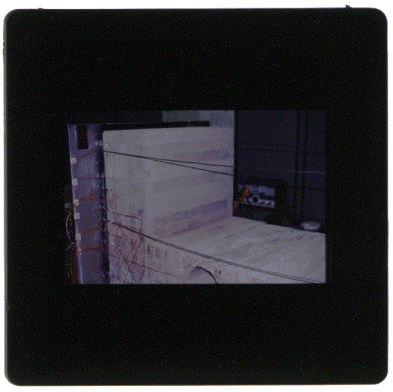
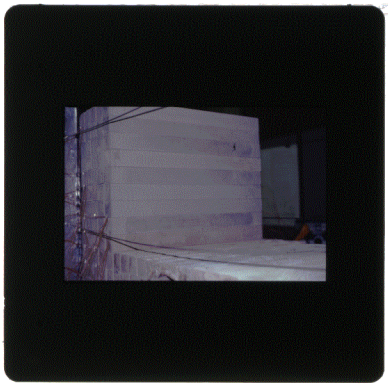
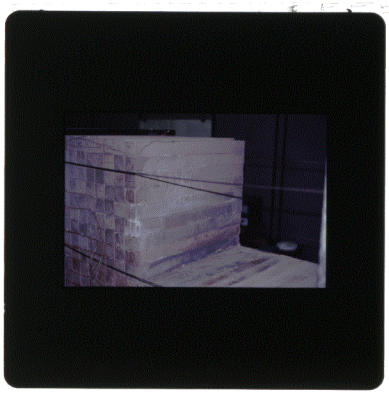
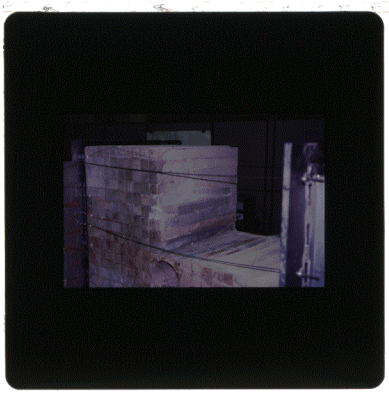
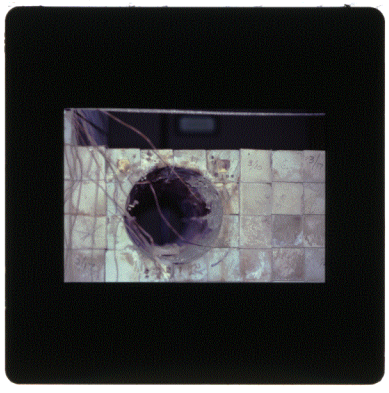
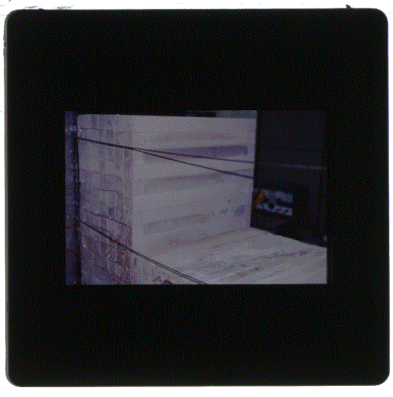
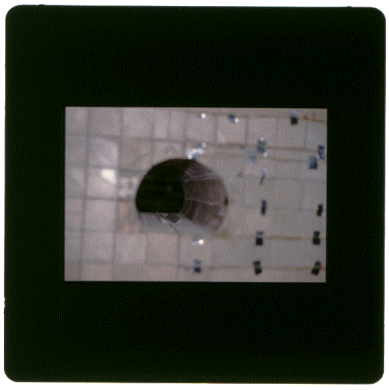
Heat 4 Experiment

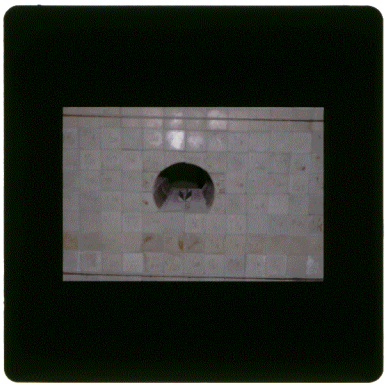



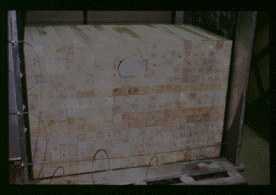



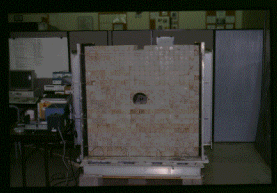
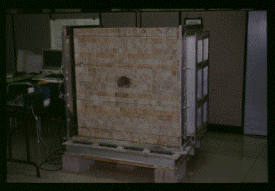


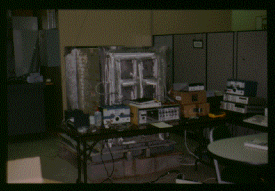
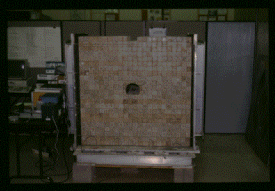
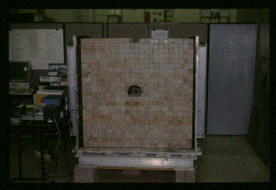
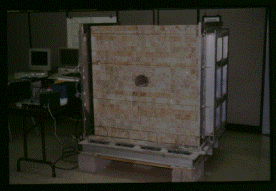
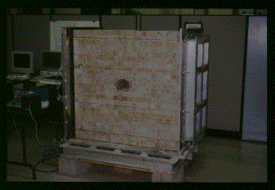
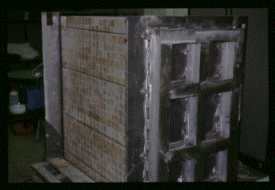


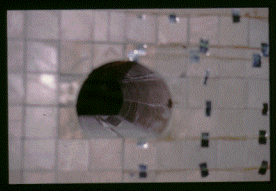


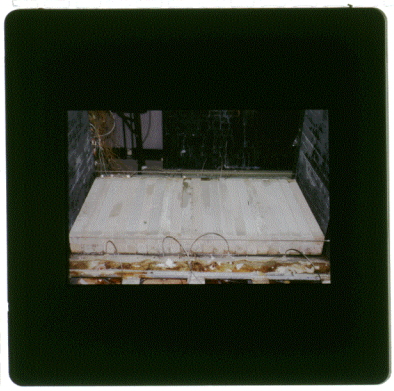


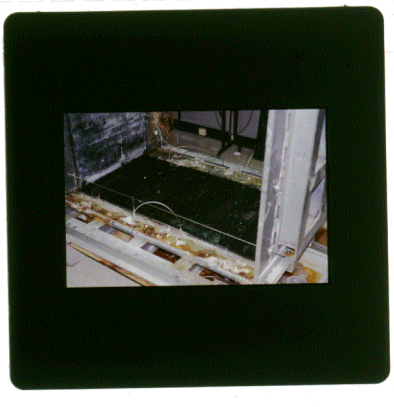


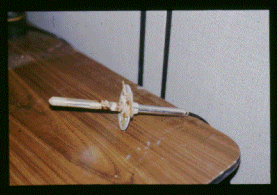



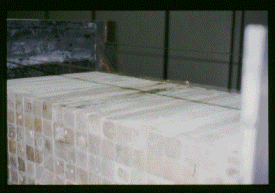
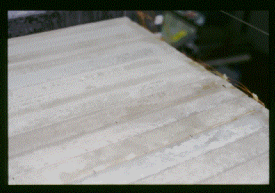
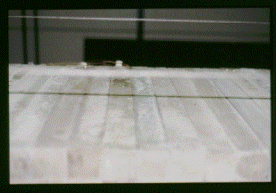
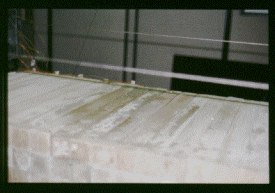







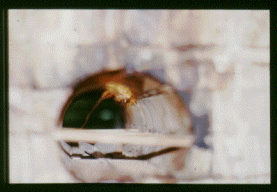
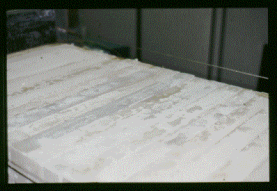
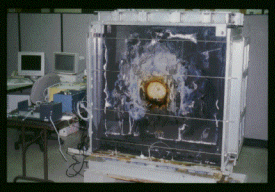
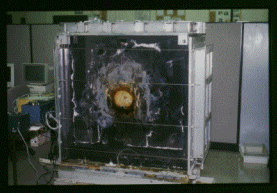
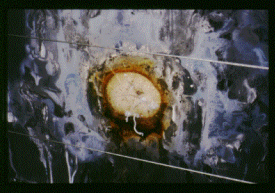
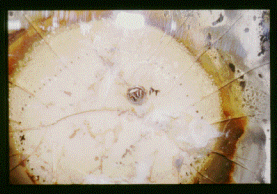
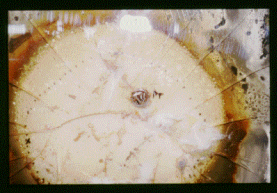
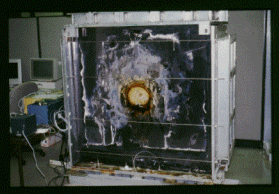
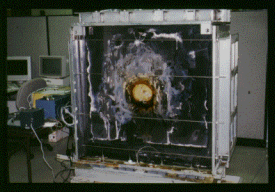
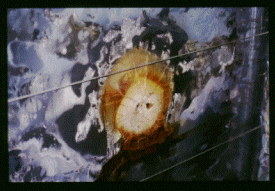
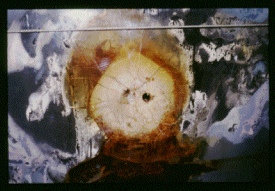
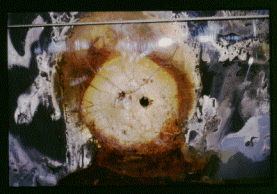


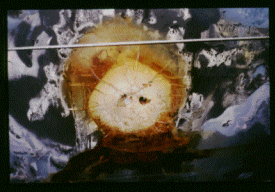
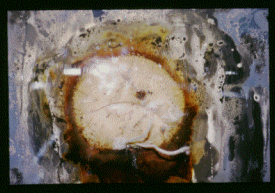
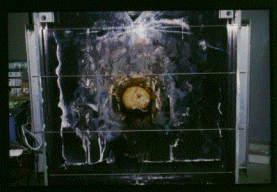
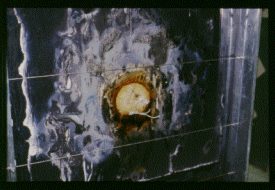
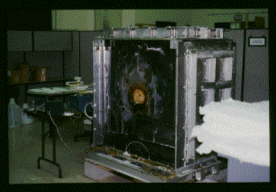
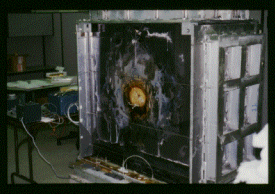


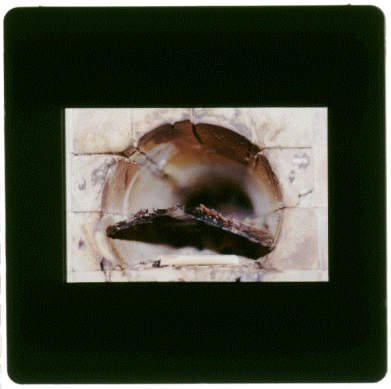


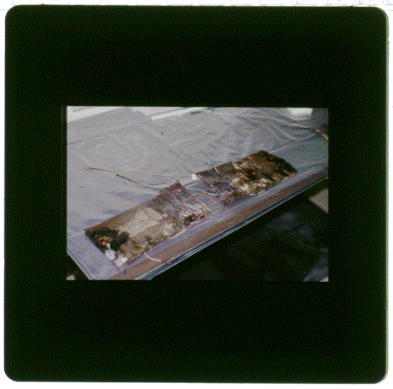






MEMORANDUM

TO: Jim Prikryl
Division 20

FROM: Jo Ann Boyd, Manager QAU, Division 01

RE: Project No.: 20-1402-661
Work order #: 14287
Metals Analysis for 3 Liquid Samples Received 9-15-98

DATE: October 22, 1998

Enclosed please find the sample results for the analysis referenced above.

If there are any questions, please feel free to contact me by voice mail at 522-2169 or by fax at 522-2021. I look forward to our continued analytical support of your projects.

Jo Ann Boyd,
Manager QAU

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111799

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.039	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.056	0.02
Cadmium	0.007	0.005
Calcium	70.3	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.023	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	15.1	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.977	0.1
Selenium	<0.01	0.01
Silicon	5.83	0.01
Silver	<0.005	0.005
Sodium	9.67	0.5
Strontium	0.407	0.005
Sulfur	6.17	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.404	0.005
Zirconium	<0.005	0.005

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111800

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.041	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.055	0.02
Cadmium	0.008	0.005
Calcium	69.9	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.042	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	14.9	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.984	0.1
Selenium	<0.01	0.01
Silicon	5.87	0.01
Silver	<0.005	0.005
Sodium	9.67	0.5
Strontium	0.411	0.005
Sulfur	6.00	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.017	0.005
Yttrium	<0.005	0.005
Zinc	1.60	0.005
Zirconium	<0.005	0.005

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111801

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.043	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.055	0.02
Cadmium	0.007	0.005
Calcium	70.2	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.096	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	14.9	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.974	0.1
Selenium	<0.01	0.01
Silicon	6.10	0.01
Silver	<0.005	0.005
Sodium	9.64	0.5
Strontium	0.415	0.005
Sulfur	5.97	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.356	0.005
Zirconium	<0.005	0.005

SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY

Sample ID
Tap-3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111801

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.0%
Antimony	<0.005	<0.005	0.0%
Arsenic	<0.005	<0.005	0.0%
Barium	0.043	0.042	0.4%
Beryllium	<0.005	<0.005	0.0%
Bismuth	<0.005	<0.005	0.0%
Boron	0.055	0.054	2.0%
Cadmium	0.007	0.007	2.1%
Calcium	70.2	69.9	0.4%
Chromium	<0.005	<0.005	0.0%
Cobalt	<0.005	<0.005	0.0%
Copper	0.096	0.095	1.2%
Iron	<0.02	<0.02	0.0%
Lanthanum	<0.005	<0.005	0.0%
Lead	<0.05	<0.05	0.0%
Lithium	<0.005	<0.005	0.0%
Magnesium	14.9	14.8	0.4%
Manganese	<0.005	<0.005	0.0%
Molybdenum	<0.005	<0.005	0.0%
Nickel	<0.005	<0.005	0.0%
Palladium	<0.005	<0.005	0.0%
Phosphorus	<0.01	<0.01	0.0%
Potassium	0.974	0.976	0.3%
Selenium	<0.01	<0.01	0.0%
Silicon	6.10	6.06	0.7%
Silver	<0.005	<0.005	0.0%
Sodium	9.64	9.70	0.6%
Strontium	0.415	0.415	0.0%
Sulfur	5.97	6.22	4.1%
Thallium	<0.01	<0.01	0.0%
Thorium	<0.005	<0.005	0.0%
Tin	<0.005	<0.005	0.0%
Titanium	<0.005	<0.005	0.0%
Tungsten	<0.01	<0.01	0.0%
Uranium	<0.1	<0.1	0.0%
Vanadium	<0.005	<0.005	0.0%
Yttrium	<0.005	<0.005	0.0%
Zinc	0.356	0.355	0.3%
Zirconium	<0.005	<0.005	0.0%

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID
Tap-3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111801

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.05	2.03	2.00	102%
Antimony	<0.005	0.506	0.500	101%
Arsenic	<0.005	2.09	2.00	104%
Barium	0.043	2.03	2.00	99%
Beryllium	<0.005	0.049	0.050	98%
Bismuth	NR	NR	NR	NR
Boron	NR	NR	NR	NR
Cadmium	0.007	0.057	0.050	101%
Calcium	70.2	89.3	20.0	96%
Chromium	<0.005	0.196	0.200	98%
Cobalt	<0.005	0.484	0.500	97%
Copper	0.096	0.336	0.250	96%
Iron	<0.02	1.06	1.00	106%
Lanthanum	NR	NR	NR	NR
Lead	<0.05	0.488	0.500	98%
Lithium	NR	NR	NR	NR
Magnesium	14.9	35.3	20.0	102%
Manganese	<0.005	0.489	0.500	98%
Molybdenum	NR	NR	NR	NR
Nickel	<0.005	0.473	0.500	95%
Palladium	NR	NR	NR	NR
Phosphorus	NR	NR	NR	NR
Potassium	0.974	22.6	20.0	108%
Selenium	<0.01	2.22	2.00	111%
Silicon	NR	NR	NR	NR
Silver	<0.005	0.046	0.050	91%
Sodium	9.64	33.4	20.0	119%
Strontium	NR	NR	NR	NR
Sulfur	NR	NR	NR	NR
Thallium	<0.01	2.07	2.00	104%
Thorium	NR	NR	NR	NR
Tin	NR	NR	NR	NR
Titanium	NR	NR	NR	NR
Tungsten	NR	NR	NR	NR
Uranium	NR	NR	NR	NR
Vanadium	<0.005	0.508	0.500	102%
Yttrium	NR	NR	NR	NR
Zinc	0.356	0.860	0.500	101%
Zirconium	NR	NR	NR	NR

NR - Not Reported

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-6

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119068

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.039	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.022	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.879	0.1
Selenium	<0.02	0.02
Silicon	5.68	0.1
Silver	<0.005	0.005
Sodium	8.44	0.2
Strontium	0.395	0.005
Sulfur	5.44	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.511	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	18.2	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-7

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119069

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.037	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.890	0.1
Selenium	<0.02	0.02
Silicon	5.72	0.1
Silver	<0.005	0.005
Sodium	8.48	0.2
Strontium	0.395	0.005
Sulfur	5.45	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.509	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.3	0.1
Phosphate-P	<0.1	0.1
Sulfate	17.7	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-3

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119070

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	5.53	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.025	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	8.54	0.05
Manganese	<0.005	0.005
Molybdenum	0.016	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.14	0.1
Selenium	<0.02	0.02
Silicon	75.3	0.1
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.063	0.005
Sulfur	5.04	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.076	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.3	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
114-4

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119071

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	7.89	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.029	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	9.42	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.25	0.1
Selenium	<0.02	0.02
Silicon	74.1	0.1
Silver	<0.005	0.005
Sodium	160	0.2
Strontium	0.080	0.005
Sulfur	5.49	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.084	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.4	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119072

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.74	0.05
Antimony	<0.005	0.005
Arsenic	0.015	0.005
Barium	0.097	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.080	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.114	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.348	0.005
Magnesium	0.114	0.05
Manganese	<0.005	0.005
Molybdenum	0.018	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.082	0.01
Potassium	950	0.1
Selenium	<0.02	0.02
Silicon	83.6	0.1
Silver	<0.005	0.005
Sodium	406	0.2
Strontium	0.017	0.005
Sulfur	104	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.081	0.005
Yttrium	<0.005	0.005
Zinc	0.011	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	20.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	288	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-D

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119073

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.73	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.005
Barium	0.096	0.005
Beryllium	<0.005	0.005
Bismuth	0.005	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.081	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.117	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.344	0.005
Magnesium	0.119	0.05
Manganese	<0.005	0.005
Molybdenum	0.017	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.083	0.01
Potassium	910	0.1
Selenium	<0.02	0.02
Silicon	80.4	0.1
Silver	<0.005	0.005
Sodium	403	0.2
Strontium	0.016	0.005
Sulfur	100	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.082	0.005
Yttrium	<0.005	0.005
Zinc	0.010	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	20.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	296	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-E

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119074

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.56	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.127	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.493	0.05
Cadmium	<0.005	0.005
Calcium	2.56	0.05
Chromium	0.104	0.005
Cobalt	<0.005	0.005
Copper	0.082	0.005
Iron	0.120	0.02
Lanthanum	<0.005	0.005
Lead	0.006	0.005
Lithium	0.501	0.005
Magnesium	2.61	0.05
Manganese	<0.005	0.005
Molybdenum	0.041	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.709	0.01
Potassium	1500	0.1
Selenium	<0.02	0.02
Silicon	91.3	0.1
Silver	<0.005	0.005
Sodium	675	0.2
Strontium	0.020	0.005
Sulfur	136	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.007	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.129	0.005
Yttrium	<0.005	0.005
Zinc	0.223	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	62.2	0.1
Phosphate-P	0.336	0.1
Sulfate	352	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-F

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119075

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.75	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.258	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.496	0.05
Cadmium	<0.005	0.005
Calcium	2.71	0.05
Chromium	0.106	0.005
Cobalt	<0.005	0.005
Copper	0.083	0.005
Iron	0.140	0.02
Lanthanum	<0.005	0.005
Lead	0.008	0.005
Lithium	0.505	0.005
Magnesium	2.67	0.05
Manganese	<0.005	0.005
Molybdenum	0.034	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.725	0.01
Potassium	1540	0.1
Selenium	<0.02	0.02
Silicon	92.4	0.1
Silver	<0.005	0.005
Sodium	690	0.2
Strontium	0.021	0.005
Sulfur	140	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.009	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.131	0.005
Yttrium	<0.005	0.005
Zinc	0.233	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	58.2	0.1
Phosphate-P	0.336	0.1
Sulfate	327	0.1

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID
TAP-6

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119068

Work Order: 15191

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.0%
Antimony	<0.005	<0.005	0.0%
Arsenic	<0.005	<0.005	0.0%
Barium	0.039	0.038	3.2%
Beryllium	<0.005	<0.005	0.0%
Bismuth	<0.005	<0.005	0.0%
Boron	<0.05	<0.05	0.0%
Cadmium	<0.005	<0.005	0.0%
Calcium	66.0	65.9	0.3%
Chromium	<0.005	<0.005	0.0%
Cobalt	<0.005	<0.005	0.0%
Copper	0.022	0.021	1.6%
Iron	<0.02	<0.02	0.0%
Lanthanum	<0.005	<0.005	0.0%
Lead	<0.005	<0.005	0.0%
Lithium	<0.005	<0.005	0.0%
Magnesium	13.8	13.8	0.0%
Manganese	<0.005	<0.005	0.0%
Molybdenum	<0.005	<0.005	0.0%
Nickel	<0.005	<0.005	0.0%
Palladium	<0.005	<0.005	0.0%
Phosphorus	<0.01	<0.01	0.0%
Potassium	0.879	0.883	0.4%
Selenium	<0.02	<0.02	0.0%
Silicon	5.68	5.85	3.0%
Silver	<0.005	<0.005	0.0%
Sodium	8.44	8.72	3.3%
Strontium	0.395	0.395	0.1%
Sulfur	5.44	5.45	0.1%
Thallium	<0.05	<0.05	0.0%
Thorium	<0.01	<0.01	0.0%
Tin	<0.005	<0.005	0.0%
Titanium	<0.005	<0.005	0.0%
Tungsten	<0.01	<0.01	0.0%
Uranium	<0.1	<0.1	0.0%
Vanadium	<0.005	<0.005	0.0%
Yttrium	<0.005	<0.005	0.0%
Zinc	0.511	0.511	0.1%
Zirconium	<0.005	<0.005	0.0%
Bromide	<0.2	<2	0.0%
Chloride	16.2	16	1.2%
Phosphate-P	<0.1	<0.1	0.0%
Sulfate	18.2	18.2	0.0%

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID
H4-C

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119072

Work Order: 15191

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	5.74	7.59	2.00	92.5%
Antimony	<0.005	0.516	0.500	103.2%
Arsenic	0.015	2.11	2.00	104.9%
Barium	0.097	1.81	2.00	85.7%
Beryllium	<0.005	0.045	0.050	90.1%
Bismuth	NR	NR	NR	NR
Boron	NR	NR	NR	NR
Cadmium	<0.005	0.047	0.050	94.1%
Calcium	1.58	20.5	20.0	94.5%
Chromium	0.080	0.254	0.200	87.3%
Cobalt	<0.005	0.473	0.500	94.7%
Copper	0.030	0.256	0.250	90.6%
Iron	0.114	1.09	1.00	97.1%
Lanthanum	NR	NR	NR	NR
Lead	<0.005	0.481	0.500	96.2%
Lithium	NR	NR	NR	NR
Magnesium	0.114	18.4	20.0	91.7%
Manganese	<0.005	0.466	0.500	93.2%
Molybdenum	NR	NR	NR	NR
Nickel	<0.005	0.436	0.500	87.2%
Palladium	NR	NR	NR	NR
Phosphorus	NR	NR	NR	NR
Potassium	950	990	20.0	200.0%
Selenium	<0.02	2.03	2.00	101.6%
Silicon	83.6	73.8	2.00	0.0%
Silver	<0.005	0.047	0.050	93.5%
Sodium	406	426	20.0	102.6%
Strontium	NR	NR	NR	NR
Sulfur	NR	NR	NR	NR
Thallium	<0.05	2.09	2.00	104.7%
Thorium	NR	NR	NR	NR
Tin	NR	NR	NR	NR
Titanium	NR	NR	NR	NR
Tungsten	NR	NR	NR	NR
Uranium	NR	NR	NR	NR
Vanadium	0.081	0.547	0.500	93.0%
Yttrium	NR	NR	NR	NR
Zinc	0.011	0.496	0.500	97.0%
Zirconium	NR	NR	NR	NR
Bromide *	<0.2	7.4	8.0	92.5%
Chloride *	16.2	17.9	2.0	85.0%
Phosphate-P *	<0.1	1.94	1.91	101.6%
Sulfate *	18.2	24.8	8.0	82.5%

NR - Not Reported
* = Sample TAP-6 (Lab System ID: 119068)

SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

Sample ID
LCSW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	3.80	4.00	95.1%
Antimony	0.987	1.000	98.7%
Arsenic	3.98	4.00	99.4%
Barium	3.61	4.00	90.3%
Beryllium	0.093	0.100	92.5%
Bismuth	NR	NR	NR
Boron	NR	NR	NR
Cadmium	0.094	0.100	93.8%
Calcium	19.3	20.0	96.6%
Chromium	0.359	0.400	89.8%
Cobalt	0.924	1.000	92.4%
Copper	0.444	0.500	88.9%
Iron	1.99	2.00	99.5%
Lanthanum	NR	NR	NR
Lead	0.932	1.000	93.2%
Lithium	NR	NR	NR
Magnesium	19.1	20.0	95.4%
Manganese	0.947	1.000	94.7%
Molybdenum	NR	NR	NR
Nickel	0.864	1.000	86.4%
Palladium	NR	NR	NR
Phosphorus	NR	NR	NR
Potassium	17.1	20.0	85.3%
Selenium	4.02	4.00	100.6%
Silicon	1.92	2.00	96.2%
Silver	0.093	0.100	92.7%
Sodium	17.6	20.0	87.9%
Strontium	NR	NR	NR
Sulfur	NR	NR	NR
Thallium	3.89	4.00	97.3%
Thorium	NR	NR	NR
Tin	NR	NR	NR
Titanium	NR	NR	NR
Tungsten	NR	NR	NR
Uranium	NR	NR	NR
Vanadium	0.940	1.000	94.0%
Yttrium	NR	NR	NR
Zinc	0.934	1.000	93.4%
Zirconium	NR	NR	NR
Bromide	383.5	400.0	95.9%
Chloride	196	200	98.0%
Phosphate-P	201	191	105.2%
Sulfate	378	400	94.5%

NR - Not Reported

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID
PBW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	<0.1	0.1
Selenium	<0.02	0.02
Silicon	<0.1	0.1
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.1	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

NUCLEAR
DIV. 20
20-1402-661
WO 14527

FINAL REPORT

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, USA 78228-0510 • (210) 684-5111 • TELEX 244846
Chemistry and Chemical Engineering
Department of Analytical and Environmental Chemistry

November 30, 1998

Mr. Jim Prikryl
Division 20

Subject: Results of Analyses for Sample Received 10/27/98
SwRI Project 20-1402-661 Work Order #14527

Dear Mr. Prikryl:

Enclosed please find the results for the samples received on the above date. The samples were analyzed for chloride, bromide, phosphate and sulfate by ion chromatography. After the samples were analyzed, it was realized that an expired phosphate standard (09/17/98) was used in the calibration of the instrument. A Division 01 Non-conformance Report was issued by our Quality Assurance Unit and the following is the corrective action taken.

The phosphate standard was re-certified by ICP using another certified source of phosphorous. The standard was analyzed in triplicate with an average calculated concentration of phosphate of 1017 mg/L; the certified value is 1000 mg/L. I also reviewed the last two quarterly instrument calibrations to verify the standard results, and according to those calibrations, the instrument was reading very close to previous results on 11/11/98. Since there were no detectable quantities of phosphate in the samples, the expired standard did not affect the data validity

The expired sample has now been disposed of and an order for a replacement has been placed. The IAP re-certification of the standard and copies of the IC calibrations are archived with the raw data at QAU. If you would like to review this data, please contact JoAnn Boyd at 522-2169. If the re-certification of this standard is not acceptable and the samples need to be reanalyzed, please contact me at 522-5428 or Radonna Spies at 522-3242.

Best Regards,

Mike Dammann
Inorganic Manager

Quality Assurance Unit

JoAnn Boyd
Manager

MJD:rr

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113669

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.057	0.02
Cadmium	0.009	0.005
Calcium	5.20	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.008	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.5	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.26	0.1
Selenium	0.008	0.005
Silicon	85.6	2
Silver	<0.005	0.005
Sodium	150	0.2
Strontium	0.076	0.005
Sulfur	5.47	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.120	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	15.7	0.1
Phosphate	<0.1	0.1
Sulfate	25.9	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113670

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.005	0.005
Beryllium	<0.005	0.005
Bismuth	0.008	0.005
Boron	0.055	0.02
Cadmium	0.010	0.005
Calcium	5.11	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.007	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.3	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.24	0.1
Selenium	0.008	0.005
Silicon	86.0	2
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.075	0.005
Sulfur	5.21	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.117	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	16.8	0.1
Phosphate	<0.1	0.1
Sulfate	26	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-A

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113671

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.68	0.05
Antimony	<0.005	0.005
Arsenic	0.013	0.01
Barium	0.119	0.005
Beryllium	<0.005	0.005
Bismuth	0.011	0.005
Boron	0.200	0.02
Cadmium	0.008	0.005
Calcium	3.00	0.05
Chromium	0.021	0.005
Cobalt	<0.005	0.005
Copper	0.021	0.005
Iron	0.074	0.02
Lanthanum	<0.005	0.005
Lead	0.012	0.005
Lithium	0.064	0.005
Magnesium	9.39	0.05
Manganese	<0.005	0.005
Molybdenum	0.011	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.077	0.01
Potassium	309	0.1
Selenium	0.010	0.005
Silicon	131	2
Silver	<0.005	0.005
Sodium	327	0.2
Strontium	0.017	0.005
Sulfur	23.6	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.033	0.005
Yttrium	<0.005	0.005
Zinc	0.540	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25	0.1
Phosphate	<0.1	0.1
Sulfate	75.1	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-B

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113672

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.42	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.01
Barium	0.114	0.005
Beryllium	<0.005	0.005
Bismuth	0.009	0.005
Boron	0.233	0.02
Cadmium	0.009	0.005
Calcium	4.02	0.05
Chromium	0.024	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	0.089	0.02
Lanthanum	<0.005	0.005
Lead	0.014	0.005
Lithium	0.063	0.005
Magnesium	9.37	0.05
Manganese	<0.005	0.005
Molybdenum	0.028	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.106	0.01
Potassium	287	0.1
Selenium	0.014	0.005
Silicon	125	2
Silver	<0.005	0.005
Sodium	318	0.2
Strontium	0.018	0.005
Sulfur	26.7	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.037	0.005
Yttrium	<0.005	0.005
Zinc	0.578	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25.6	0.1
Phosphate	<0.1	0.1
Sulfate	83.3	0.1

SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY

Sample ID
H4-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113669

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.0%
Antimony	<0.005	<0.005	0.0%
Arsenic	<0.01	<0.01	0.0%
Barium	0.006	0.005	3.7%
Beryllium	<0.005	<0.005	0.0%
Bismuth	0.006	0.007	21.8%
Boron	0.057	0.056	1.3%
Cadmium	0.009	0.008	3.2%
Calcium	5.20	5.14	1.2%
Chromium	<0.005	<0.005	0.0%
Cobalt	<0.005	<0.005	0.0%
Copper	0.008	0.013	49.1%
Iron	<0.02	<0.02	0.0%
Lanthanum	<0.005	<0.005	0.0%
Lead	<0.005	<0.005	0.0%
Lithium	<0.005	<0.005	0.0%
Magnesium	11.5	11.4	1.2%
Manganese	<0.005	<0.005	0.0%
Molybdenum	<0.005	<0.005	0.0%
Nickel	<0.005	<0.005	0.0%
Palladium	<0.005	<0.005	0.0%
Phosphorus	<0.01	0.011	200.0%
Potassium	1.26	1.24	1.5%
Selenium	0.008	0.005	36.0%
Silicon	85.6	85.0	0.8%
Silver	<0.005	<0.005	0.0%
Sodium	150	148	1.1%
Strontium	0.076	0.076	1.1%
Sulfur	5.47	5.32	2.8%
Thallium	<0.01	<0.01	0.0%
Thorium	<0.005	<0.005	0.0%
Tin	<0.005	<0.005	0.0%
Titanium	<0.005	<0.005	0.0%
Tungsten	<0.01	<0.01	0.0%
Uranium	<0.1	<0.1	0.0%
Vanadium	<0.005	<0.005	0.0%
Yttrium	<0.005	<0.005	0.0%
Zinc	0.120	0.121	0.9%
Zirconium	<0.005	<0.005	0.0%
Bromide	<2	<2	0.0%
Chloride	15.7	15.5	1.3%
Phosphate	<0.1	<0.1	0.0%
Sulfate	25.9	27.5	6.0%

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID
H4-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113670

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.05	2.10	2.00	105%
Antimony	<0.005	0.532	0.500	106%
Arsenic	<0.01	2.11	2.00	106%
Barium	0.005	2.04	2.00	102%
Beryllium	<0.005	0.052	0.050	104%
Bismuth	NR	NR	NR	NR
Boron	NR	NR	NR	NR
Cadmium	0.010	0.062	0.050	104%
Calcium	5.11	25.2	20.0	100%
Chromium	<0.005	0.201	0.200	100%
Cobalt	<0.005	0.520	0.500	104%
Copper	0.007	0.264	0.250	103%
Iron	<0.02	1.09	1.00	109%
Lanthanum	NR	NR	NR	NR
Lead	<0.005	0.495	0.500	99.0%
Lithium	NR	NR	NR	NR
Magnesium	11.3	31.5	20.0	101%
Manganese	<0.005	0.511	0.500	102%
Molybdenum	NR	NR	NR	NR
Nickel	<0.005	0.500	0.500	100%
Palladium	NR	NR	NR	NR
Phosphorus	NR	NR	NR	NR
Potassium	1.24	25.0	20.0	119%
Selenium	0.008	2.21	2.00	110%
Silicon	NR	NR	NR	NR
Silver	<0.005	0.050	0.050	99.5%
Sodium	147	174	20.0	133%
Strontium	NR	NR	NR	NR
Sulfur	NR	NR	NR	NR
Thallium	<0.01	2.07	2.00	103%
Thorium	NR	NR	NR	NR
Tin	NR	NR	NR	NR
Titanium	NR	NR	NR	NR
Tungsten	NR	NR	NR	NR
Uranium	NR	NR	NR	NR
Vanadium	<0.005	0.522	0.500	104%
Yttrium	NR	NR	NR	NR
Zinc	0.117	0.644	0.500	105%
Zirconium	NR	NR	NR	NR
Bromide	<2	78	80.0	97.5%
Chloride	15.7	56.7	40.0	103%
Phosphate	<0.1	1.77	1.91	92.7%
Sulfate	25.9	104	80.0	97.6%

NR - Not Reported
* Sample H4-1 (SwRI# 113669)

SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

Sample ID
LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	4.12	4.00	103%
Antimony	1.06	1.00	106%
Arsenic	4.19	4.00	105%
Barium	4.01	4.00	100%
Beryllium	0.102	0.100	102%
Bismuth	NR	NR	NR
Boron	NR	NR	NR
Cadmium	0.103	0.100	103%
Calcium	20.3	20.0	102%
Chromium	0.403	0.400	101%
Cobalt	1.02	1.00	102%
Copper	0.496	0.500	99.2%
Iron	2.16	2.00	108%
Lanthanum	NR	NR	NR
Lead	0.990	1.00	99.0%
Lithium	NR	NR	NR
Magnesium	20.1	20.0	101%
Manganese	1.01	1.00	101%
Molybdenum	NR	NR	NR
Nickel	0.989	1.00	98.9%
Palladium	NR	NR	NR
Phosphorus	NR	NR	NR
Potassium	17.9	20.0	89.3%
Selenium	4.38	4.00	109%
Silicon	NR	NR	NR
Silver	0.099	0.100	99.3%
Sodium	18.6	20.0	93.1%
Strontium	NR	NR	NR
Sulfur	NR	NR	NR
Thallium	4.16	4.00	104%
Thorium	NR	NR	NR
Tin	NR	NR	NR
Titanium	NR	NR	NR
Tungsten	NR	NR	NR
Uranium	NR	NR	NR
Vanadium	1.05	1.00	105%
Yttrium	NR	NR	NR
Zinc	1.04	1.00	104%
Zirconium	NR	NR	NR
Bromide	407	400	102%
Chloride	210	200	105%
Phosphate	201	191	105%
Sulfate	413	400	103%

NR - Not Reported

SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

Sample ID
PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.02	0.02
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	<0.1	0.1
Selenium	<0.005	0.005
Silicon	<2	2
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.02	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	<0.1	0.1
Phosphate	<0.1	0.1
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA RD • P.O. DRAWER 28510 • SAN ANTONIO, TX 78228-0510 • (210) 684-5111 • TELEX 244846
FAX NUMBER (210) 522-5938 OR (210) 522-3649

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
BUILDING 199, 113 AVENUE C
TRANSMITTAL SHEET

DATE: November 23, 1998 NUMBER OF PAGES: 9

TO: Jim Prikryl

Division 20

WO 14527

OFFICE TELEPHONE: x5667

FAX NUMBER: x5184

FROM: Mike Dammann

TELEPHONE: x5428

NOTE: Attached are the reults for the four liquid samples received 10/27/98. A hard copy will follow shortly.

Chemistry and Chemical Engineering
Department of Analytical and Environmental Chemistry

November 23, 1998

Mr. Jim Prikryl
Division 20

Subject: Results of Analyses for Sample Received 10/27/98
SwRI Project 20-1402-661 Work Order #14527

Dear Mr. Prikryl:

Enclosed please find the results for the samples received on the above date. The samples were analyzed for chloride, bromide, phosphate and sulfate by ion chromatography. After the samples were analyzed, it was realized that an expired phosphate standard (09/17/98) was used in the calibration of the instrument. A Division 01 Non-conformance Report was issued by our Quality Assurance Unit and the following is the corrective action taken.

The phosphate standard was re-certified by ICP using another certified source of phosphorous. The standard was analyzed in triplicate with an average calculated concentration of phosphate of 1017 mg/L; the certified value is 1000 mg/L. I also reviewed the last two quarterly instrument calibrations to verify the standard results, and according to those calibrations, the instrument was reading very close to previous results on 11/11/98. Since there were no detectable quantities of phosphate in the samples, the expired standard did not affect the data validity

The expired sample has now been disposed of and an order for a replacement has been placed. The IAP re-certification of the standard and copies of the IC calibrations are archived with the raw data at QAU. If you would like to review this data, please contact JoAnn Boyd at 522-2169. If the re-certification of this standard is not acceptable and the samples need to be reanalyzed, please contact me at 522-5428 or Radonna Spies at 522-3242.

Best Regards,

Mike Dammann
Inorganic Manager

Quality Assurance Unit

JoAnn Boyd
Manager

MJD:rr

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113669

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.057	0.02
Cadmium	0.009	0.005
Calcium	5.20	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.008	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.5	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.26	0.1
Selenium	0.008	0.005
Silicon	85.6	2
Silver	<0.005	0.005
Sodium	150	0.2
Strontium	0.076	0.005
Sulfur	5.47	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.120	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	15.7	0.1
Phosphate	<0.1	0.1
Sulfate	25.9	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113670

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.005	0.005
Beryllium	<0.005	0.005
Bismuth	0.008	0.005
Boron	0.055	0.02
Cadmium	0.010	0.005
Calcium	5.11	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.007	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.3	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.24	0.1
Selenium	0.008	0.005
Silicon	86.0	2
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.075	0.005
Sulfur	5.21	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.117	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	16.8	0.1
Phosphate	<0.1	0.1
Sulfate	26	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-A

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113671

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.68	0.05
Antimony	<0.005	0.005
Arsenic	0.013	0.01
Barium	0.119	0.005
Beryllium	<0.005	0.005
Bismuth	0.011	0.005
Boron	0.200	0.02
Cadmium	0.008	0.005
Calcium	3.00	0.05
Chromium	0.021	0.005
Cobalt	<0.005	0.005
Copper	0.021	0.005
Iron	0.074	0.02
Lanthanum	<0.005	0.005
Lead	0.012	0.005
Lithium	0.064	0.005
Magnesium	9.39	0.05
Manganese	<0.005	0.005
Molybdenum	0.011	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.077	0.01
Potassium	309	0.1
Selenium	0.010	0.005
Silicon	131	2
Silver	<0.005	0.005
Sodium	327	0.2
Strontium	0.017	0.005
Sulfur	23.6	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.033	0.005
Yttrium	<0.005	0.005
Zinc	0.540	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25	0.1
Phosphate	<0.1	0.1
Sulfate	75.1	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-B

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113672

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.42	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.01
Barium	0.114	0.005
Beryllium	<0.005	0.005
Bismuth	0.009	0.005
Boron	0.233	0.02
Cadmium	0.009	0.005
Calcium	4.02	0.05
Chromium	0.024	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	0.089	0.02
Lanthanum	<0.005	0.005
Lead	0.014	0.005
Lithium	0.063	0.005
Magnesium	9.37	0.05
Manganese	<0.005	0.005
Molybdenum	0.028	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.106	0.01
Potassium	287	0.1
Selenium	0.014	0.005
Silicon	125	2
Silver	<0.005	0.005
Sodium	318	0.2
Strontium	0.018	0.005
Sulfur	26.7	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.037	0.005
Yttrium	<0.005	0.005
Zinc	0.578	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25.6	0.1
Phosphate	<0.1	0.1
Sulfate	83.3	0.1

SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY

Sample ID
H4-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113669

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.0%
Antimony	<0.005	<0.005	0.0%
Arsenic	<0.01	<0.01	0.0%
Barium	0.006	0.005	3.7%
Beryllium	<0.005	<0.005	0.0%
Bismuth	0.006	0.007	21.8%
Boron	0.057	0.056	1.3%
Cadmium	0.009	0.008	3.2%
Calcium	5.20	5.14	1.2%
Chromium	<0.005	<0.005	0.0%
Cobalt	<0.005	<0.005	0.0%
Copper	0.008	0.013	49.1%
Iron	<0.02	<0.02	0.0%
Lanthanum	<0.005	<0.005	0.0%
Lead	<0.005	<0.005	0.0%
Lithium	<0.005	<0.005	0.0%
Magnesium	11.5	11.4	1.2%
Manganese	<0.005	<0.005	0.0%
Molybdenum	<0.005	<0.005	0.0%
Nickel	<0.005	<0.005	0.0%
Palladium	<0.005	<0.005	0.0%
Phosphorus	<0.01	0.011	200.0%
Potassium	1.26	1.24	1.5%
Selenium	0.008	0.005	36.0%
Silicon	85.6	85.0	0.8%
Silver	<0.005	<0.005	0.0%
Sodium	150	148	1.1%
Strontium	0.076	0.076	1.1%
Sulfur	5.47	5.32	2.8%
Thallium	<0.01	<0.01	0.0%
Thorium	<0.005	<0.005	0.0%
Tin	<0.005	<0.005	0.0%
Titanium	<0.005	<0.005	0.0%
Tungsten	<0.01	<0.01	0.0%
Uranium	<0.1	<0.1	0.0%
Vanadium	<0.005	<0.005	0.0%
Yttrium	<0.005	<0.005	0.0%
Zinc	0.120	0.121	0.9%
Zirconium	<0.005	<0.005	0.0%
Bromide	<2	<2	0.0%
Chloride	15.7	15.5	1.3%
Phosphate	<0.1	<0.1	0.0%
Sulfate	25.9	27.5	6.0%

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID
H4-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/27/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 113670

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.05	2.10	2.00	105%
Antimony	<0.005	0.532	0.500	106%
Arsenic	<0.01	2.11	2.00	106%
Barium	0.005	2.04	2.00	102%
Beryllium	<0.005	0.052	0.050	104%
Bismuth	NR	NR	NR	NR
Boron	NR	NR	NR	NR
Cadmium	0.010	0.062	0.050	104%
Calcium	5.11	25.2	20.0	100%
Chromium	<0.005	0.201	0.200	100%
Cobalt	<0.005	0.520	0.500	104%
Copper	0.007	0.264	0.250	103%
Iron	<0.02	1.09	1.00	109%
Lanthanum	NR	NR	NR	NR
Lead	<0.005	0.495	0.500	99.0%
Lithium	NR	NR	NR	NR
Magnesium	11.3	31.5	20.0	101%
Manganese	<0.005	0.511	0.500	102%
Molybdenum	NR	NR	NR	NR
Nickel	<0.005	0.500	0.500	100%
Palladium	NR	NR	NR	NR
Phosphorus	NR	NR	NR	NR
Potassium	1.24	25.0	20.0	119%
Selenium	0.008	2.21	2.00	110%
Silicon	NR	NR	NR	NR
Silver	<0.005	0.050	0.050	99.5%
Sodium	147	174	20.0	133%
Strontium	NR	NR	NR	NR
Sulfur	NR	NR	NR	NR
Thallium	<0.01	2.07	2.00	103%
Thorium	NR	NR	NR	NR
Tin	NR	NR	NR	NR
Titanium	NR	NR	NR	NR
Tungsten	NR	NR	NR	NR
Uranium	NR	NR	NR	NR
Vanadium	<0.005	0.522	0.500	104%
Yttrium	NR	NR	NR	NR
Zinc	0.117	0.644	0.500	105%
Zirconium	NR	NR	NR	NR
Bromide	<2	78	80.0	97.5%
Chloride	15.7	56.7	40.0	103%
Phosphate	<0.1	1.77	1.91	92.7%
Sulfate	25.9	104	80.0	97.6%

NR - Not Reported
* Sample H4-1 (SwRI# 113669)

SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

Sample ID
LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	4.12	4.00	103%
Antimony	1.06	1.00	106%
Arsenic	4.19	4.00	105%
Barium	4.01	4.00	100%
Beryllium	0.102	0.100	102%
Bismuth	NR	NR	NR
Boron	NR	NR	NR
Cadmium	0.103	0.100	103%
Calcium	20.3	20.0	102%
Chromium	0.403	0.400	101%
Cobalt	1.02	1.00	102%
Copper	0.496	0.500	99.2%
Iron	2.16	2.00	108%
Lanthanum	NR	NR	NR
Lead	0.990	1.00	99.0%
Lithium	NR	NR	NR
Magnesium	20.1	20.0	101%
Manganese	1.01	1.00	101%
Molybdenum	NR	NR	NR
Nickel	0.989	1.00	98.9%
Palladium	NR	NR	NR
Phosphorus	NR	NR	NR
Potassium	17.9	20.0	89.3%
Selenium	4.38	4.00	109%
Silicon	NR	NR	NR
Silver	0.099	0.100	99.3%
Sodium	18.6	20.0	93.1%
Strontium	NR	NR	NR
Sulfur	NR	NR	NR
Thallium	4.16	4.00	104%
Thorium	NR	NR	NR
Tin	NR	NR	NR
Titanium	NR	NR	NR
Tungsten	NR	NR	NR
Uranium	NR	NR	NR
Vanadium	1.05	1.00	105%
Yttrium	NR	NR	NR
Zinc	1.04	1.00	104%
Zirconium	NR	NR	NR
Bromide	407	400	102%
Chloride	210	200	105%
Phosphate	201	191	105%
Sulfate	413	400	103%

NR - Not Reported

SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

Sample ID
PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.02	0.02
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	<0.1	0.1
Selenium	<0.005	0.005
Silicon	<2	2
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.02	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	<0.1	0.1
Phosphate	<0.1	0.1
Sulfate	<0.1	0.1

××× TRANSMISSION REPORT ×××

NOV-23-98 17:16 ID:2105222021 SWRI BLDG 201

START TIME	NOV-23-98 17:14
TELEPHONE NUMBER	5184
NAME(ID NUMBER)	CNWRA LAB. 57/51
TRANSMISSION MODE	EMMR
RESOLUTION	STD
PAGES TRANSMITTED	010
MAILBOX	OFF
SECURITY	OFF
INFORMATION CODE	OK
REDIALING TIMES	00
MACHINE ENGAGED	02'23
JOB NUMBER	896

THIS TRANSMISSION IS COMPLETED.

LAST SUCCESSFUL PAGE 010

NUCLEAR
DIV. 20
20-1402-661
WO 14527

Jim: this needs to go with the data for this project. Some how this paperwork came over with these recent samples.

Sydney Gorton
DIV 01 ext. 2476

CHAIN OF CUSTODY

Client Name/Address: James D. Prikryl
CNWRA / Div 20
Bldg 57

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Requested Turnaround:
- ☐ 1 Week
- ☒ 2 Weeks (Normal)
- ☐ 3 Weeks
- ☐ Other:_____

Client Purchase Order/Other ID:

Site/Zone ID:

Analyses Requested

SwRI Contact:

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time (mm/dd/yy)	Matrix Type	Sample Type	# of Containers	ICP of common elements including Si	Anions by ion chromatography including Cl, Br, PO_4, SO_4									
~~H4-1~~	10/25/98		0.01M HNO_3	DM	1	X	X									
~~H4-2~~	"		"	DM	1	X	X									
~~H4-A~~	"		"	DM	1	X	X									
H4-B	"		"	DM	1	X	X									

REMARKS

Preservation
- **a** = HCl to pH <2
- **b** = HNO_3 to pH <2
- **c** = H_2SO_4 to pH <2
- **d** = NaOH to pH >12
- **e** = Other (Specify)

Project is nuclear safety related 10CFR50 Part 21, Appendix B.

Matrix Types: **A** - Air; **P** - Product; **S** - Soil; **T** - Tissue; **W** - Water

Sample Types: **DM** - Dissolved Metals; **ER** - Equipment Rinsate; **FB** - Field Blank; **MSD** - Matrix Spike Duplicate; **MS** - Matrix Spike; **TB** - Trip Blank; **TM** - Total Metals; **ES** - Environmental Samples; **FD** - Field Duplicate

Relinquished by (Signature):

Received by (Signature)

Relinquished by Sampler (Signature): James D. Prikryl

Relinquished by (Signature)

Received by (Signature):

Comments: 22ºC #44

SwRI Project No. 20-1402-661

Received by SwRI Lab (Signature): R. P.

Samples Disposed by:

Date/Time: 10/27/98 15:05

Div 01 COC Form 01-01-001, Rev 1/97

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-6

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119068

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.039	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.022	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.879	0.1
Selenium	<0.02	0.02
Silicon	5.68	0.1
Silver	<0.005	0.005
Sodium	8.44	0.2
Strontium	0.395	0.005
Sulfur	5.44	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.511	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	18.2	0.1

Tap Water
pH 7.37
Total Alkalinity
190 mg $CaCO_3$/L

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-7

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119069

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.037	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.890	0.1
Selenium	<0.02	0.02
Silicon	5.72	0.1
Silver	<0.005	0.005
Sodium	8.48	0.2
Strontium	0.395	0.005
Sulfur	5.45	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.509	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.3	0.1
Phosphate-P	<0.1	0.1
Sulfate	17.7	0.1

Tap Water
pH 7.55

Alkalinity
196 mg $CaCO_3$/L

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
114-3

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119070

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	5.53	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.025	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	8.54	0.05
Manganese	<0.005	0.005
Molybdenum	0.016	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.14	0.1
Selenium	<0.02	0.02
Silicon	75.3	0.1
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.063	0.005
Sulfur	5.04	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.076	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.3	0.1

Tap Water
spiked with
Si Std
pH 9.95
Alkalinity
220 mg $CaCO_3$/l

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
114-4

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119071

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	7.89	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.029	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	9.42	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.25	0.1
Selenium	<0.02	0.02
Silicon	74.1	0.1
Silver	<0.005	0.005
Sodium	160	0.2
Strontium	0.089	0.005
Sulfur	5.49	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.084	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.4	0.1

Tap Water spiked with Si Std
pH 9.95

Alkalinity
250 mg $CaCO_3$/L

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119072

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.74	0.05
Antimony	<0.005	0.005
Arsenic	0.015	0.005
Barium	0.097	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.080	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.114	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.348	0.005
Magnesium	0.114	0.05
Manganese	<0.005	0.005
Molybdenum	0.018	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.082	0.01
Potassium	950	0.1
Selenium	<0.02	0.02
Silicon	83.6	0.1
Silver	<0.005	0.005
Sodium	406	0.2
Strontium	0.017	0.005
Sulfur	104	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.081	0.005
Yttrium	<0.005	0.005
Zinc	0.011	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	29.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	288	0.1

Water collected from dipping at bottom of test cell pH 9.74 collected 1/29/99

Alkalinity 394 mg $CaCO_3$/L

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-D

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119073

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.73	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.005
Barium	0.096	0.005
Beryllium	<0.005	0.005
Bismuth	0.005	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.081	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.117	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.344	0.005
Magnesium	0.119	0.05
Manganese	<0.005	0.005
Molybdenum	0.017	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.003	0.01
Potassium	910	0.1
Selenium	<0.02	0.02
Silicon	80.4	0.1
Silver	<0.005	0.005
Sodium	403	0.2
Strontium	0.016	0.005
Sulfur	100	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.082	0.005
Yttrium	<0.005	0.005
Zinc	0.010	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	20.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	296	0.1

Water collected from test cell on 1/24/99
pH 9.74

Alkalinity
395 mg $CaCO_3$

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-F

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119074

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.56	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.127	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.493	0.05
Cadmium	<0.005	0.005
Calcium	2.56	0.05
Chromium	0.104	0.005
Cobalt	<0.005	0.005
Copper	0.082	0.005
Iron	0.120	0.02
Lanthanum	<0.005	0.005
Lead	0.006	0.005
Lithium	0.501	0.005
Magnesium	2.61	0.05
Manganese	<0.005	0.005
Molybdenum	0.041	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.709	0.01
Potassium	1500	0.1
Selenium	<0.02	0.02
Silicon	91.3	0.1
Silver	<0.005	0.005
Sodium	675	0.2
Strontium	0.020	0.005
Sulfur	136	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.007	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.129	0.005
Yttrium	<0.005	0.005
Zinc	0.223	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	62.2	0.1
Phosphate-P	0.336	0.1
Sulfate	352	0.1

Water collected from test cell on 2/23/99
pH 10.01

Alkalinity
665 mg $CaCO_3$/l

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-P

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119075

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.75	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.258	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.496	0.05
Cadmium	<0.005	0.005
Calcium	2.71	0.05
Chromium	0.106	0.005
Cobalt	<0.005	0.005
Copper	0.083	0.005
Iron	0.140	0.02
Lanthanum	<0.005	0.005
Lead	0.008	0.005
Lithium	0.505	0.005
Magnesium	2.67	0.05
Manganese	<0.005	0.005
Molybdenum	0.034	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.725	0.01
Potassium	1540	0.1
Selenium	<0.02	0.02
Silicon	92.4	0.1
Silver	<0.005	0.005
Sodium	690	0.2
Strontium	0.021	0.005
Sulfur	140	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.009	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.131	0.005
Yttrium	<0.005	0.005
Zinc	0.233	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	58.2	0.1
Phosphate-P	0.336	0.1
Sulfate	327	0.1

Water collected from test well on 2/23/99 pH 10.01

Alkalinity 672 mg $CaCO_3$/l

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/15/98

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 111799

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.039	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.056	0.02
Cadmium	0.007	0.005
Calcium	70.3	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.023	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	15.1	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.977	0.1
Selenium	<0.01	0.01
Silicon	5.83	0.01
Silver	<0.005	0.005
Sodium	9.67	0.5
Strontium	0.407	0.005
Sulfur	6.17	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.404	0.005
Zirconium	<0.005	0.005

Tap Water
pH 7.36

SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 111800

Client: Division 20

Date Received: 09/15/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.041	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.055	0.02
Cadmium	0.008	0.005
Calcium	69.9	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.042	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	14.9	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.984	0.1
Selenium	<0.01	0.01
Silicon	5.87	0.01
Silver	<0.005	0.005
Sodium	9.67	0.5
Strontium	0.411	0.005
Sulfur	6.00	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.017	0.005
Yttrium	<0.005	0.005
Zinc	1.60	0.005
Zirconium	<0.005	0.005

Tap Water
pH 7.35

SAMPLE ANALYSIS DATA SHEET

Sample ID
Tap-3

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 111801

Client: Division 20

Date Received: 09/15/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.043	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.055	0.02
Cadmium	0.007	0.005
Calcium	70.2	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.096	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.05	0.05
Lithium	<0.005	0.005
Magnesium	14.9	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.974	0.1
Selenium	<0.01	0.01
Silicon	6.10	0.01
Silver	<0.005	0.005
Sodium	9.64	0.5
Strontium	0.415	0.005
Sulfur	5.97	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.356	0.005
Zirconium	<0.005	0.005

Tap Water
pH 7.34

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 113669

Client: Division 20

Date Received: 10/27/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.057	0.02
Cadmium	0.009	0.005
Calcium	5.20	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.008	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.5	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.26	0.1
Selenium	0.008	0.005
Silicon	85.6	2
Silver	<0.005	0.005
Sodium	150	0.2
Strontium	0.076	0.005
Sulfur	5.47	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.120	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	15.7	0.1
Phosphate	<0.1	0.1
Sulfate	25.9	0.1

Tap Water spiked with Si Std To 85 To 90 ppm Si
pH 9.82

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 113670

Client: Division 20

Date Received: 10/27/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.01	0.01
Barium	0.005	0.005
Beryllium	<0.005	0.005
Bismuth	0.008	0.005
Boron	0.055	0.02
Cadmium	0.010	0.005
Calcium	5.11	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.007	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	11.3	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.24	0.1
Selenium	0.008	0.005
Silicon	86.0	2
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.075	0.005
Sulfur	5.21	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.117	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	16.8	0.1
Phosphate	<0.1	0.1
Sulfate	26	0.1

Tap Water
Spiked with
Si Std To
85 To 90 ppm Si
pH 9.81

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 113671

Client: Division 20

Date Received: 10/27/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.68	0.05
Antimony	<0.005	0.005
Arsenic	0.013	0.01
Barium	0.119	0.005
Beryllium	<0.005	0.005
Bismuth	0.011	0.005
Boron	0.200	0.02
Cadmium	0.008	0.005
Calcium	3.00	0.05
Chromium	0.021	0.005
Cobalt	<0.005	0.005
Copper	0.021	0.005
Iron	0.074	0.02
Lanthanum	<0.005	0.005
Lead	0.012	0.005
Lithium	0.064	0.005
Magnesium	9.39	0.05
Manganese	<0.005	0.005
Molybdenum	0.011	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.077	0.01
Potassium	309	0.1
Selenium	0.010	0.005
Silicon	131	2
Silver	<0.005	0.005
Sodium	327	0.2
Strontium	0.017	0.005
Sulfur	23.6	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.033	0.005
Yttrium	<0.005	0.005
Zinc	0.540	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25	0.1
Phosphate	<0.1	0.1
Sulfate	75.1	0.1

Water collected from dripping at bottom of test cell
pH 9.67

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-B

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 113672

Client: Division 20

Date Received: 10/27/98

Project No.: 20-1402-661

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	1.42	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.01
Barium	0.114	0.005
Beryllium	<0.005	0.005
Bismuth	0.009	0.005
Boron	0.233	0.02
Cadmium	0.009	0.005
Calcium	4.02	0.05
Chromium	0.024	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	0.089	0.02
Lanthanum	<0.005	0.005
Lead	0.014	0.005
Lithium	0.063	0.005
Magnesium	9.37	0.05
Manganese	<0.005	0.005
Molybdenum	0.028	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.106	0.01
Potassium	287	0.1
Selenium	0.014	0.005
Silicon	125	2
Silver	<0.005	0.005
Sodium	318	0.2
Strontium	0.018	0.005
Sulfur	26.7	0.02
Thallium	<0.01	0.01
Thorium	<0.005	0.005
Tin	<0.005	0.005
Titanium	0.010	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.037	0.005
Yttrium	<0.005	0.005
Zinc	0.578	0.005
Zirconium	<0.005	0.005
Bromide	<2	2
Chloride	25.6	0.1
Phosphate	<0.1	0.1
Sulfate	83.3	0.1

Water collected from dripping at bottom of test cell
pH = 9.57

MEMORANDUM

TO: Jim Prikryl
Division 20

FROM: Jo Ann Boyd, Manager QAU, Division 01

RE: Project No.: 20-1402-661
Work order #: 15191
Samples Received 2-24-99

Analysis of liquid samples for metals and anions.
Raw data and nuclear safety documentation for this project are archived in Division 01.

DATE: March 12,1999

Enclosed please find the sample results for the analysis referenced above.

If there are any questions, please feel free to contact me by voice mail at 522-2169 or by fax at 522-2021. I look forward to our continued analytical support of your projects.

Jo Ann Boyd,
Jo Ann Boyd
Manager QAU

NUCLEAR
DIV. 20
20-1401-661
WO 15191

FINAL REPORT

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-6

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119068

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.039	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.022	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.879	0.1
Selenium	<0.02	0.02
Silicon	5.68	0.1
Silver	<0.005	0.005
Sodium	8.44	0.2
Strontium	0.395	0.005
Sulfur	5.44	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.511	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	18.2	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
TAP-7

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Liquid

Lab System ID: 119069

Client: Division 20

Date Received: 02/24/99

Project No.: 20-1402-661

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.037	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	66.0	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.026	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	13.8	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	0.890	0.1
Selenium	<0.02	0.02
Silicon	5.72	0.1
Silver	<0.005	0.005
Sodium	8.48	0.2
Strontium	0.395	0.005
Sulfur	5.45	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.509	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	16.3	0.1
Phosphate-P	<0.1	0.1
Sulfate	17.7	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119070

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	5.53	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.025	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	8.54	0.05
Manganese	<0.005	0.005
Molybdenum	0.016	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.14	0.1
Selenium	<0.02	0.02
Silicon	75.3	0.1
Silver	<0.005	0.005
Sodium	147	0.2
Strontium	0.063	0.005
Sulfur	5.04	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.076	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.3	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-4

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119071

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	0.006	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	7.89	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	0.029	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	9.42	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	1.25	0.1
Selenium	<0.02	0.02
Silicon	74.1	0.1
Silver	<0.005	0.005
Sodium	160	0.2
Strontium	0.080	0.005
Sulfur	5.49	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.084	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	15.2	0.1
Phosphate-P	<0.1	0.1
Sulfate	16.4	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-C

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119072

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.74	0.05
Antimony	<0.005	0.005
Arsenic	0.015	0.005
Barium	0.097	0.005
Beryllium	<0.005	0.005
Bismuth	0.006	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.080	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.114	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.348	0.005
Magnesium	0.114	0.05
Manganese	<0.005	0.005
Molybdenum	0.018	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.082	0.01
Potassium	950	0.1
Selenium	<0.02	0.02
Silicon	83.6	0.1
Silver	<0.005	0.005
Sodium	406	0.2
Strontium	0.017	0.005
Sulfur	104	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.081	0.005
Yttrium	<0.005	0.005
Zinc	0.011	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	20.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	288	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-D

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119073

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	5.73	0.05
Antimony	<0.005	0.005
Arsenic	0.014	0.005
Barium	0.096	0.005
Beryllium	<0.005	0.005
Bismuth	0.005	0.005
Boron	0.344	0.05
Cadmium	<0.005	0.005
Calcium	1.58	0.05
Chromium	0.081	0.005
Cobalt	<0.005	0.005
Copper	0.030	0.005
Iron	0.117	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.344	0.005
Magnesium	0.119	0.05
Manganese	<0.005	0.005
Molybdenum	0.017	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.083	0.01
Potassium	910	0.1
Selenium	<0.02	0.02
Silicon	80.4	0.1
Silver	<0.005	0.005
Sodium	403	0.2
Strontium	0.016	0.005
Sulfur	100	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.082	0.005
Yttrium	<0.005	0.005
Zinc	0.010	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	20.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	296	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-E

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119074

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.56	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.127	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.493	0.05
Cadmium	<0.005	0.005
Calcium	2.56	0.05
Chromium	0.104	0.005
Cobalt	<0.005	0.005
Copper	0.082	0.005
Iron	0.120	0.02
Lanthanum	<0.005	0.005
Lead	0.006	0.005
Lithium	0.501	0.005
Magnesium	2.61	0.05
Manganese	<0.005	0.005
Molybdenum	0.041	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.709	0.01
Potassium	1500	0.1
Selenium	<0.02	0.02
Silicon	91.3	0.1
Silver	<0.005	0.005
Sodium	675	0.2
Strontium	0.020	0.005
Sulfur	136	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.007	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.129	0.005
Yttrium	<0.005	0.005
Zinc	0.223	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	62.2	0.1
Phosphate-P	0.336	0.1
Sulfate	352	0.1

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
H4-F

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119075

Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	4.75	0.05
Antimony	<0.005	0.005
Arsenic	0.026	0.005
Barium	0.258	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	0.496	0.05
Cadmium	<0.005	0.005
Calcium	2.71	0.05
Chromium	0.106	0.005
Cobalt	<0.005	0.005
Copper	0.083	0.005
Iron	0.140	0.02
Lanthanum	<0.005	0.005
Lead	0.008	0.005
Lithium	0.505	0.005
Magnesium	2.67	0.05
Manganese	<0.005	0.005
Molybdenum	0.034	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	0.725	0.01
Potassium	1540	0.1
Selenium	<0.02	0.02
Silicon	92.4	0.1
Silver	<0.005	0.005
Sodium	690	0.2
Strontium	0.021	0.005
Sulfur	140	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	0.009	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.131	0.005
Yttrium	<0.005	0.005
Zinc	0.233	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	58.2	0.1
Phosphate-P	0.336	0.1
Sulfate	327	0.1

SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY

Sample ID
TAP-6

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119068

Work Order: 15191

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.0%
Antimony	<0.005	<0.005	0.0%
Arsenic	<0.005	<0.005	0.0%
Barium	0.039	0.038	3.2%
Beryllium	<0.005	<0.005	0.0%
Bismuth	<0.005	<0.005	0.0%
Boron	<0.05	<0.05	0.0%
Cadmium	<0.005	<0.005	0.0%
Calcium	66.0	65.9	0.3%
Chromium	<0.005	<0.005	0.0%
Cobalt	<0.005	<0.005	0.0%
Copper	0.022	0.021	1.6%
Iron	<0.02	<0.02	0.0%
Lanthanum	<0.005	<0.005	0.0%
Lead	<0.005	<0.005	0.0%
Lithium	<0.005	<0.005	0.0%
Magnesium	13.8	13.8	0.0%
Manganese	<0.005	<0.005	0.0%
Molybdenum	<0.005	<0.005	0.0%
Nickel	<0.005	<0.005	0.0%
Palladium	<0.005	<0.005	0.0%
Phosphorus	<0.01	<0.01	0.0%
Potassium	0.879	0.883	0.4%
Selenium	<0.02	<0.02	0.0%
Silicon	5.68	5.85	3.0%
Silver	<0.005	<0.005	0.0%
Sodium	8.44	8.72	3.3%
Strontium	0.395	0.395	0.1%
Sulfur	5.44	5.45	0.1%
Thallium	<0.05	<0.05	0.0%
Thorium	<0.01	<0.01	0.0%
Tin	<0.005	<0.005	0.0%
Titanium	<0.005	<0.005	0.0%
Tungsten	<0.01	<0.01	0.0%
Uranium	<0.1	<0.1	0.0%
Vanadium	<0.005	<0.005	0.0%
Yttrium	<0.005	<0.005	0.0%
Zinc	0.511	0.511	0.1%
Zirconium	<0.005	<0.005	0.0%
Bromide	<0.2	<2	0.0%
Chloride	16.2	16	1.2%
Phosphate-P	<0.1	<0.1	0.0%
Sulfate	18.2	18.2	0.0%

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID
H4-C

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 02/24/99

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: 119072

Work Order: 15191

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	5.74	7.59	2.00	92.5%
Antimony	<0.005	0.516	0.500	103.2%
Arsenic	0.015	2.11	2.00	104.9%
Barium	0.097	1.81	2.00	85.7%
Beryllium	<0.005	0.045	0.050	90.1%
Bismuth	NR	NR	NR	NR
Boron	NR	NR	NR	NR
Cadmium	<0.005	0.047	0.050	94.1%
Calcium	1.58	20.5	20.0	94.5%
Chromium	0.080	0.254	0.200	87.3%
Cobalt	<0.005	0.473	0.500	94.7%
Copper	0.030	0.256	0.250	90.6%
Iron	0.114	1.09	1.00	97.1%
Lanthanum	NR	NR	NR	NR
Lead	<0.005	0.481	0.500	96.2%
Lithium	NR	NR	NR	NR
Magnesium	0.114	18.4	20.0	91.7%
Manganese	<0.005	0.466	0.500	93.2%
Molybdenum	NR	NR	NR	NR
Nickel	<0.005	0.436	0.500	87.2%
Palladium	NR	NR	NR	NR
Phosphorus	NR	NR	NR	NR
Potassium	950	990	20.0	200.0%
Selenium	<0.02	2.03	2.00	101.6%
Silicon	83.6	73.8	2.00	0.0%
Silver	<0.005	0.047	0.050	93.5%
Sodium	406	426	20.0	102.6%
Strontium	NR	NR	NR	NR
Sulfur	NR	NR	NR	NR
Thallium	<0.05	2.09	2.00	104.7%
Thorium	NR	NR	NR	NR
Tin	NR	NR	NR	NR
Titanium	NR	NR	NR	NR
Tungsten	NR	NR	NR	NR
Uranium	NR	NR	NR	NR
Vanadium	0.081	0.547	0.500	93.0%
Yttrium	NR	NR	NR	NR
Zinc	0.011	0.496	0.500	97.0%
Zirconium	NR	NR	NR	NR
Bromide *	<0.2	7.4	8.0	92.5%
Chloride *	16.2	17.9	2.0	85.0%
Phosphate-P *	<0.1	1.94	1.91	101.6%
Sulfate *	18.2	24.8	8.0	82.5%

NR - Not Reported
* = Sample TAP-6 (Lab System ID: 119068)

SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

Sample ID
LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

Work Order: 15191

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	3.80	4.00	95.1%
Antimony	0.987	1.000	98.7%
Arsenic	3.98	4.00	99.4%
Barium	3.61	4.00	90.3%
Beryllium	0.093	0.100	92.5%
Bismuth	NR	NR	NR
Boron	NR	NR	NR
Cadmium	0.094	0.100	93.8%
Calcium	19.3	20.0	96.6%
Chromium	0.359	0.400	89.8%
Cobalt	0.924	1.000	92.4%
Copper	0.444	0.500	88.9%
Iron	1.99	2.00	99.5%
Lanthanum	NR	NR	NR
Lead	0.932	1.000	93.2%
Lithium	NR	NR	NR
Magnesium	19.1	20.0	95.4%
Manganese	0.947	1.000	94.7%
Molybdenum	NR	NR	NR
Nickel	0.864	1.000	86.4%
Palladium	NR	NR	NR
Phosphorus	NR	NR	NR
Potassium	17.1	20.0	85.3%
Selenium	4.02	4.00	100.6%
Silicon	1.92	2.00	96.2%
Silver	0.093	0.100	92.7%
Sodium	17.6	20.0	87.9%
Strontium	NR	NR	NR
Sulfur	NR	NR	NR
Thallium	3.89	4.00	97.3%
Thorium	NR	NR	NR
Tin	NR	NR	NR
Titanium	NR	NR	NR
Tungsten	NR	NR	NR
Uranium	NR	NR	NR
Vanadium	0.940	1.000	94.0%
Yttrium	NR	NR	NR
Zinc	0.934	1.000	93.4%
Zirconium	NR	NR	NR
Bromide	383.5	400.0	95.9%
Chloride	196	200	98.0%
Phosphate-P	201	191	105.2%
Sulfate	378	400	94.5%

NR - Not Reported

SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

Sample ID
PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

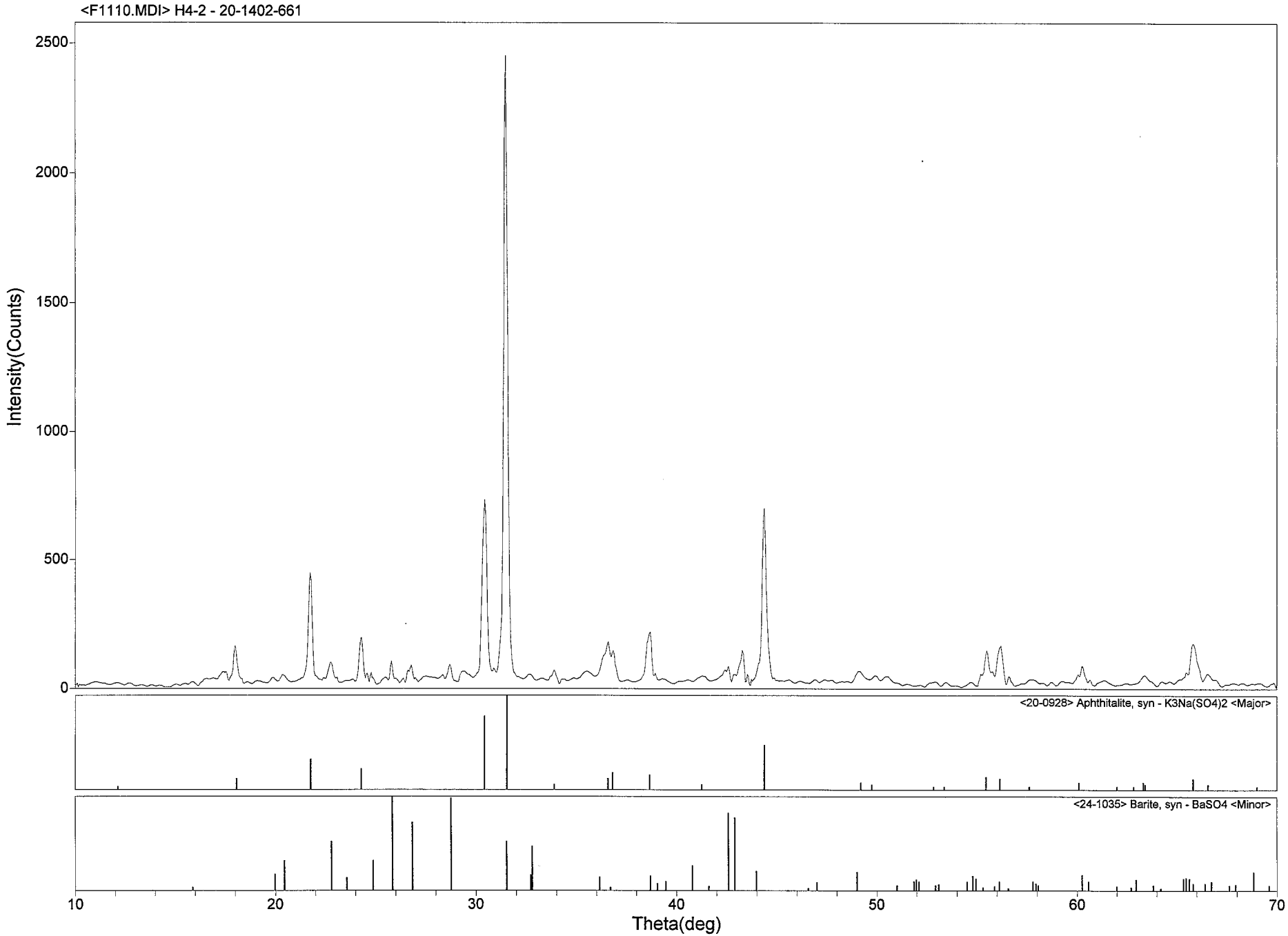
Matrix: Liquid

Project No.: 20-1402-661

Lab System ID: NA

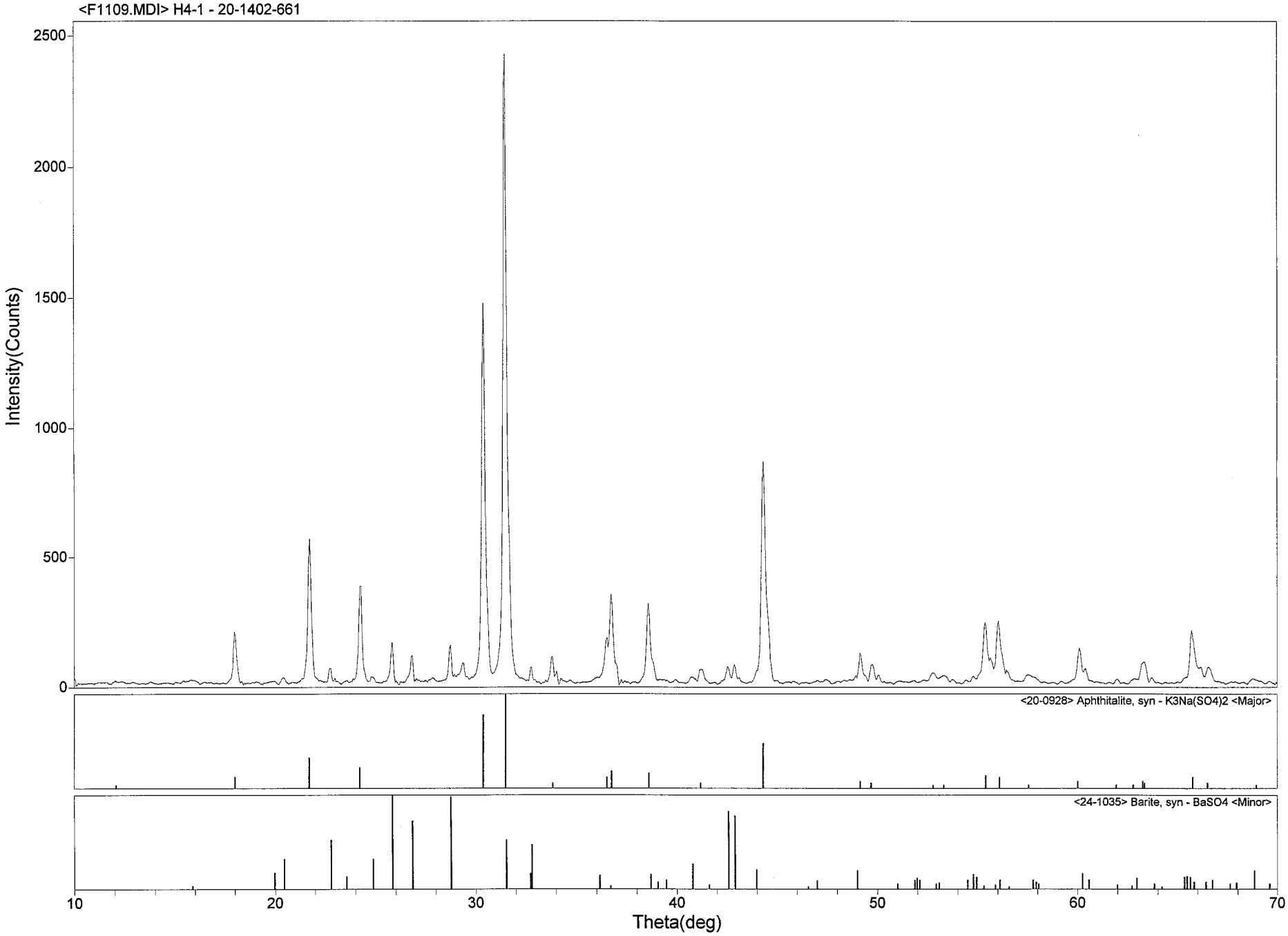
Work Order: 15191

Analysis	Sample Result (mg/L)	Detection Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.005	0.005
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.005	0.005
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.02	0.02
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.005	0.005
Nickel	<0.005	0.005
Palladium	<0.005	0.005
Phosphorus	<0.01	0.01
Potassium	<0.1	0.1
Selenium	<0.02	0.02
Silicon	<0.1	0.1
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.1	0.1
Thallium	<0.05	0.05
Thorium	<0.01	0.01
Tin	<0.005	0.005
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005
Bromide	<0.2	0.2
Chloride	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1



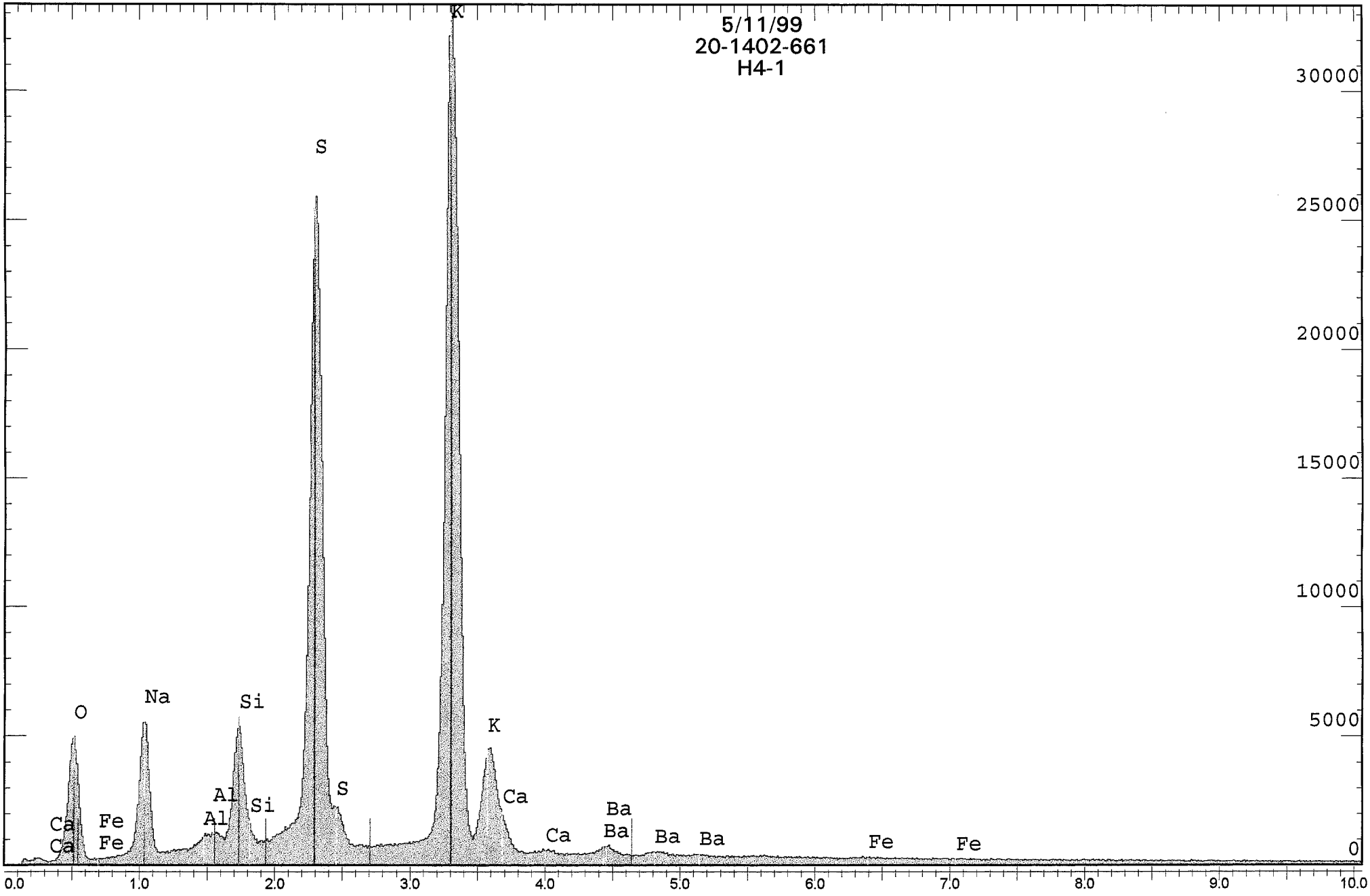
Southwest Research Institute

<c:\winjade\data> Tuesday, May 11, 1999 @11:05a


<F1109.MDI> H4-1 - 20-1402-661
Intensity(Counts)
2500
2000
1500
1000
500
0
<20-0928> Aphthitalite, syn - K3Na(SO4)2 <Major>
<24-1035> Barite, syn - BaSO4 <Minor>
10
20
30
40
50
60
70
Theta(deg)

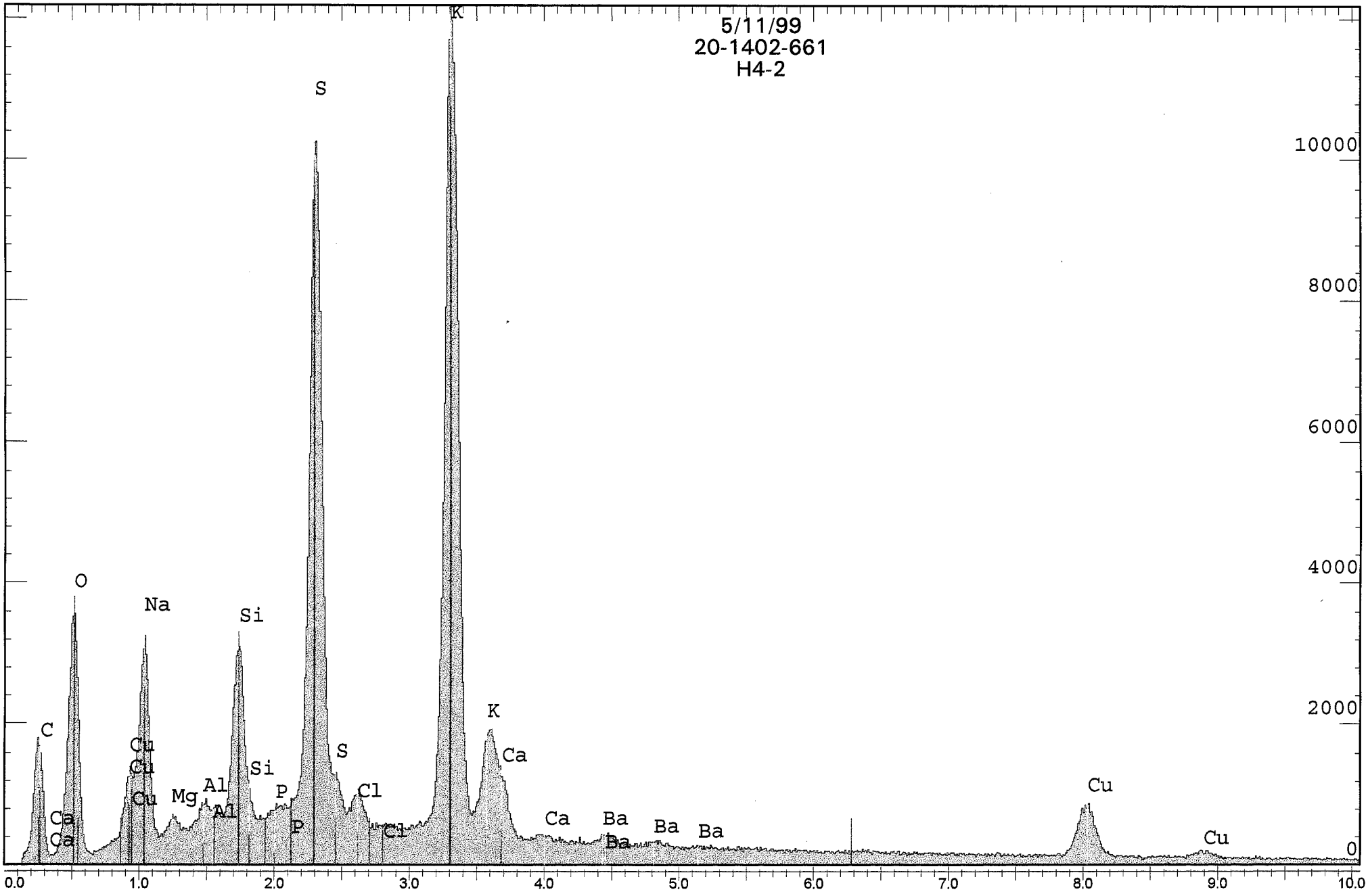
Spectrum: JFS1095 Range:20 keV

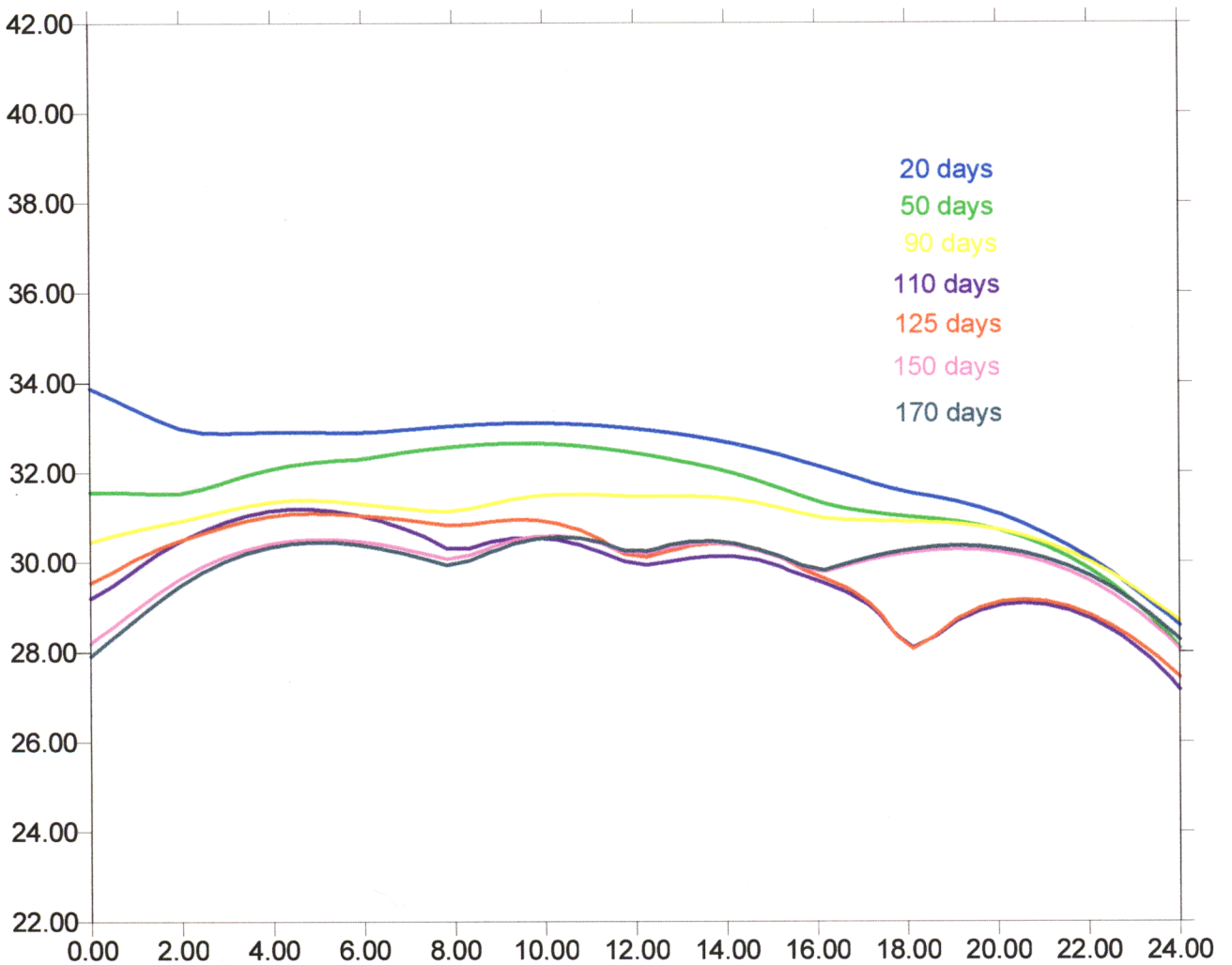
Total Counts=1309832. Linear Auto-VS=33280

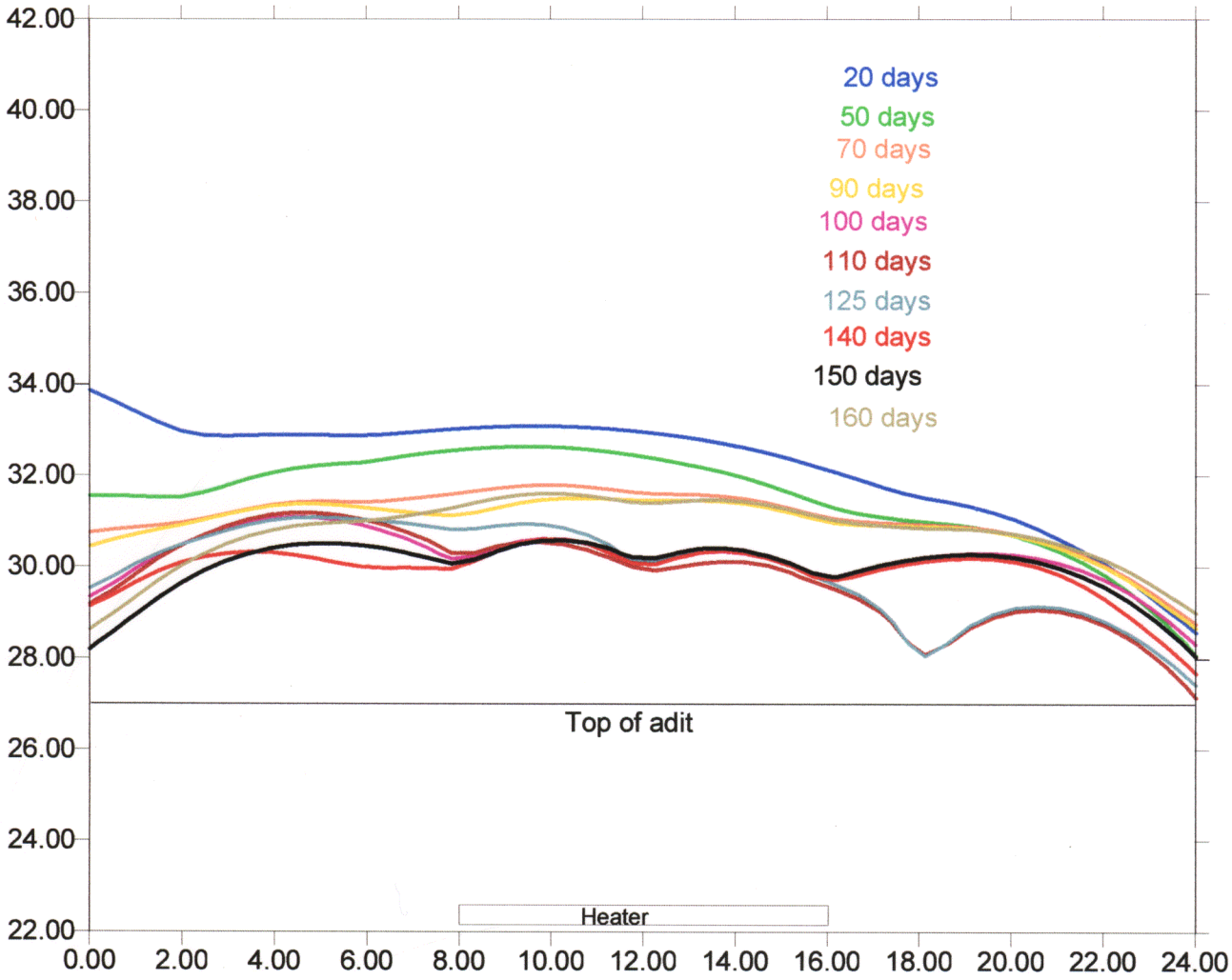


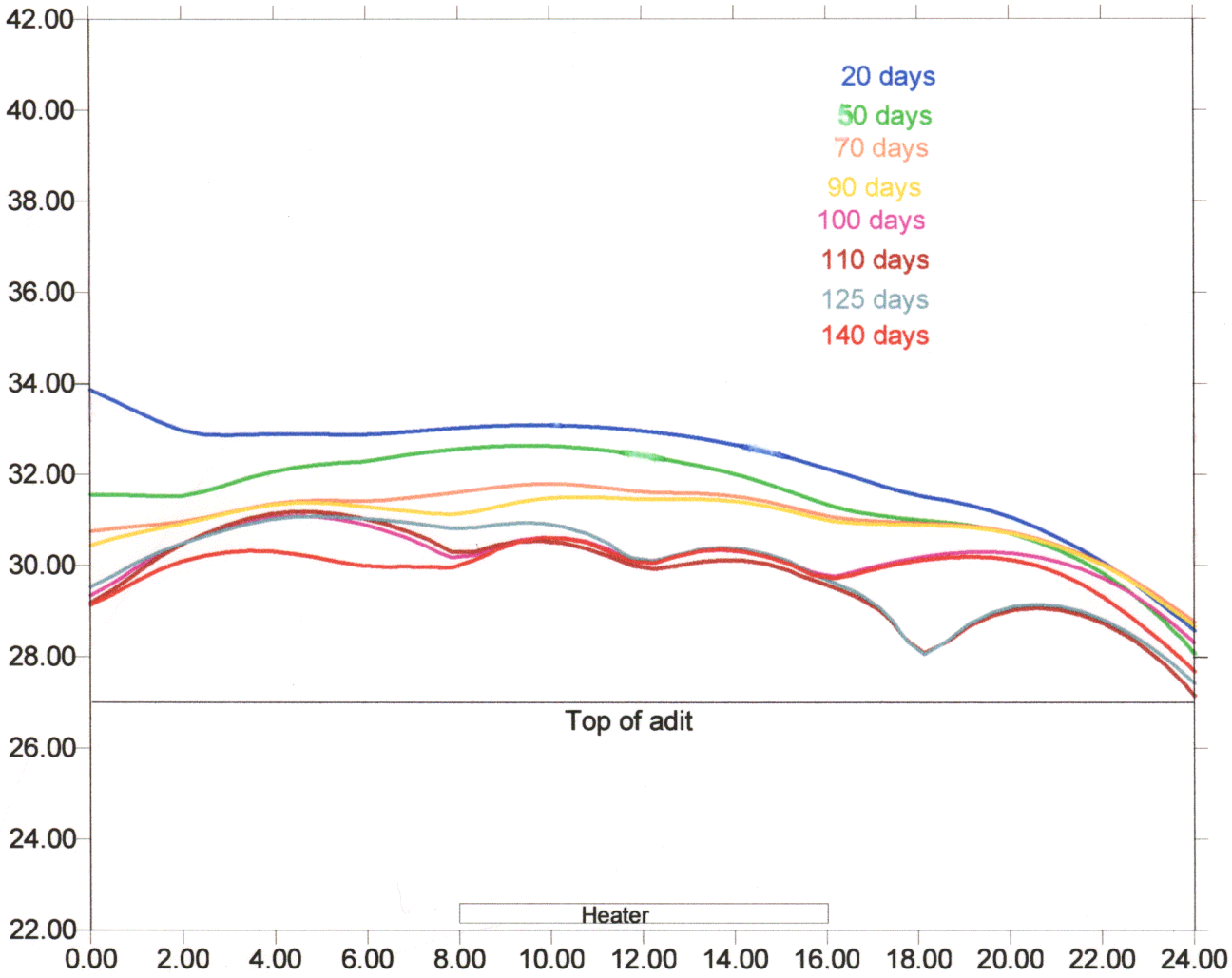
Spectrum: JFS1096 Range:20 keV

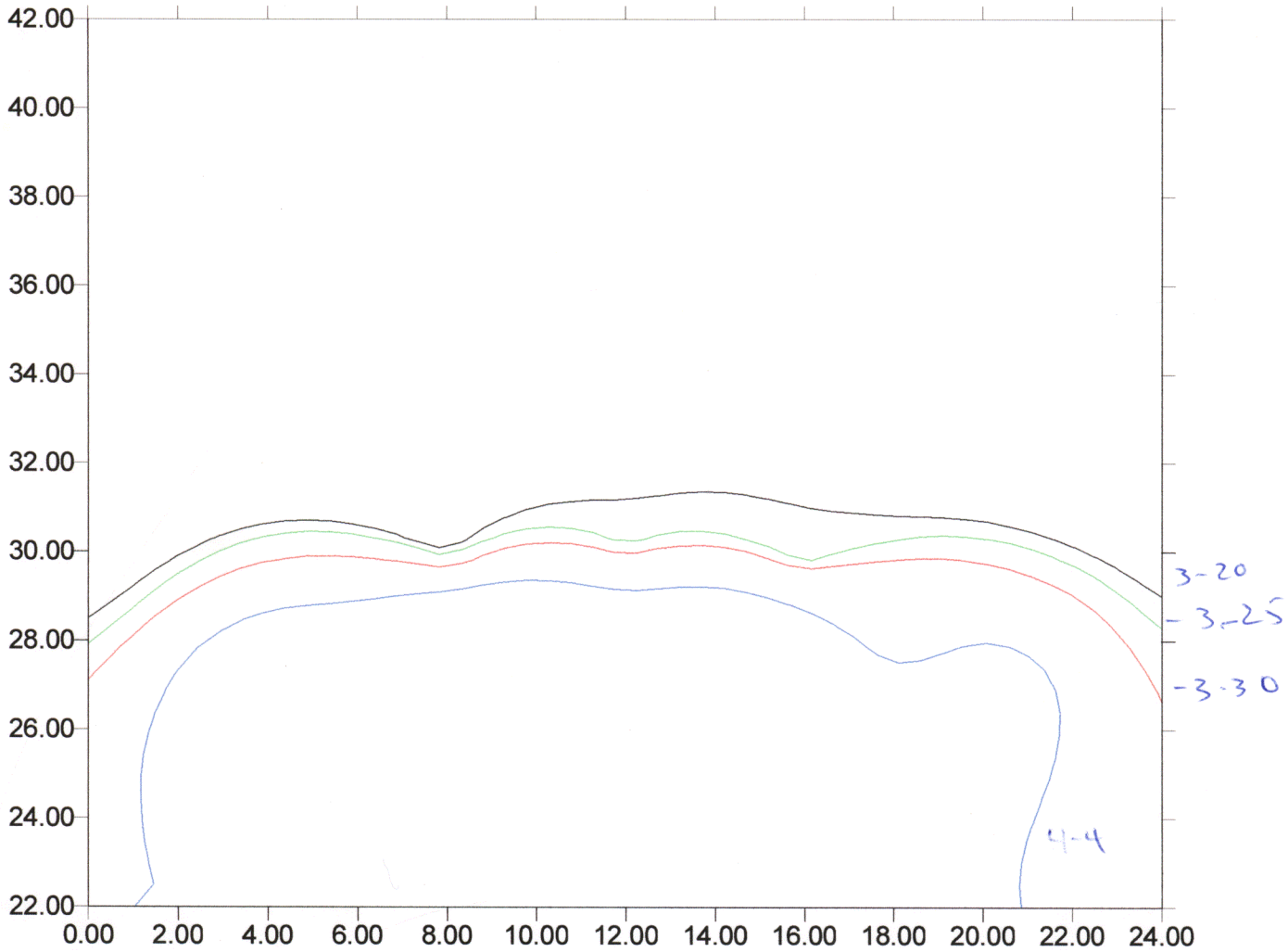
Total Counts=703590. Linear Auto-VS=12154




42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
20 days
50 days
90 days
110 days
125 days
150 days
170 days

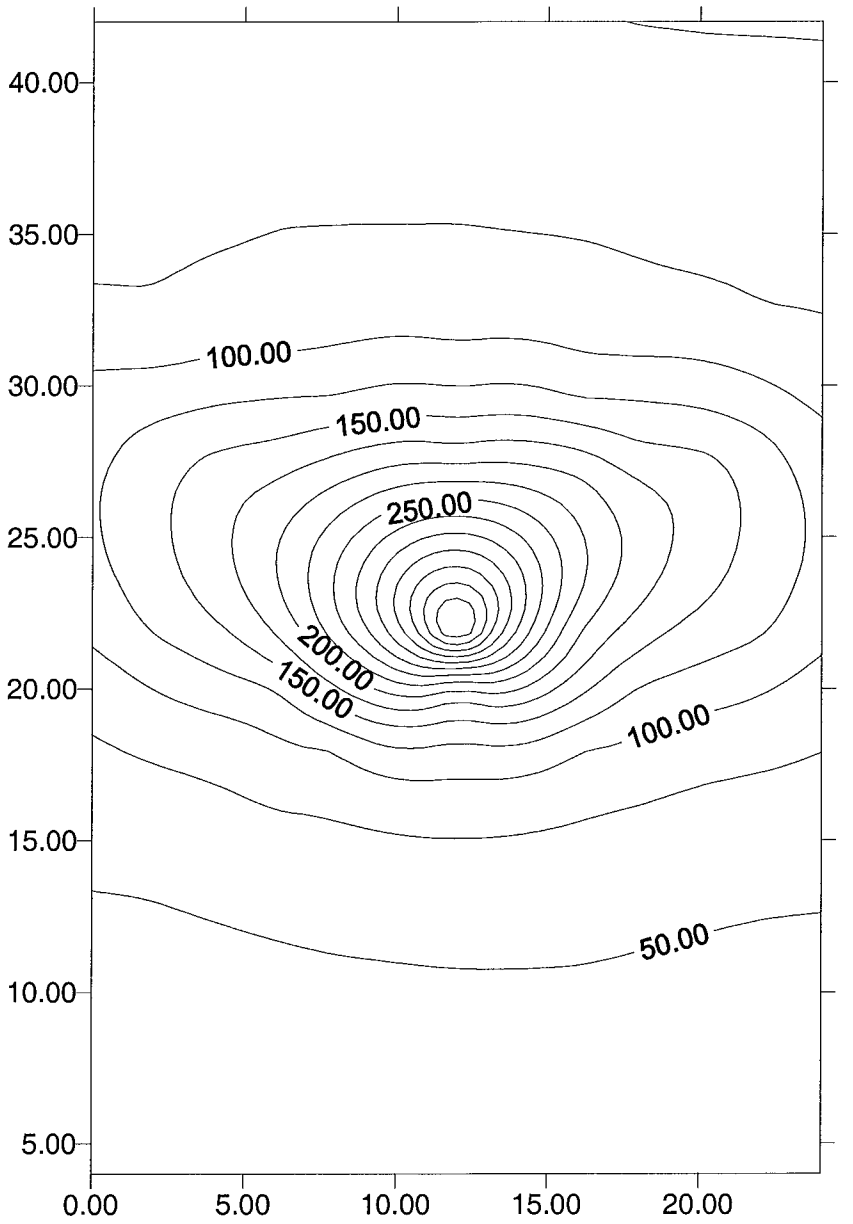

42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
20 days
50 days
70 days
90 days
100 days
110 days
125 days
140 days
150 days
160 days
Top of adit
Heater


42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
20 days
50 days
70 days
90 days
100 days
110 days
125 days
140 days
Top of adit
Heater

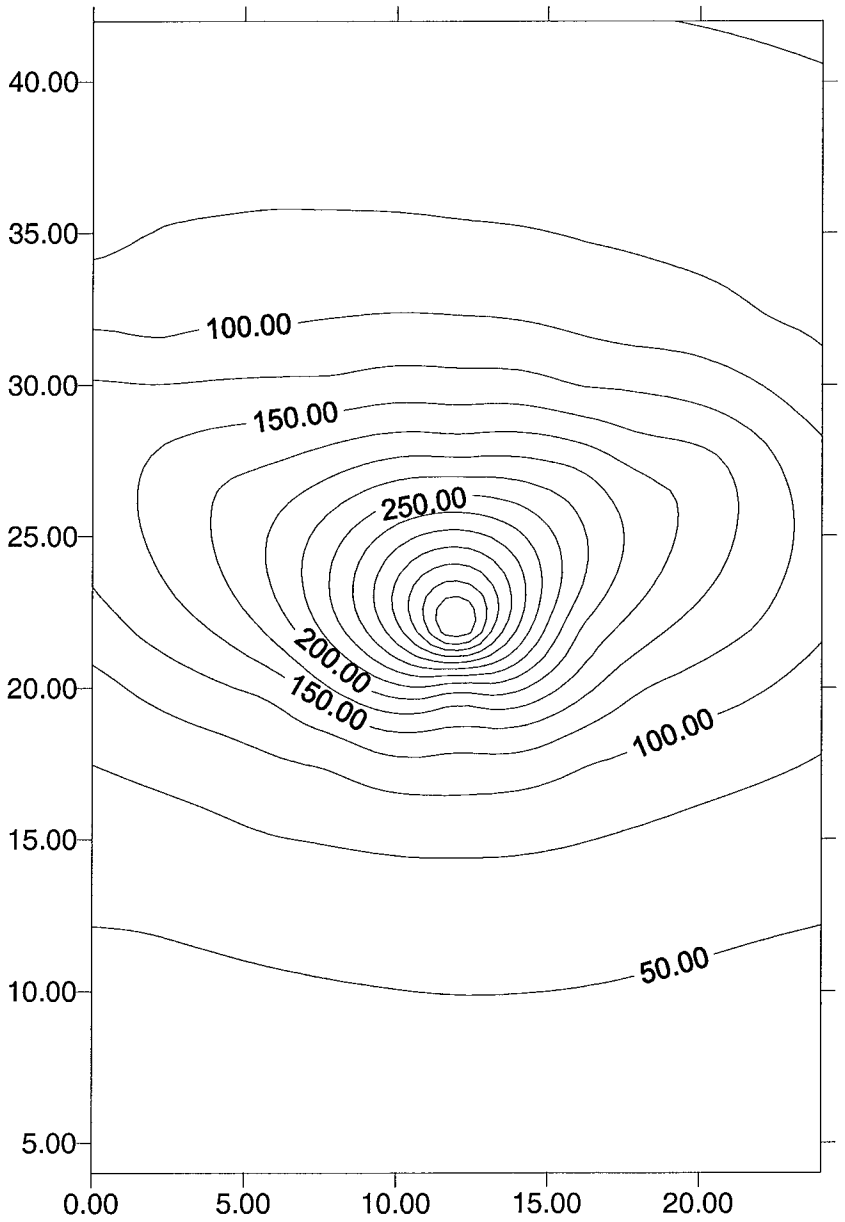

42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
3-20
3-25
3-30
4-4

5 days (before infiltration)

~~10/6~~ 10/6

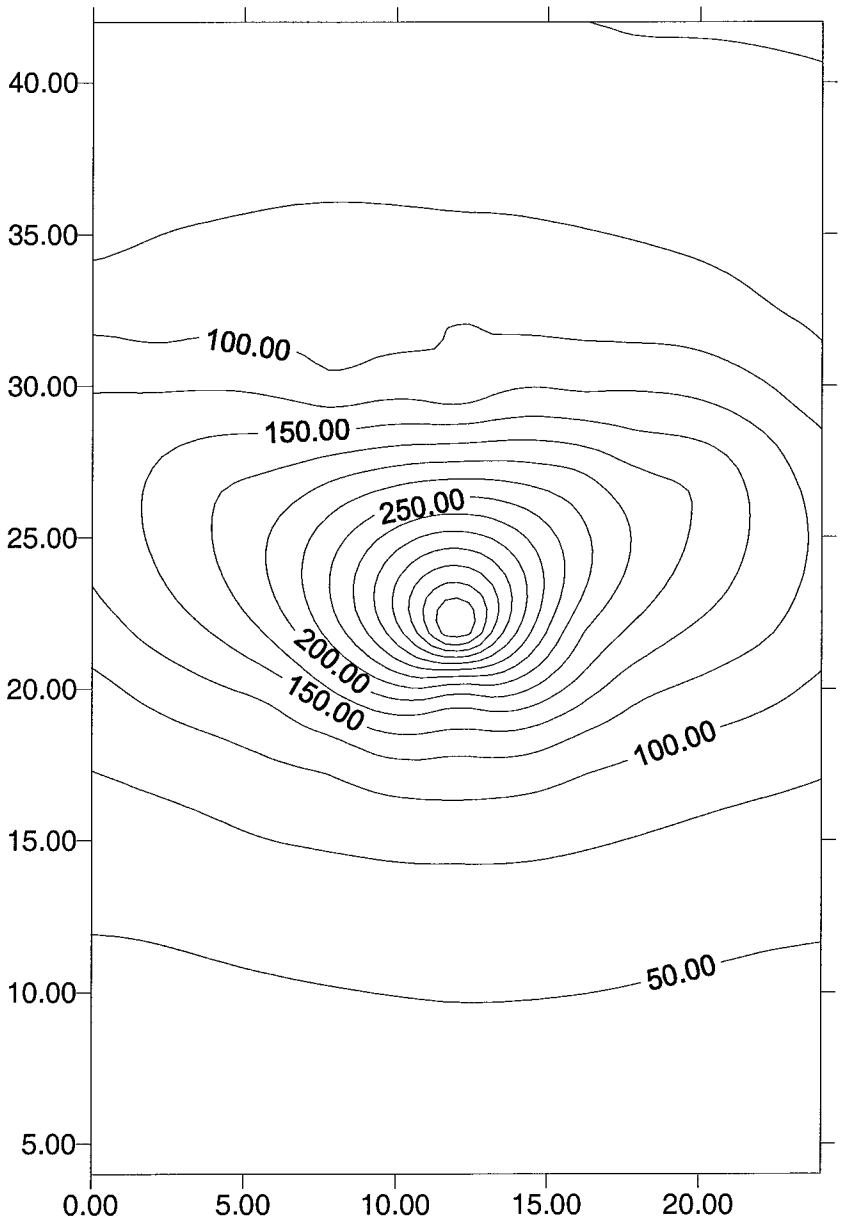


10/11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

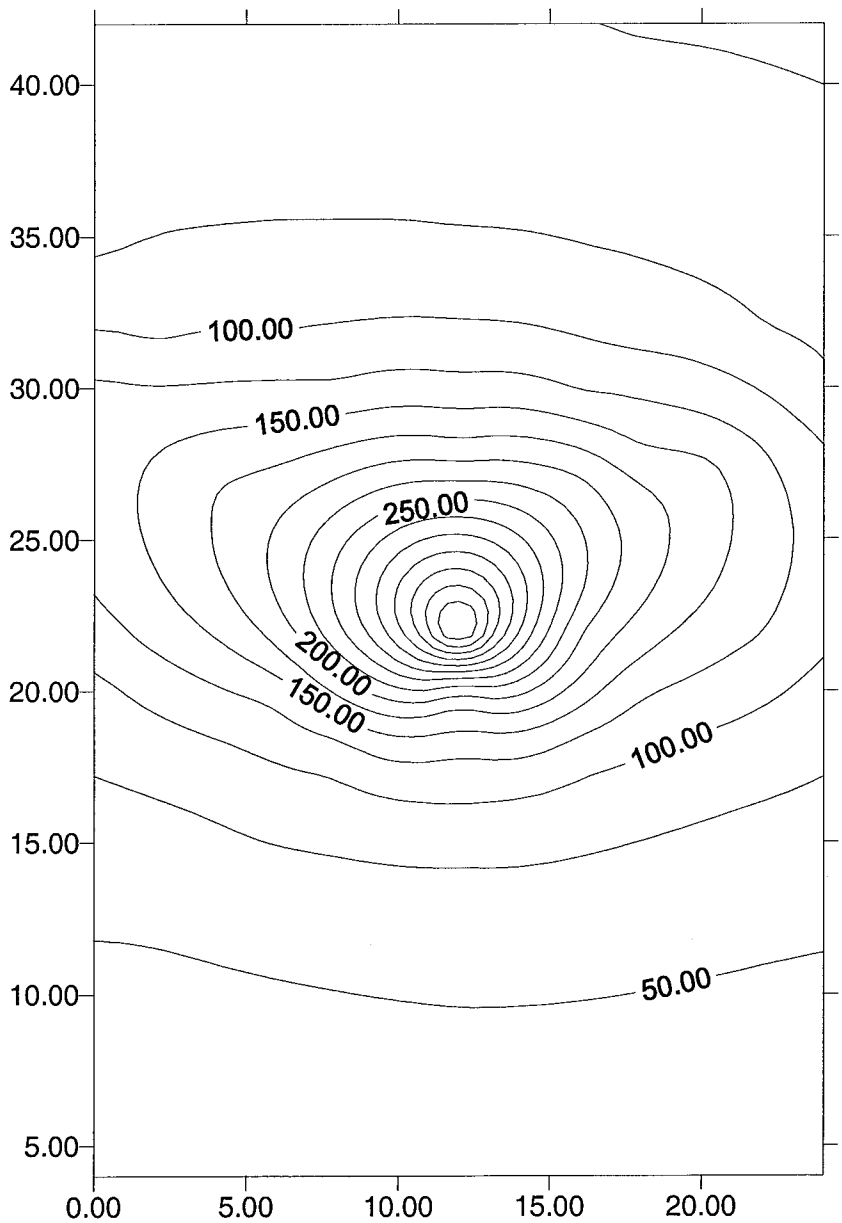
~~12 Days~~

10/13

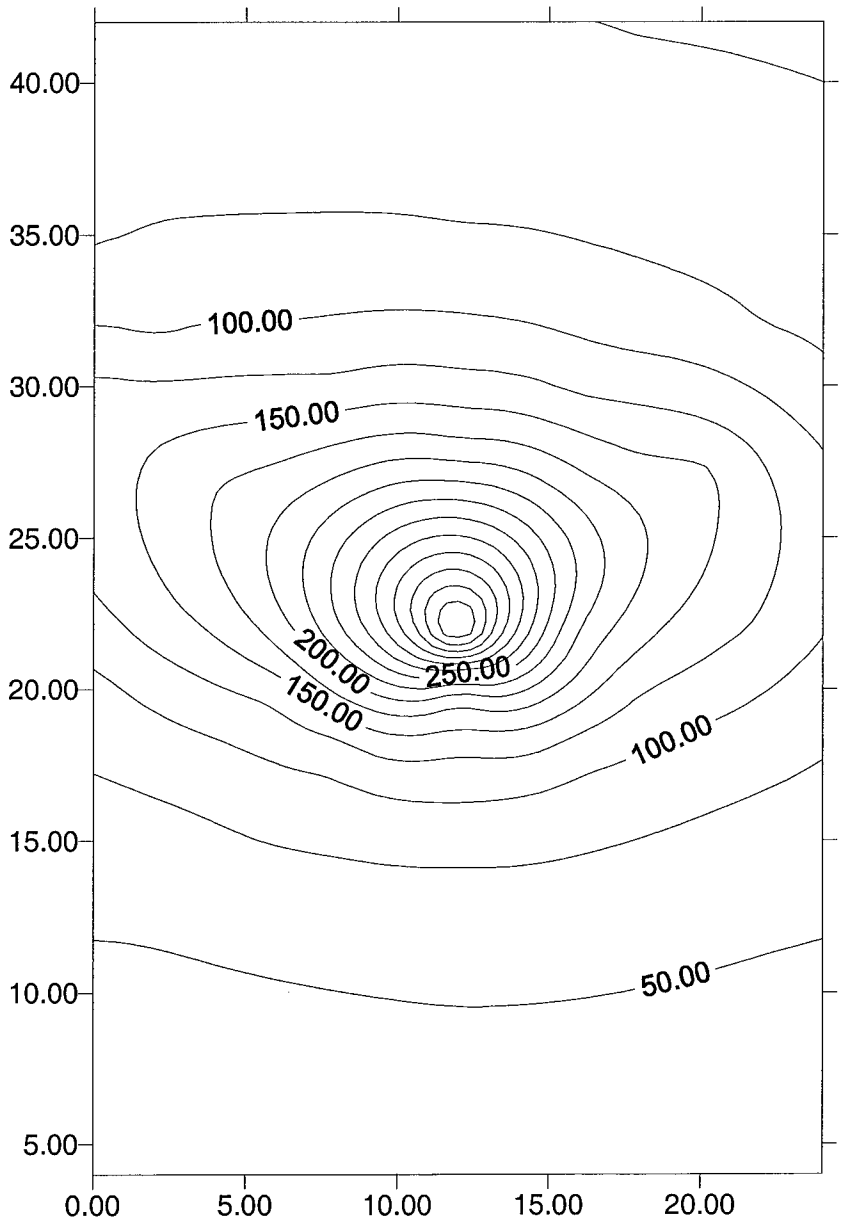


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

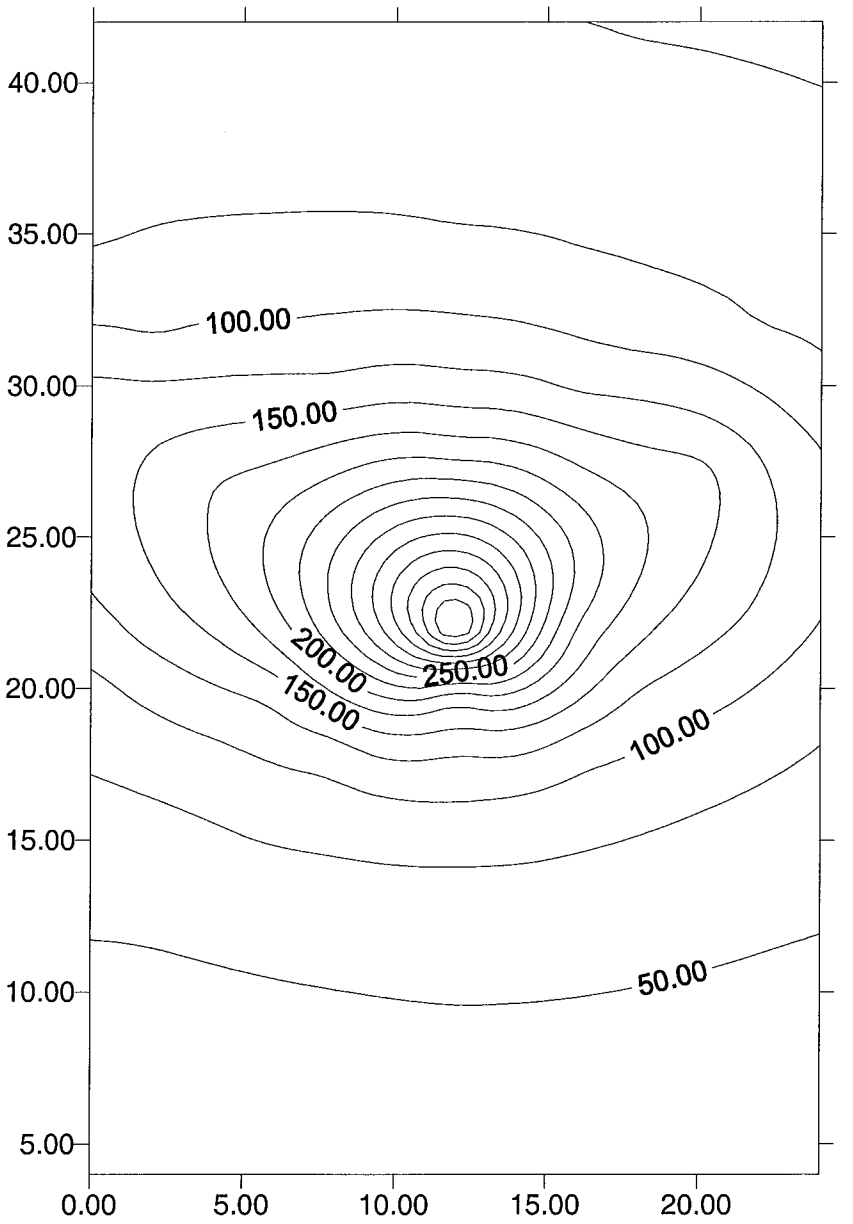
10/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

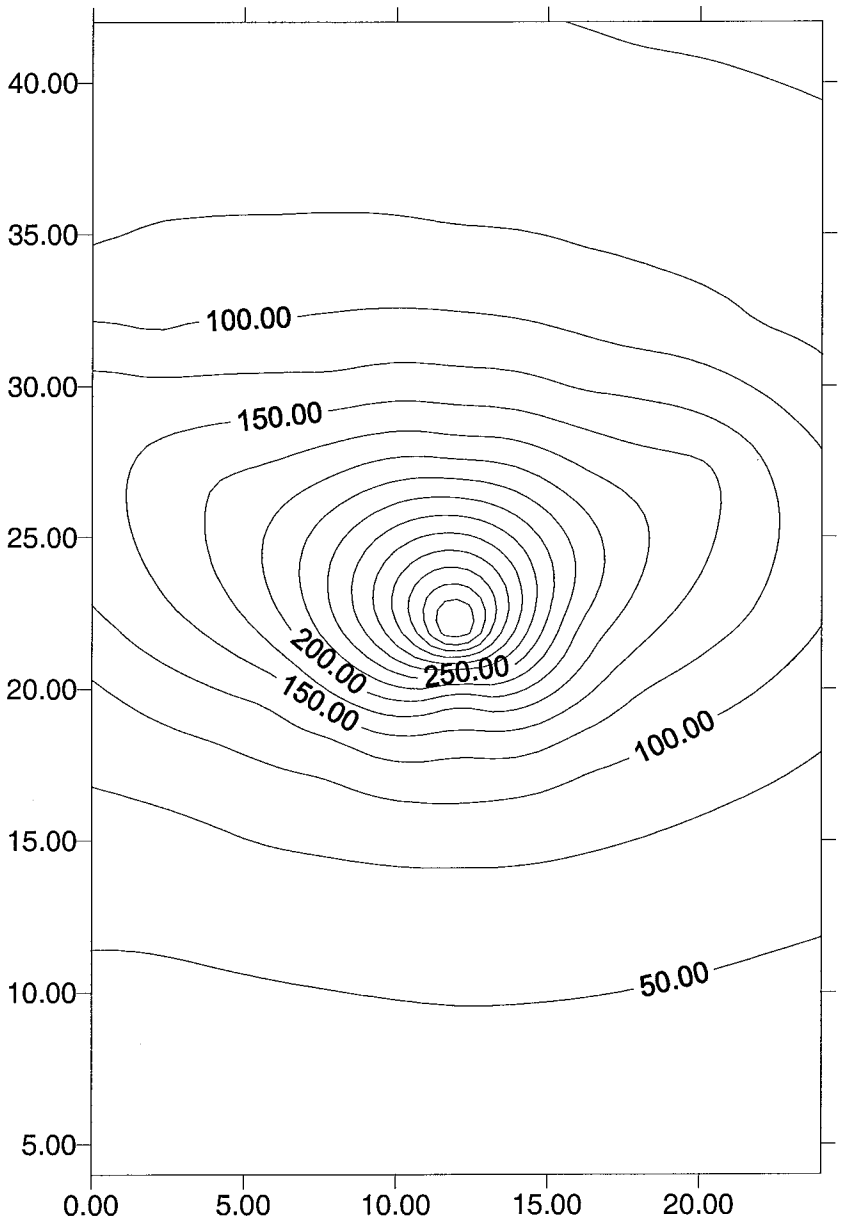
10|15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

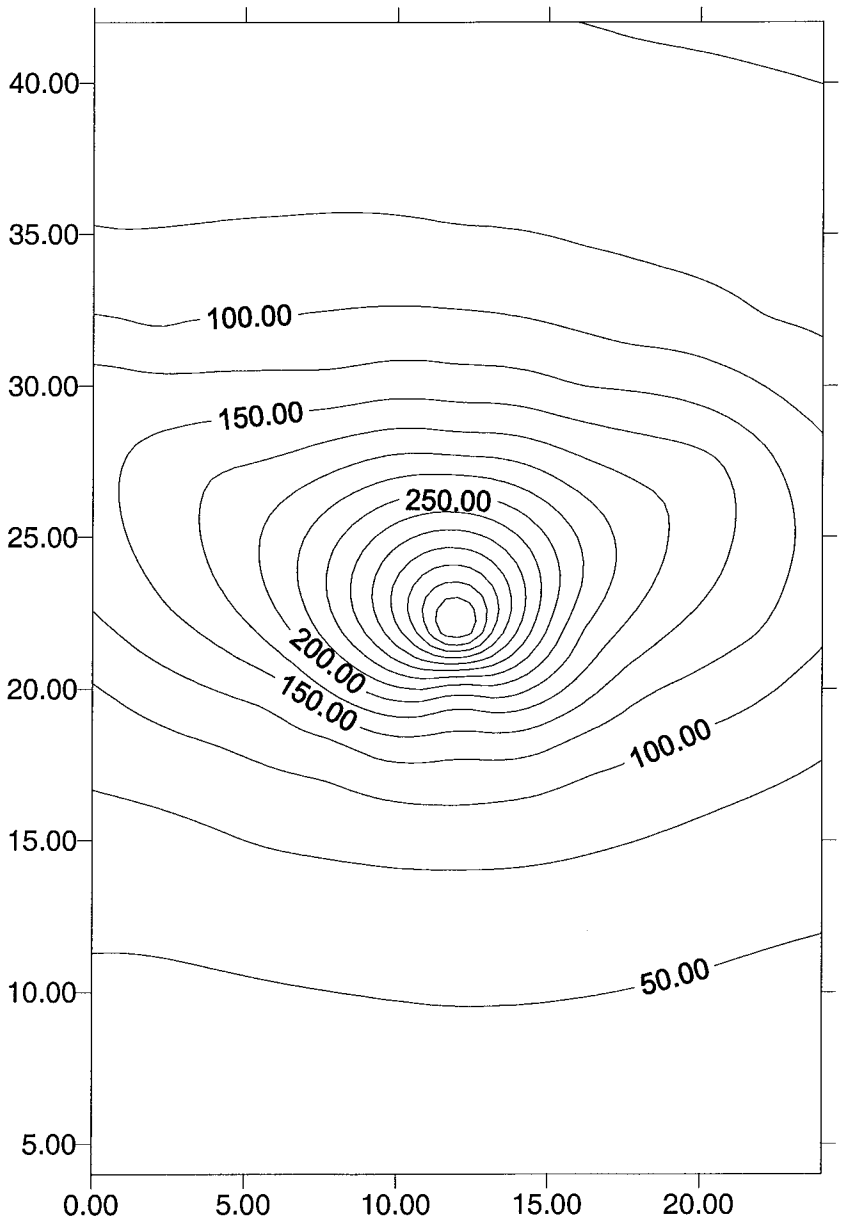
10|16


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

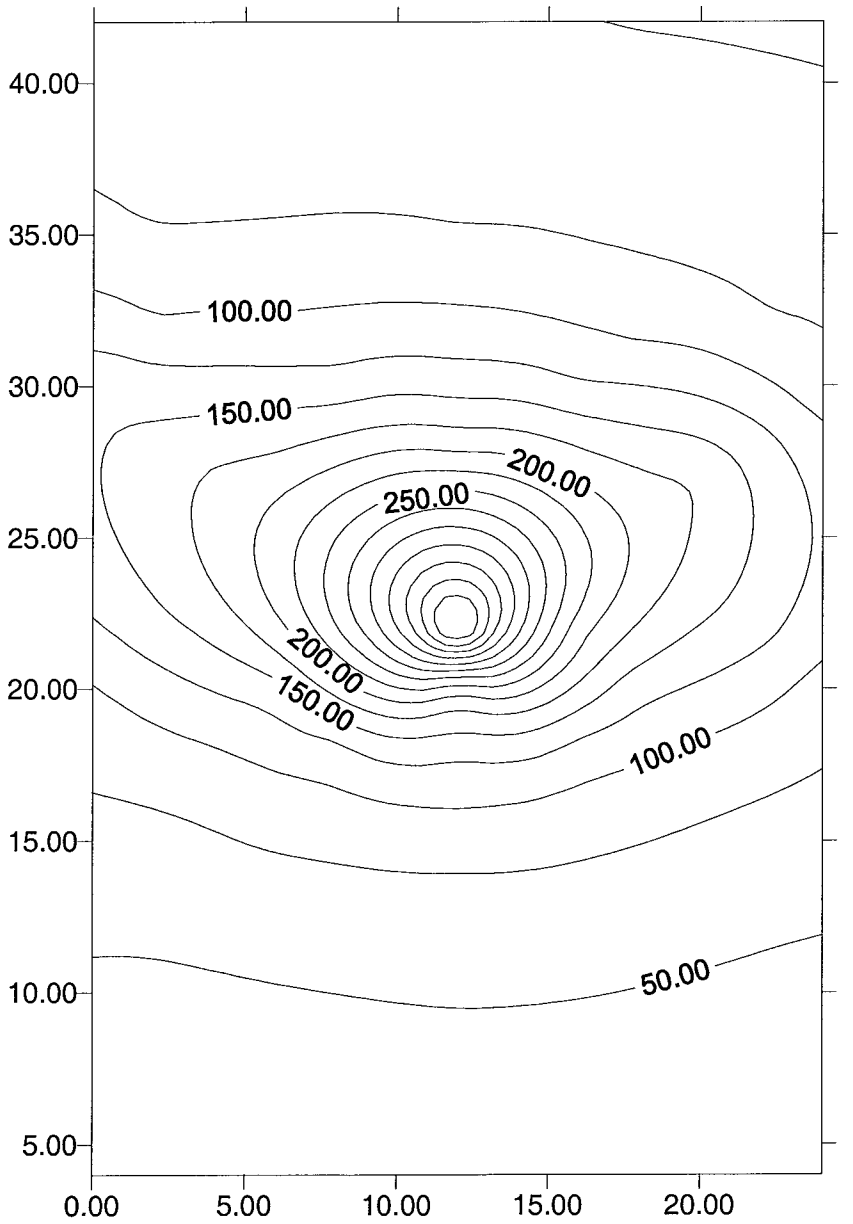
10/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

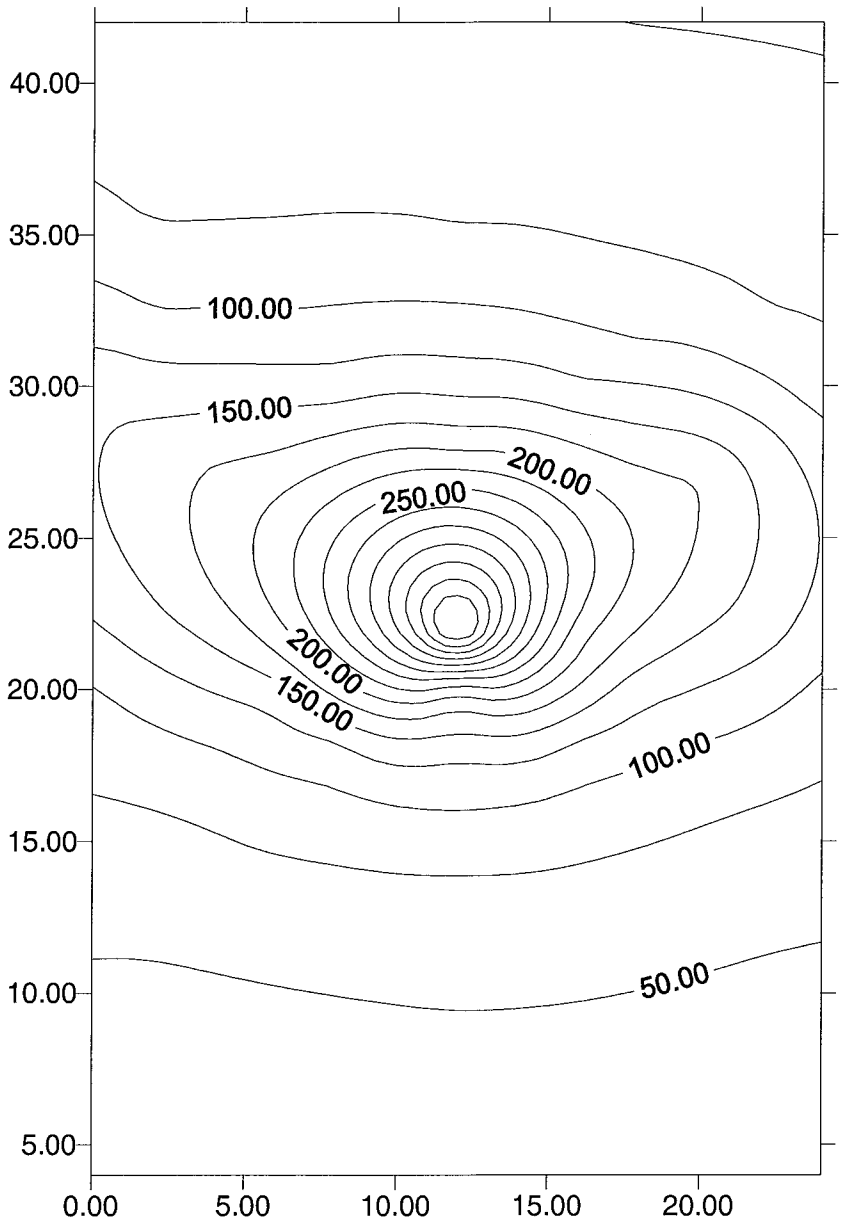
10/18


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

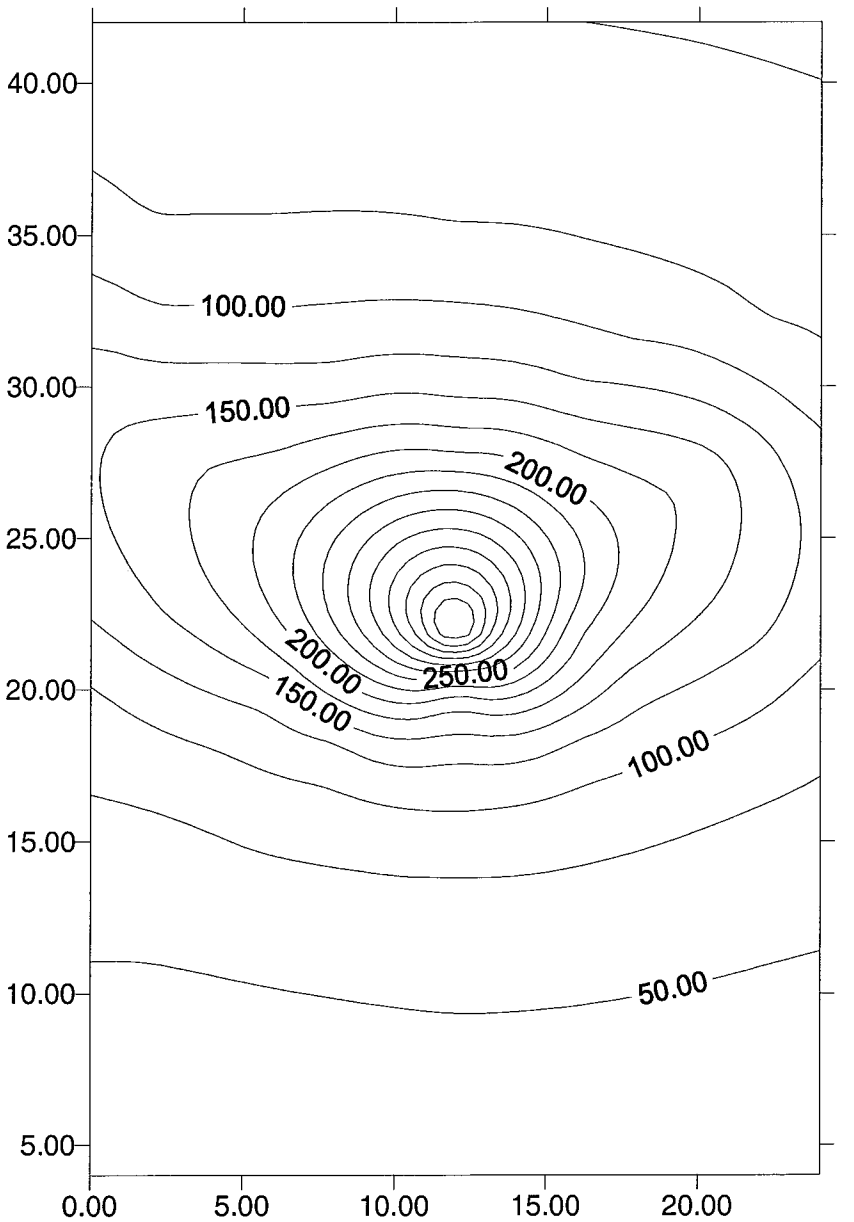
10/19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

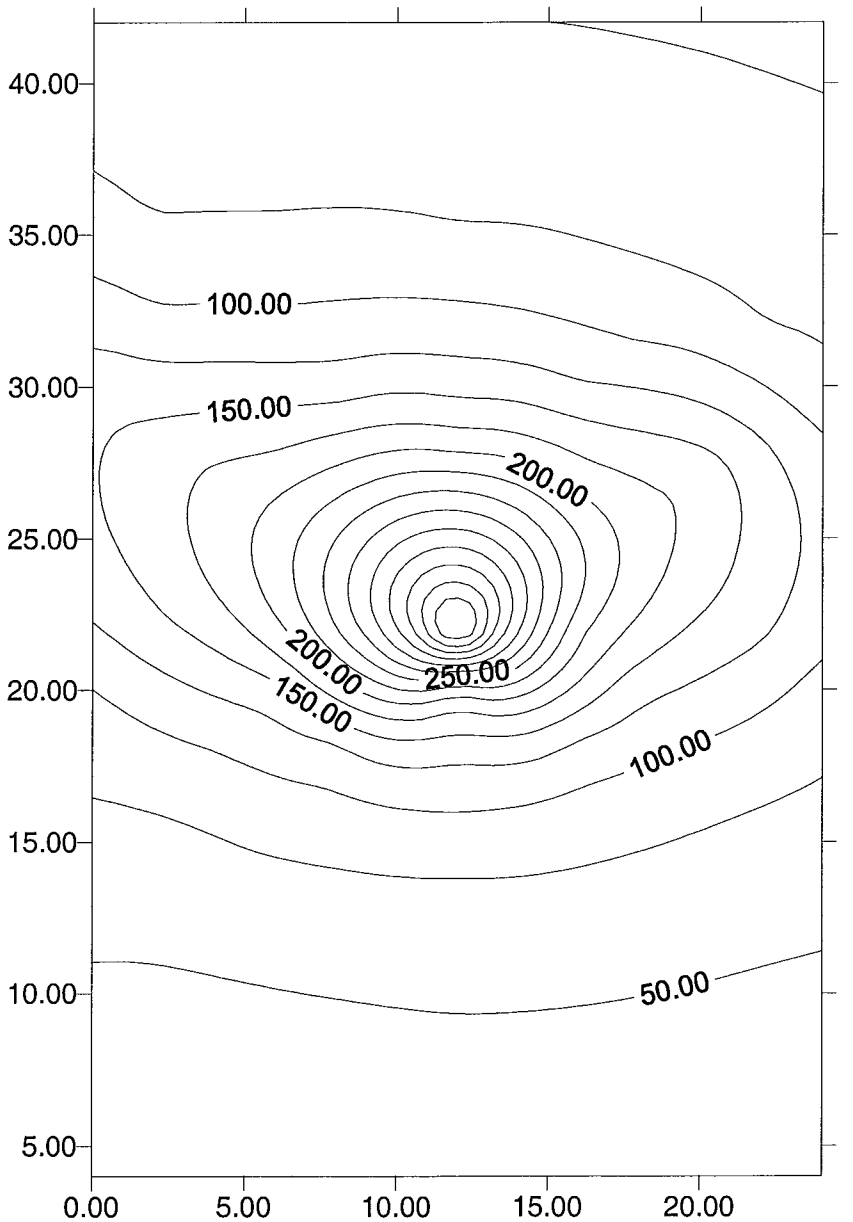
10|20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

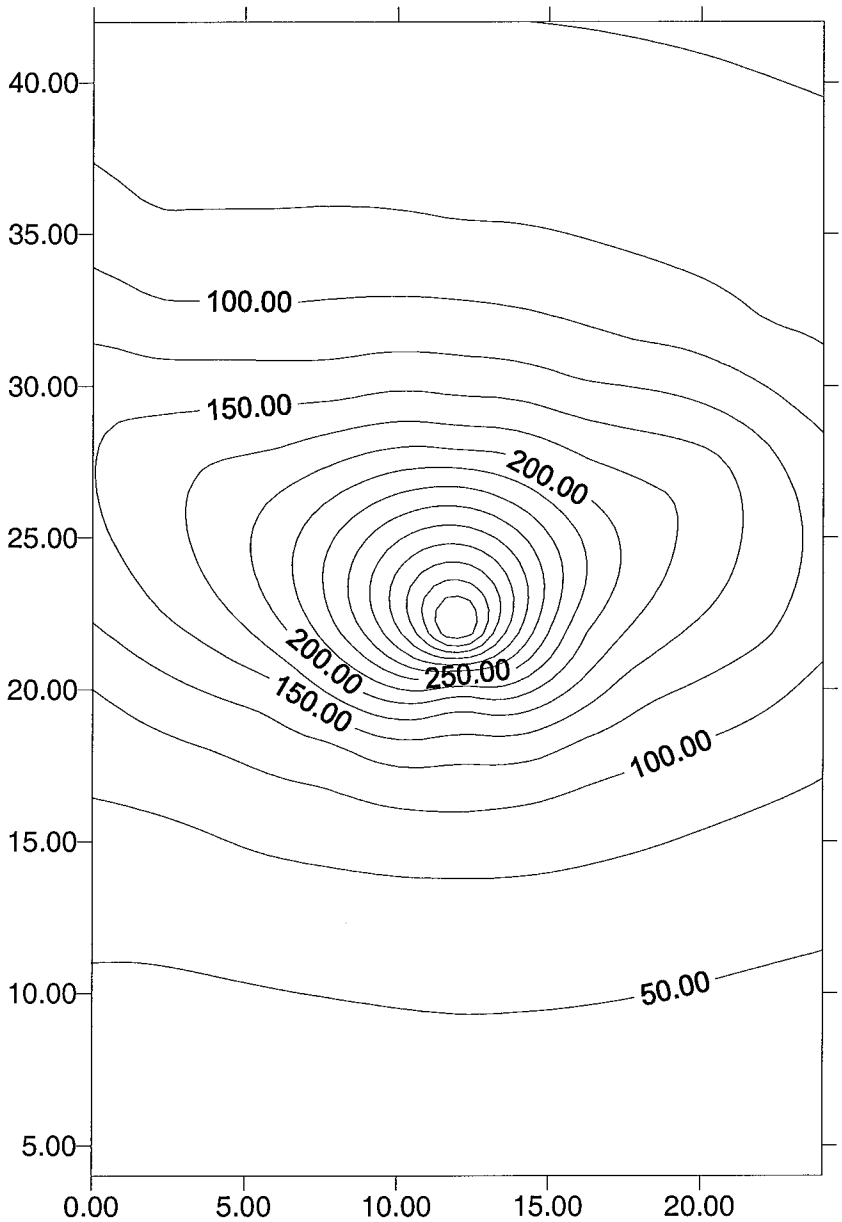
10/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

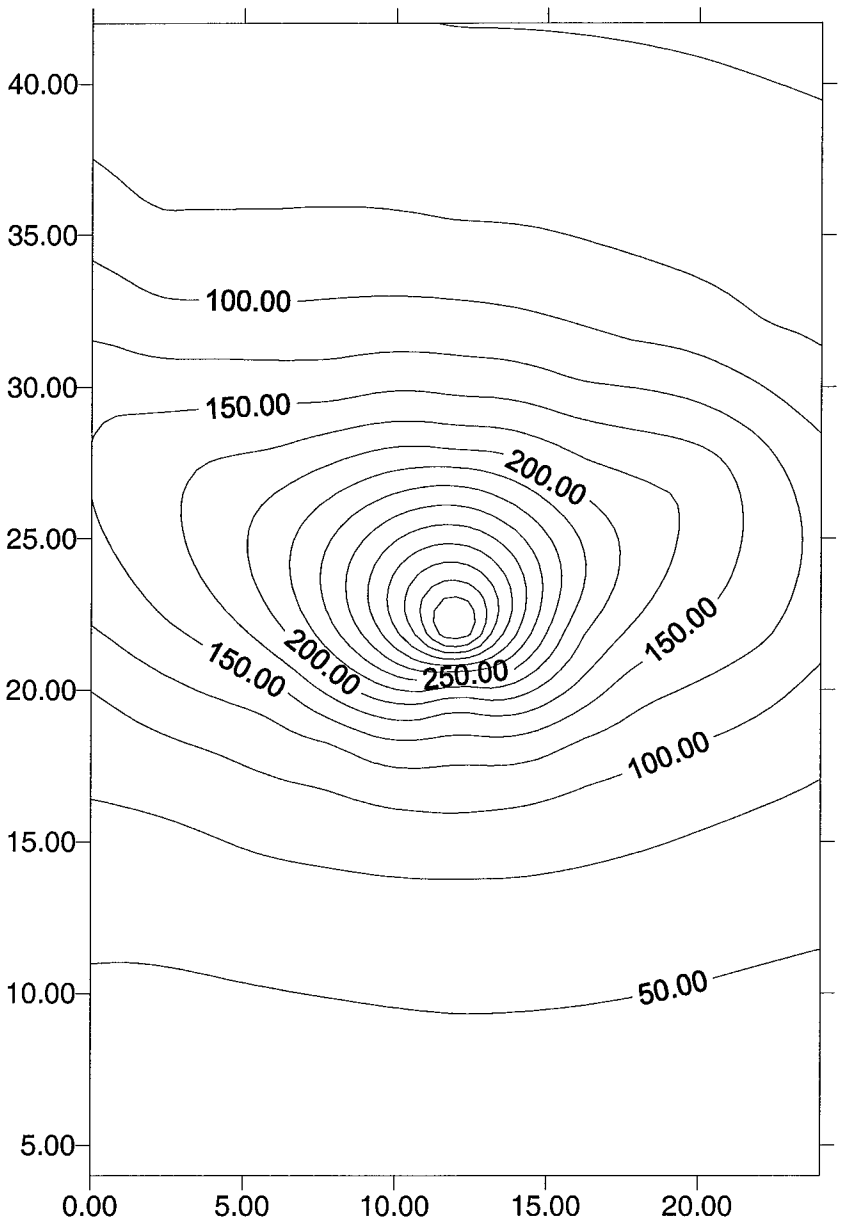
10/22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
200.00
250.00
150.00
100.00
50.00

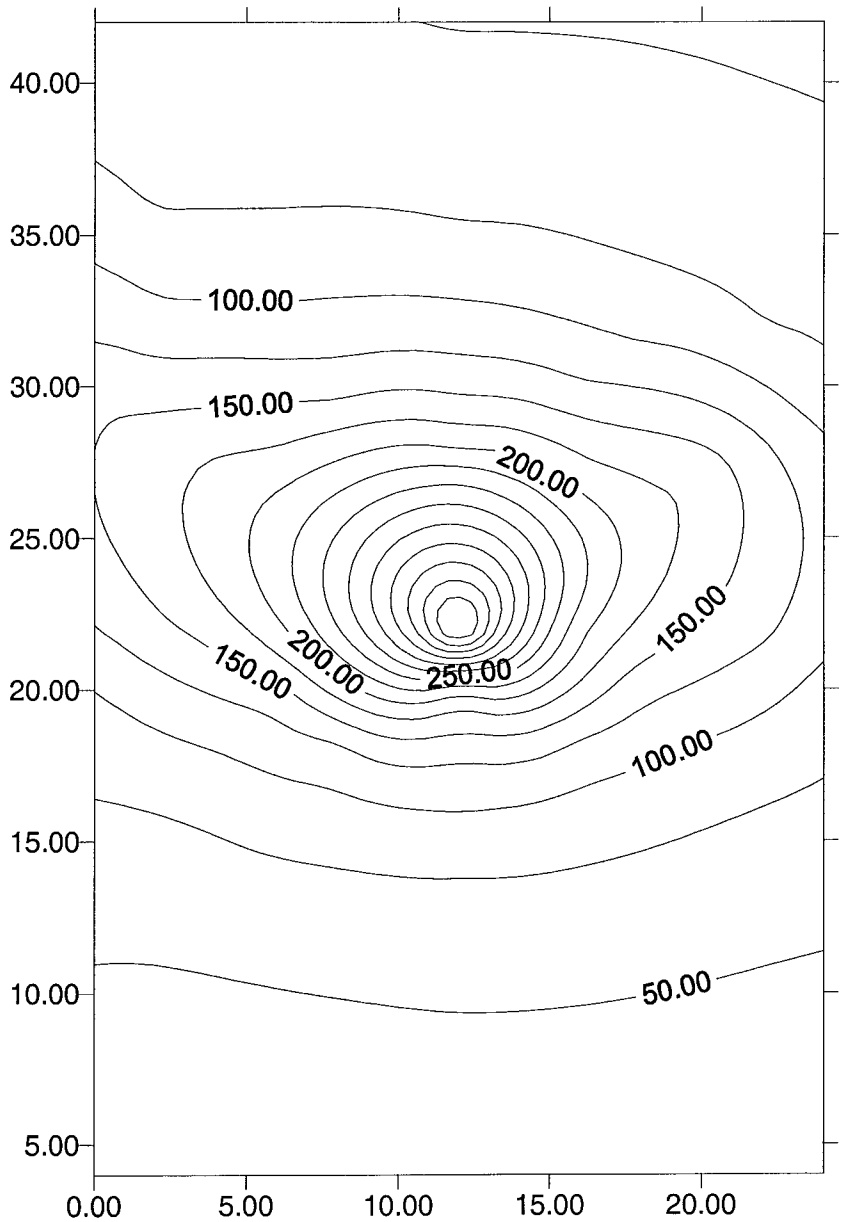
10/23


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
200.00
250.00
150.00
100.00
50.00

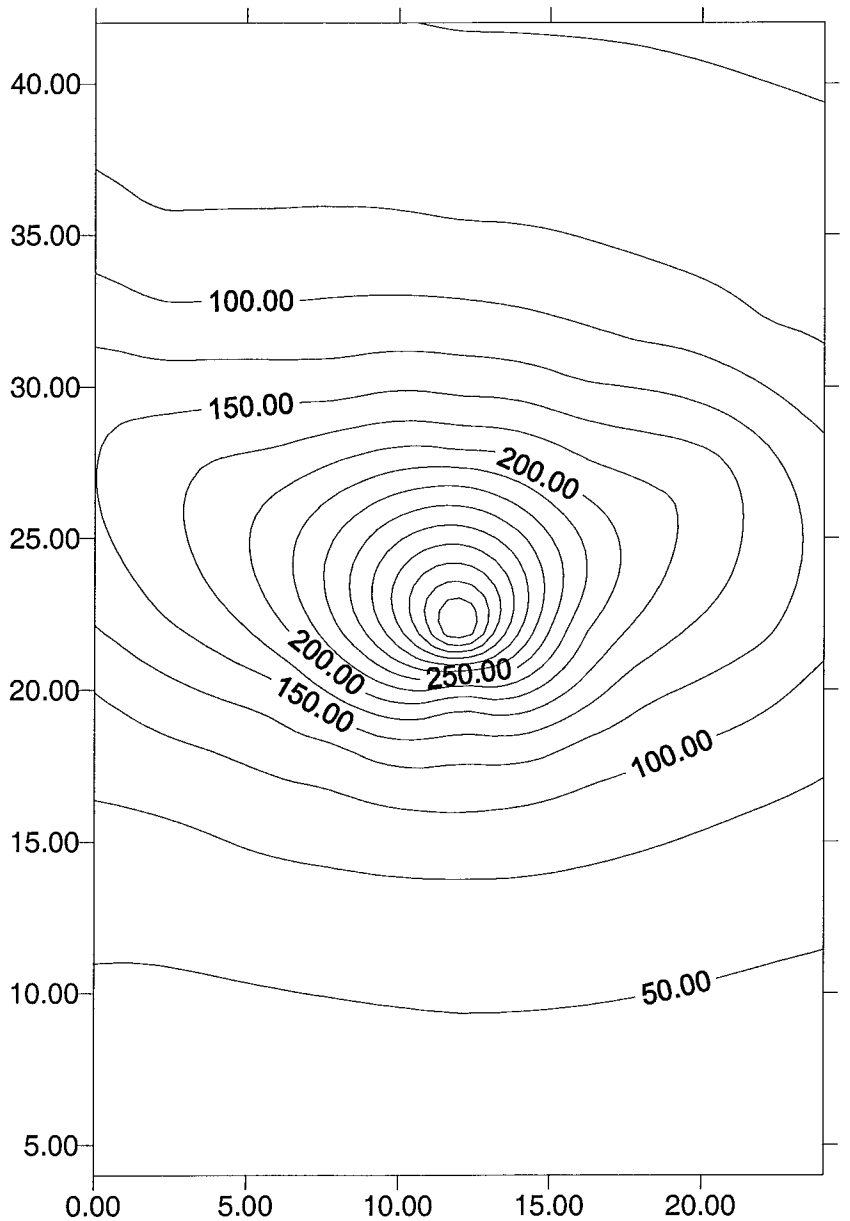
10/24


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
150.00
100.00
50.00

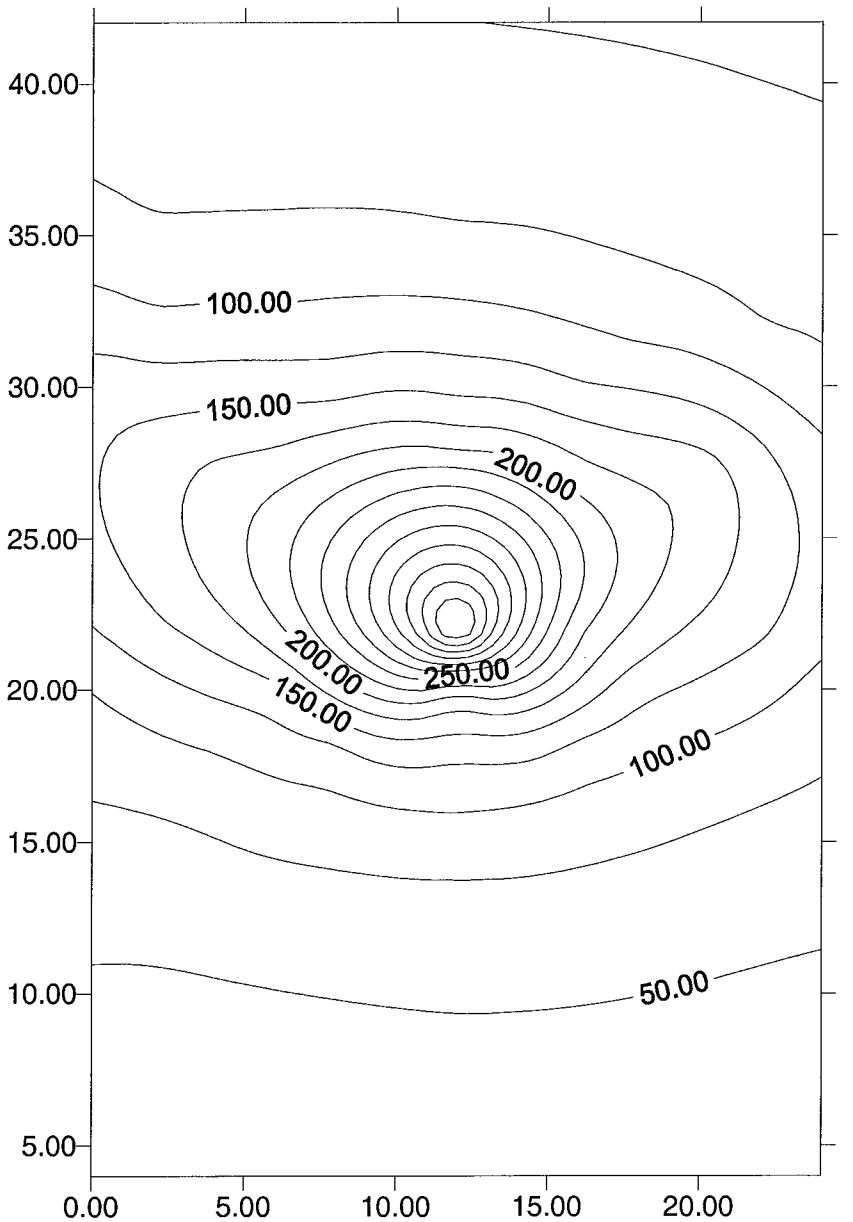
10/25


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
150.00
100.00
50.00

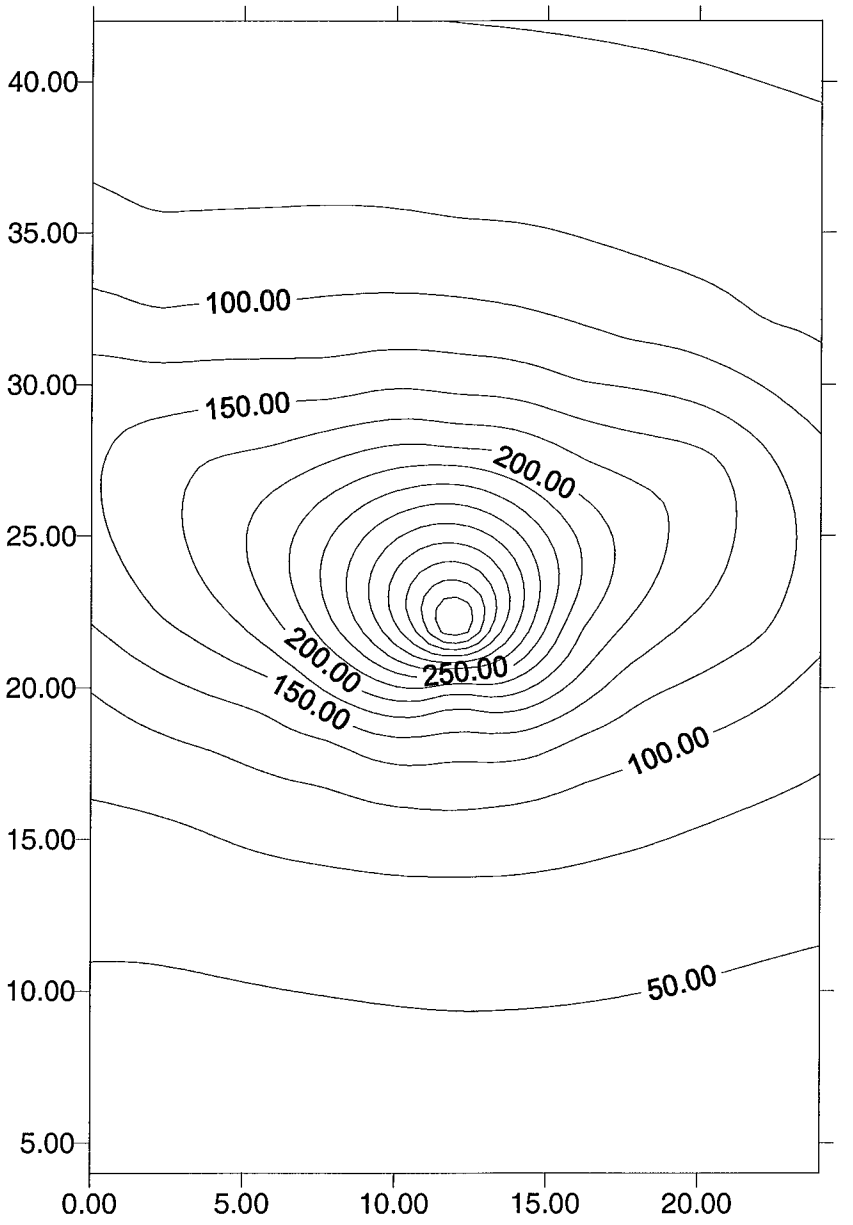
10/26


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
200.00
250.00
150.00
100.00
50.00

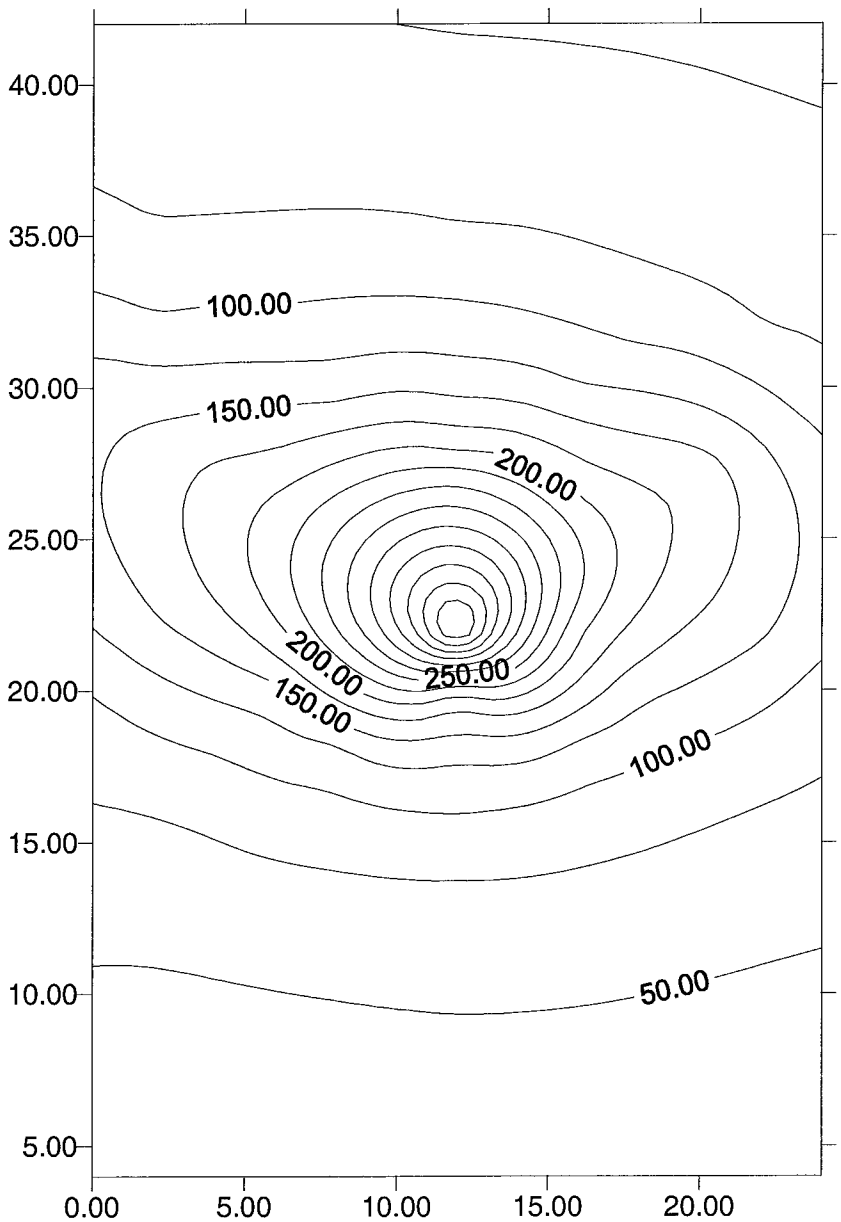
10/27


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

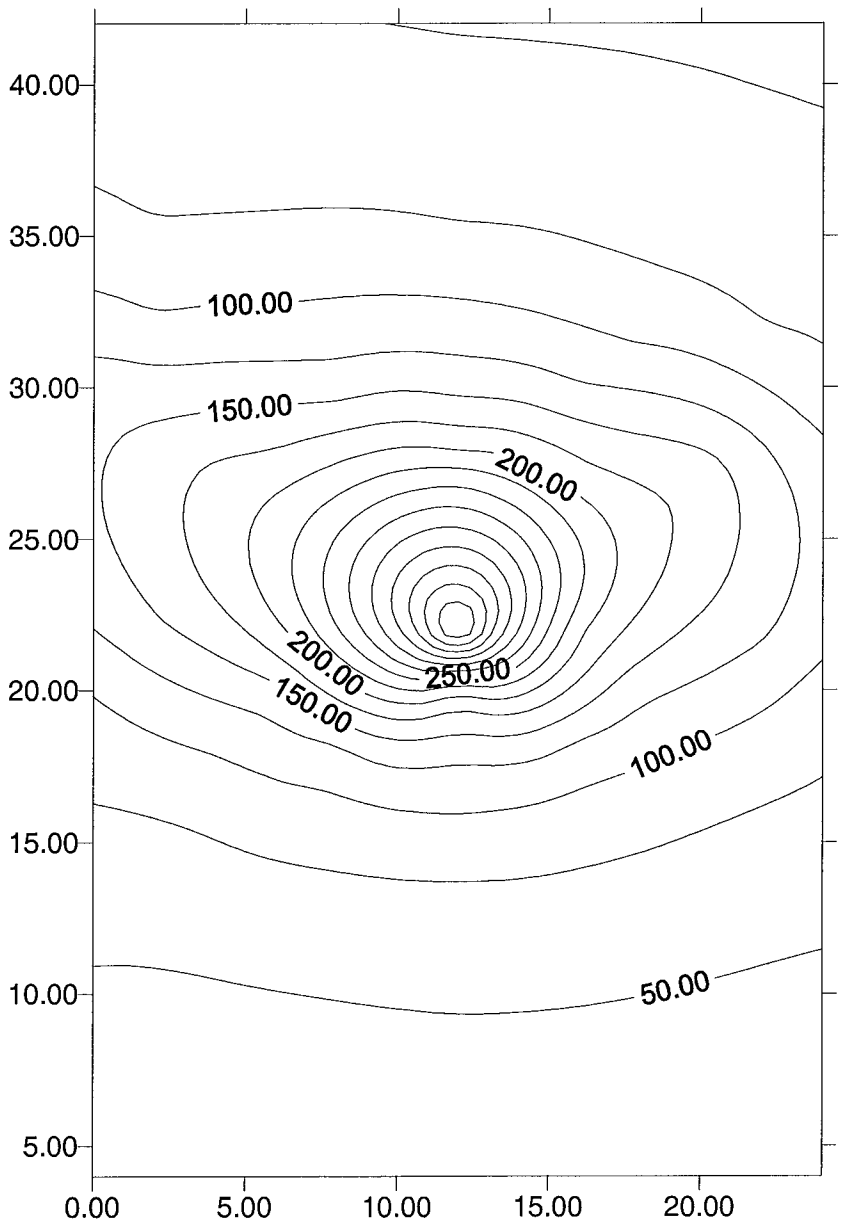
10/28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

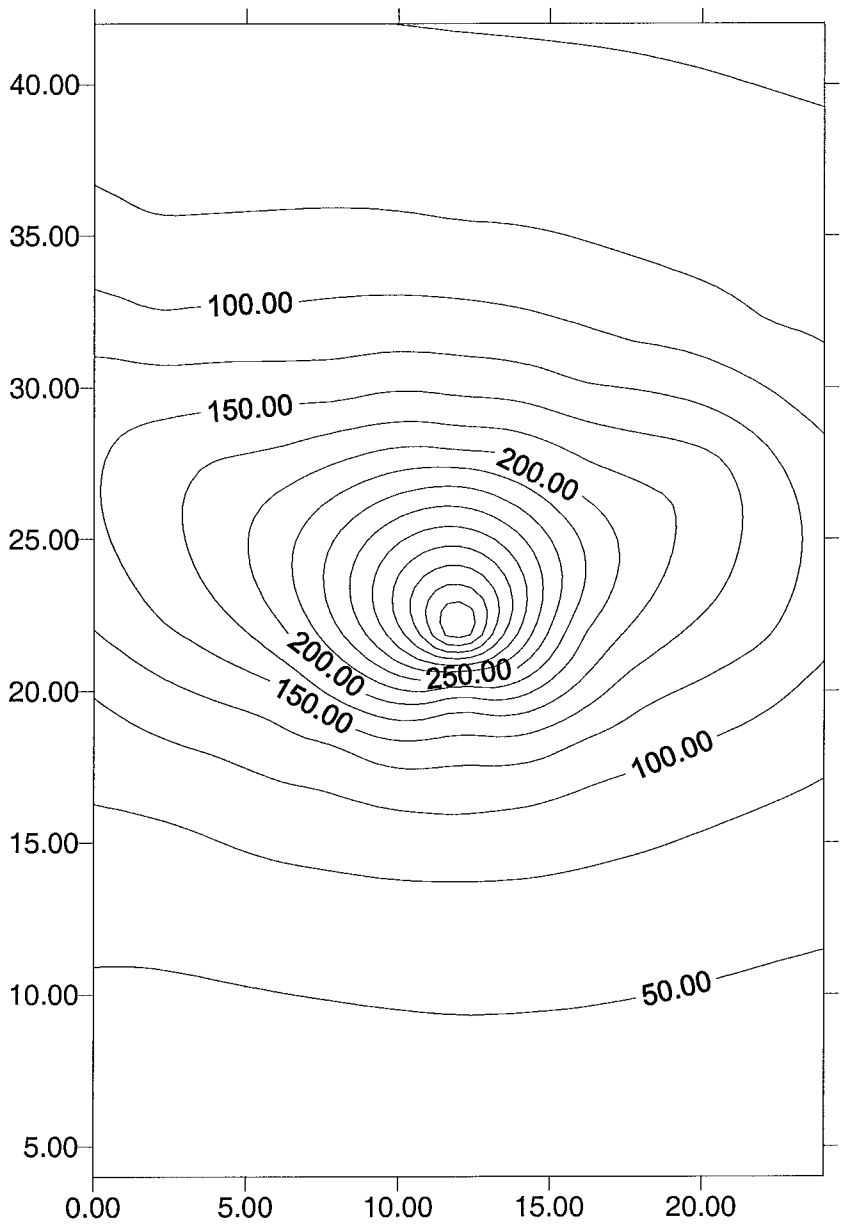
10/29


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

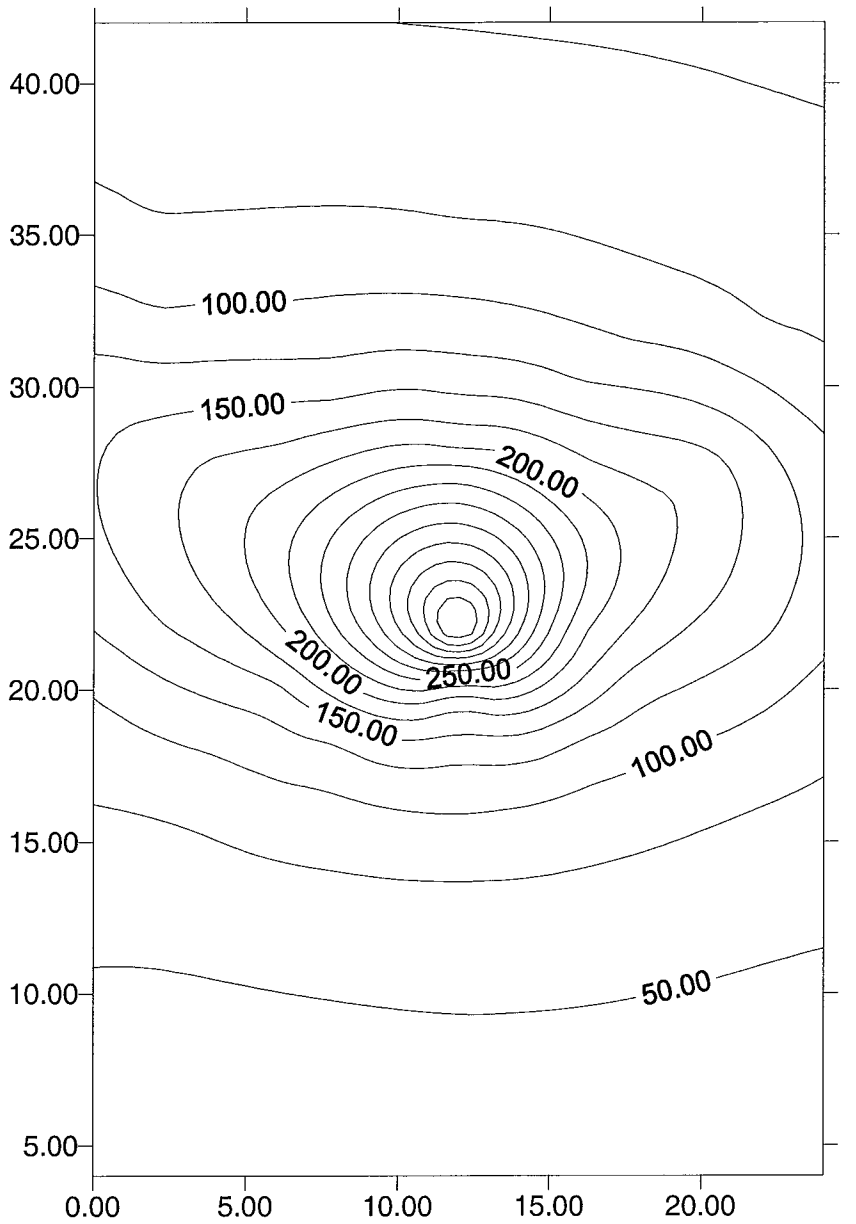
10/30


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

10/3'

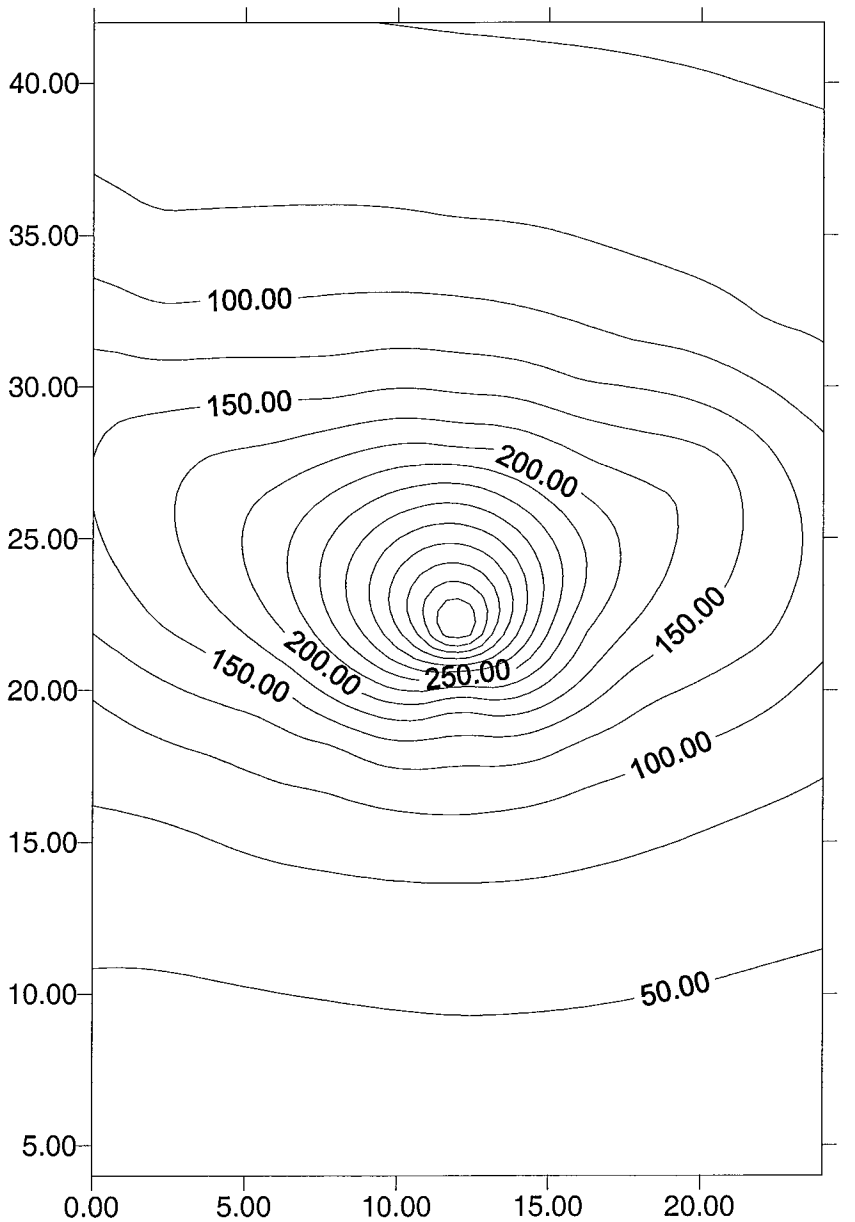

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

11/1

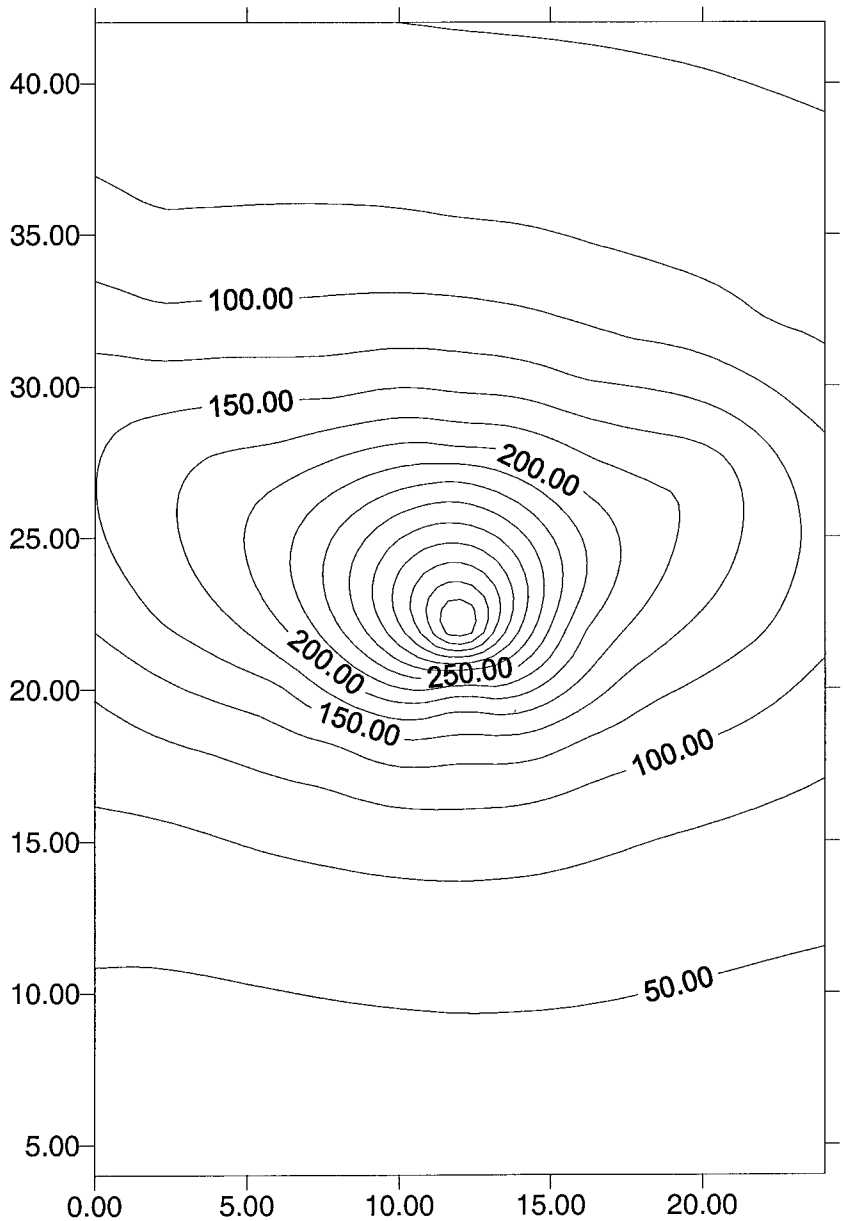


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

11/2

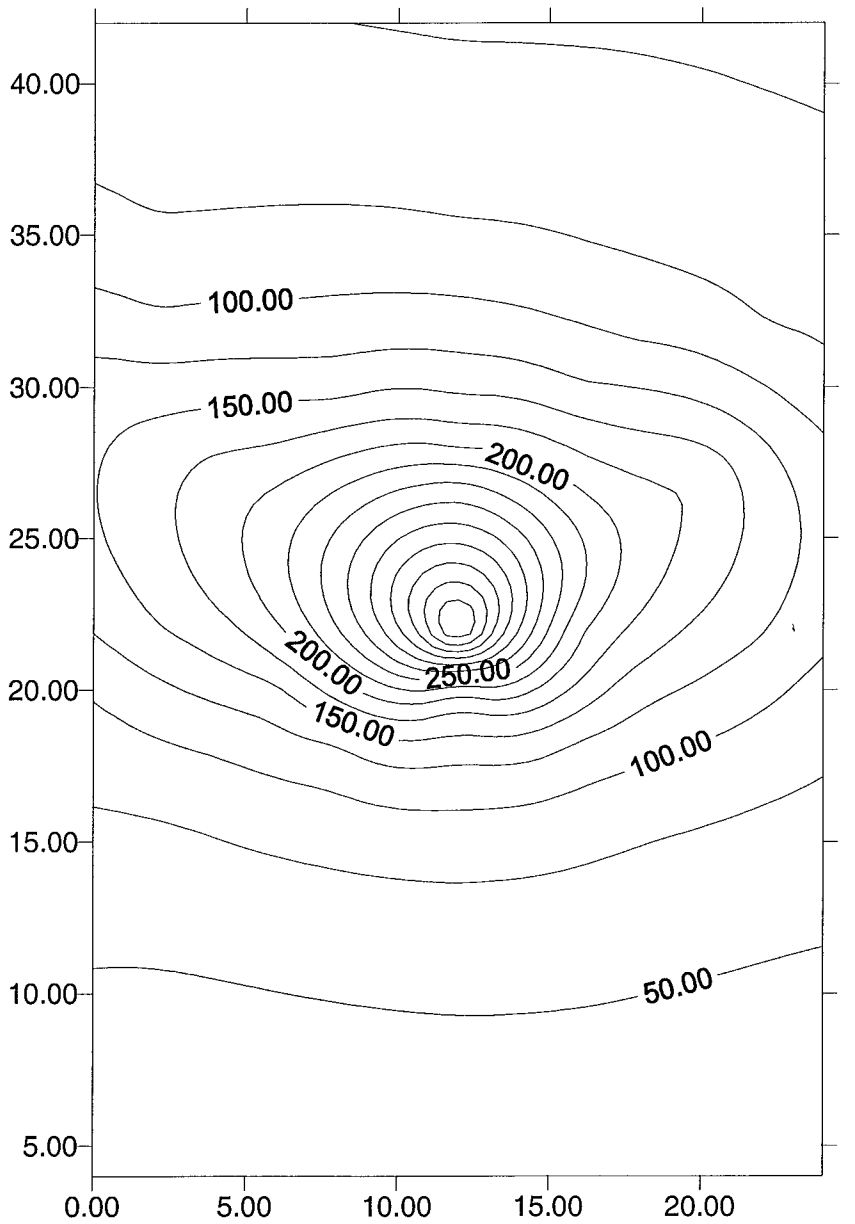

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
150.00
100.00
50.00

11|3

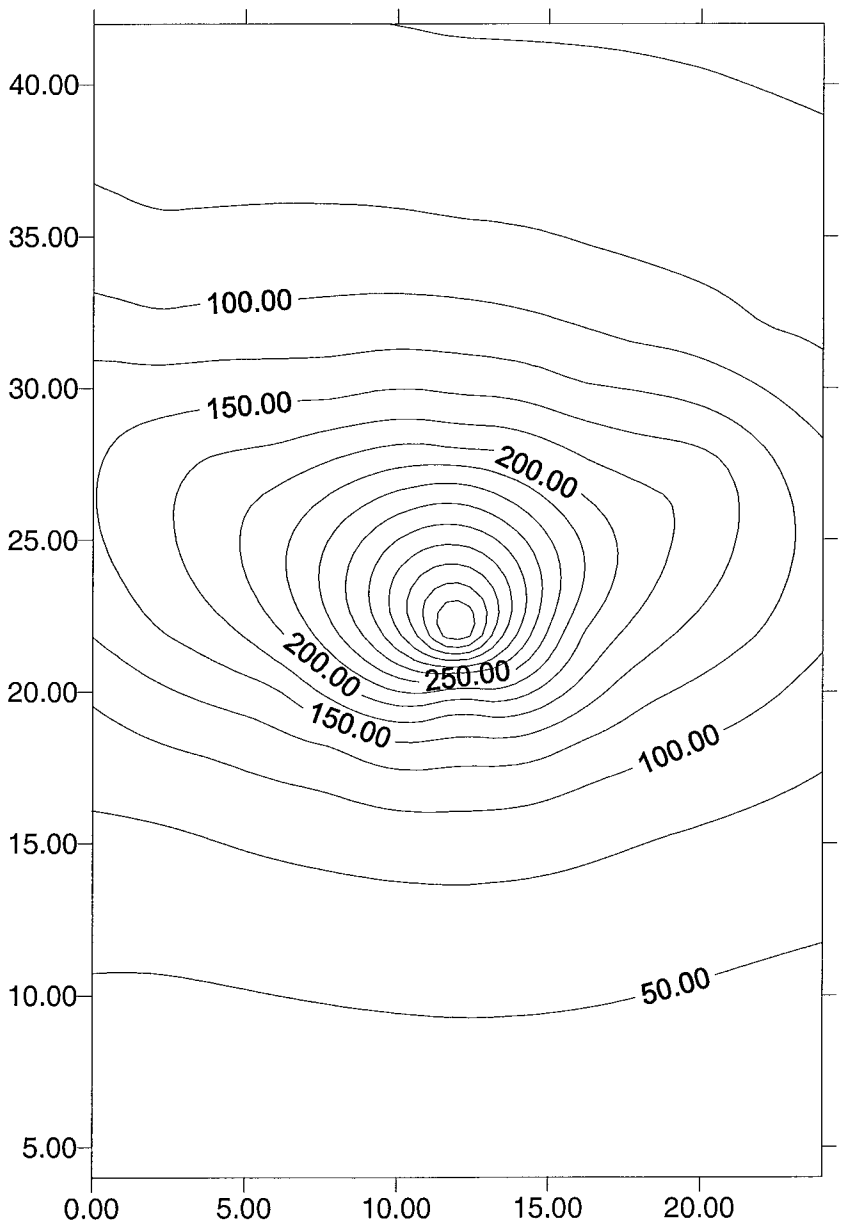


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

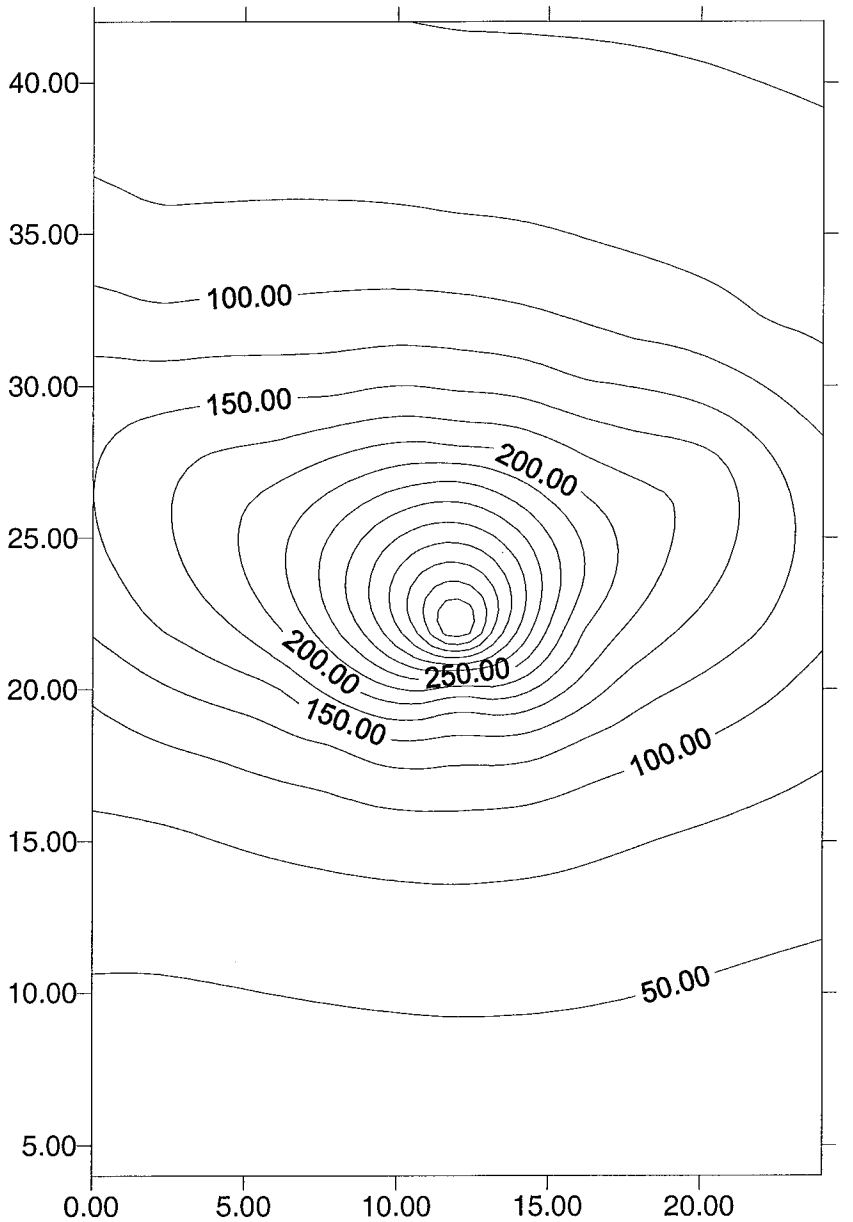
11/4


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

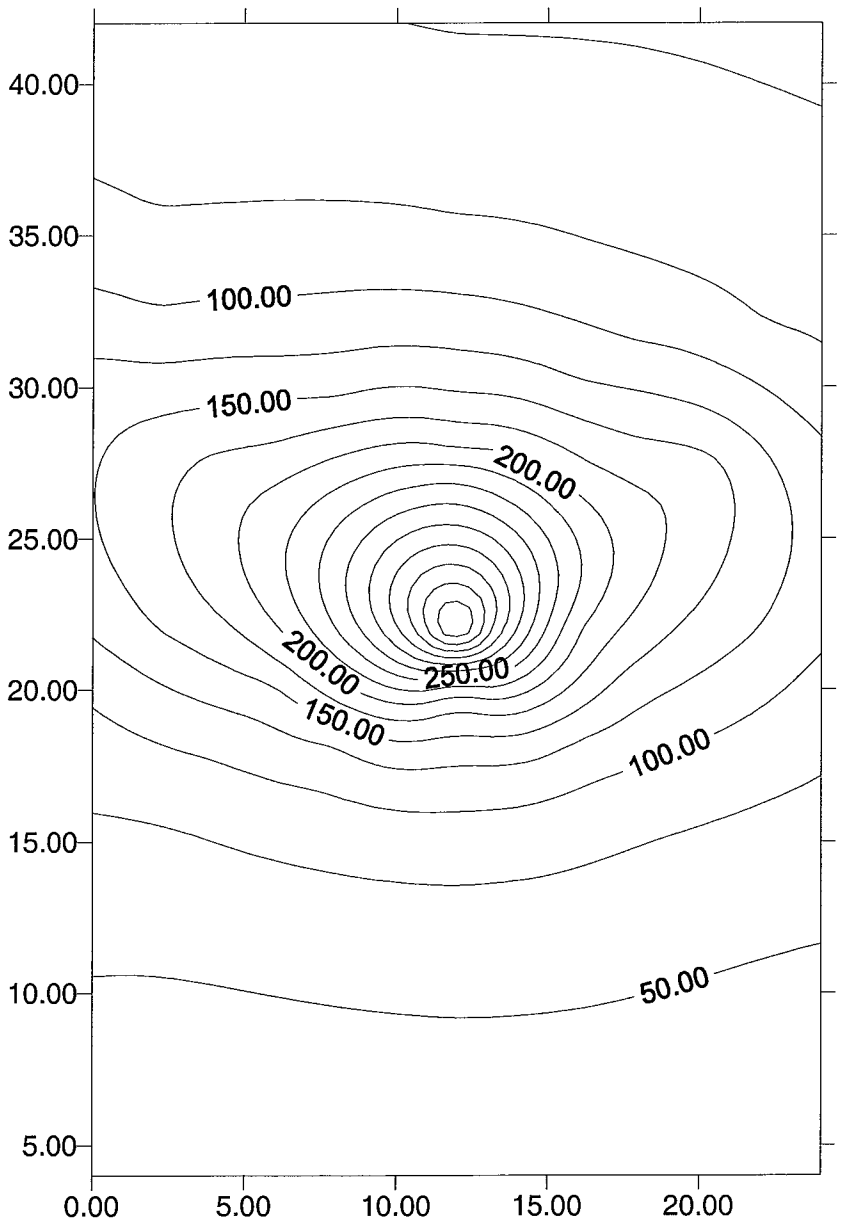
11/5


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

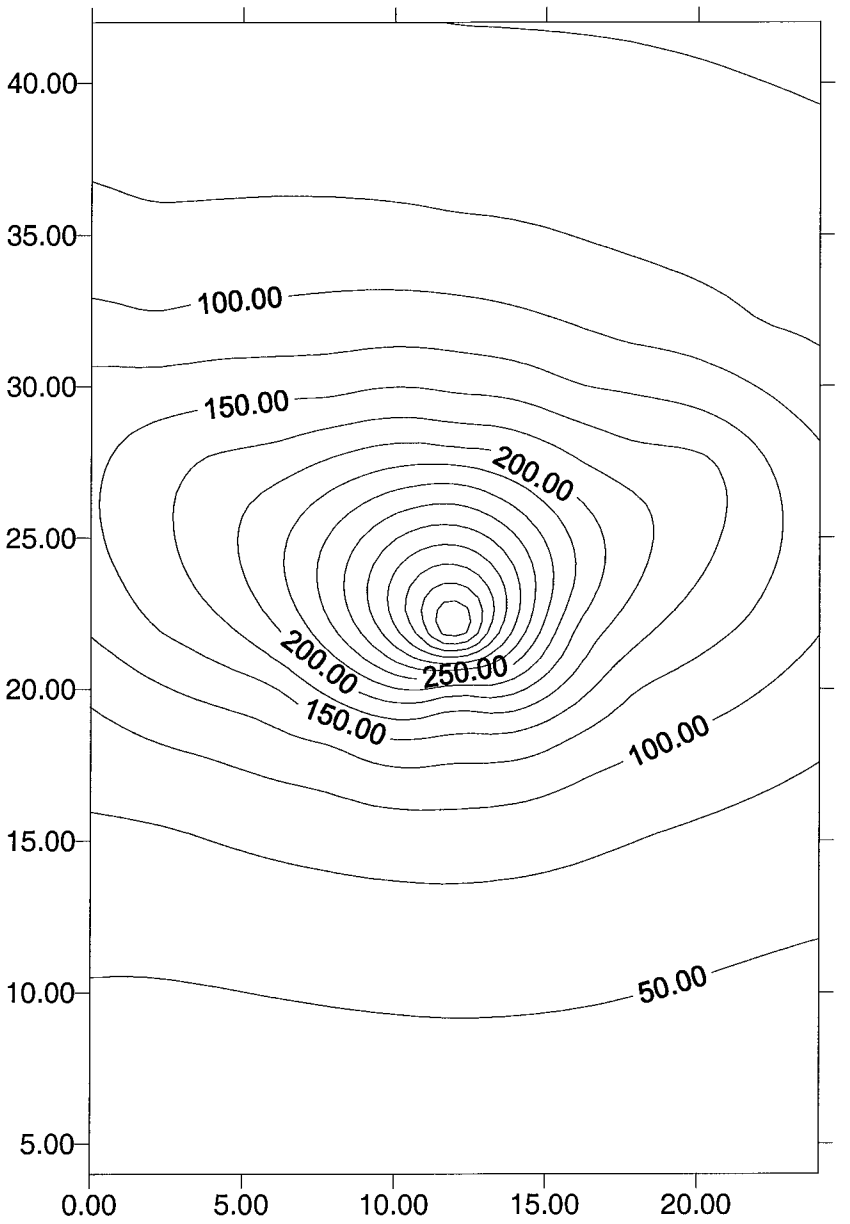
11/6


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

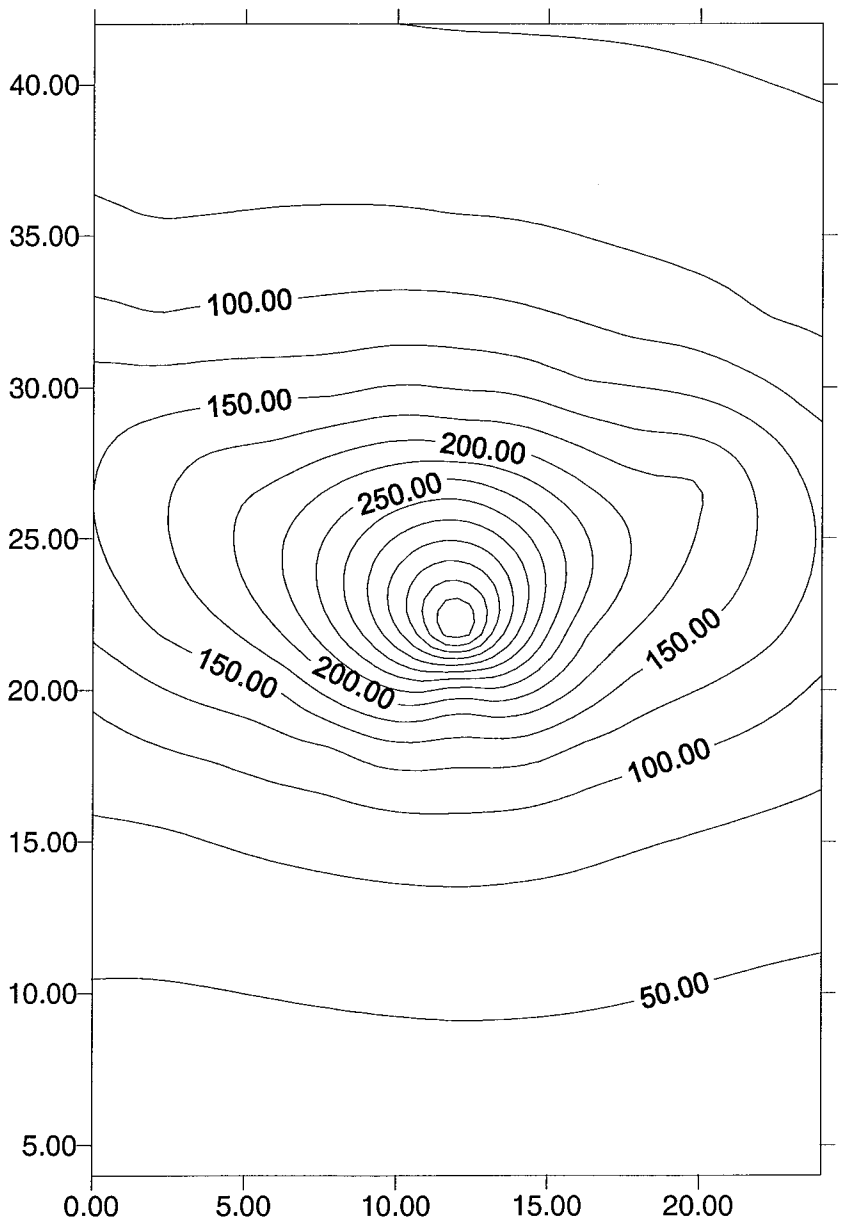
11/7


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

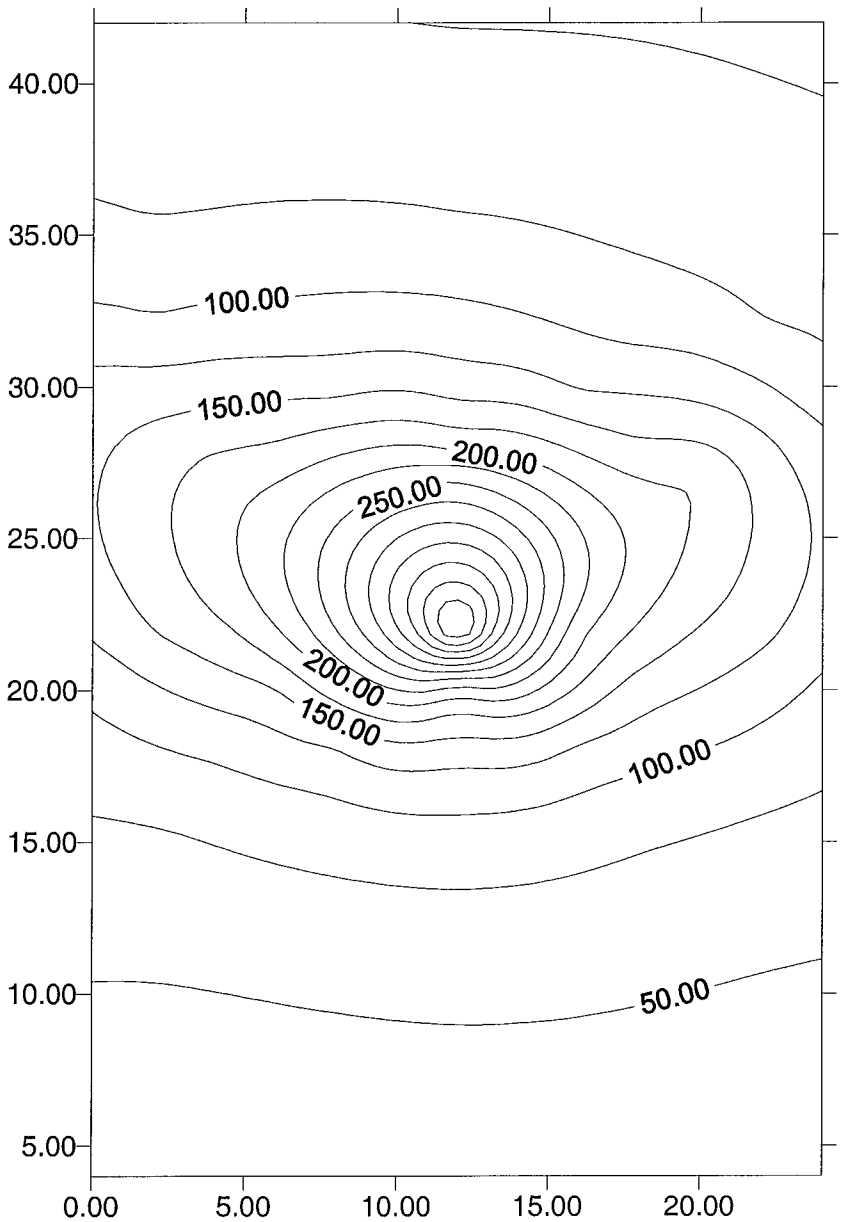
11/8


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

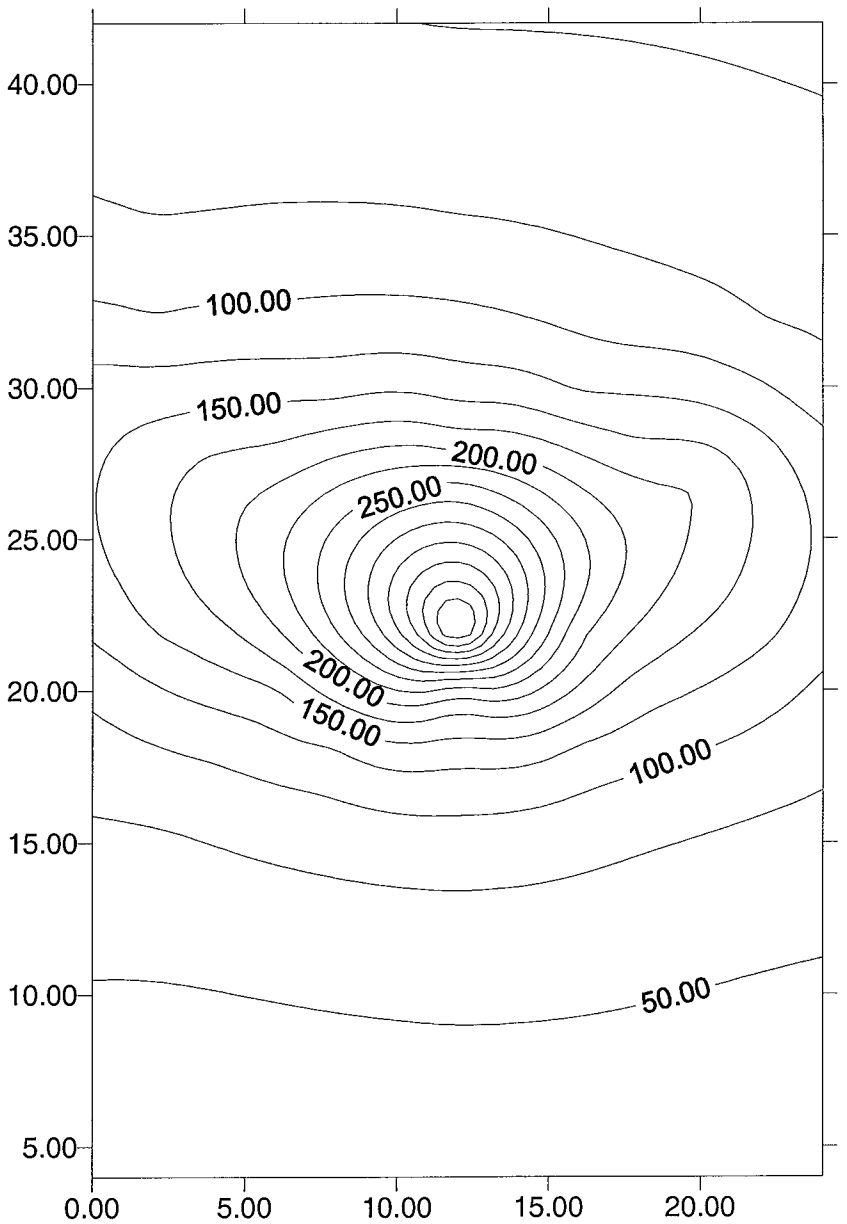
11/9


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
200.00
150.00
100.00
50.00

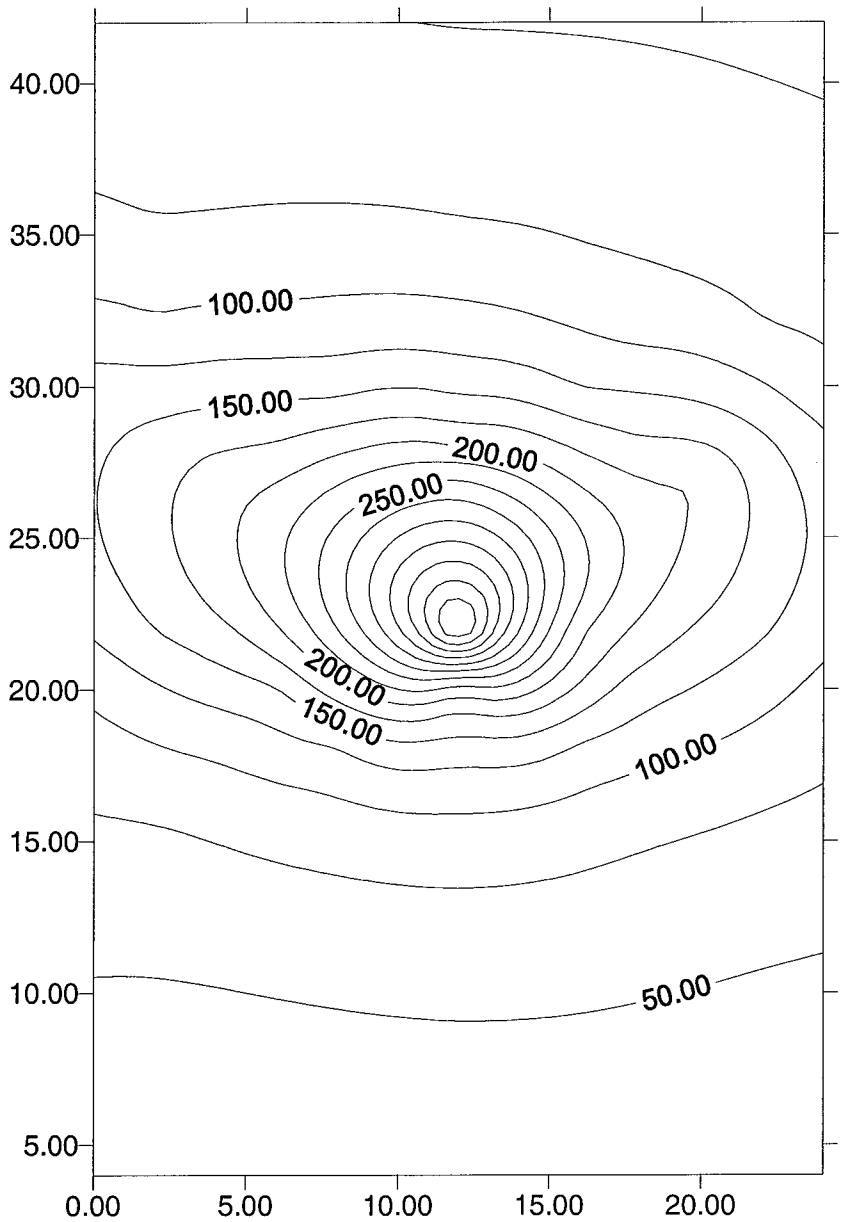
11/10

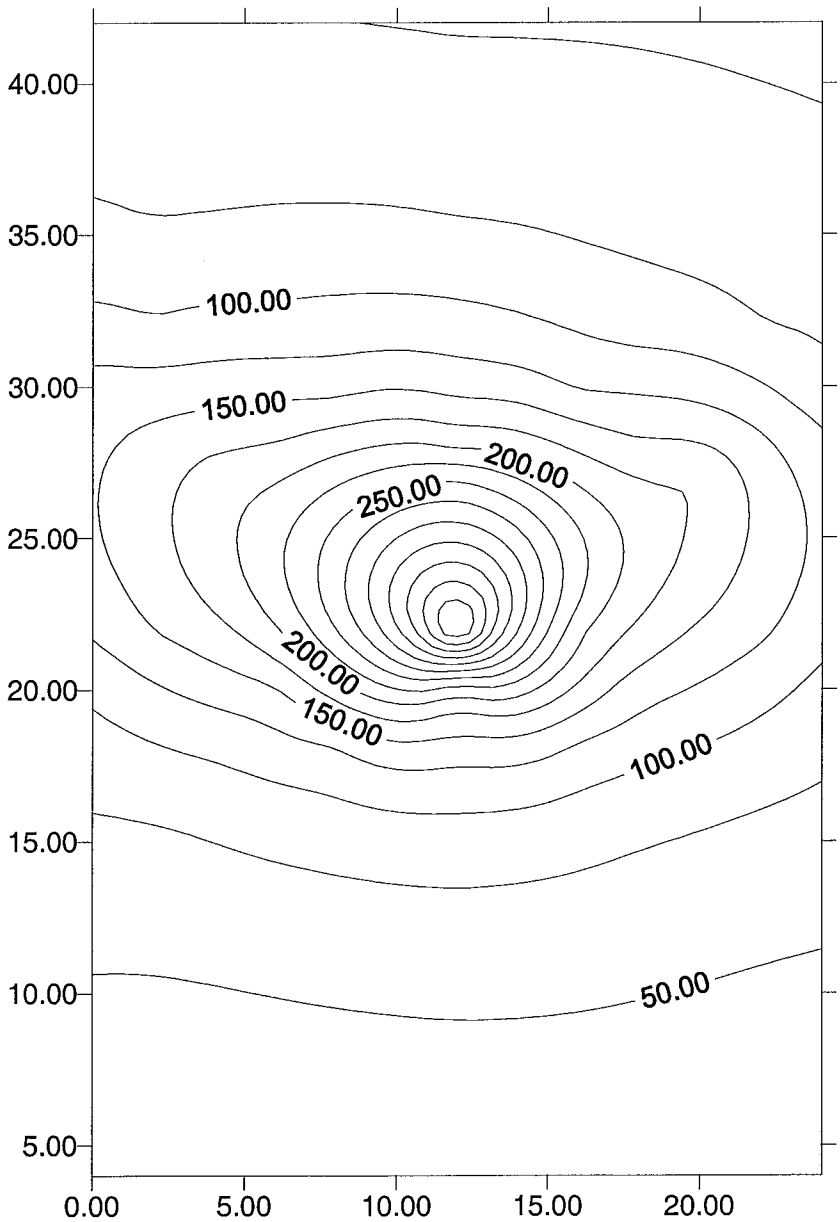

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

11/21

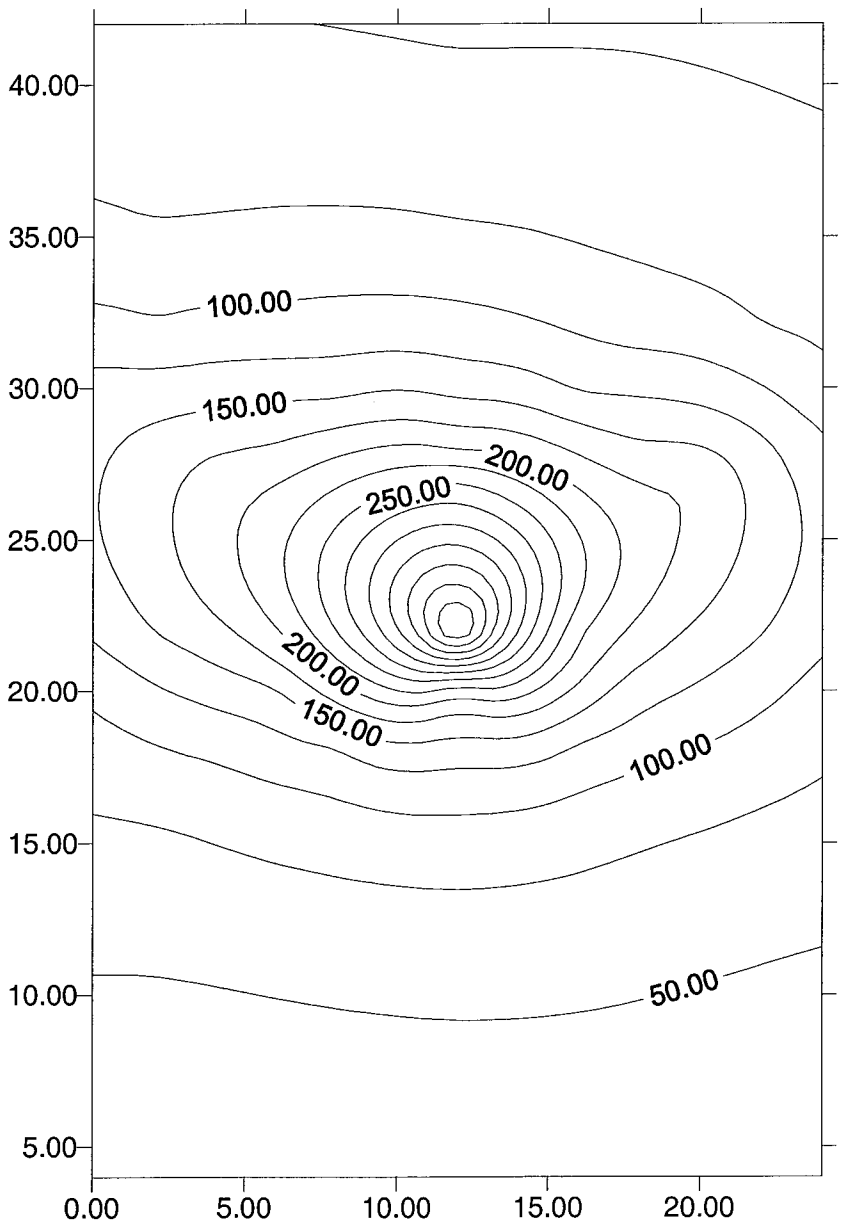

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

11/12

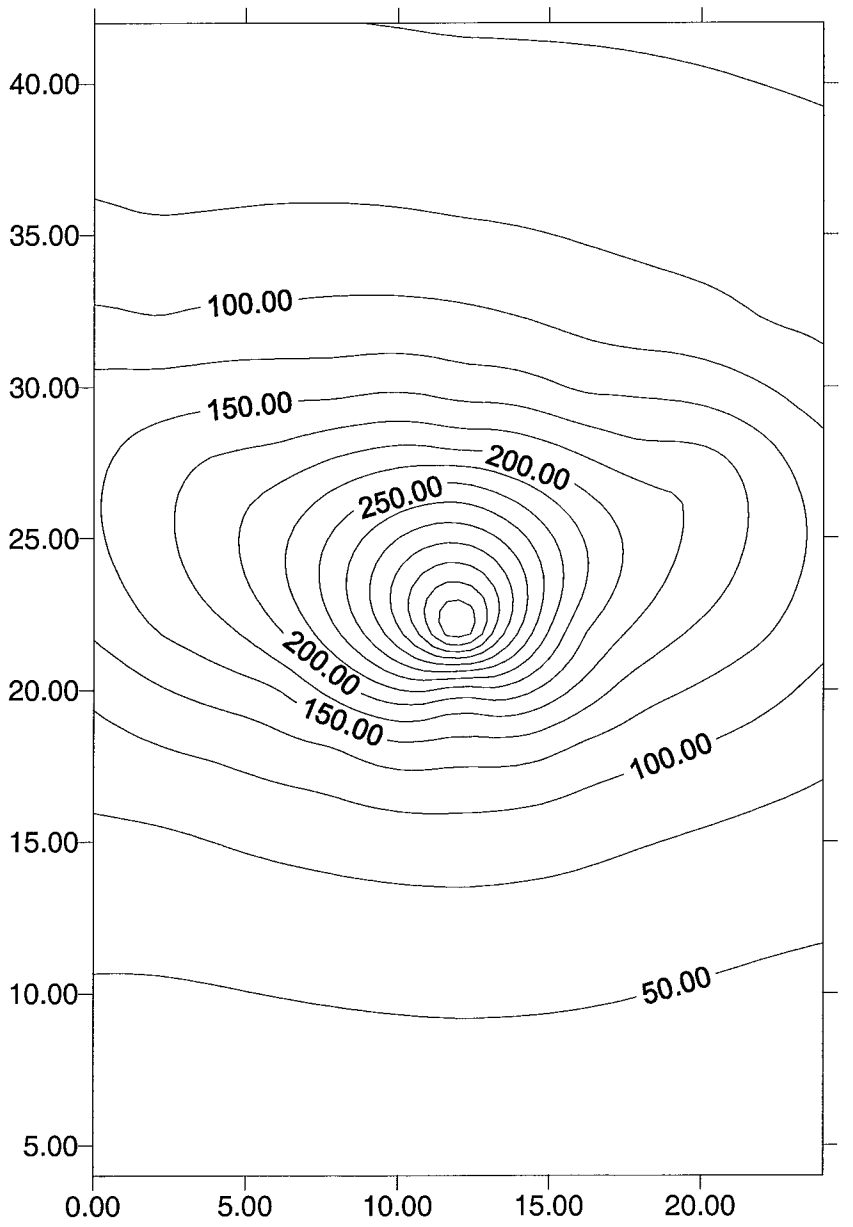

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

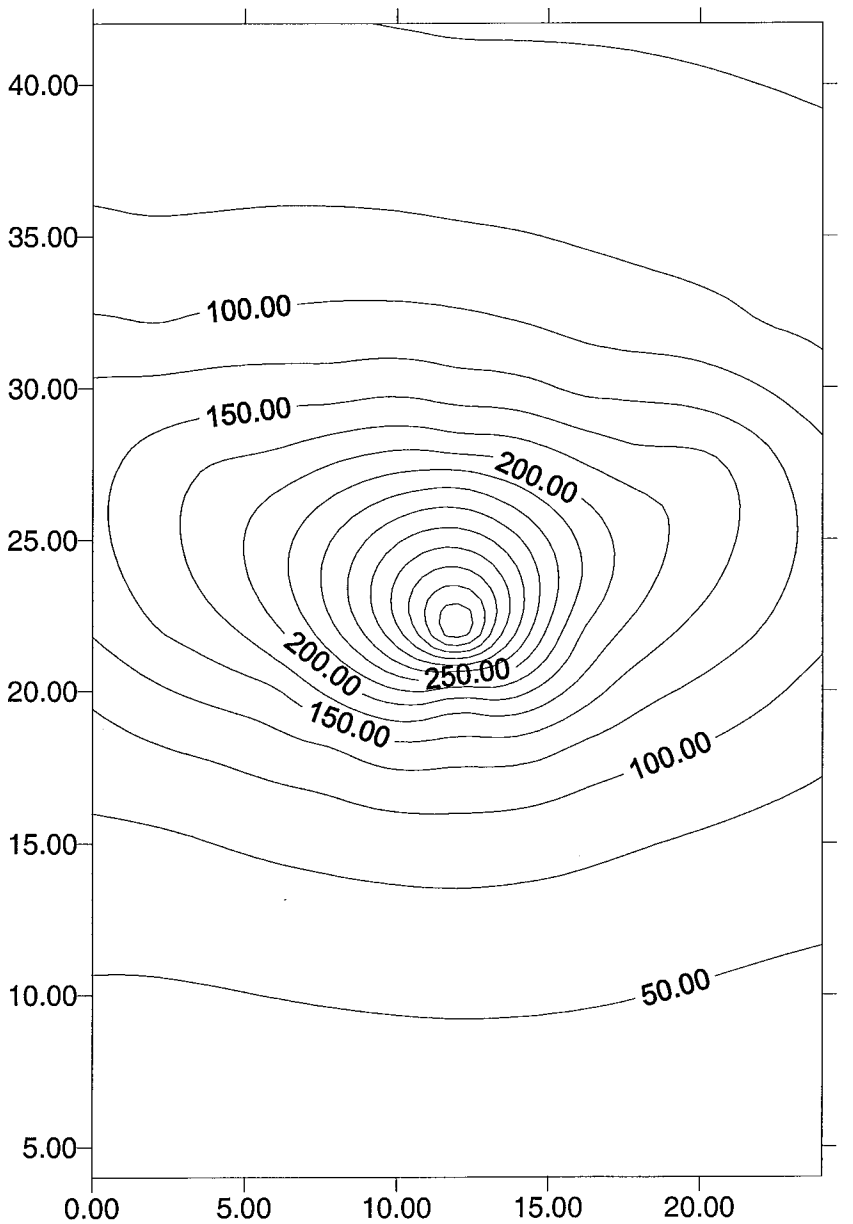
11/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

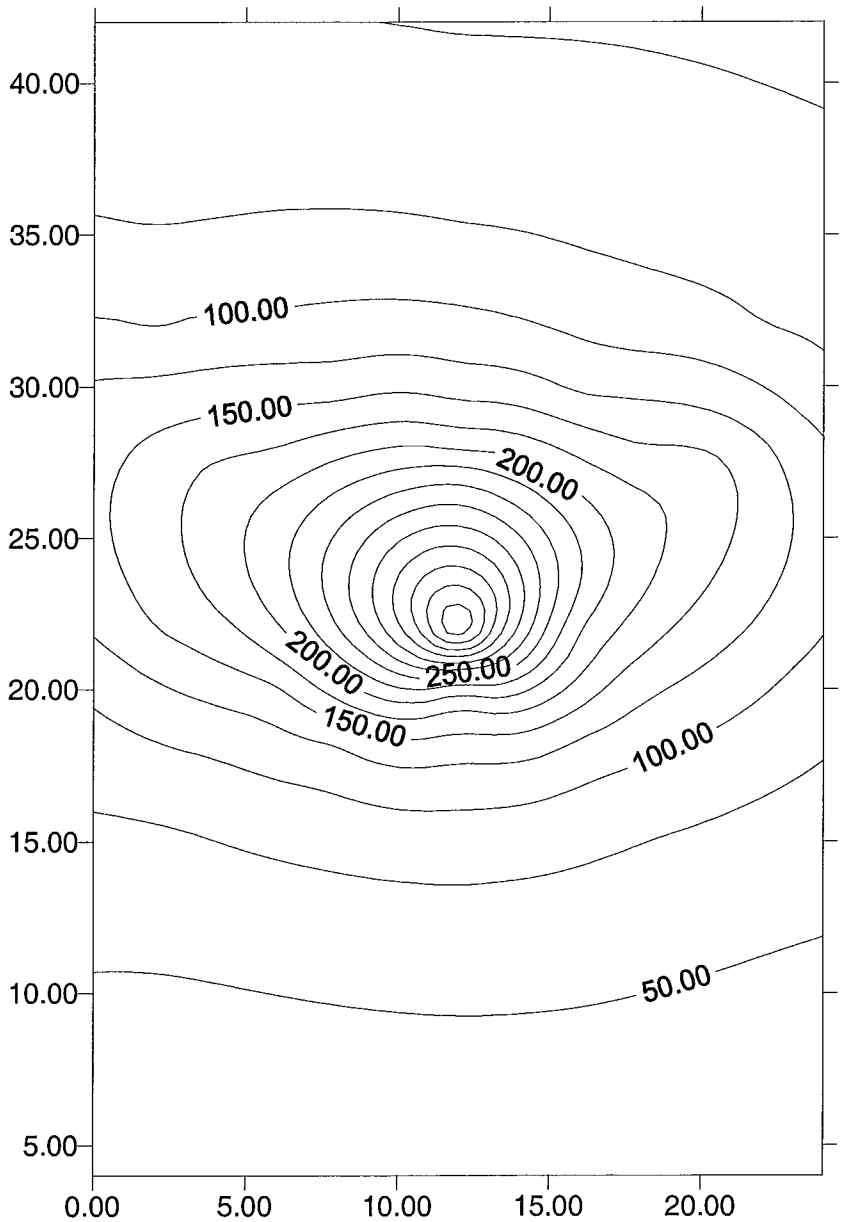
11/15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

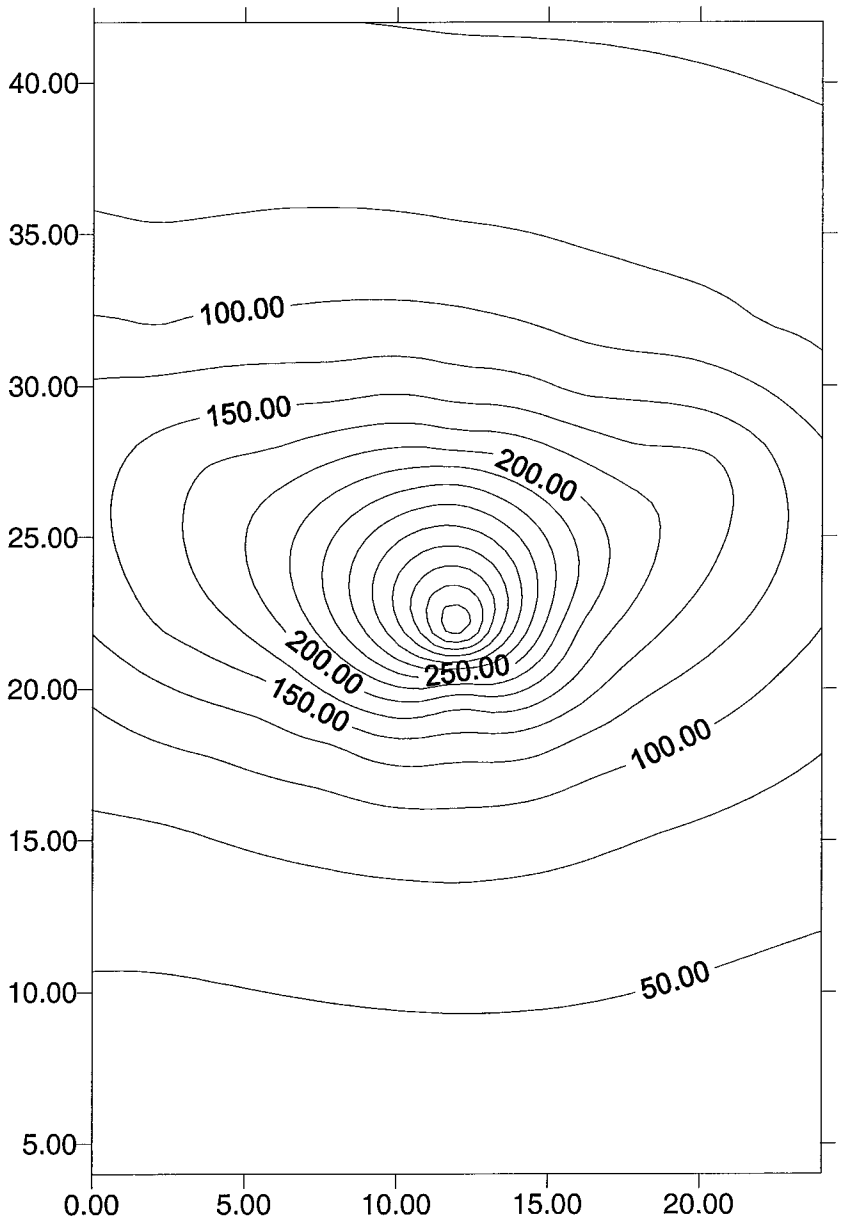
11/16


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

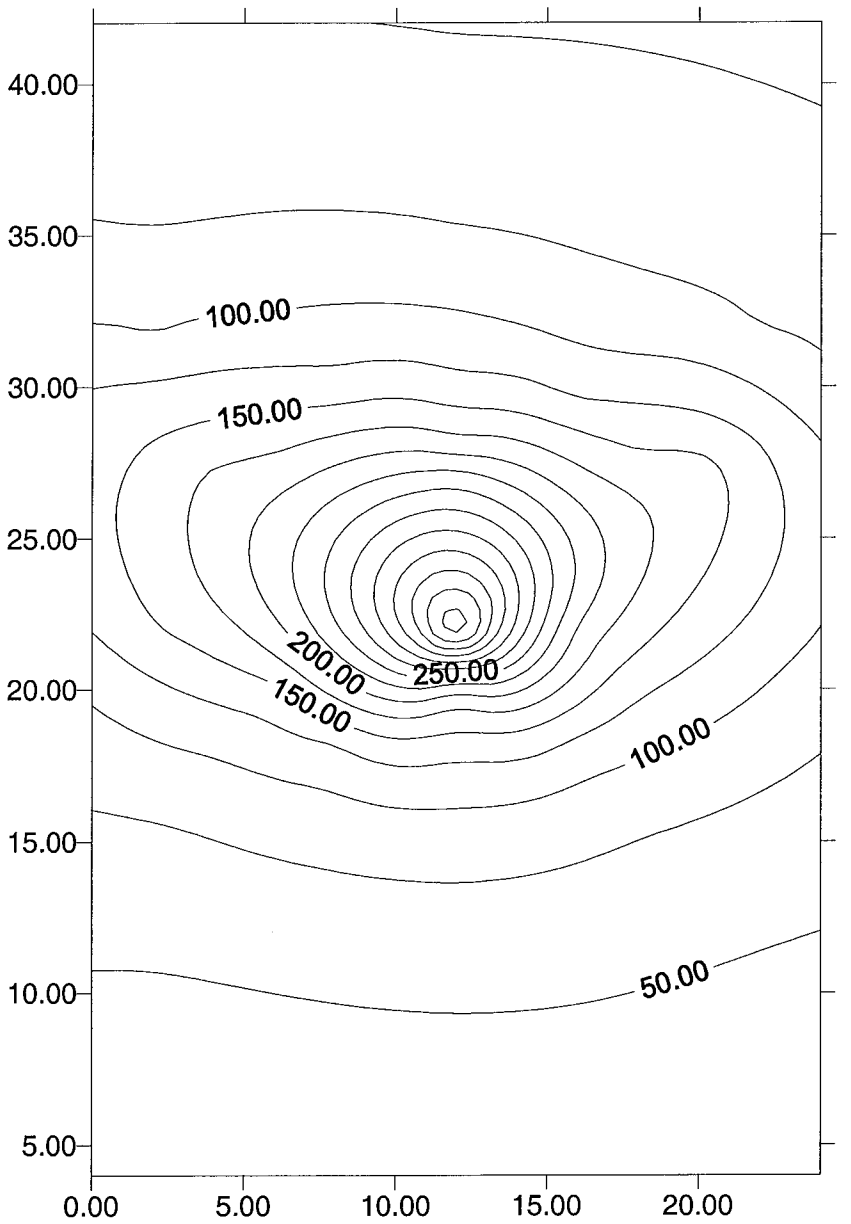
11/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

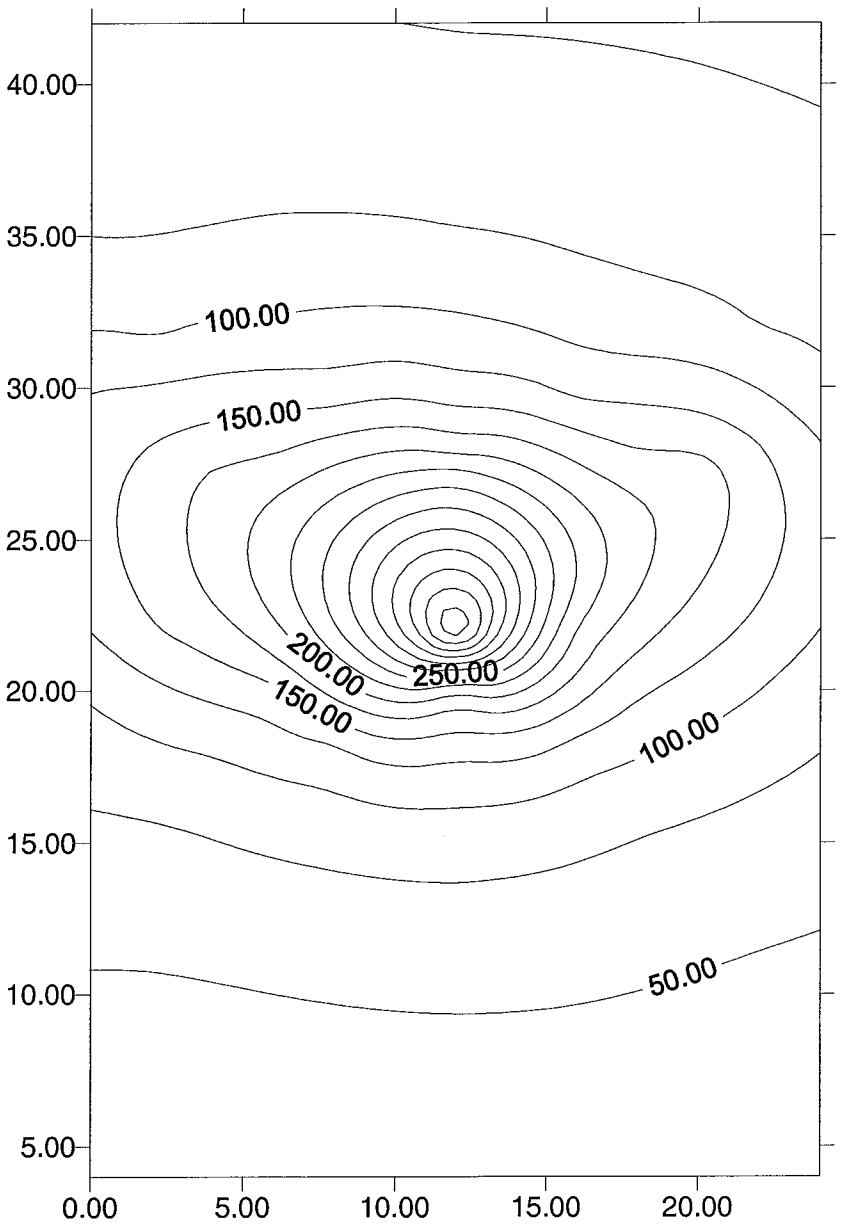
11/18


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

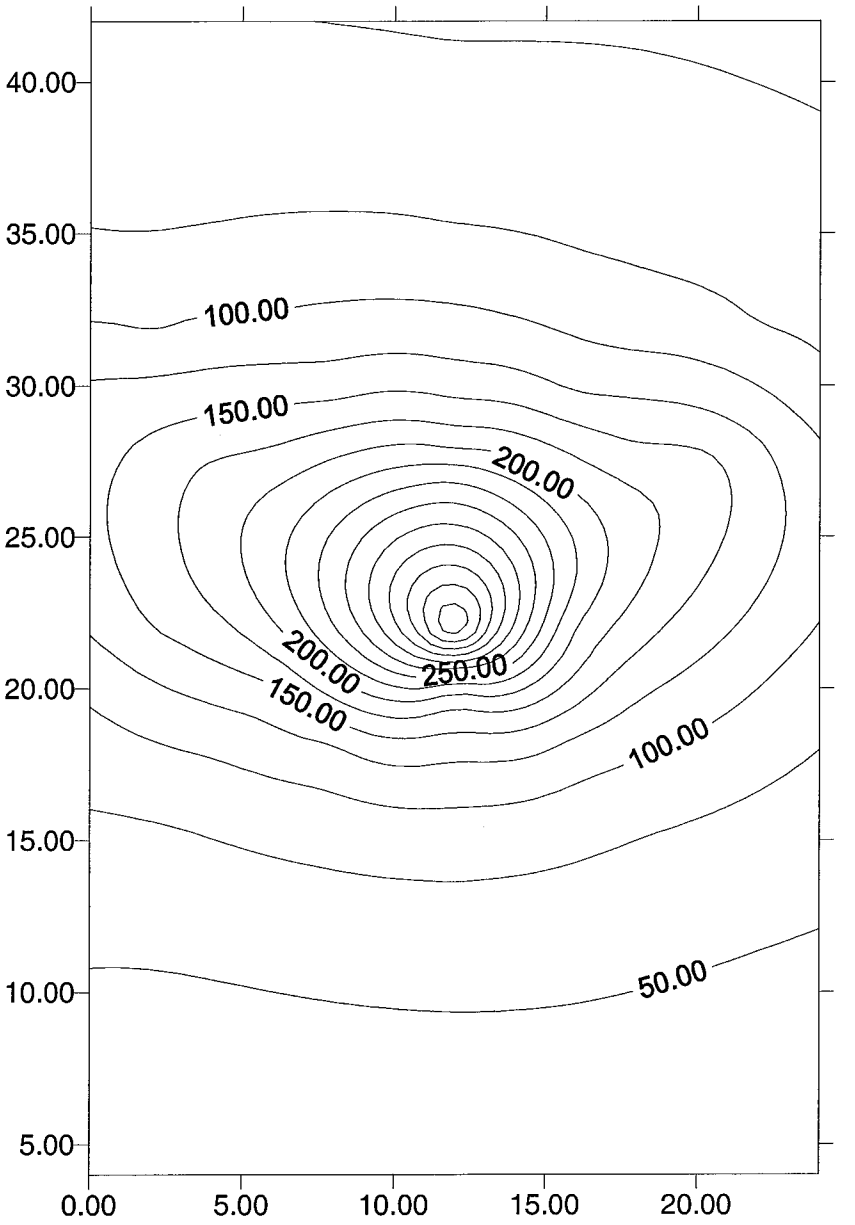
11/19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

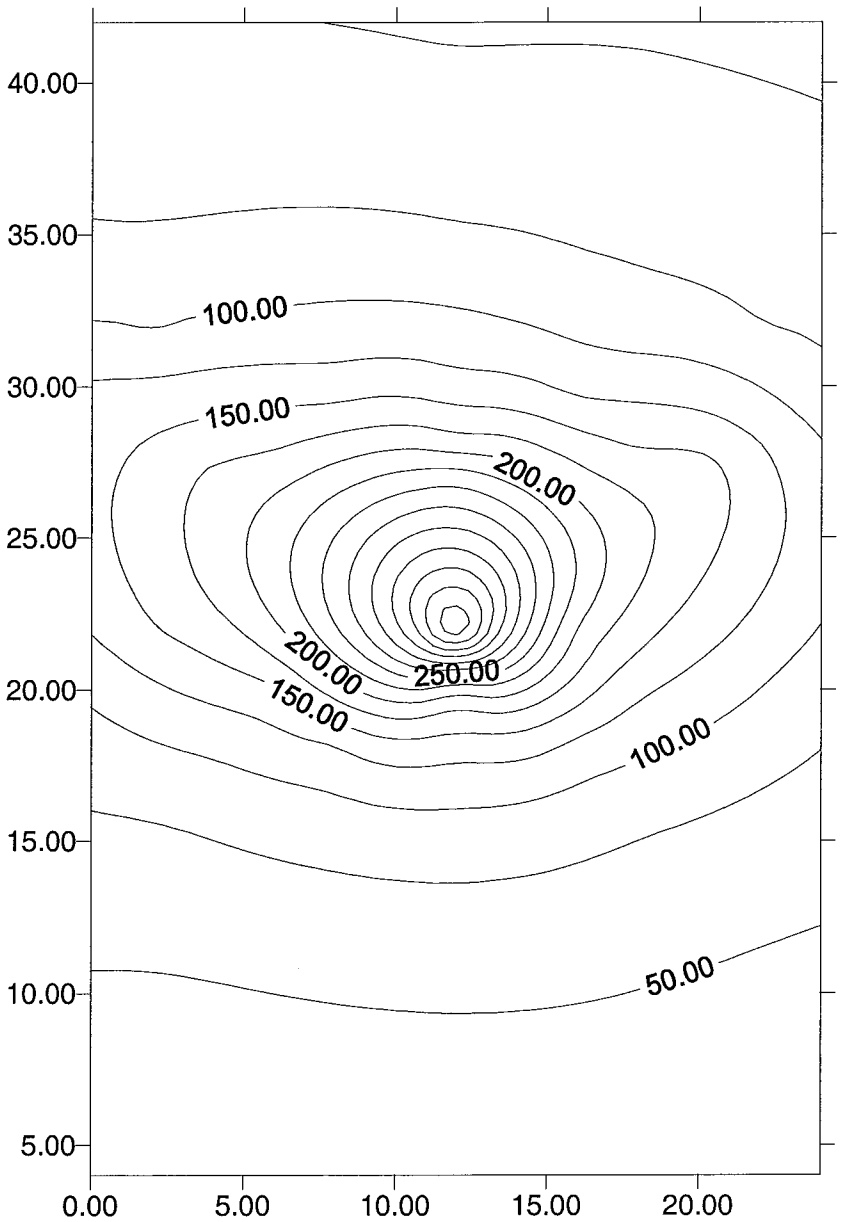
11/20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

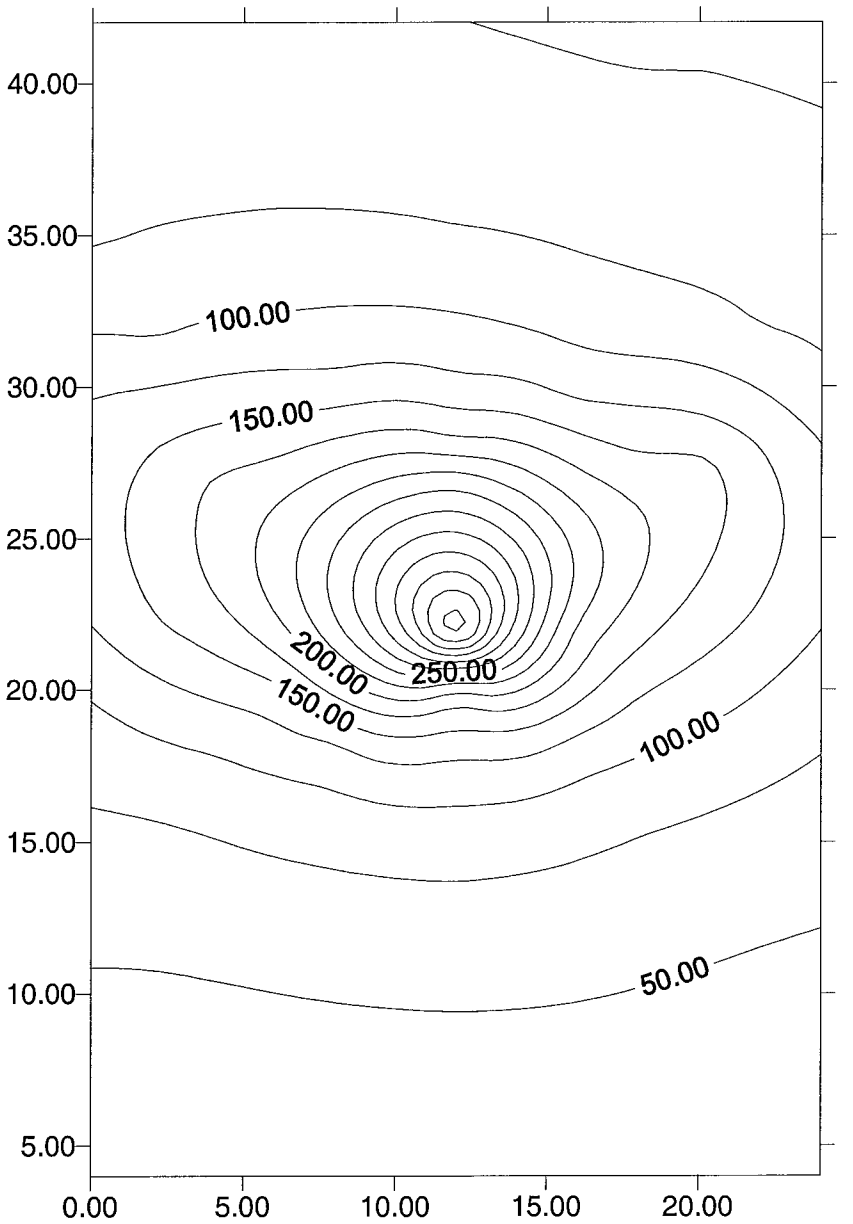
11/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

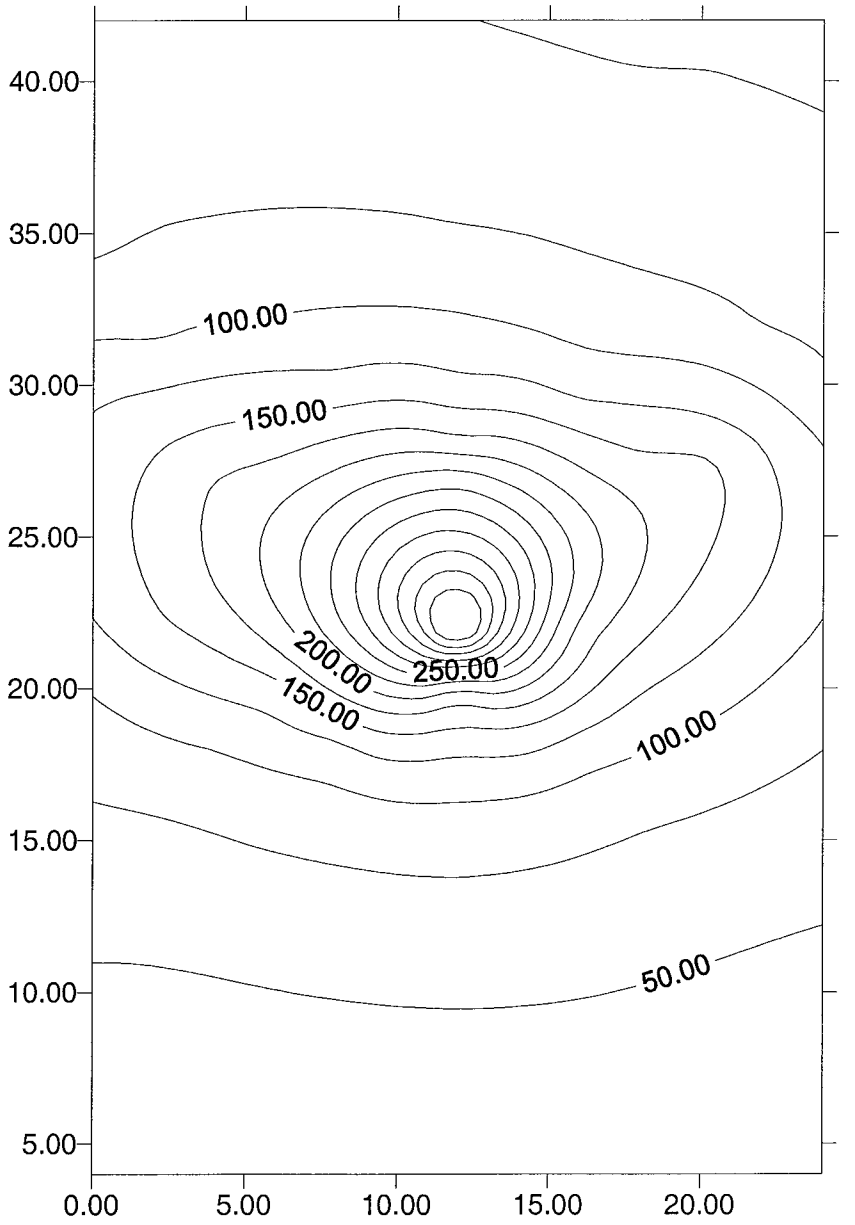
11/22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

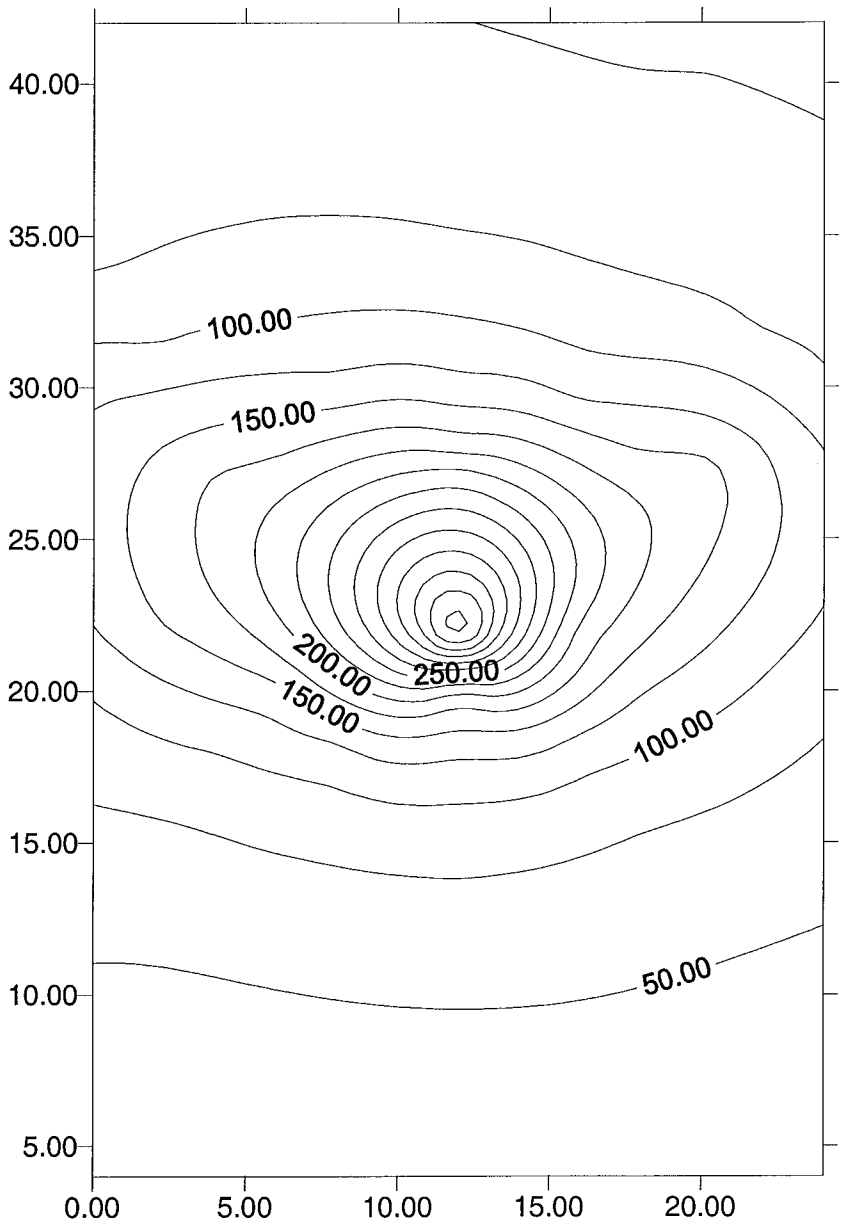
11/23


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

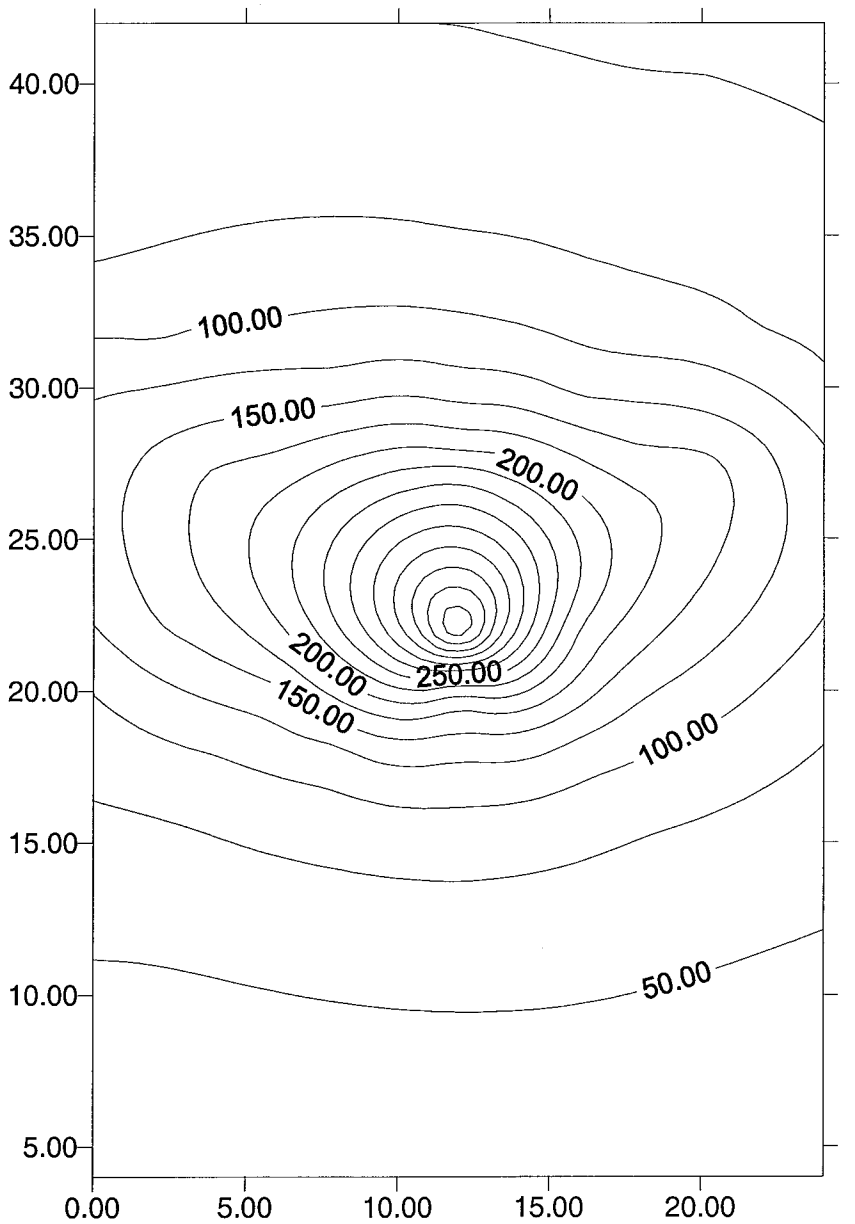
11|24


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

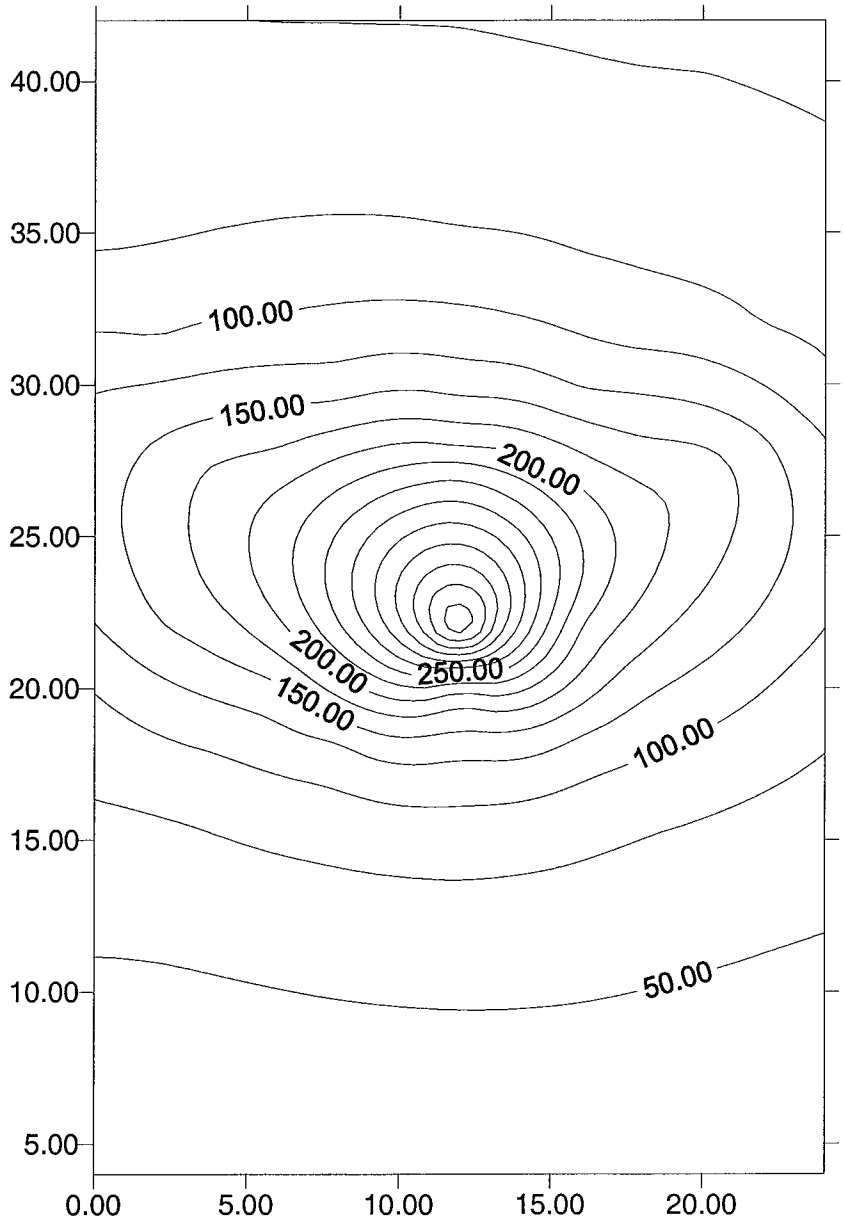
11/25


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

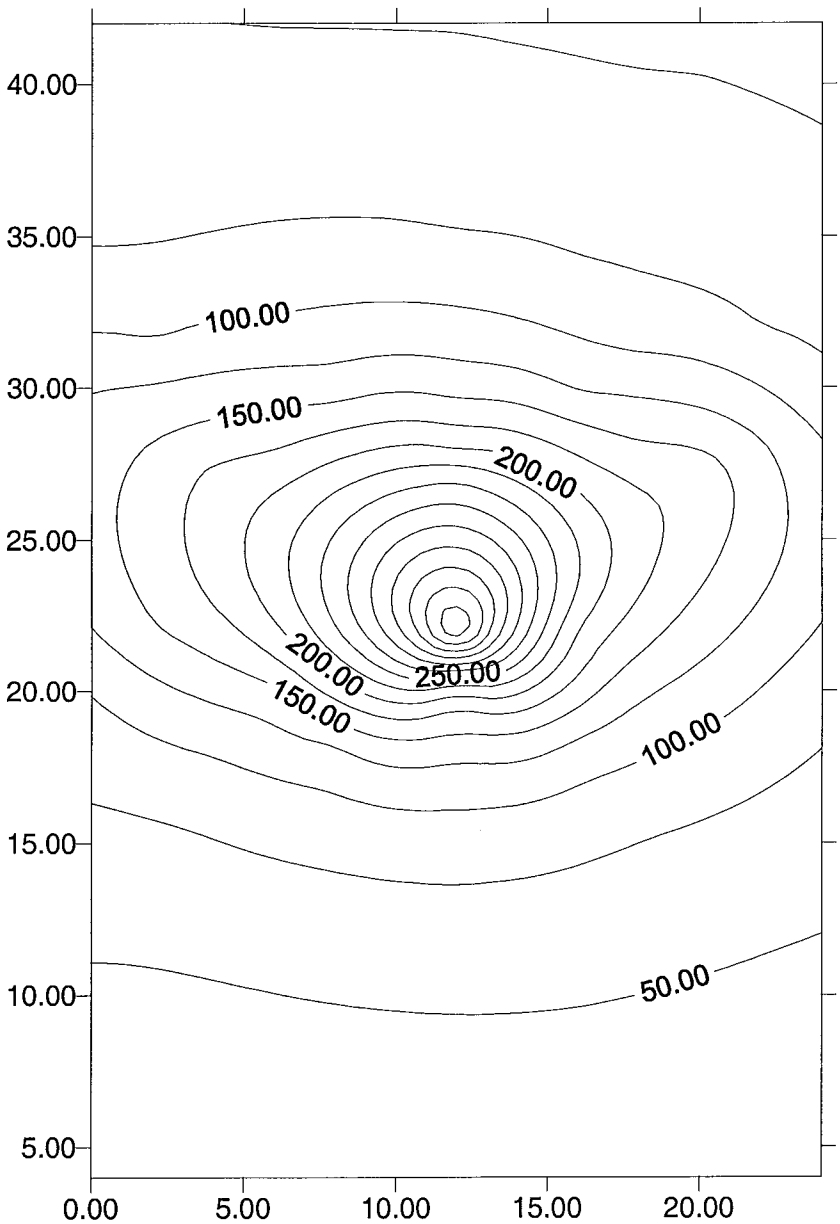
11/26


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

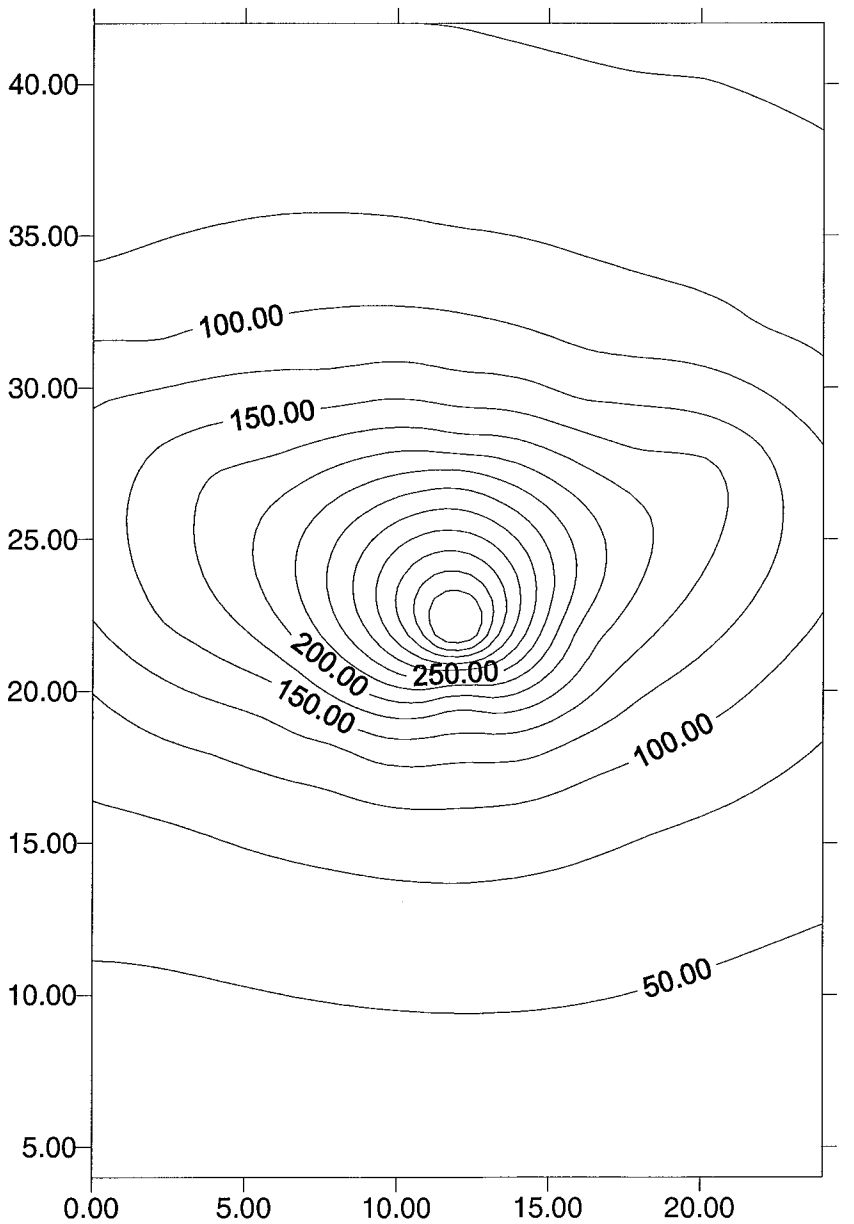
11/27


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

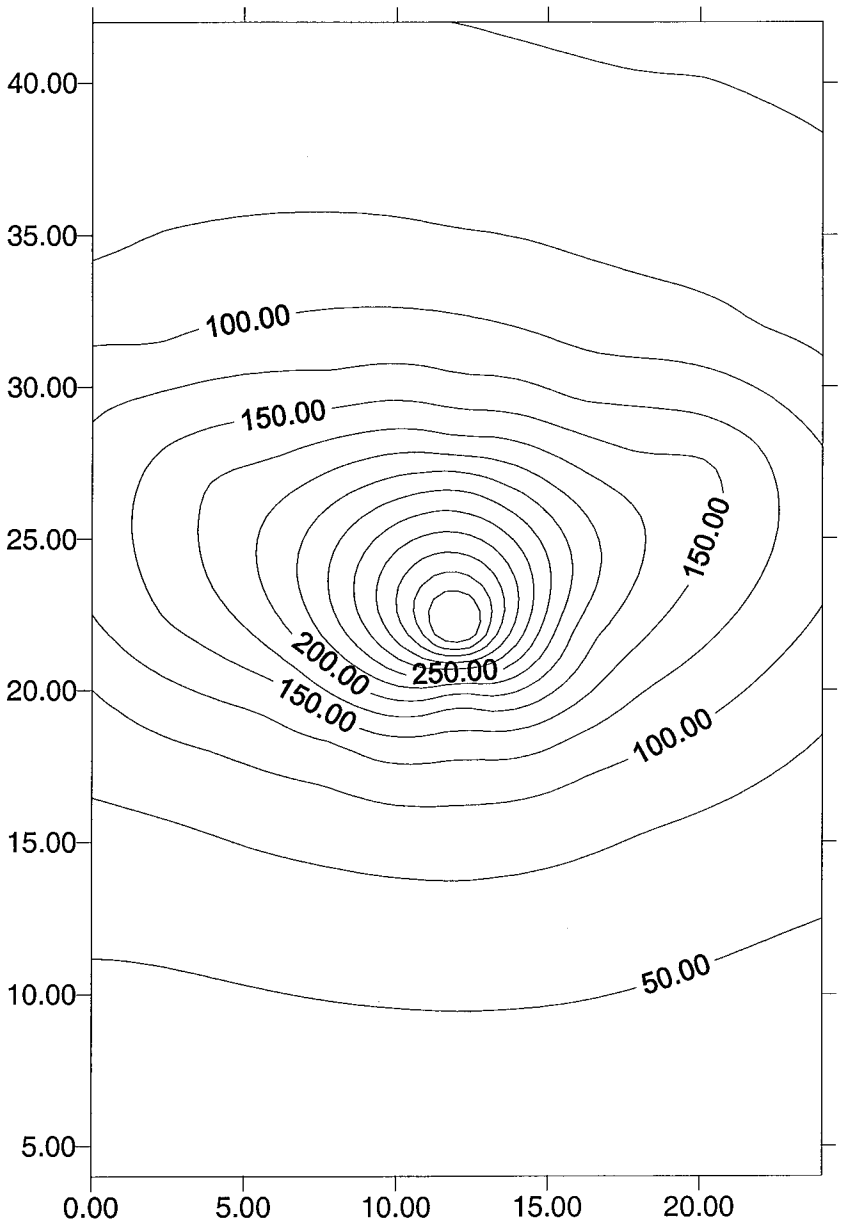
11/28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

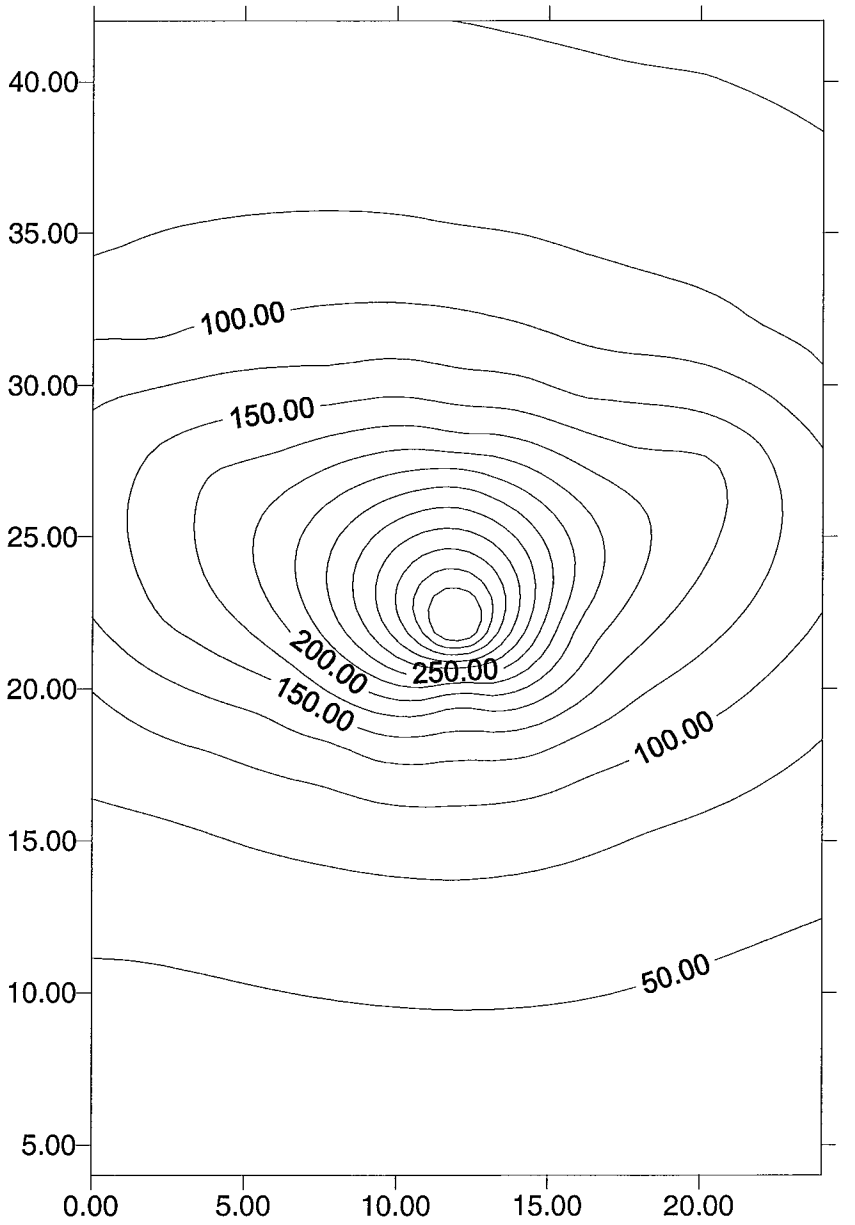
11/29


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

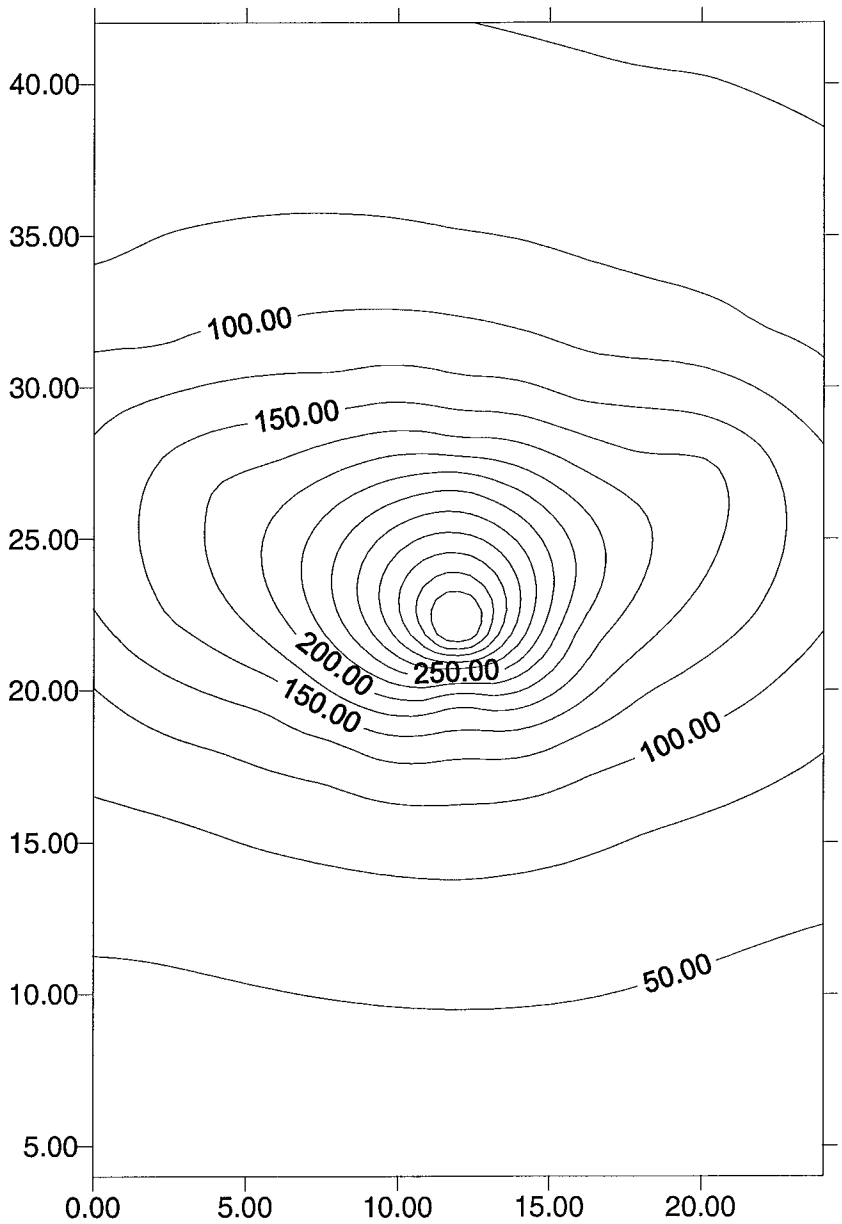
11/30


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
150.00
200.00
250.00
150.00
100.00
50.00

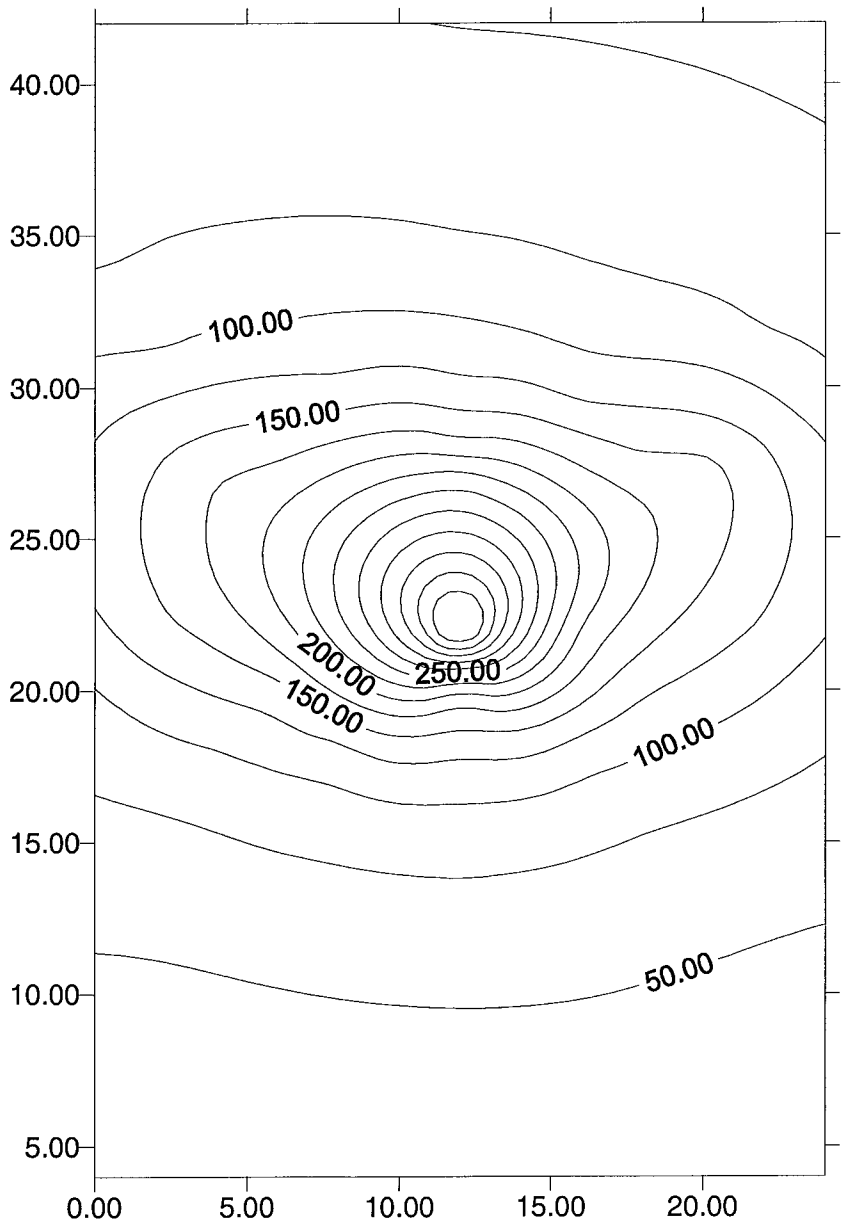
12 | 1

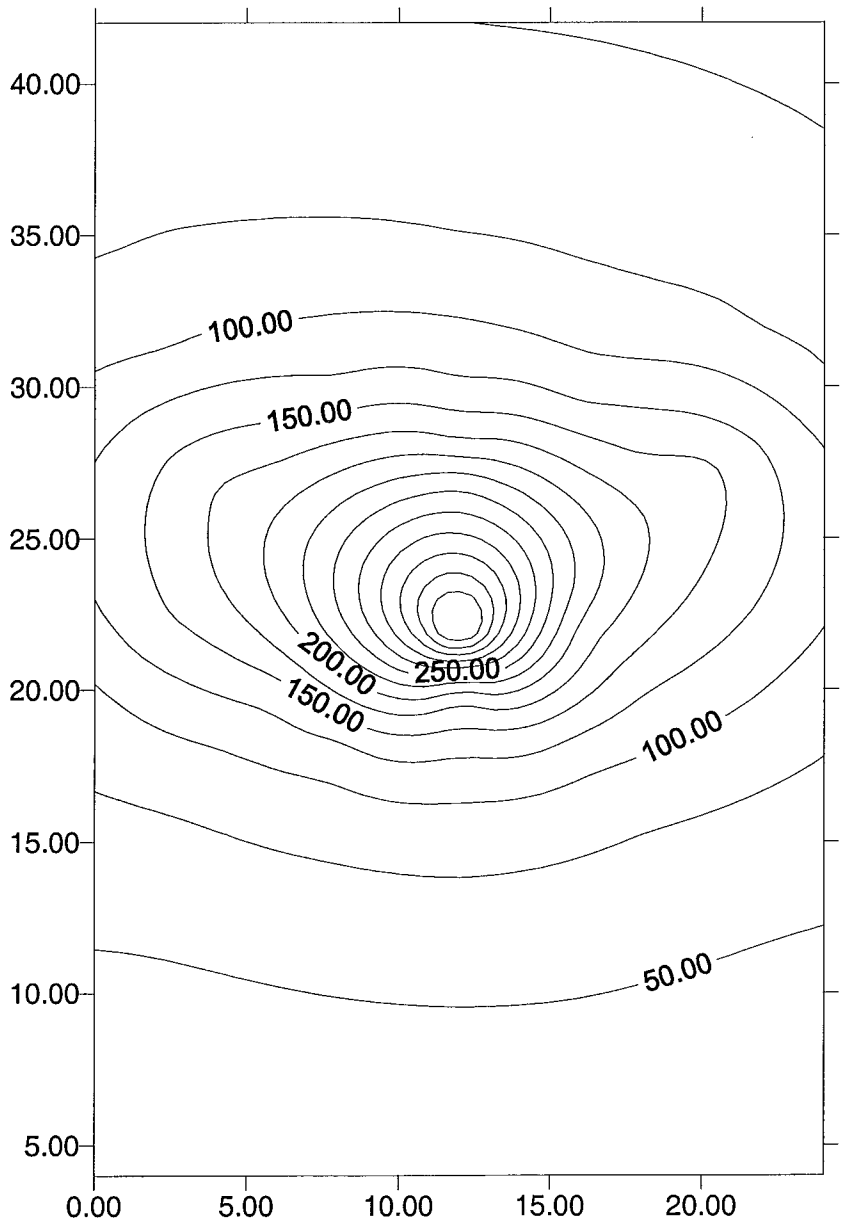

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

12/2

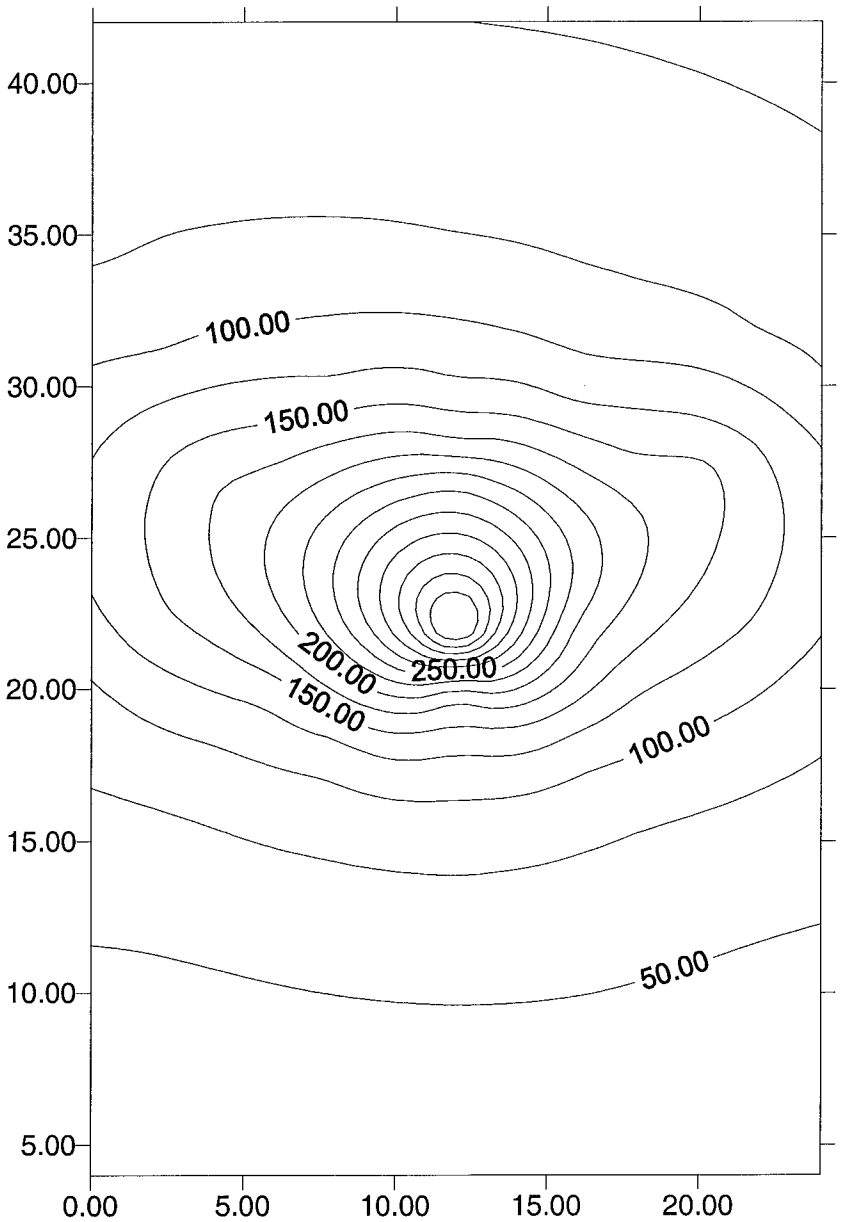

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

1213

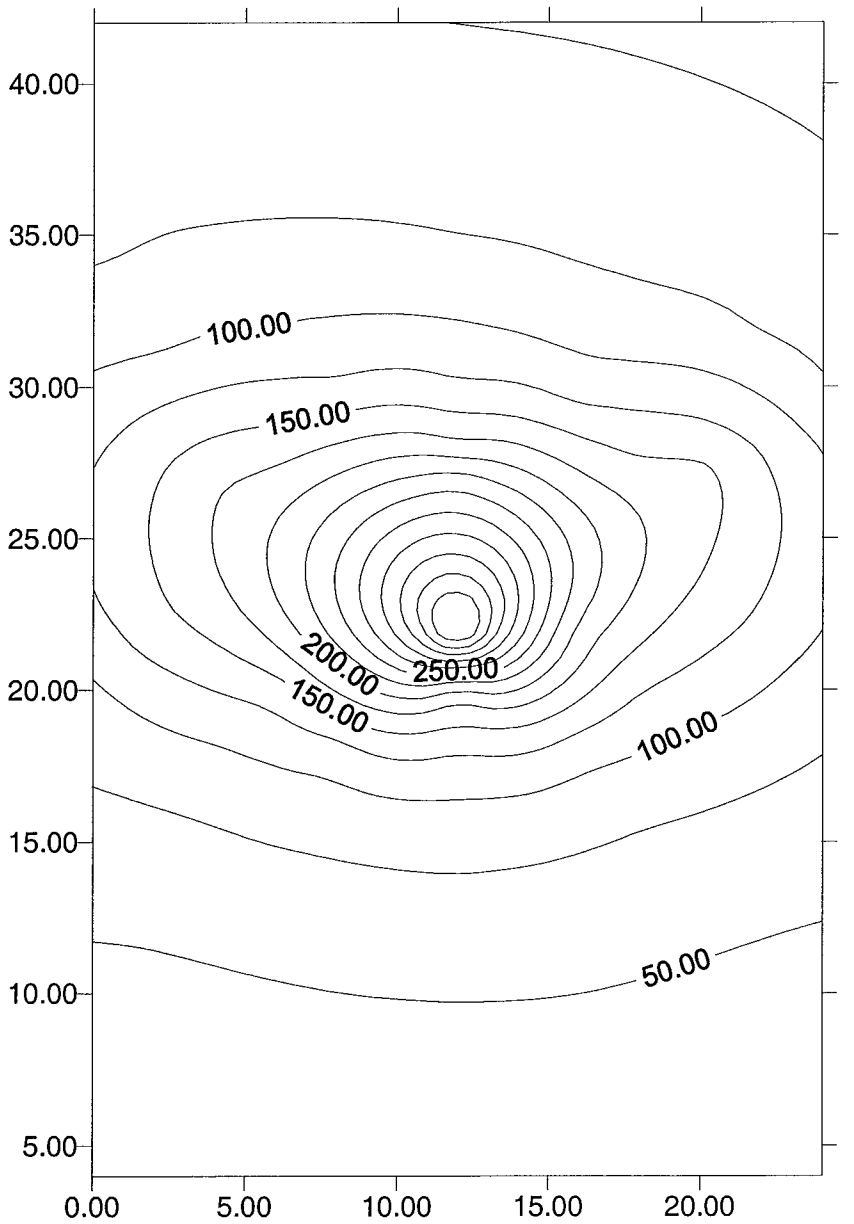

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

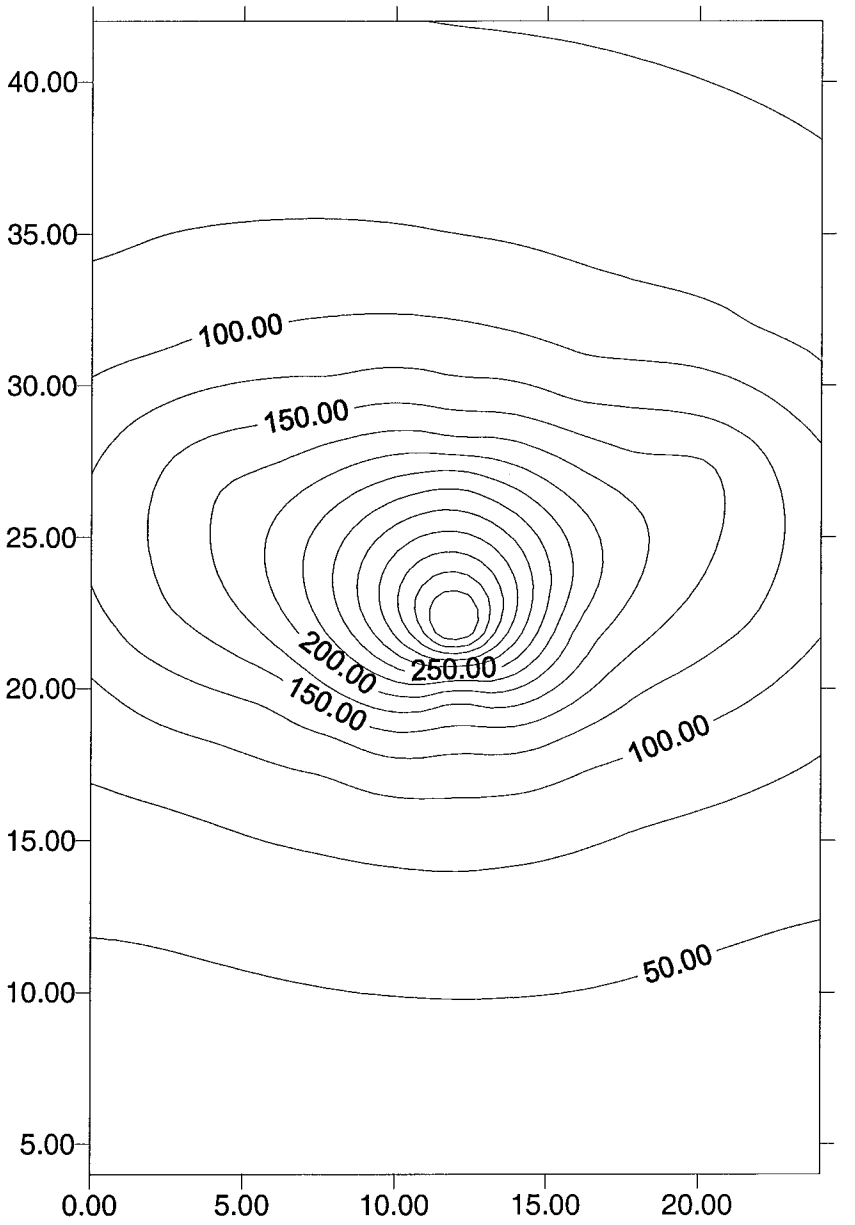
12/5


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

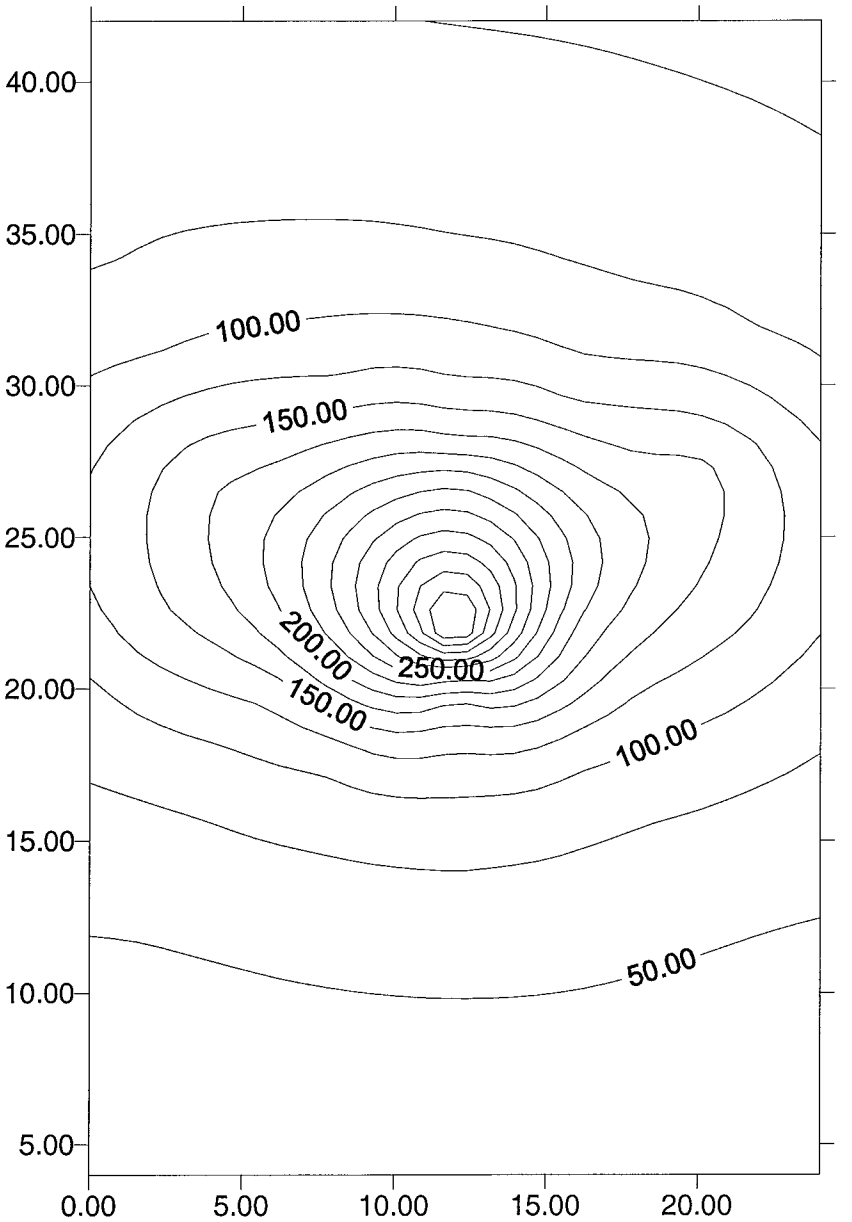
12/6


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

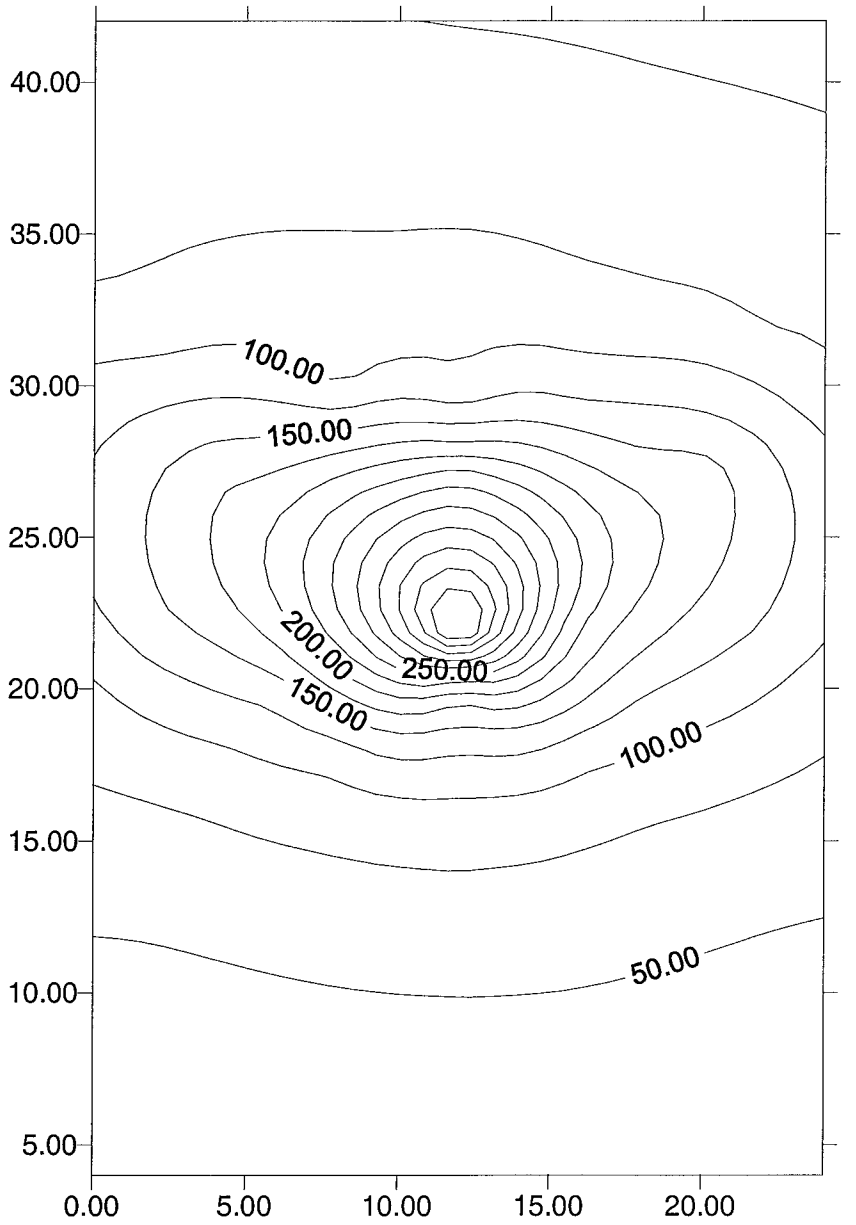
12\7


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

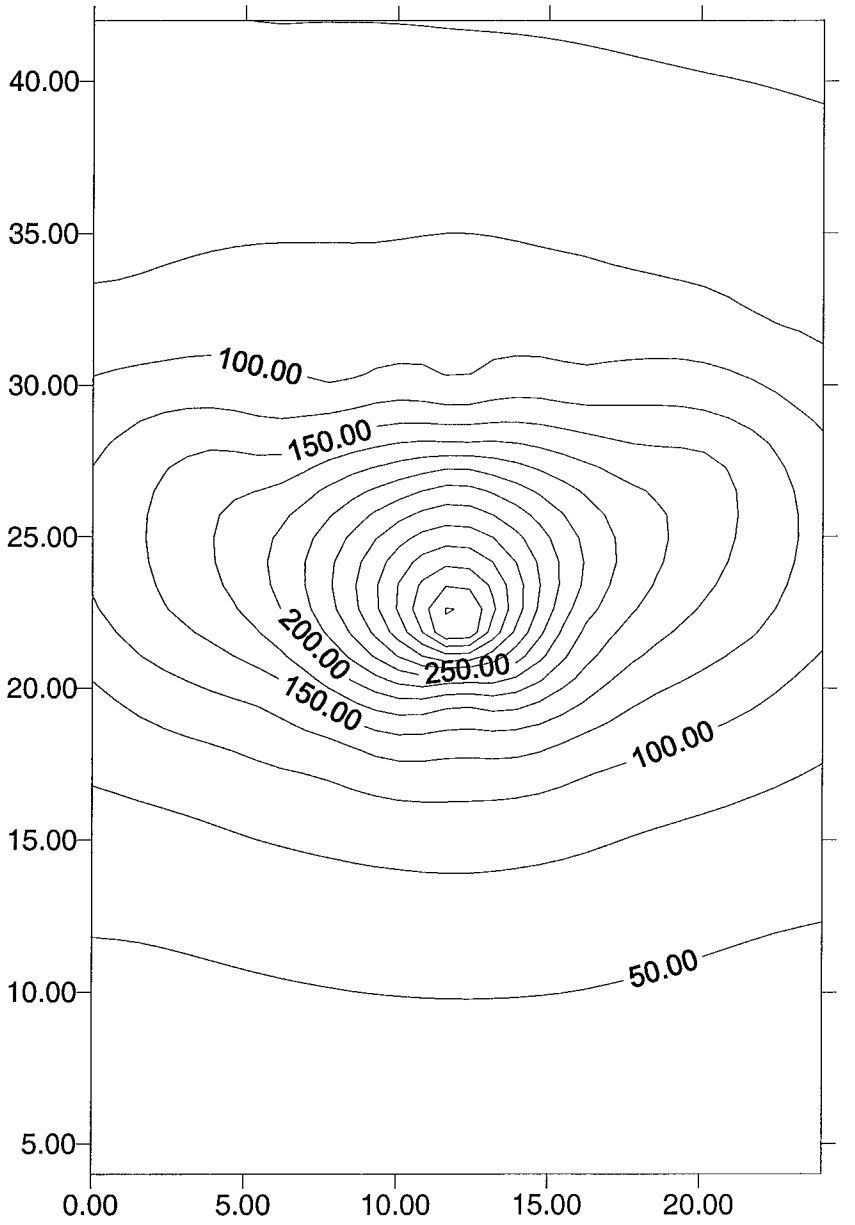
12/8


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

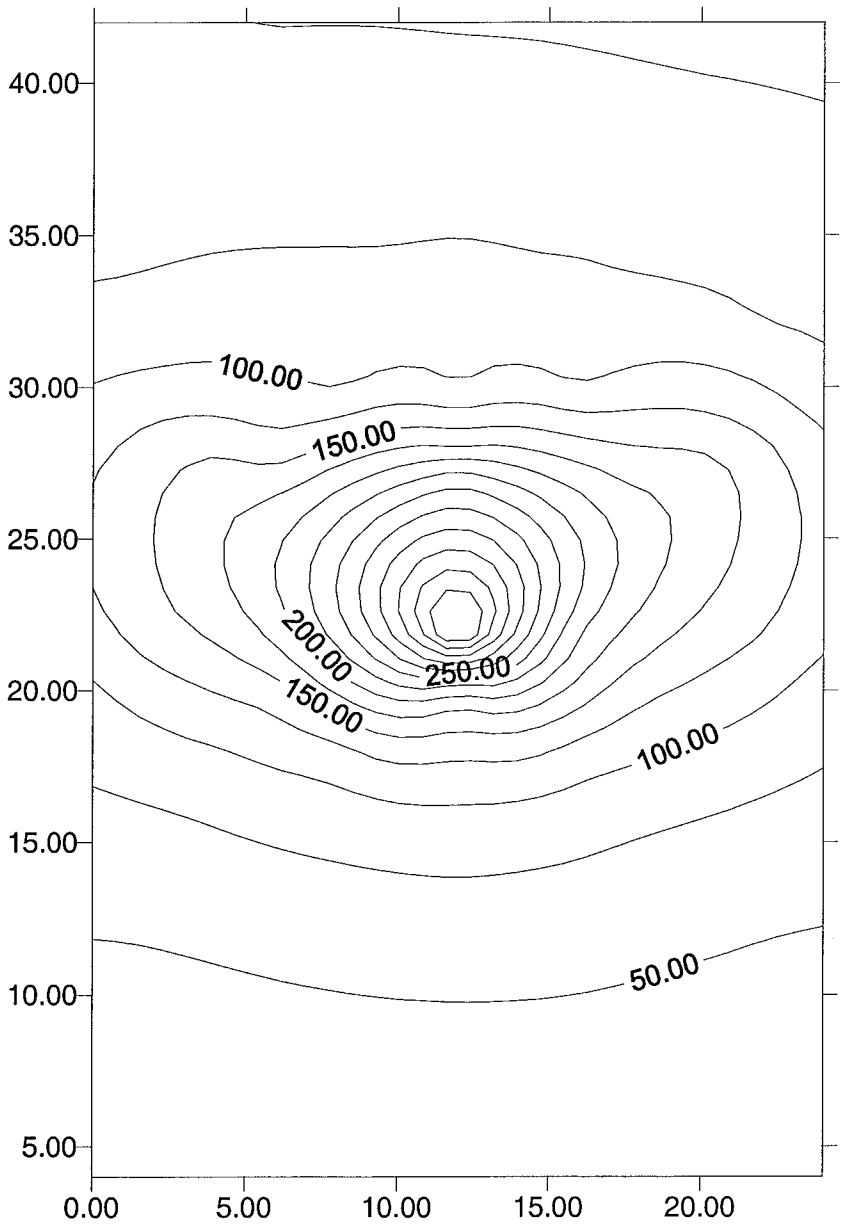
12|9


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

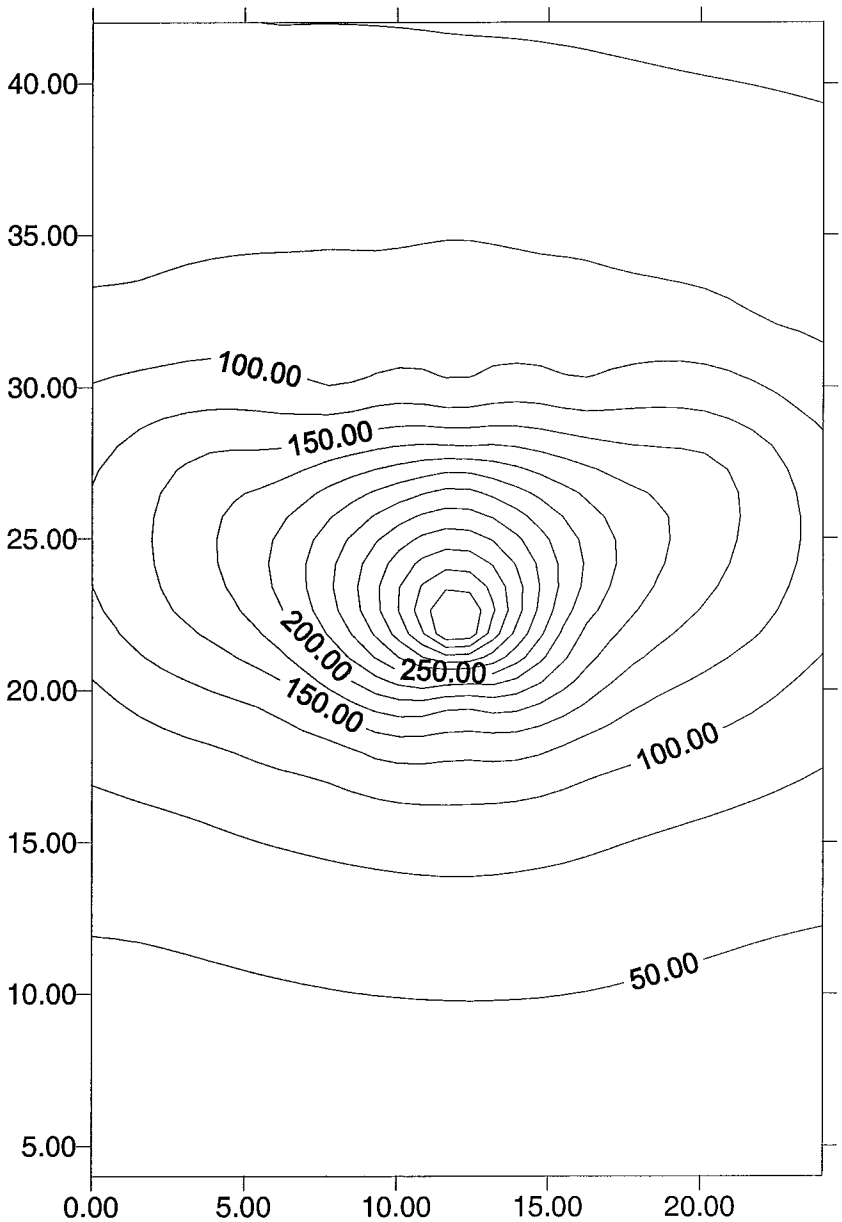
12|10


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

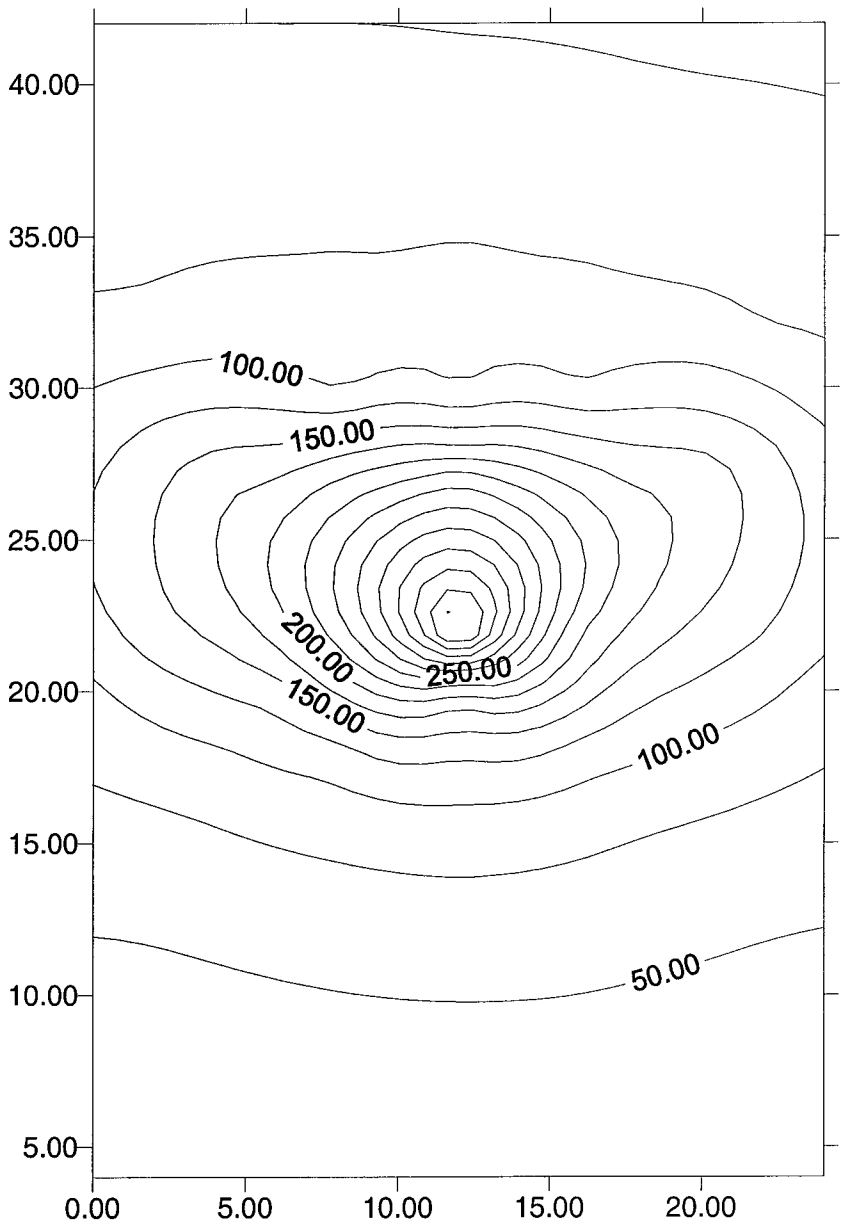
12/11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

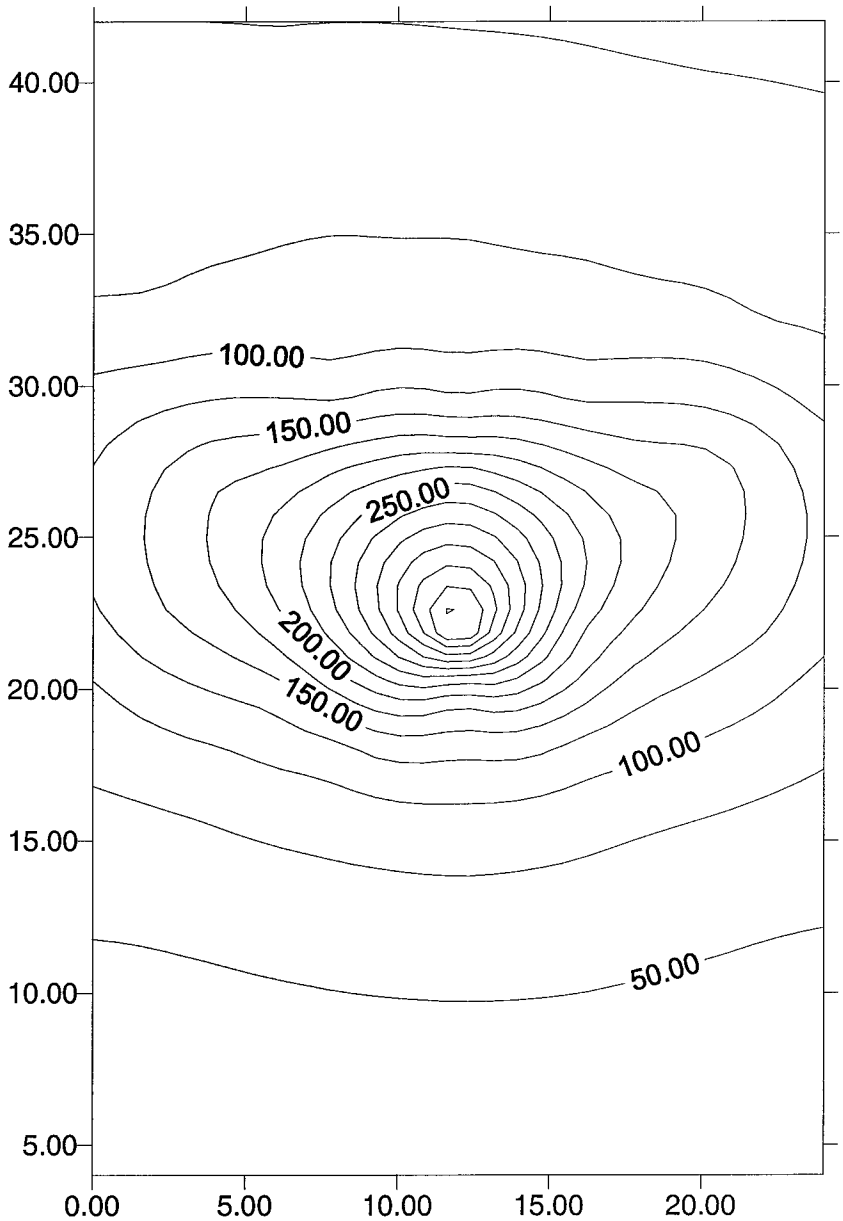
12/12


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

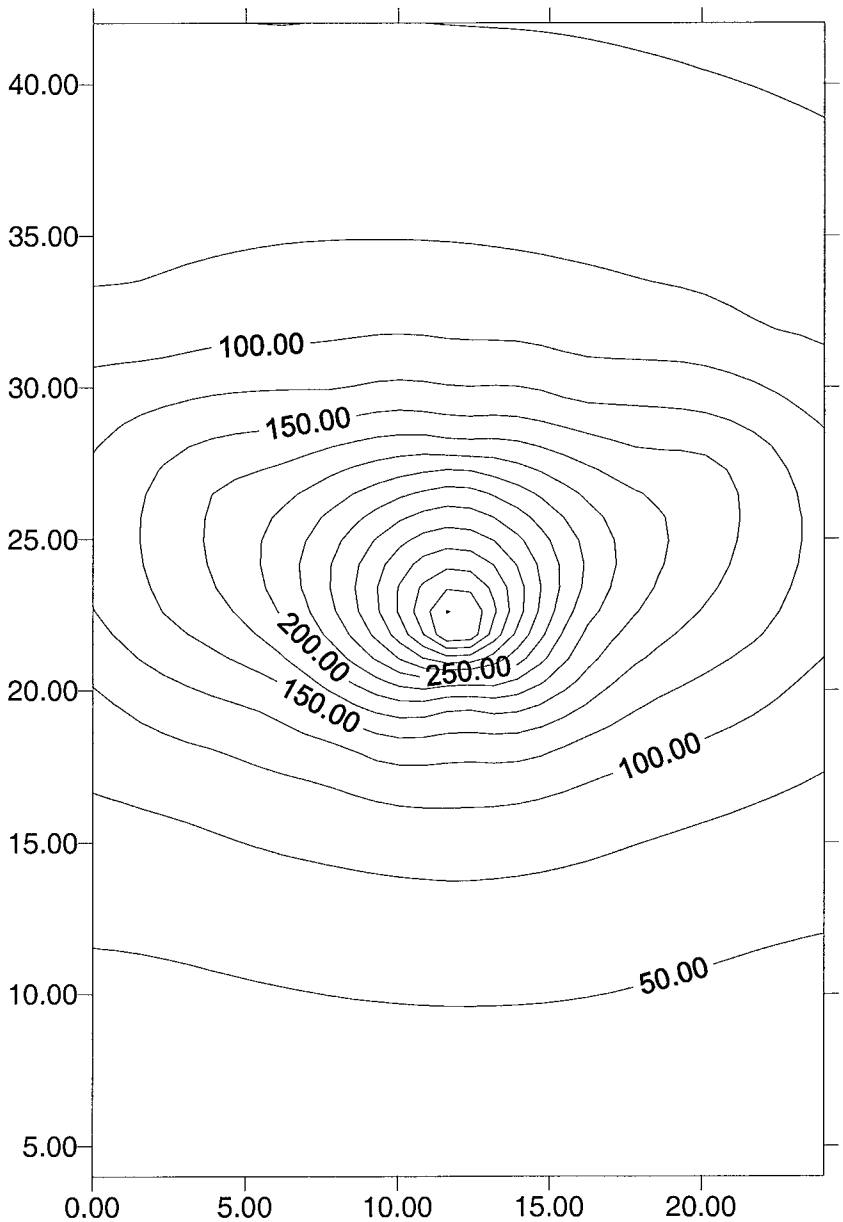
12/13


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

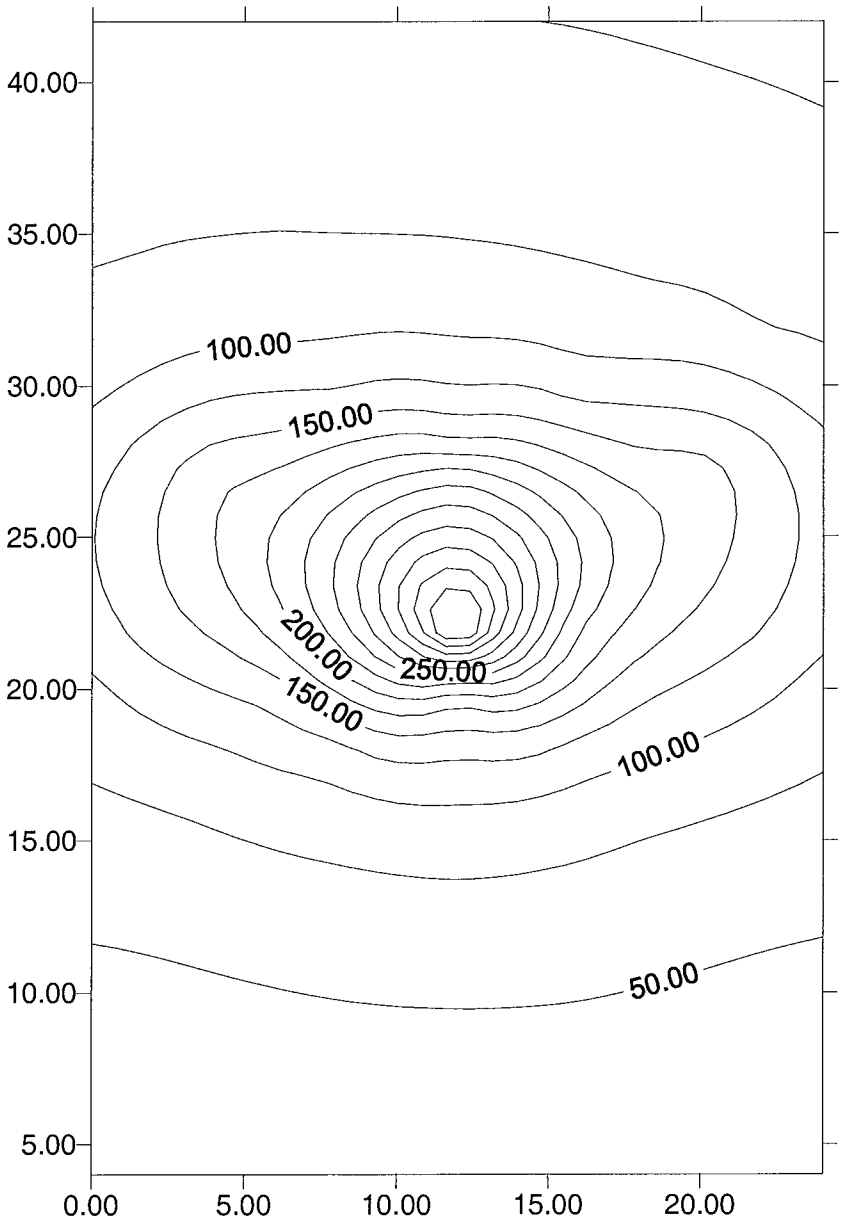
12/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

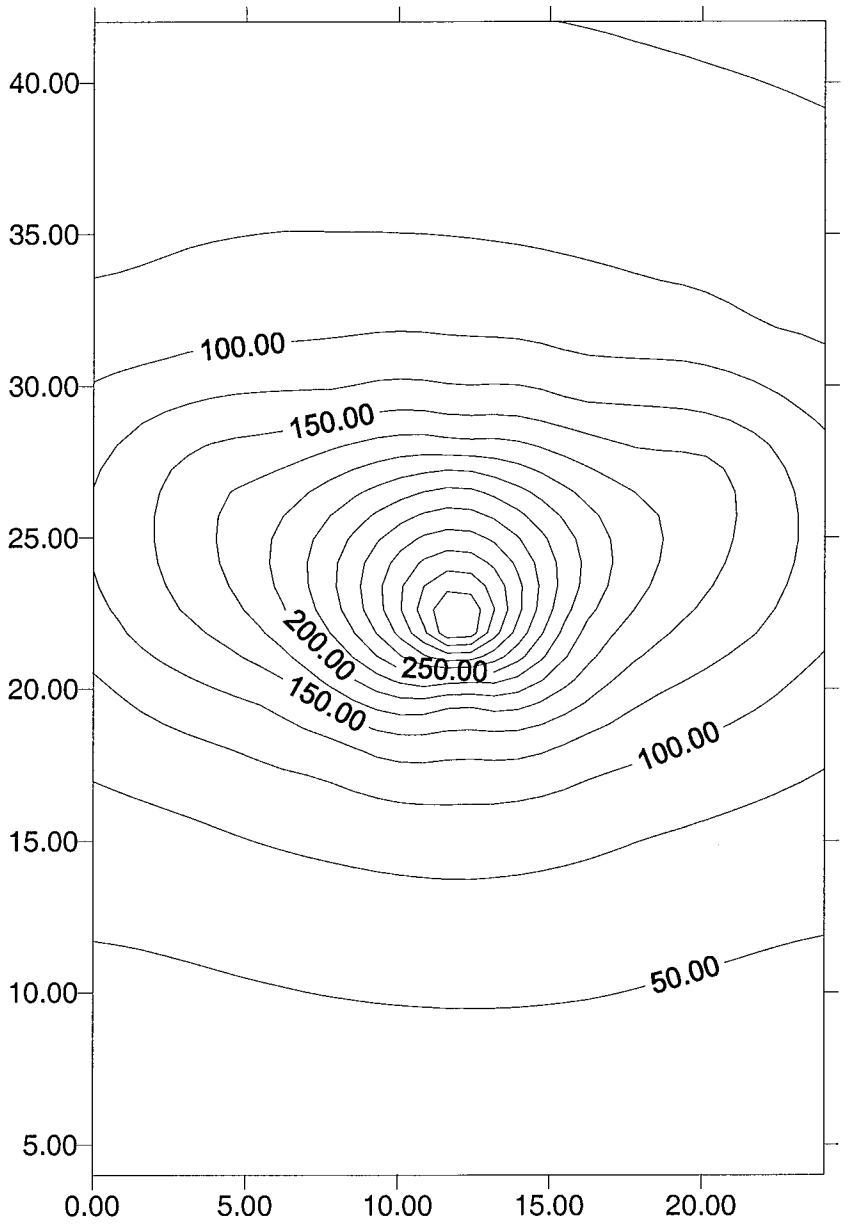
12/15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

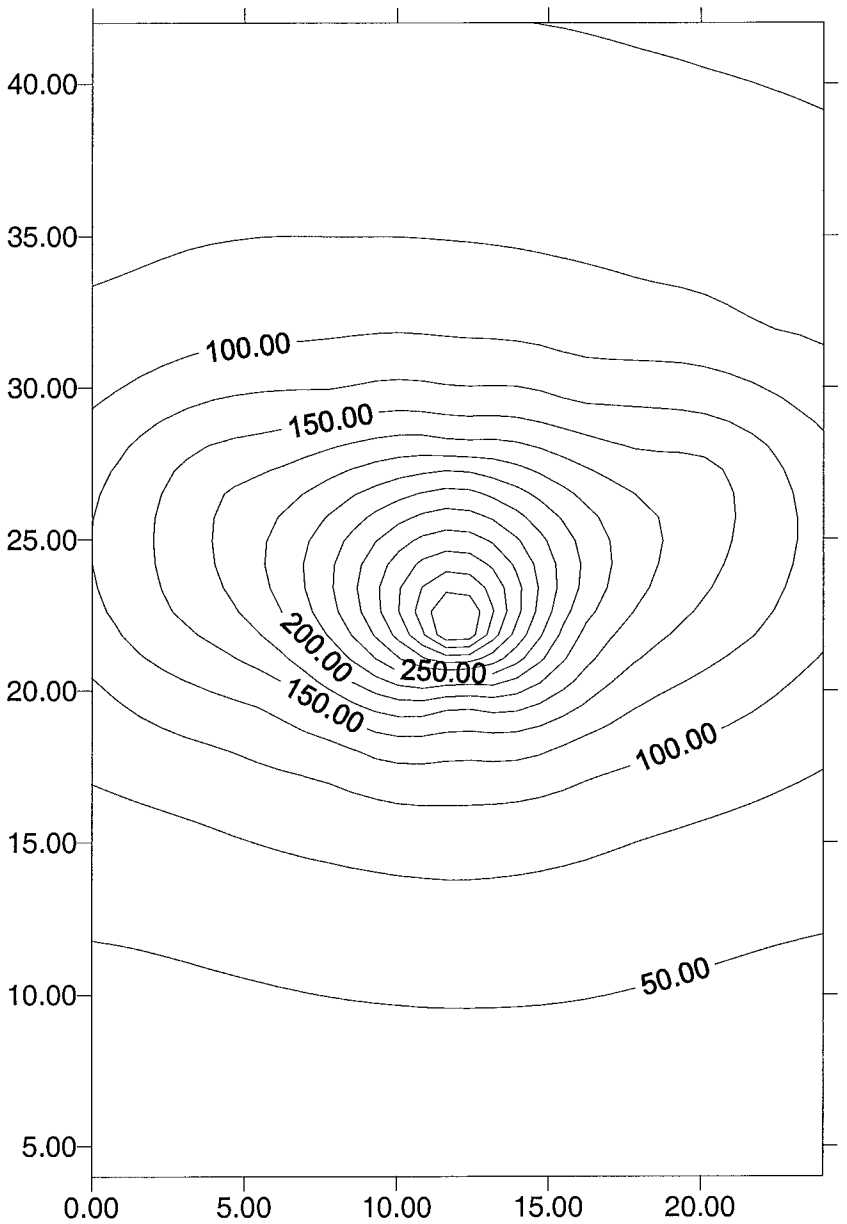
12/16


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

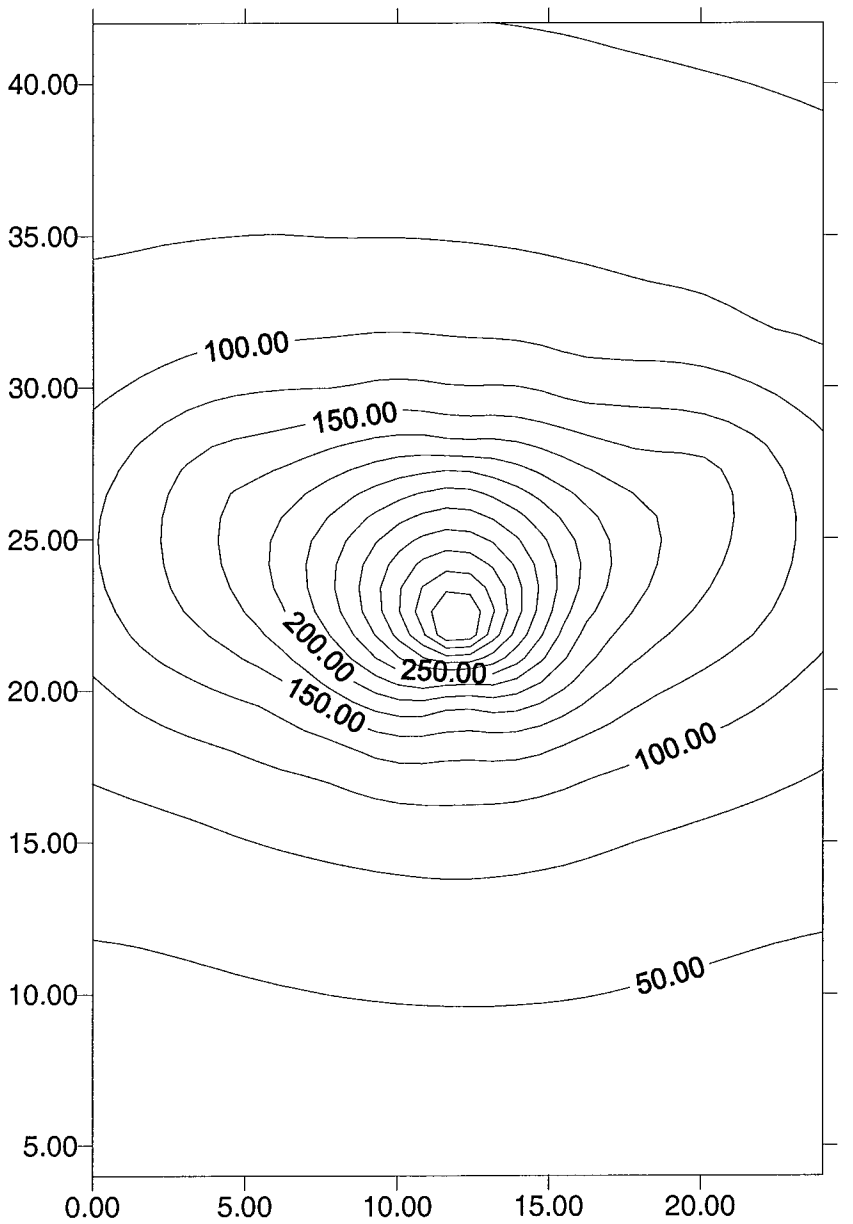
12/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

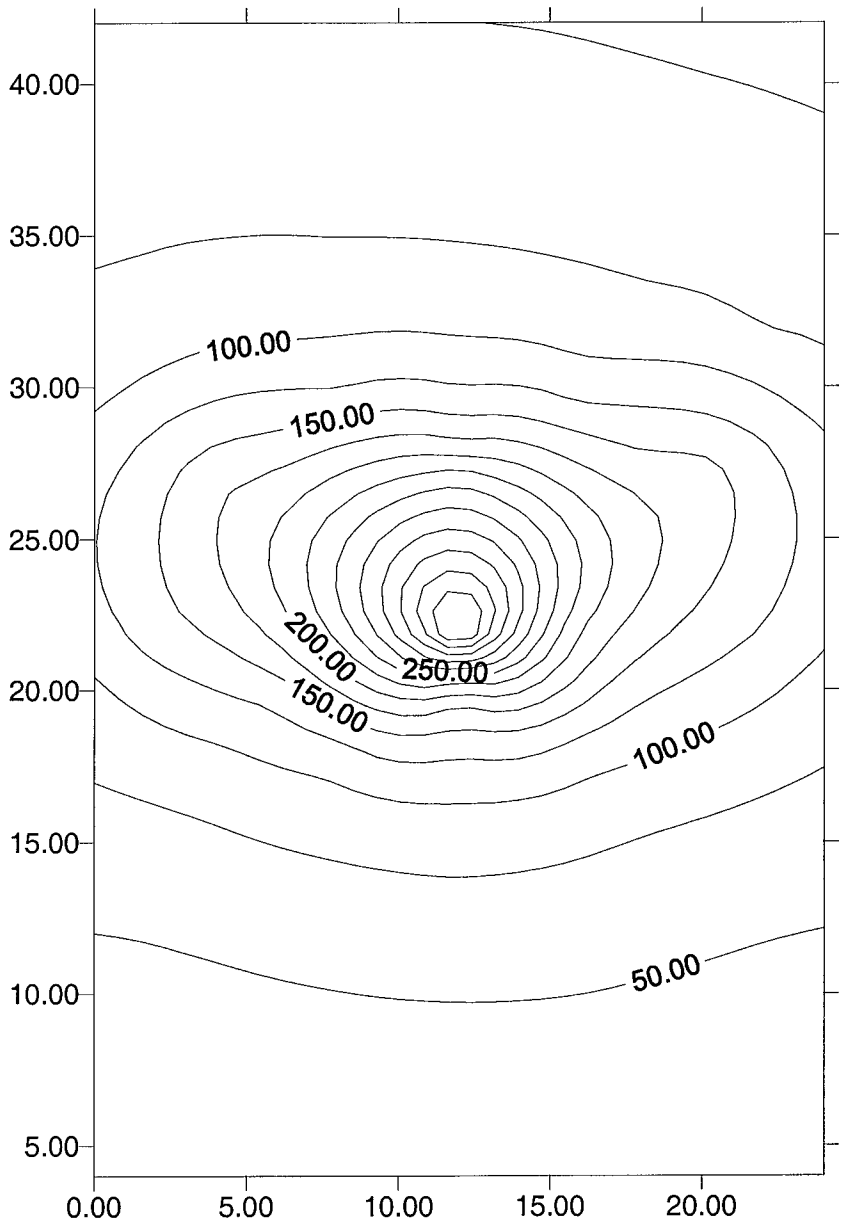
12/18


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

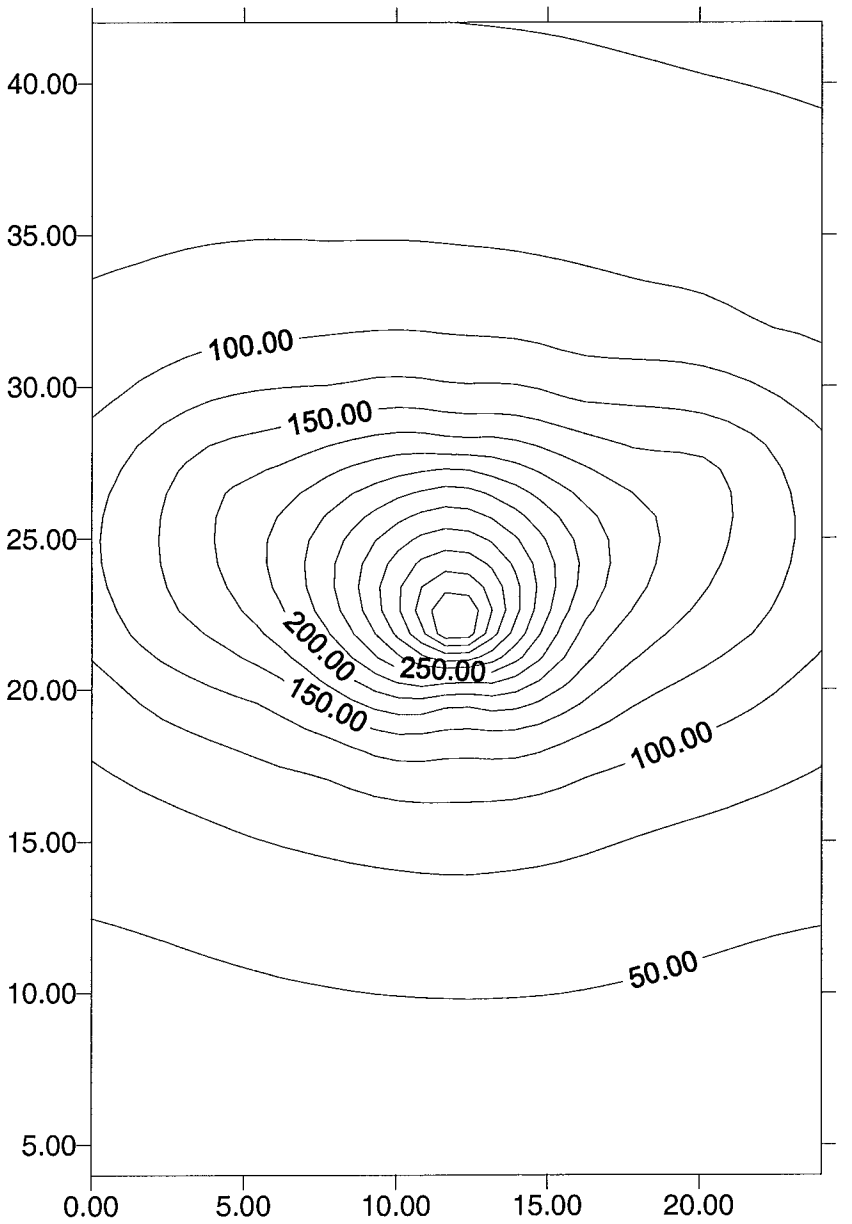
12/19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

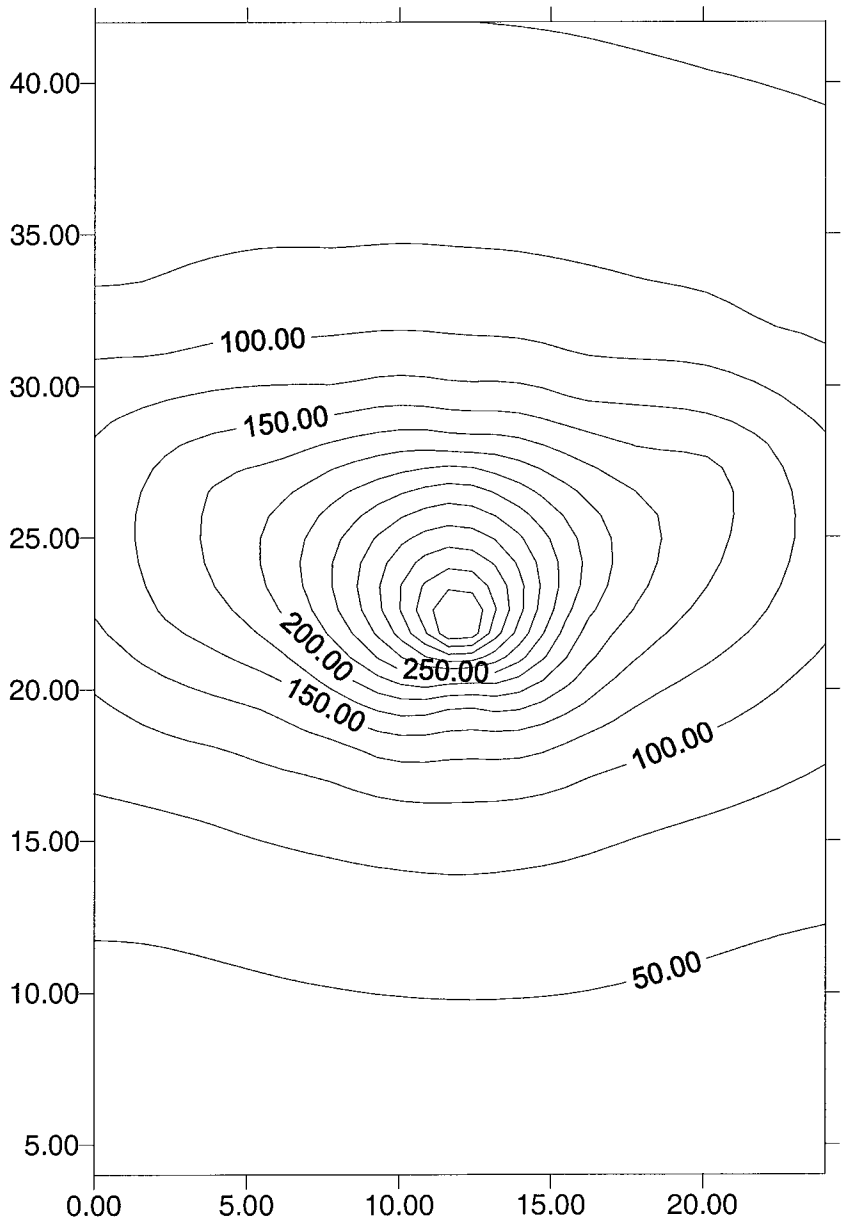
12/20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

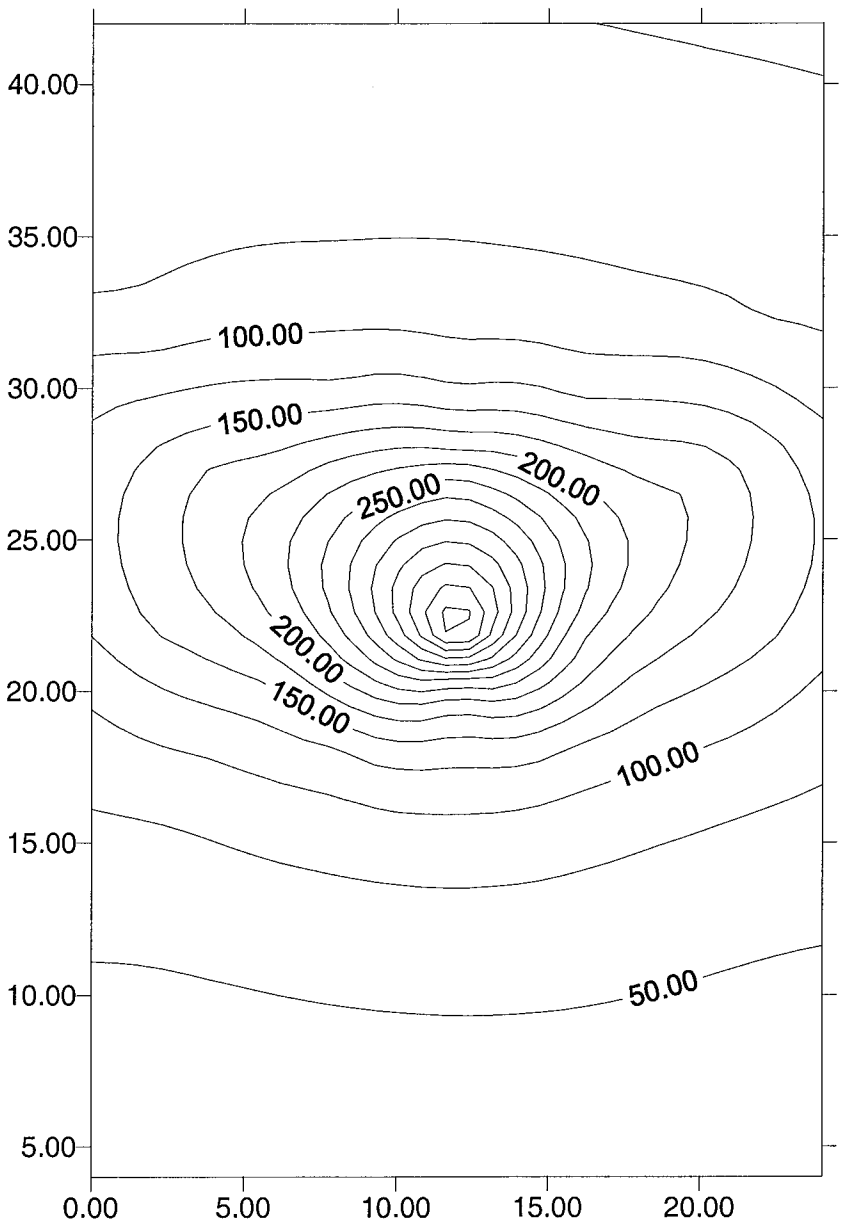
12/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

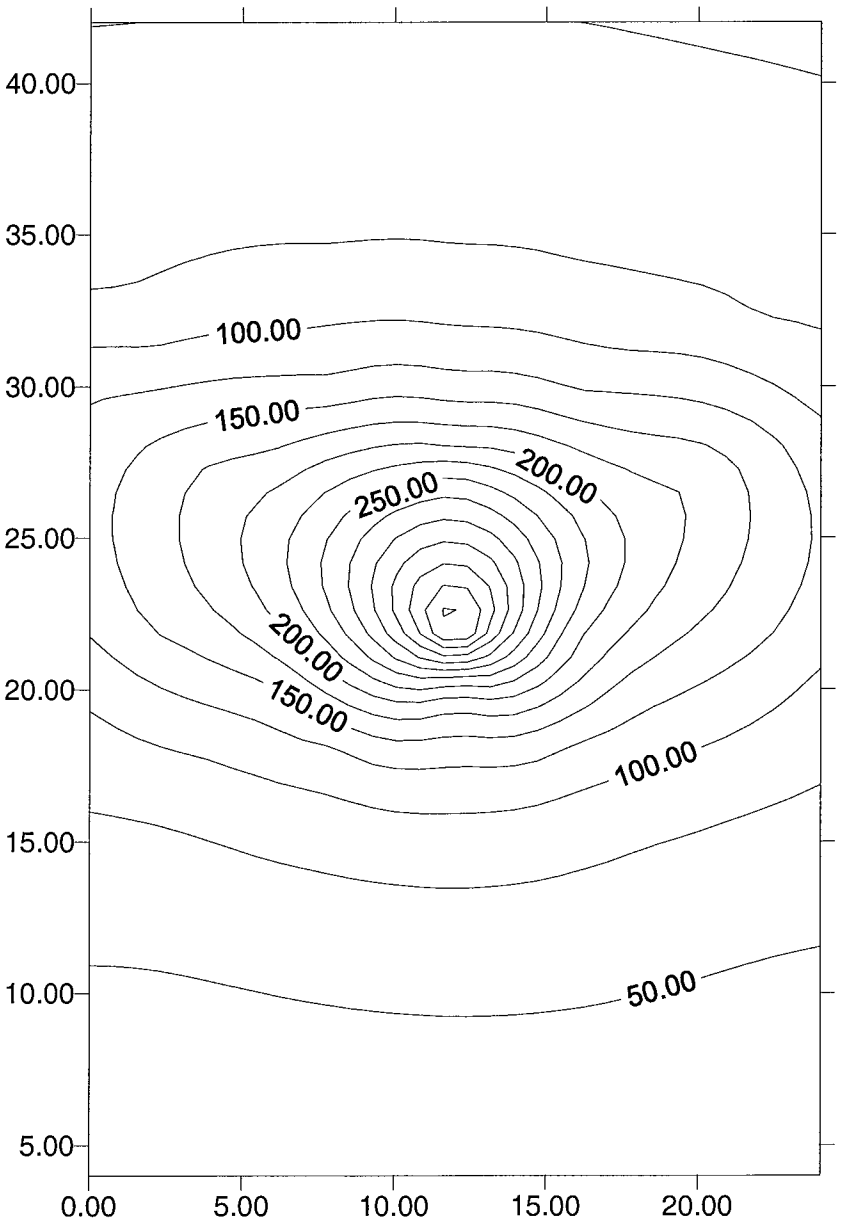
12/22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

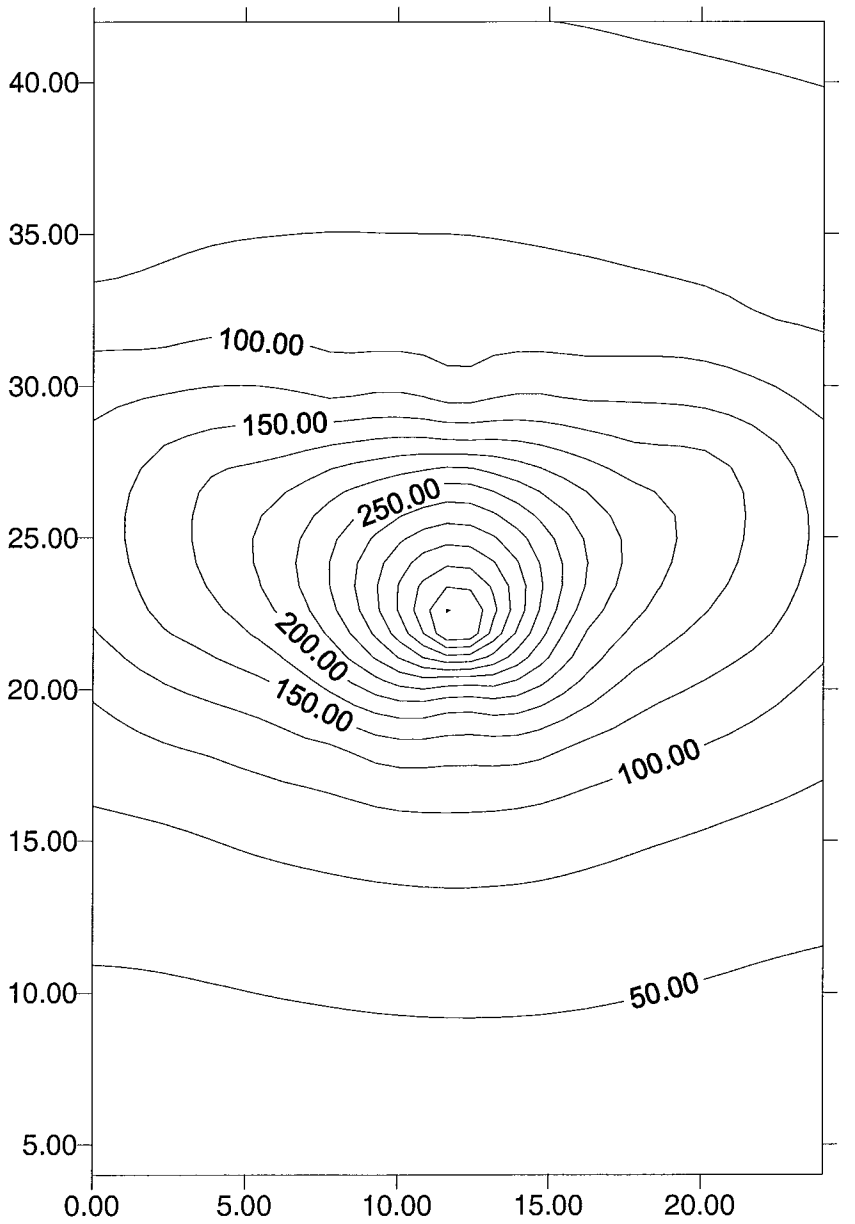
12|28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

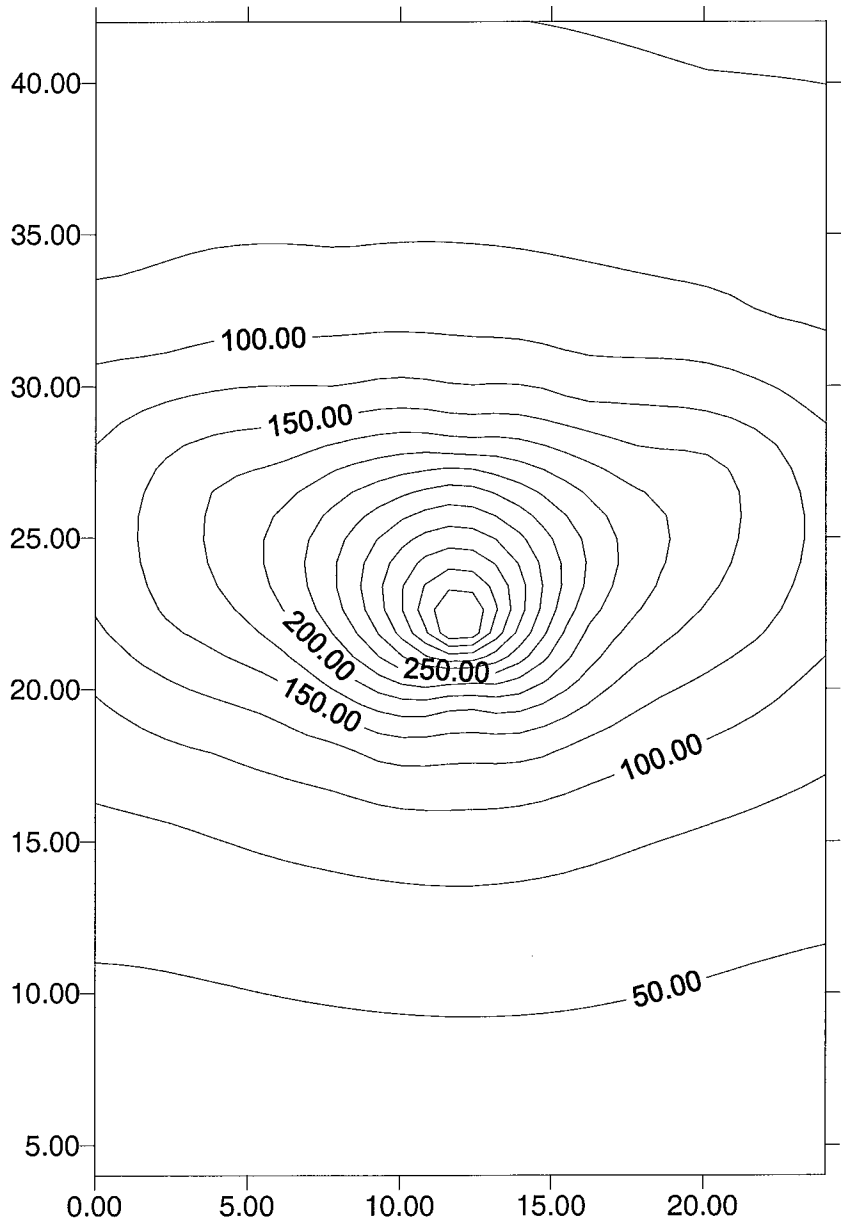
12/29


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
200.00
150.00
100.00
50.00

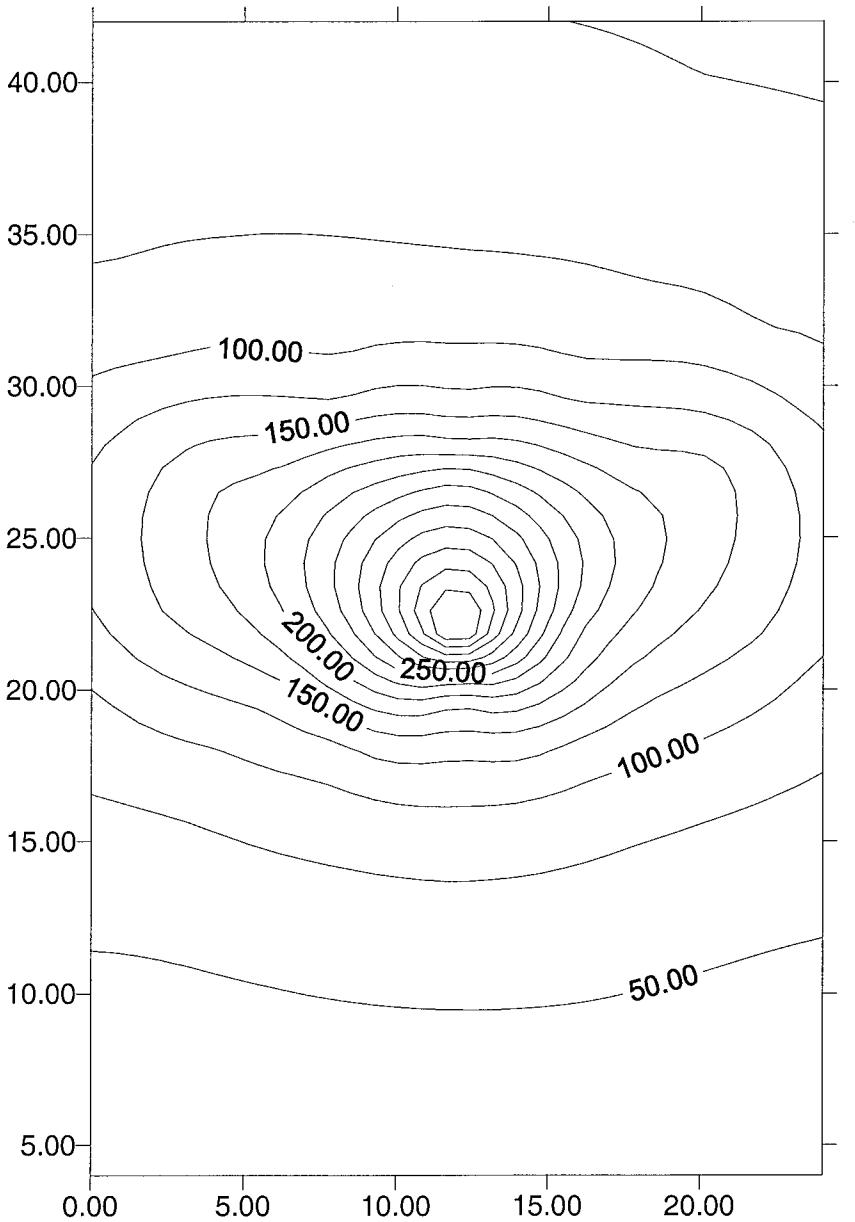
12/30/98


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
250.00
200.00
150.00
100.00
50.00

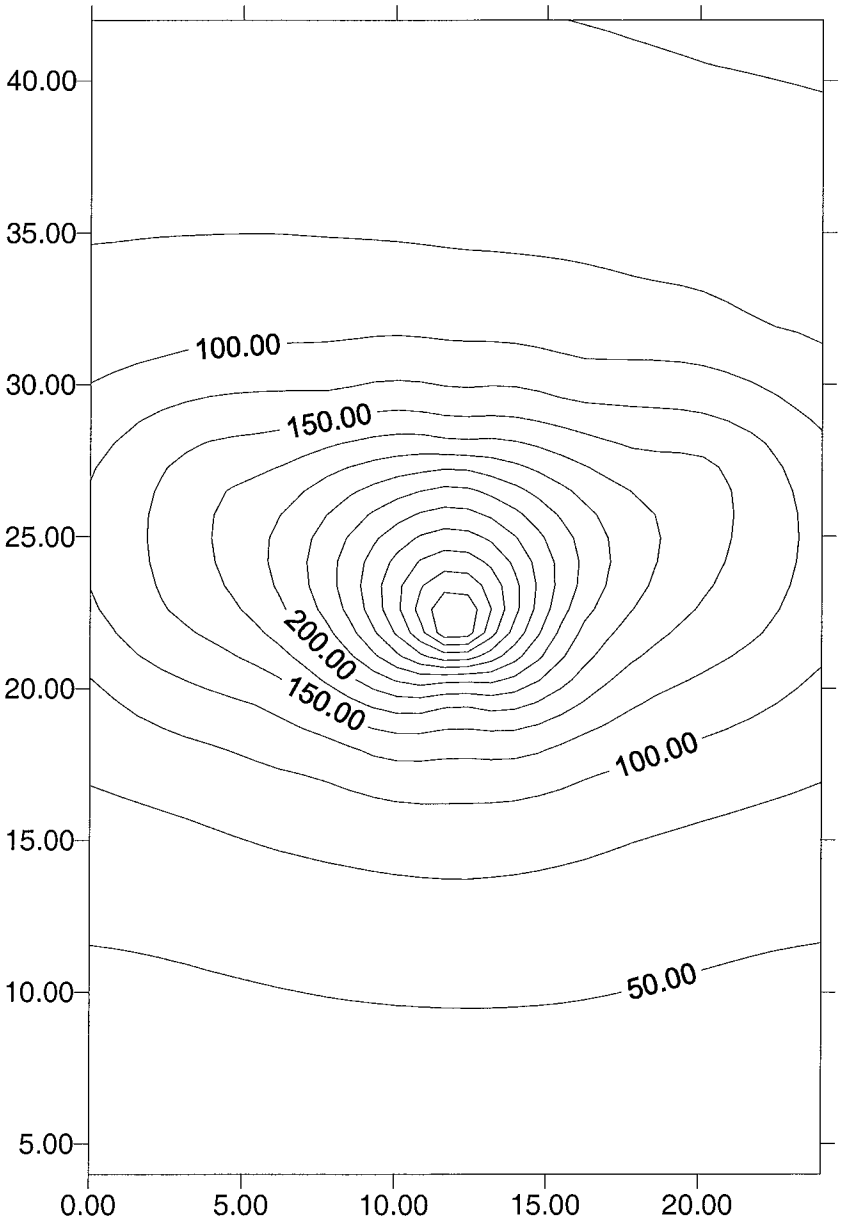
12/31/98


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

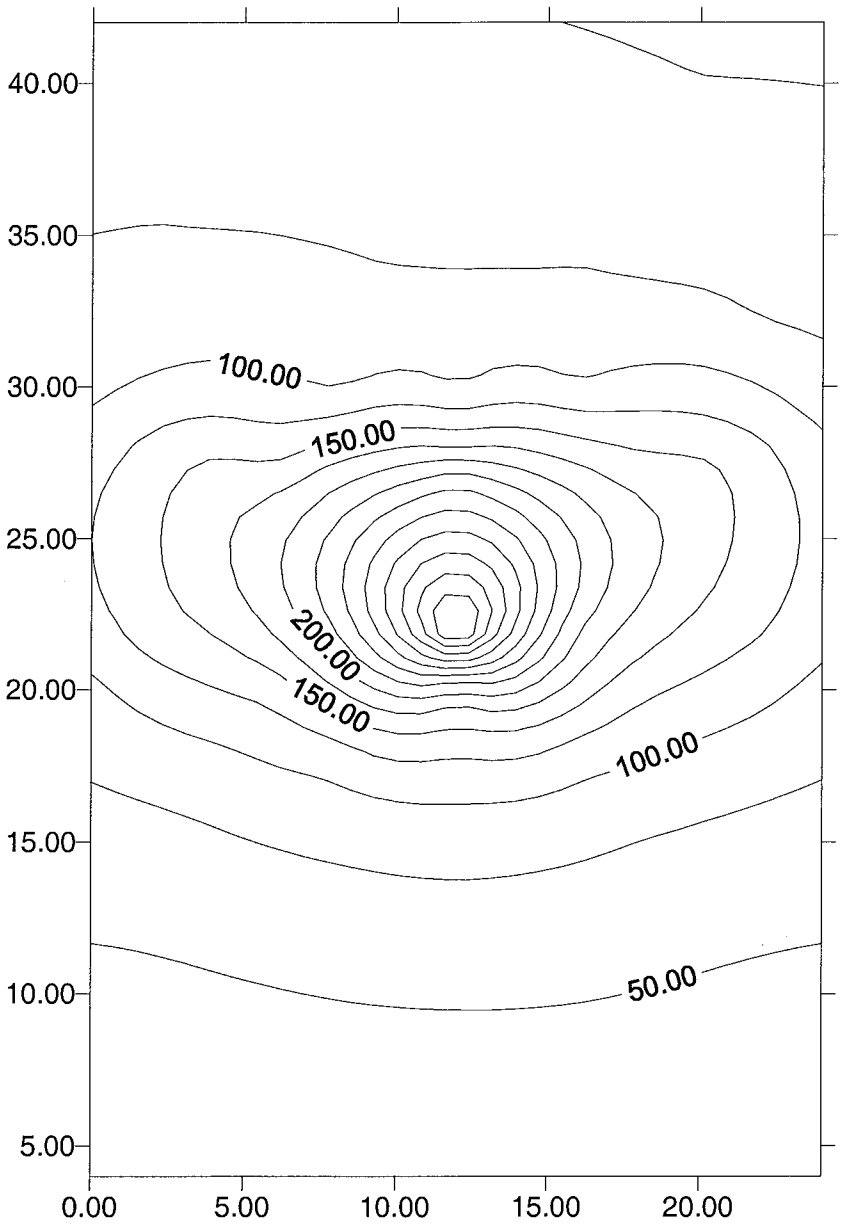
1/4


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
250.00
150.00
100.00
50.00

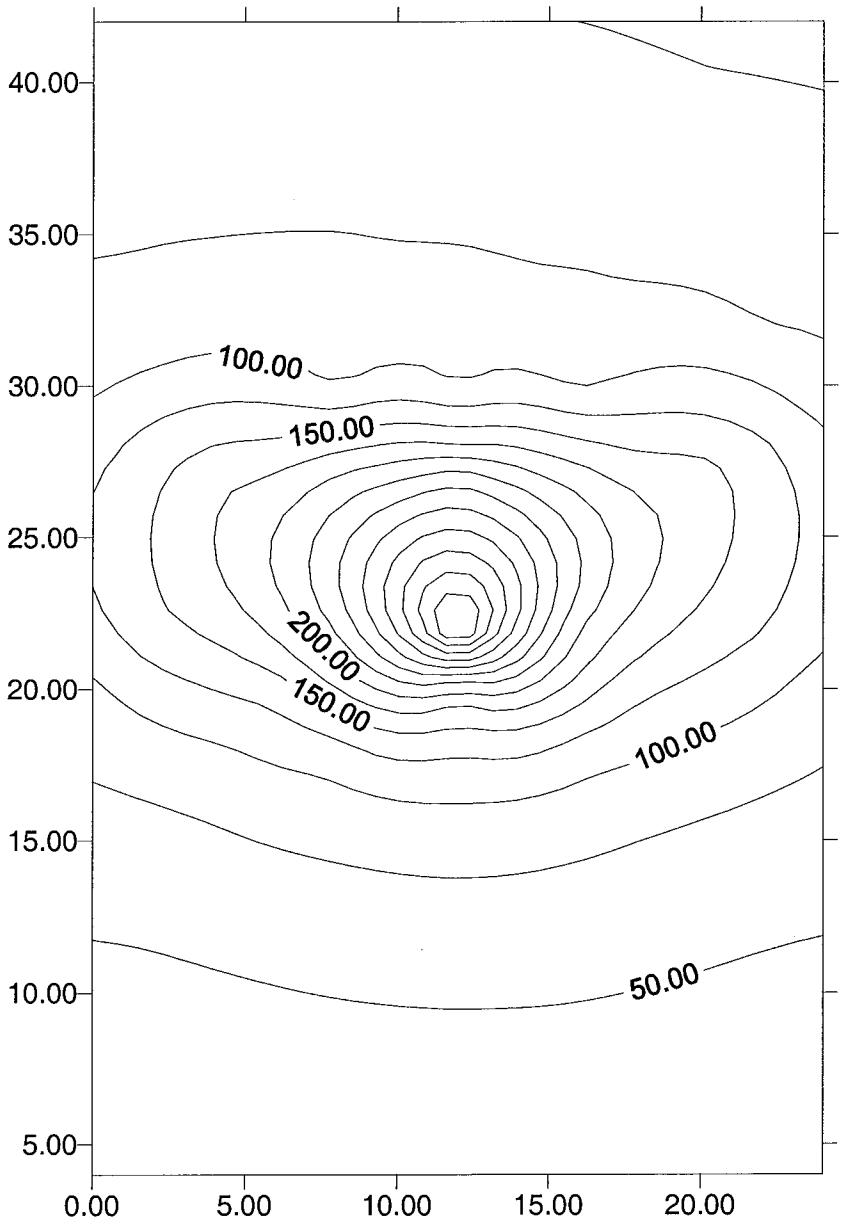
1/5


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

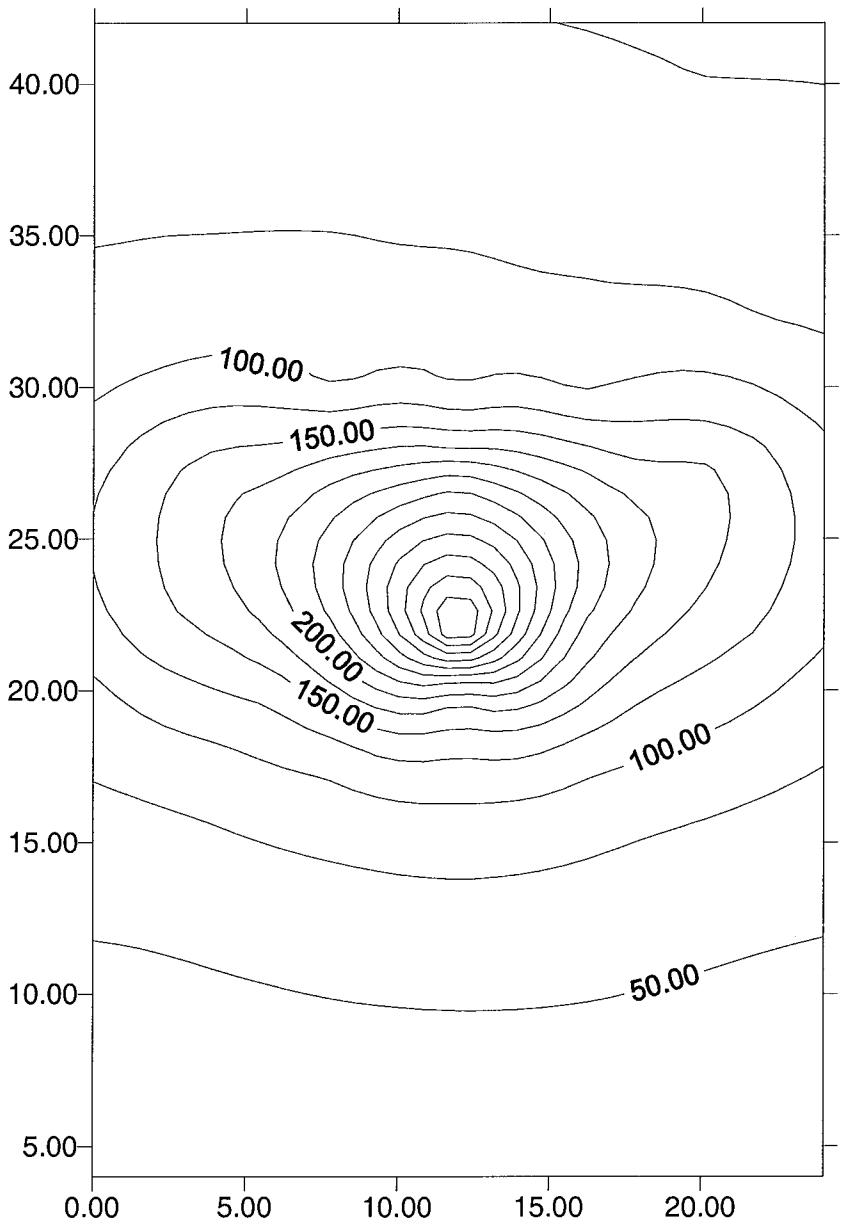
116


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

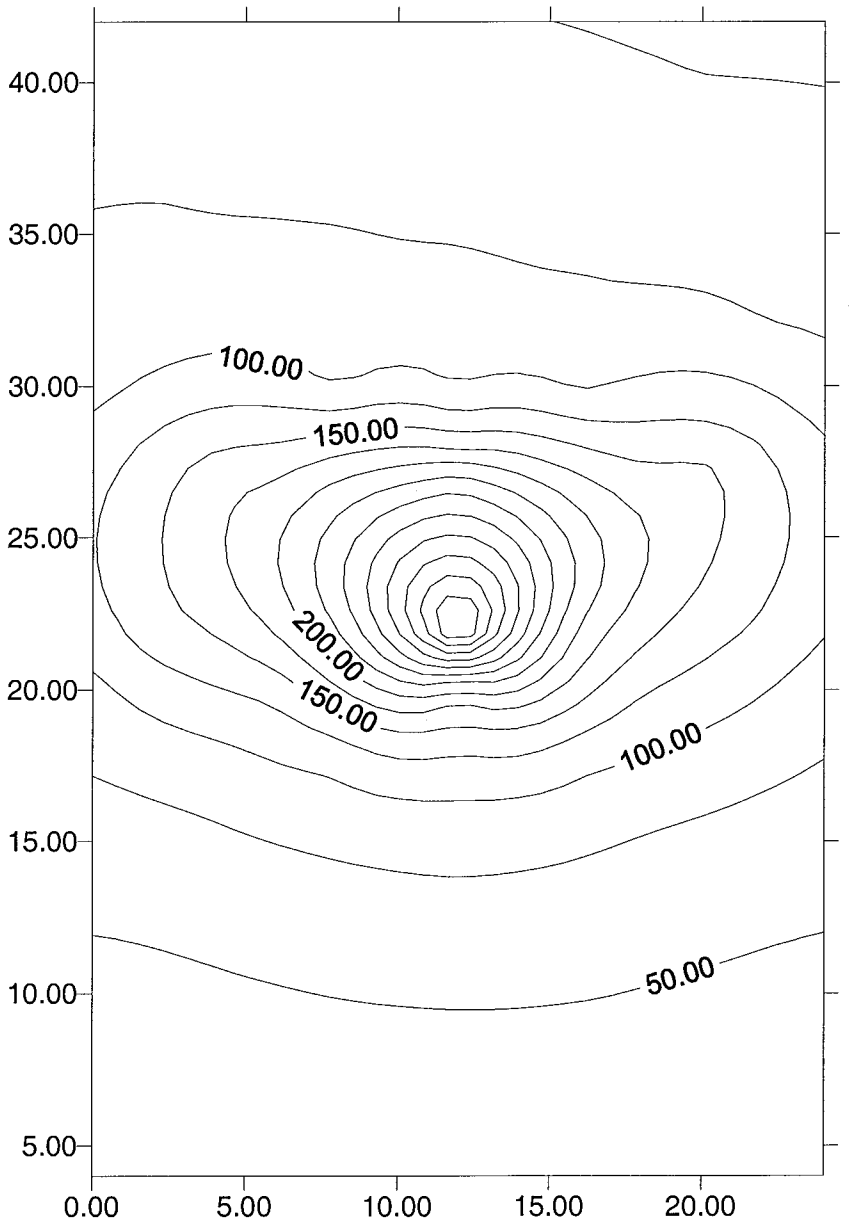
1/7


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

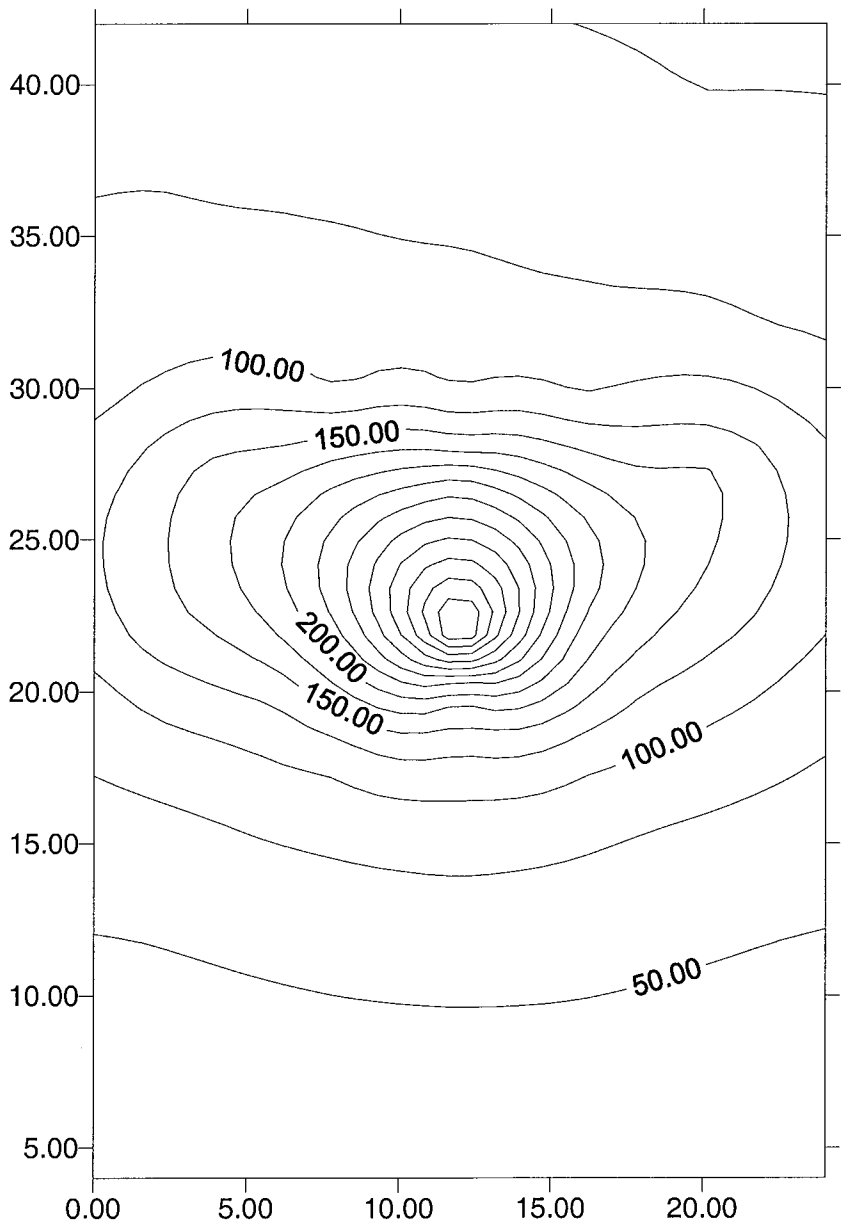
1/8


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

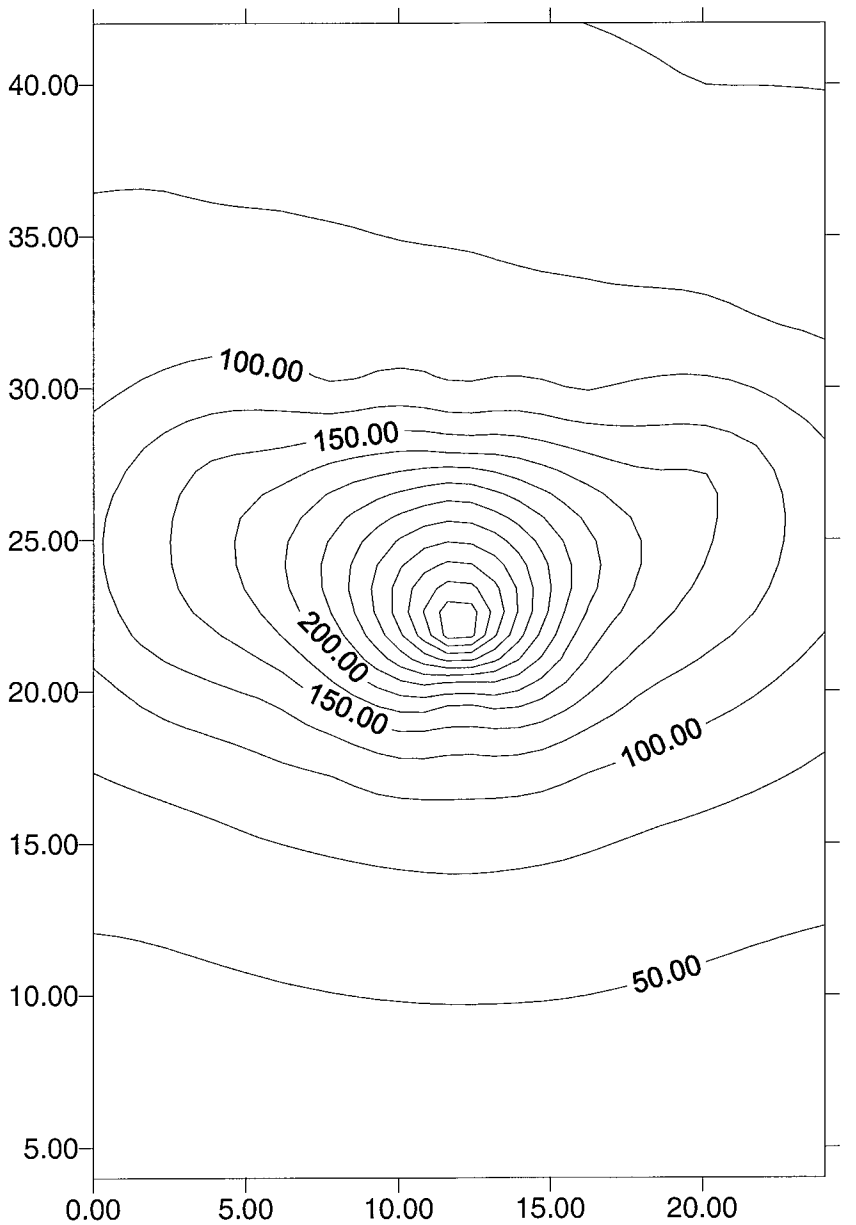
1/9


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

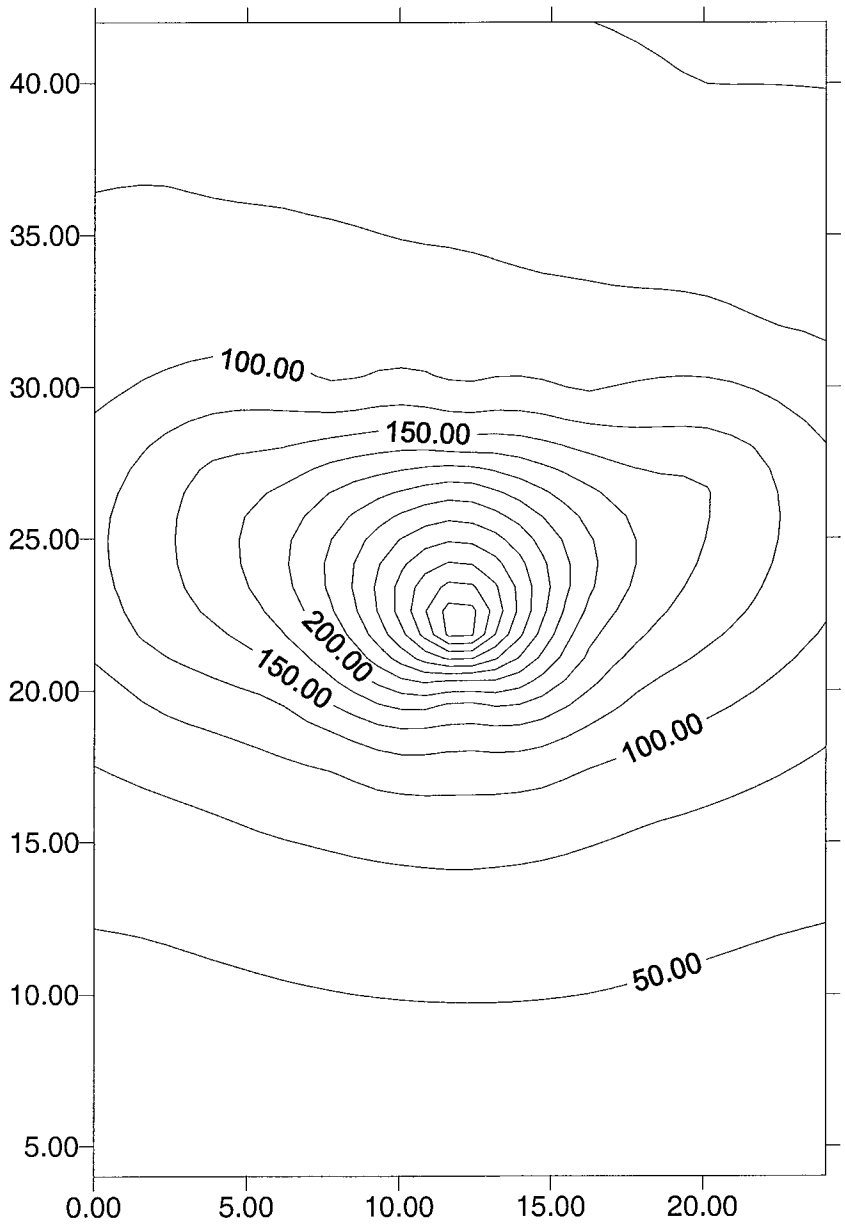
1/10


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

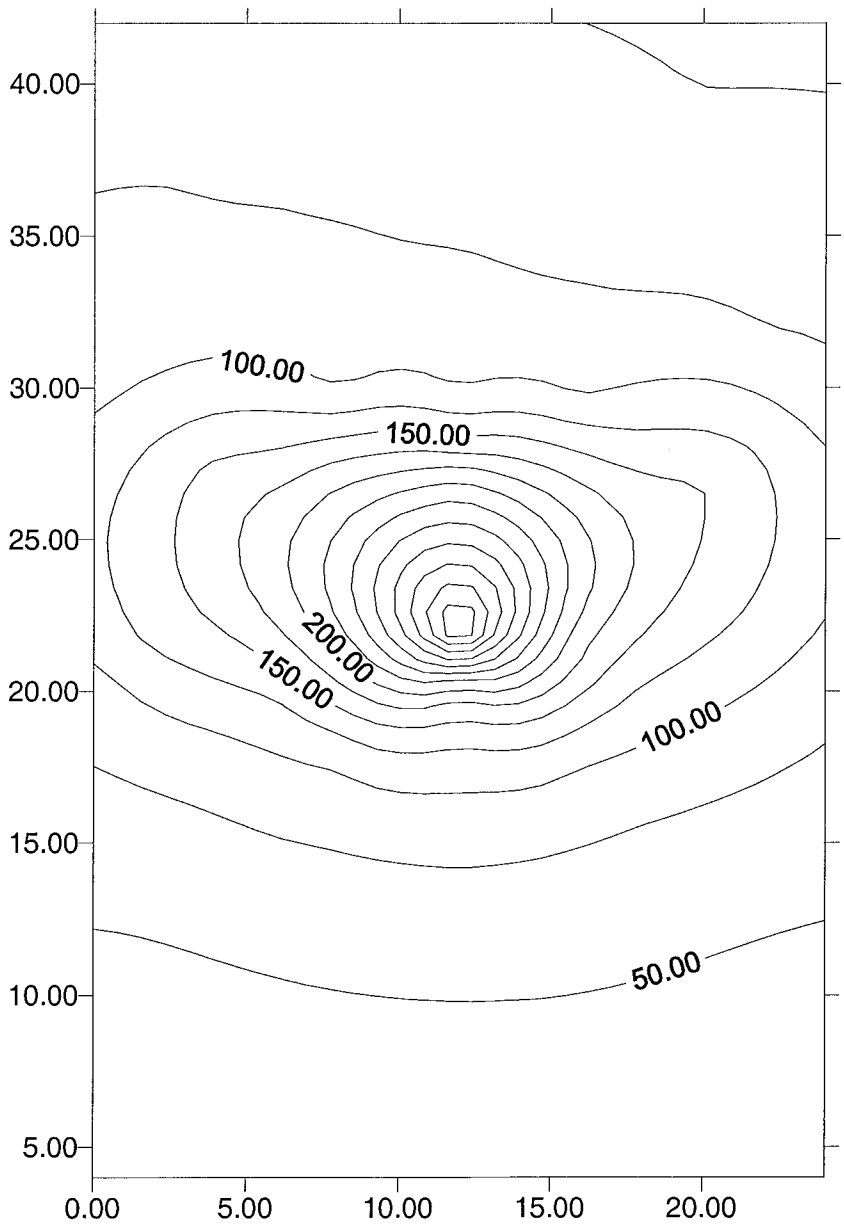
1/11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

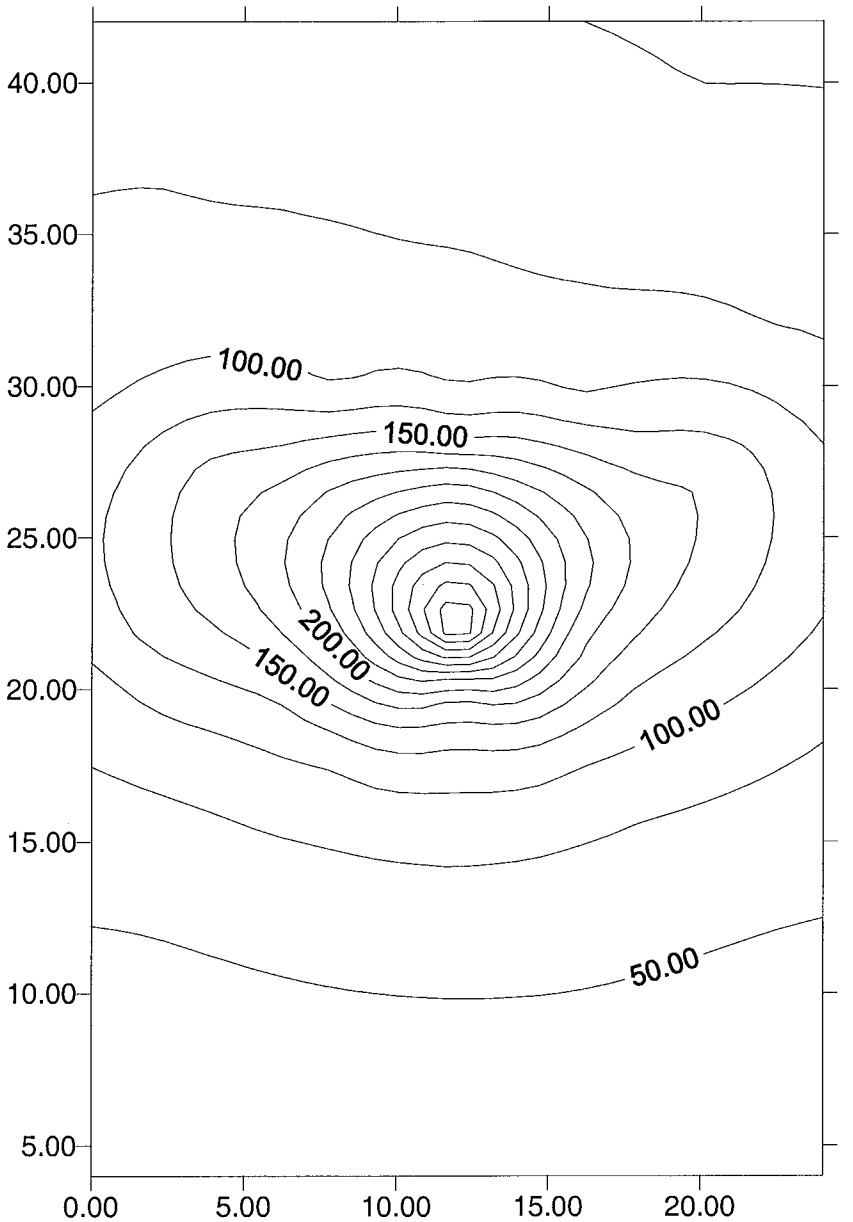
1/12


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

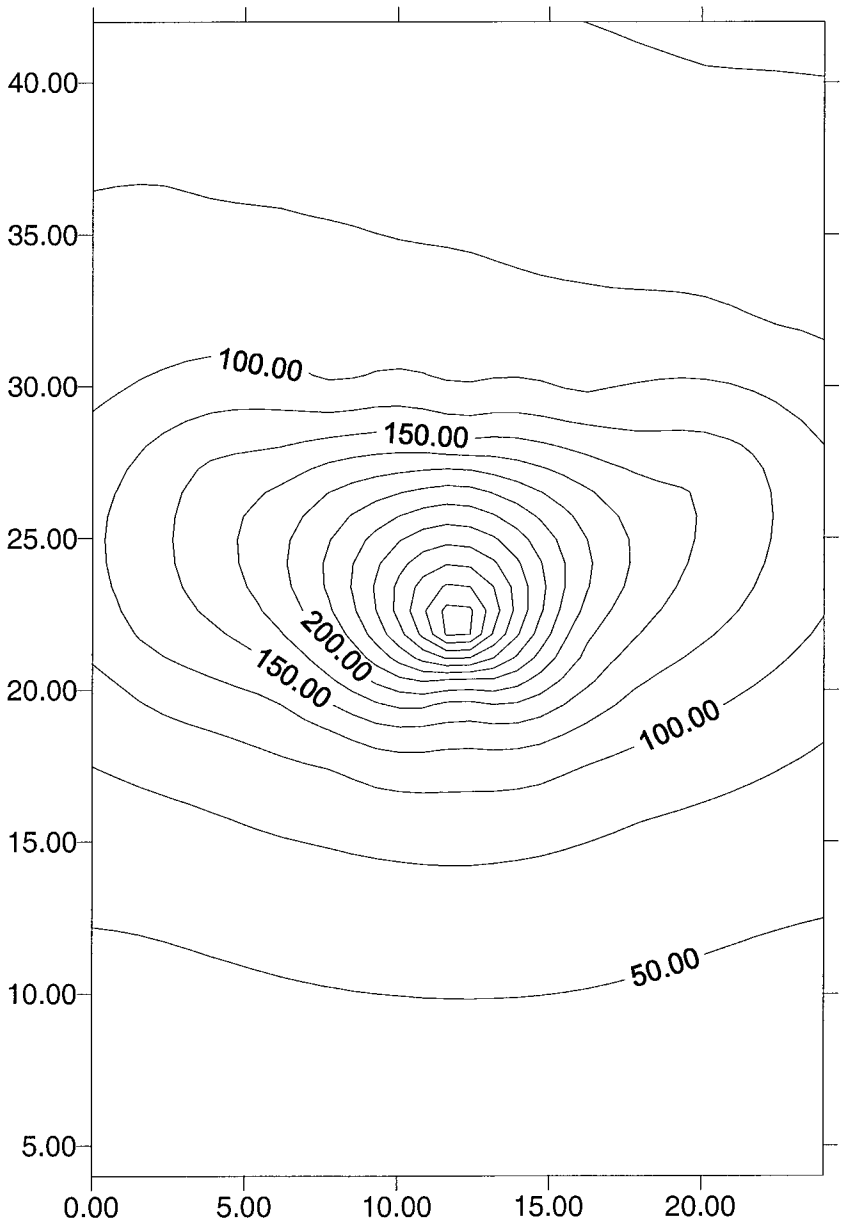
1|13


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

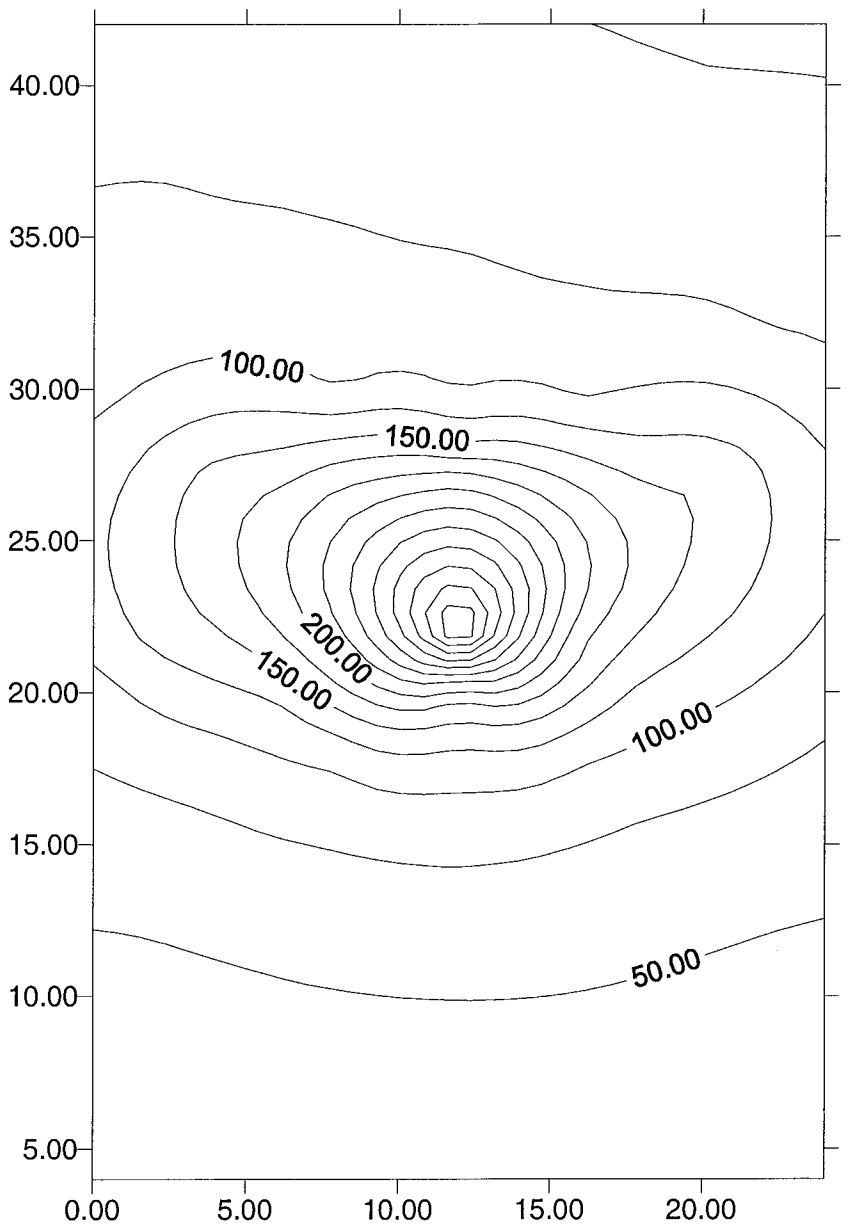
1/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

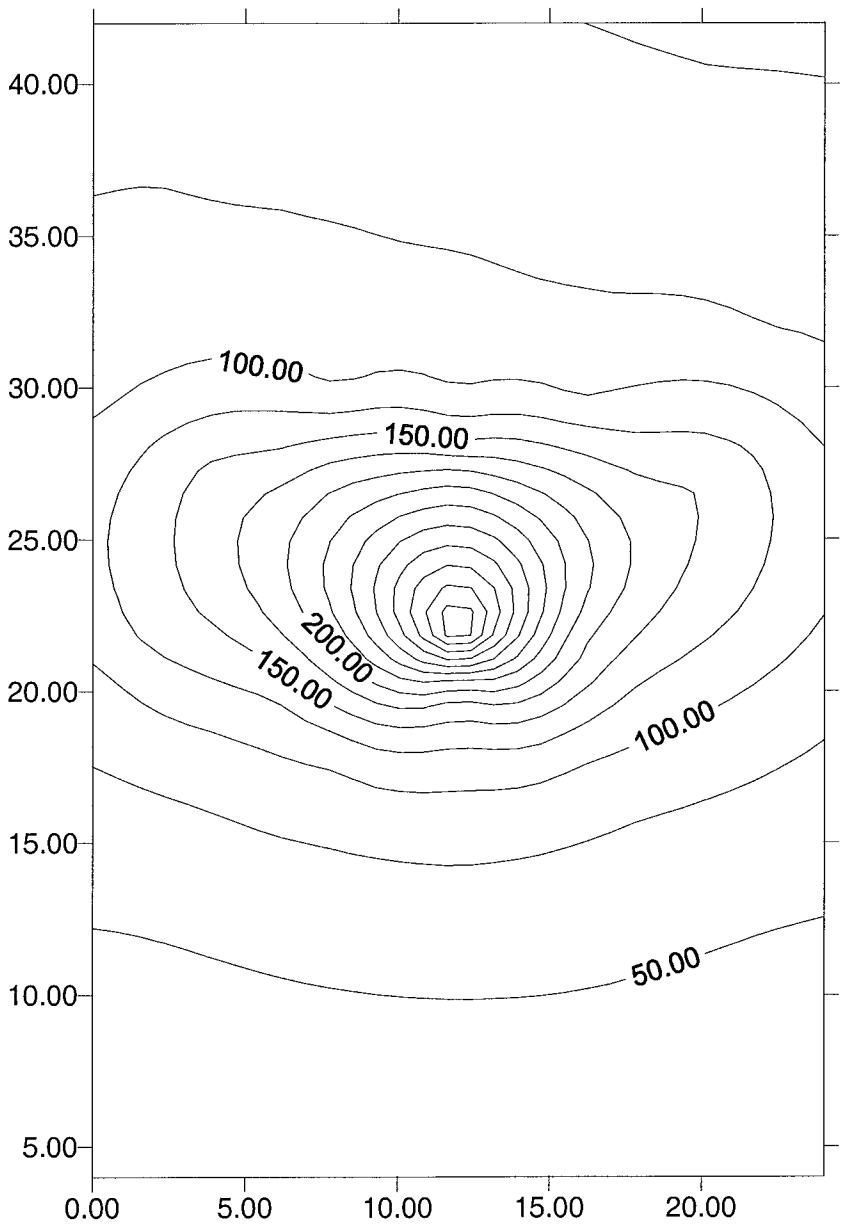
1/45


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

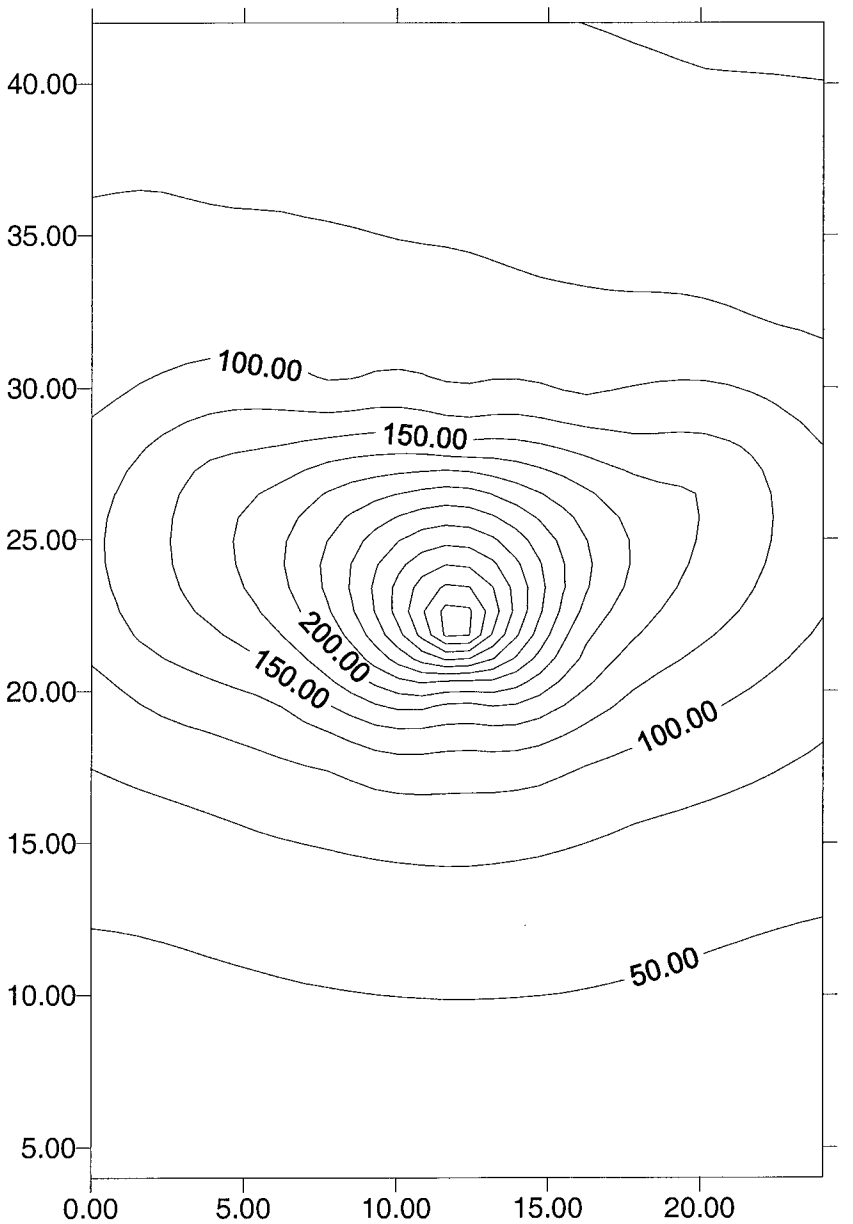
1/16


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

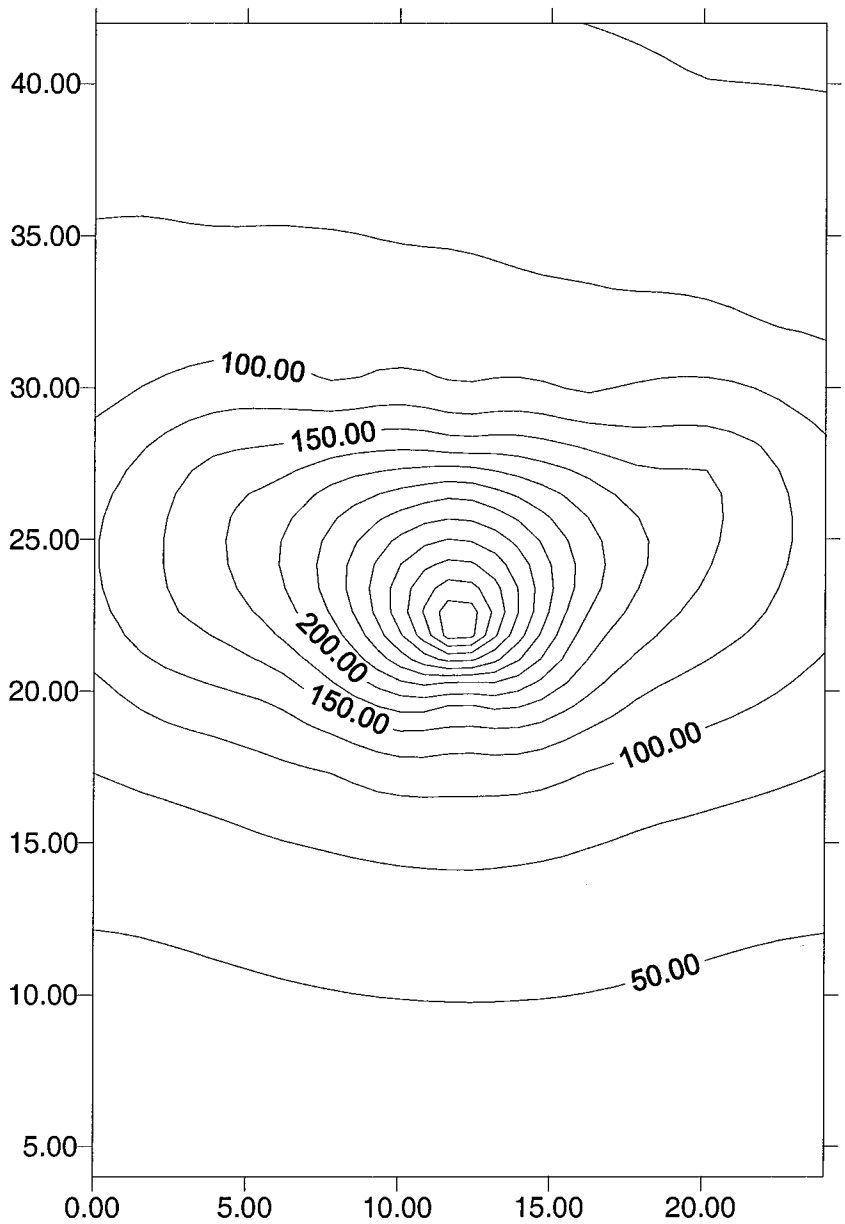
1/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

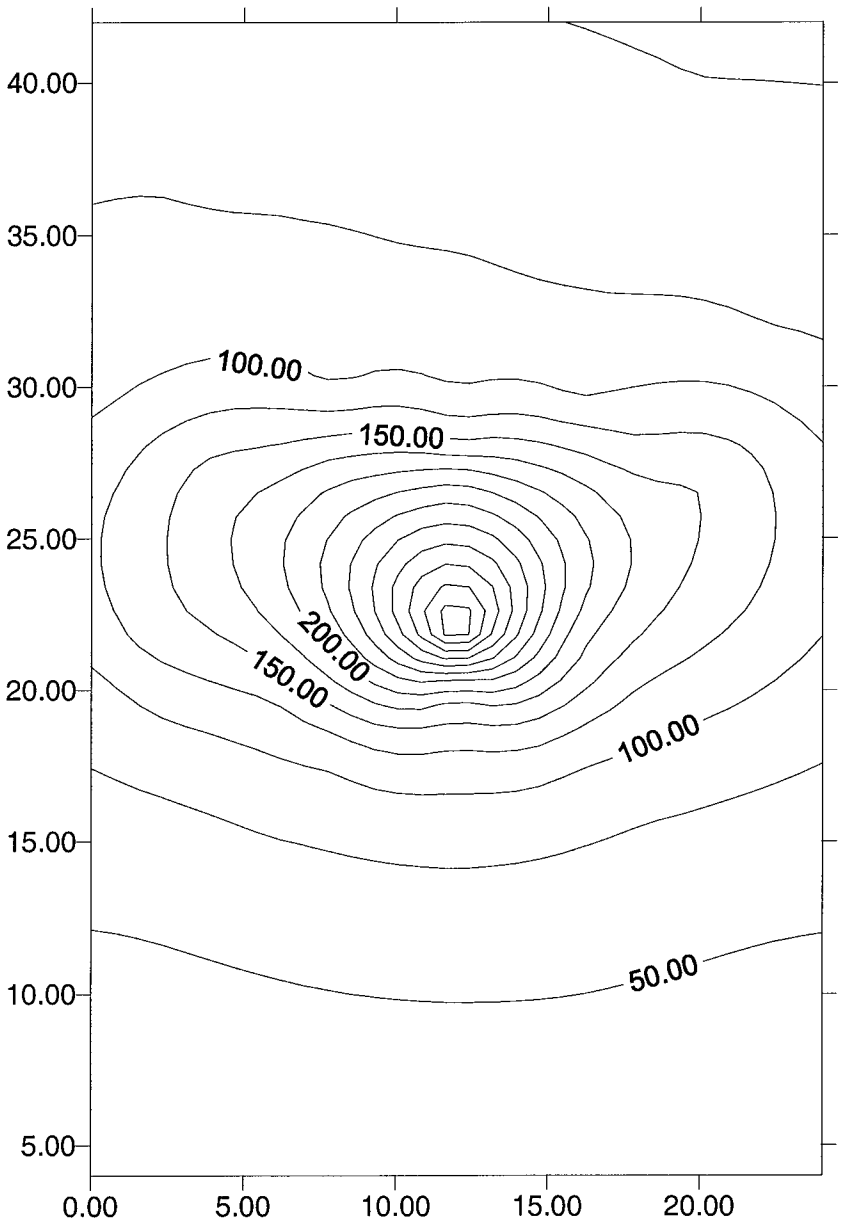
1/18


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

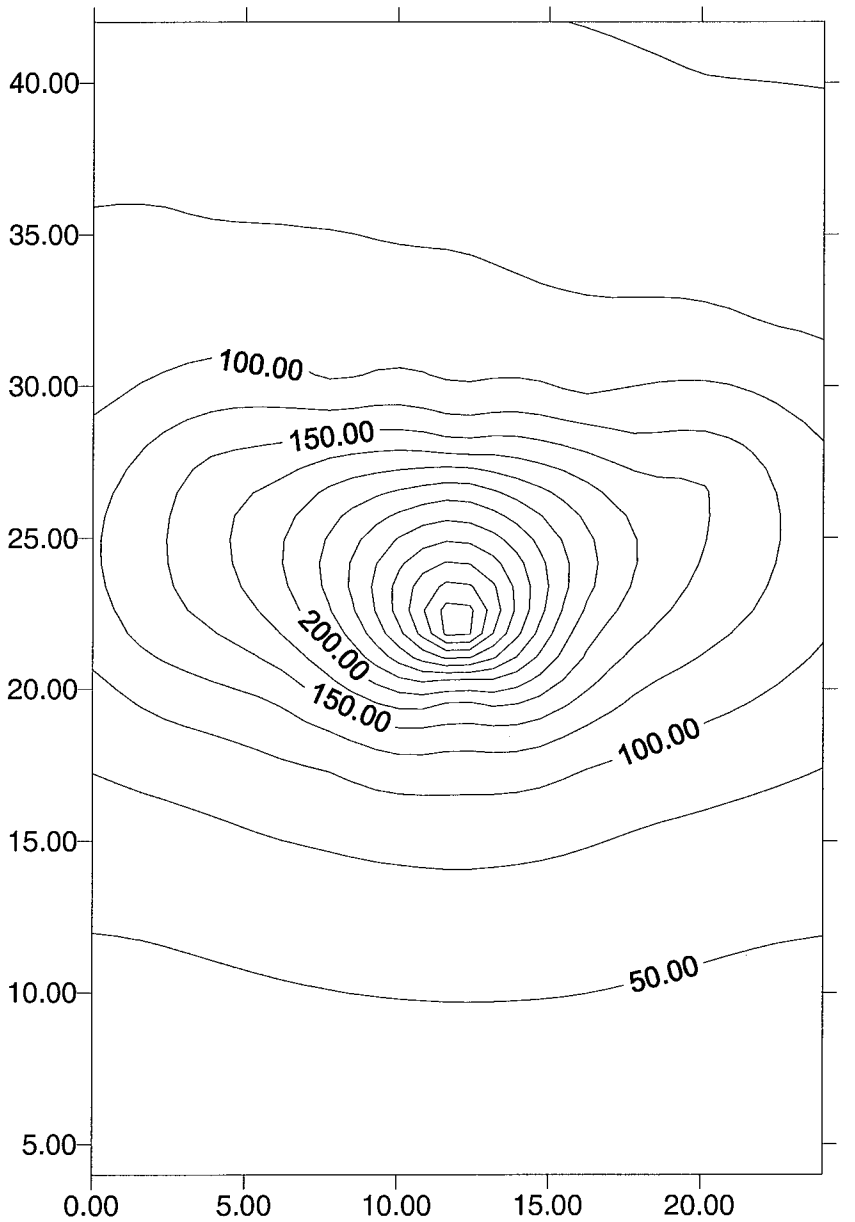
1|19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

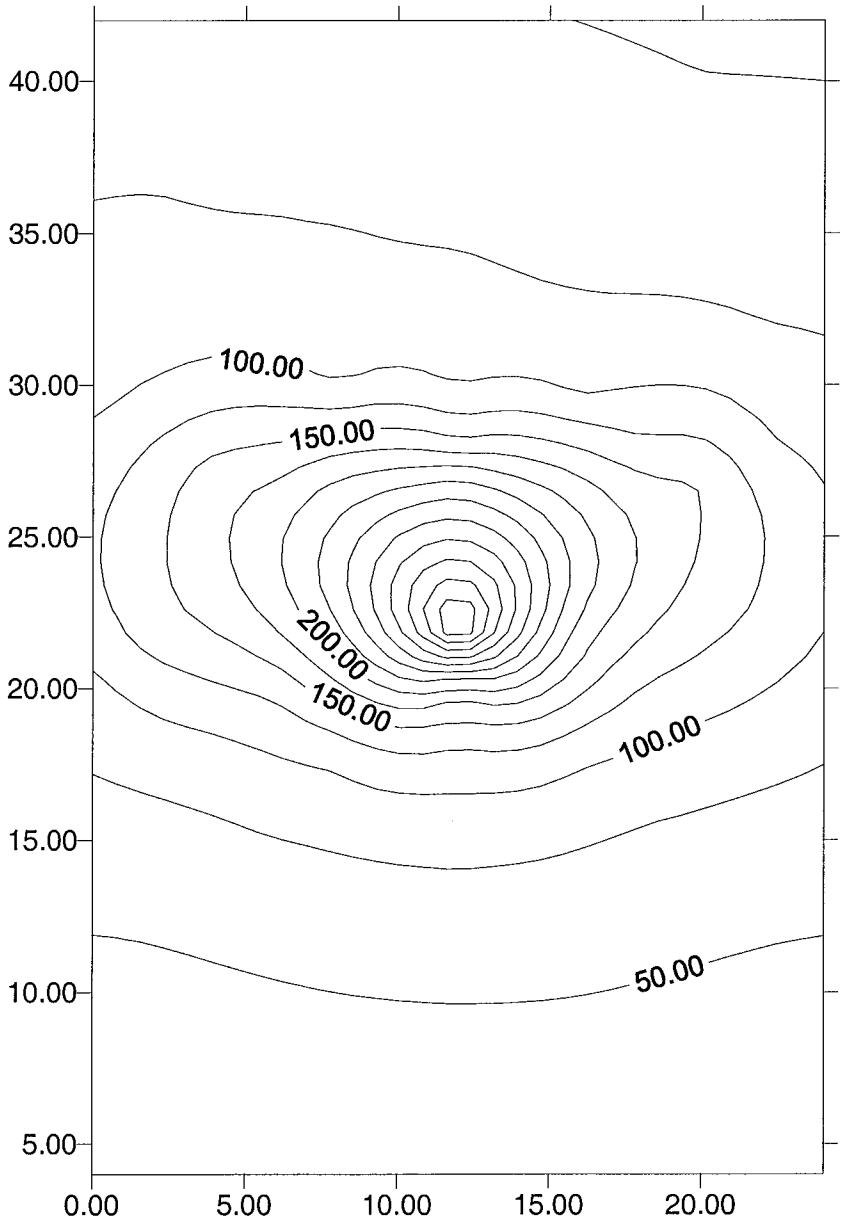
1/20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

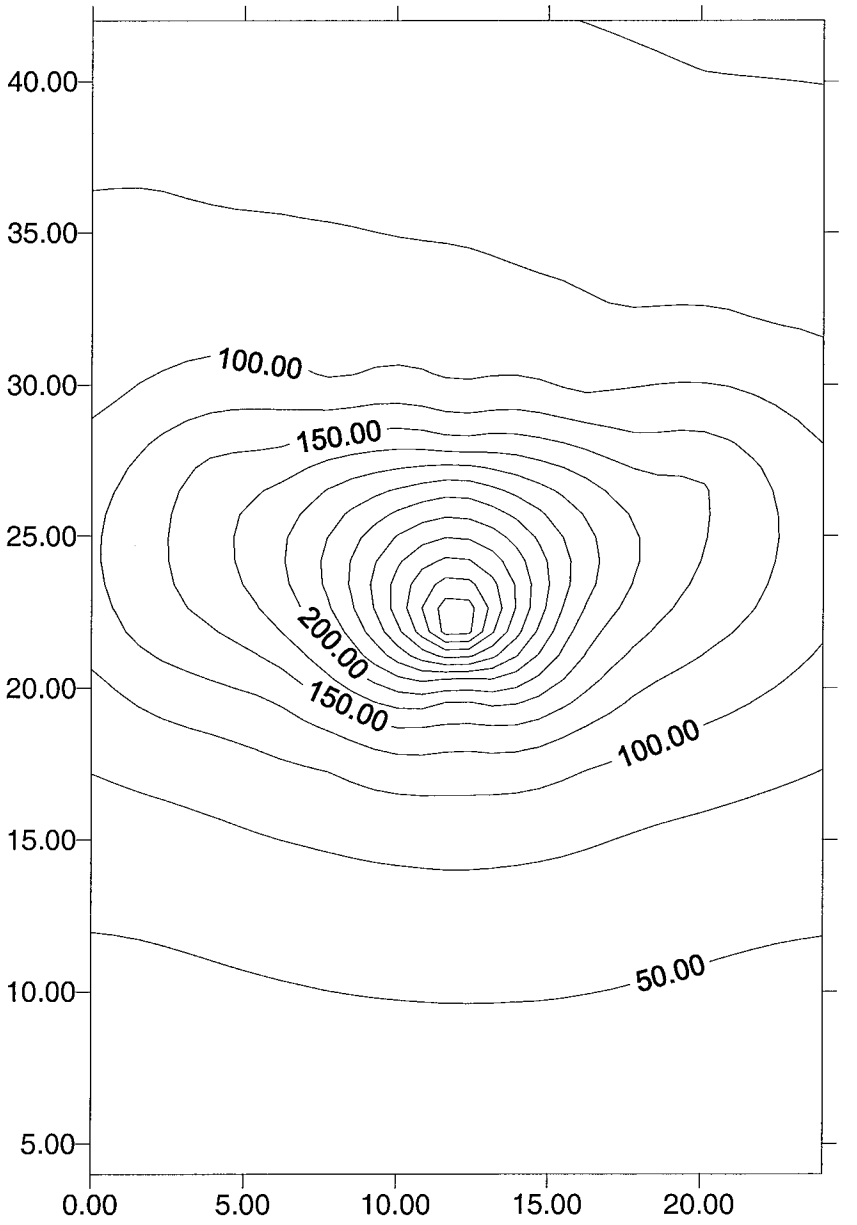
1/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

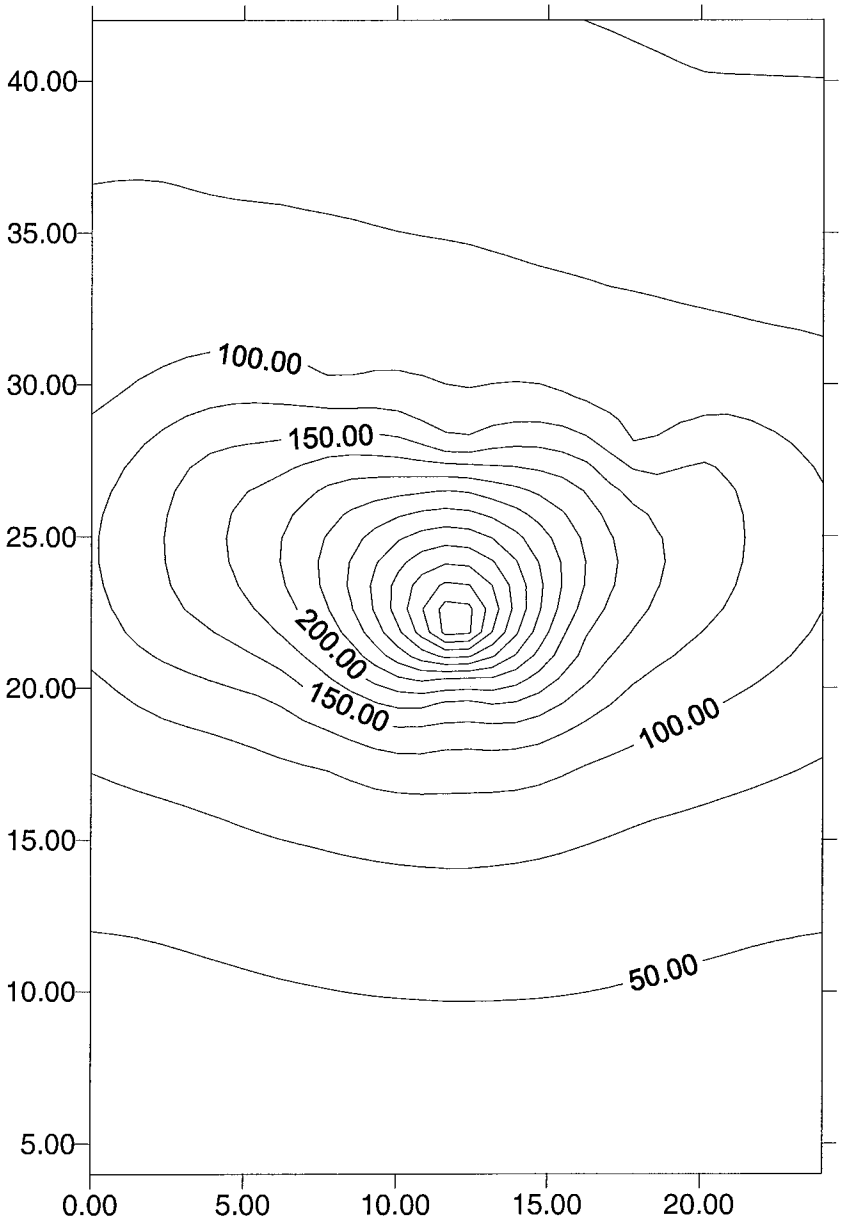
1/22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

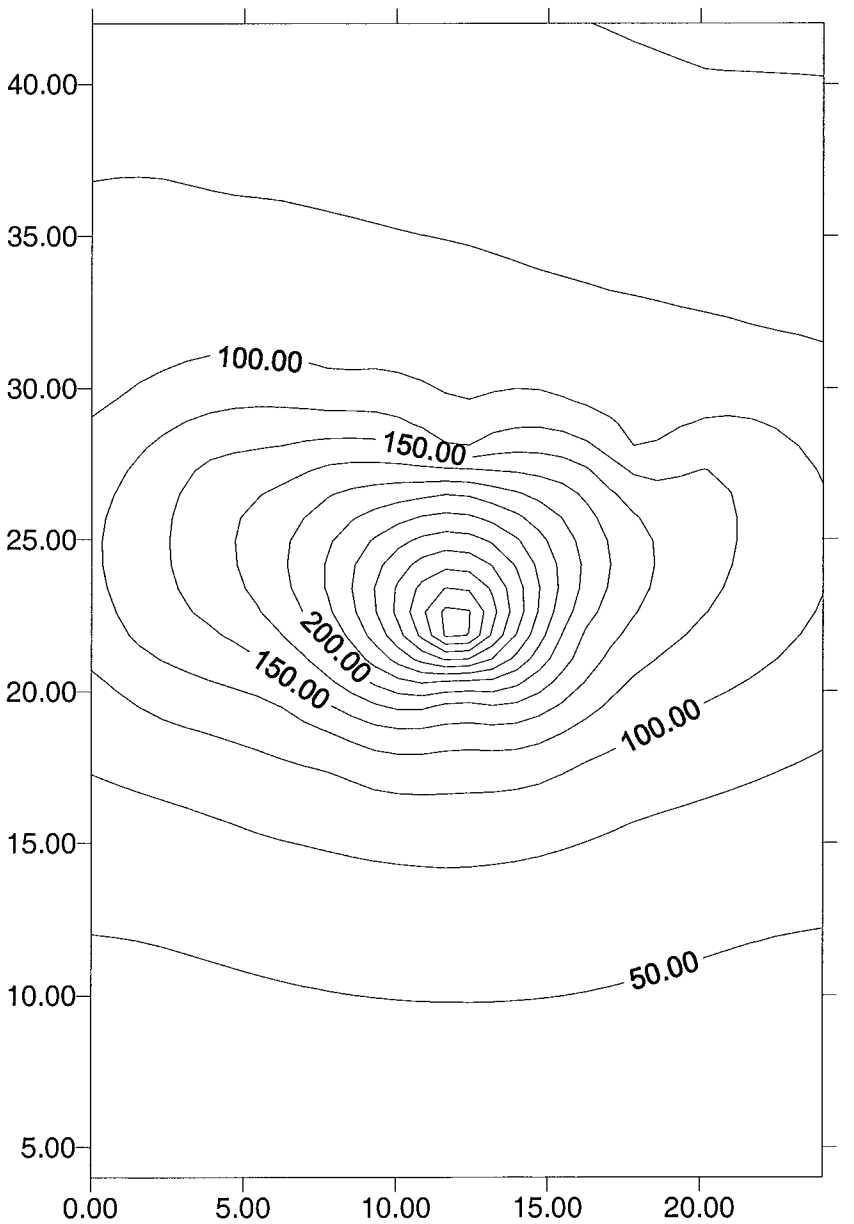
1|23


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

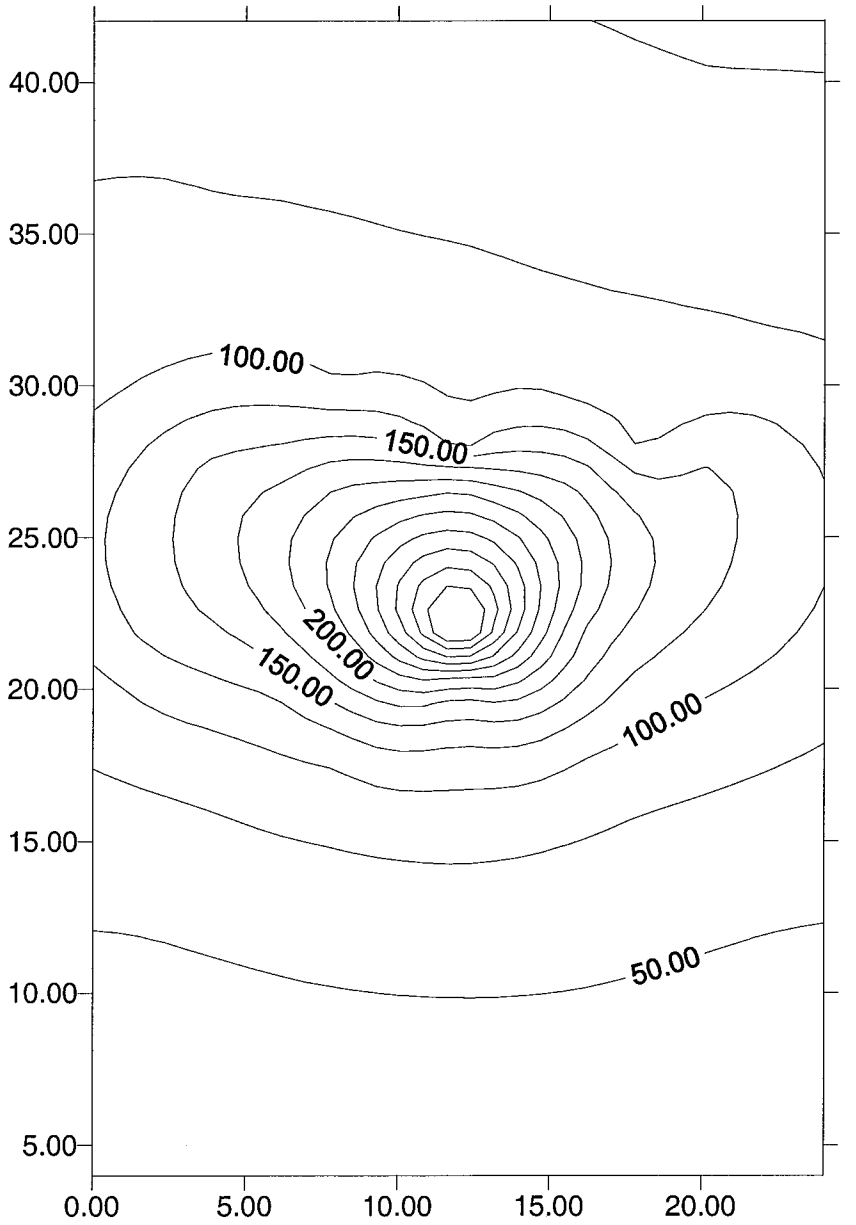
1/24


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

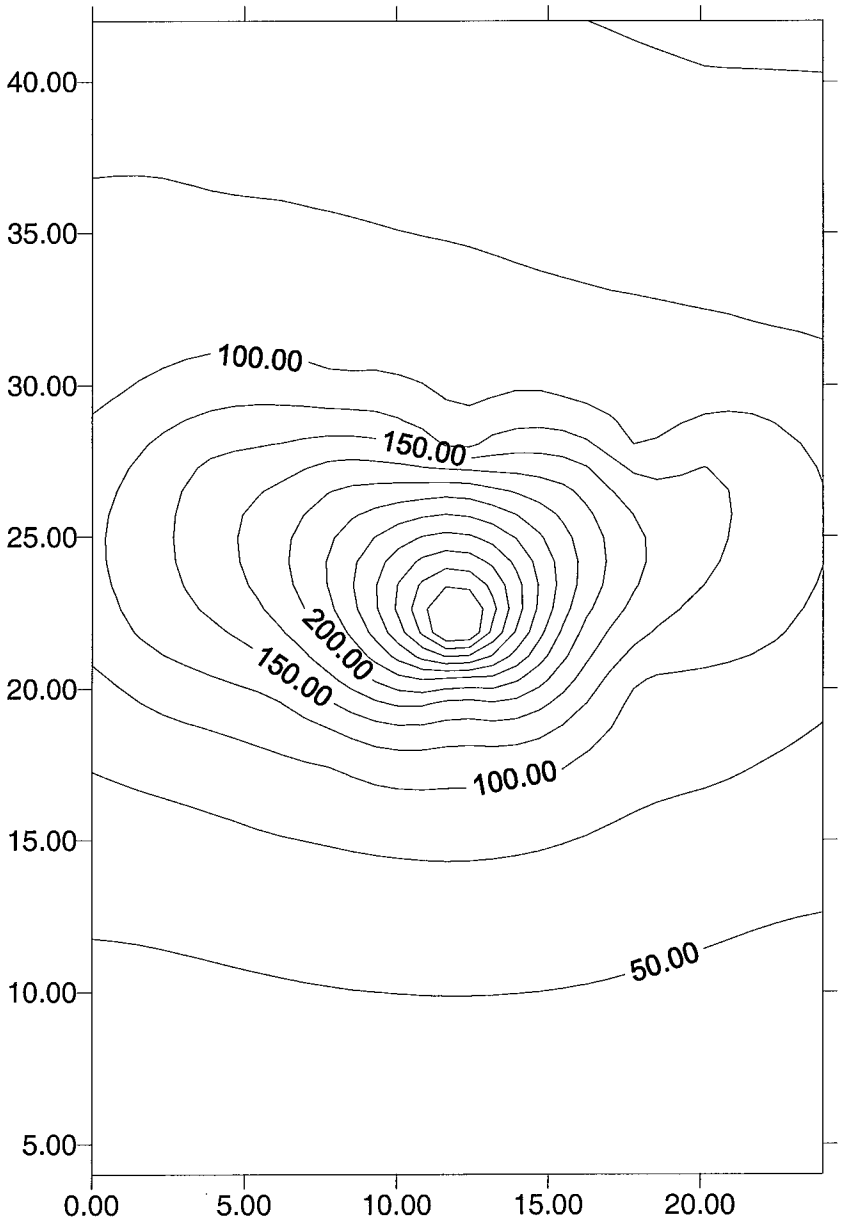
1/25


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

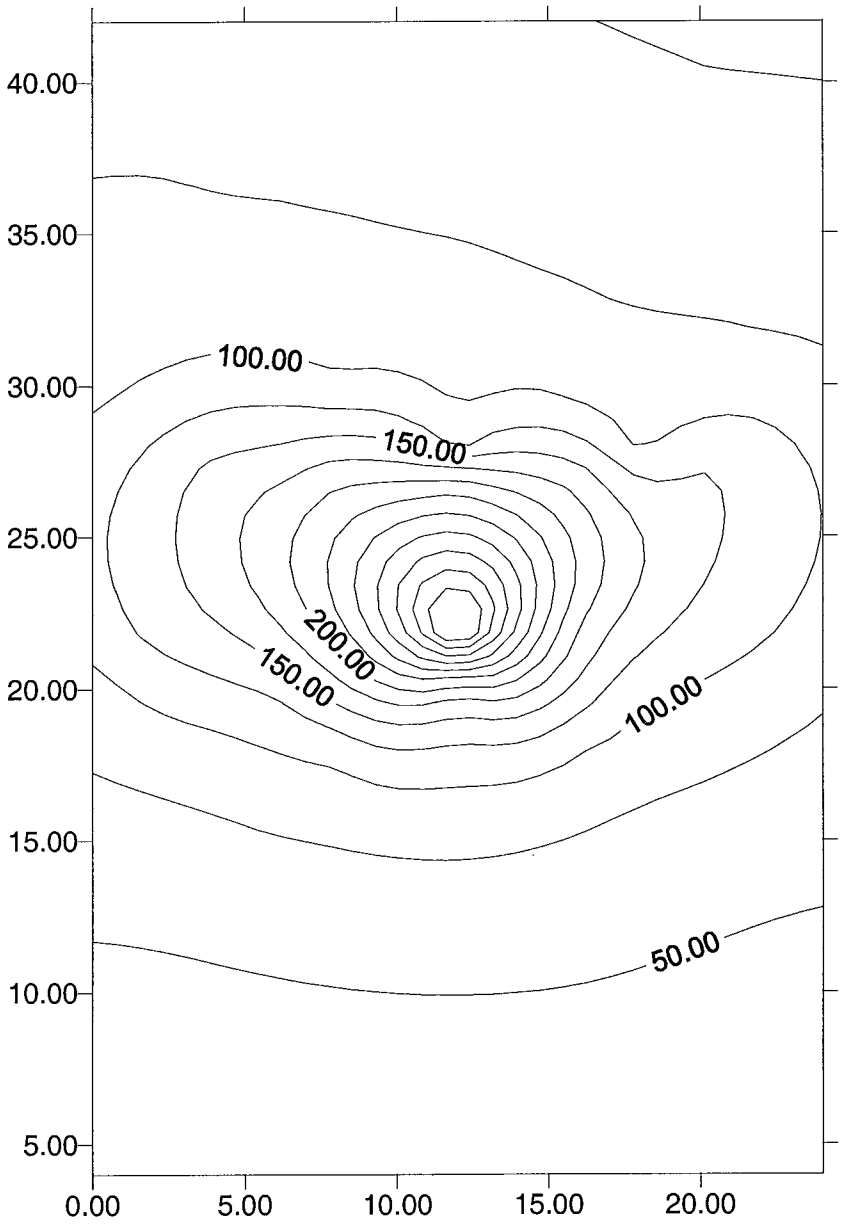
1/26


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

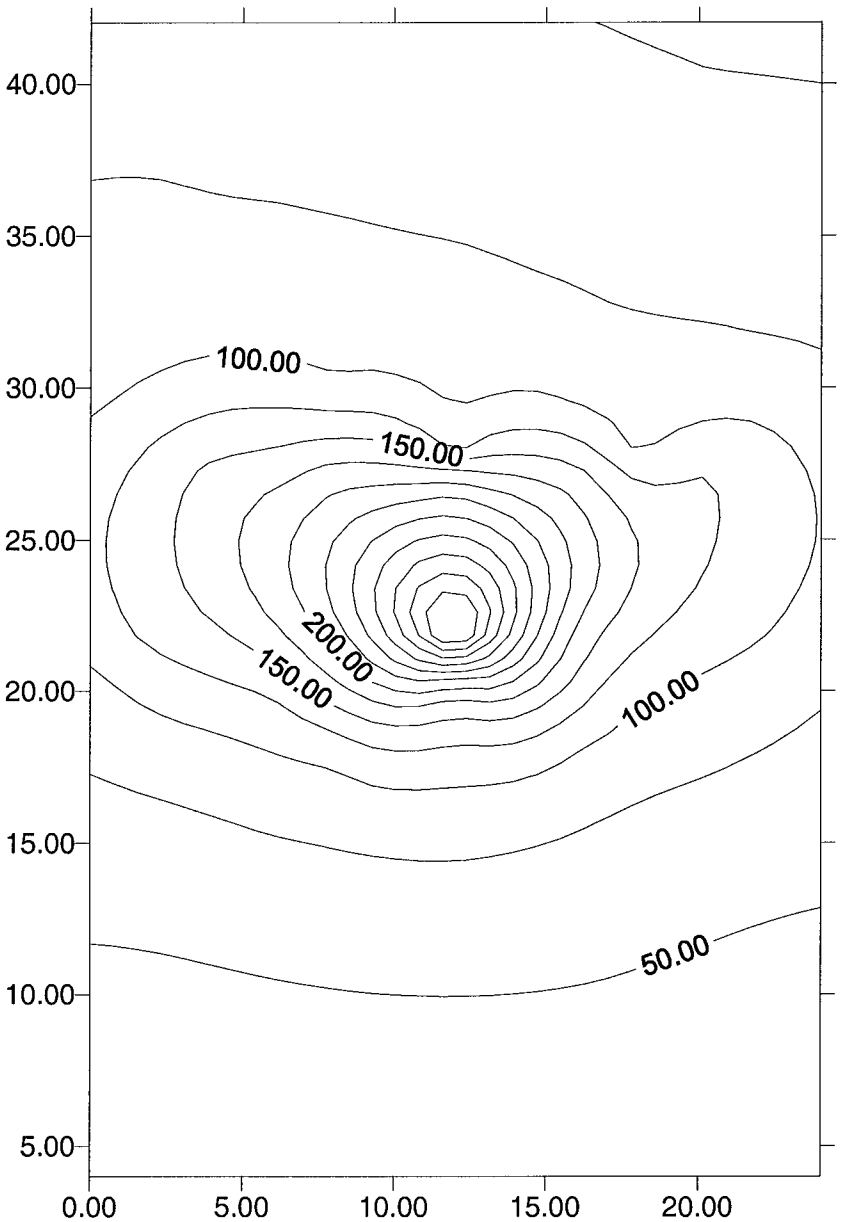
1/27


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

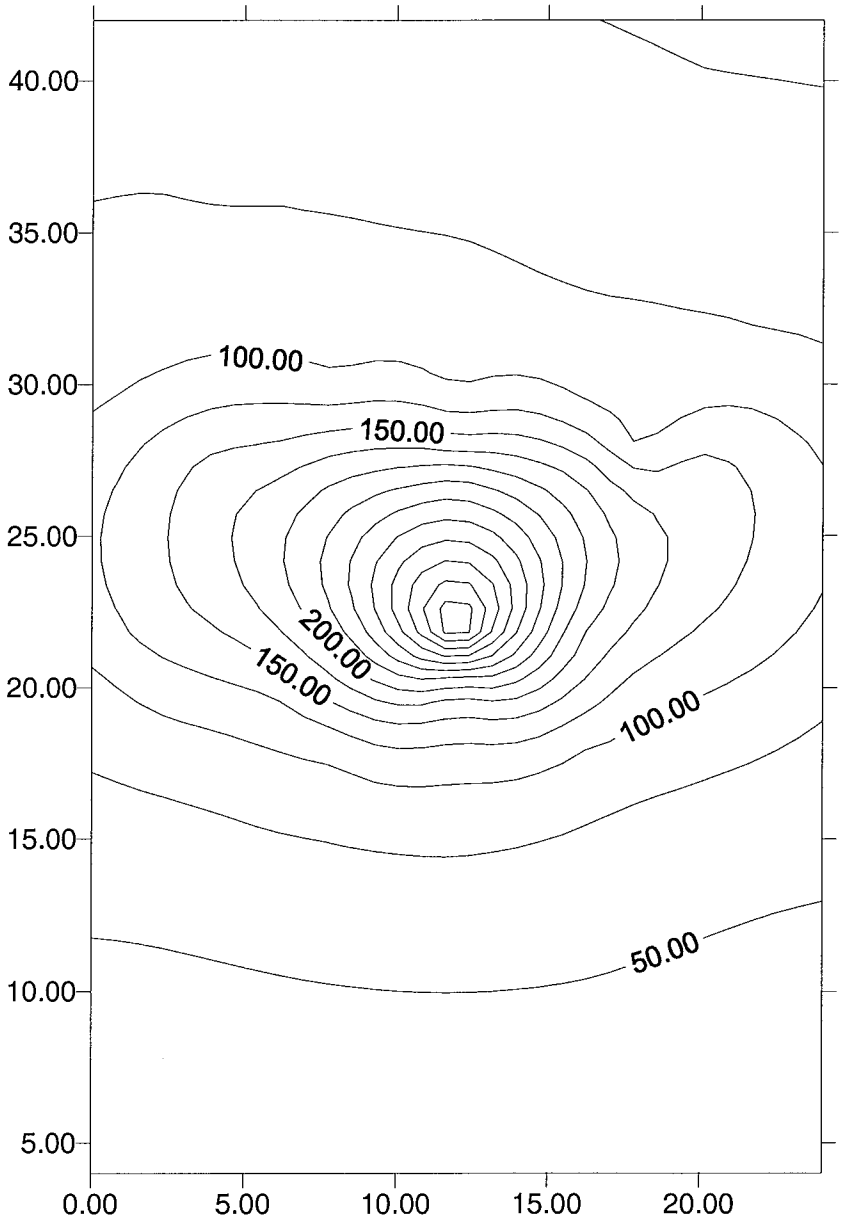
1/28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

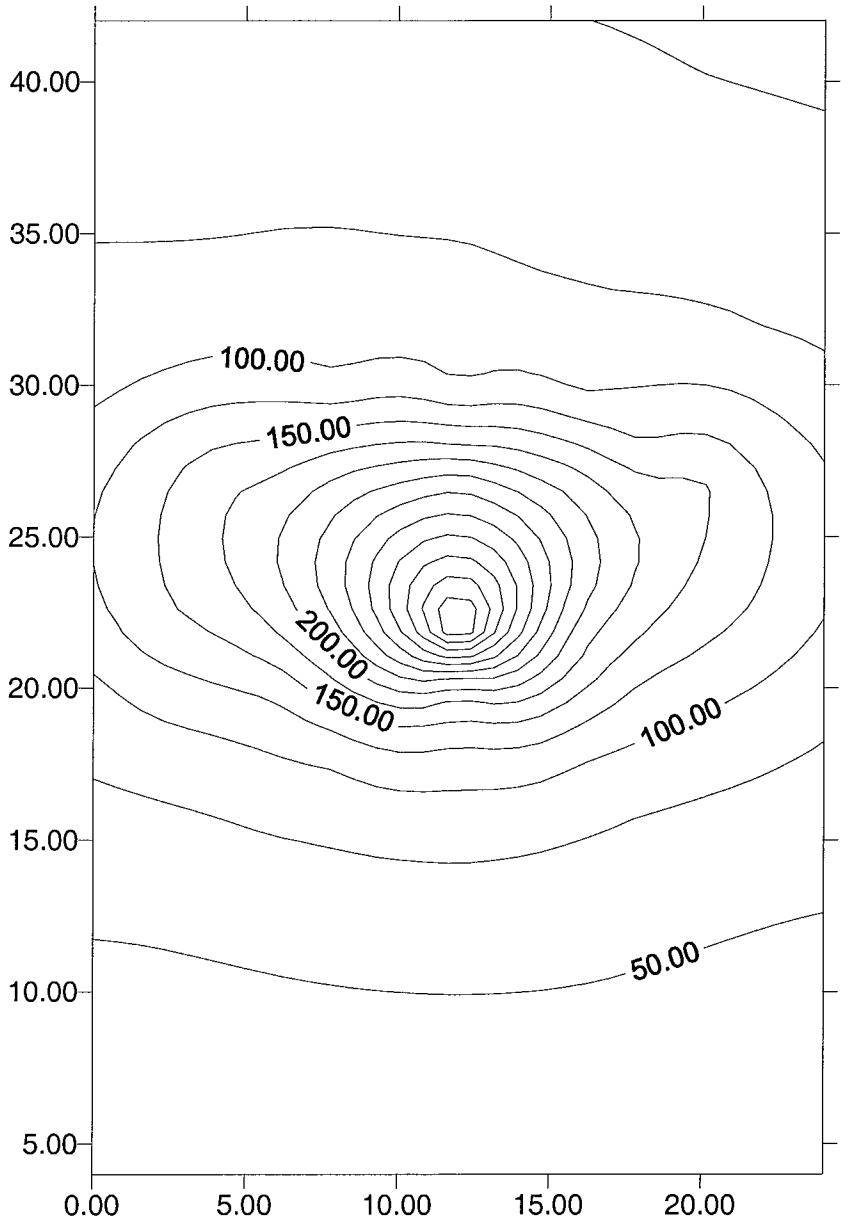
1|29


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

1130

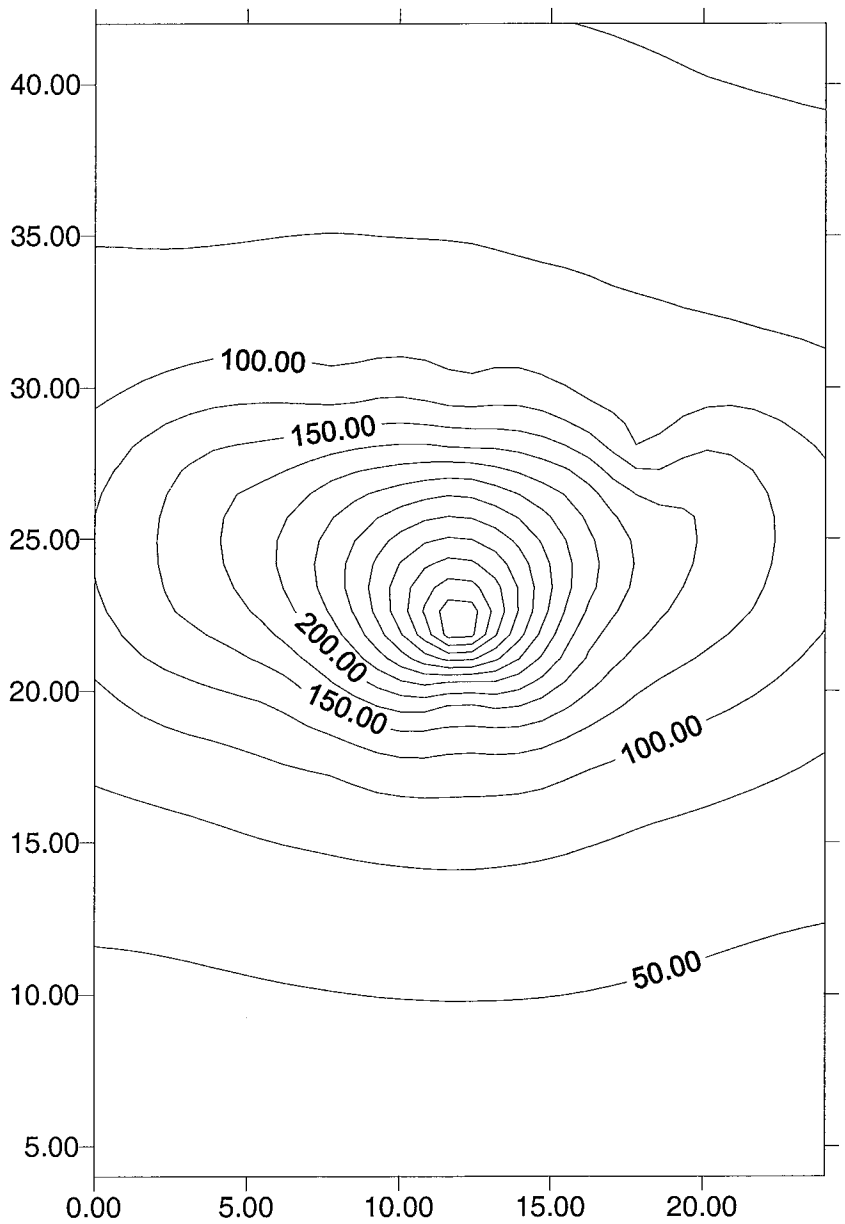

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

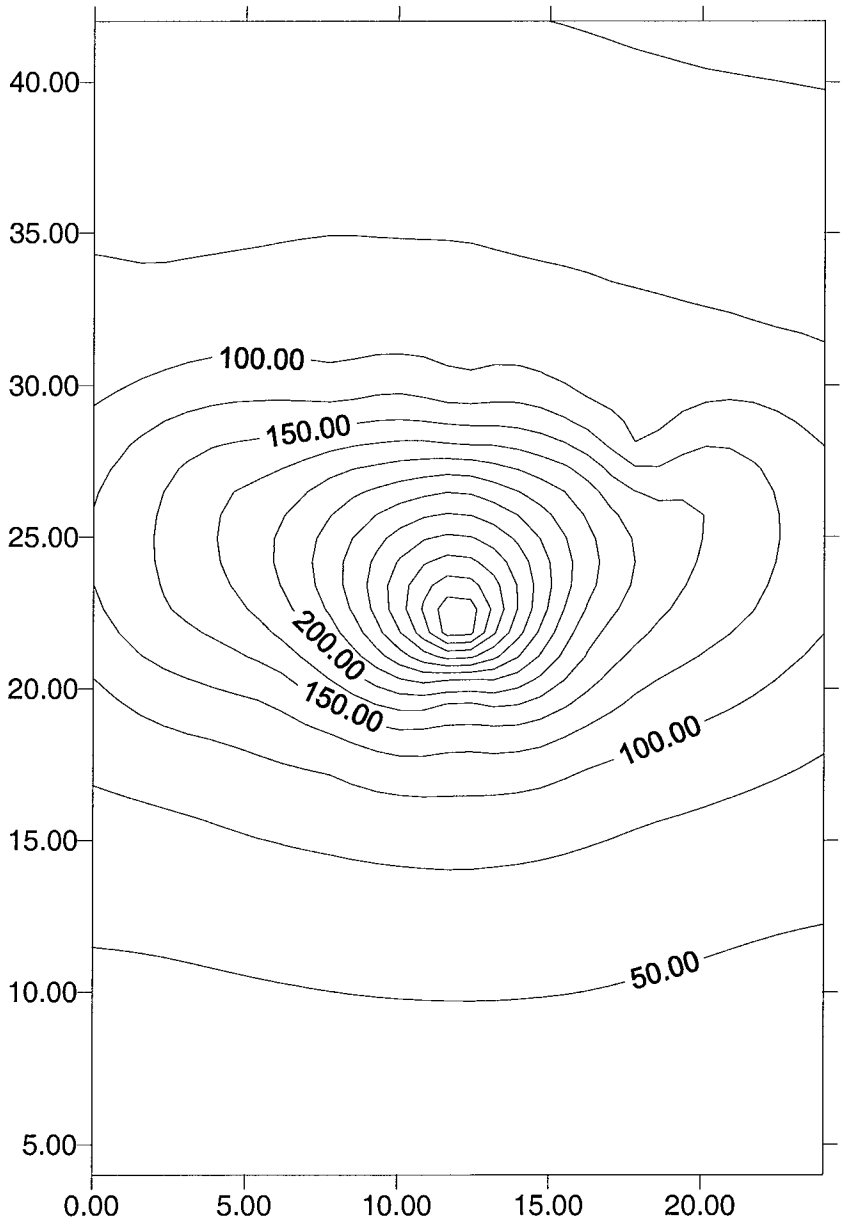
1|3'

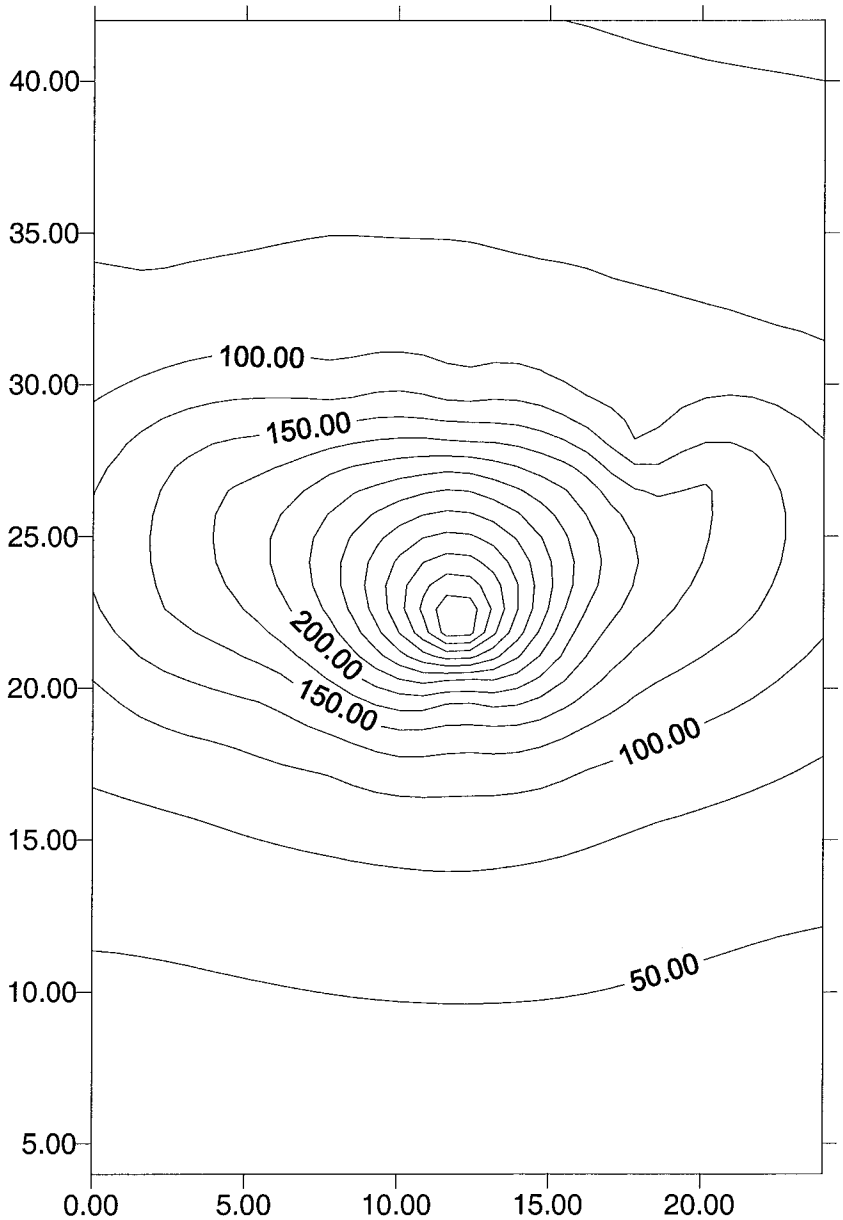


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

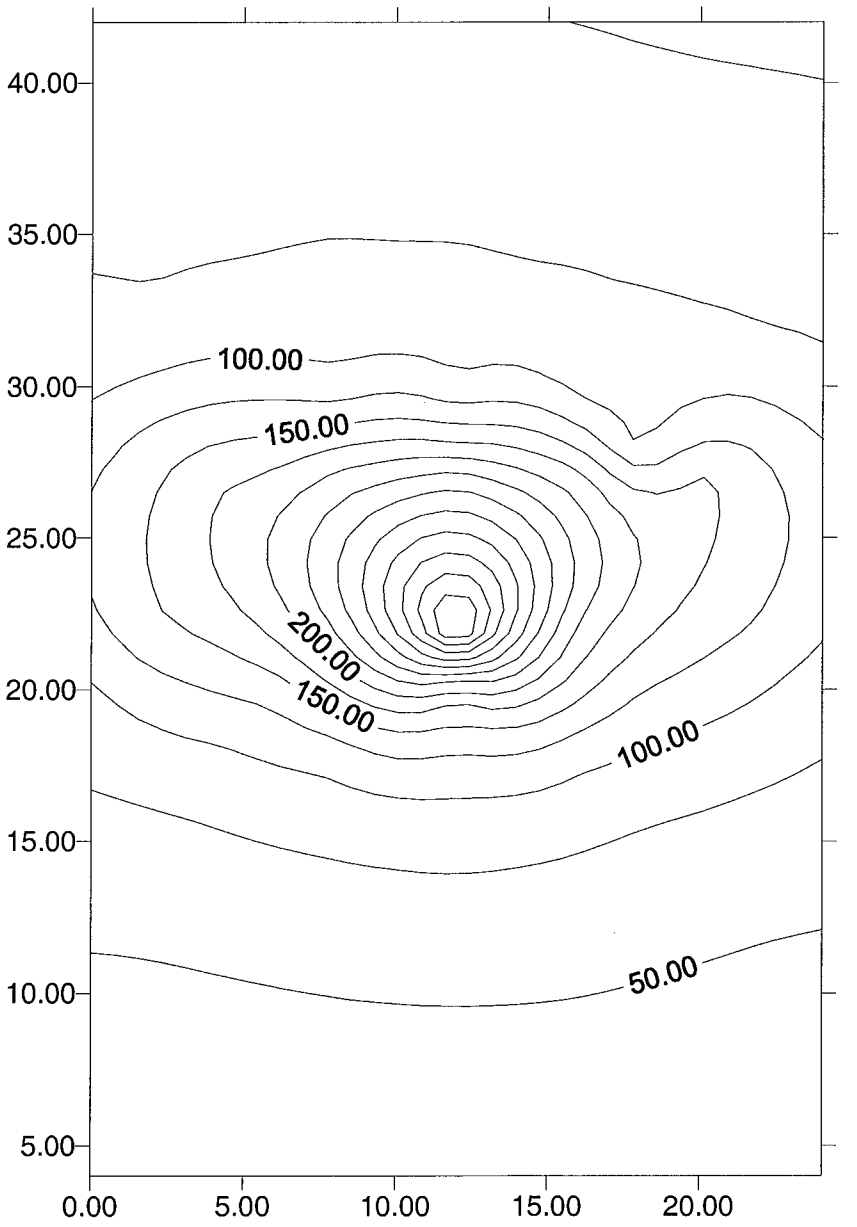
2|1

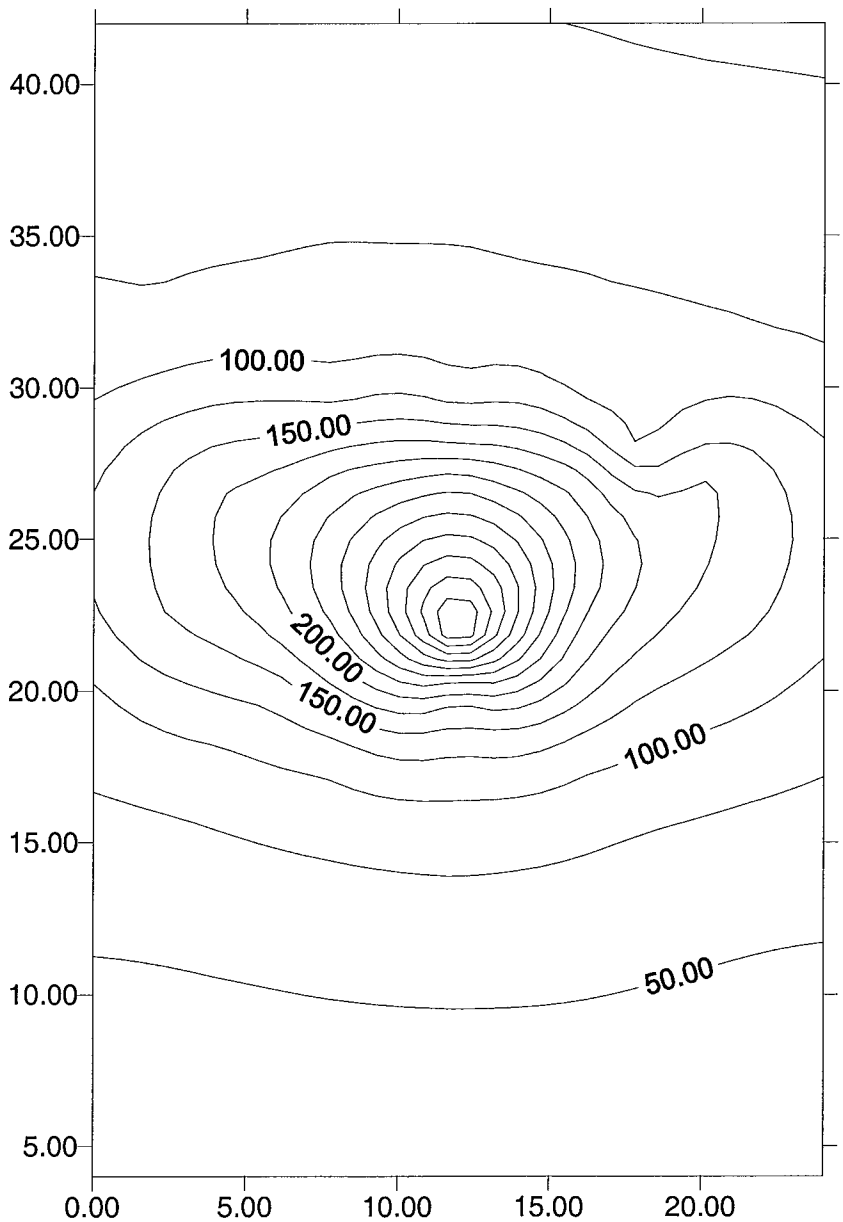

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

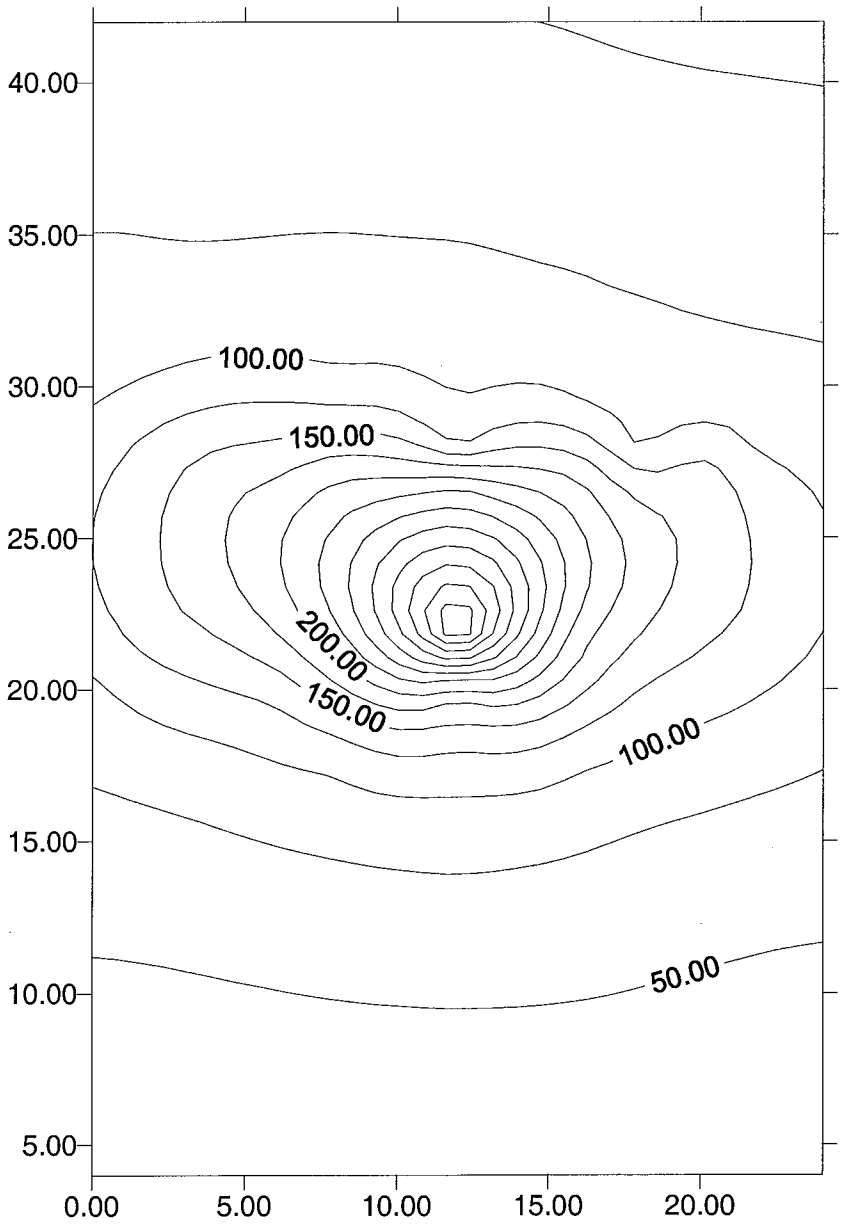

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

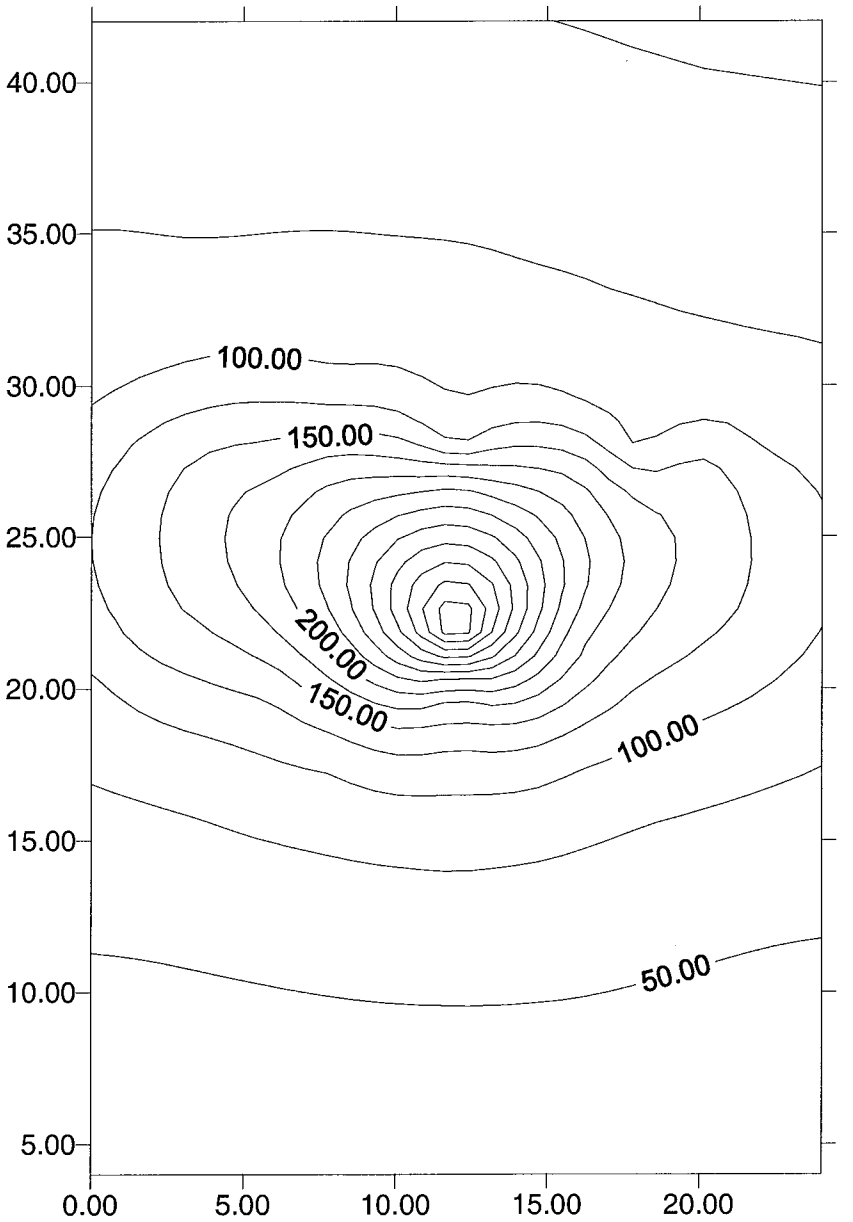

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

2/4

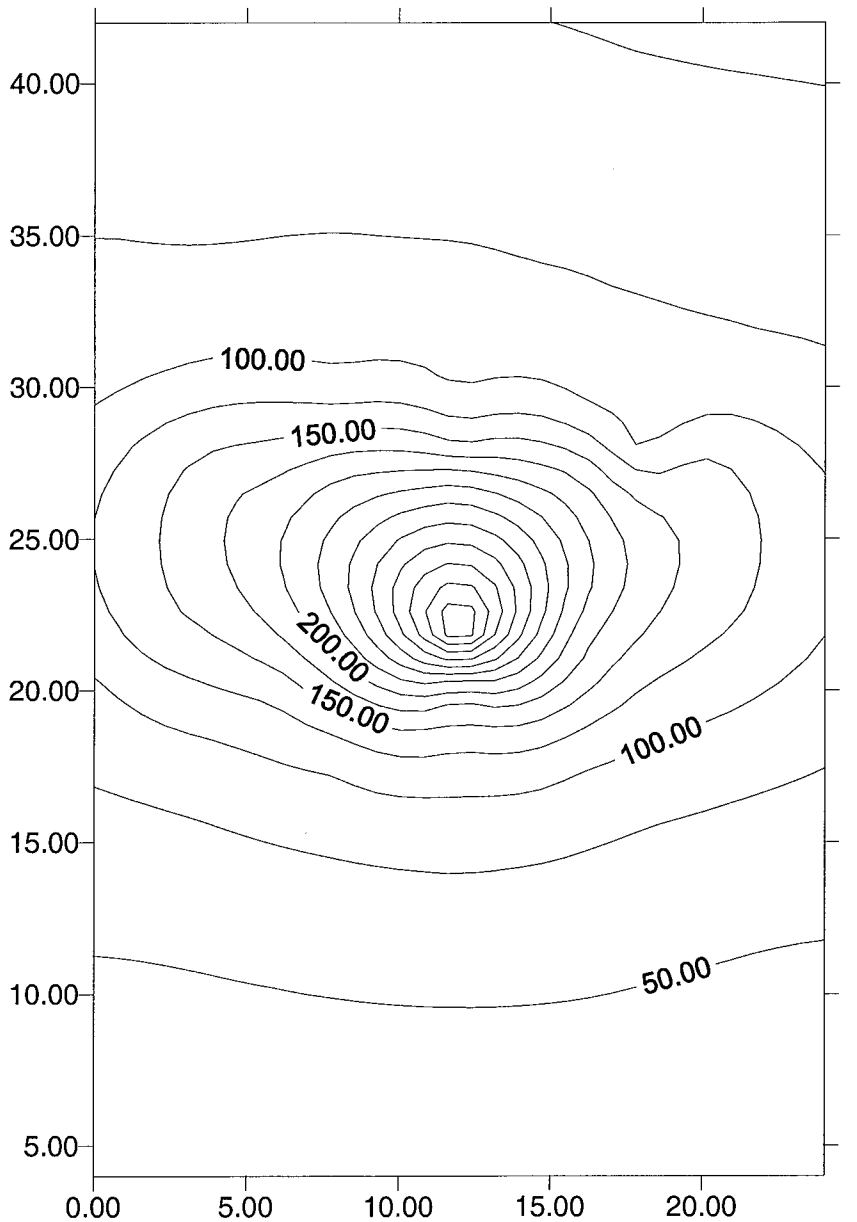

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

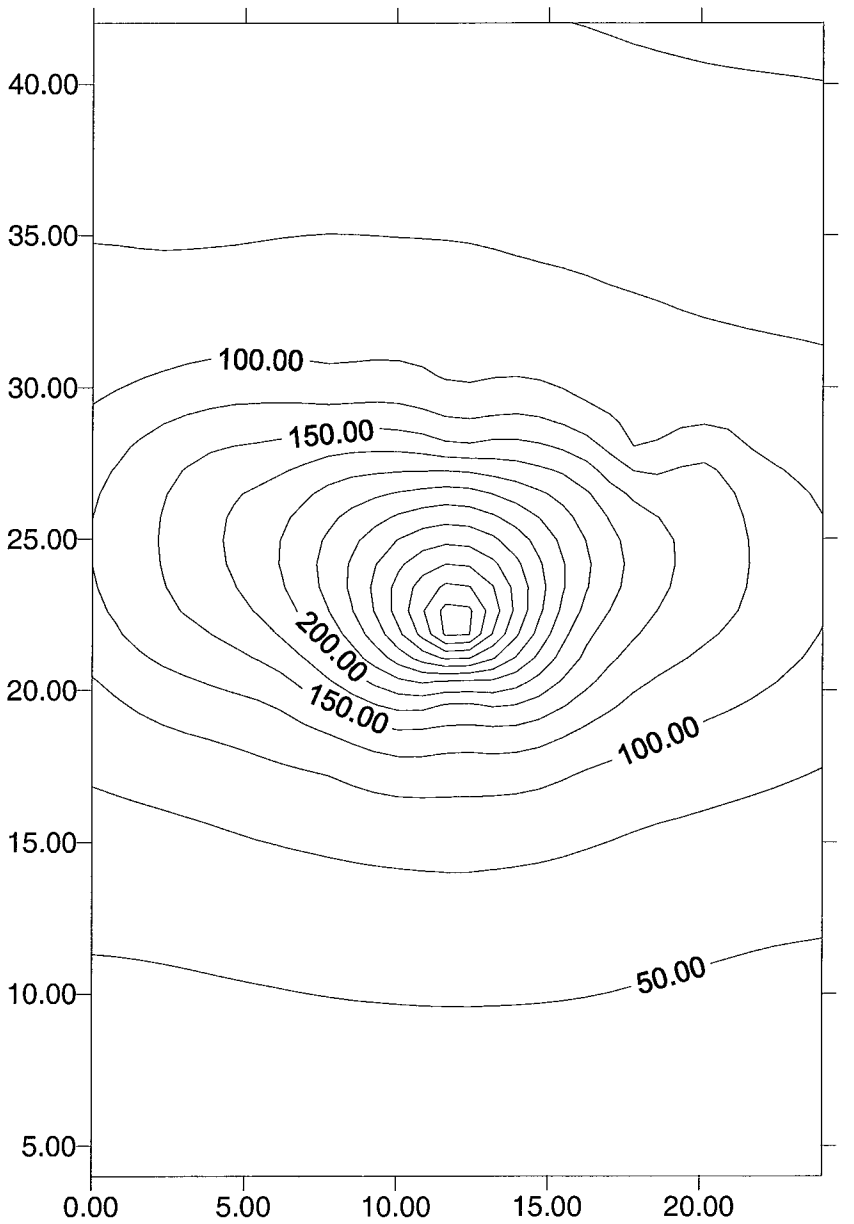

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

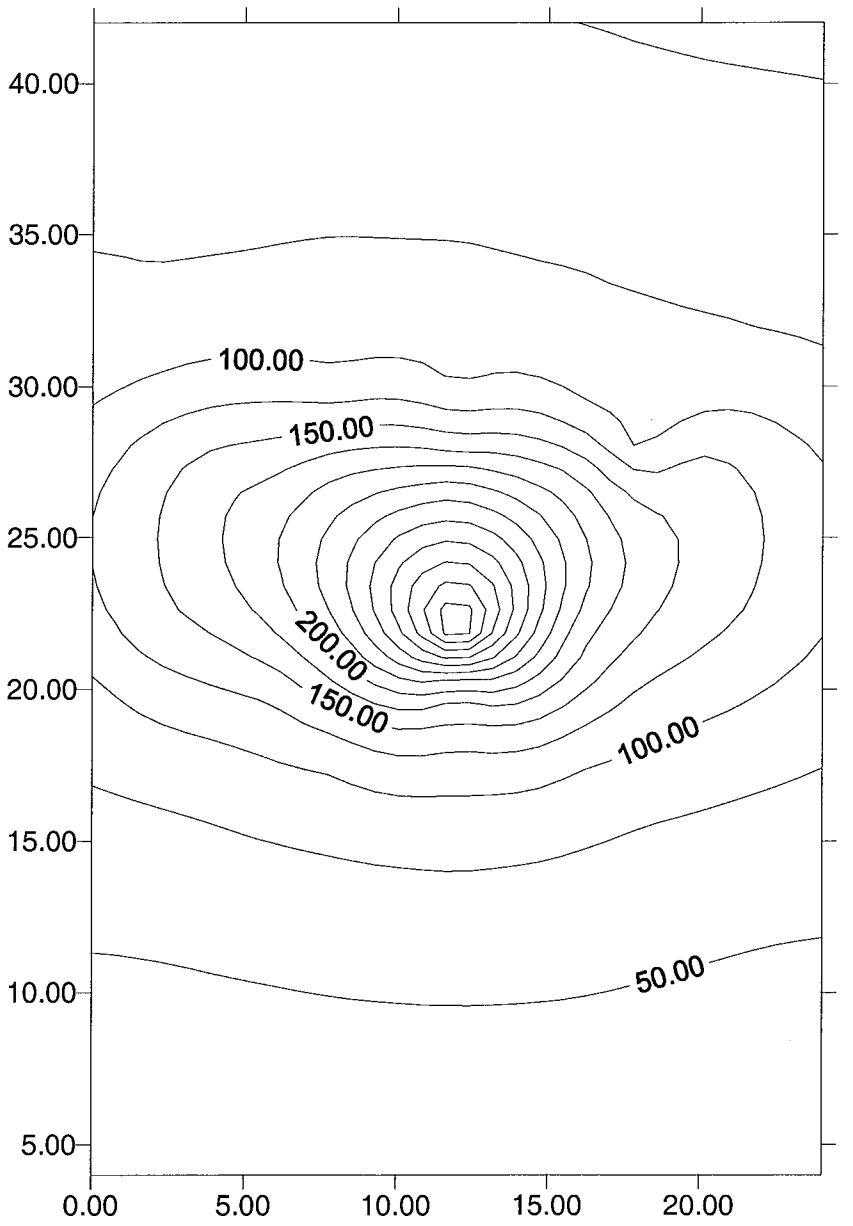

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

2/8


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

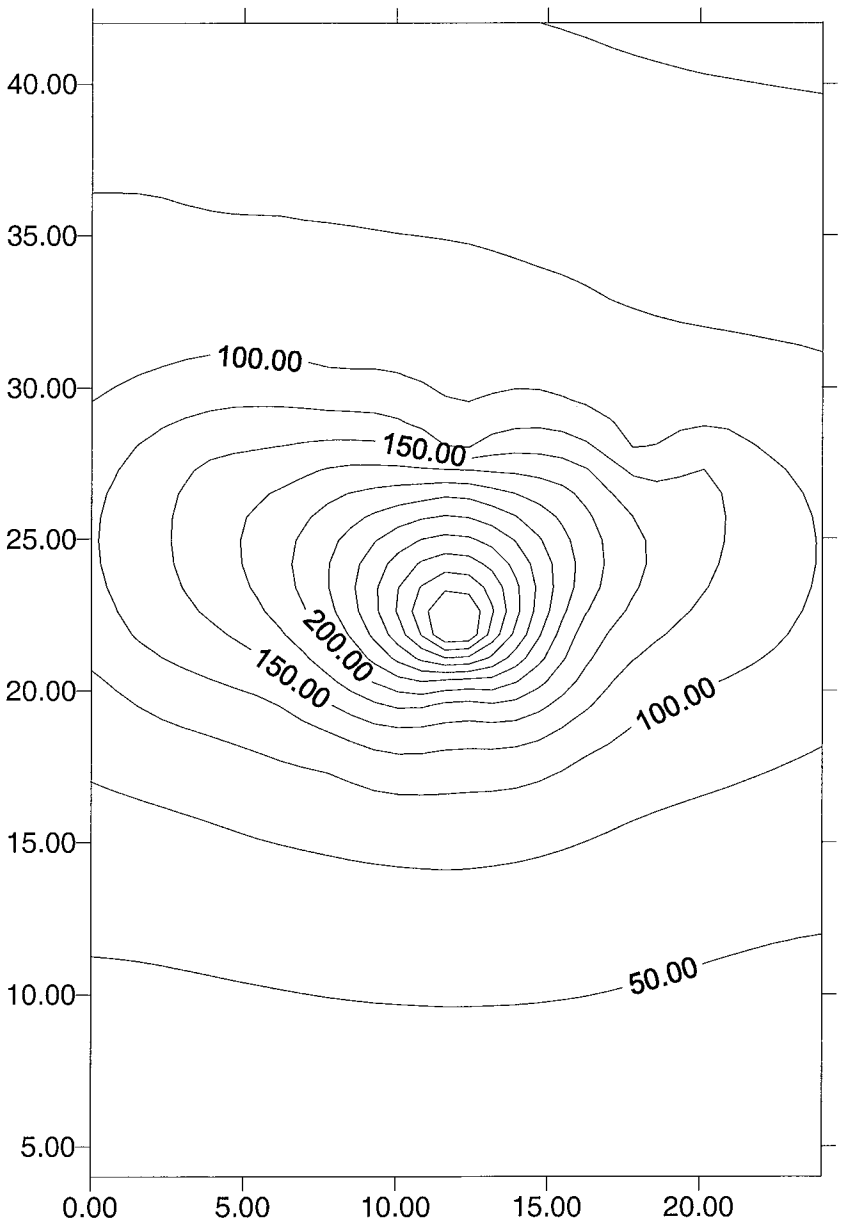

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

2/10

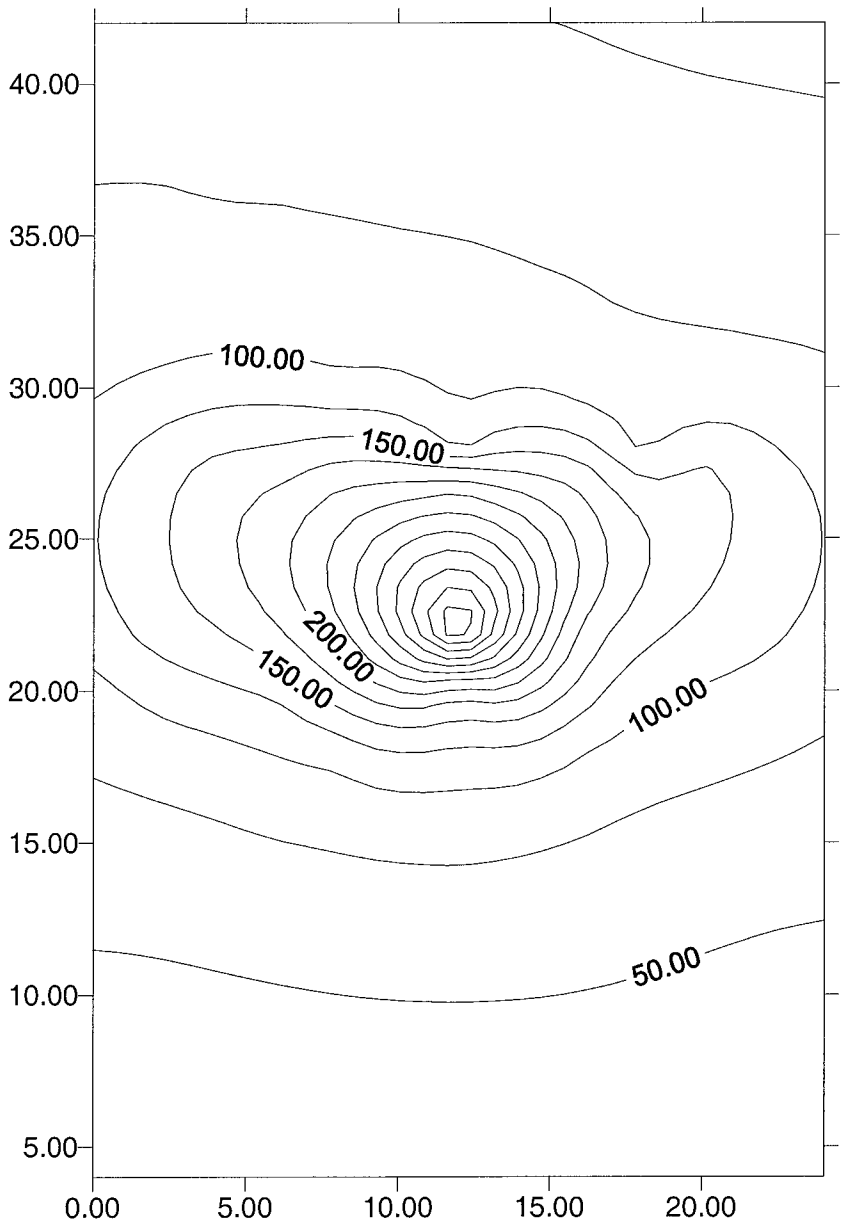


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

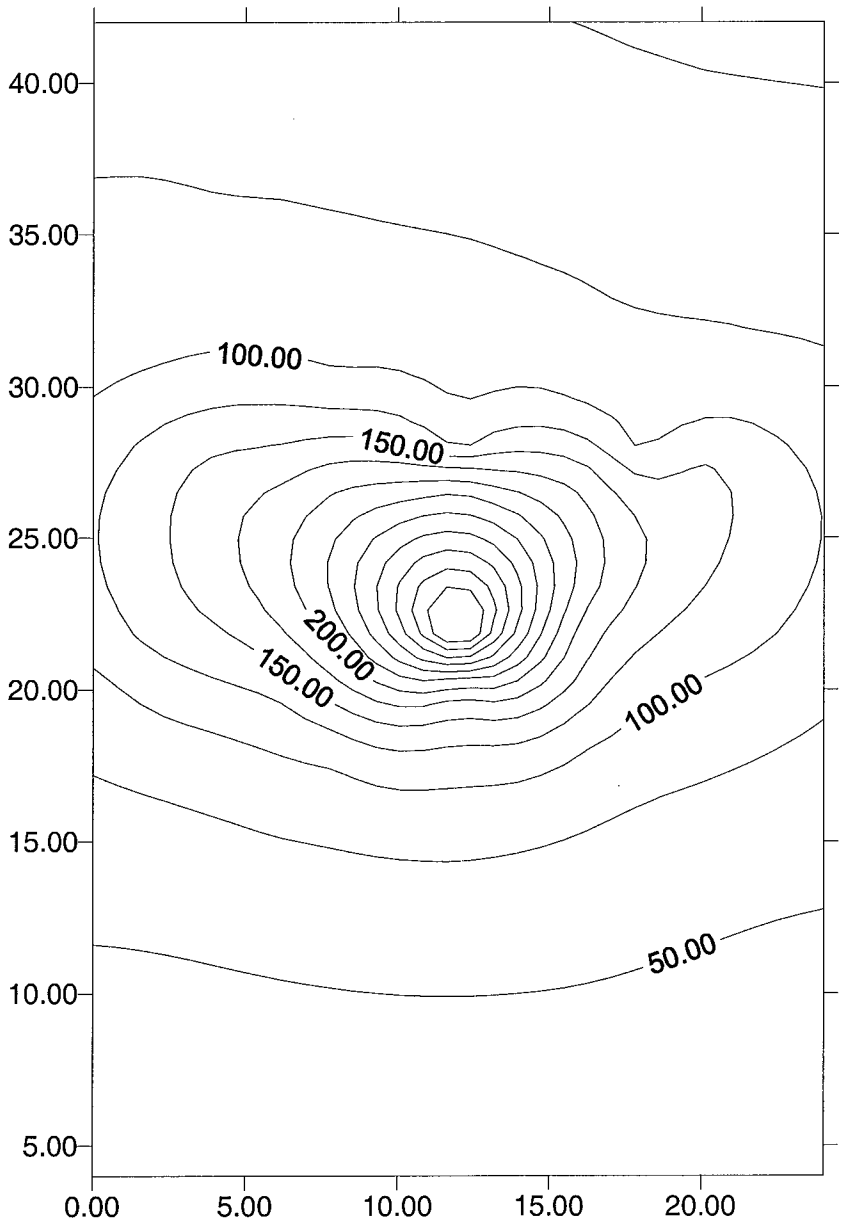
2\11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

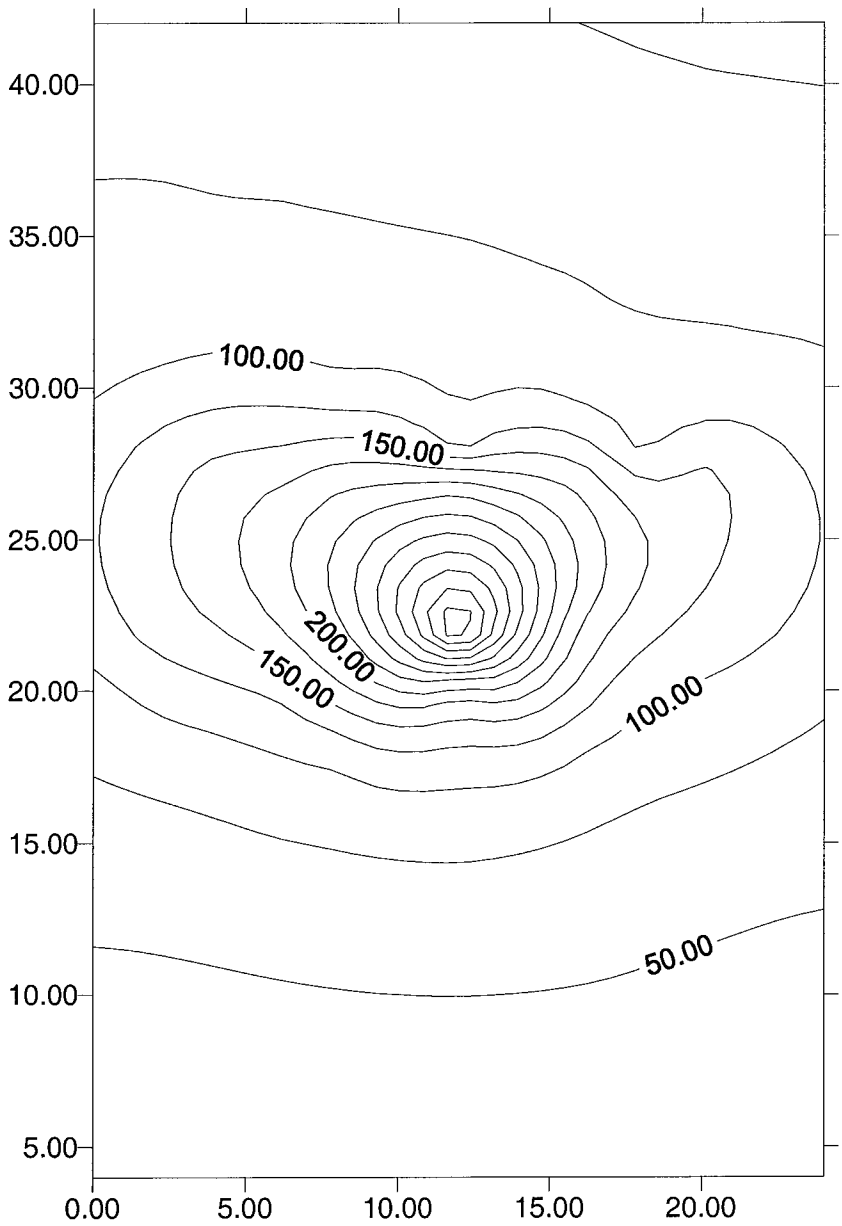
2/12


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

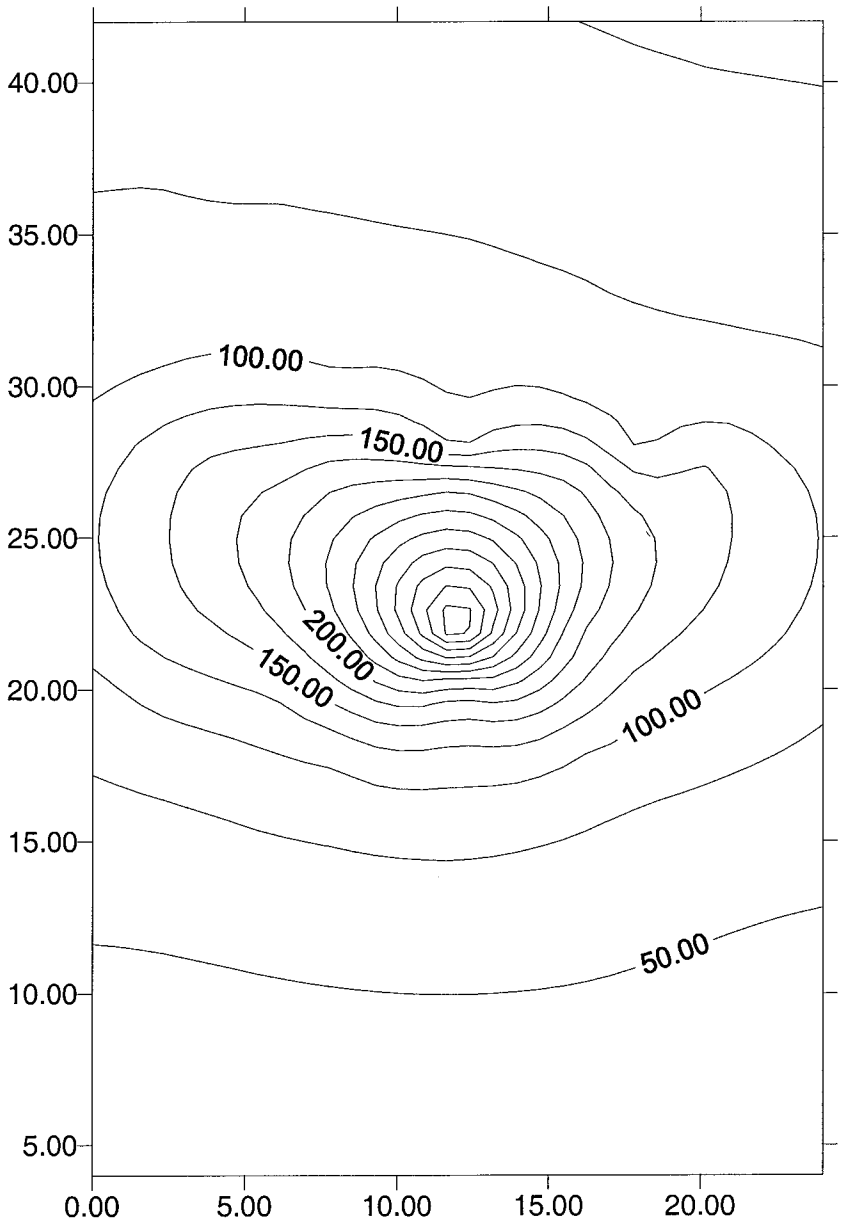
2/13


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

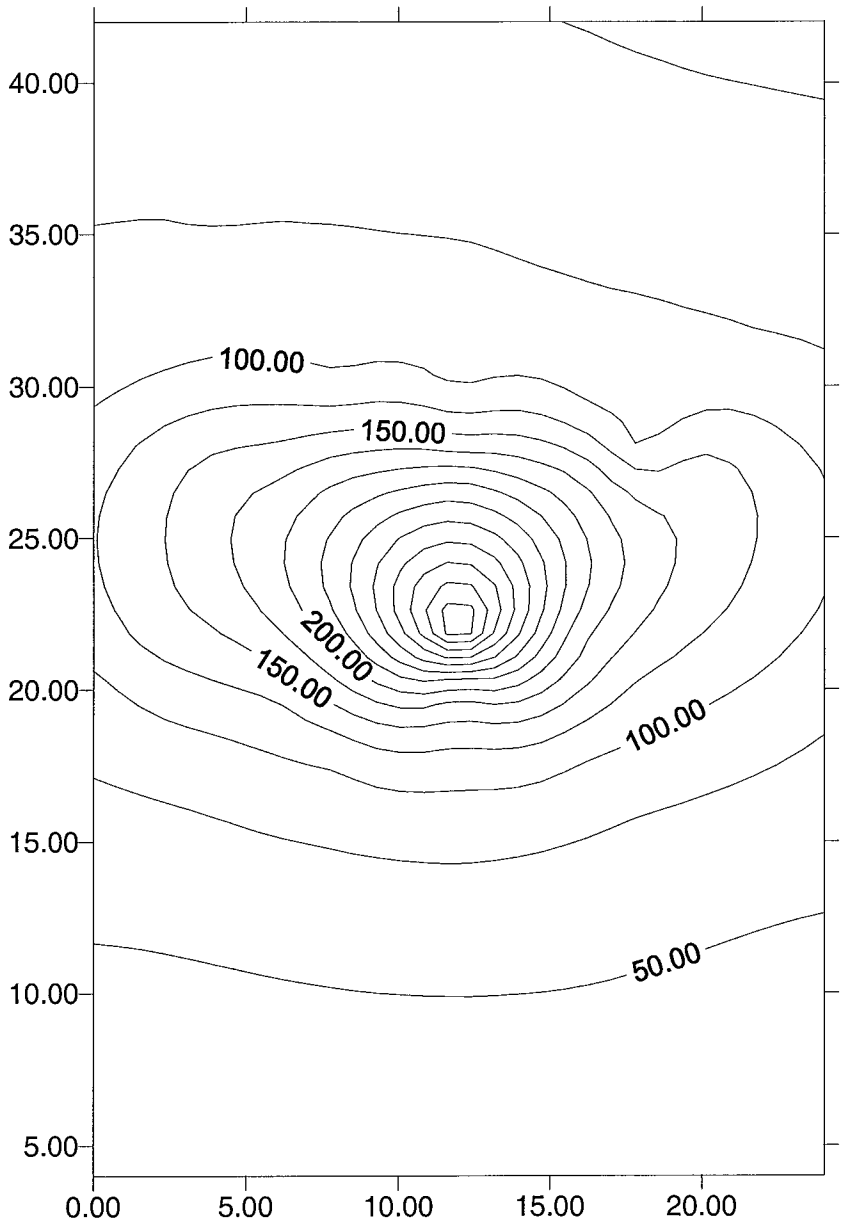
2/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

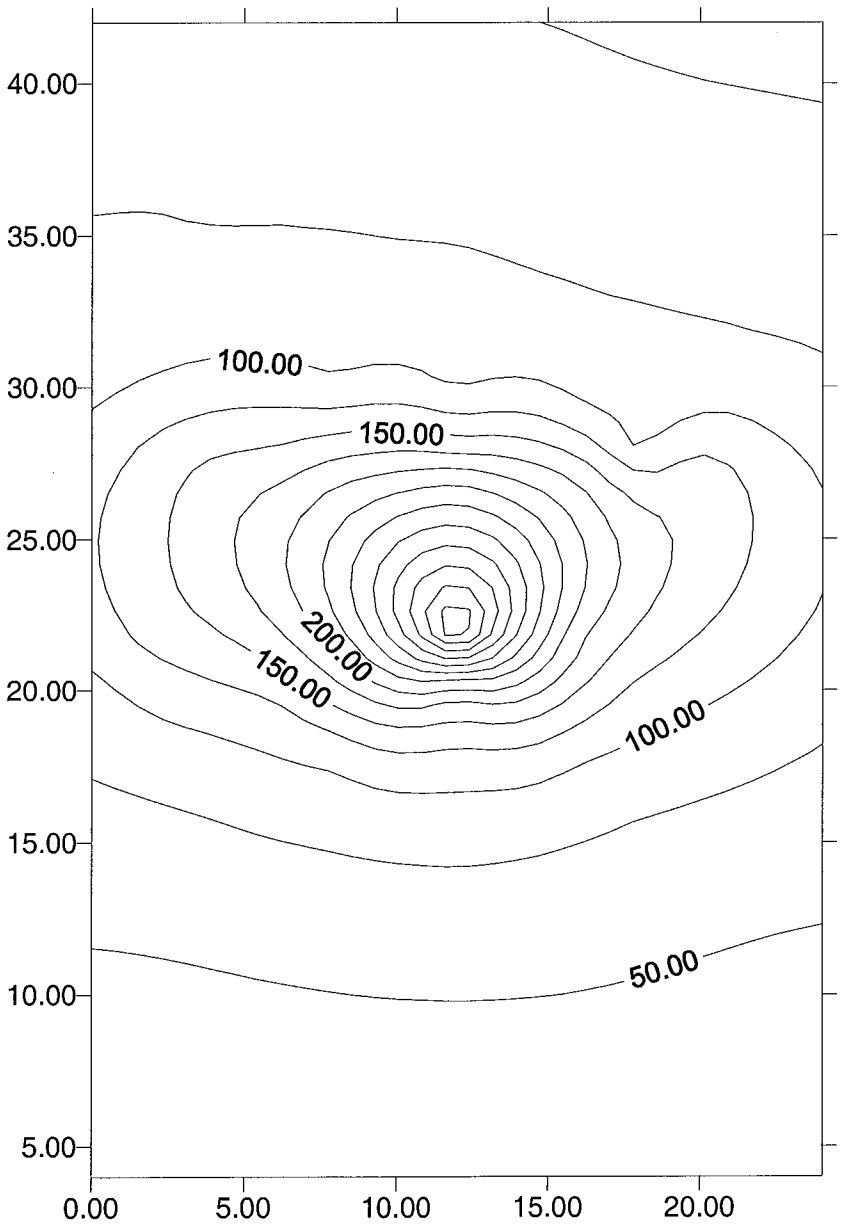
2/15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

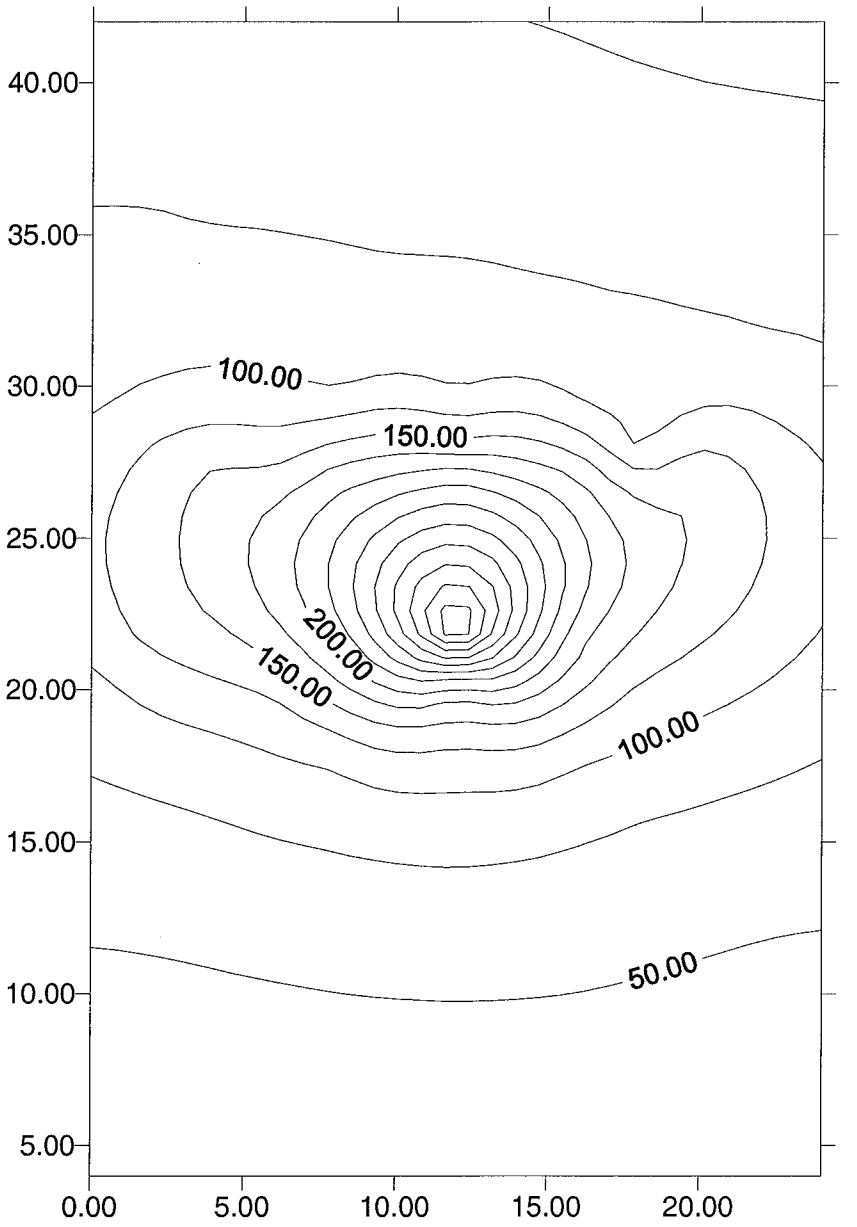
2/16

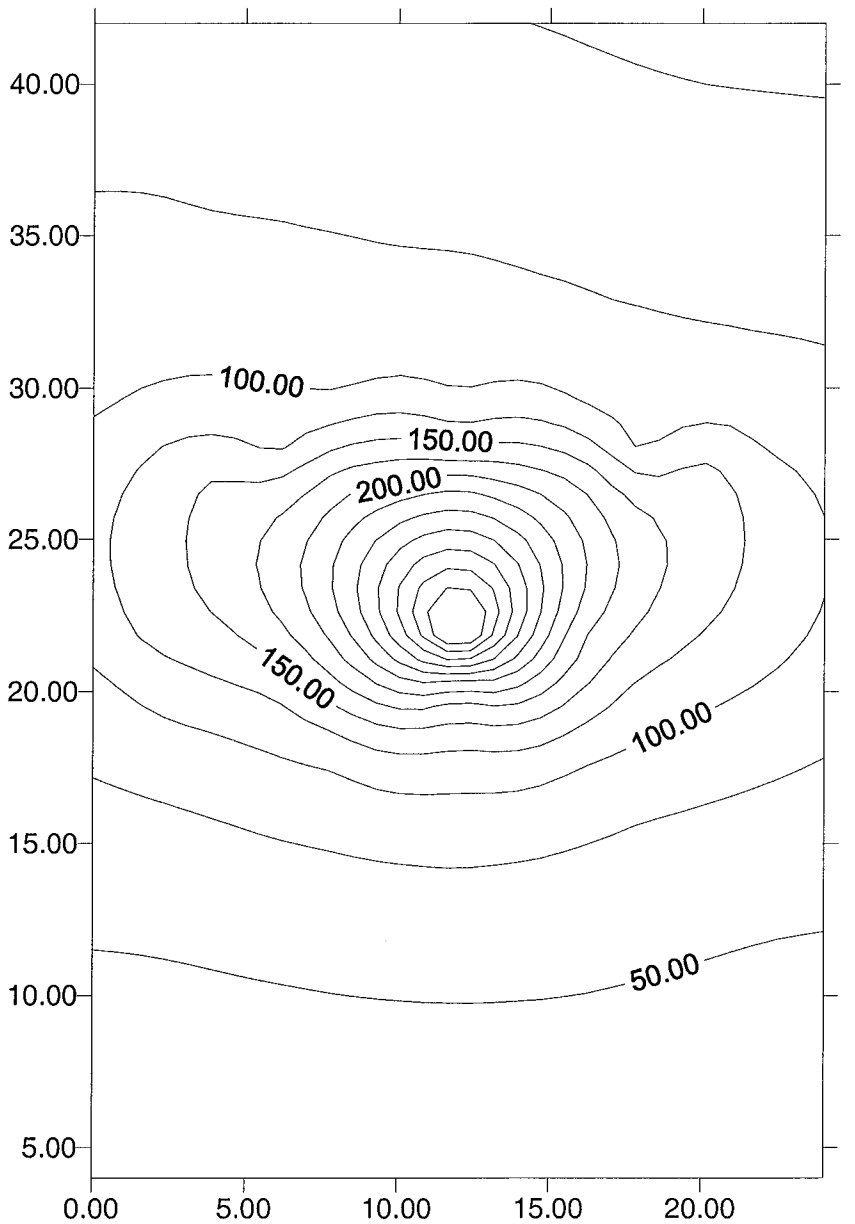

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

2\17

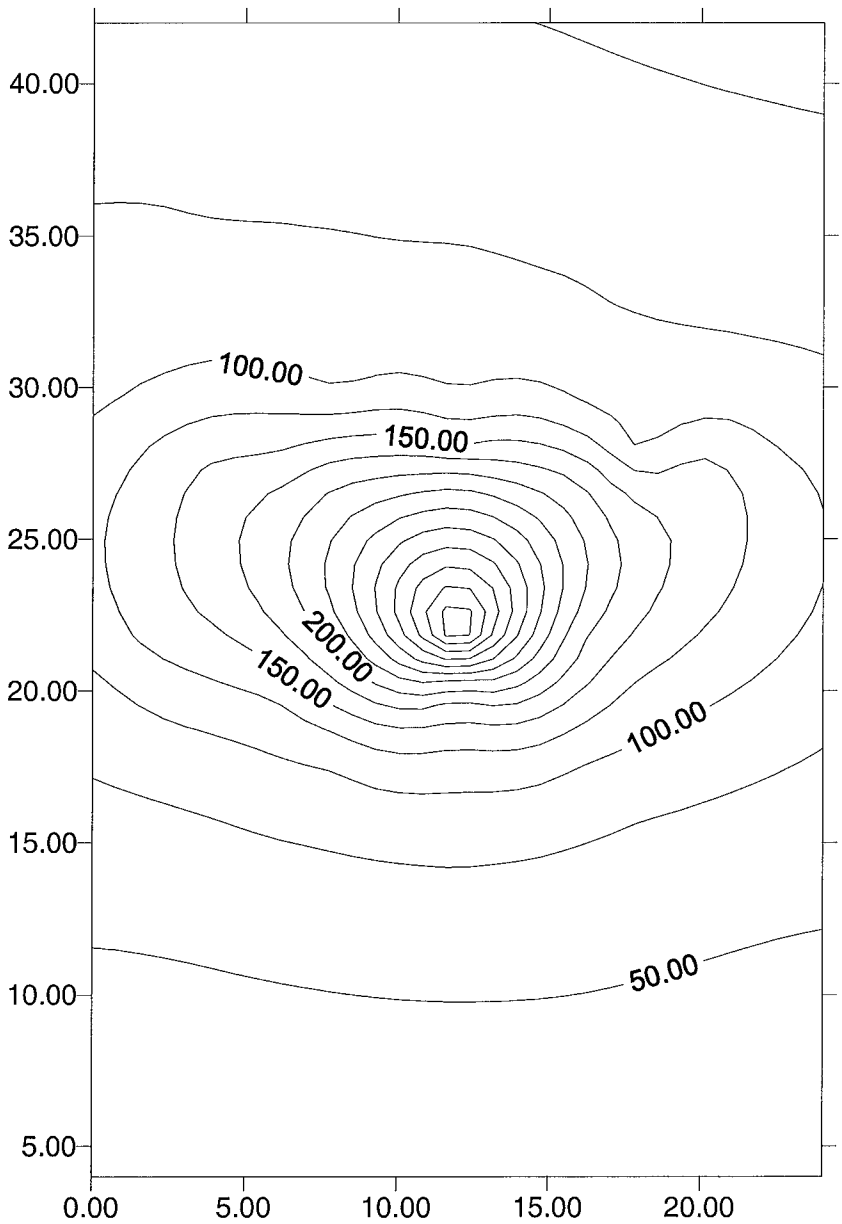

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

2|18

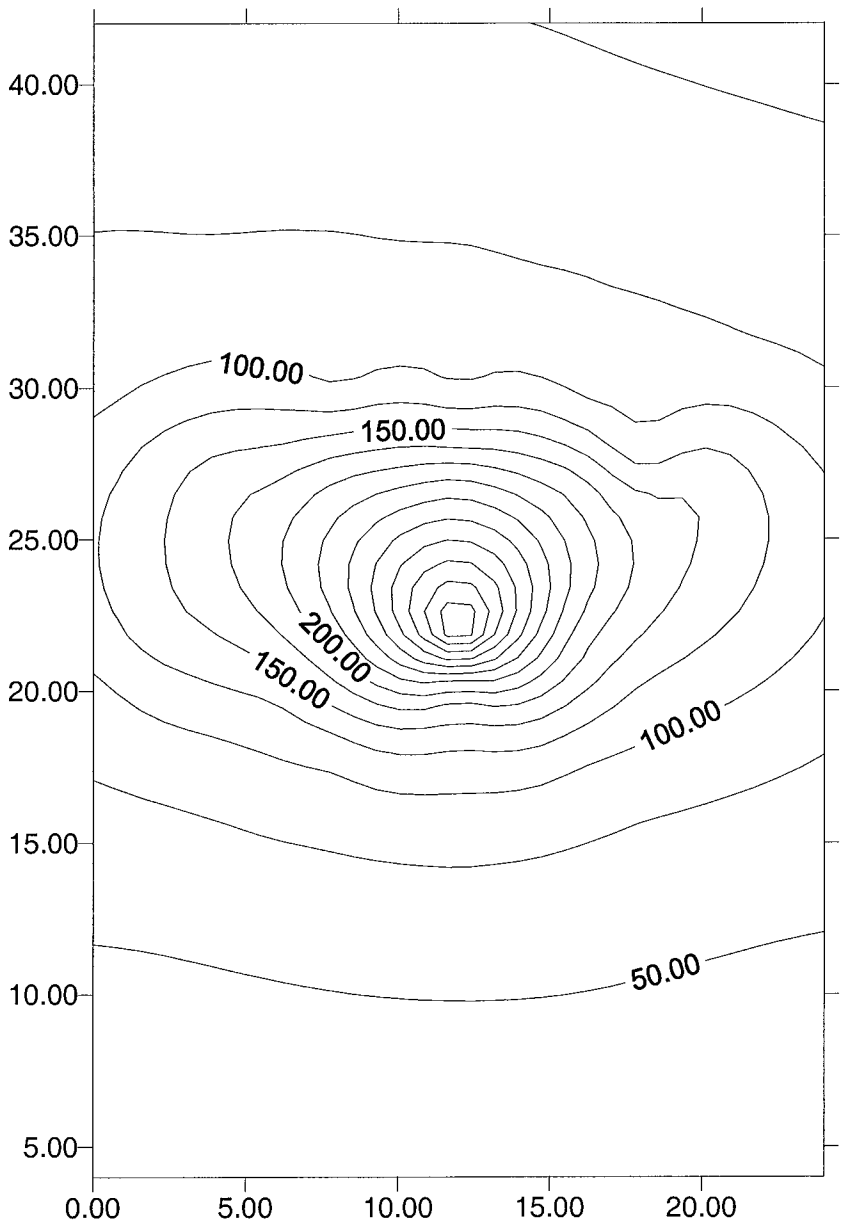

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

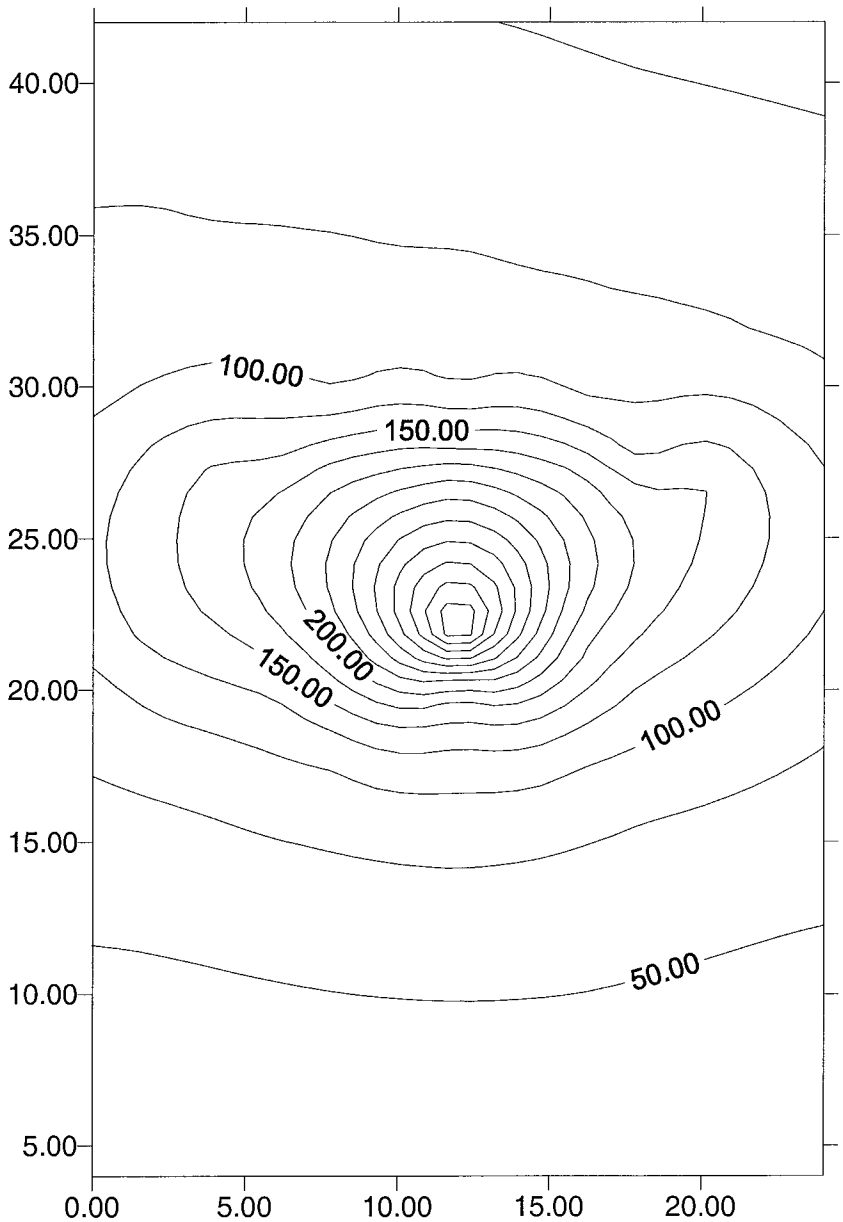
2/20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

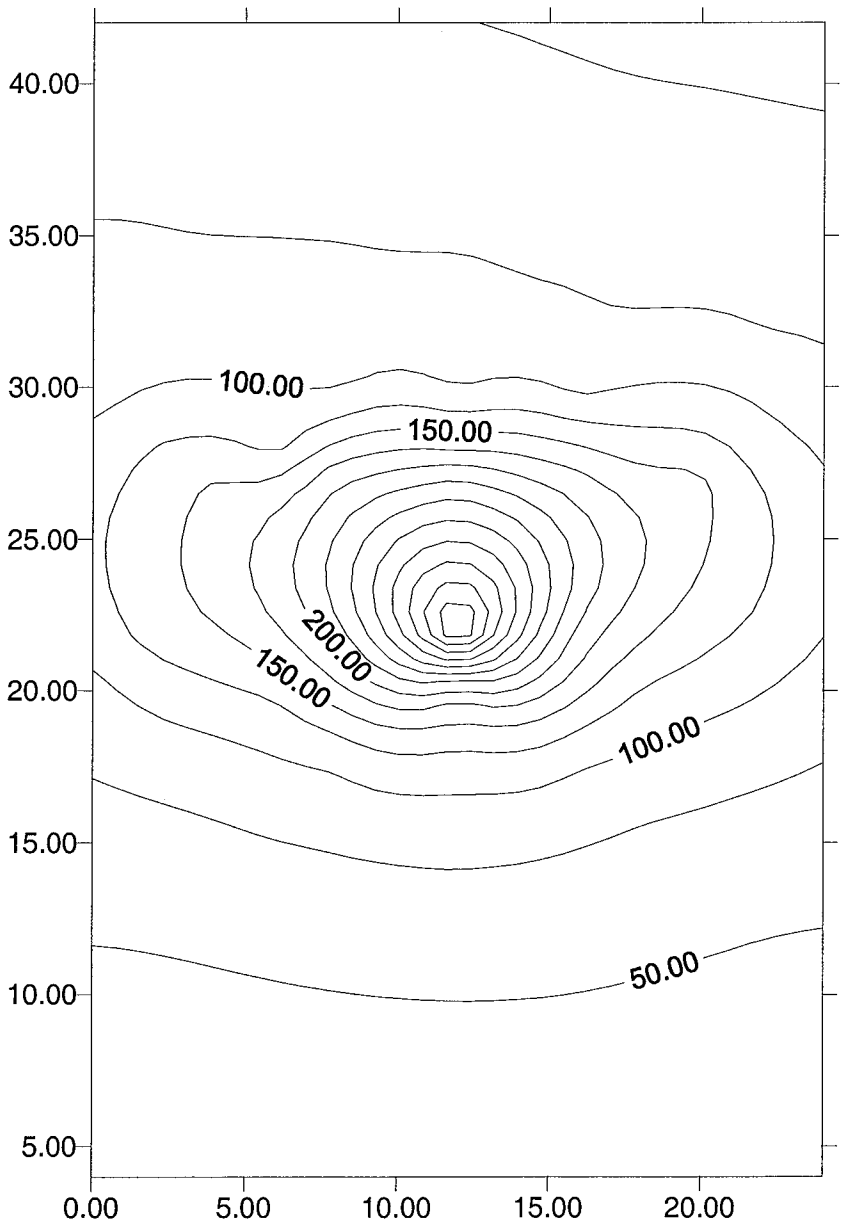
2|21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

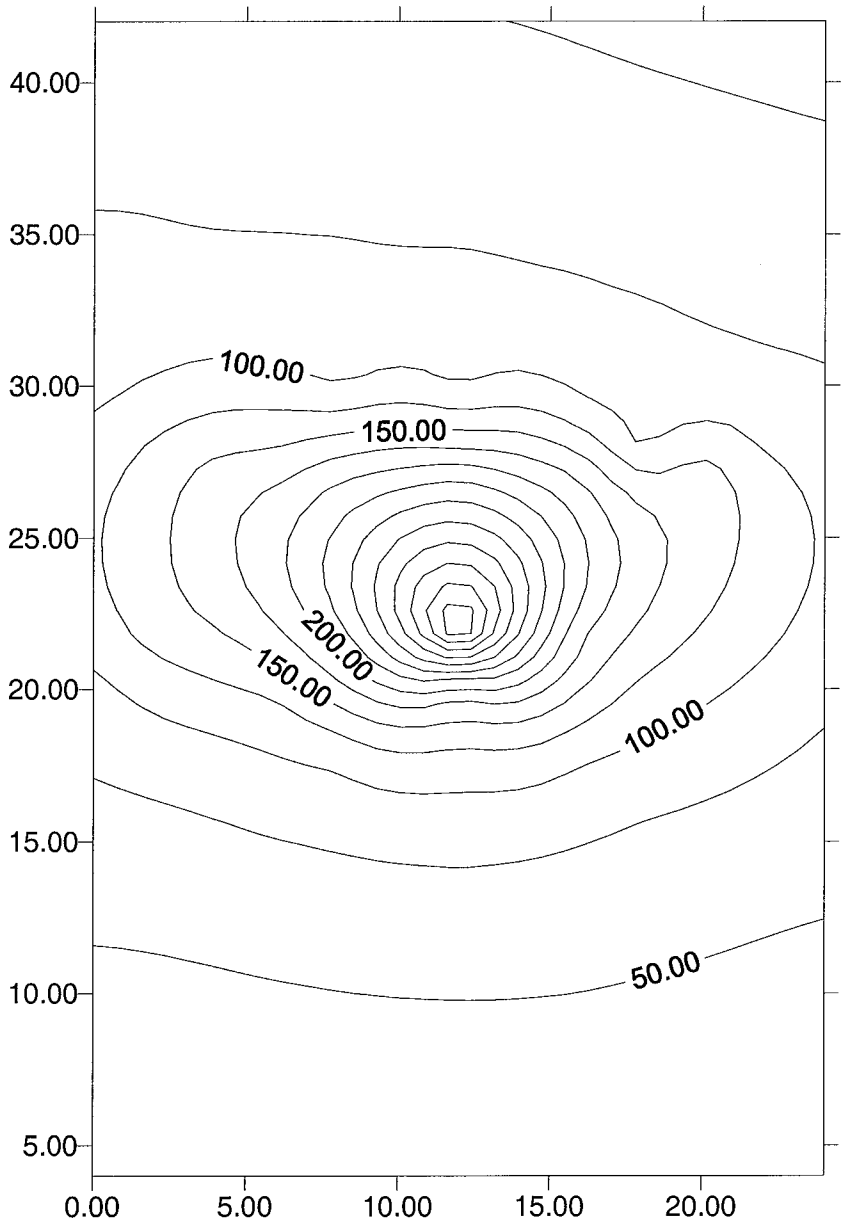
2/22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

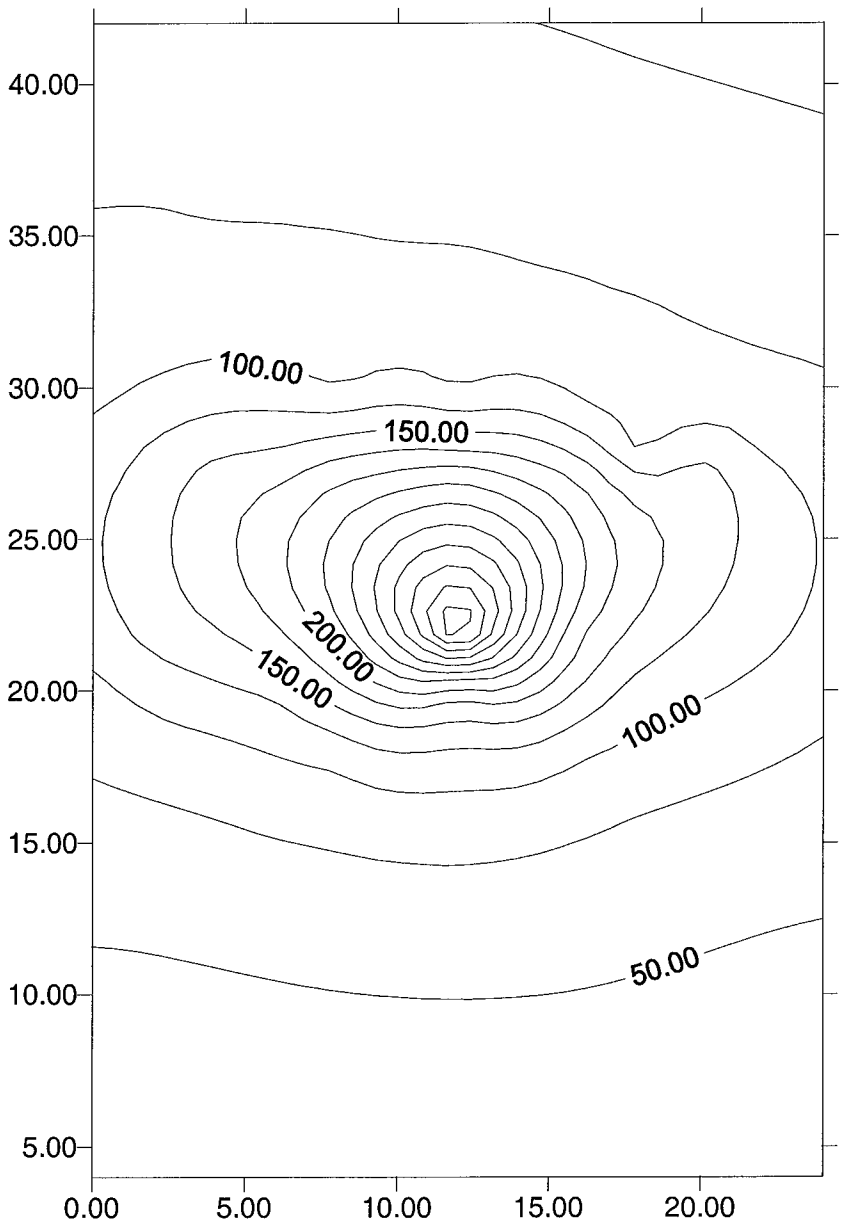
2\23


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

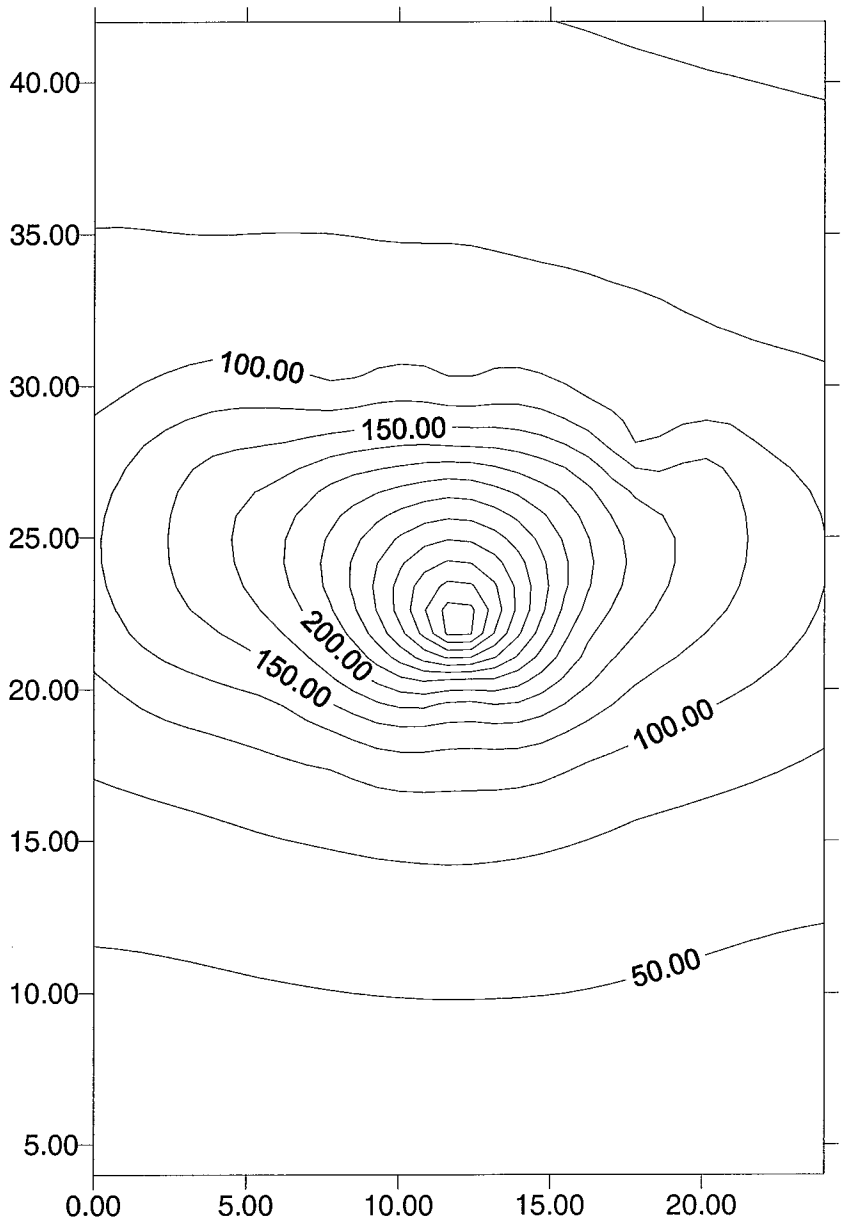
2124


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

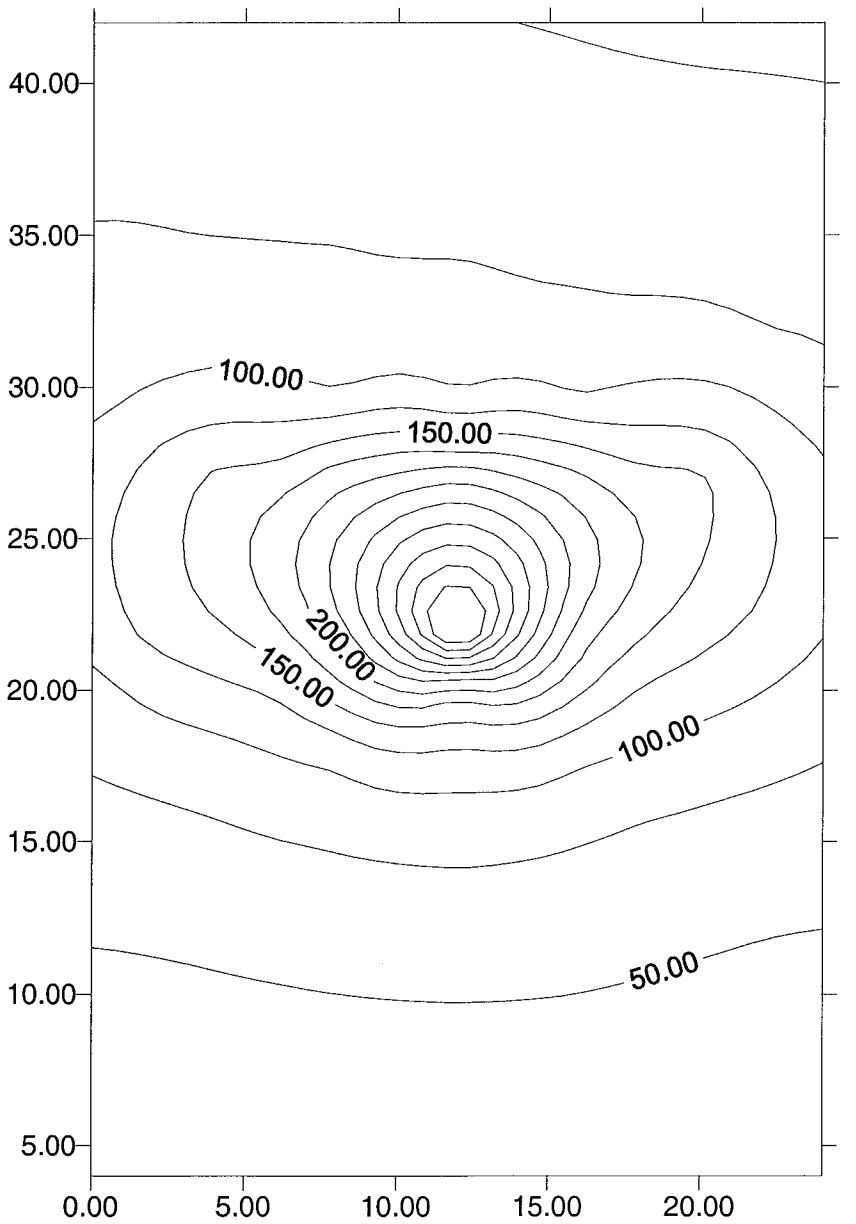
2125


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

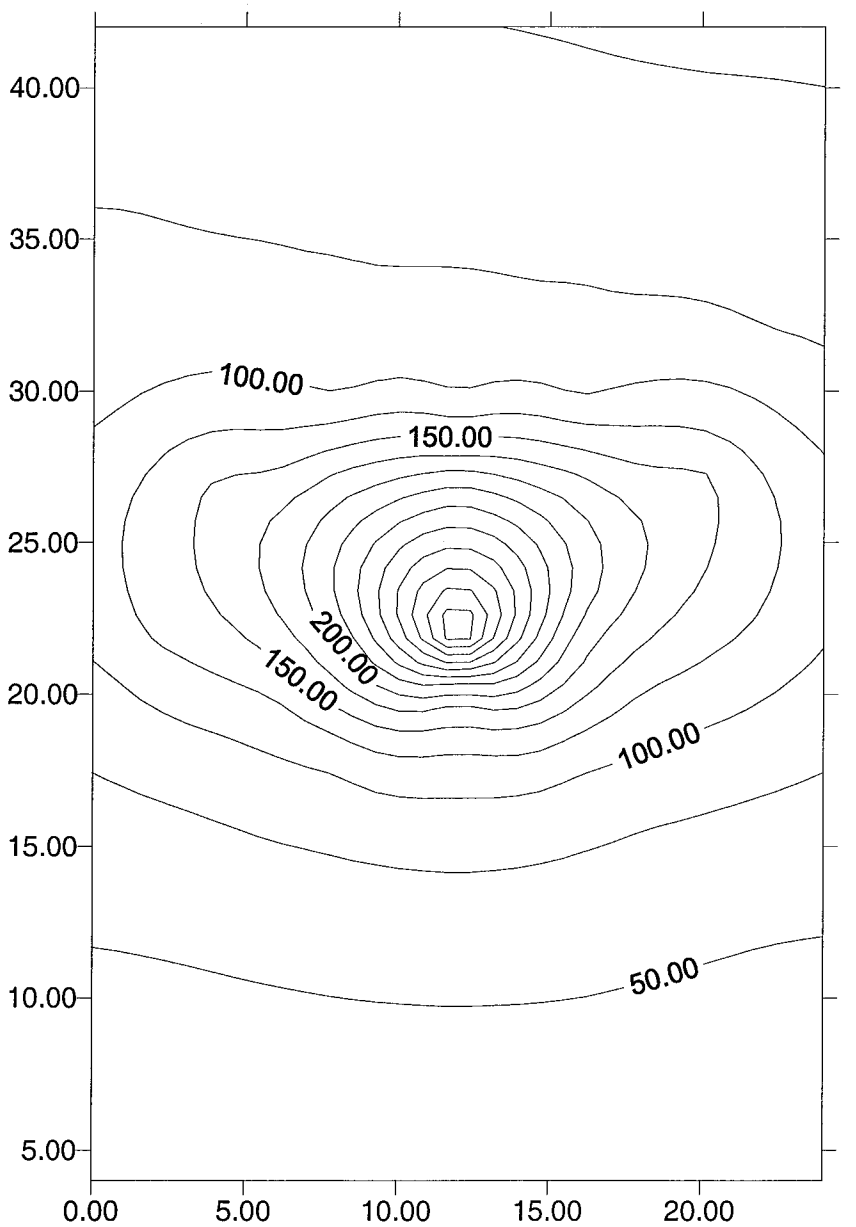
2/26


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

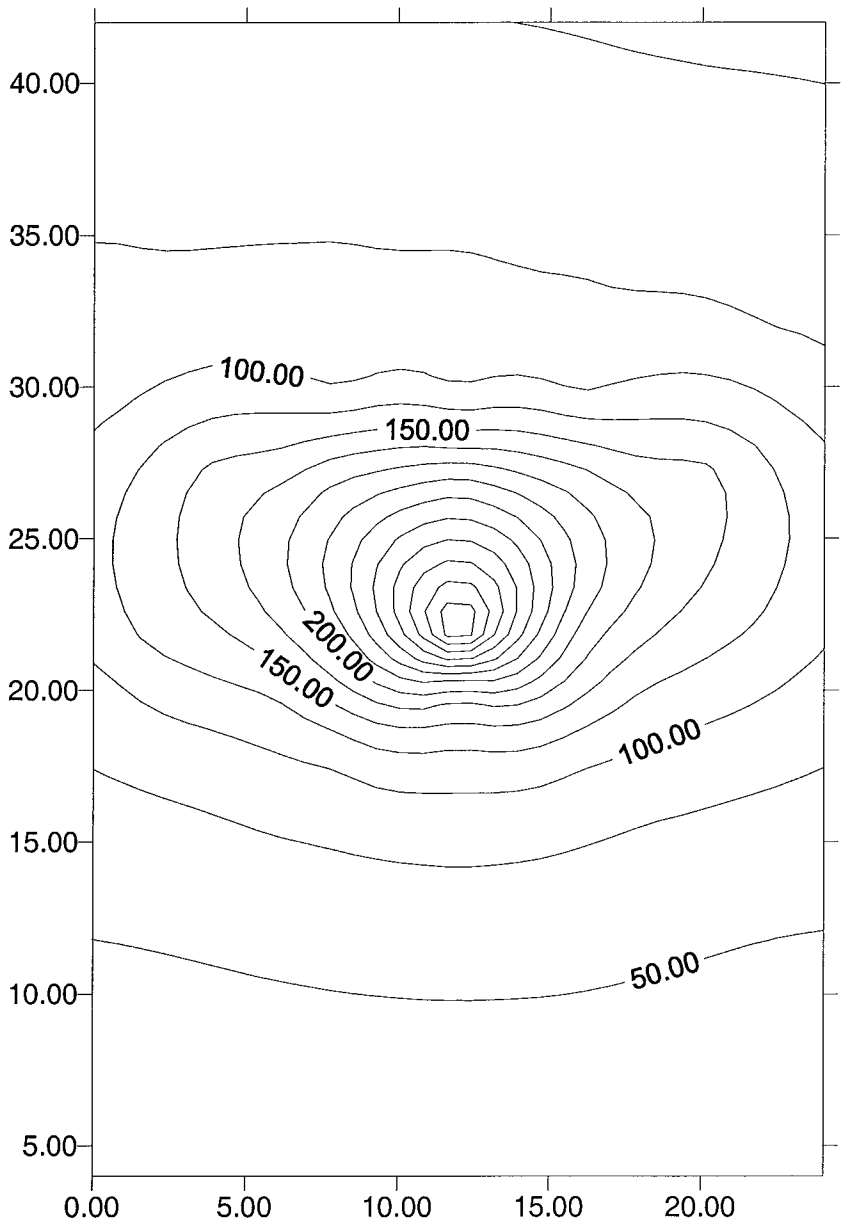
2|27


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

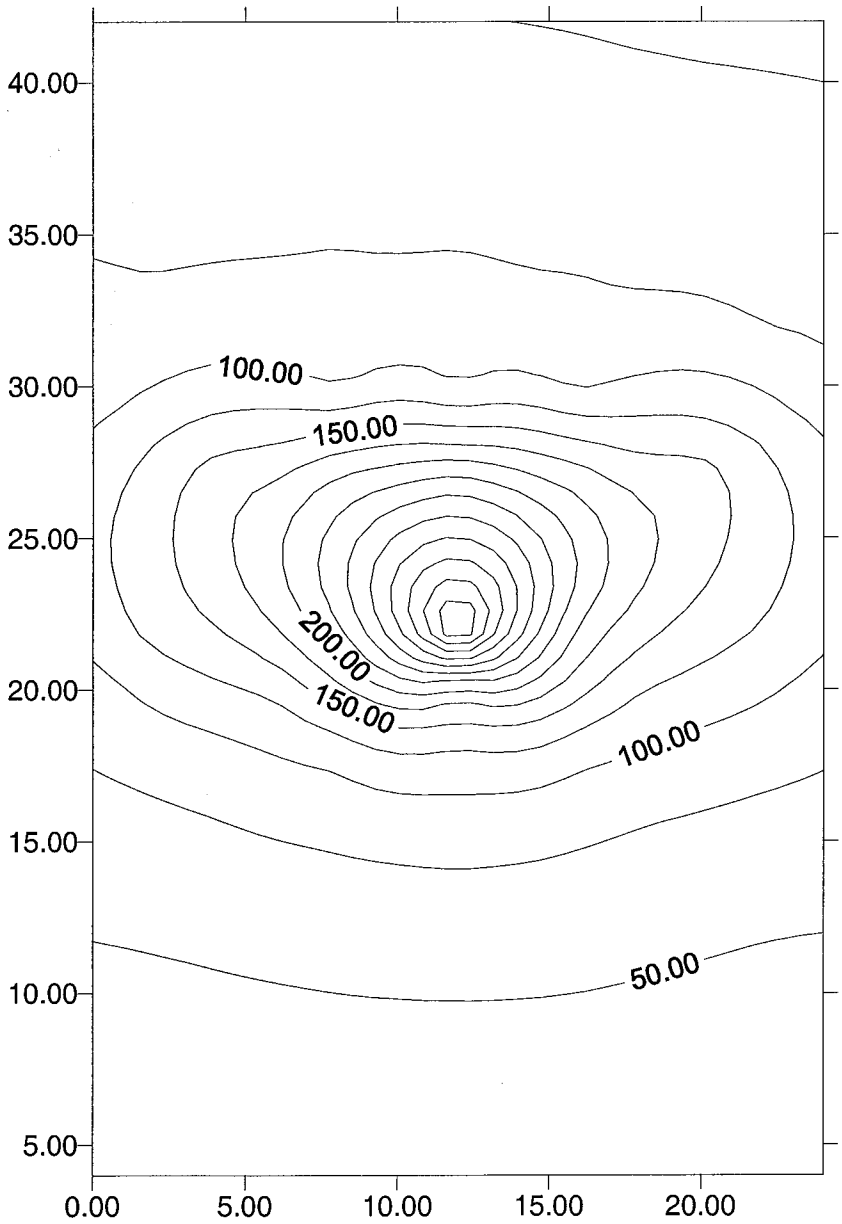
2/28

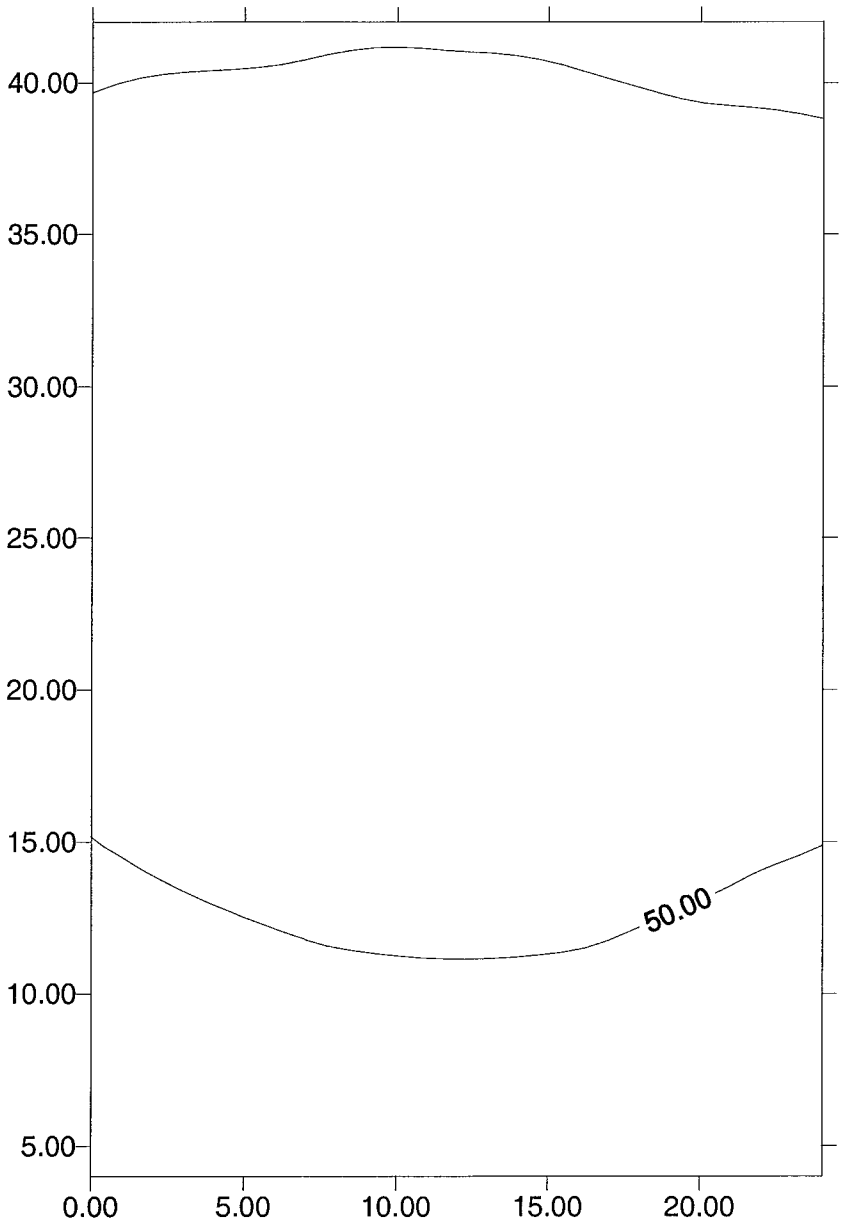

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

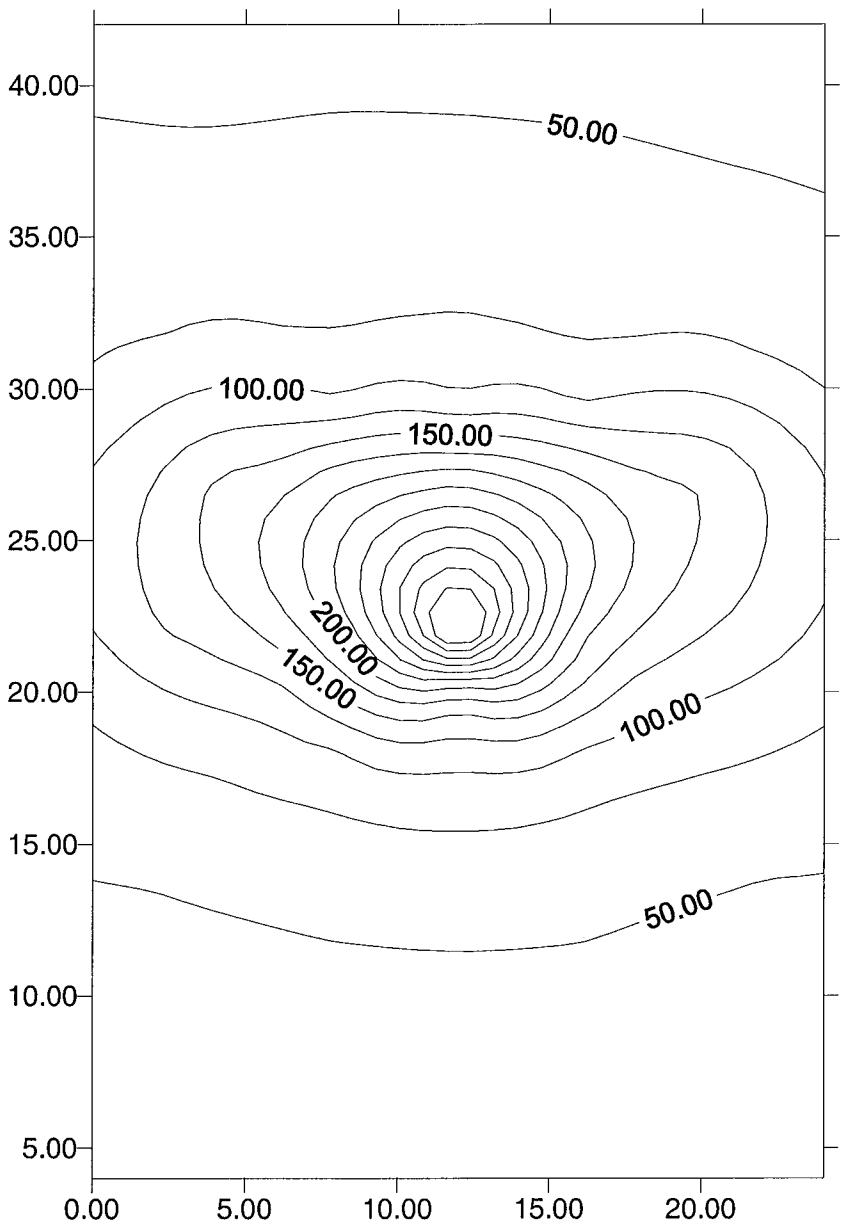
3/1


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

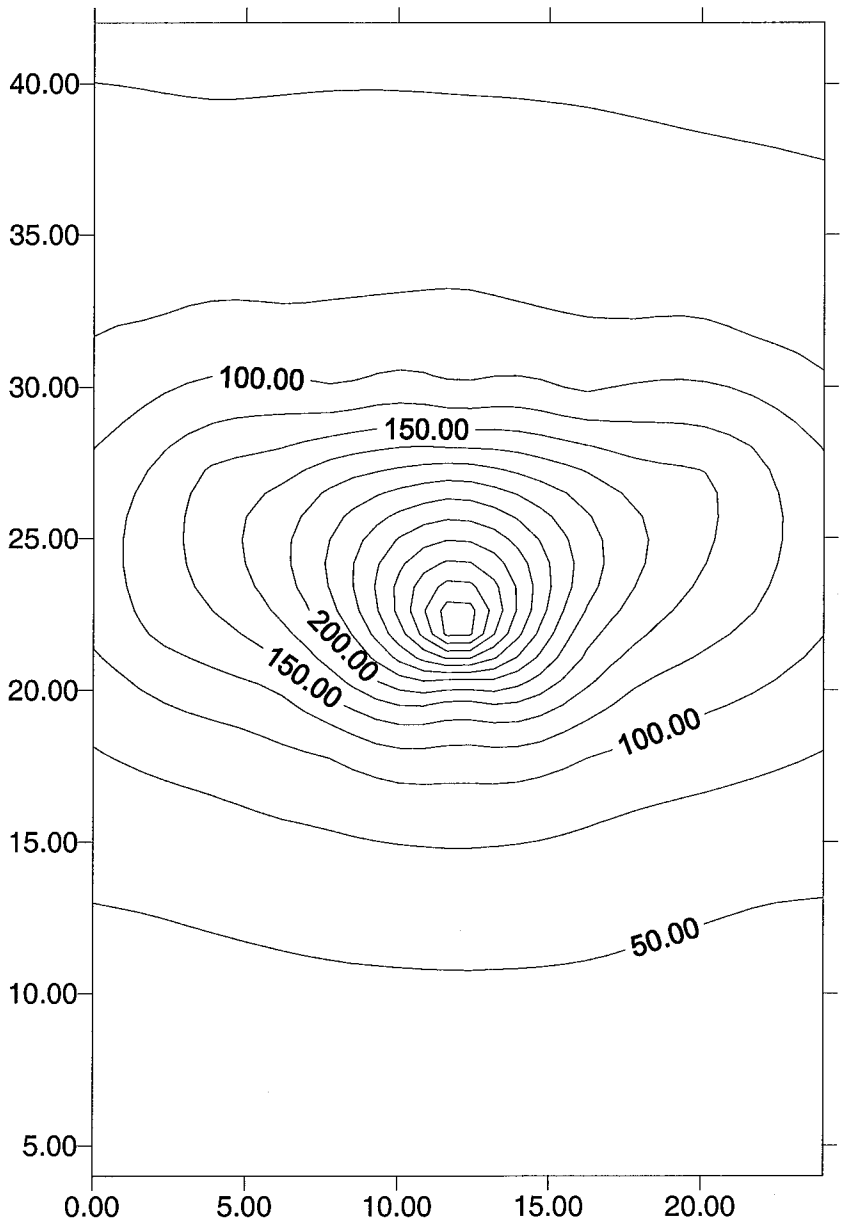
3/2/99


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

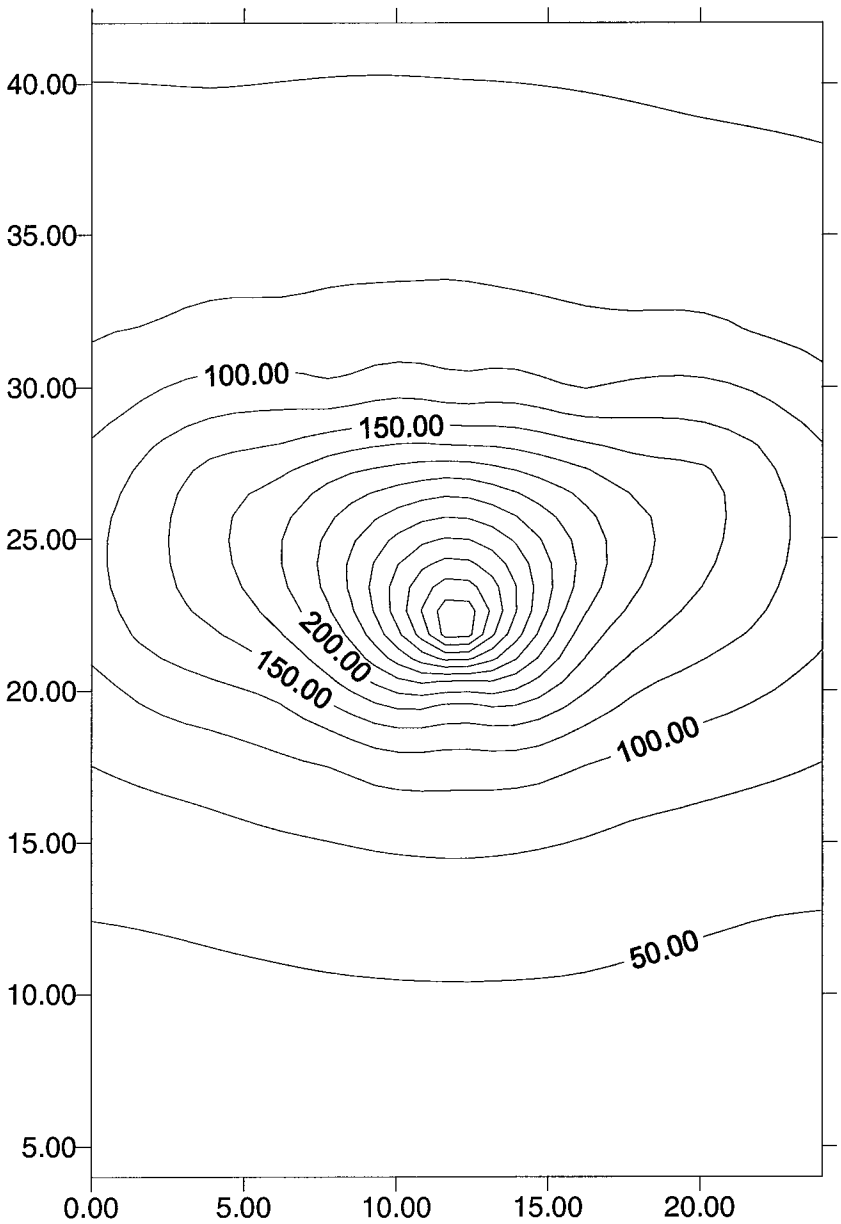

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
200.00
150.00
100.00
50.00

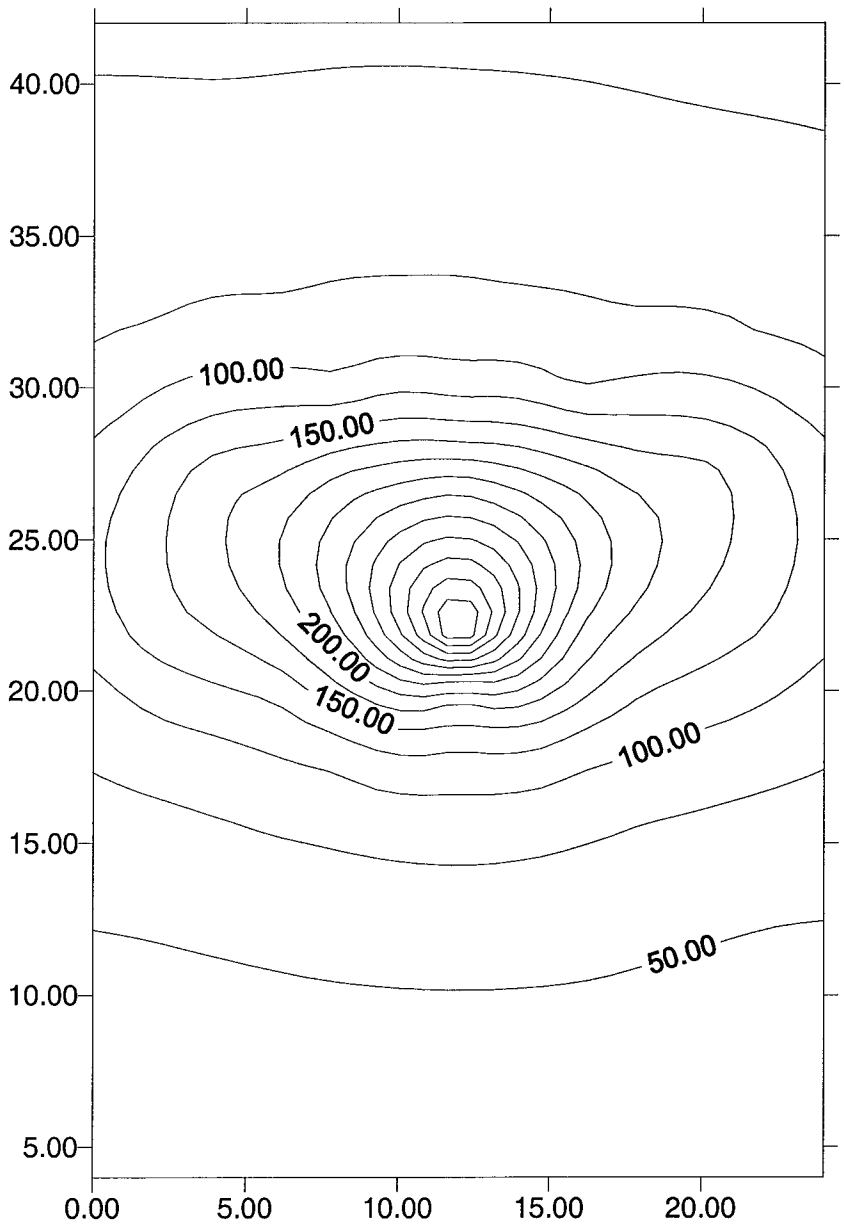
315

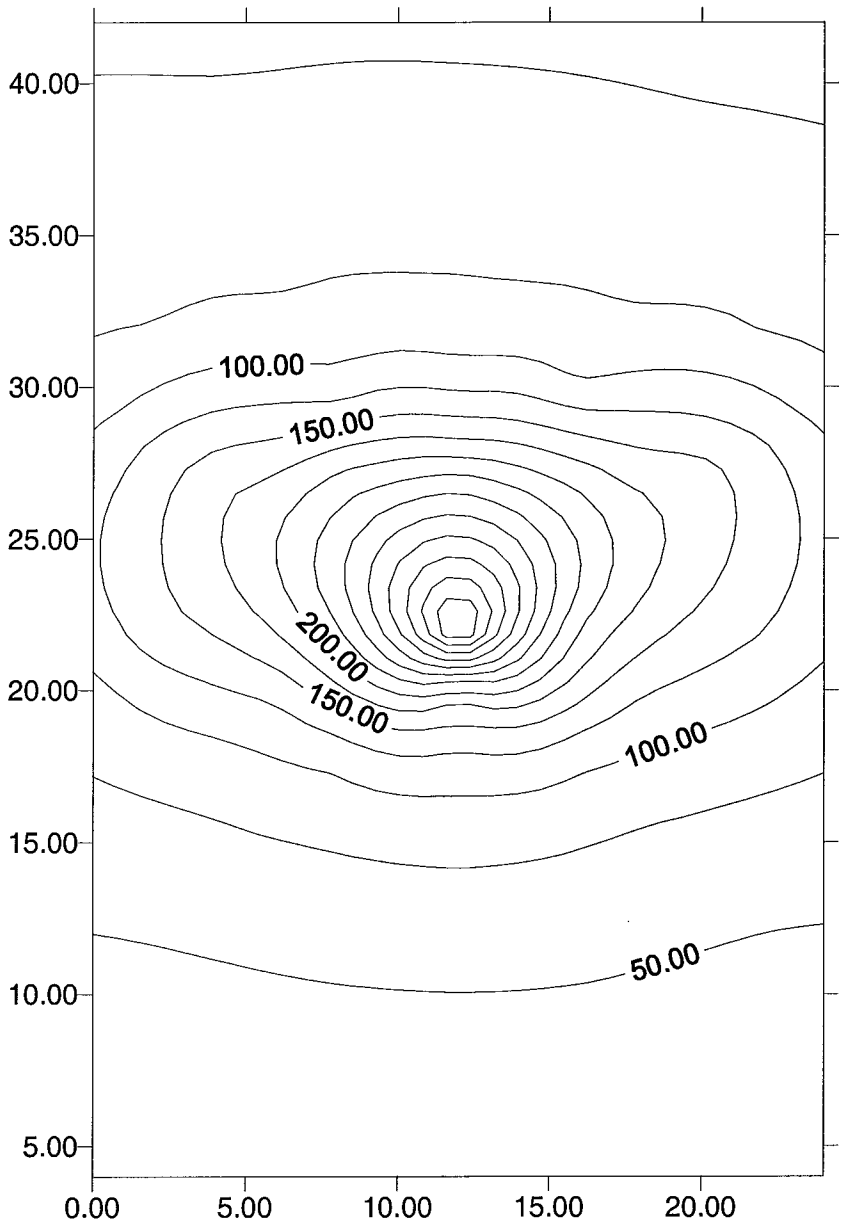

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

3/6

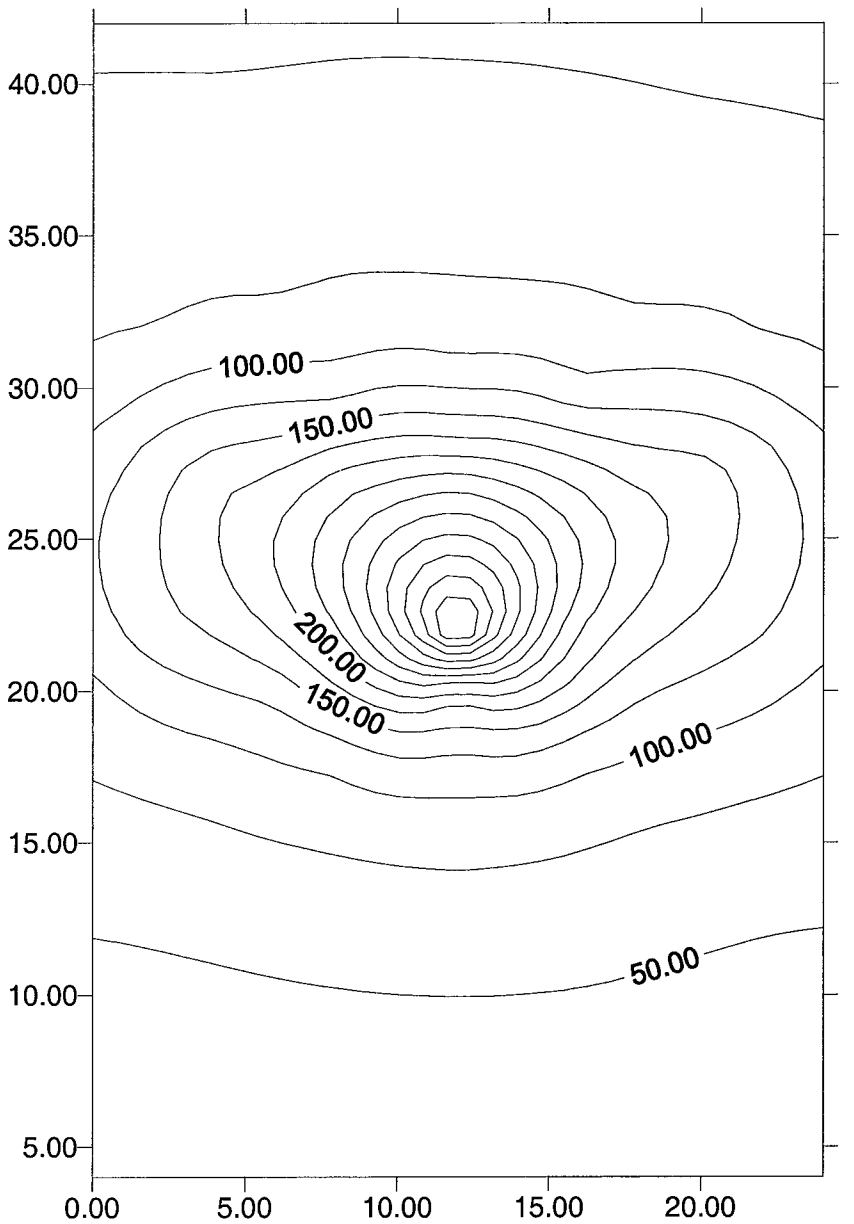

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

3/7

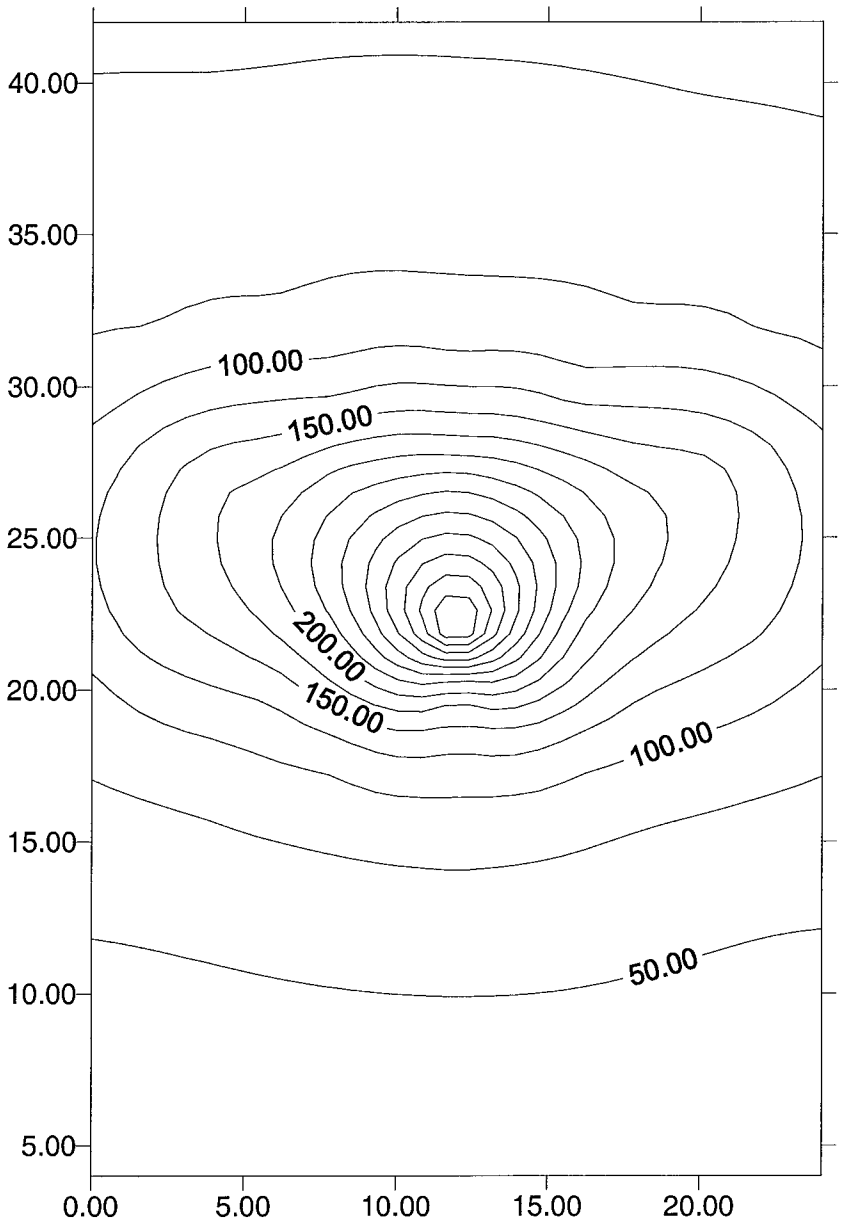

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

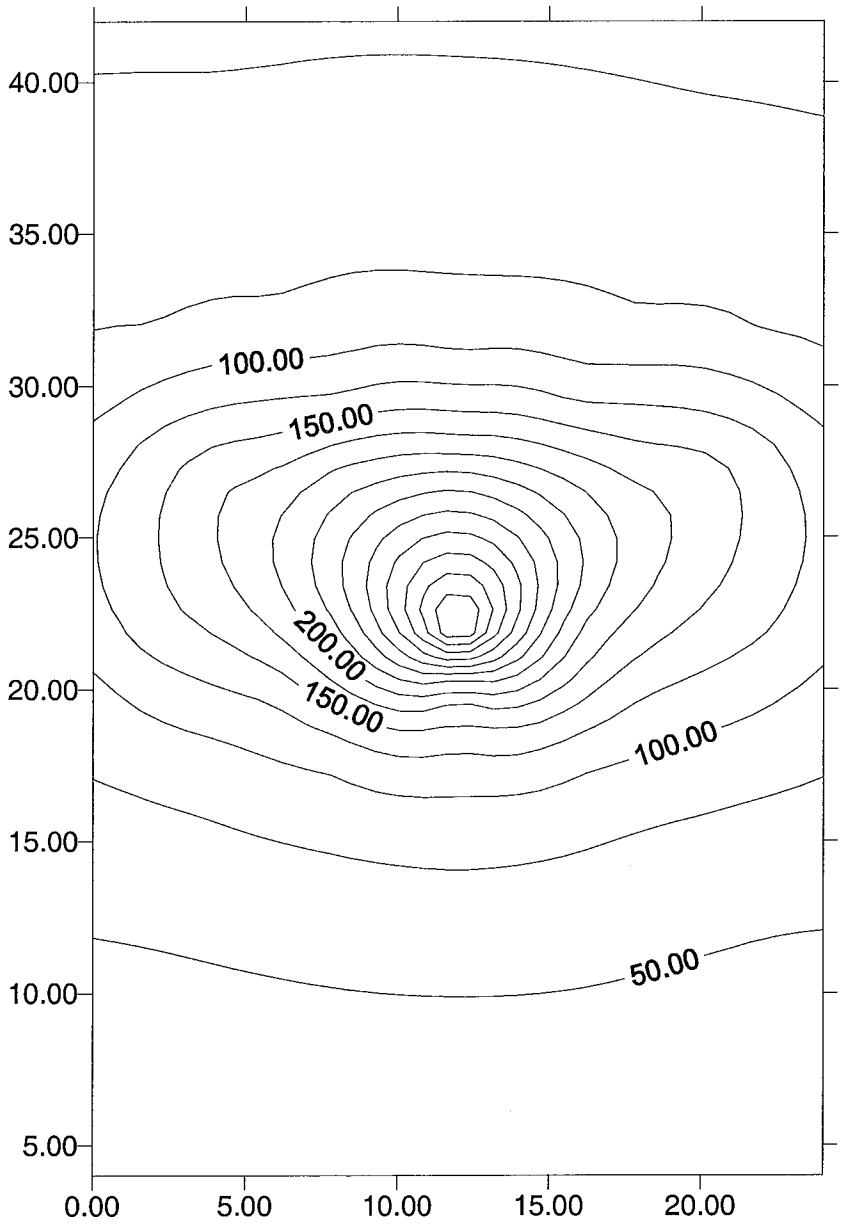
3|9


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

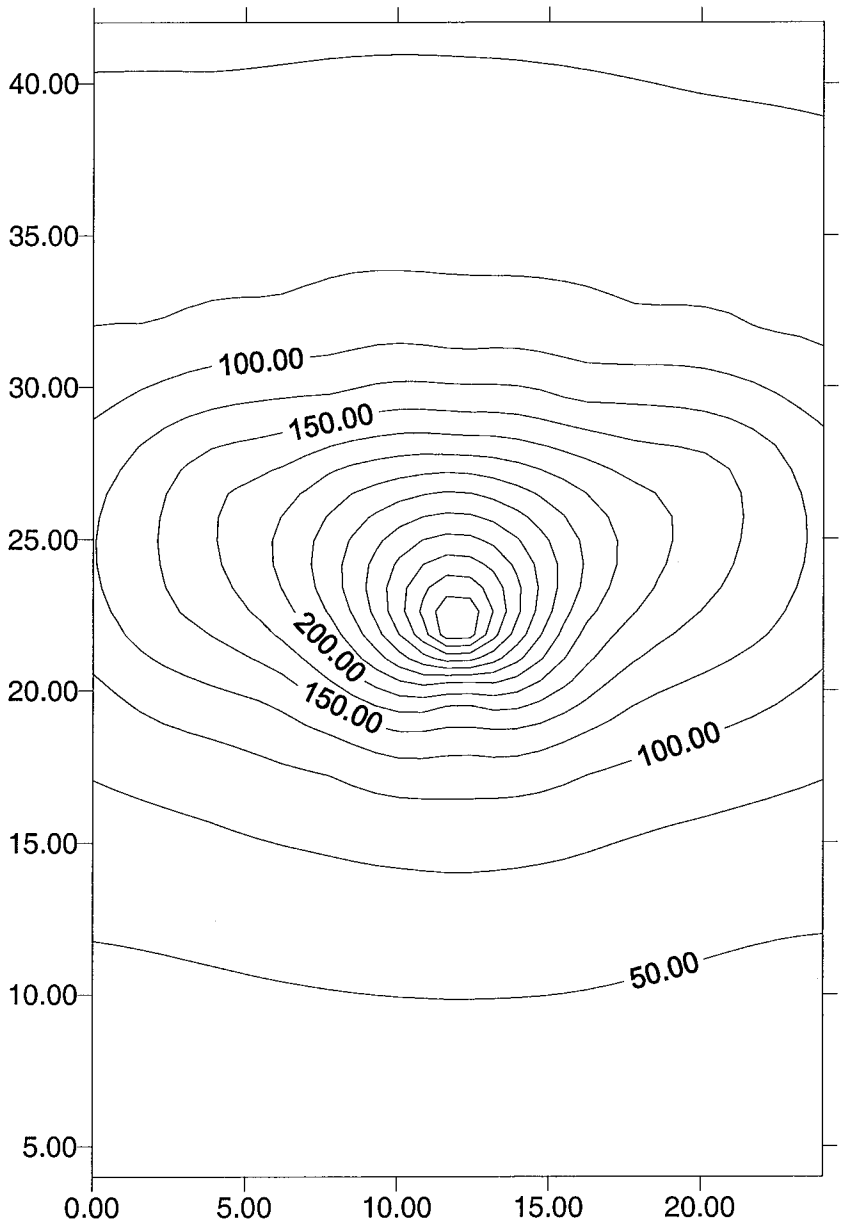
3|10

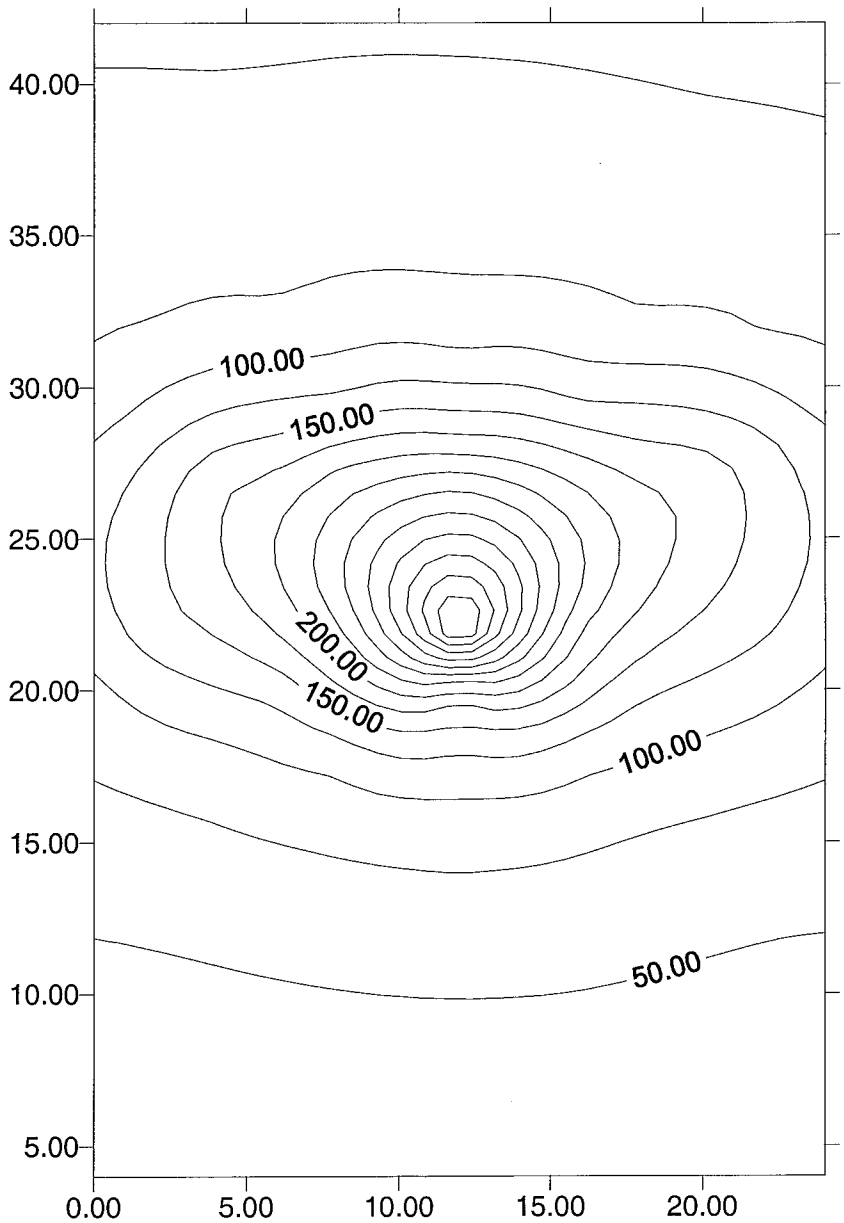

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

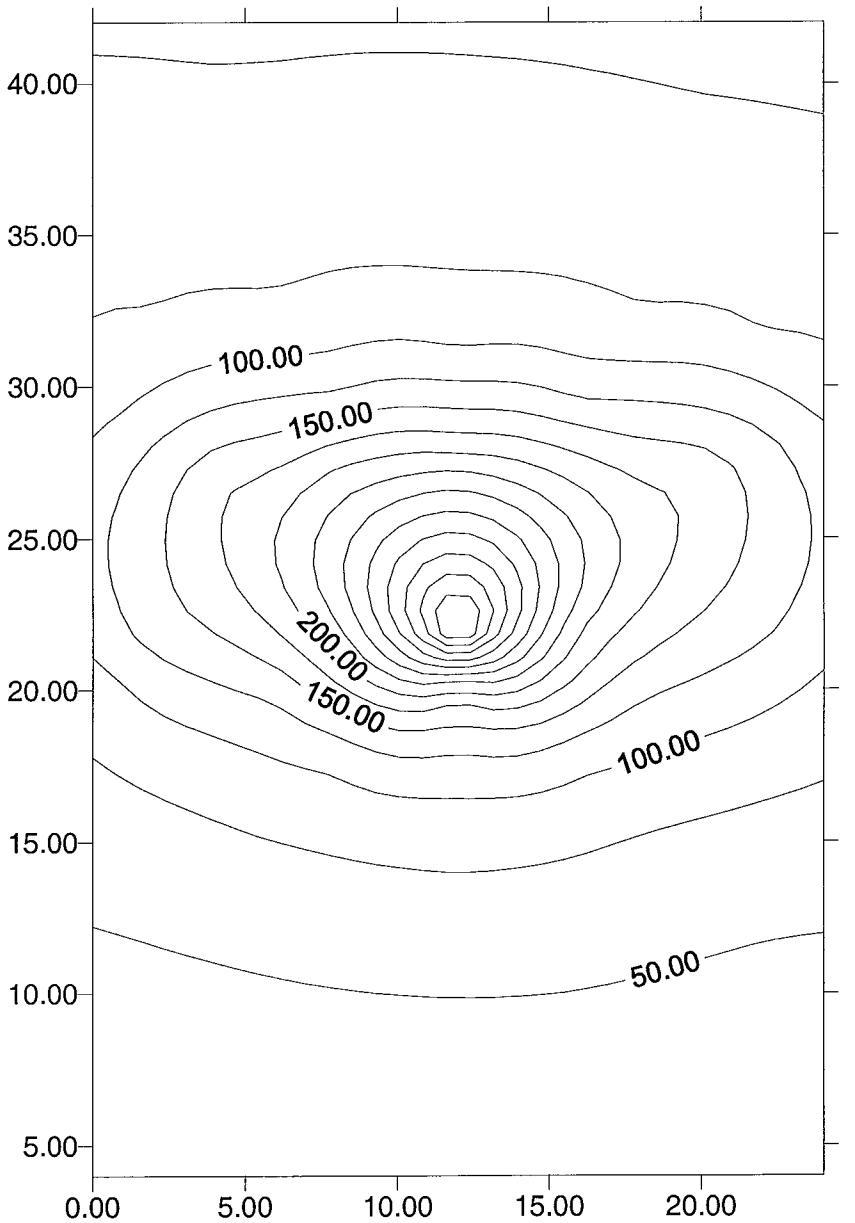
3|11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

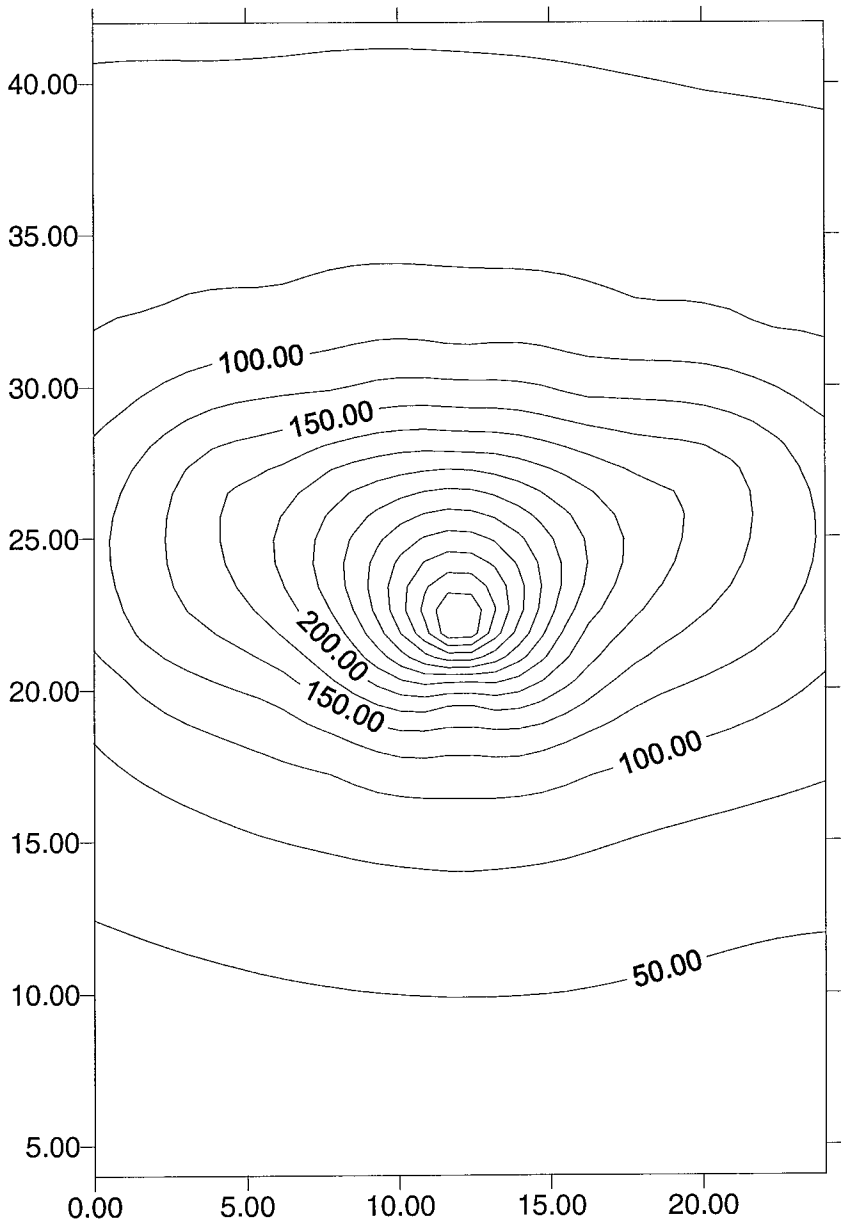
3|12


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

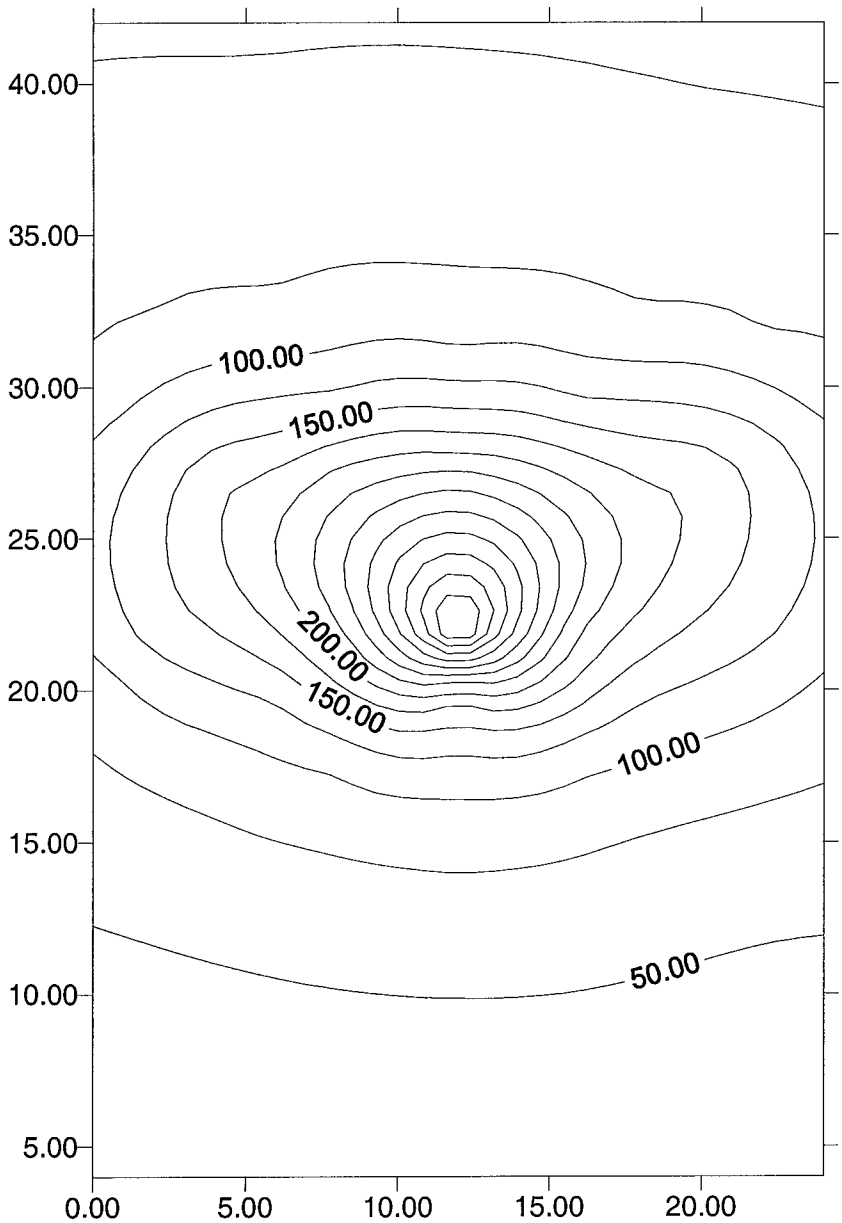

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

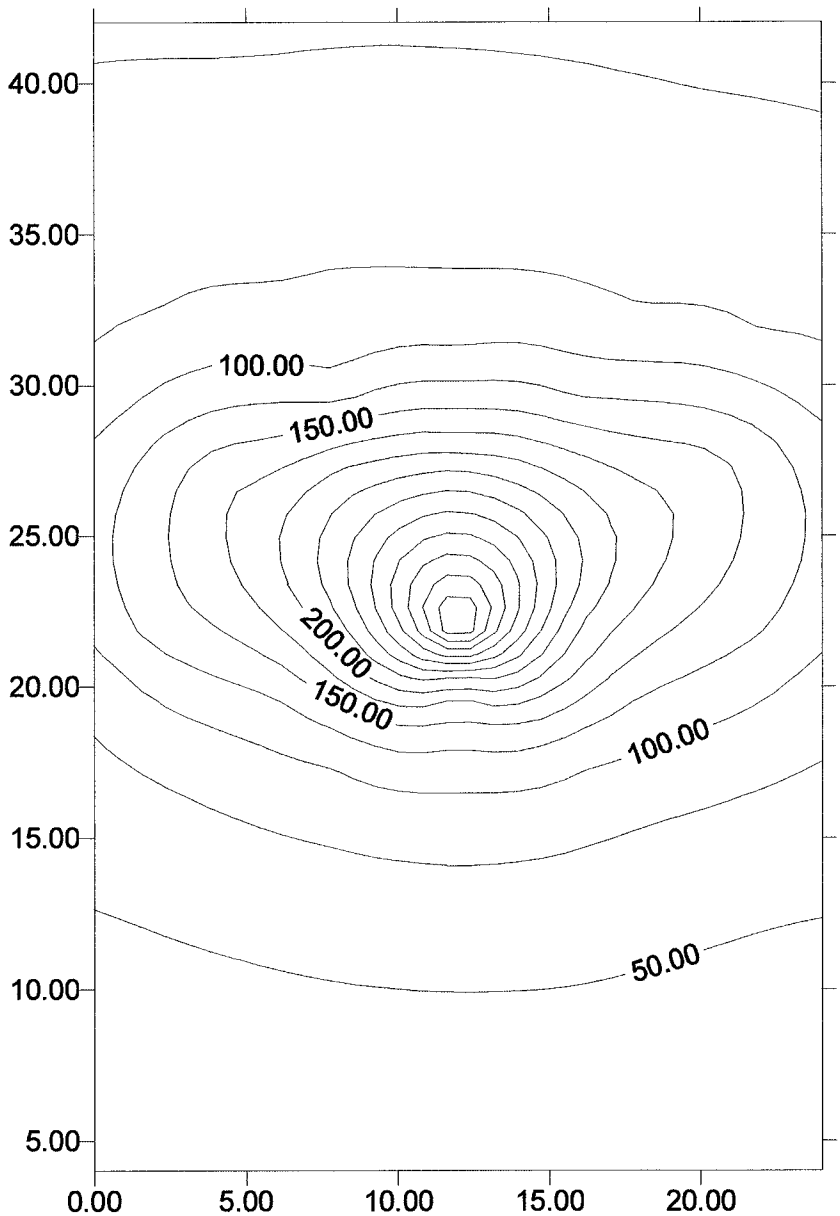
3/15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

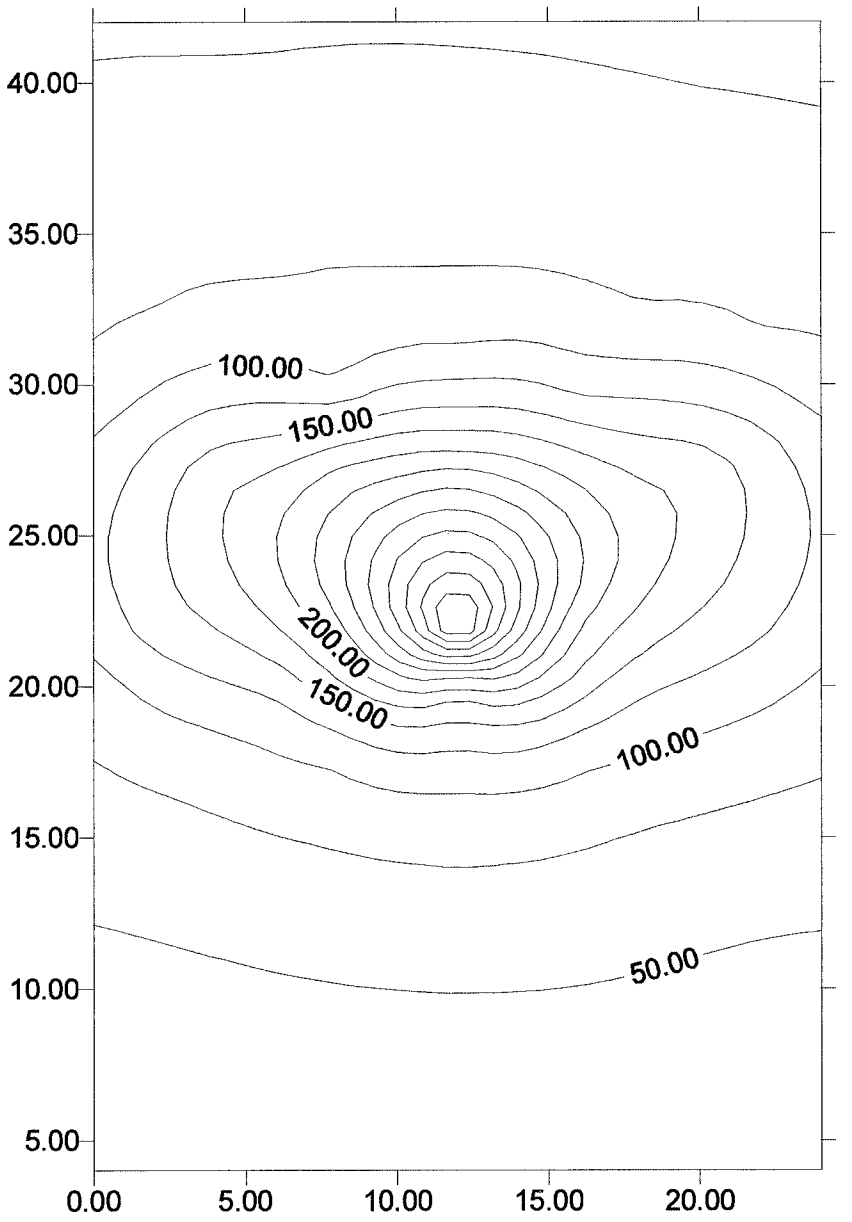
3|16


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

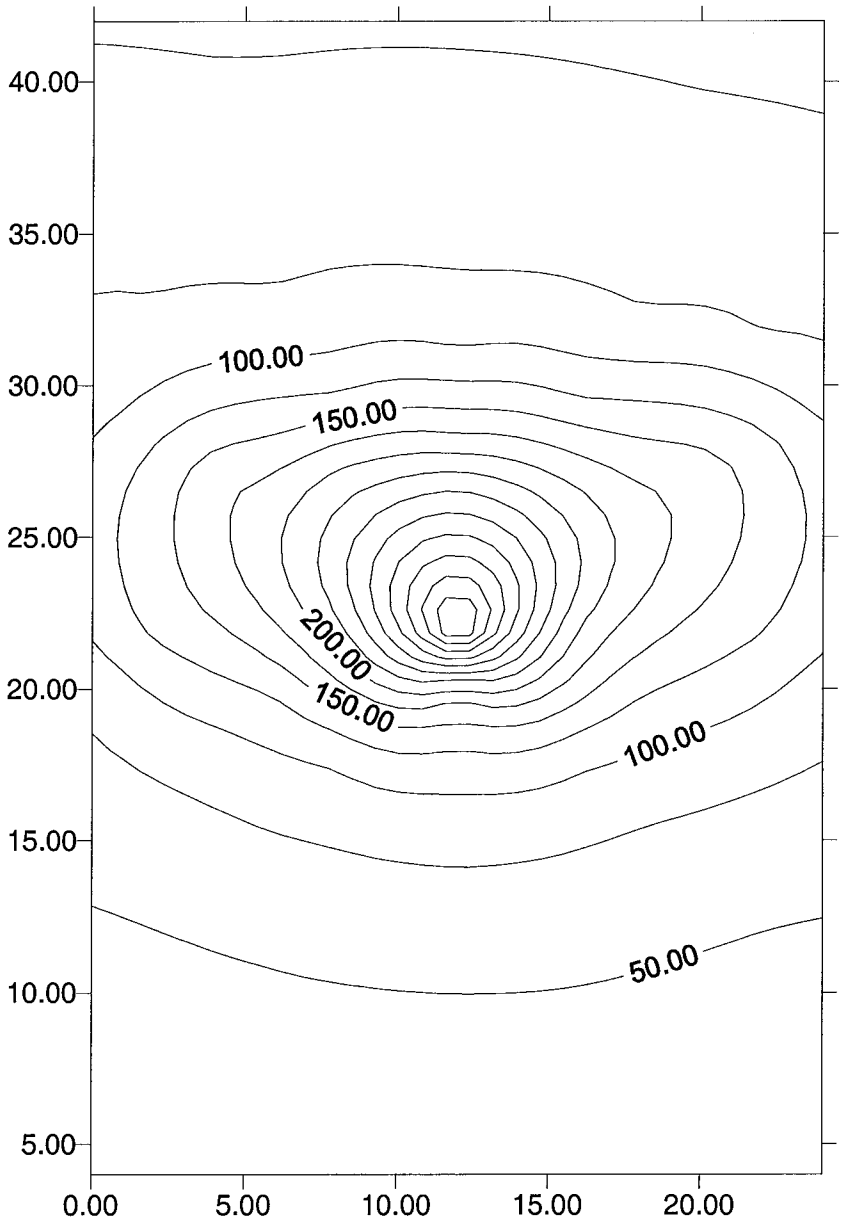
3/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

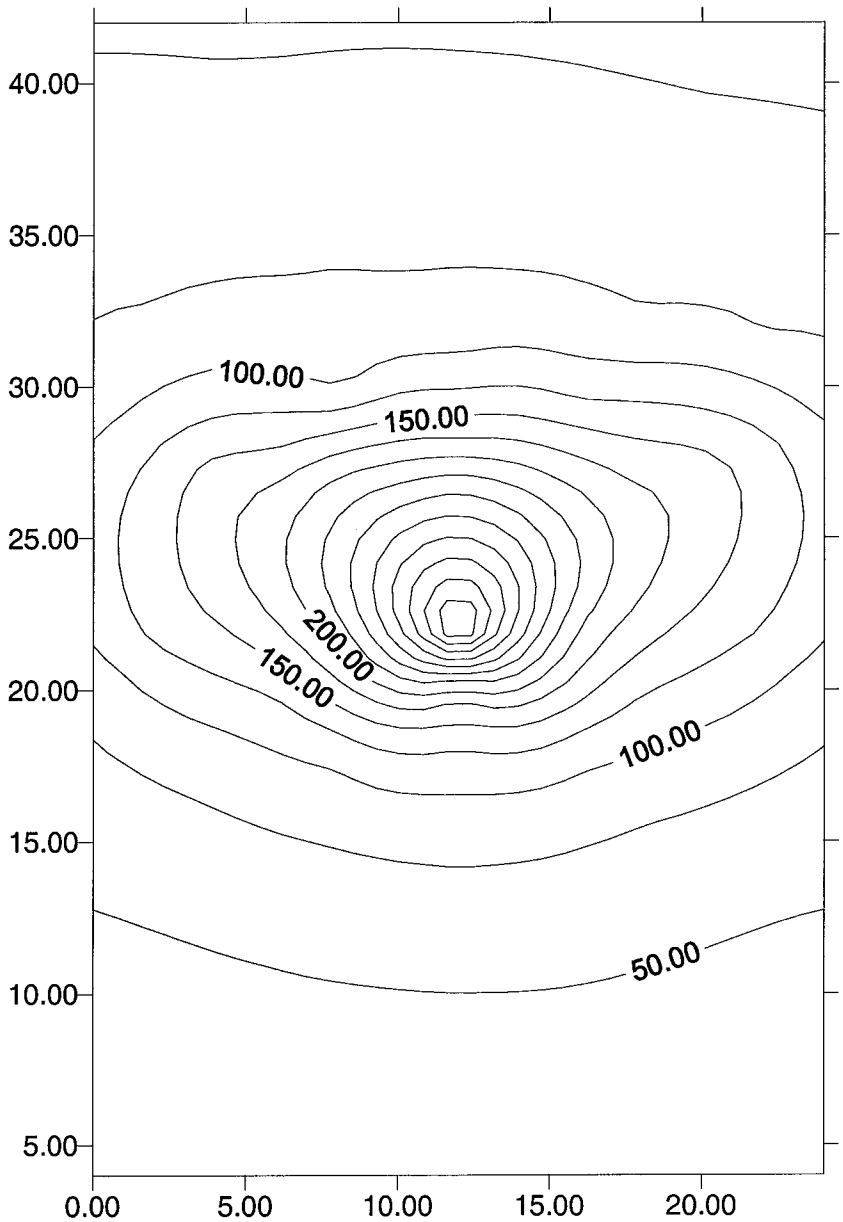
3|18


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

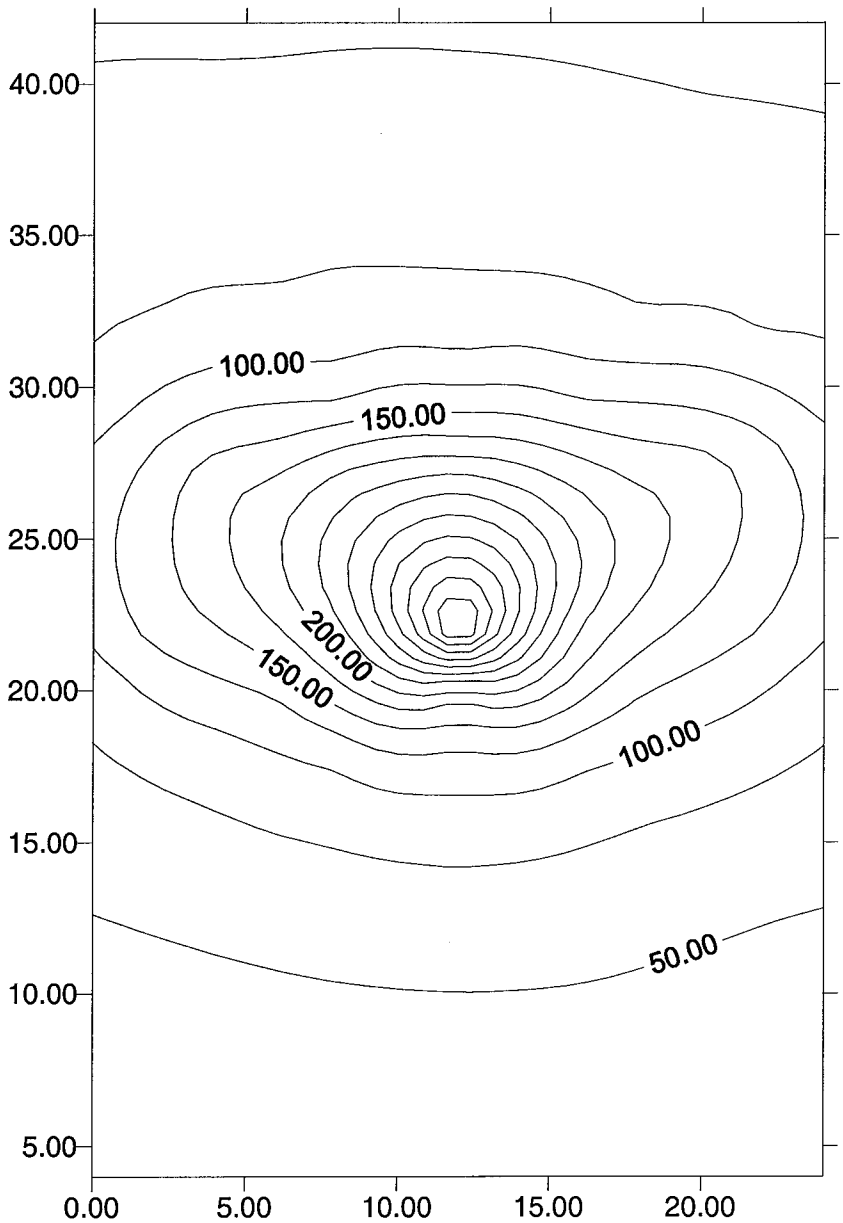
3|19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

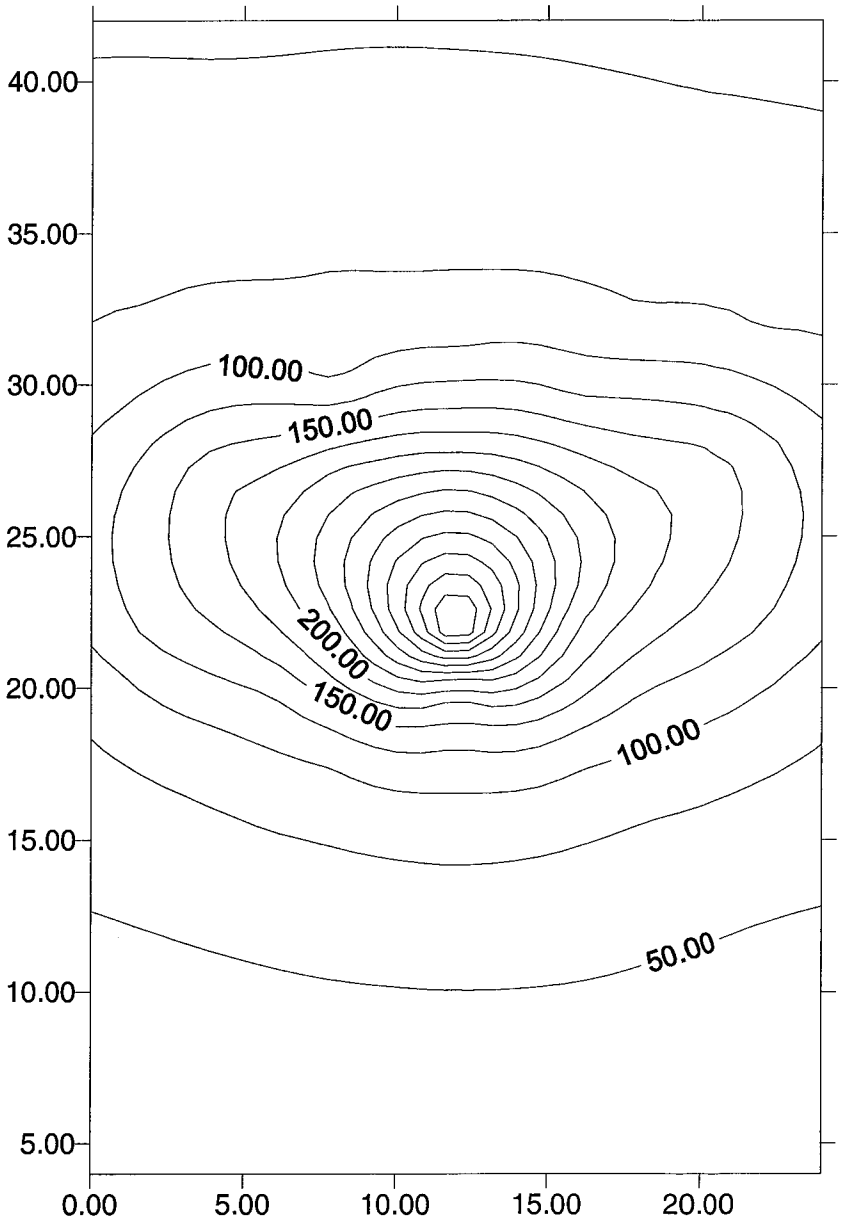
3/20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

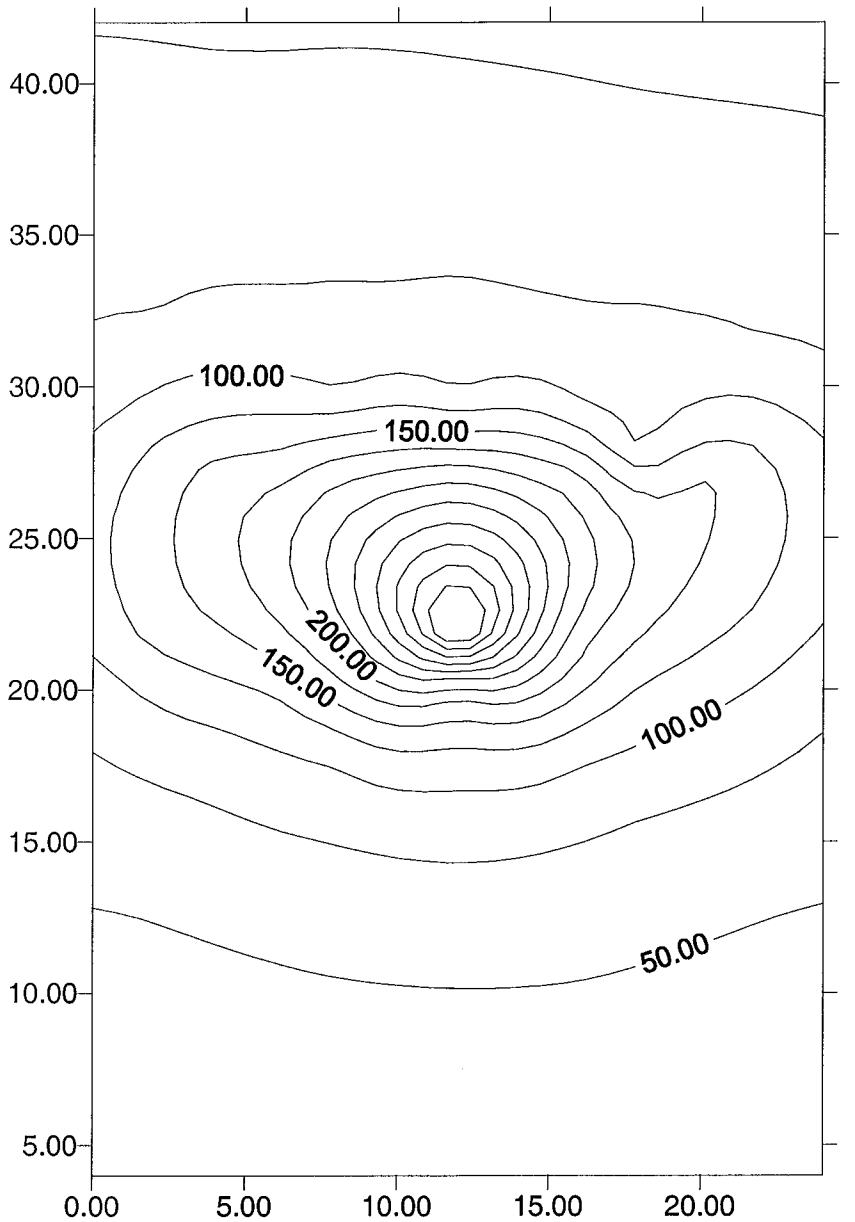
3/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

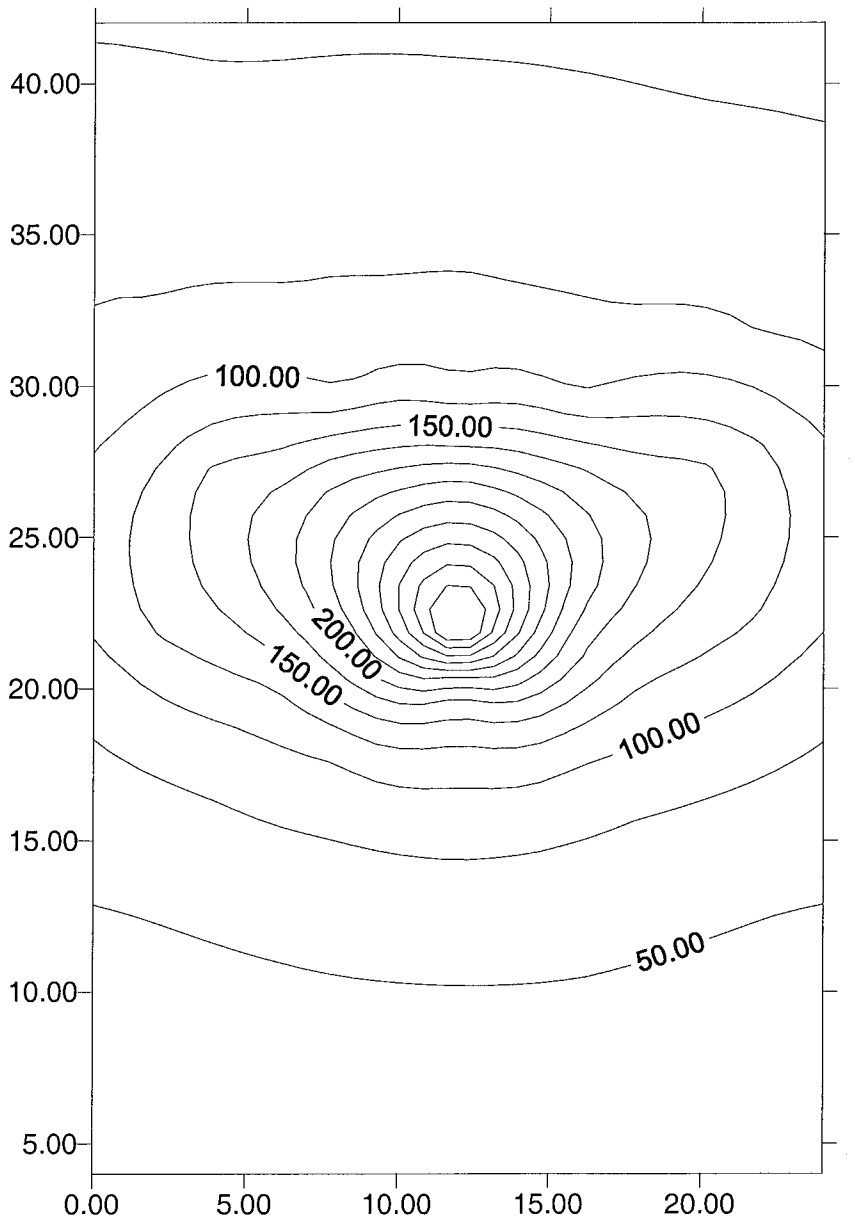
3|22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

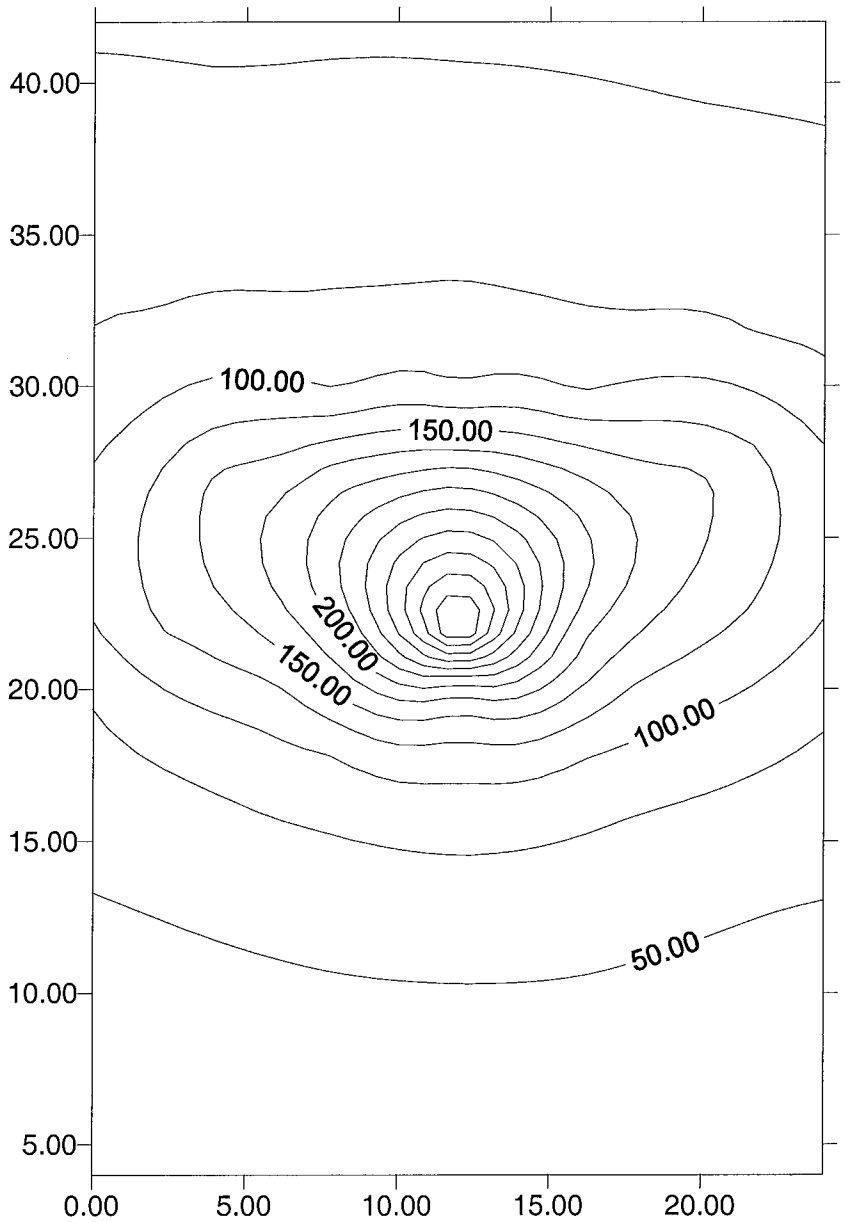
3/23/99


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

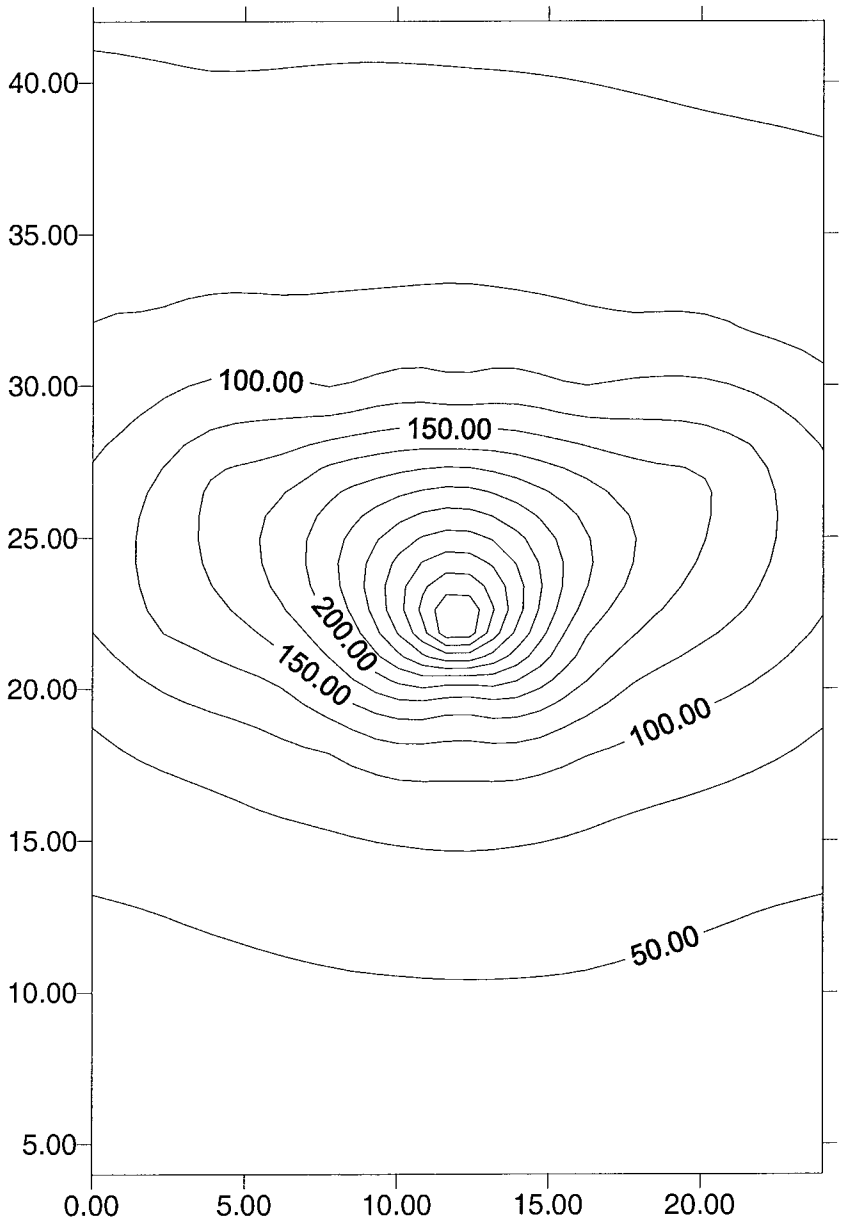
3|24


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

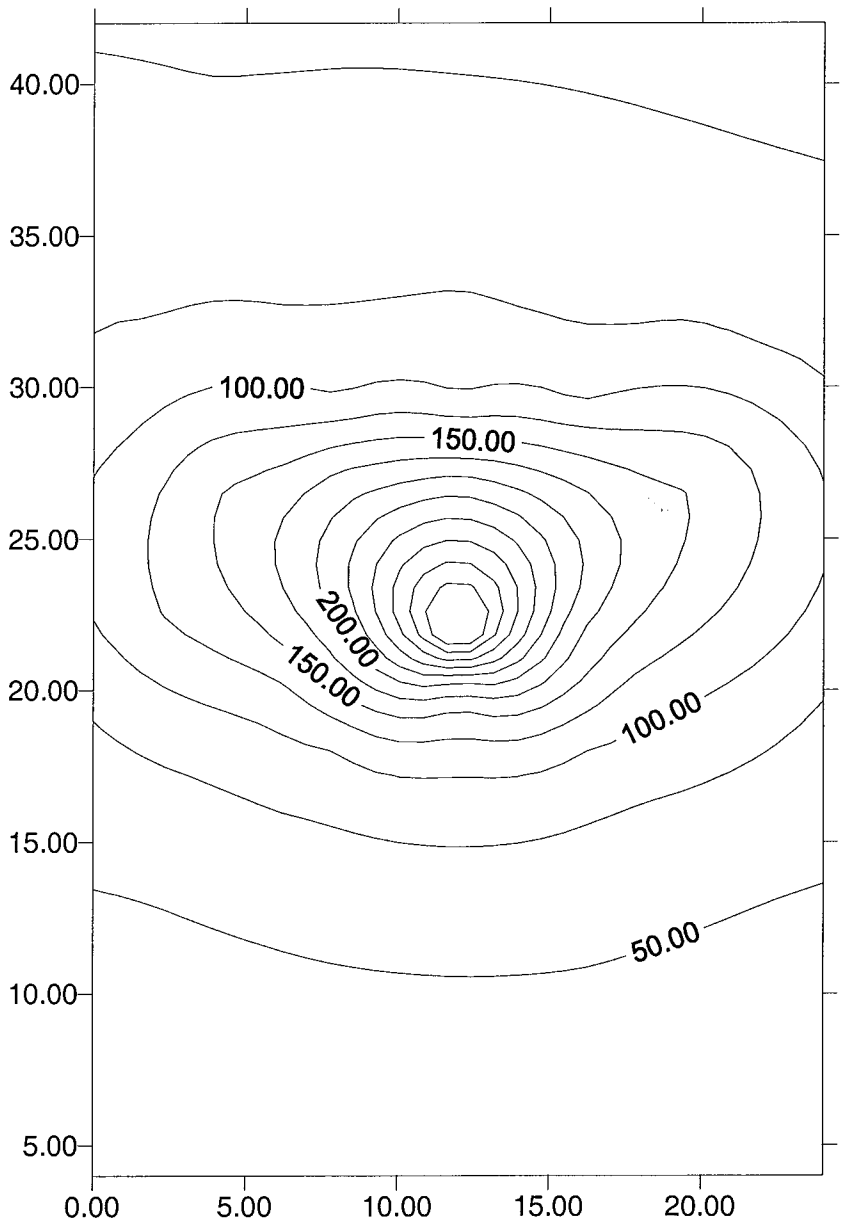
3|25


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

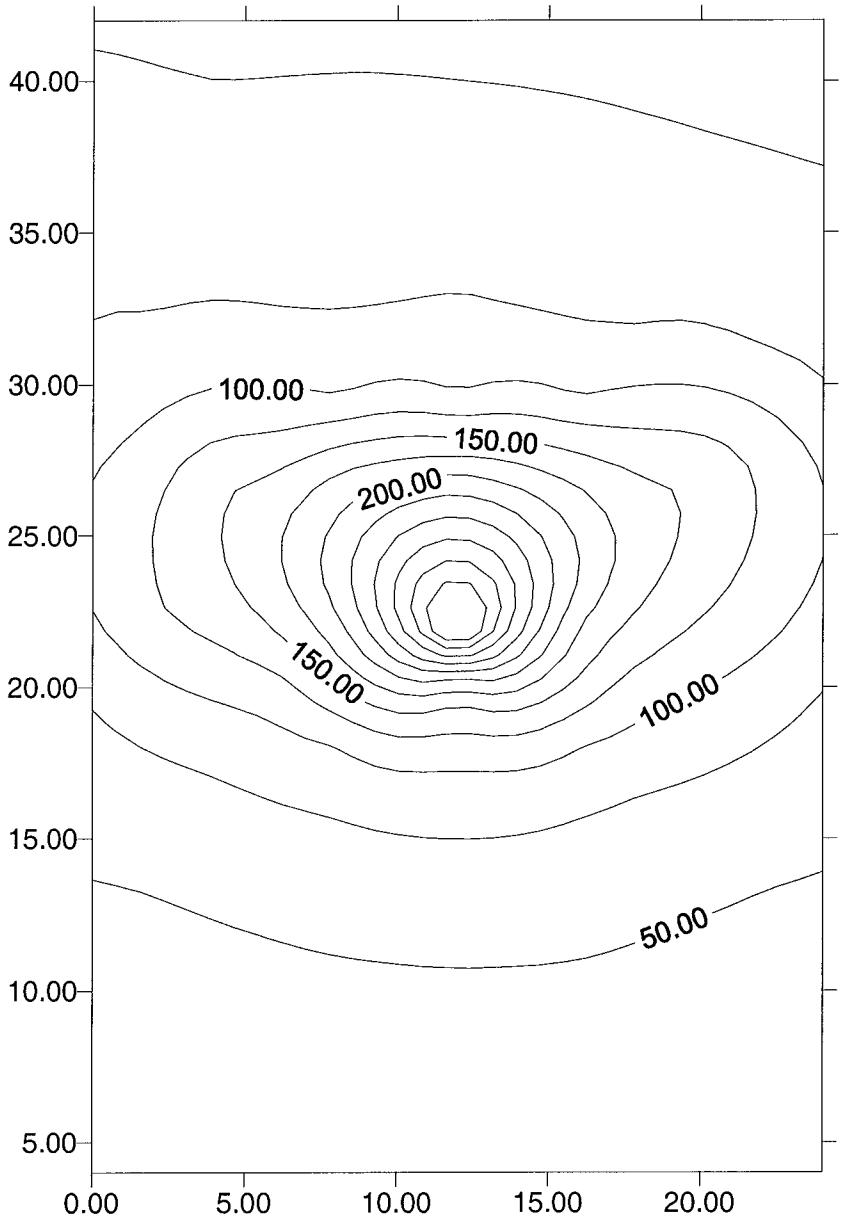
3|26


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

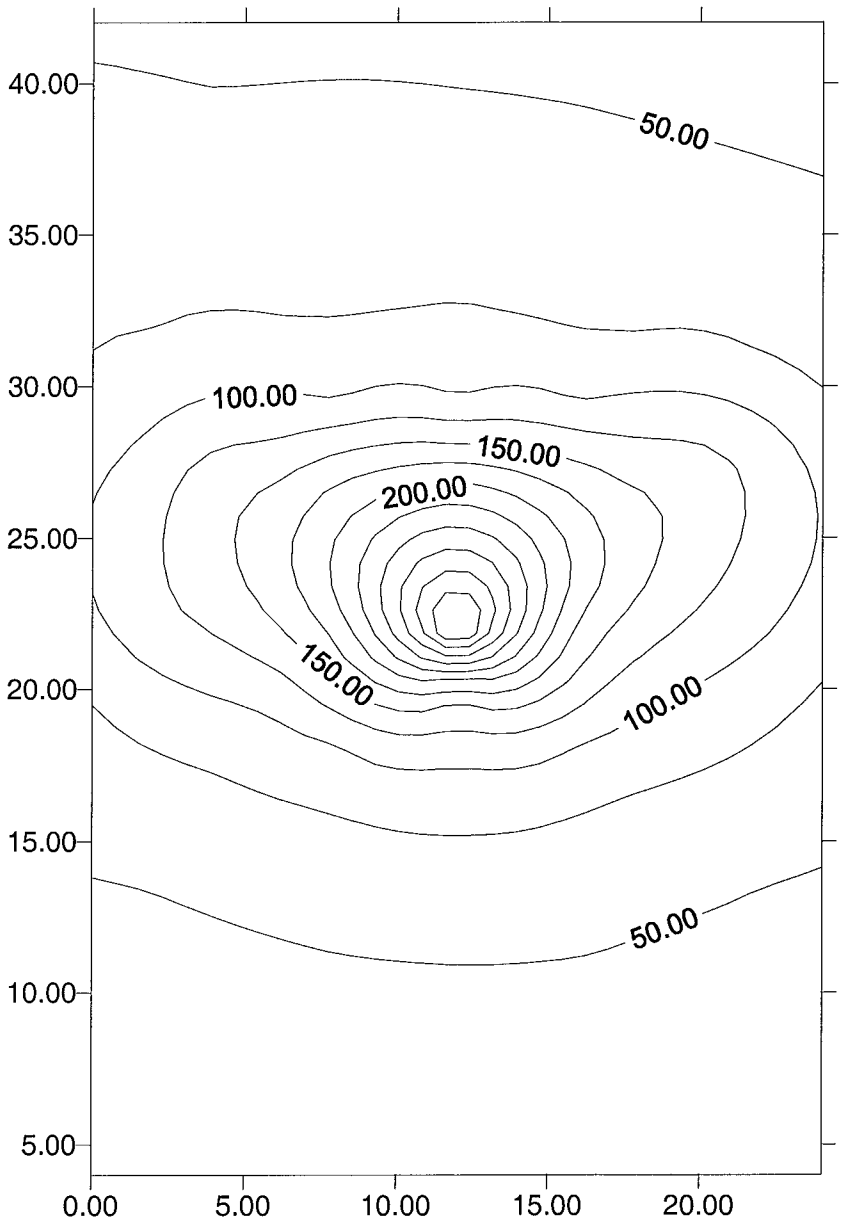
3|27


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

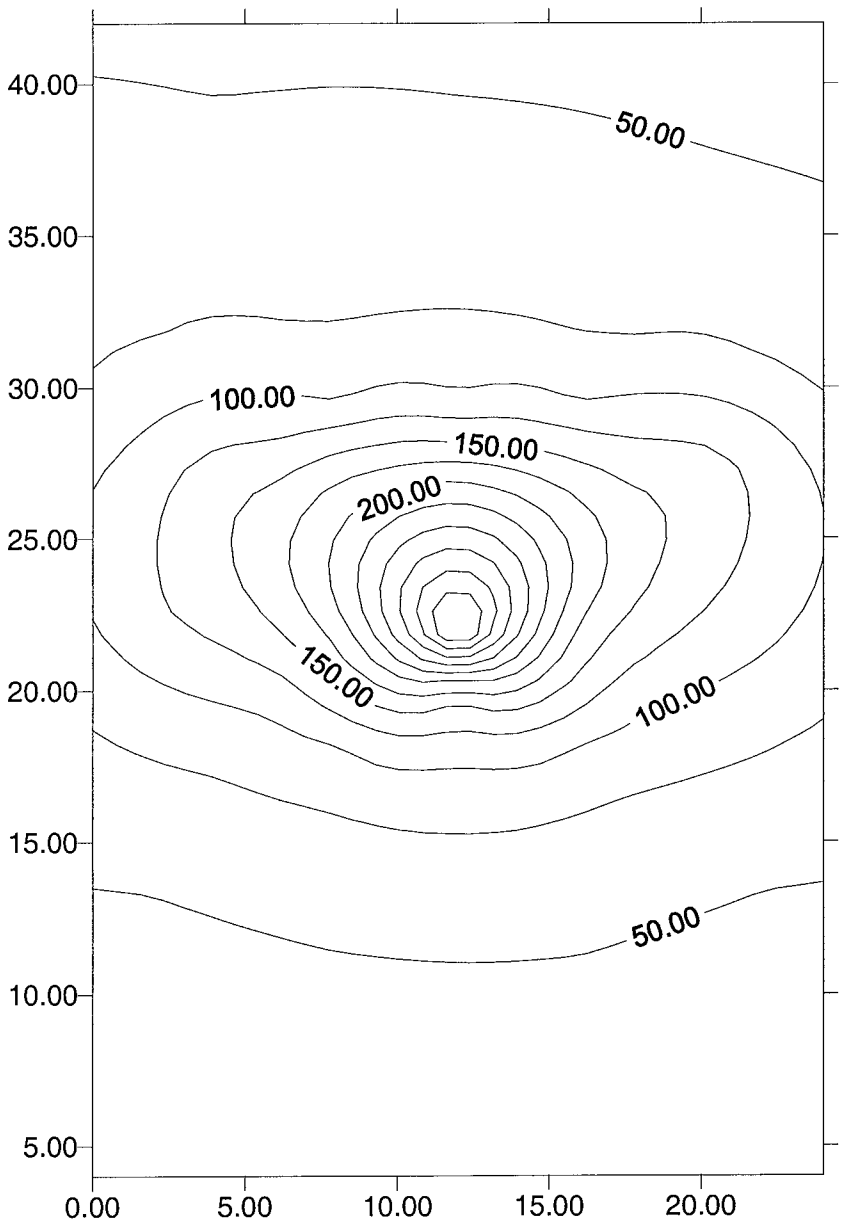
3/28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
100.00
150.00
200.00
150.00
100.00
50.00

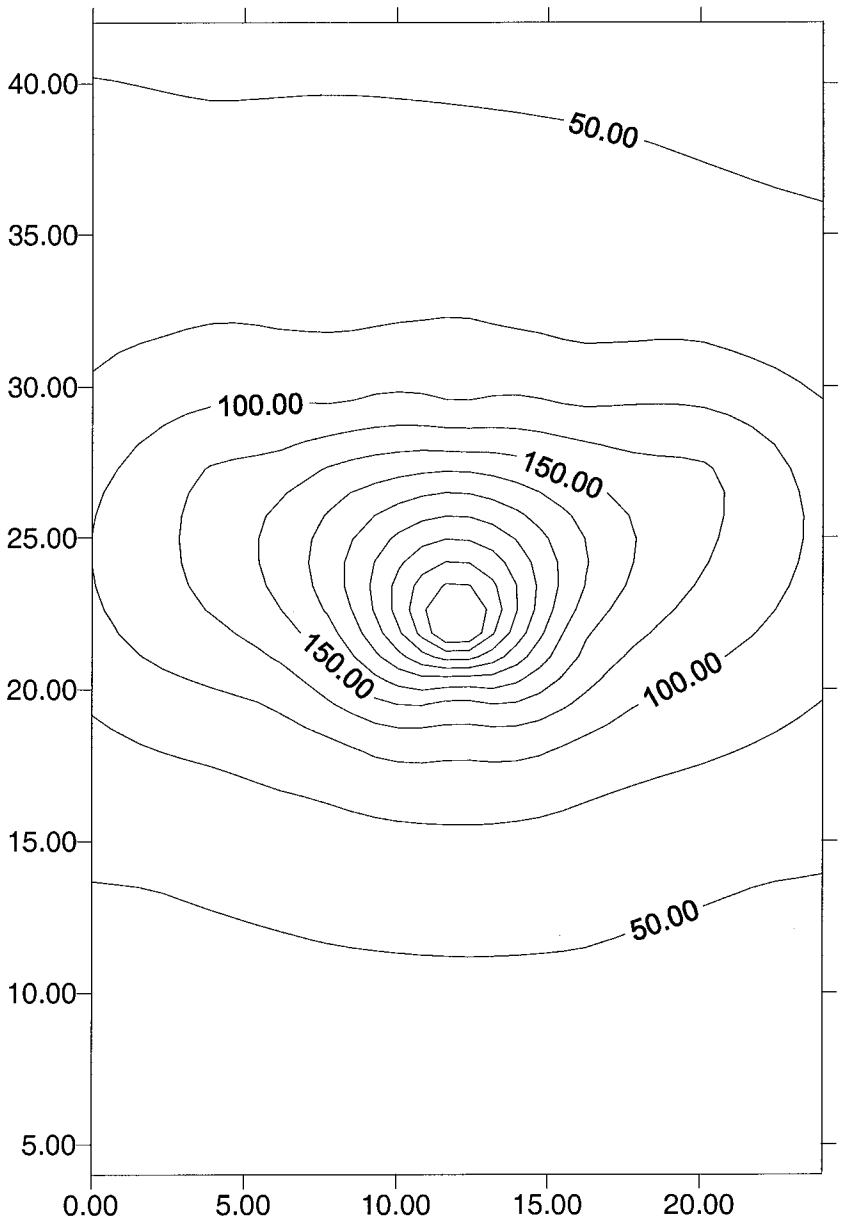
3/29


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
200.00
150.00
100.00
50.00

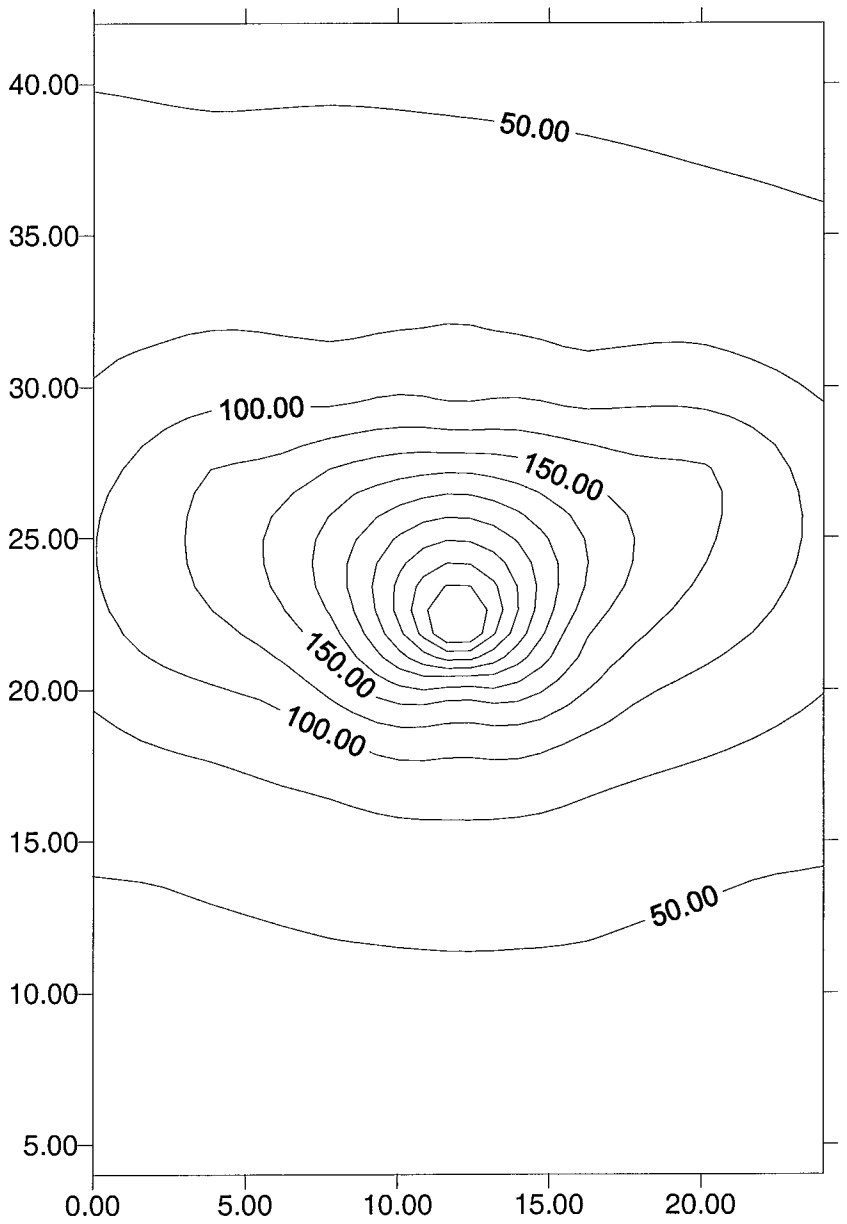
3/30


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
200.00
150.00
100.00
50.00

3|31

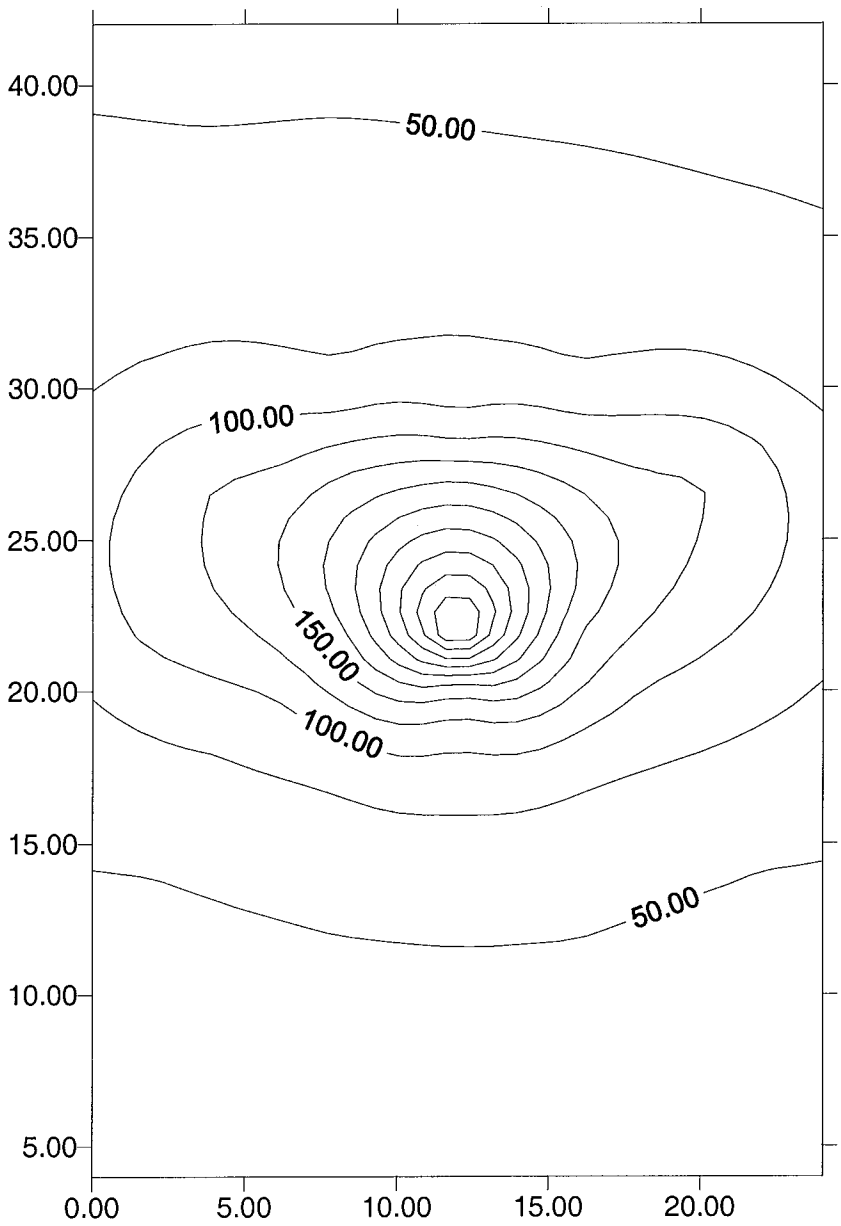

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
150.00
100.00
50.00

4|1

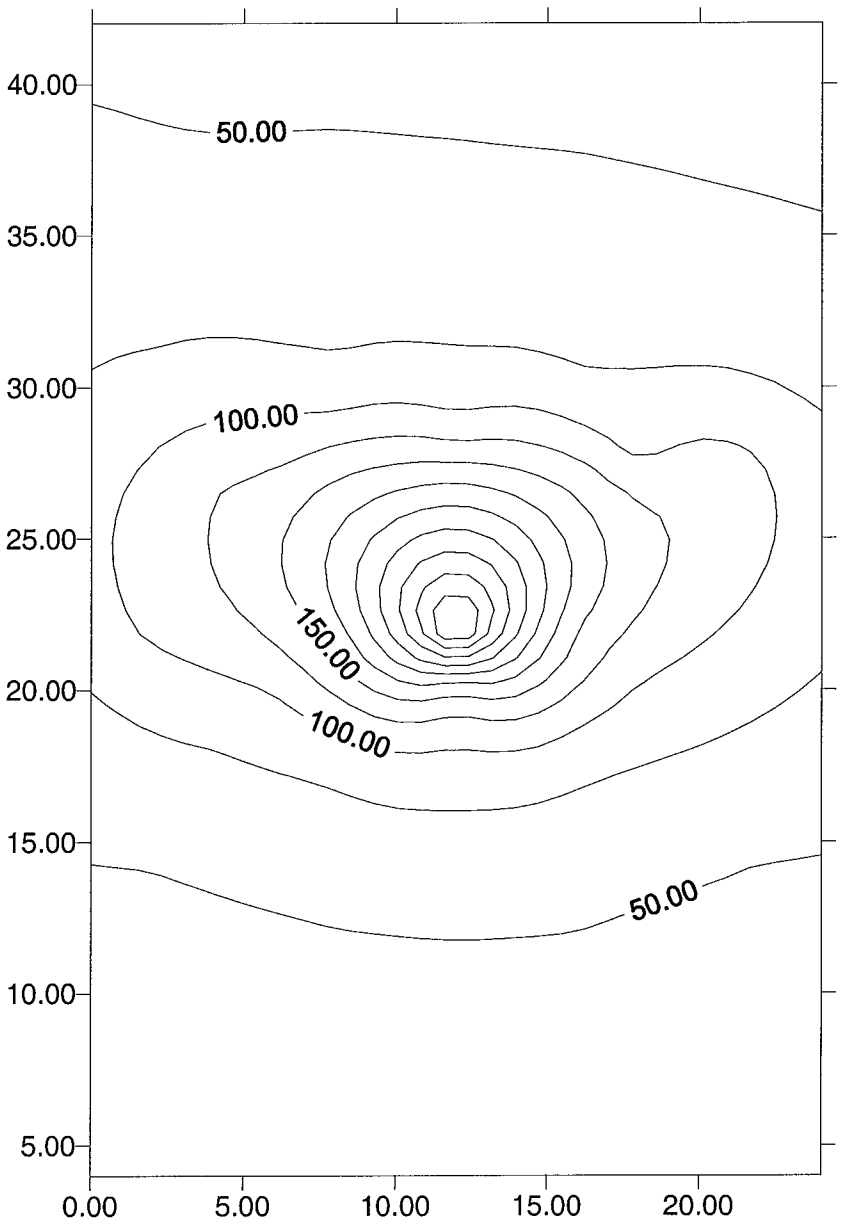

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
150.00
100.00
50.00

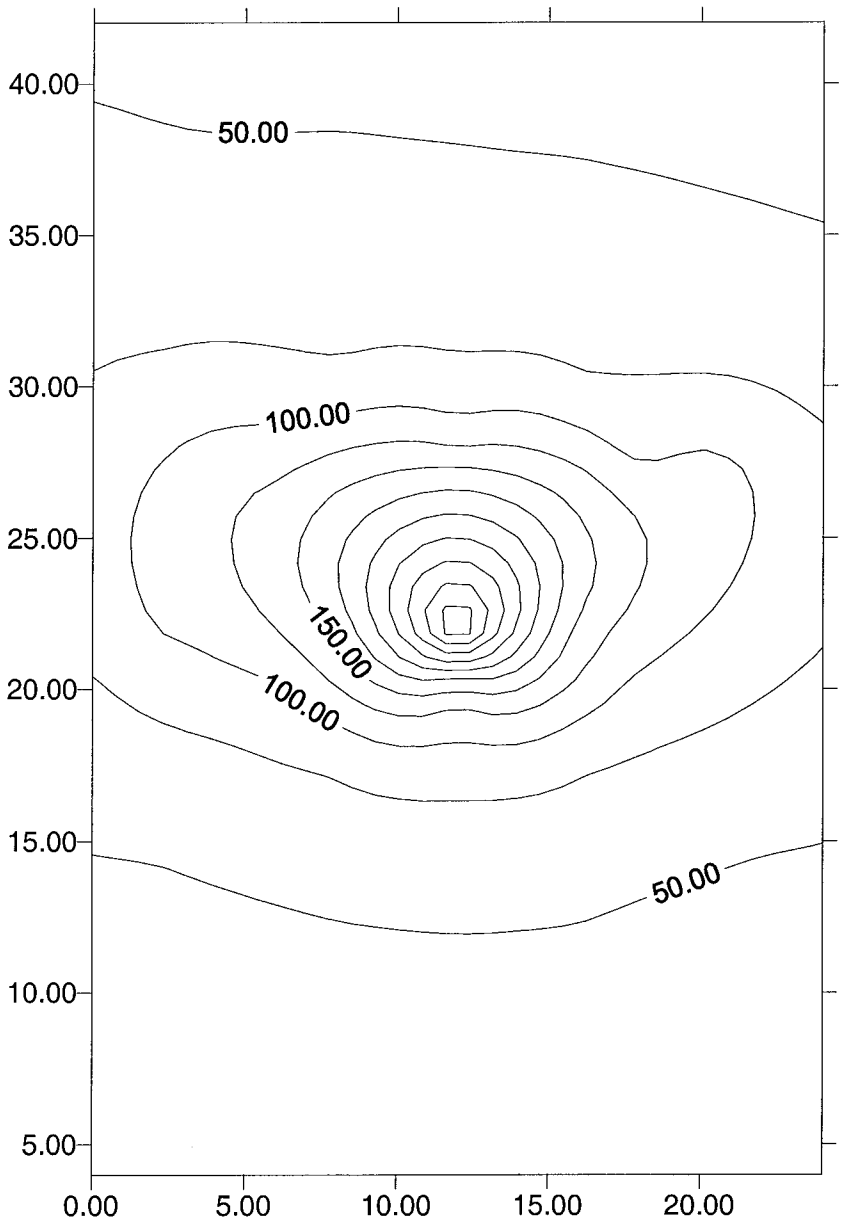
~~#1~~

4/2

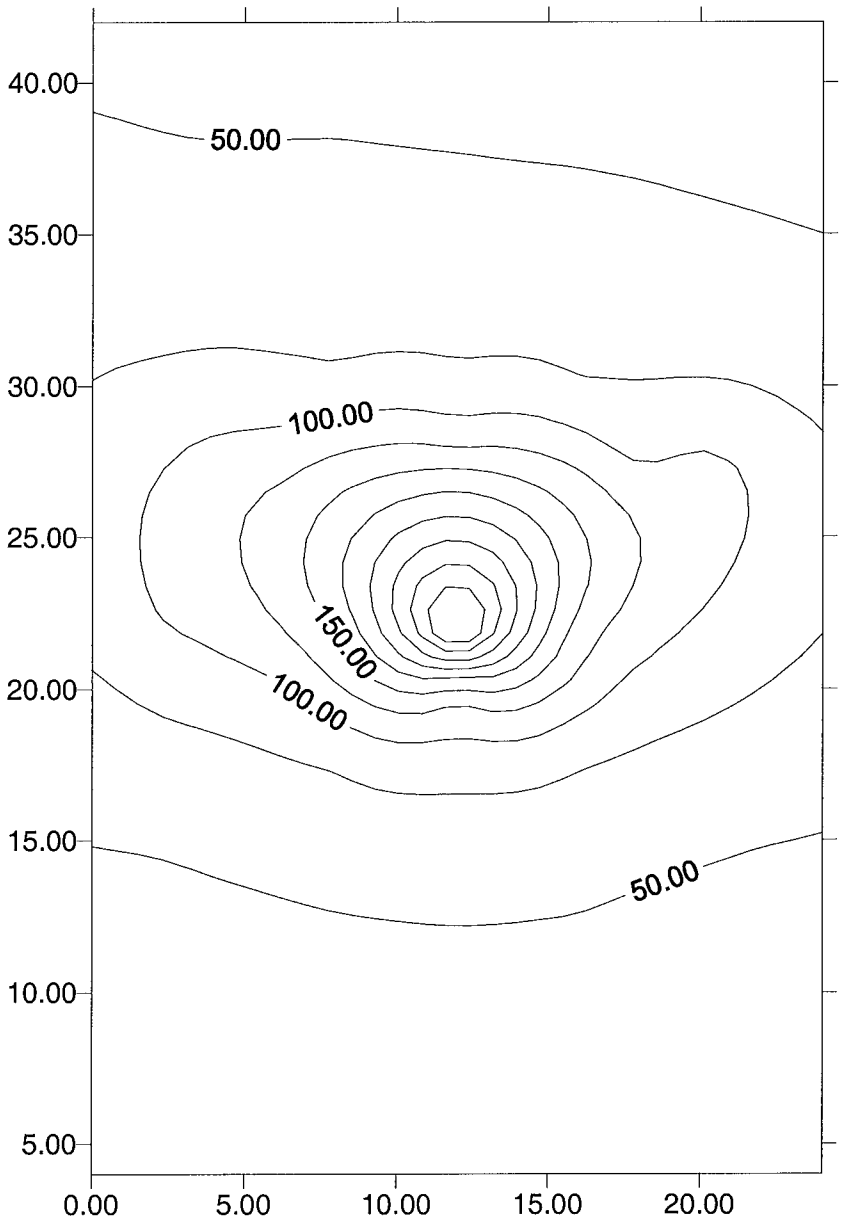

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

4/3

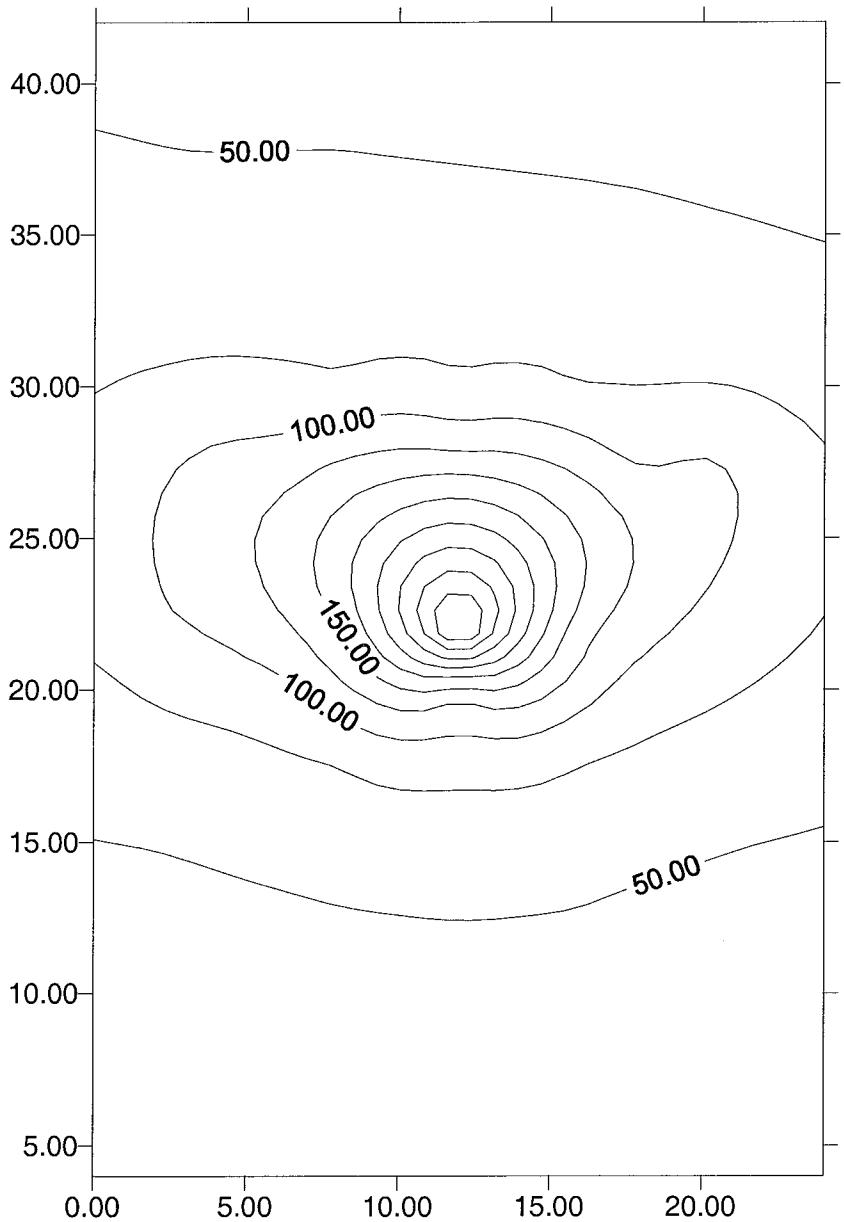

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

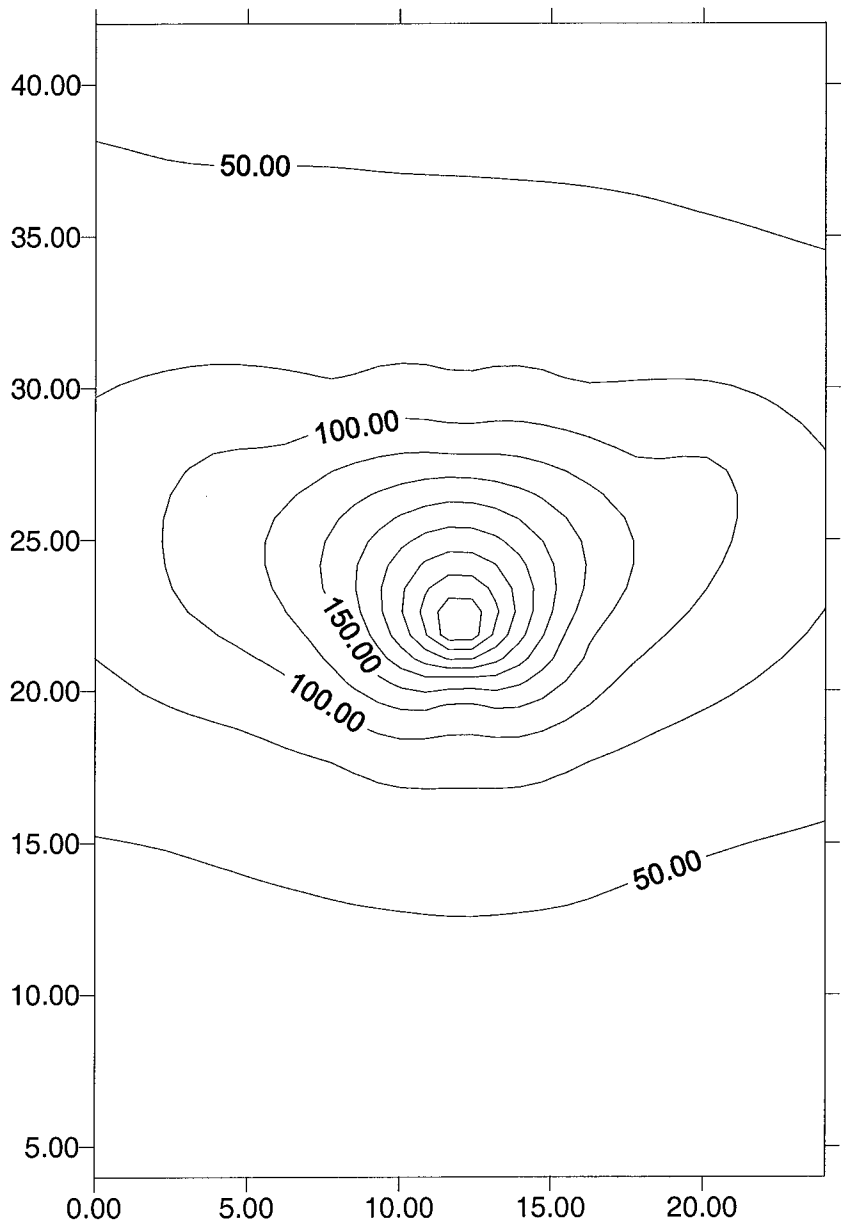
4|5


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

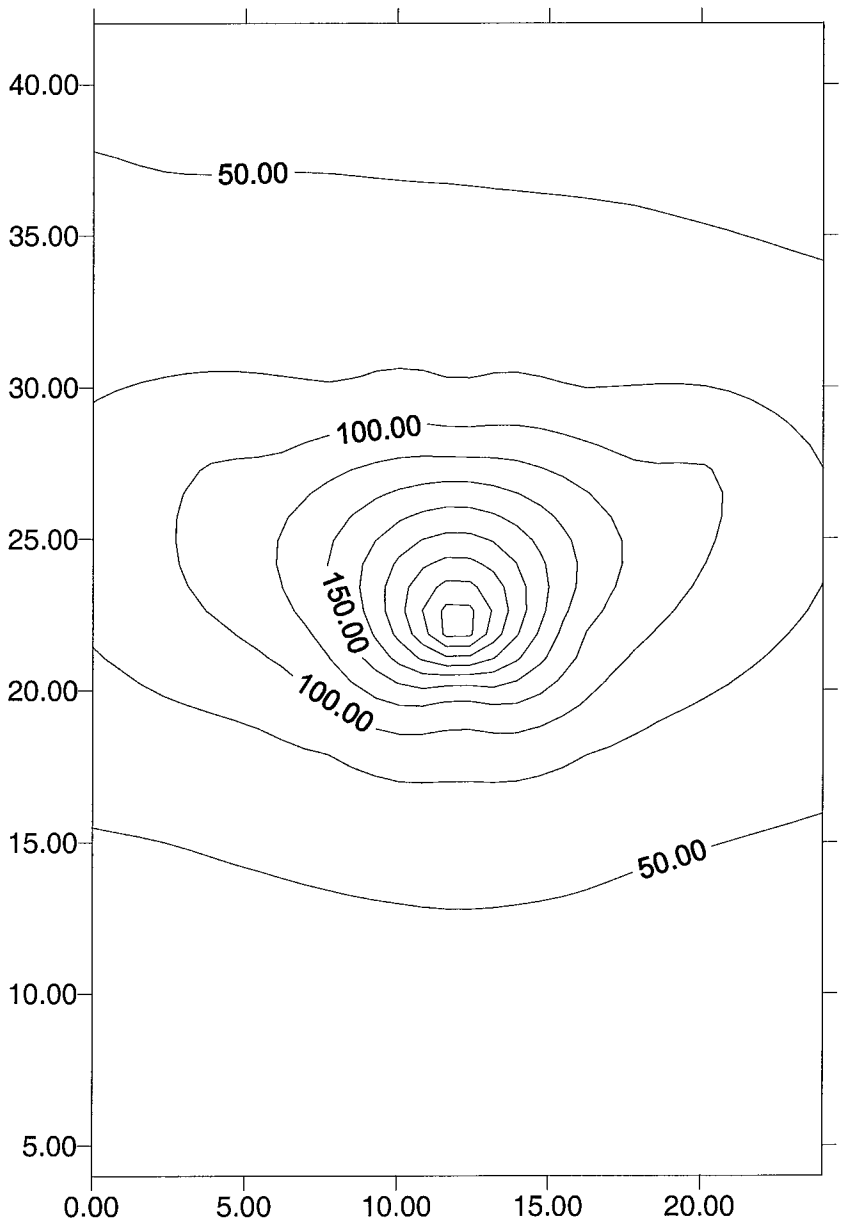
4/6


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

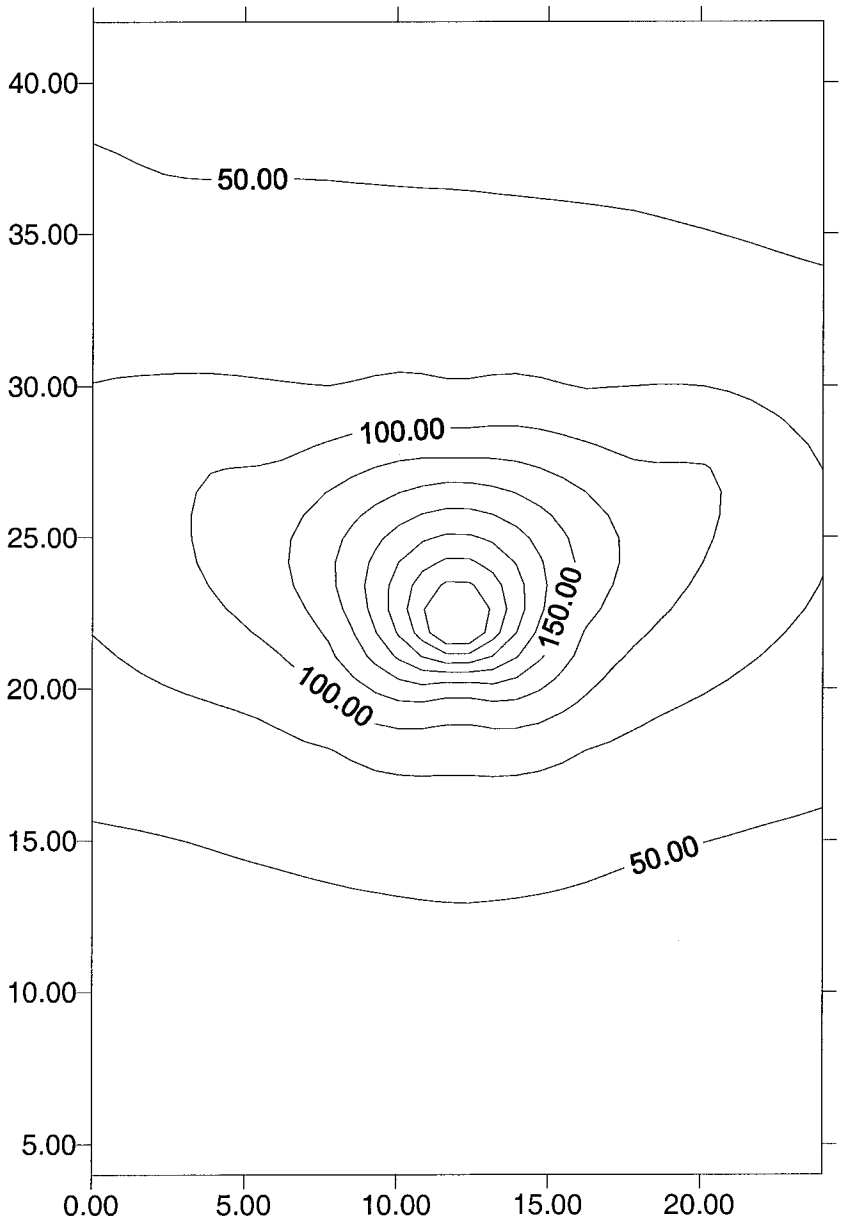
4/7


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

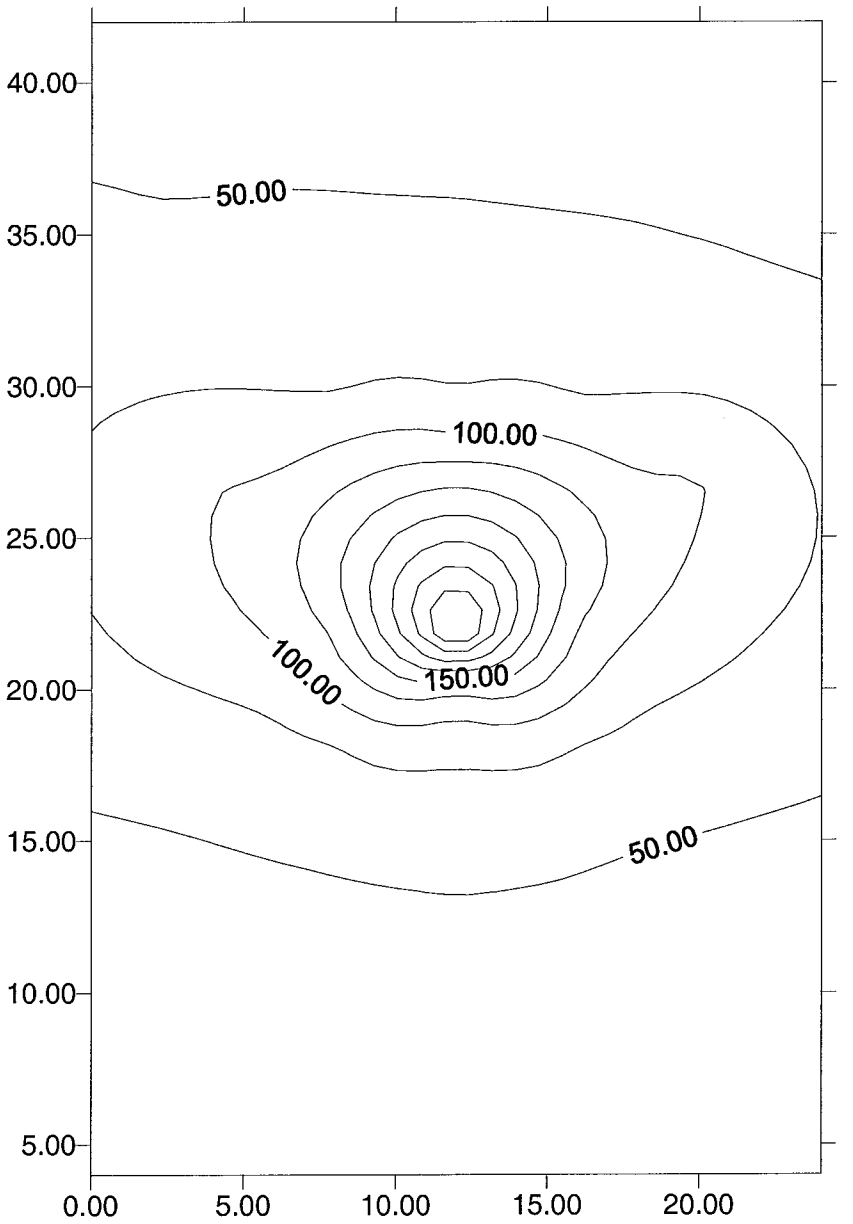
4/8


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

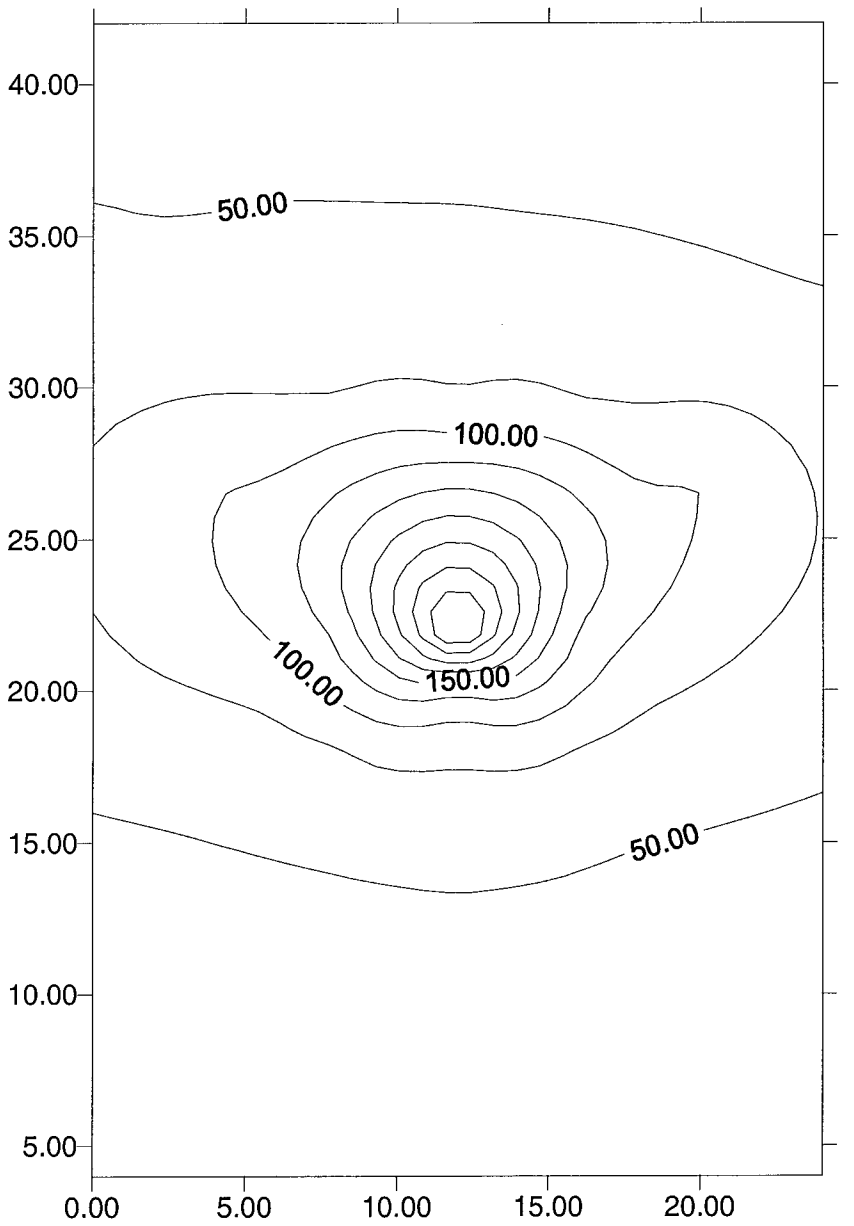
4/9


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

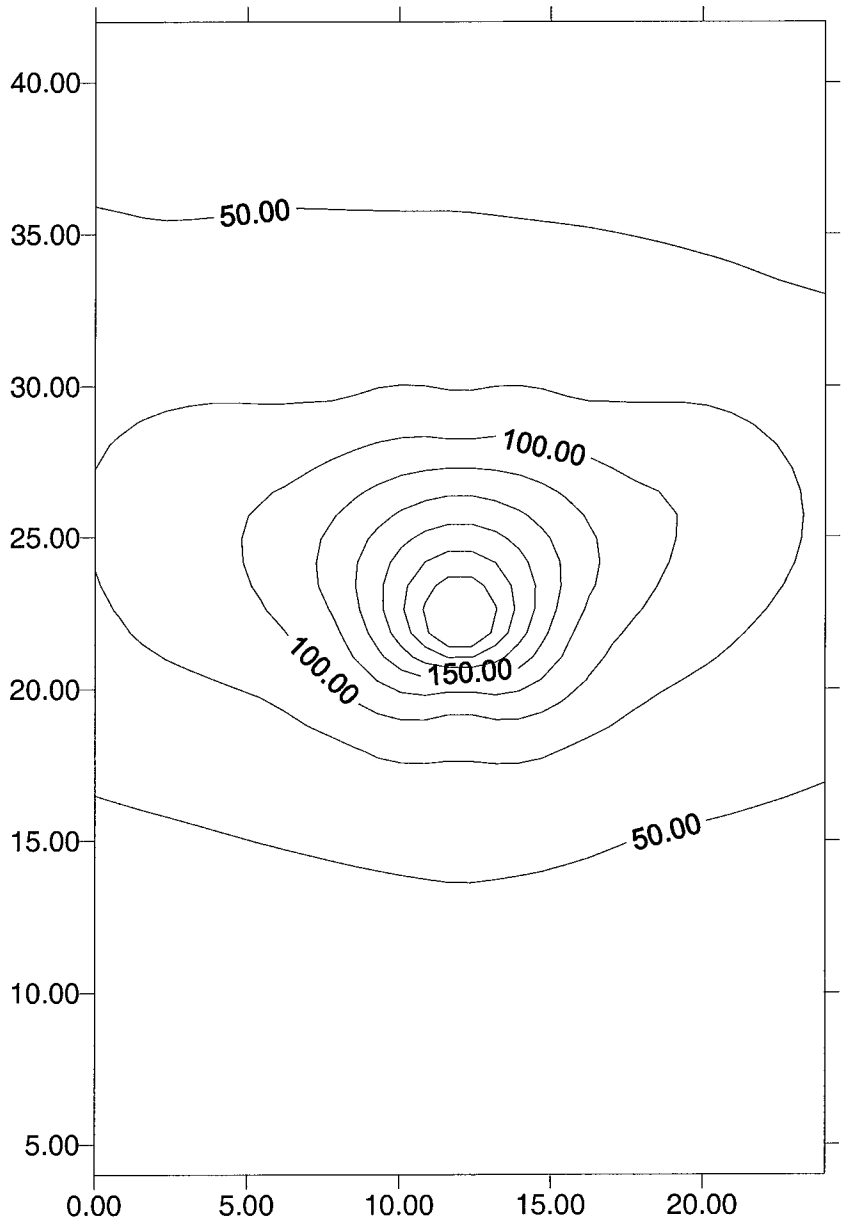
4|10


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
150.00
50.00

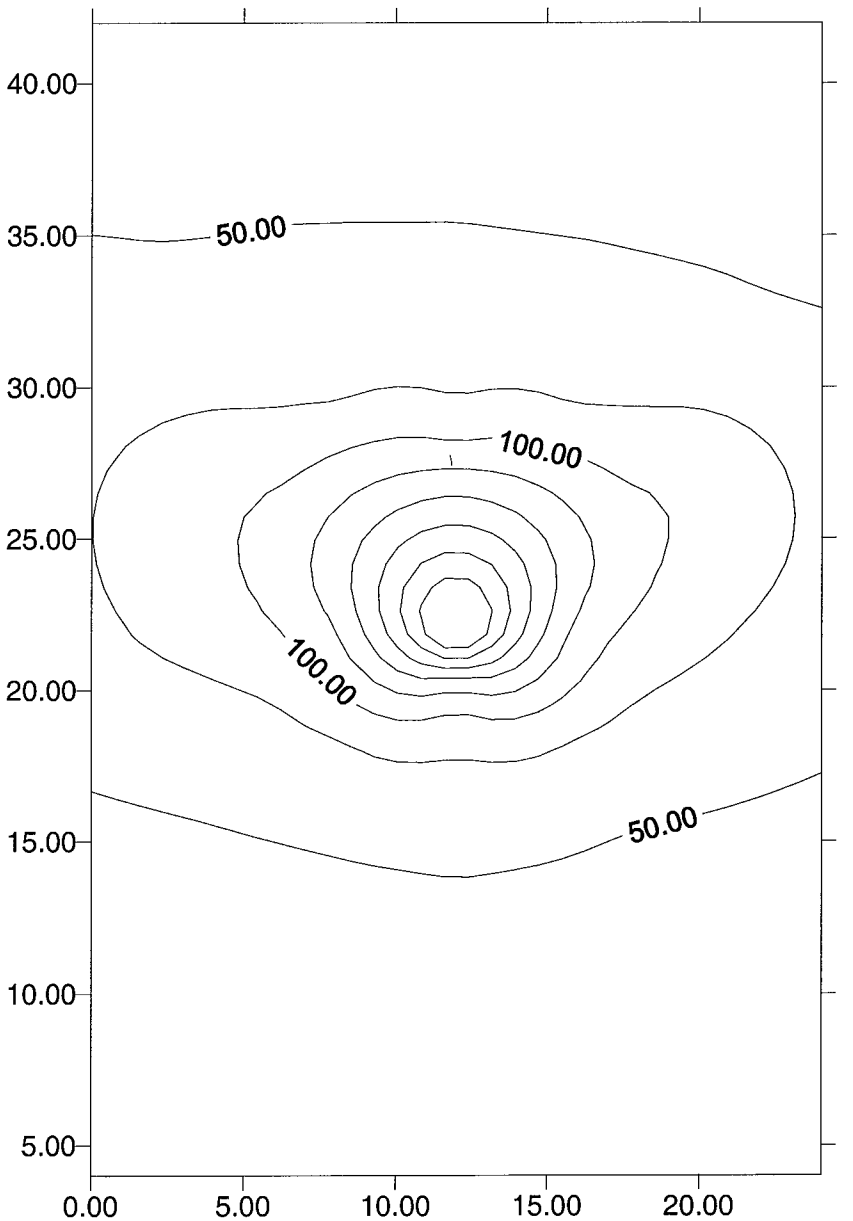
4/11


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
150.00
50.00

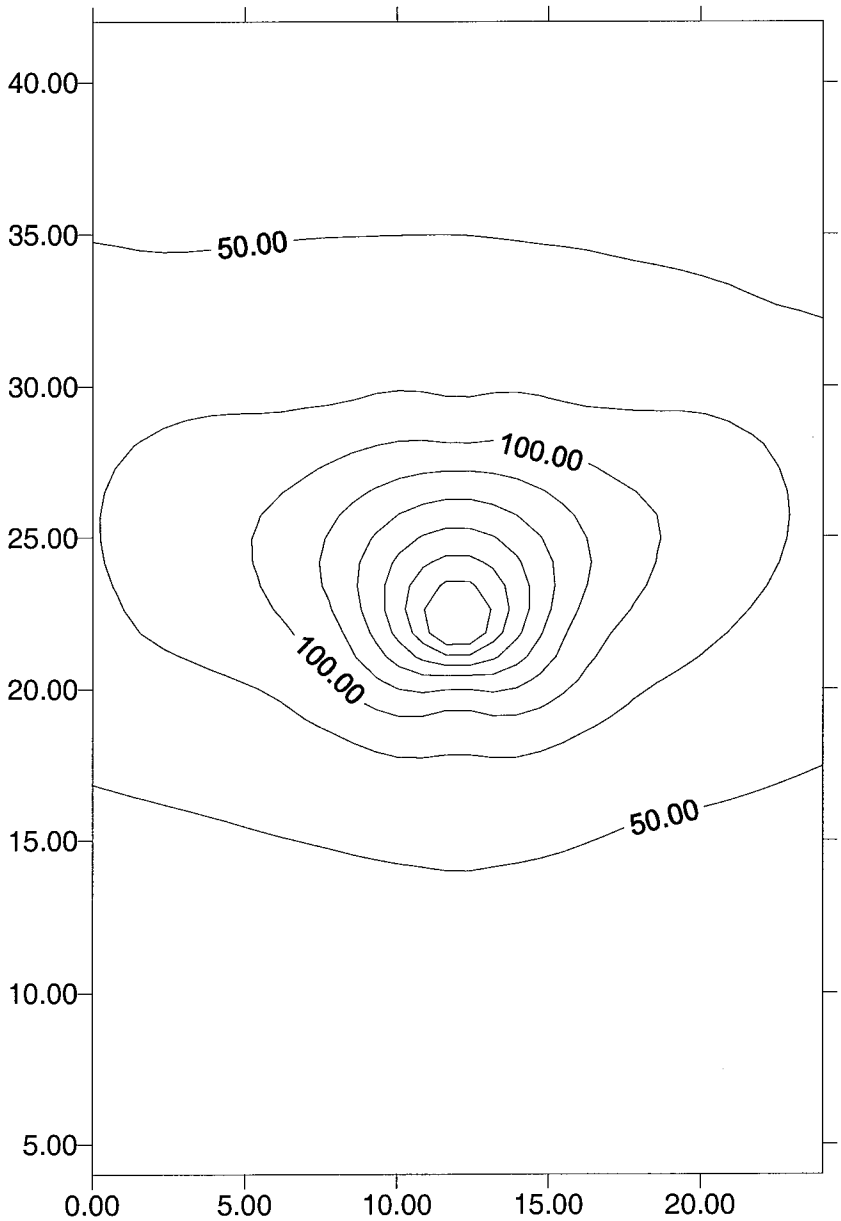
4/12


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
150.00
100.00
50.00

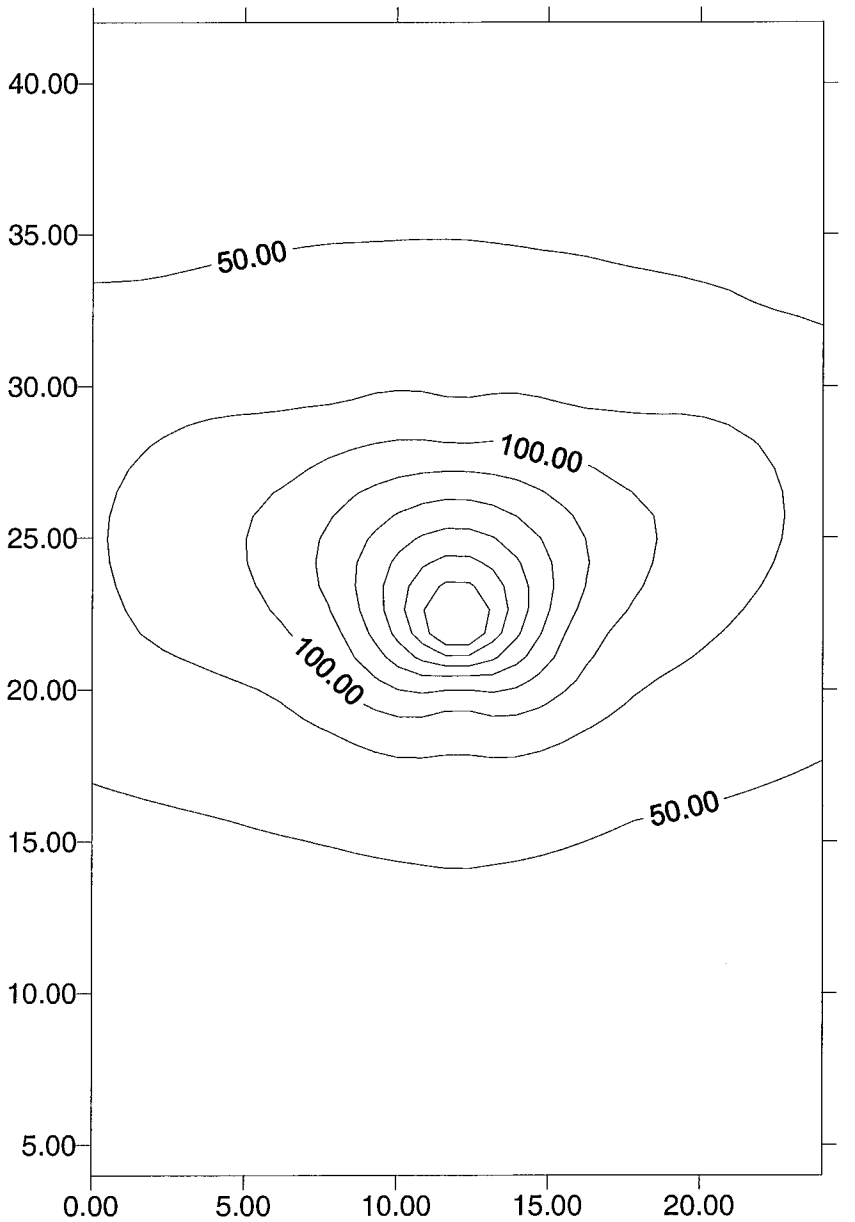
4/13


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
50.00

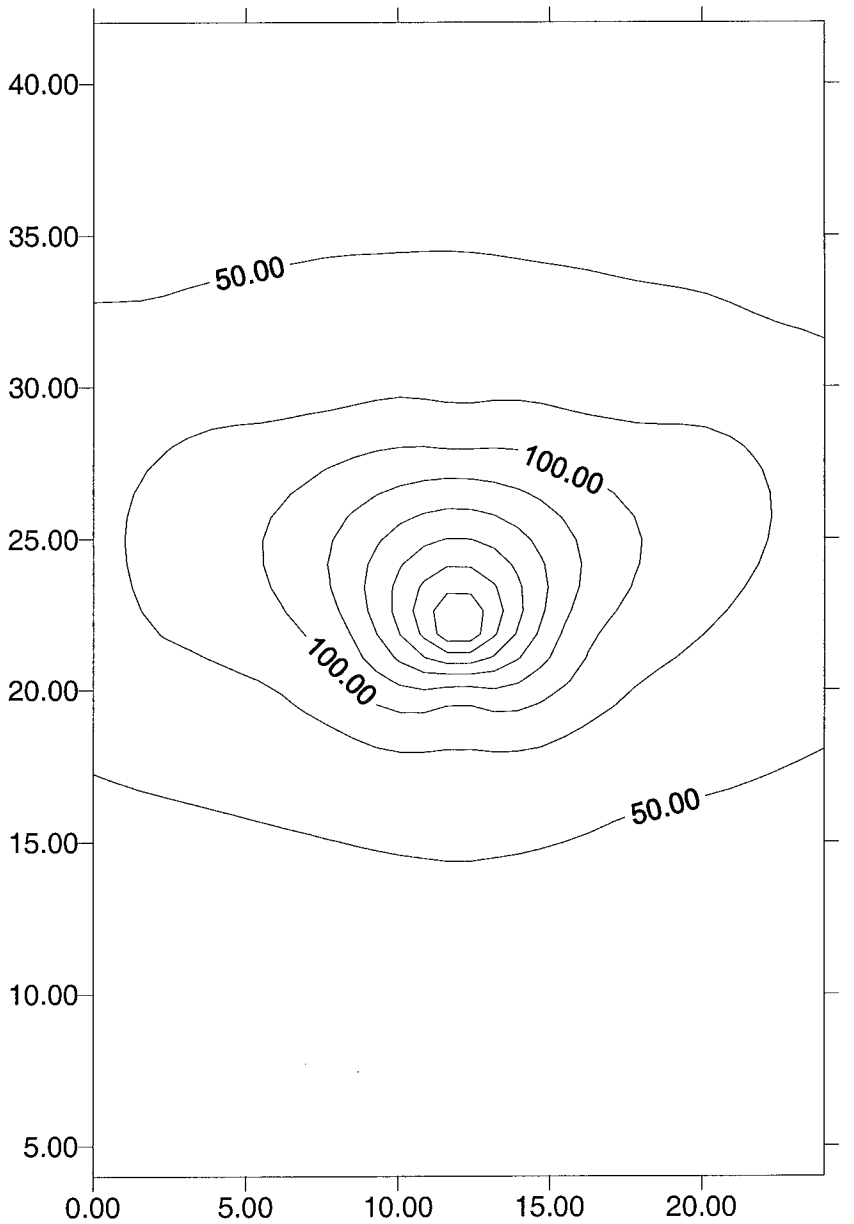
4/14


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
50.00

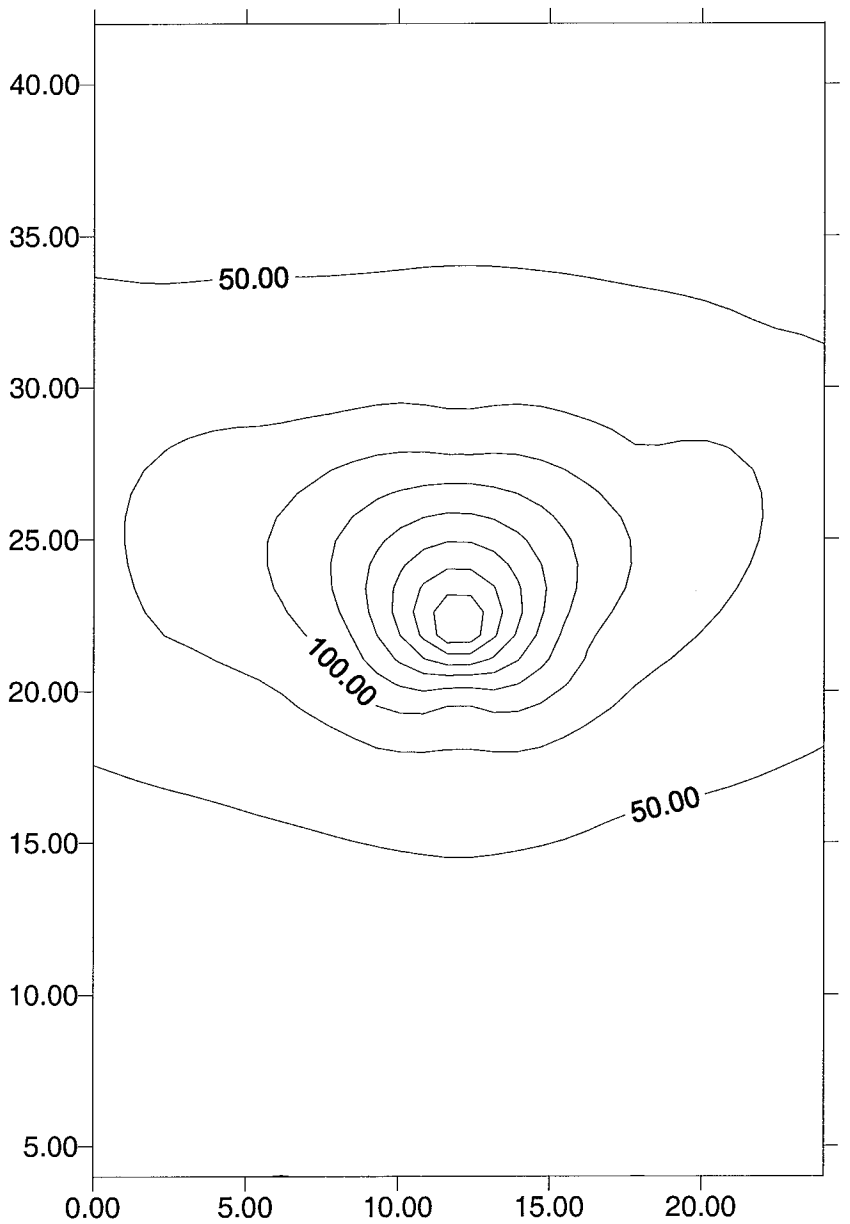
4/15


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
50.00

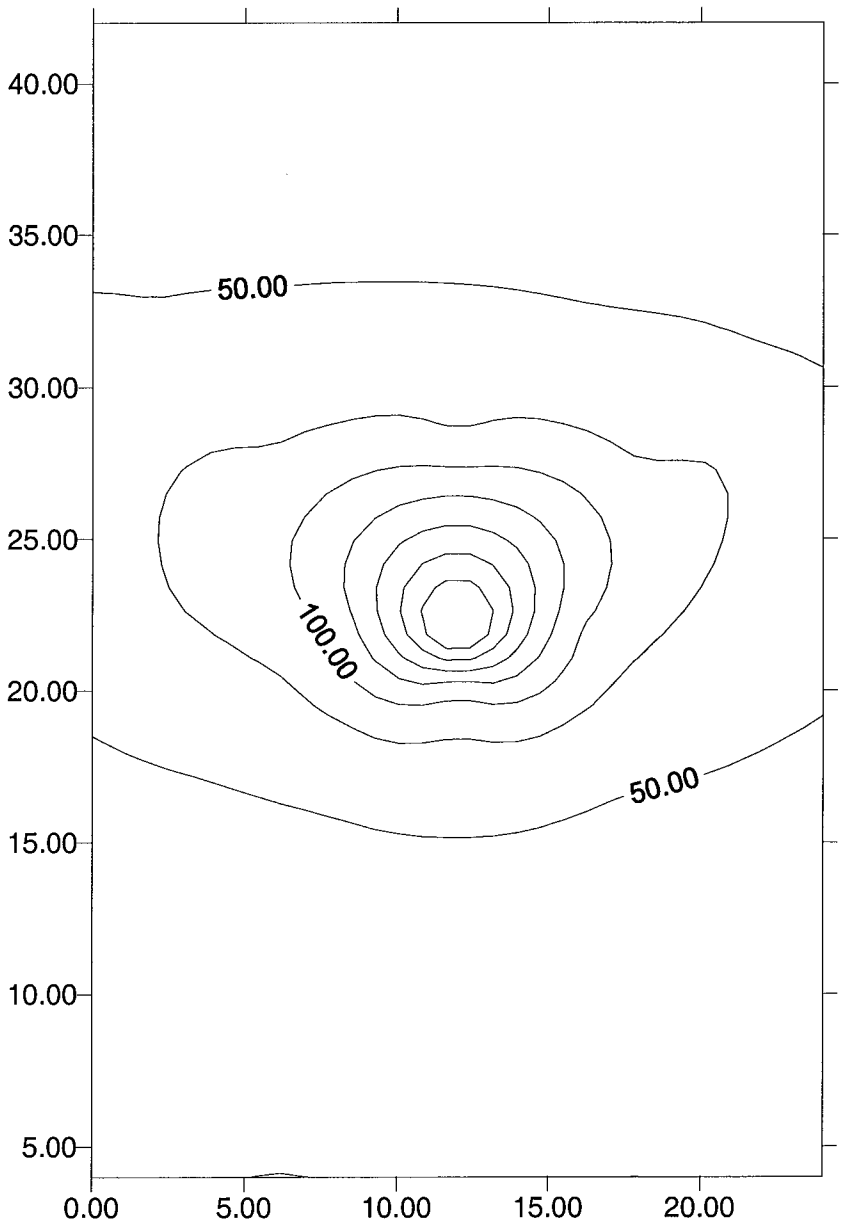
4116


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
100.00
50.00

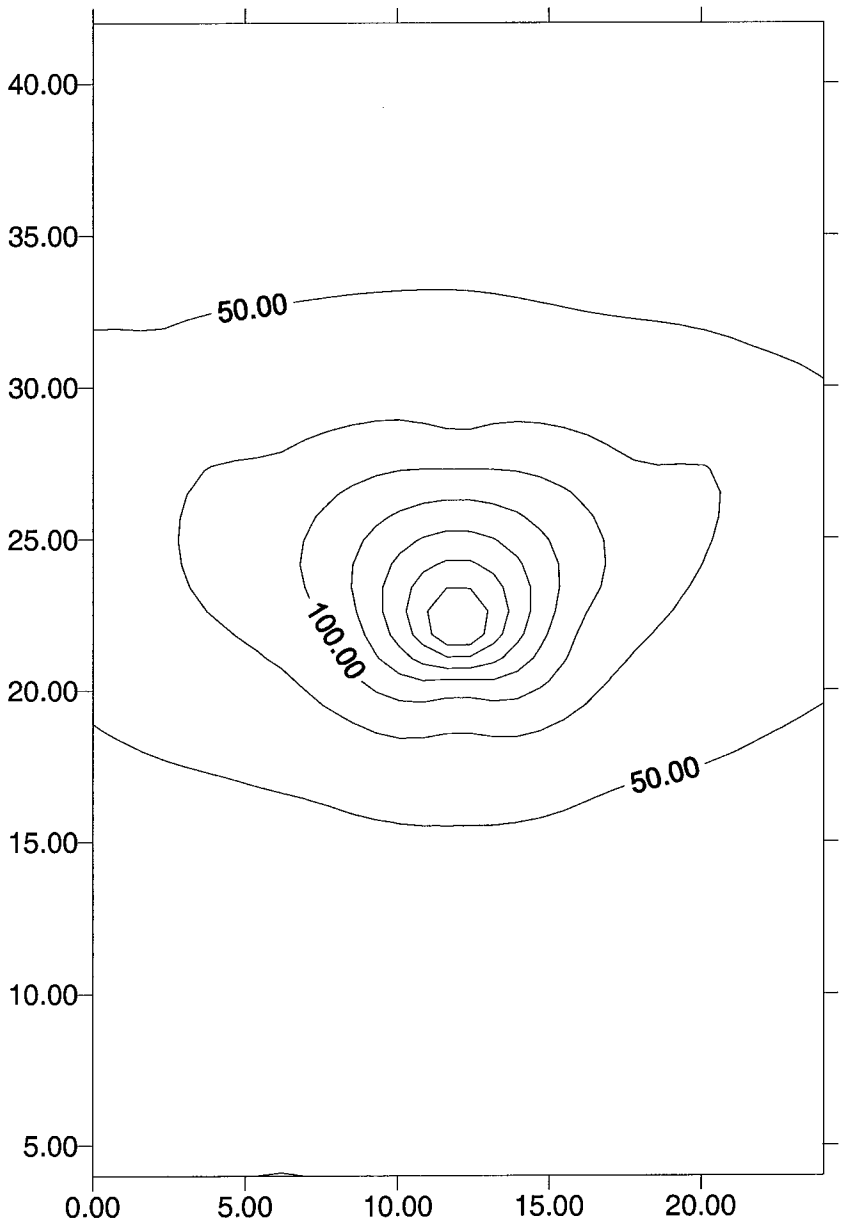
4/17


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

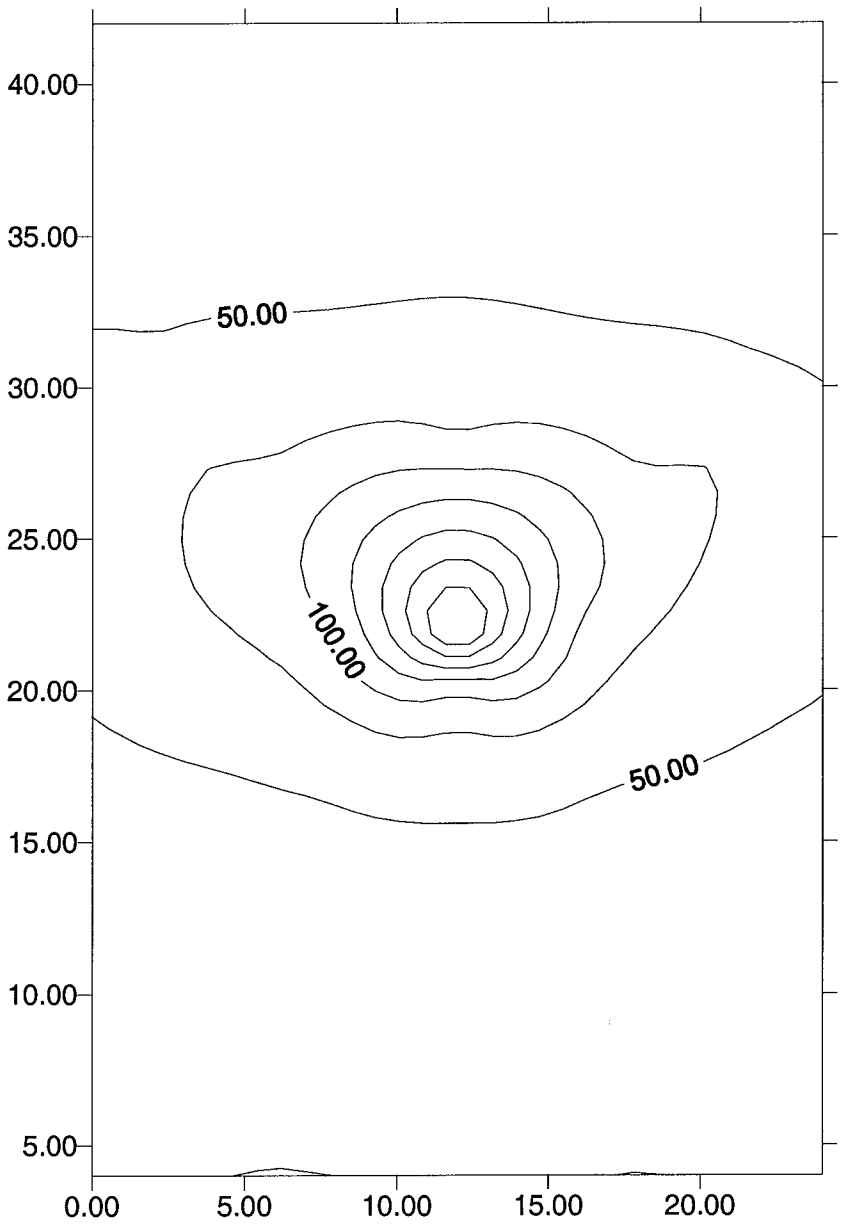
4/19


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

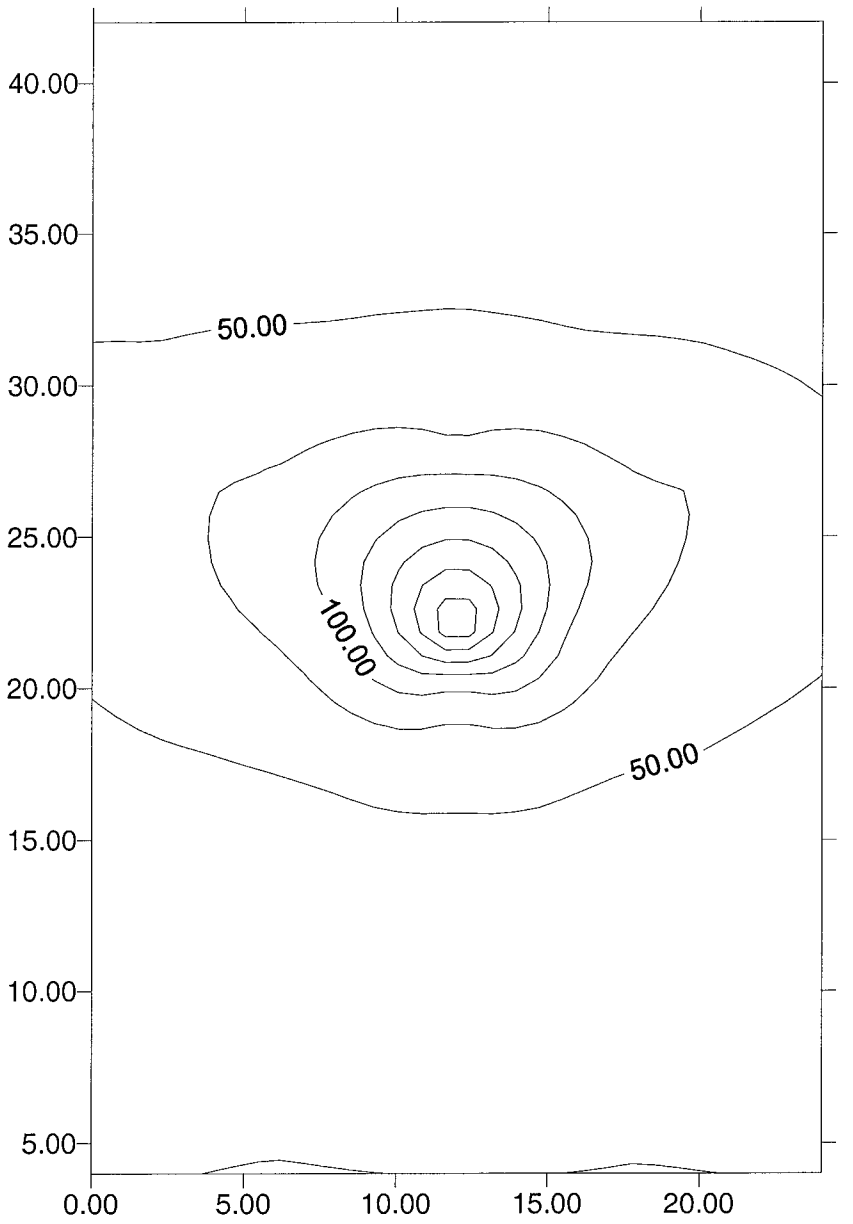
4|20


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

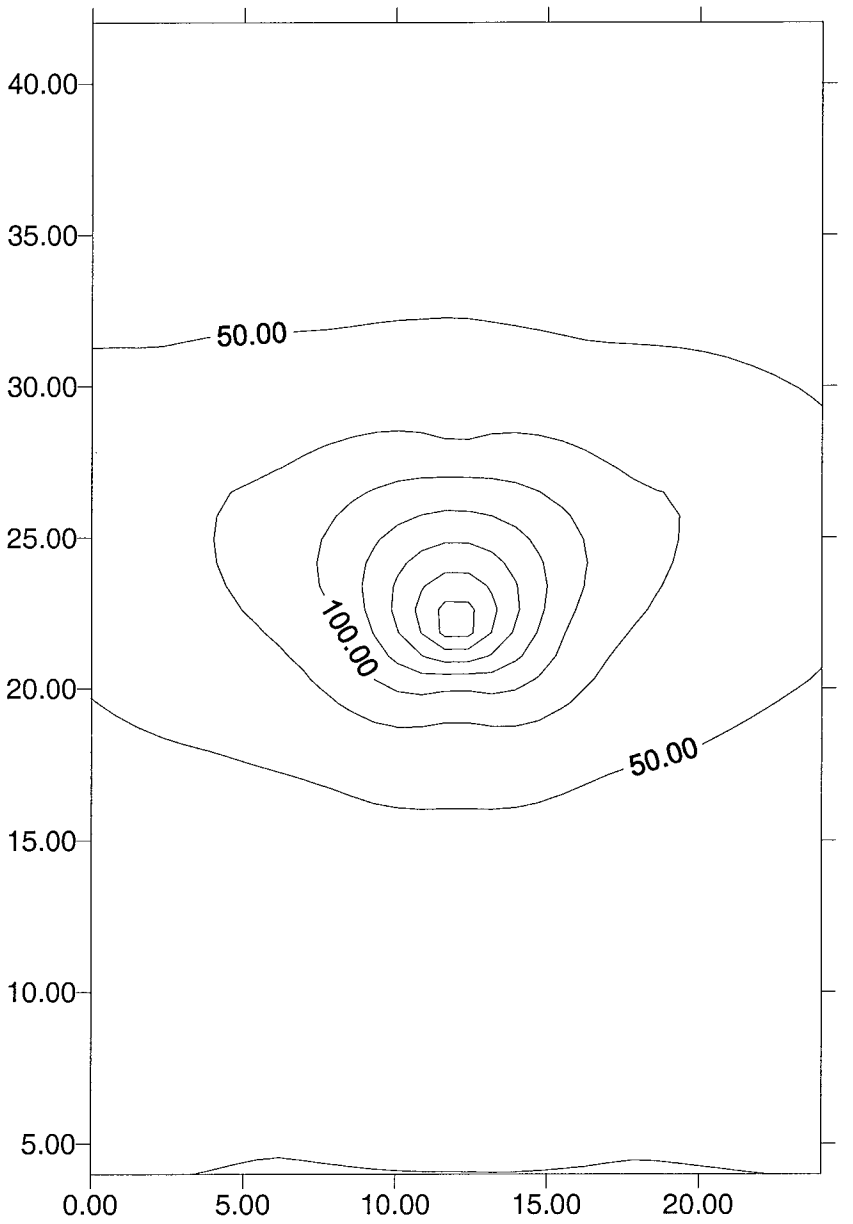
4/21


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

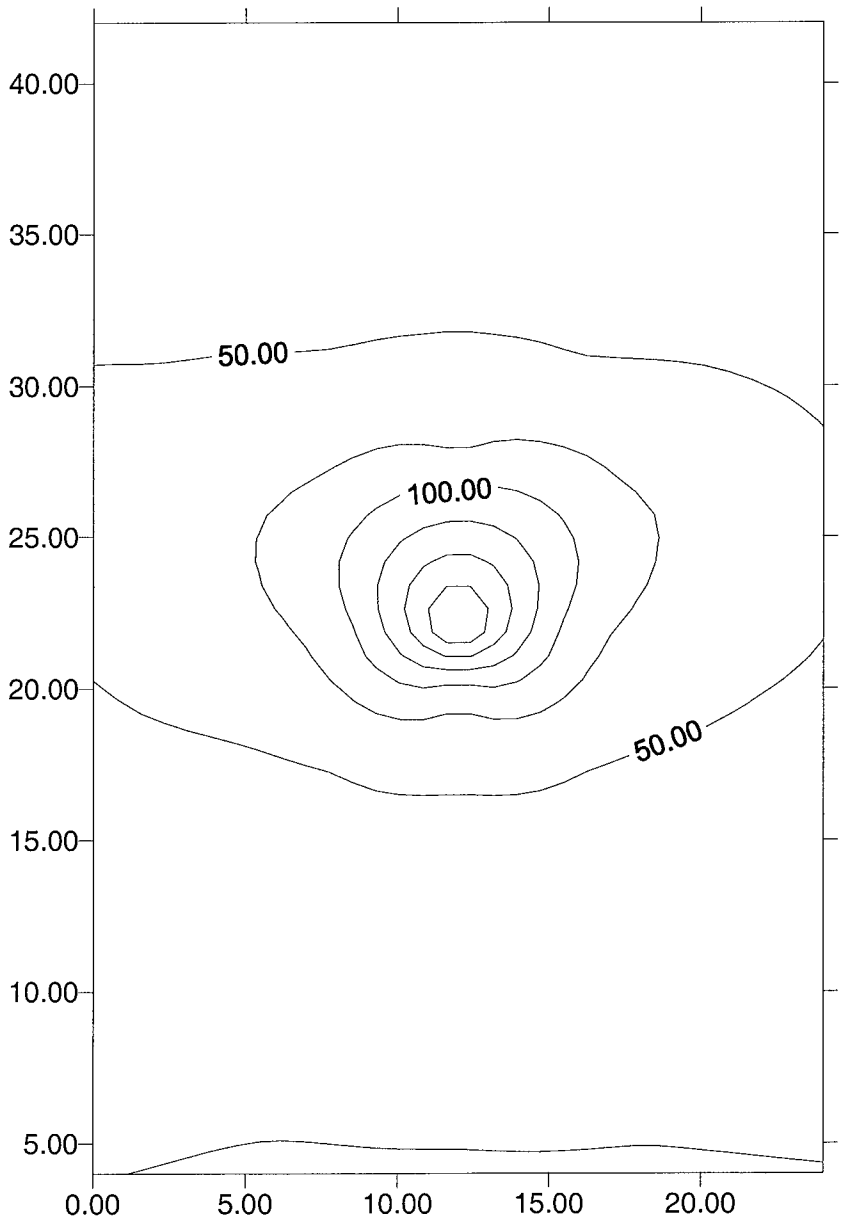
4\22


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

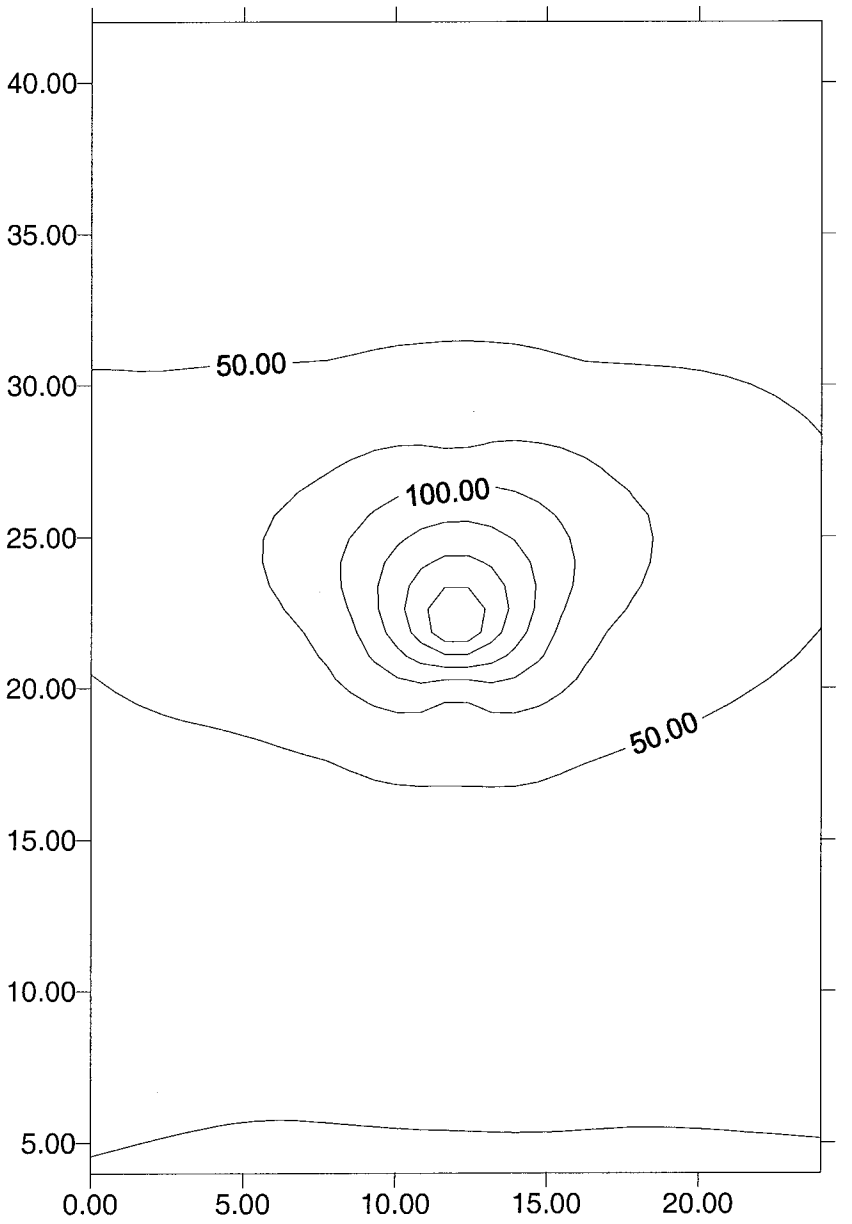
4/23


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

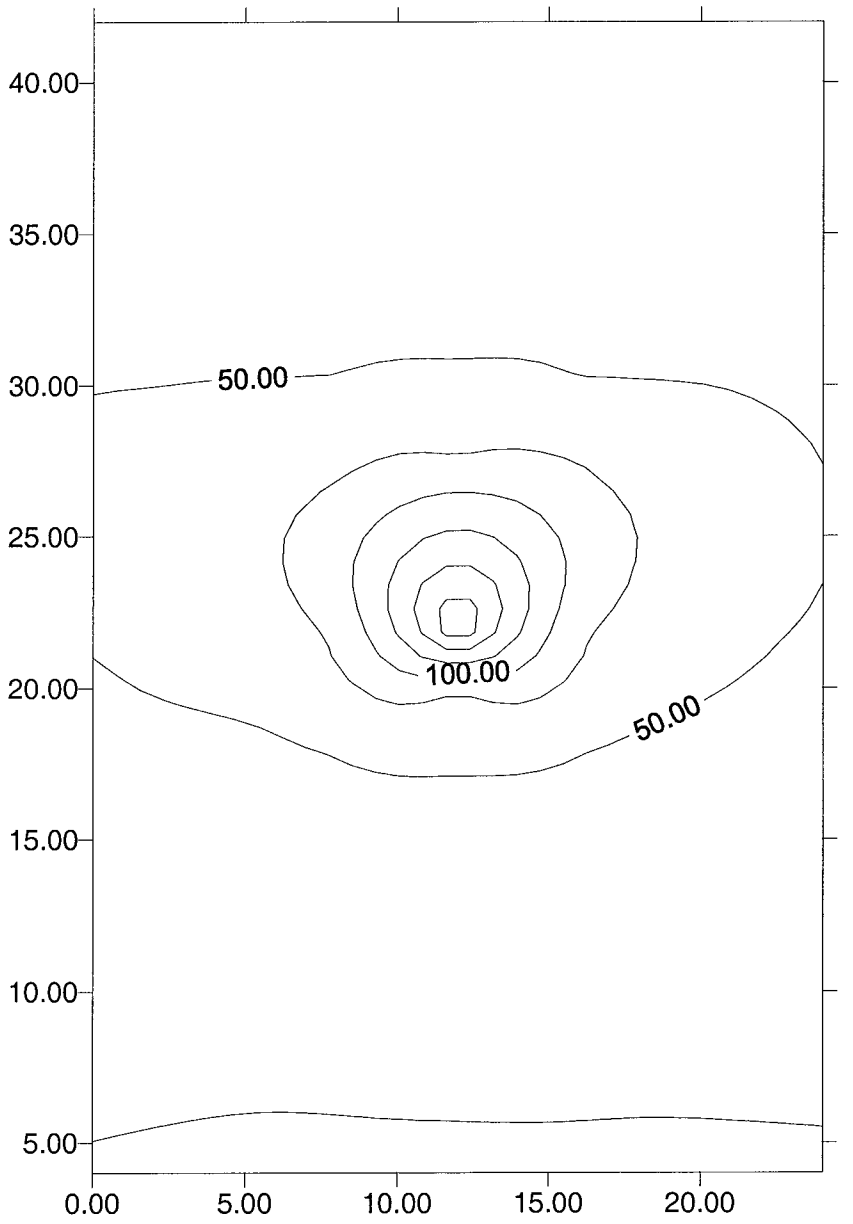
4/24


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

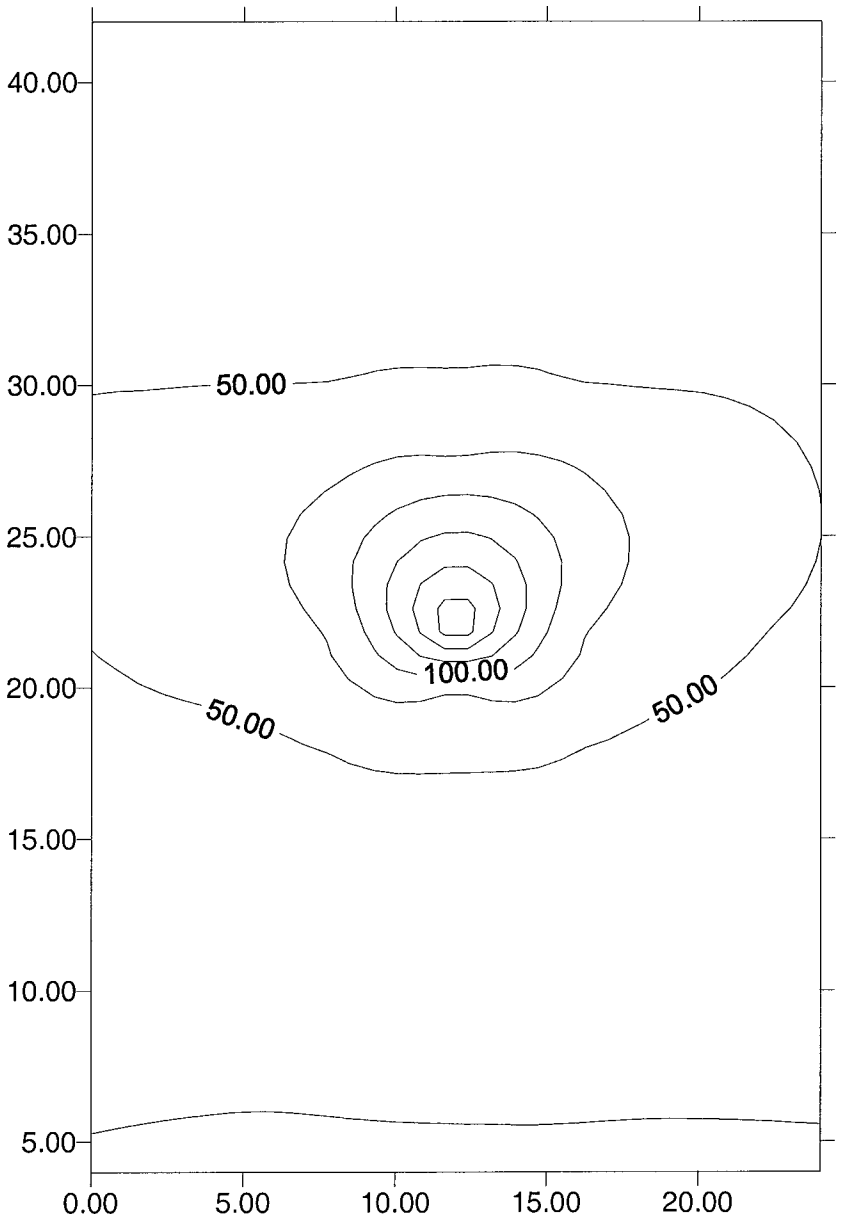
4/25


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

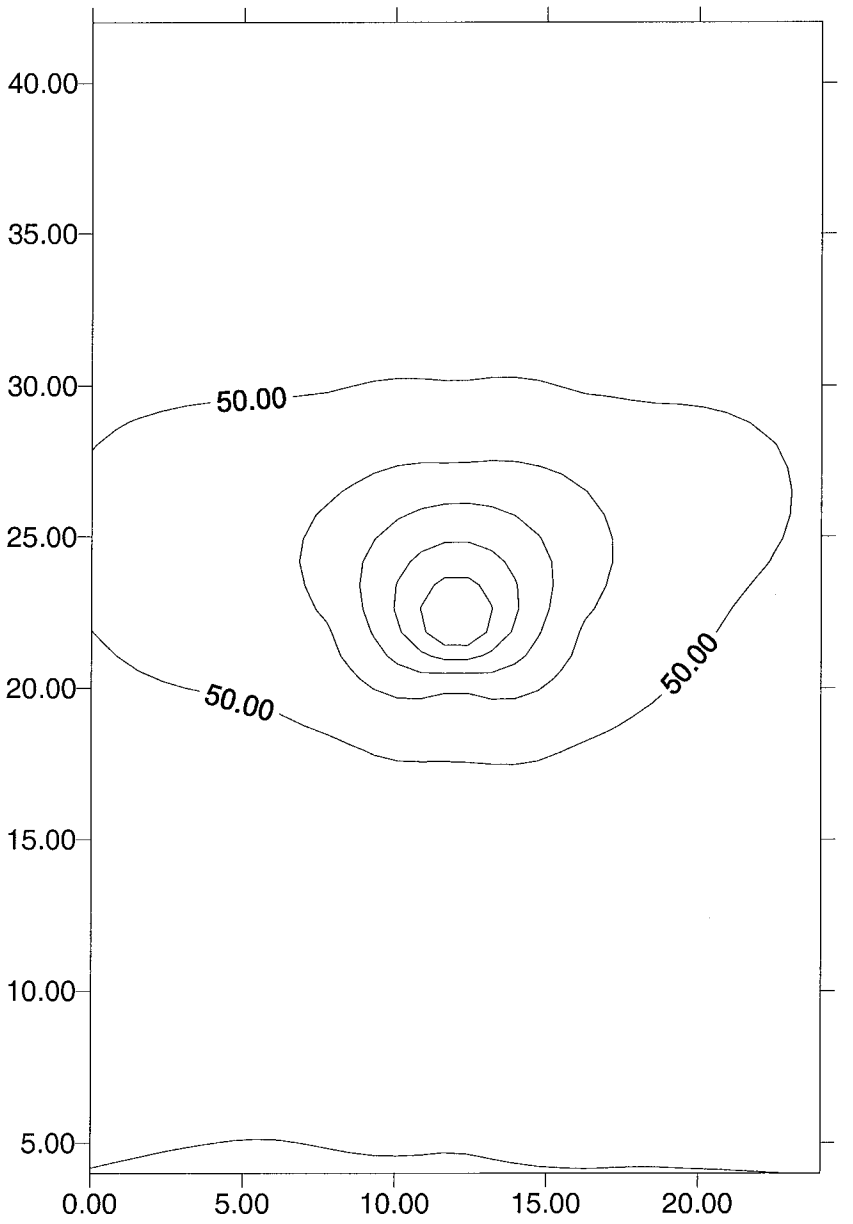
4/26

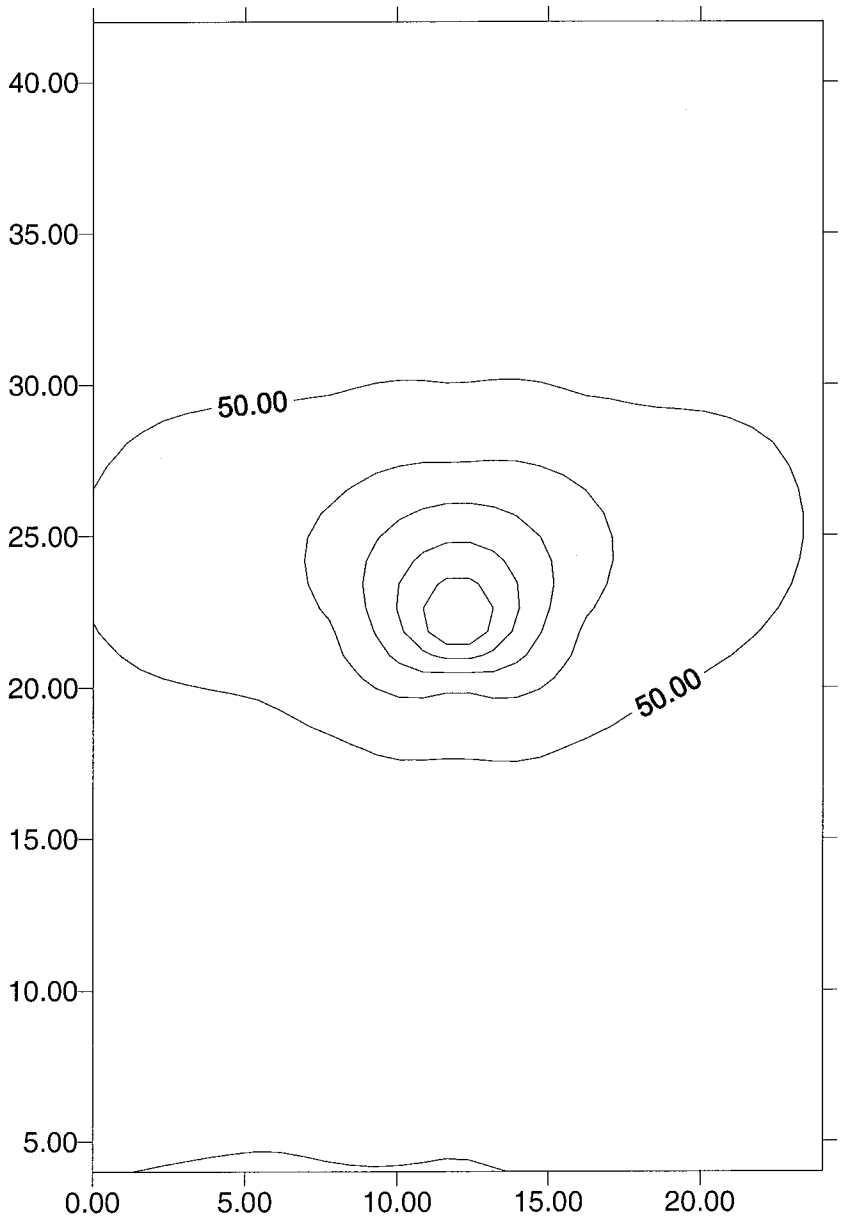

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00

4/27

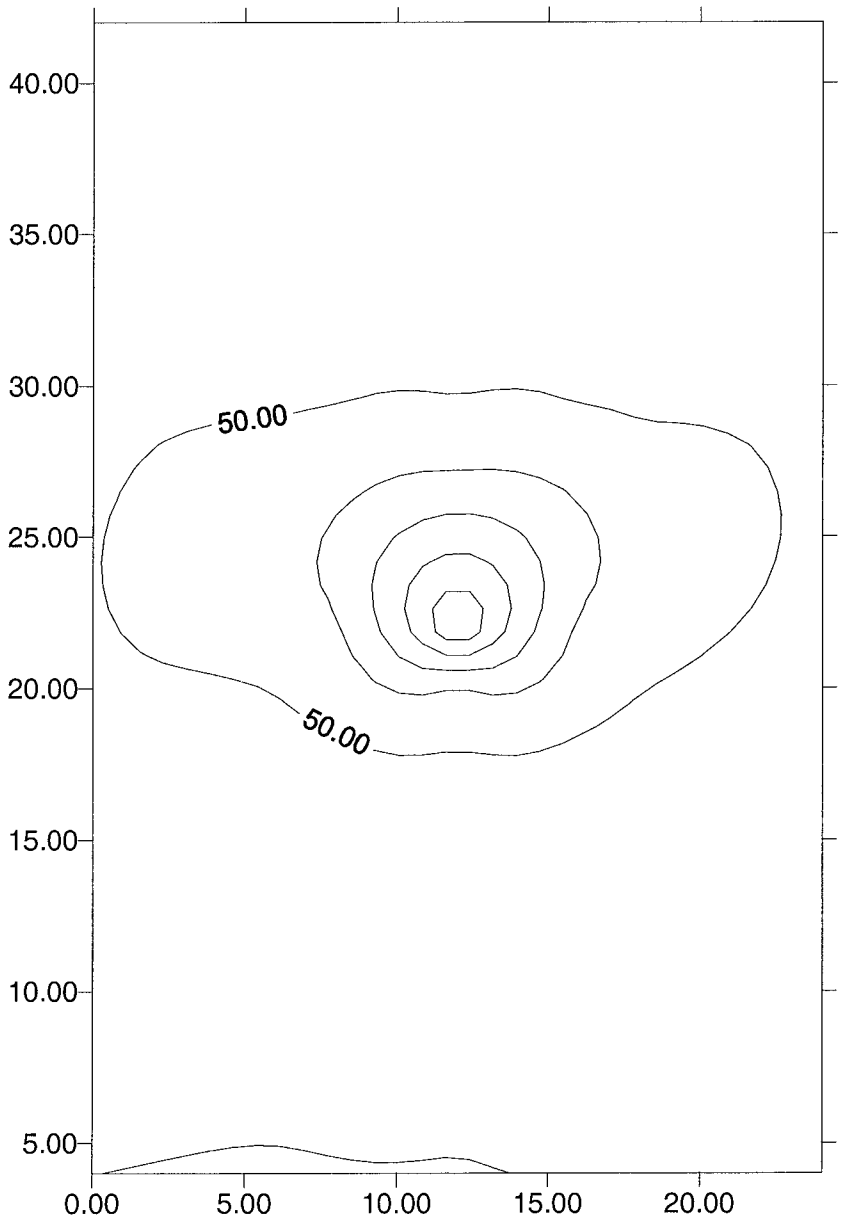

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
100.00
50.00
50.00

4/28


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00
50.00

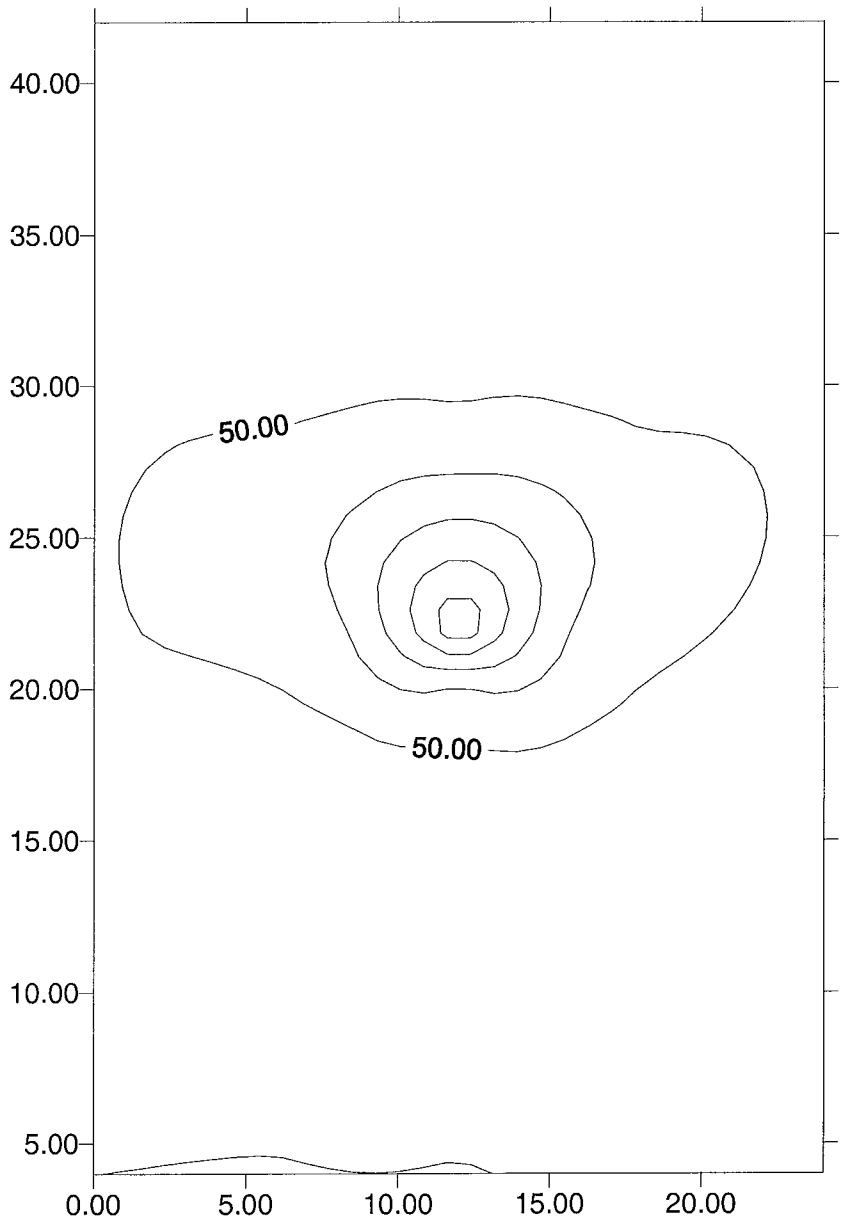

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00

4/30

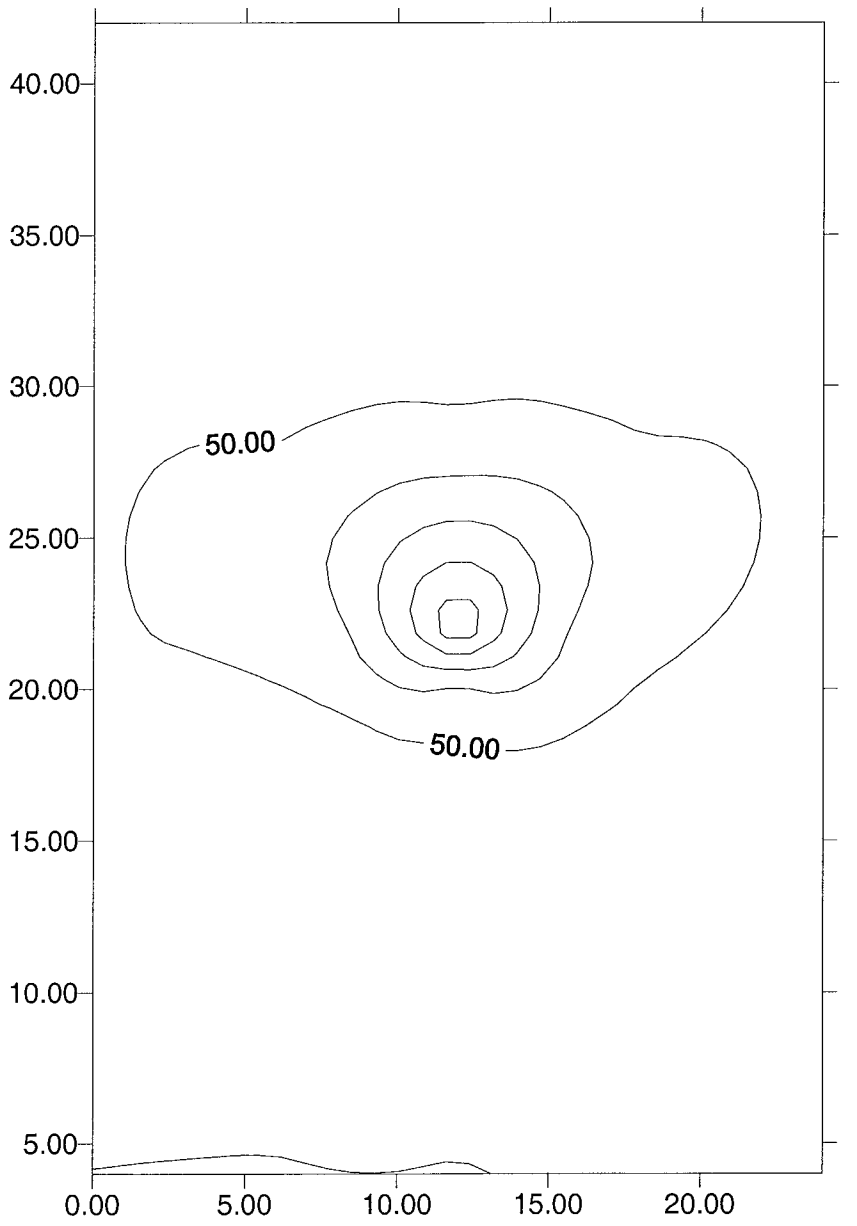


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00

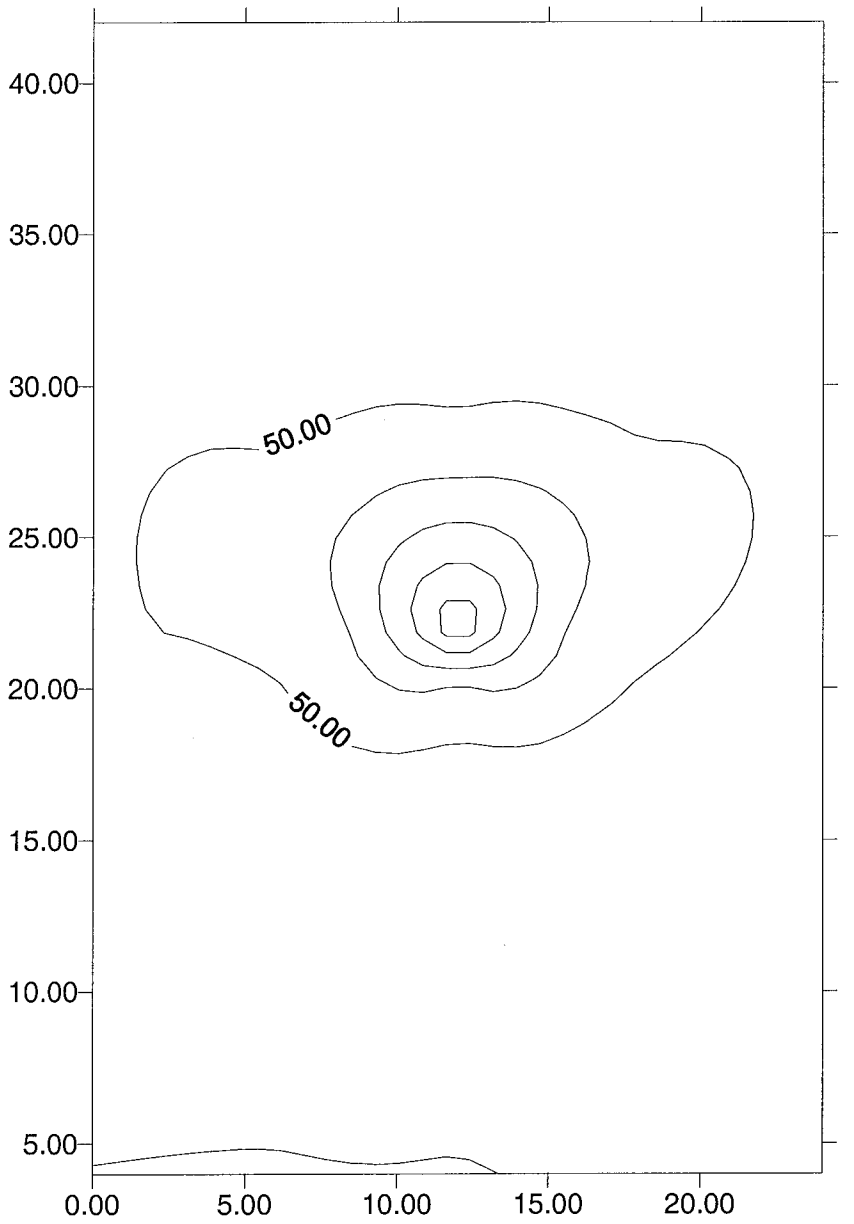
5/1


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00

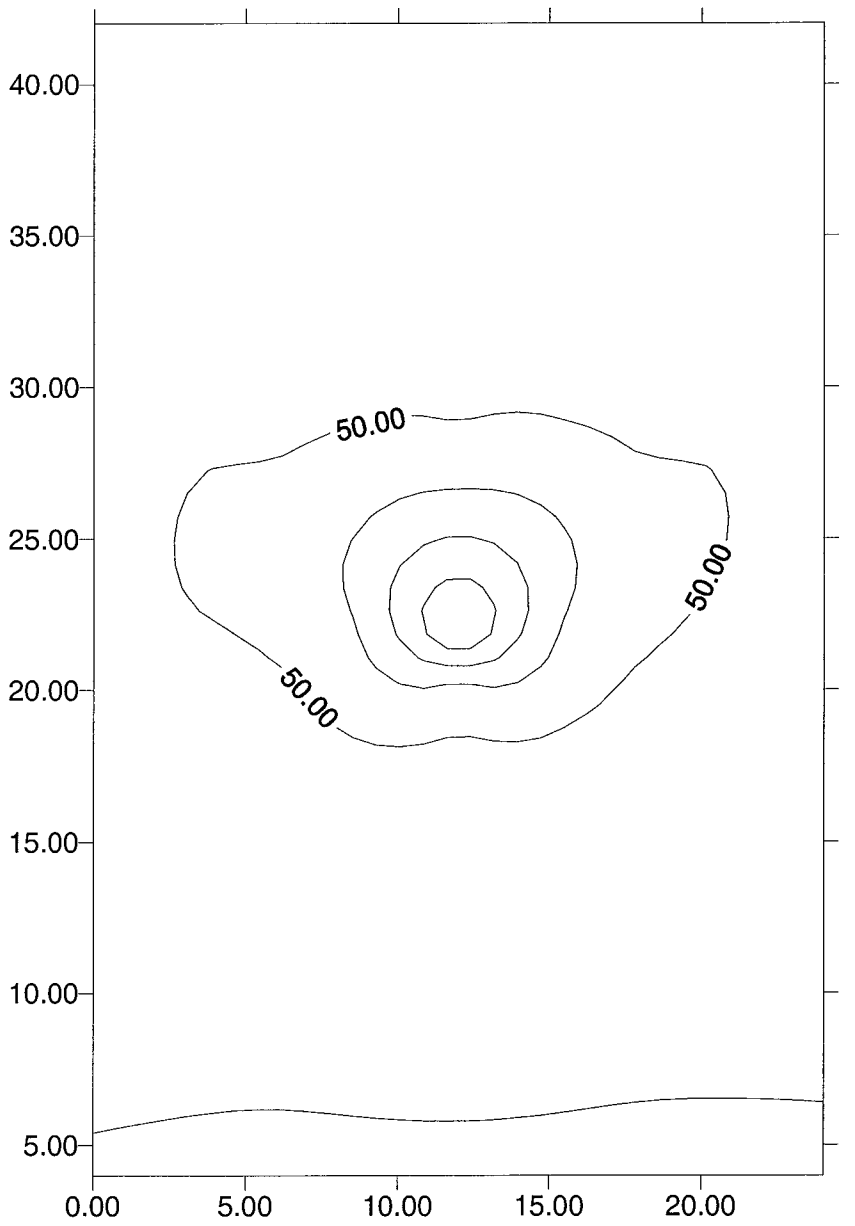
5/2


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00

5/3


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00

5/4


40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
5.00
10.00
15.00
20.00
50.00
50.00
50.00