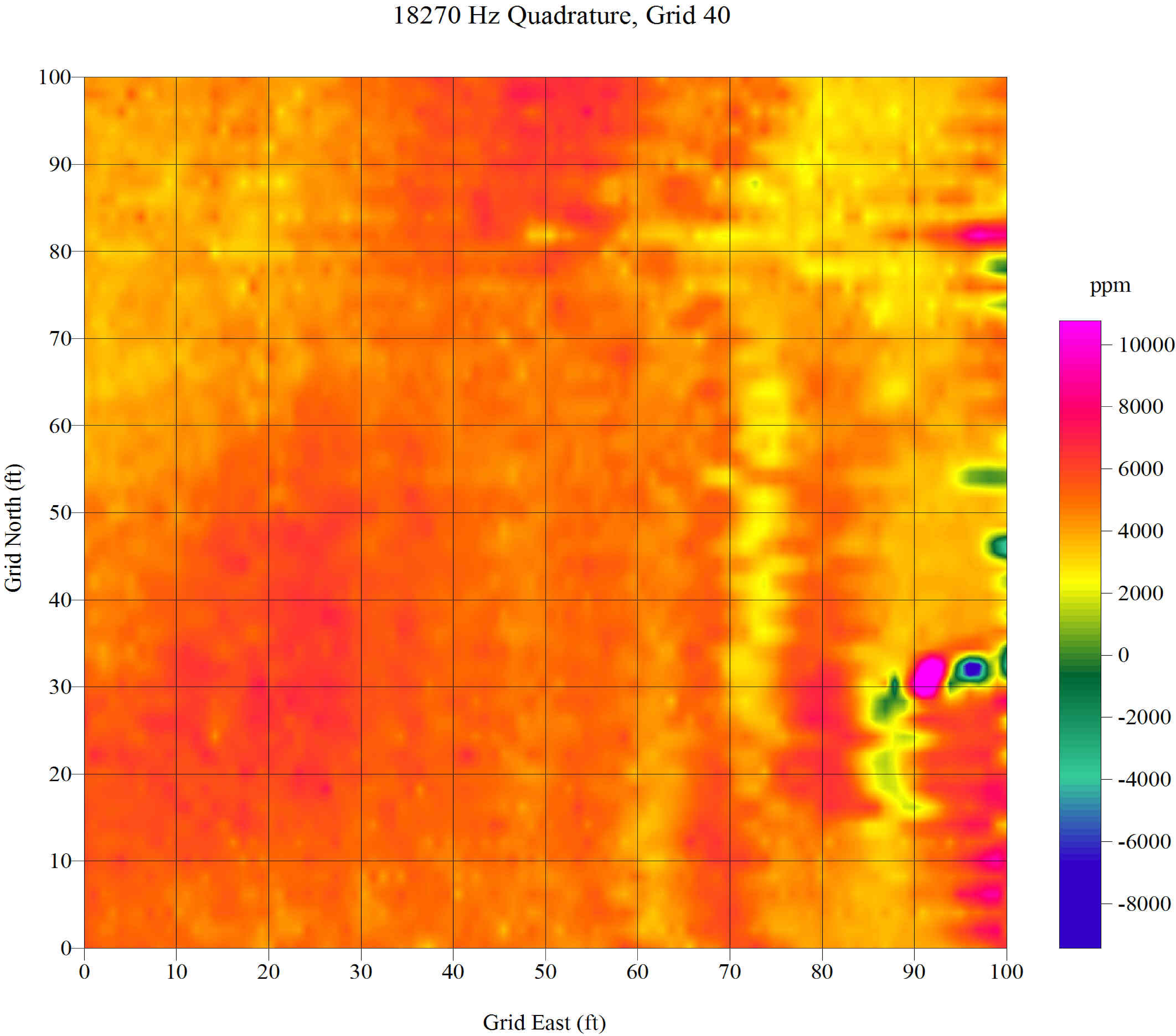

18270 Hz Quadrature, Grid 40
Grid North (ft)
Grid East (ft)
ppm
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
0
10
20
30
40
50
60
70
80
90
100

Figure B40-f

Figure B40-g

Figure B40-h