N. Dak. Water Use Program

&

Telemetry Pilot Study

Michael Hove
North Dakota Office of the State Engineer

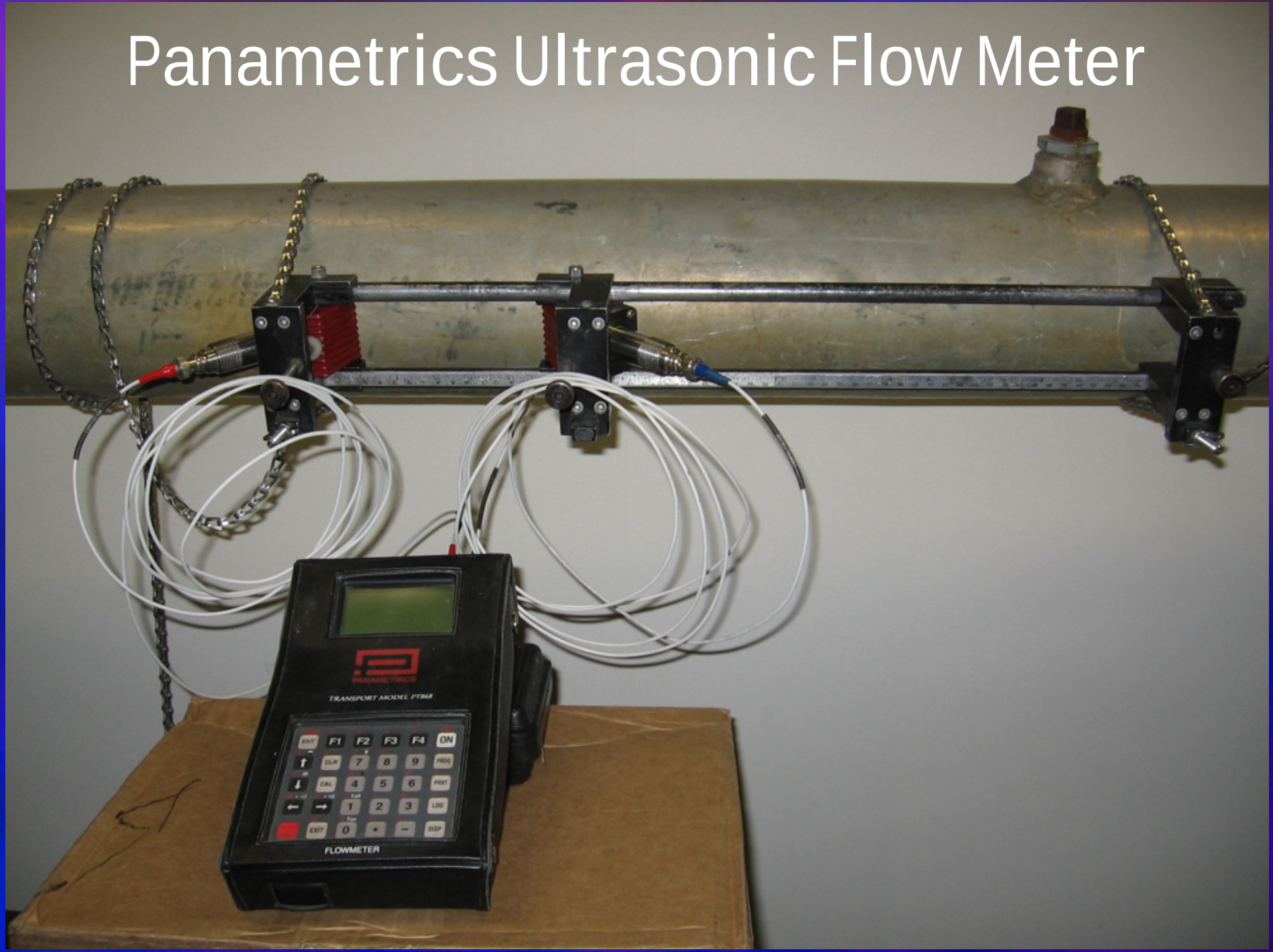
Main Topics

- Water Use Program
- Telemetry History – Why & How
- Telemetry Pilot Study – What is being done?

State Engineer Water Use Program

- 1970s to Present
- Annual Water Use Form (AUF)
- Self-Monitoring & Reporting “Honor System”
- Over 2,200 Irrigation Permit AUFs : ~ 93% R.R.
- Over 850 Mun/Ind Permit AUFs : ~ 97% R.R
- Water Permit Database
- S.E. Flow Rates : Ultrasonic Flow Meter

Panametrics Ultrasonic Flow Meter



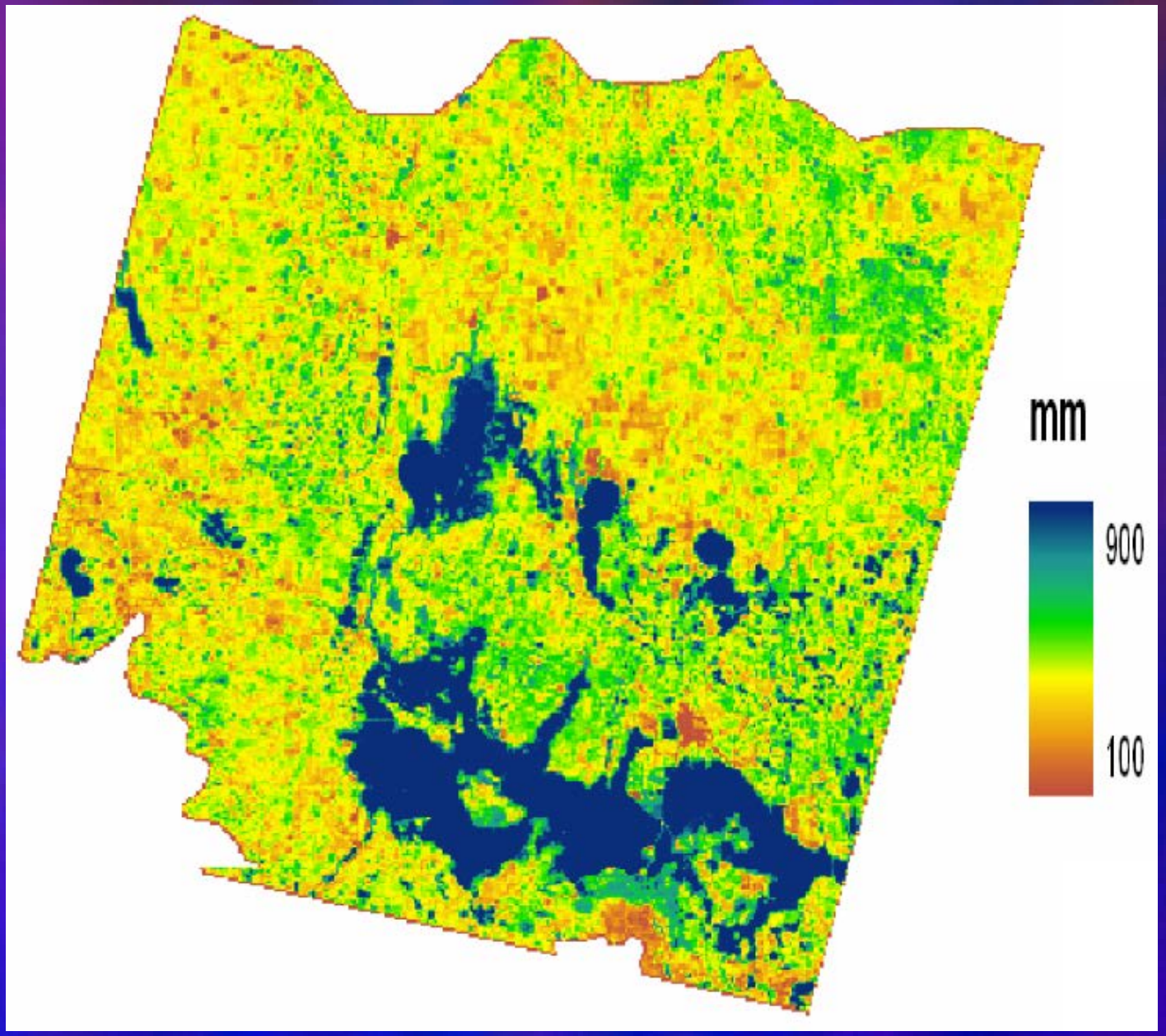
Annual Hydrologic Monitoring

- Well Drilling Program – State Rig : ~ 120 sites
- Water level monitoring : ~4,200 wells
- Obs. Well Sampling : ~ 1,200 samples
- Surface Water gauges : ~ 150 gauges
- Surface Water Sampling : ~ 200 samples
- Satellite Data : NDAWN & METRIC (Dr. Allen)
- Water Use Program : ~ 3,000 AUFs

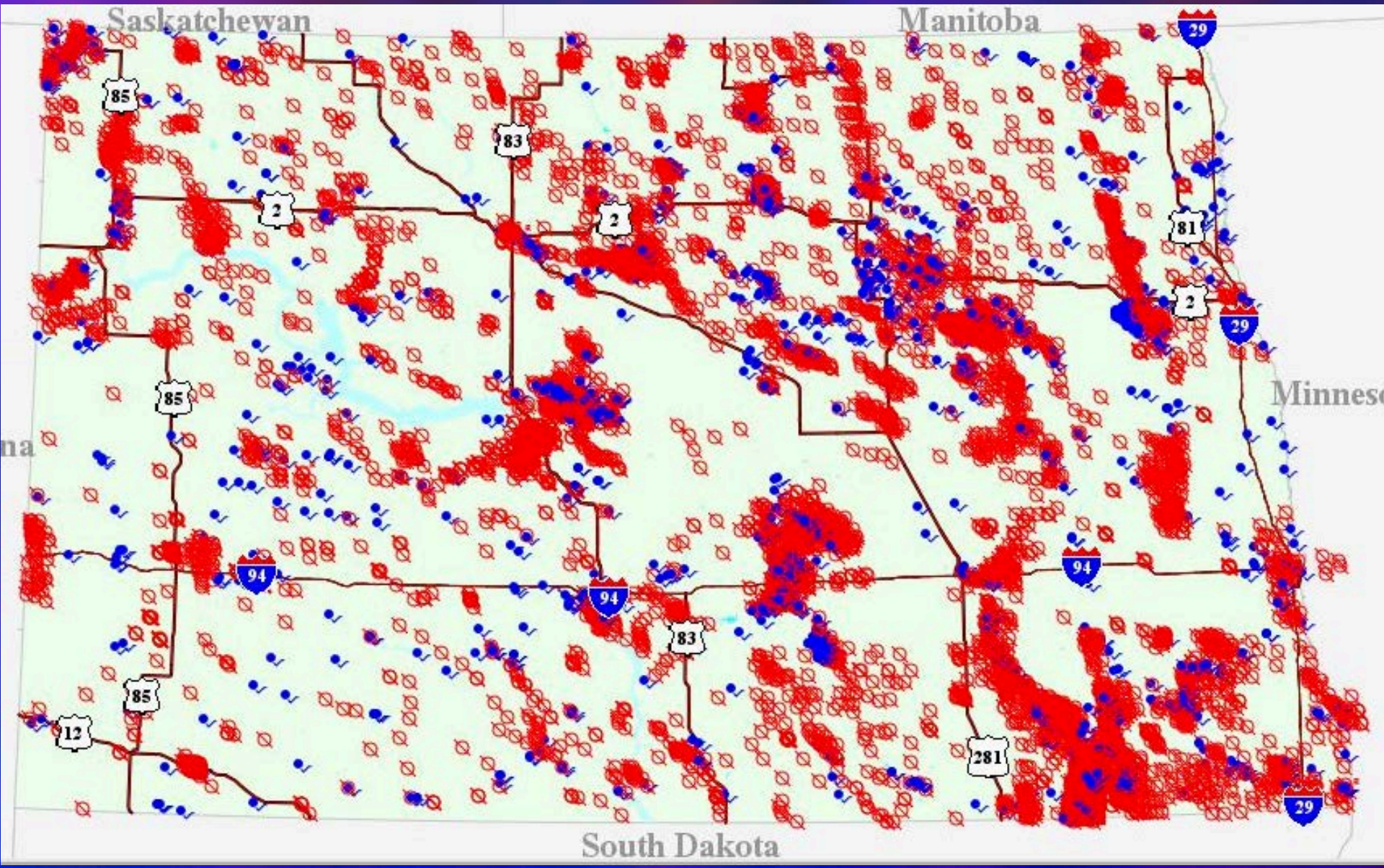
Satellite Data

- Kidder County 2006 Irrigation Study
  - 2002 NDAWN & Landsat
  - Crop Water Deficit & Crop Areas
  - Only 10% difference between reported use
- METRIC (Mapping EvapoTranspiration at high Resolution with Internalized Calibration)
  - 2006 Devils Lake /NDSU ET Project
  - Satellite Data : NDAWN & METRIC
  - Dr. Dean Steele & Sheldon Tuscherer

Devils Lake 2006 ET Project



Monitoring Wells & Surface Water Sites



Telemetry History : Why?

- Rapid Development of Oil Industry
- Rapid Development of Water Depots
- 2011 Legislative concern regarding : Accuracy of information from the “Self Reporting : Honor System”

Telemetry History : How ?

- April 28, 2011 – Bill 2020 Passes House & Senate : "Remote Terminal Water Metering Devices"

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Telemetry History : How ?

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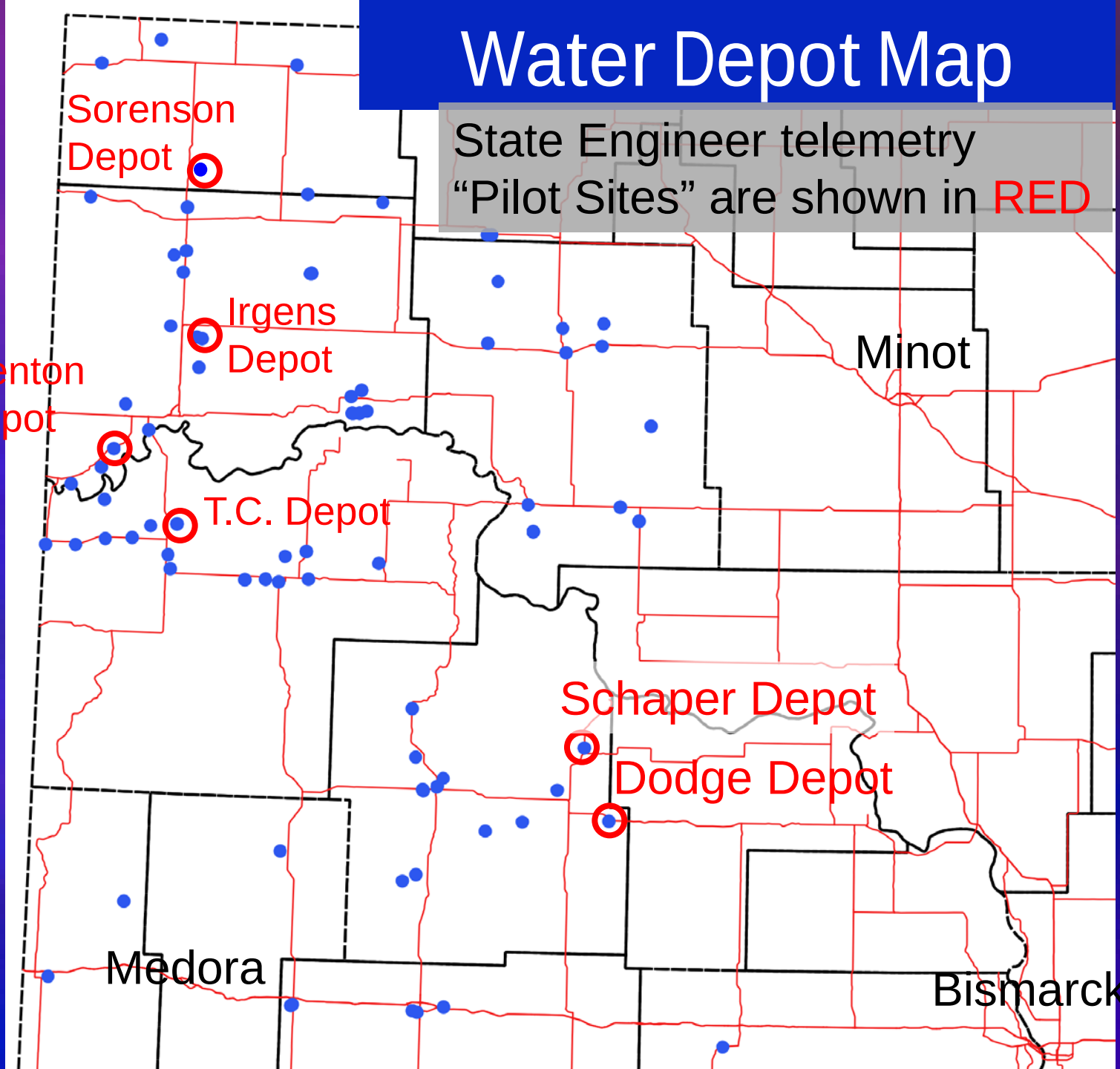
- May 18, 2011 – Governor veto of telemetry section, noting S.E. is in best position to develop metering specifications.
- State Engineer provided assurances :
  1. Increase frequency of meter readings by staff
  2. Develop monthly meter report by permit holder
  3. Implement a Telemetry Pilot Study

Water Depot Map

State Engineer telemetry
"Pilot Sites" are shown in RED



Telemetry Pilot Study : What is being done?

- 1st Phase – Research & Review
- 2nd Phase – Data Transfer Testing
- 3rd Phase – Installation at sites (collection & transfer)
    A. Dodge Depot : On-Set Computer, HOBO
    B. Timber Creek (T. C.) Depot : McCrometer
    C. Trenton Depot : McCrometer
    D. Schaper Depot : iDT

1st Phase – Research & Review

- Tabulated meter brands at 73 depot fills : (18)

  McCrometer 53%

  Neptune 12%

  Sensus 9%

  15 other meter types 26%

- McCrometer pilot : Central Colorado Con. Water District

  Ken Quandt : Regional Representative

  Randy Ray : Telemtry project started in June of 2009

1st Phase – Research & Review

- Existing telemetry at N.D. water depots : Basic Energy

SWWA , Lalim Depot, & Cities of Williston, Killdeer, New Town

2 to 4 months for successful completion of installation.

Parshall Depot : Feb. 2012 transition to SCADA ~ $40 K

1st Phase – Research & Review

- Other telemetry vendors : $5,000 to $40,000 & Up.
  1. On-Set Computer HOBO Data Logger : Dodge depot
  2. Design Solutions & Integration : Basic Energy
  3. Informational Data Technologies : SWWA (5 sites)
  4. Red Lion : Lalim Depot
  5. Watch Technologies : Oregon
  6. MicroComm SCADA (supervisory control & data acq.)

1st Phase – Research & Review

- Telemetry communication :

  1. Satellite : McCrometer & idt

     Very good coverage; Greater Costs

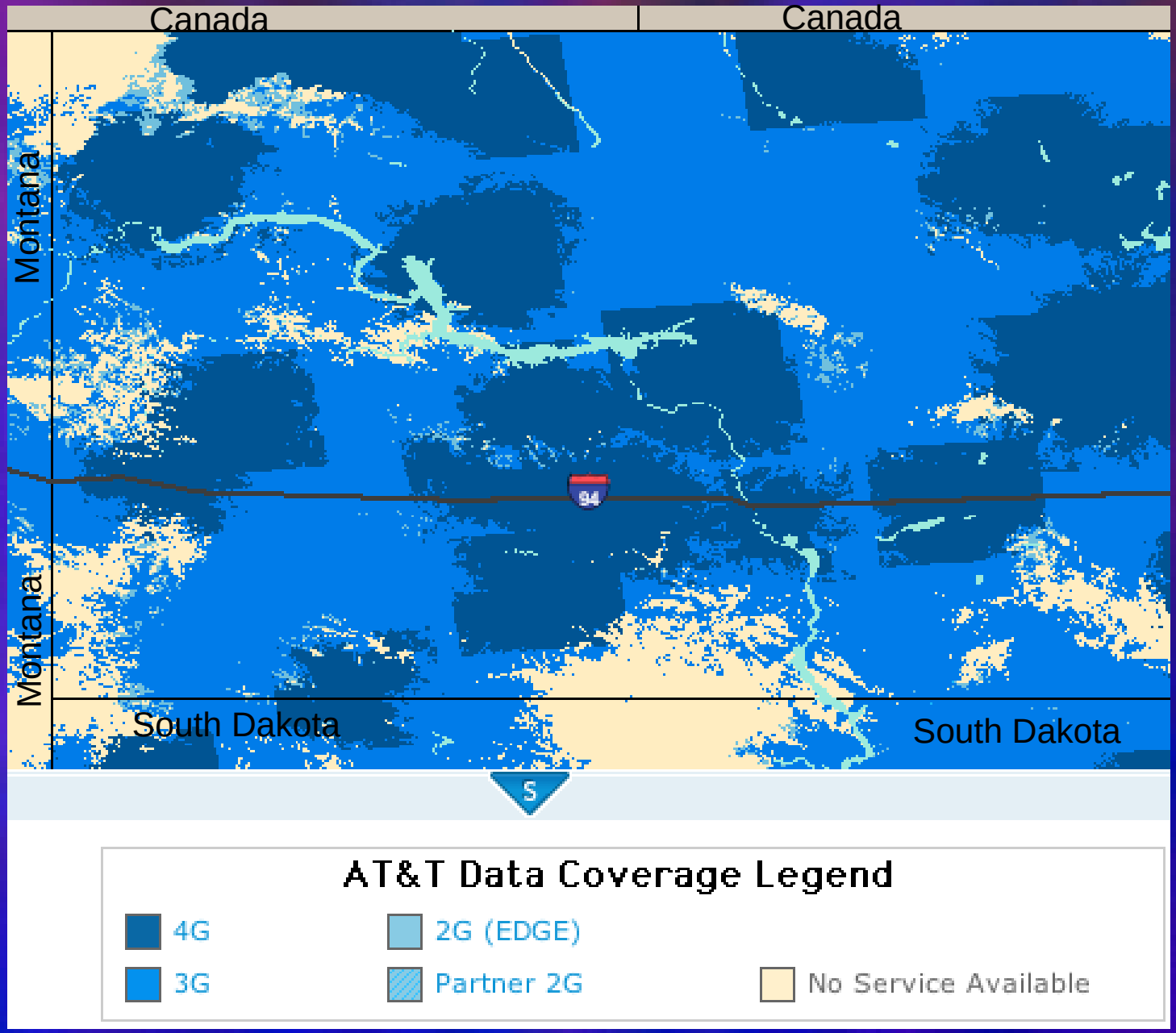
  2. Cell Phone : HOBO logger

     Reasonable coverage; Less Costly

  3. Radio : State Radio Towers : ~ $500K upgrade

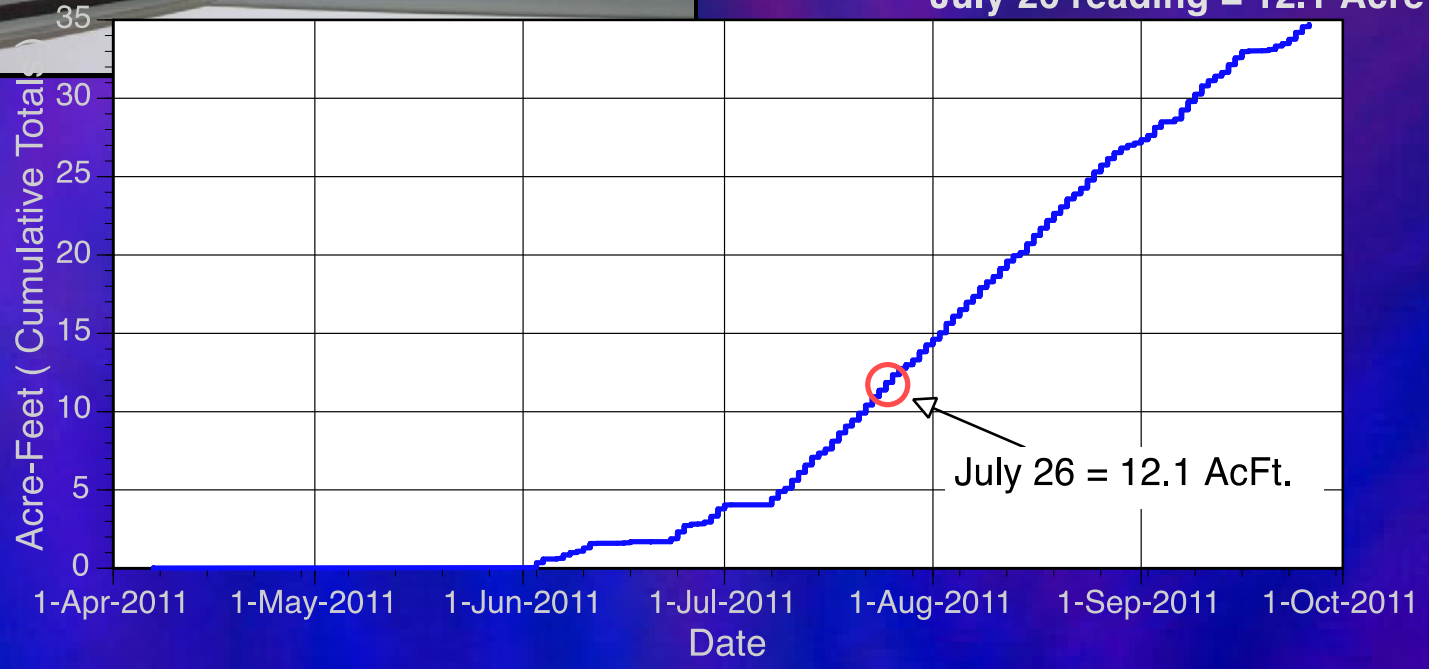
  4. Hard-wired internet (TCP / IP) : DSI

AT&T Data Coverage Map of N. Dak.



2nd Phase – Data Transfer from Basic E .

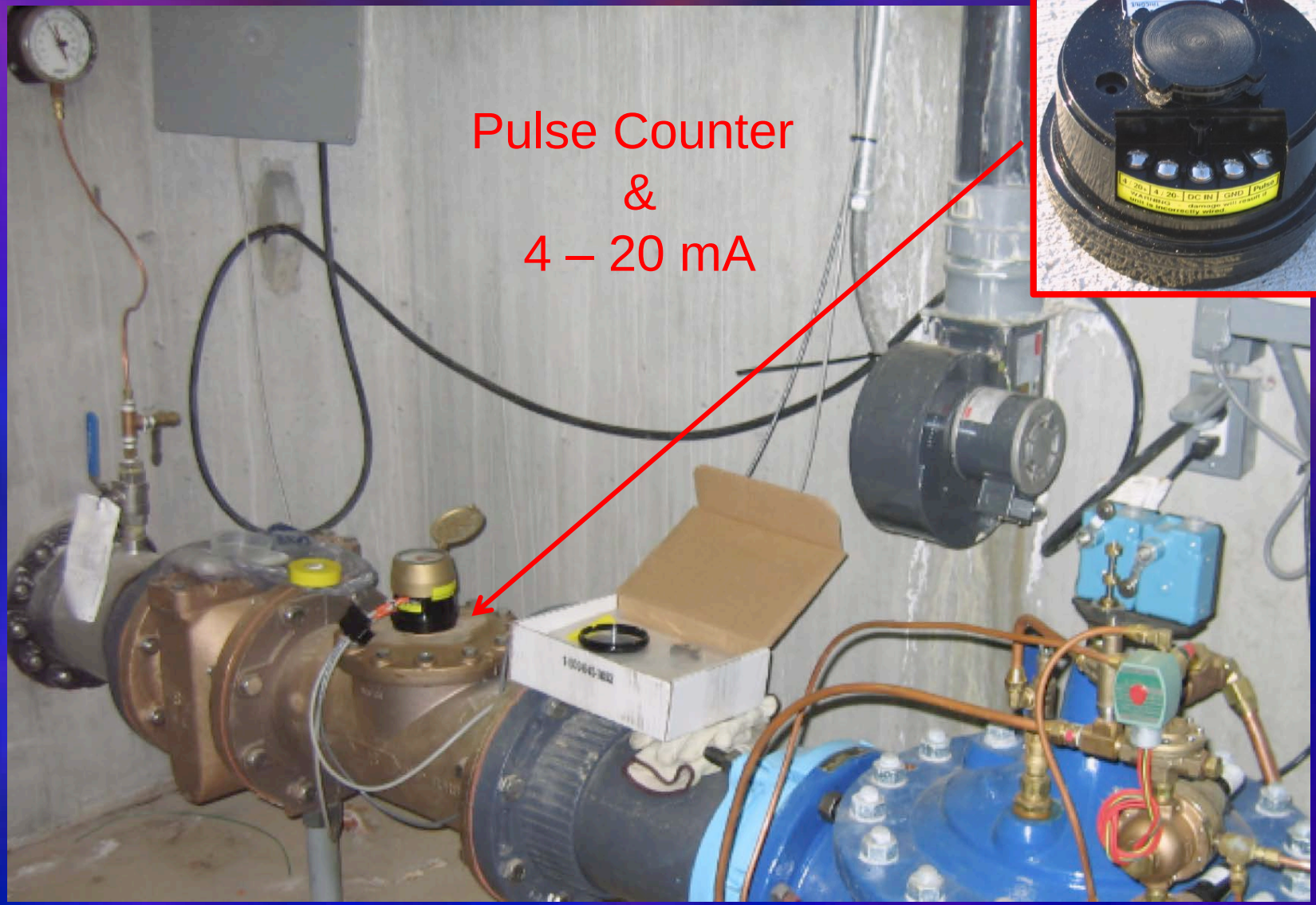
Flow Meter at Basic Energy Site
July 26 reading = 12.1 Acre-Feet.



3rd Phase – HOBO Installation at Dodge

Dodge Depot : Jan. 2012 Initial set-up ~ $1,600+$750+$143

3rd Phase – HOBO Installation at Dodge



3rd Phase – HOBO Installation at Dodge

https://www.hobolink.com:443/p/0b05ccd80d330a35cee9b8646e4fa7ed

Latest Conditions

Relay State: Deactivated (Open)

Gallons (Start ~ 57,036,000): 135 Gallons

Tricon (Dodge GPM): 1.6 GPM

Battery: 4.39 V

Latest Connections

Next connection expected in 34 minutes

Today at 12:44 MDT

Today at 11:35 MDT

Today at 10:36 MDT

Today at 09:26 MDT

Today at 08:28 MDT

Latest Data

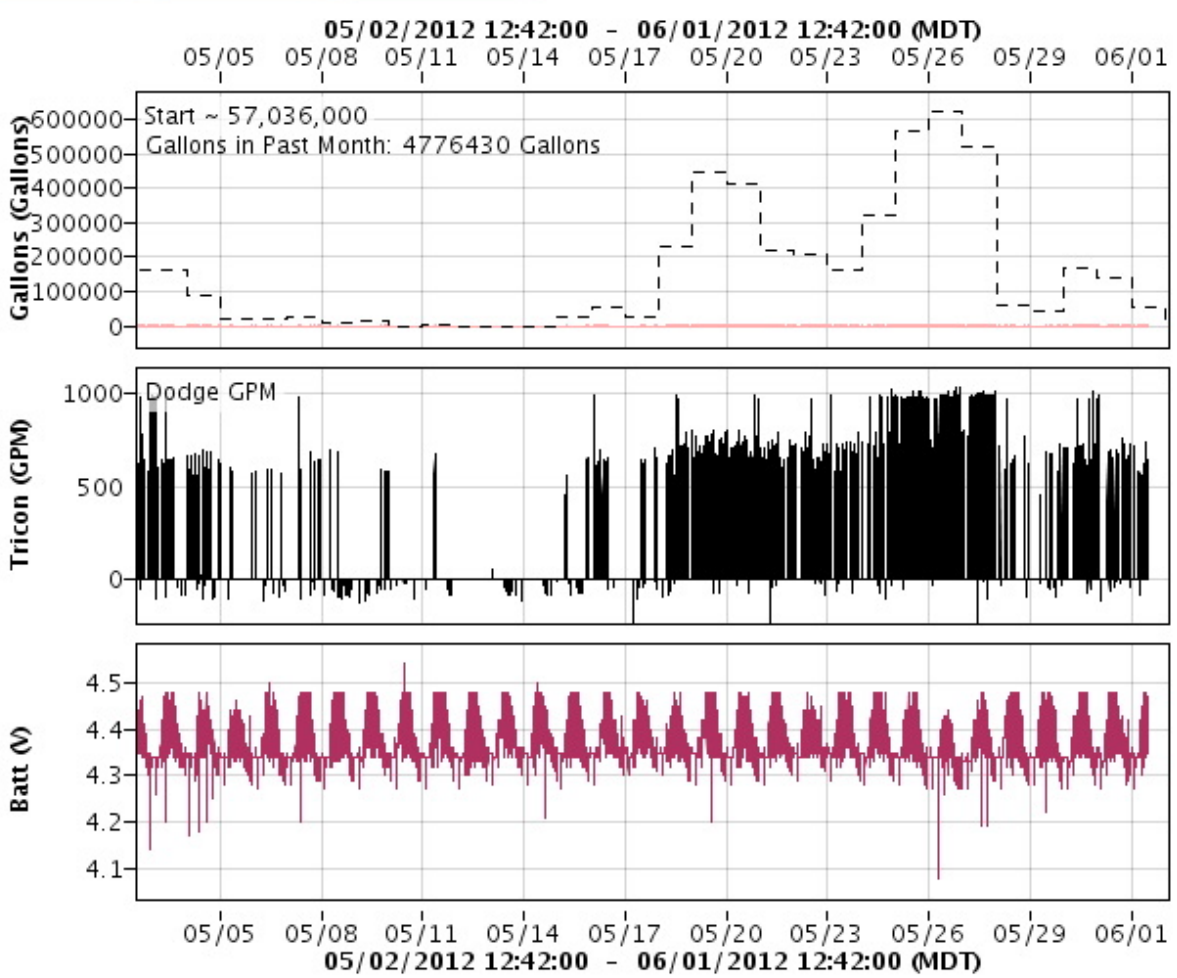
- Dodge Depot_18.csv
- Dodge Depot_18.dtf
- Dodge Depot_17.csv
- Dodge Depot_17.dtf
- Dodge Depot_16.csv

Device Information

Status: Logging every 01 min

SWC_HOBO1

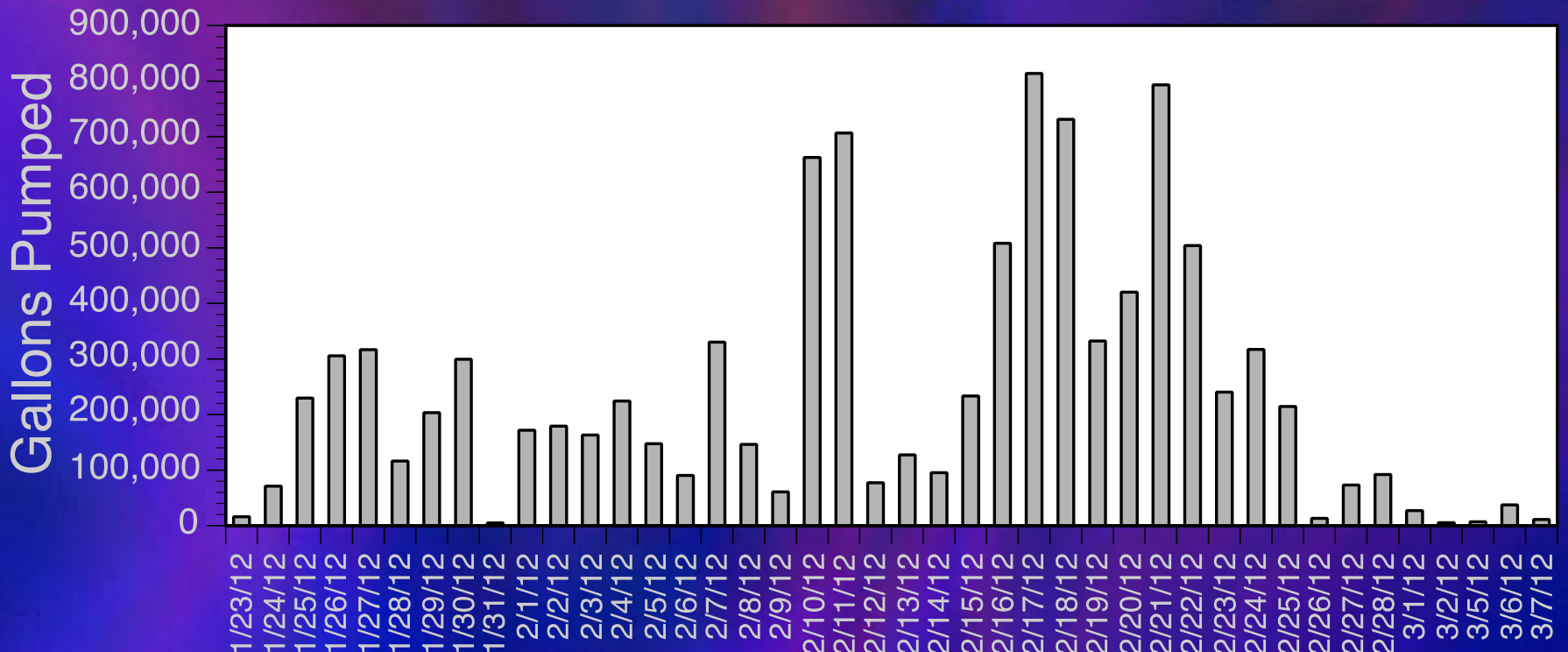
Past Day | Past Week | Past Month



3rd Phase – HOBO Installation at Dodge

Date	Total Gallons	Avg. GPM	Max GPM	Date	Total Gallons	Avg. GPM	Max GPM
23-Jan	16,062	537	658	**8-Feb**	146,268	619	755
24-Jan	71,040	625	1,072	**9-Feb**	60,705	639	1,047
25-Jan	229,485	781	1,095	**10-Feb**	662,640	708	1,069
26-Jan	305,795	679	1,080	**11-Feb**	706,468	779	1,069
27-Jan	316,927	726	1,113	**12-Feb**	77,447	587	697
28-Jan	116,106	647	1,077	**13-Feb**	127,318	599	1,050
29-Jan	203,255	691	1,091	**14-Feb**	95,169	639	1,069
30-Jan	299,434	713	1,113	**15-Feb**	233,393	627	1,053
31-Jan	4,981	577	653	**16-Feb**	508,121	689	1,066
1-Feb	171,822	704	1,083	**17-Feb**	813,628	749	1,158
2-Feb	179,127	641	1,092	**18-Feb**	731,281	724	1,070
3-Feb	163,156	644	1,073	**19-Feb**	332,346	628	1,058
4-Feb	224,276	632	1,081	**20-Feb**	420,364	672	1,066
5-Feb	147,567	615	838	**21-Feb**	793,070	759	1,073
6-Feb	90,336	536	761	**22-Feb**	504,169	678	1,080
7-Feb	330,106	722	1,086	**23-Feb**	240,519	660	961

3rd Phase – HOBO Installation at Dodge



3rd Phase – McCrometer Installation

T.C. Depot : April 2012 Initial set-up ~ $2,100+$300+$300

3rd Phase – McCrometer Installation

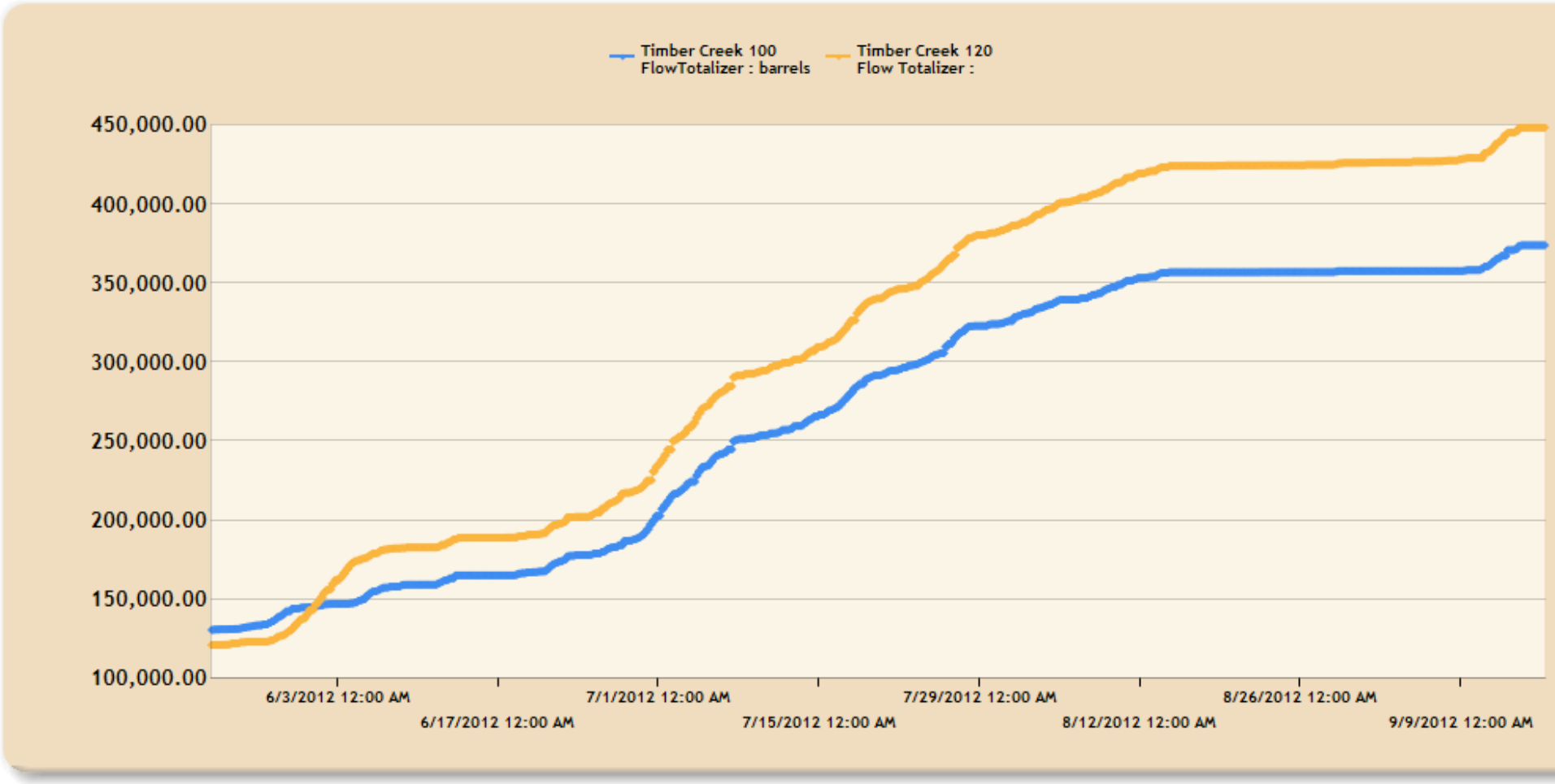
McCROMETER CONNECT

Home LogOut Help

Admin Menu

Station_Graph Alarms Digital_I/O Irrigation Models Sensor_Map_3D /_2D Graph Mod

This is the new graphing page, if you wish to use the old one, it is here: Old Graph Page



Add Sensor to Graph | Timber Creek 120 | Flow Totalizer | Add Sensor

From: 05-23-2012 00 00 00

Select Group to Graph

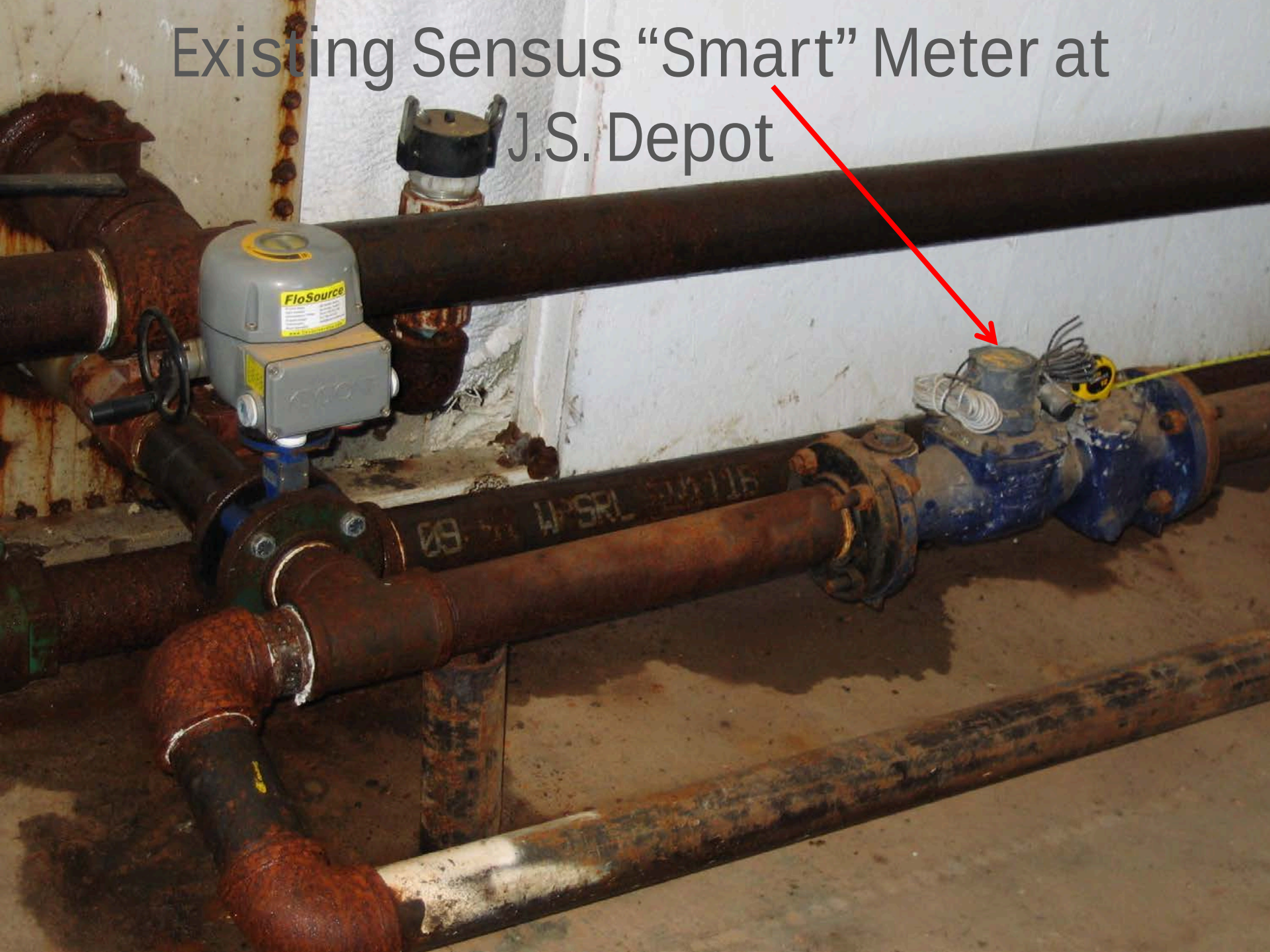
Delete

Redraw Graph

I.D.T. Installation at J.S. Depot

$1,300

Existing Sensus “Smart” Meter at J.S. Depot



I.D.T. Web Page for display of Telemetry Data

Dashboard | Water User | Fast Report | Customer Billing | Edit Sites | Zone Analysis | Reports

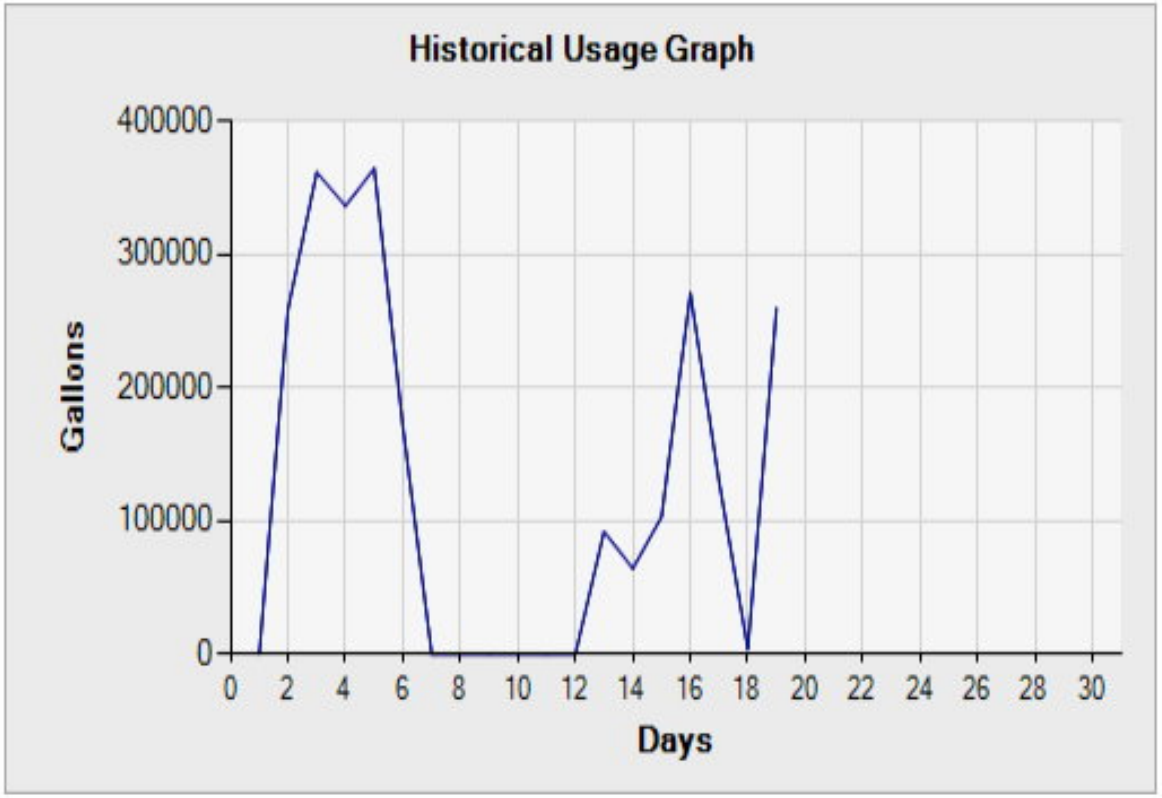
Name: Schaper, Jim

Account No.: 1 North

Terminal ID: 4690060

Address: 279 Hwy 8 N, Halliday, ND

Phone Number:



Previous | **Nov 2012** | Next

Day	Reading	Daily Usage
1	49665280	
2	49924396	259116
3	50286067	361671
4	50622440	336373
5	50986844	364404
6	51157570	170726
7	51157566	0
8	51157562	0
9	51157541	0
10	51157533	0
11	51157526	0
12	51157524	0
13	51249461	91937
14	51313700	64239
15	51416709	103009

Telemetry : Data : --- ?→ : Database

Telemetry : Data : SOAP →: Database

The SOAP connection

Telemetry : Data : SOAP : Database

The SOAP connection

- SOAP (Simple Object Access Protocol)
- Open Standard Web Service (XML)
- Hardware and Software Independent

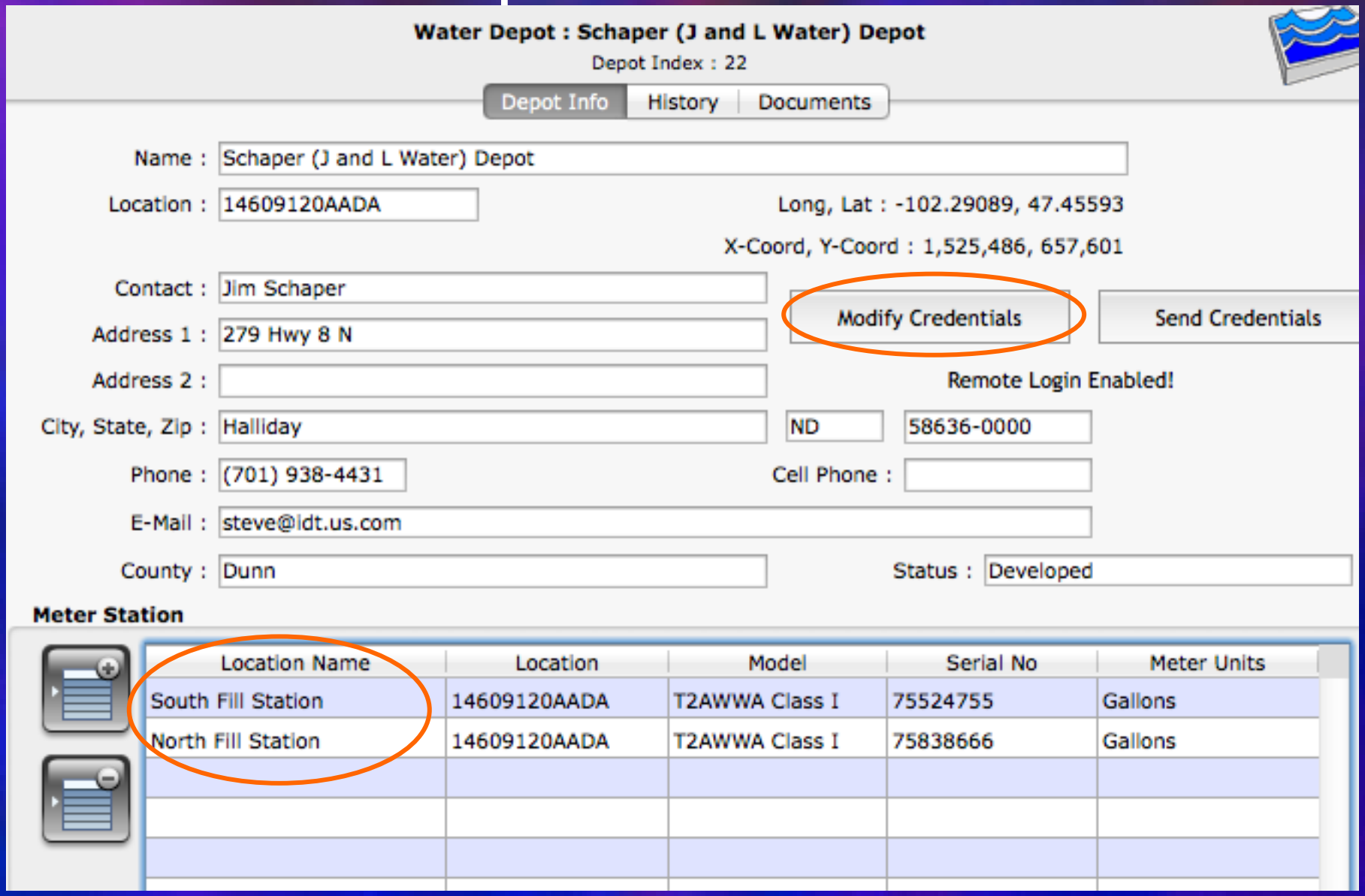
Telemetry : Data : SOAP : Database

The SOAP connection

Agency SOAP Service developed by Chris Bader

- Telemetry Hardware becomes “Transparent”
- Pushes the data to the agency database
  - Savages Industries (Ames Water)
  - IDT (South Dakota)
  - McCrometer

Water Depot Database - SOAP



Water Depot Database - SOAP

- SOAP Credentials - auto sent by e-mail
  - Station ID
  - User Name
  - Password

You can access the SOAP Telemetry information at
http://www.swc.nd.gov/SWCTelemetrySOAPSpec.html
The Web Services specification can be accessed at
http://dbase1.swc.nd.gov:8082/4dwsdl

Following is summary information that will be required to set up the communication services on your meter equipment.

Depot Name : Johnsrud Water Depot
Depot ID : 40
Username : Johnsrud
Password : TJruh4
Notification E-Mail : swcsoapnotify@nd.gov

Meter Station Information :

Station ID : 60
Location (TRS) : 15109831DDB
Location Name : North Power Fuels fill
Longitude : -103.26610
Latitude : 47.85066
Meter Name : McCrometer
Meter Model :
Meter Serial No : GP11-1940
Meter Units : Barrels
Meter Precision : 1

Water Depot Database - SOAP

Location Name : South Fill Station

Location : 14609120AADA

Long, Lat : -102.29089, 47.45593

X-Coord, Y-Coord : 1,525,483, 657,600

Meter Name : Sensus

Meter Model : T2AWWA Class I

Meter Serial No : 75524755

Meter Units : Gallons

Telemetry Required

Meter Precision : 1

Total Pumping for 2013 :

Meter Reading

Date	Time	Break	Reading	Observer Type	Comment
6/30/13	23:08:20		64783372	SOAP Service	
6/29/13	23:08:32		64706224	SOAP Service	
6/28/13	23:08:20		64480362	SOAP Service	
6/27/13	23:08:30		64260253	SOAP Service	
6/26/13	23:08:22		64001943	SOAP Service	
6/26/13	18:26:00		63919484	State Personnel	
6/25/13	23:08:22		63785016	SOAP Service	
6/24/13	23:08:32		63719933	SOAP Service	
6/1/13	14:00:00		61957504	Permit Holder	Same as telemetry.
5/1/13	11:00:00		58256286	Permit Holder	Same as telemetry.

Water Depot Database - SOAP

Name	Depot ID	Depot Approp	Status	Station ID	Location	Meter	Model	Units	Date	Reading	Elapsed Days
▼ Pennington-Ames Depot (New Town)											
	63	200.0		88	15109204CCCC	McCrometer	FC100-02-K	Barrels	9/12/13	3086763	1
	63	200.0		89	15109204CCCC	McCrometer	FC100-02-K	Barrels	9/12/13	3041080	1
▼ Bratcher-Ames (Timber Creek) Depot											
	50	120.0		29	15110109CAAC	McCrometer MI	FC100-02-K	Barrels	9/12/13	833107	1
	50	120.0		30	15110109CAAC	McCrometer MI	FC100-02-K	Barrels	9/6/13	718527	7
	50	125.0		111	15110109CAAC	McCrometer	FC100-02-K	Barrels	9/12/13	648056	1
	50	125.0		112	15110109CAAC	McCrometer	FC100-02-K	Barrels	9/6/13	471407	7
▼ Dwyer, Michael water depot											
	43	284.4		97	15110220DDCB	McCrometer	McCrometer	Barrels	9/13/13	409680	0
▼ Reistad-Ames (Westby) Water Depot											
	39	284.4		23	16310234CBBC	McCrometer	MF-106	Barrels	8/28/13	707803	3
	39	113.5		24	16310234CBBC	McCrometer	MF-106	Barrels	9/12/13	634559	1
▼ Wurtz & Ames Parshall Depot											
	26	113.5		31	15209015CCCC	McCrometer	FC100-02-K	Barrels	9/12/13	296079	1
	26	495.7		32	15209015CCCC	McCrometer	FC100-02-K	Barrels	9/12/13	421925	1
▼ Schaper (J and L Water) Depot											
	22	495.7		20	14609120AADA	Sensus	T2AWWA Class I	Gallons	9/12/13	2330658	1
	22	200.0		21	14609120AADA	Sensus	T2AWWA Class I	Gallons	9/12/13	2389391	1
▼ Jensen (Clearwater) Water Depot											
	18	200.0		14	15709035DDC	McCrometer	ML106-00	Barrels	9/5/13	0	8
	18	729.5		15	15709035DDC	McCrometer	ML106-00	Barrels	9/13/13	0	0
▼ Sheldon-Ames Water Depot											
	11	729.5		48	15409618ADAAB	McCrometer	FC100-02M	Barrels	9/12/13	1372506	1
	11	729.5		49	15409618ADAAB	McCrometer	FC100-02-M	Barrels	9/12/13	212141	1

Telemetry Challenges

- Network accessibility & Data up-links
- Equipment availability
- Learning curve
- Systems integration
- No New Funds : Existing 2011-13 Budget & Personnel
- Thank you to:

Todd, Bob, Jon, Chris, Dan, Alan, Paul, Kelvin, Neil & Albert

Questions ?