

The logo features a stylized globe with latitude and longitude lines, rendered in a light blue and grey color scheme. The word "Battelle" is superimposed on the globe in a large, bold, white sans-serif font.

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Update on EPA's Arsenic Removal Technology Demonstration Program

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Timelines and Major Events

1975	SDWA set As MCL at 0.05 mg/L
1996	SDWA amended to require EPA to develop an As research strategy and publish proposal to revise As MCL by 01/00
02/98	EPA published Arsenic Research Plan
01/22/01	EPA finalized As MCL at 10 µg/L
10/31/01	EPA Administrator announced As final standard as 10 µg/L and pledged to provide \$20 M for R&D of more cost-effective technologies and technical assistance and training to operators of small systems (Arsenic Rule Implementation Research Program)
03/25/03	EPA revised rule text to express MCL as 0.010 mg/L
02/22/06	Final rule to become effective
02/23/06	Final rule to be enforced

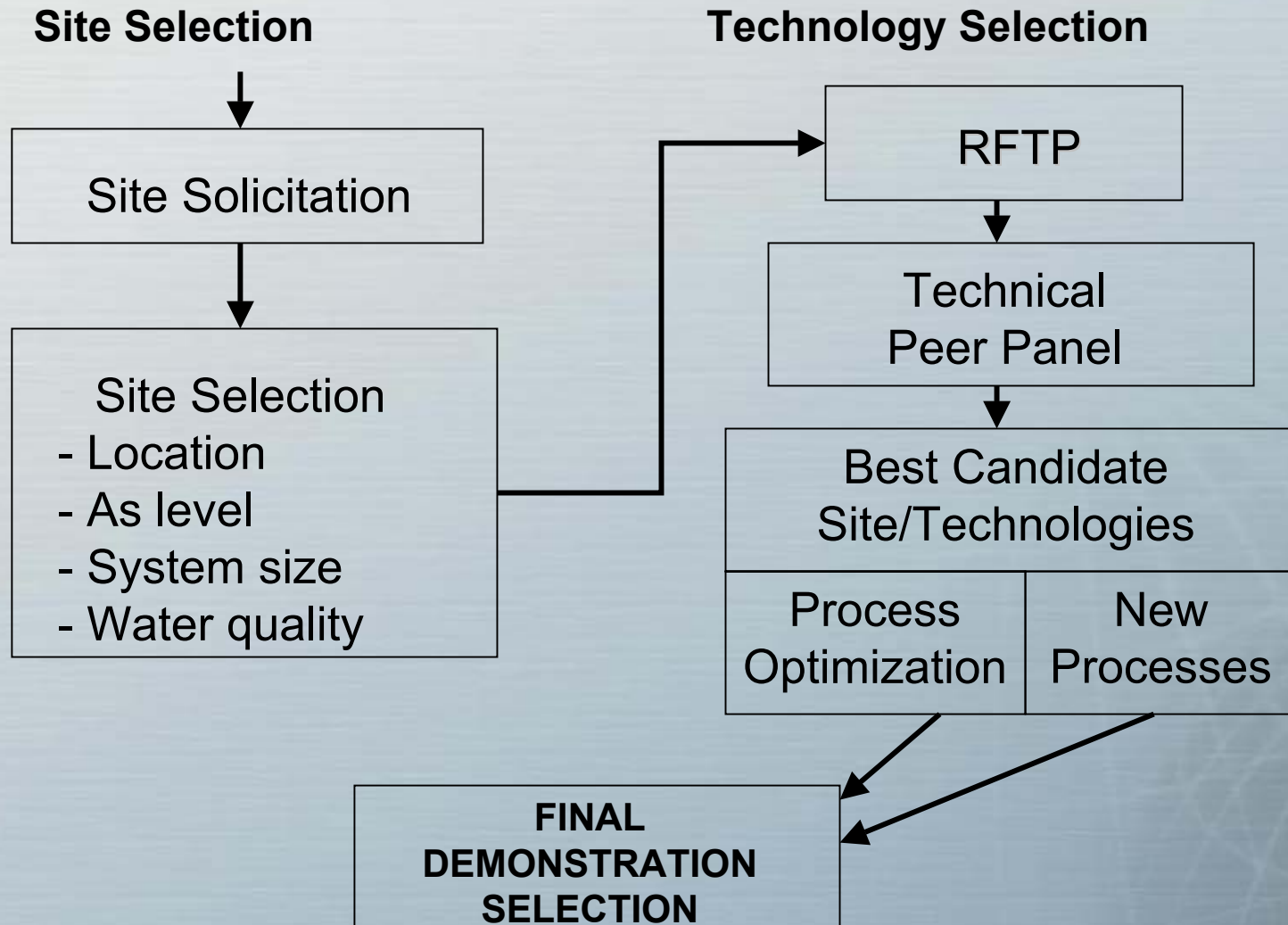
EPA Arsenic Removal Technology Demonstration Program

- Round 1: 12 sites
- Round 2: 31 sites
- Full-scale, long-term (1 year) in scope
- Focused on commercially ready technologies or engineering approaches

Goals of Demonstration

- **Determine/document** construction costs/operational costs of the new system or the modifications of existing systems to achieve compliance
- **Determine/document performance** of the new process or process modifications of existing treatment for 1 year in achieving compliance
- **Determine** the **operational and maintenance** requirements of treatment system
- **Characterize** the **residuals** produced by the process; quantity and chemical characteristics
- **Evaluate impact** of the treatment process on the distribution system

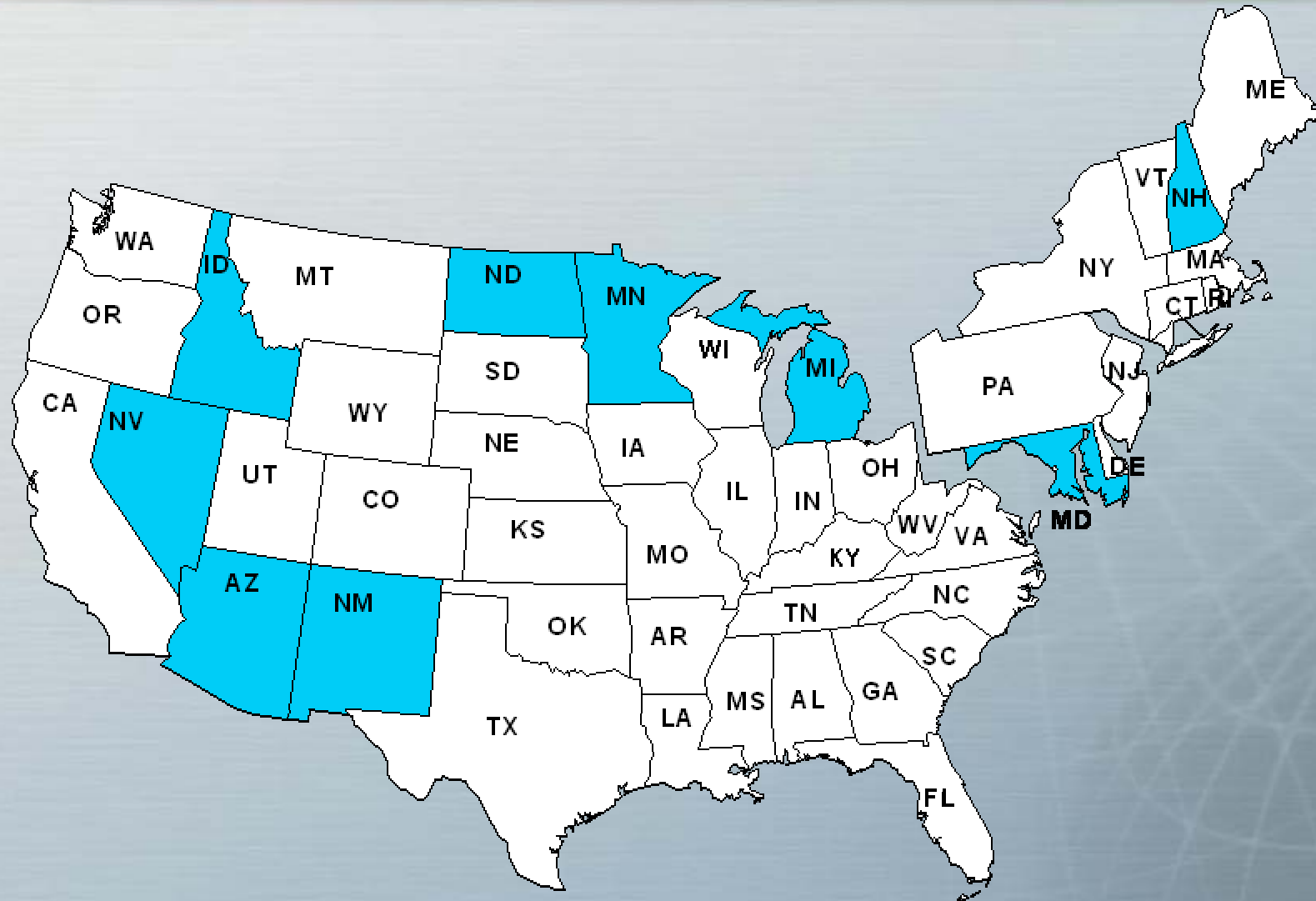
Selection Process



Major Activities

- Conduct Introductory meeting with EPA, State drinking water official(s), facility, vendor, and engineering firms
- Issue Letter of Understanding
- Issue study plan
- Establish contract(s) with vendor for equipment/system engineering, site engineering, installation/shakedown, and operator training, and coordinate O&M and troubleshoot needs
- Obtain permit(s)
- Oversee system installation/shakedown
- Provide operator training for sampling and on-site measurements and As speciation
- Track system performance for one year with weekly sampling and monthly As speciation
- Prepare progress reports to EPA/prepare reports for Office of Budget and Management
- Prepare final technology evaluation report

Round 1 – 12 Sites in 9 States



Summary of Round 1 Sites

- States – 9
- Sites per state - 1 to 2
- CWS – 12
- NTNCWS – 0
- Multi contaminant sites– 1 (As, nitrate)
- Size – 37 to 640 gpm

Technologies Selected/Evaluated

- Adsorptive media system (9)
 - Iron-based media: E 33 (6), GFH (1), G2 (1)
 - Alumina-based media: AAFS (1)
- Anion exchange system (1)
- Iron removal system (1)
- System modification (1)
 - Iron removal process: iron addition

Sites/Technologies Evaluated

State	Facility	Technology	Vendor	Flowrate (gpm)	Conc. (µg/L)/Unit		
					As	Fe	pH
NH	Bow	G2	ADI	70	39	<25	7.7
NH	Rollinsford	E33	AE	100	36	46	8.2
MD	Queen Anne's County	E33	STS	300	19	270	7.3
MI	Brown City	E33	STS	640	14	127	7.3
MN	Climax	C/F	K	140	39	546	7.4
ND	Lidgerwood	SM	K	250	146	1,325	7.2
NM	Desert Sands MDWCA	E33	STS	320	23	39	7.7
NM	Nambe Pueblo	E33	AE	145	33	<25	8.5
AZ	Rimrock	E33	AE	90	50	170	7.2
AZ	Valley Vista	AAFS	K	37	41	<25	7.8
ID	Fruitland	IX	K	250	44	<25	7.4
NV	STMGID	GFH	USF	350	39	<25	7.4

AE = AdEdge; K = Kinetico; STS = Severn Trent Services; USF = USFilter;

MDWCA = Mutual Domestic Water Consumer's Association; STMGID = South Truckee Meadows General Improvement District

Adsorptive Media Systems Design

Media Type	Site	Media Vessels			Media Volume per Vessel (ft ³)	EBCT at Design Flow (min)
		No.	Configuration	Material		
G2	Bow, NH	2	Series	SS	85	18 ^(a)
E33	Desert Sands MDWCA, NM	2	Parallel	FRP	80	3.7
E33	Brown City, MI	4	Parallel	FRP	80	3.7
E33	Queen Anne's County, MD	2	Parallel	FRP	80	4.0
E33	Nambe Pueblo, NM	3	Parallel	FRP	27	4.2
E33	Rimrock, AZ	2	Series	FRP	27	4.5 ^(a)
E33	Rollinsford, NH	2	Parallel	FRP	27	4.0
GFH	STMGID, NV	3	Parallel	CS	80	5.1
AAFS50	Valley Vista, AZ	2	Series	FRP	22	4.4 ^(a)

(a) EBCT is for one vessel only.

Pre and Post-Treatment

Media Type	Site	Pre-Cl ₂	Pre-pH Adjustment	Post-Cl ₂	Post-pH Adjustment
G2	Bow, NH	Yes	H ₂ SO ₄	No	NaOH
E33	DSMDWCA, NM	Yes	No	No	No
E33	Brown City, MI	No	No	Yes	No
E33	QAC, MD	No	No	Yes	No
E33	Nambe Pueblo, NM	Yes	CO ₂	No	No
E33	Rimrock, AZ	Yes	No	No	No
E33	Rollinsford, NH	Yes	CO ₂	No	No
GFH	STMGID, NV	No	No	Yes	No
AAFS50	Valley Vista, AZ	Yes	H ₂ SO ₄	No	No

Round 1 Status

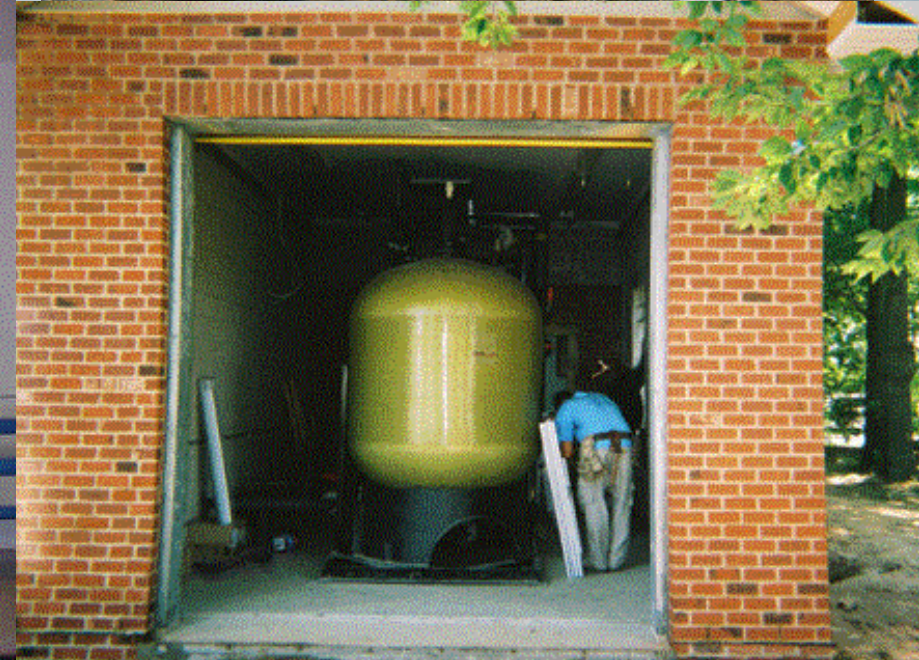
- 8 systems operational
- 1 system under iron-addition testing (Lidgerwood, ND)
- 1 system installation complete (Fruitland, ID)
- 2 systems to be installed/tested by end of year (Nambe Pueblo, NM and STMGID, NV)

APU-300 Systems

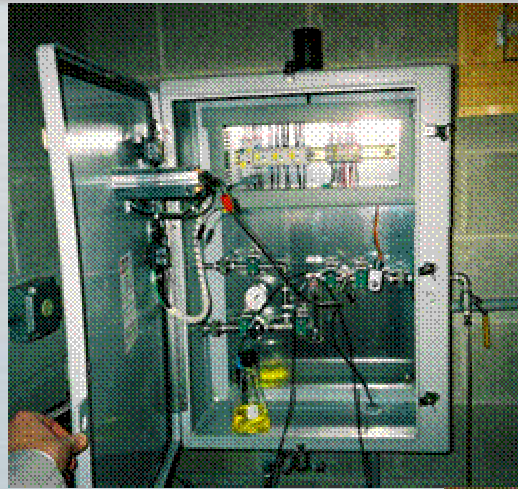
Top: Desert Sands MDWCA, NM

Right: Queen Anne's County, MD

Left: Brown City, MI



APU-100 System at Rollinsford Site



G2 System at Bow Site



AAFS50 System at Valley Vista Site



Anion Exchange and C/F Systems

Right: Fruitland, ID

Left: Climax, MN



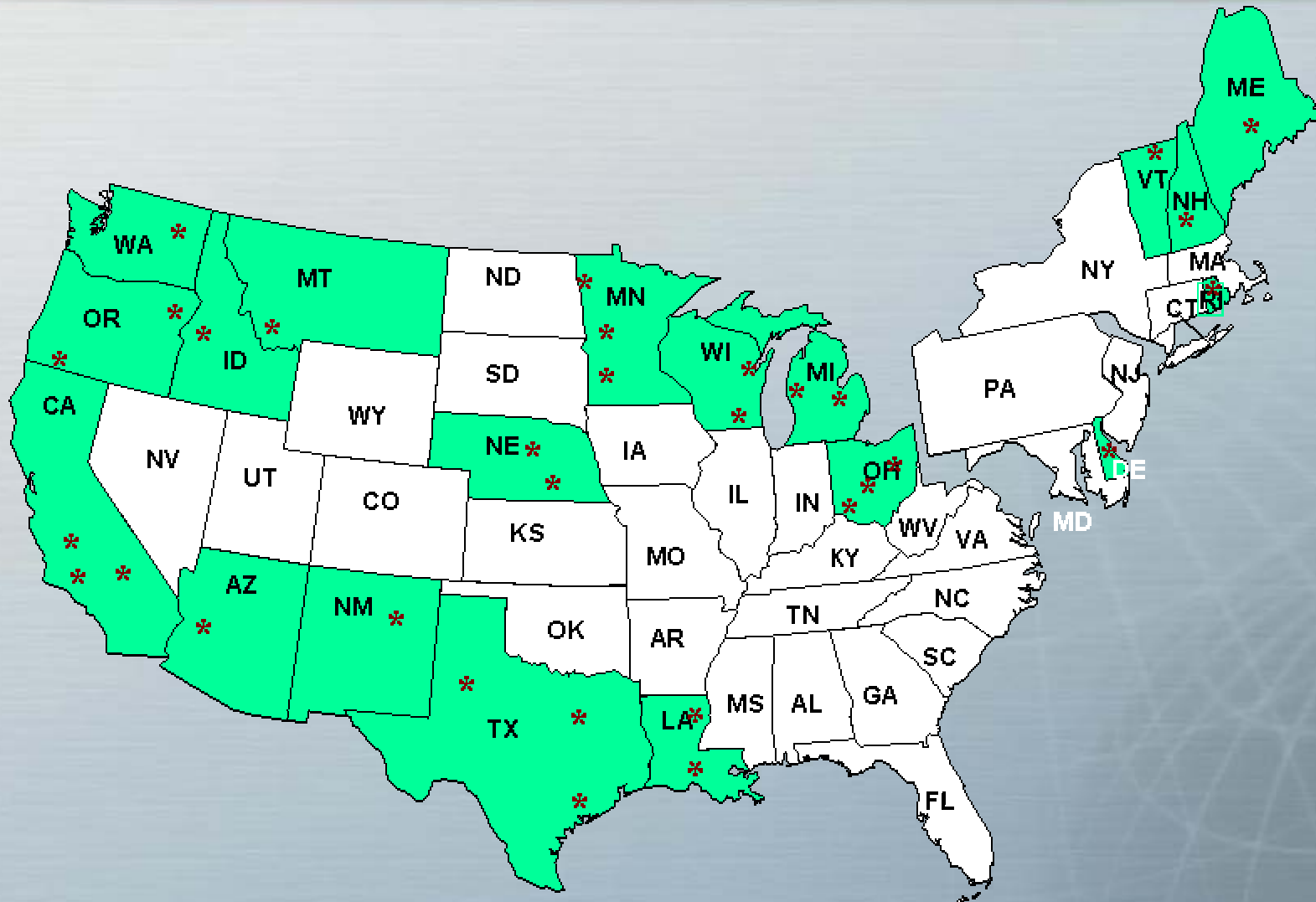
System Modification at Lidgerwood Site



Residuals Generation and Disposal

Technology	Site	Spent Media (ft ³)	Backwash Water (kgal) (Bed Volume)	Backwash Water Disposal
G2	Bow, NH	170	2.3 – 3.4 (2 – 3 BV)	Surface leach field
E33	DSMDWCA, NM	160	12 – 18 (10 – 15 BV)	Holding pond
E33	Brown City, MI	320	24 – 36 (10 – 15 BV)	Ditch
E33	QAC, MD	160	12 – 18 (10 – 15 BV)	Off-site disposal
E33	Nambe Pueblo, NM	81	6.1 – 9.1 (10 – 15 BV)	Holding pond
E33	Rimrock, AZ	54	4 – 6 (10 – 15 BV)	Recycling
E33	Rollinsford, NH	54	4 – 6 (10 – 15 BV)	Subsurface septic system
GFH	STMGID, NV	240	13 – 17 (7 – 10 BV)	Sanitary sewer
AAFS50	Valley Vista, AZ	44	1.1 – 1.4 (3 – 4 BV)	Recycling
C/F	Climax, MN	N/A	1.6 – 2.0	Sanitary sewer
IX	Fruitland, ID	N/A	7 – 10	Sanitary sewer
SM	Lidgerwood, ND	N/A	9.6	Recycling

Round 2 – 31 Sites in 19 States



Round 2 Demonstration Sites

East

Felton, DE
Wales, ME
Goffstown, NH
N. Springfield, RI
Dummerston, VT

(5)

Central Midwest

Grove City, OH
Newark, OH
Springfield, OH
Pentwater, MI
Sandusky, MI
Sabin, MN*
Sauk Centre, MN
Stewart, MN
Delavan, WI
Greenville, WI*

(10)

Midwest

Arnaudville, LA
Lyman, NE
Stromsburg, NE
Alvin, TX
Bruni, TX
Wellman, TX*

(6)

Far West

Tohono O'odham Nation, AZ
(Sells)*
Lake Isabella, CA
Susanville, CA
Techachapi, CA*
Homedale, ID
Three Forks, MT
Klamath Falls, OR
Vale, OR
Taos, NM
Okanogand, WA

(10)

* Site selected, but not funded in Round 1

Summary of Round 2 Sites

- States – 19
- Sites per State - 1 to 3
- CWS – 28
- NTNCWS – 4
- Multi contaminant sites – 4 (As, U, gross alpha, nitrate)
- Size – 7 to 600 gpm

Changes from Round 1

- Includes non-transient non-community water systems (NTNCWS)
- Allows for demonstration of POU/POE approaches
- Multi-contaminant treatment

Round 2 Technologies

- Proposals received – 148
- Companies – 24
- Proposals per site – 2 to 8
- Technology proposed
 - Adsorption technologies
 - Oxidation/filtration
 - Iron coagulation/filtration
 - Reverse osmosis
 - Ion exchange
 - Process modification
 - Dissolved air flotation/filtration
 - Distillation

**POUs (included in above technologies)

Round 2 Status

- Introductory meetings for technology selection held at 19 sites
- Project planning meetings held at 5 sites to define roles and responsibilities
- Draft Letter of Understanding issued for 2 sites

Further Information

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