

Spatial and Temporal Nitrate Variations in Groundwater from Southern Saipan

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June 2009

Pacific Islands Environmental Conference

June 1, 2007

- CUC issues a Public Notice about high nitrate levels in the drinking water

Chief Judge Alex R. Munson The federal government, rep-



COMMONWEALTH UTILITIES CORPORATION

DRINKING WATER WARNING
Areas of Saipan's water system have high levels of Nitrate

**DO NOT GIVE THE WATER TO INFANTS UNDER 6 MONTHS OLD
OR USE IT TO MAKE INFANT FORMULA**

Test results have just been provided to the Commonwealth Utilities Corporation from its California laboratory. Water samples are collected every three months, and the results received this week on Saipan showed nitrate levels at two water sources are above the allowable standard, or maximum contaminant level (MCL), of the CNMI Drinking Water Regulations.

Koblerville: The "Mafnas Well" contains nitrate levels of 11 parts per million. It is the source of water for residents in As Gonno, along Magisa Drive.

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CUC
sample

46 sites

JUL 1

JUL 2

JUL 3

JUL 4

JUL 5

JUL 6

JUL 7

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JUL 13

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CUC
sample

46 sites

JUL 1

JUL 2

JUL 3

JUL 4

JUL 5

JUL 6

JUL 7

JUL 8

JUL 9

Results
8 > MCL

JUL 10

JUL 11

JUL 12

JUL 13

JUL 14

JUL 15

JUL 16

JUL 17

JUL 18

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JUL 22

JUL 23

JUL 24

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JUL 26

JUL 27

JUL 28

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JUN 27

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JUN 29

JUN 30

CUC
sample

46 sites

JUL 1

JUL 2

JUL 3

JUL 4

JUL 5

JUL 6

JUL 7

JUL 8

JUL 9

Results
8 > MCL

JUL 10

JUL 11

JUL 12

DEQ 46
wells

JUL 13

JUL 14

JUL 15

JUL 16

JUL 17

JUL 18

JUL 19

JUL 20

JUL 21

JUL 22

JUL 23

JUL 24

JUL 25

JUL 26

JUL 27

JUL 28

SUN

MON

TUE

WED

THU

FRI

SAT

JUN 24

JUN 25

JUN 26

JUN 27

JUN 28

JUN 29

JUN 30

CUC
sample

46 sites

JUL 1

JUL 2

JUL 3

JUL 4

JUL 5

JUL 6

JUL 7

JUL 8

JUL 9

JUL 10

JUL 11

JUL 12

JUL 13

JUL 14

Results
8 > MCL

DEQ 46
wells

Results
all < MCL

JUL 15

JUL 16

JUL 17

JUL 18

JUL 19

JUL 20

JUL 21

JUL 22

JUL 23

JUL 24

JUL 25

JUL 26

JUL 27

JUL 28

June-July Results 2007

➤ June 28-29 CUC/MW

- KV 25 EP = 14.3 mg/l
- SV 7 = 10.9 mg/l
- IF 5 = 10.9 mg/l
- IF 16 = 14.2 mg/l
- IF 205 = 14.2 mg/l
- OB 14 EP = 12.6 mg/l
- Mafnas = 10.9 mg/l

➤ July 12 DEQ

- KV 25 = 8.84 mg/l
- SV 7 = 4.22 mg/l
- IF 5 = 5.91 mg/l
- IF 16 = 5.28 mg/l
- IF 205 = 4.73 mg/l
- OB 14 = not sampled
- Mafnas = 5.61 mg/l

This is why we wanted to
study nitrate variations



WERI Council Meeting

- October 2007 WERI Advisory Council Meeting
- Nitrate issue discussed
- Listed as a priority research concern

- DEQ & CUC discuss the possibility of doing the research themselves

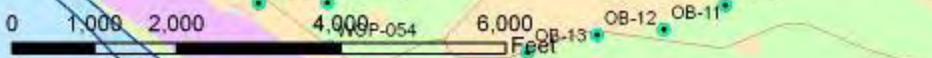
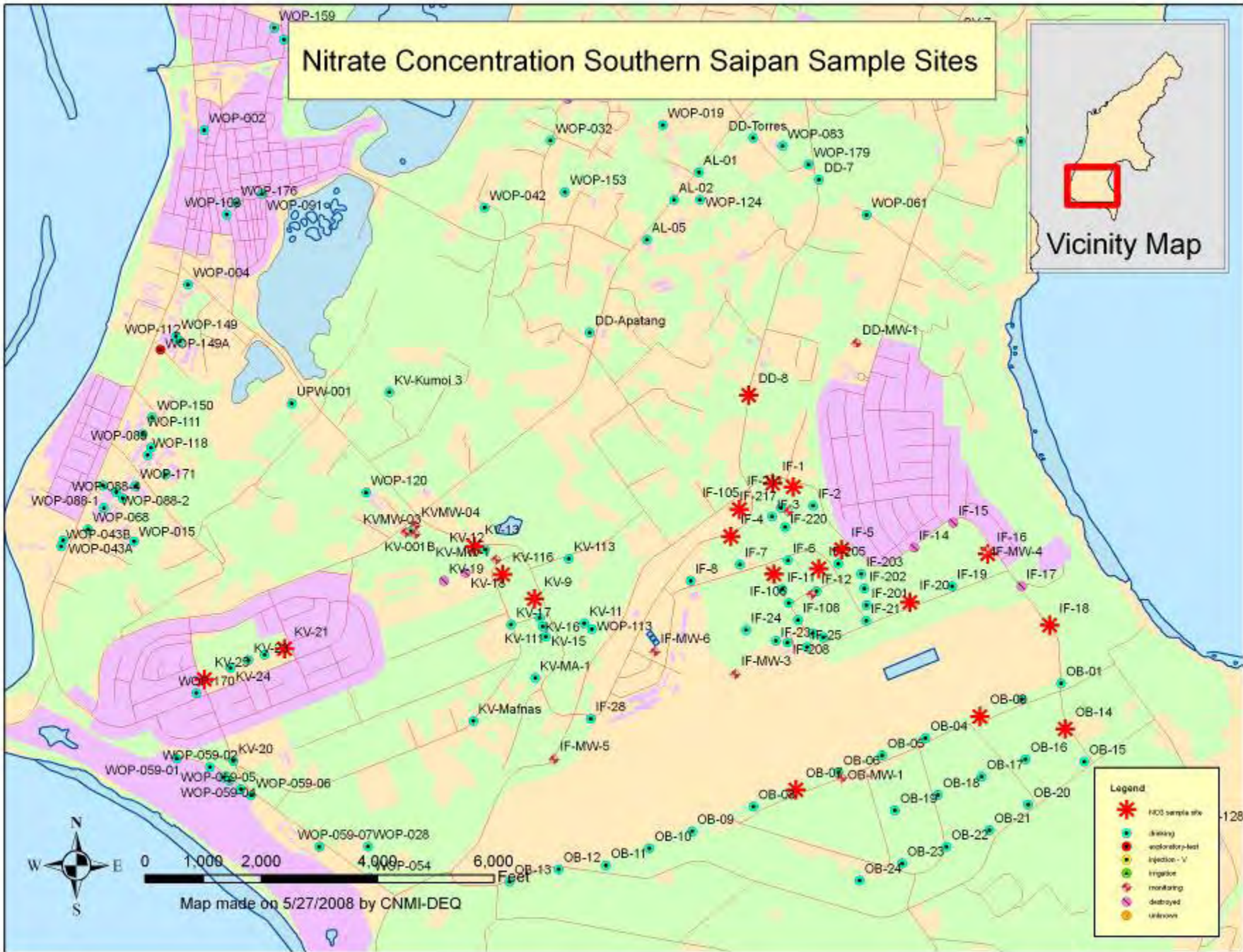
Grant Process

- DEQ and CUC prepared a grant proposal
- Submitted by mid – December 2007
- March 2008 – DEQ & CUC notified that grant proposal was accepted
- Ordered equipment in April 2008
- Started collecting data in late May 2008

The study

- Picked 20 wells in Southern Saipan
- Collected samples weekly for one year
 - pH, temperature
 - Conductivity, Salinity, TDS
 - turbidity
 - Nitrates (at DEQ lab)
- Installed rain gauges at four sites

Nitrate Concentration Southern Saipan Sample Sites



Map made on 5/27/2008 by CNMI-DEQ

Legend

- * HCO3 sample site
- drinking
- exploratory-test
- injection - V
- irrigation
- monitoring
- destroyed
- unknown

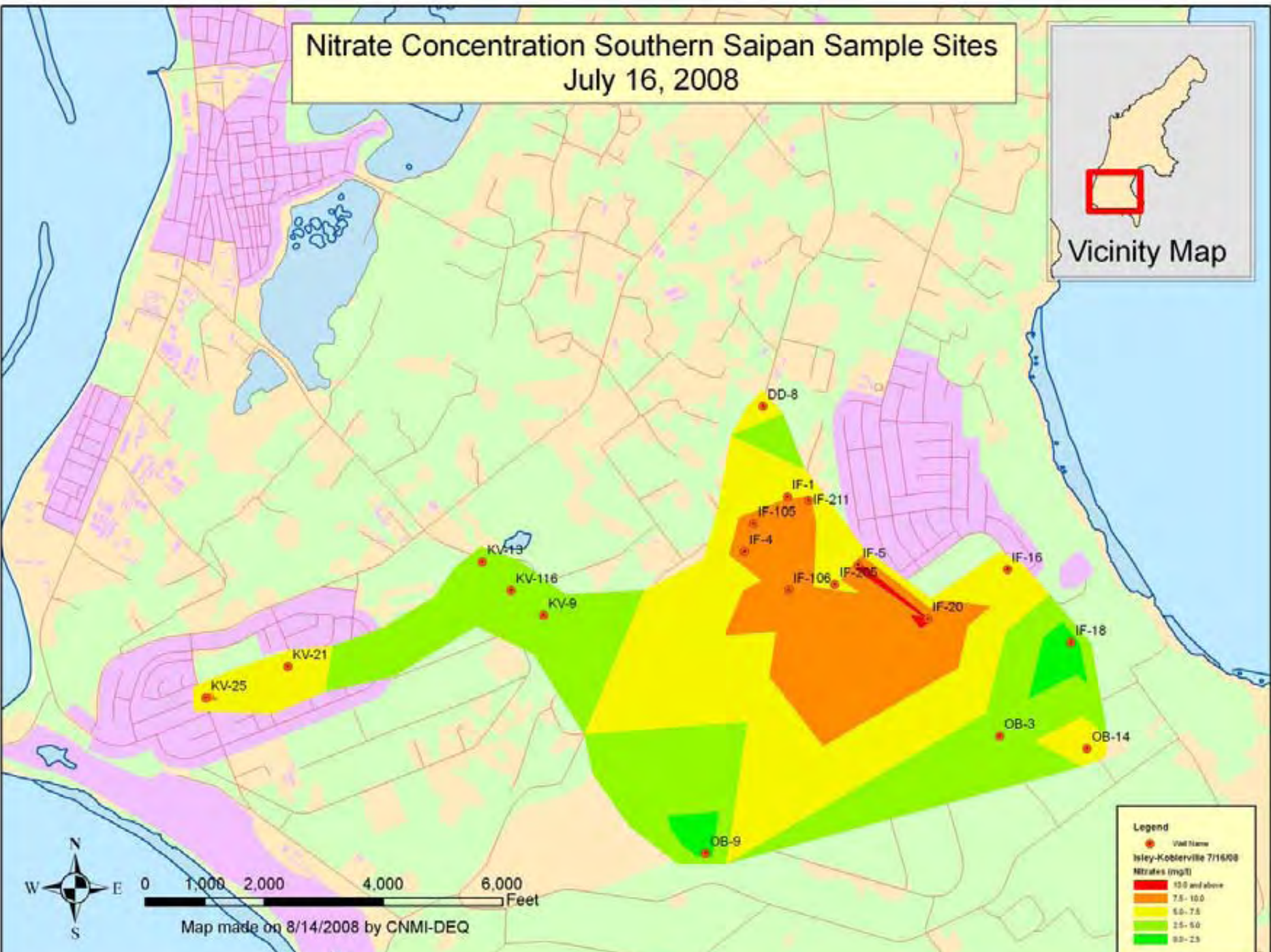
Collecting Samples



Rainfall Data



Nitrate Concentration Southern Saipan Sample Sites July 16, 2008



Legend

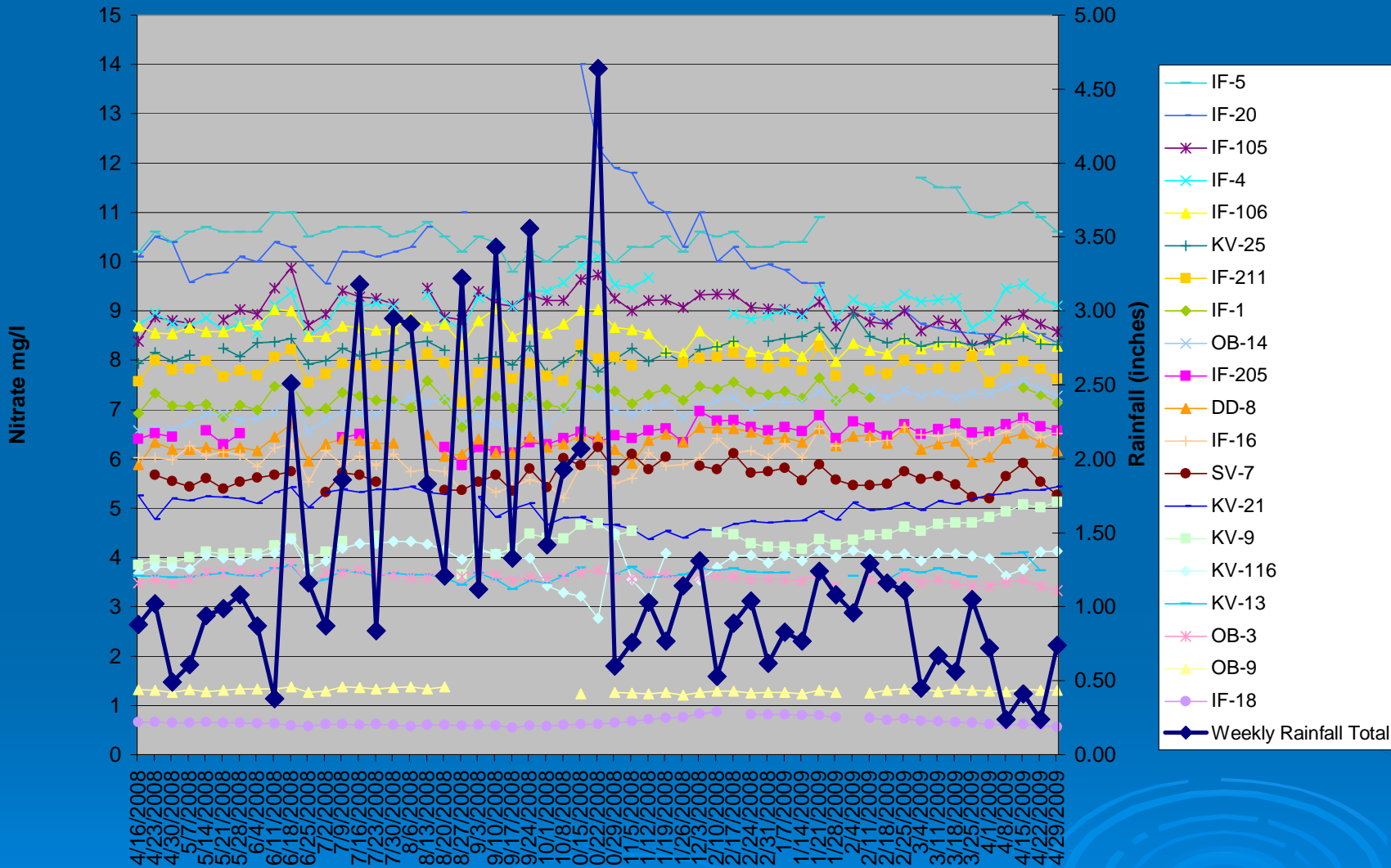
- Well Name
- Isley-Koberville 7/16/08
- Nitrates (mg/l)
- 100 and above
- 75-100
- 50-75
- 25-50
- 00-25



0 1,000 2,000 4,000 6,000 Feet

Map made on 8/14/2008 by CNMI-DEQ

Weekly Rainfall & Nitrate Concentration



Results

- Very little variation in nitrates in the groundwater with changes in rainfall
- Don't know why there were big changes in July 2007
- Did find changes in salinity with rainfall or well pumping rates

Conclusion

- If you have a research question, you may be able to do the study yourself!