

Technical Peer Review

Drinking Water USAs

May 2000

Drinking Water USA Definition



USA's

There is an abundance of natural resources that are afforded varying levels of protection under a variety of state and Federal laws.

USA should not incorporate the entire universe of federally protected natural resource areas.

USA means a subset of these resources that may be subject to “permanent and long term environmental damage”.

USA is Defined As:

Those definable geographic areas that contain drinking water or ecological resources that by their character are irreplaceable and may be subject to irreparable and irreversible injury or irretrievable loss, if they are exposed to the effects of an accidental hazardous liquids release.

USA TRIANGLE

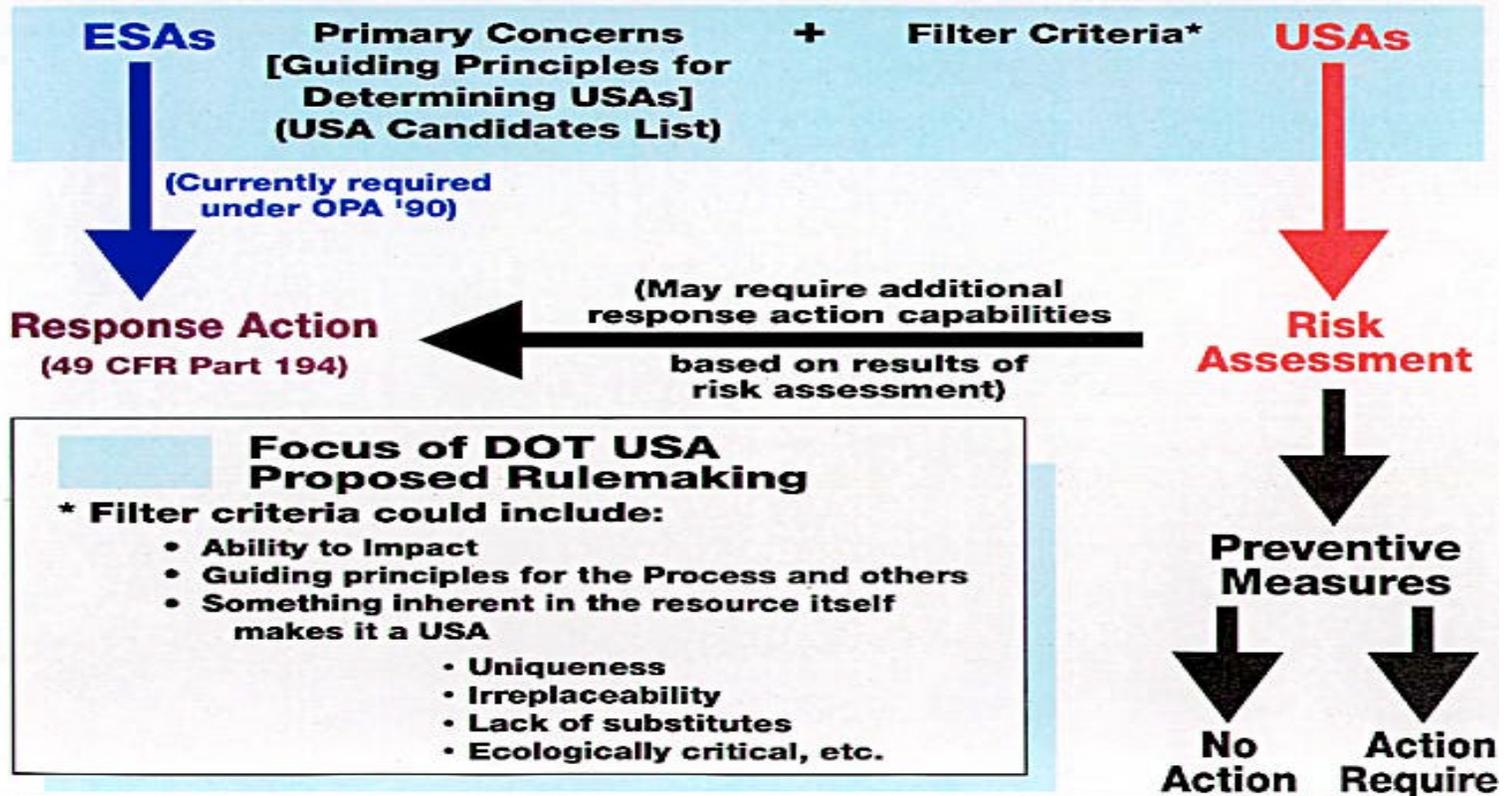
Unusually Sensitive Areas Concept



May 2000

USA FLOWCHART

PROCESS TO DETERMINE USAs



Presentation Outline

Drinking Water Filter Criteria

May 2000

USA Definition Impact to the Pipe Line Industry

API REPORT, 1995 -- A.D. Little

Initial DOT/NOAA Definition -- 134,000
Miles of Pipeline

80% of Test Lines = USA

Internal Inspection (Smart Pigging) = \$345
Million

Hydrotesting = \$ 2 Billion

EFRD = \$ 2.1 Billion

USA Definitional Process

Data Gathering

Technical Experts in Each Field Review the
Issues

Pilot Test the Results on Actual Pipeline
Segments

Presentations at Public Workshops

USA Definitional Process

The Approach is a Spatially Explicit Model
Grounded in :

- Uniform Data Format and Availability
- Uniform susceptibility of the resources to long term, irreversible or irretrievable impacts
- Geographic referencing of the resource data and pipeline data

Drinking Water Resources

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PILOT TESTING

TEXAS

CALIFORNIA

LOUISIANA

May 2000

Definitions

Community Water System(CWS): A public water system (PWS) that provides water to the same population year around.

Definitions

Drinking Water Resources: Surface water intakes or groundwater-based drinking water supplies that provide potable water for domestic, commercial and industrial users.

Definitions

Adequate Alternative Water Supply:

- A source of water that currently exists,
- It can be used almost immediately with minimal amount of effort and costs;
- Will meet the short-term (3 month) consumptive and hygiene requirements of the existing population of impacted consumers;
- Involves no perceptible change in water quality and is temporary (until a long-term alternative can be put in place, if necessary).

Drinking Water Resources Candidate List

Public Water Systems

- Community Water Systems
 - Nontransient Noncommunity
 - Transient Noncommunity

Wellhead Protection Areas

Sole Source Aquifers

Drinking Water Resources Filter Criteria #1

For Community Water Systems and NTNCWS that obtains water supplies from surface water sources, and do not have an adequate alternative source of water, the water source shall be designated as USAs.

Drinking Water Resources Filter Criteria #2

For Community Water Systems and NTNCWS that obtain water supplies from groundwater sources, where the source aquifer is defined as Class I or Class IIa and do not have an adequate alternative source of water, the Wellhead Protection Areas for such areas shall be designated as USAs.

Drinking Water Resources Filter Criteria #3

For a Community Water System and NTNCWS that obtain water supplies from groundwater sources, where the source aquifer is identified as a Class I or Class IIa and the aquifer is designated as a sole source aquifer, an area twice the wellhead protection area shall be designated as USAs

Drinking Water Resources Filter Criteria Notable Exception #1

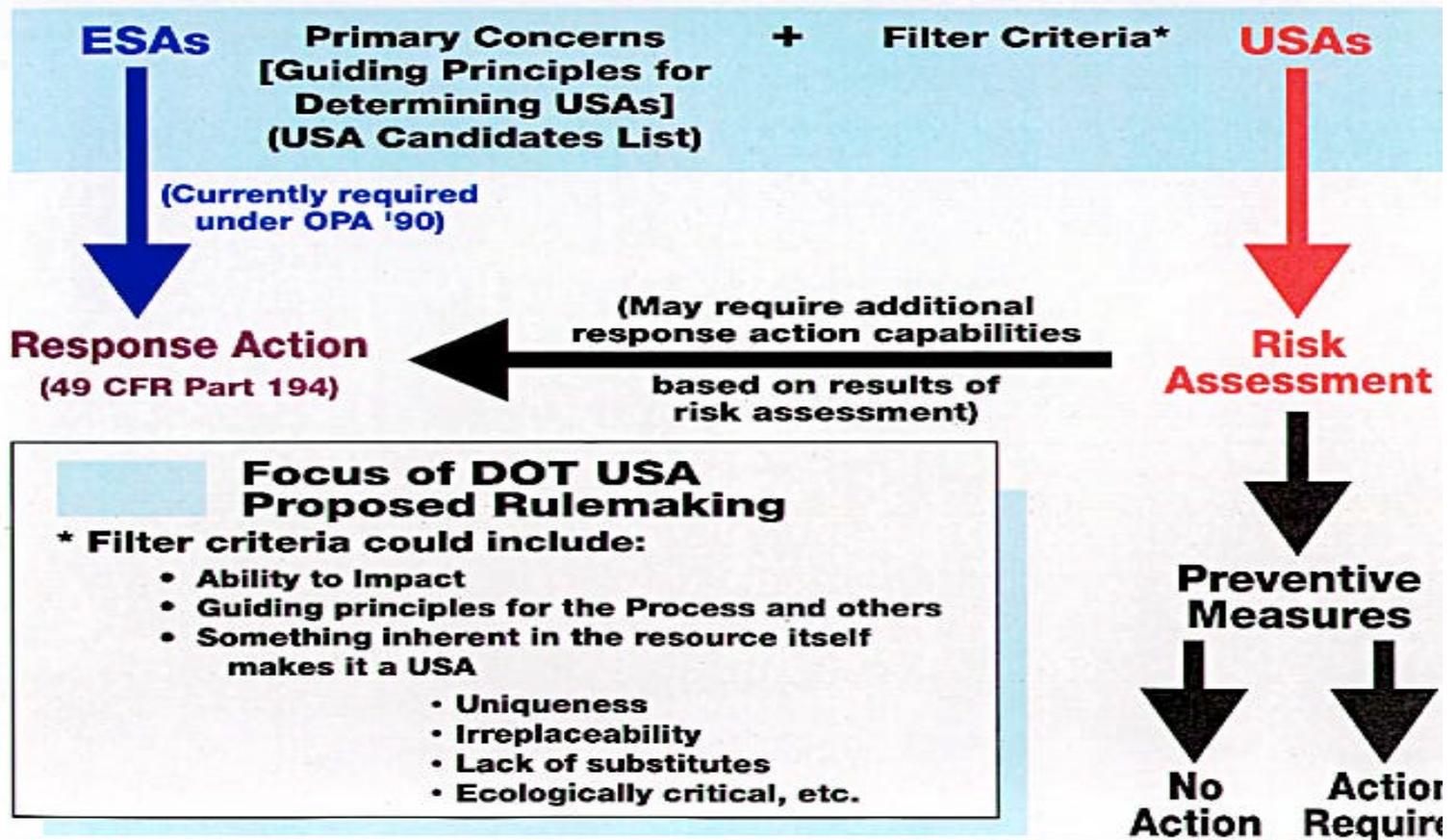
If the public water system is a Transient Noncommunity water system, the water system shall not be designated as USAs

Drinking Water Resources Filter Criteria Notable Exception #2

For Community Water Systems and NTNCWS that obtain water supplies from groundwater sources, where the source aquifer is identified as a Class IIb or Class IIc, the public water systems shall not be designated as USAs.

USA FLOWCHART

PROCESS TO DETERMINE USAs



EXAMPLES Drinking Water Resources Candidate List

Public Water Systems

- Community Water Systems
 - Nontransient Noncommunity
 - Transient Noncommunity

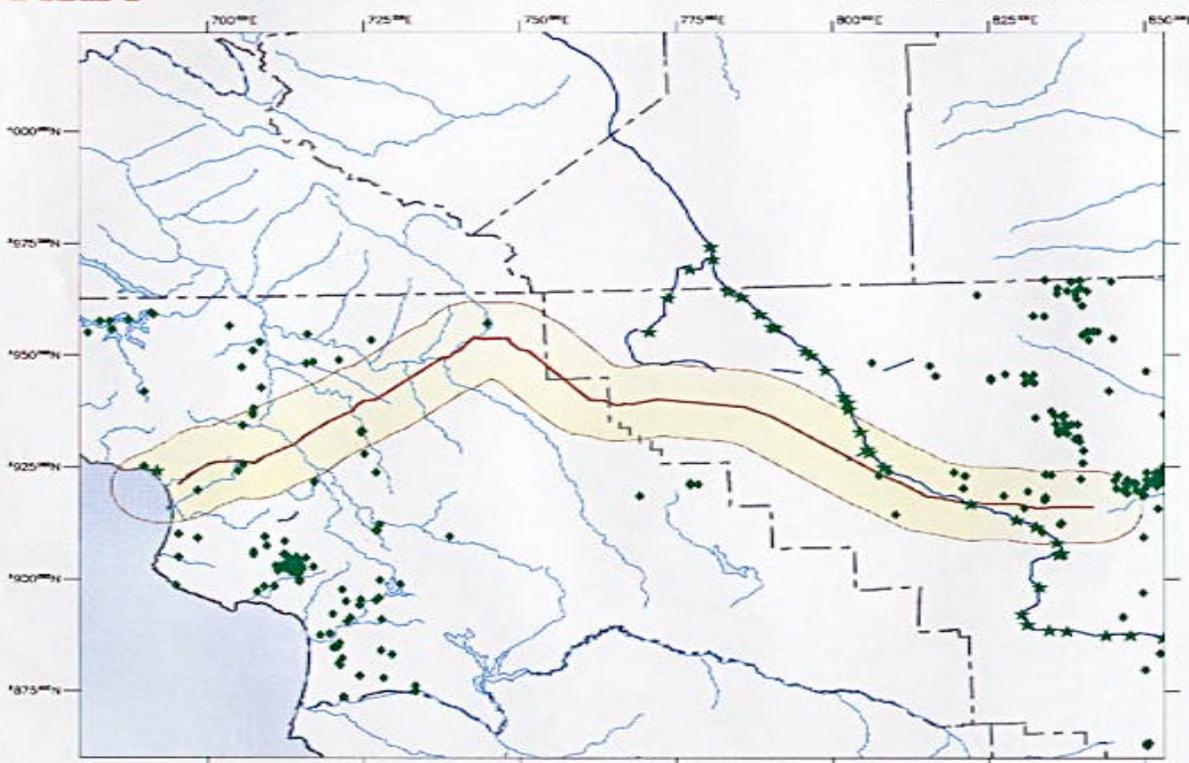
Wellhead Protection Areas

Sole Source Aquifers

Drinking Water Candidate List

DRAFT

AMERICAN PETROLEUM INSTITUTE



Drinking Water USA Candidate for the California Pipeline Segment

LEGEND

Base Features

- Pipeline
- - - County Line
- Aqueduct
- Stream
- Water
- 5 Mile Buffer Zone

Candidates for Unusually Sensitive Areas (US

- ★ Turnout / Surface W
- Groundwater Well

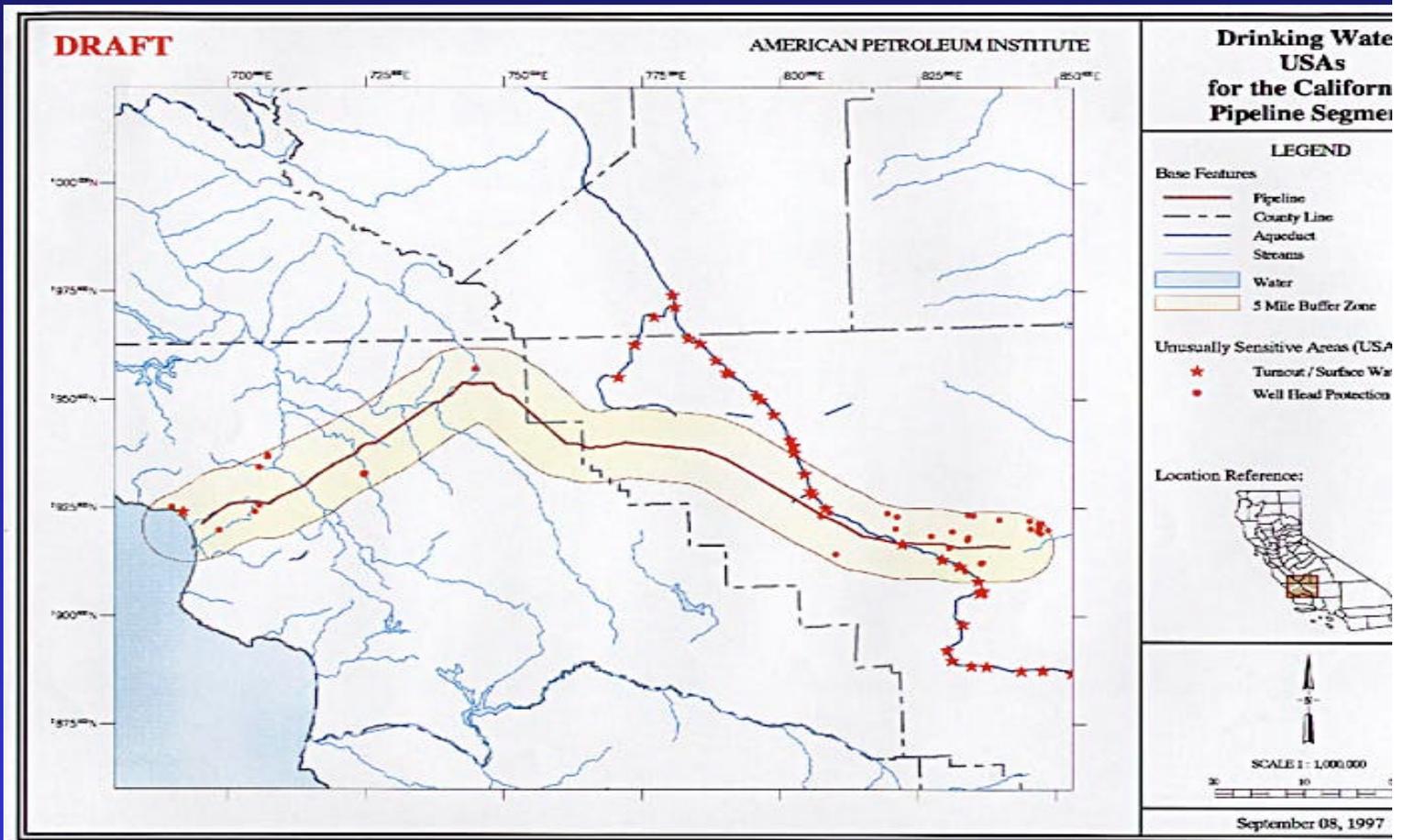
Location Reference:



September 08, 1997

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Drinking Water USAs



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Drinking Water Model

Data Collection

Data Preparation

Run Model

Data Collection

Public Water Systems

Aquifer Maps

Surface Geology Maps

Sole Source Aquifer Maps

Wellhead Protection Areas

Adequate Alternative Source

Public Water Systems

The data must be in digital format and provide geographic coordinate information for each well.

Data should indicate surface and groundwater sources

Preferably indicate CWS, TNCWS, and NTNCWS

Public Water Systems

PWS Data from Louisiana (srehast.dbf)

PWS_ID	SRE_TYPE	SOURCENAME	LATITUDE	LONGITUDE	SRE_DEPTH
1001001	SG	CHICOT AQUIFER	3024241	9212532	0283
1001001	SG		3024239	9212496	0285
1001001	SG		3024239	9212532	
1001001	SG		3024239	9212496	0334
1001002	SG	CHICOT AQUIFER	301230	922209	0250
1001002	SG		301227	922206	0294
1001002	SG		301211	922208	0282
1001002	SG		301232	922209	0252
1003004	SG				
1003005	SG	EVANGELINE AQUI	302922	925052	0696
1003005	SG		302851	925039	0888

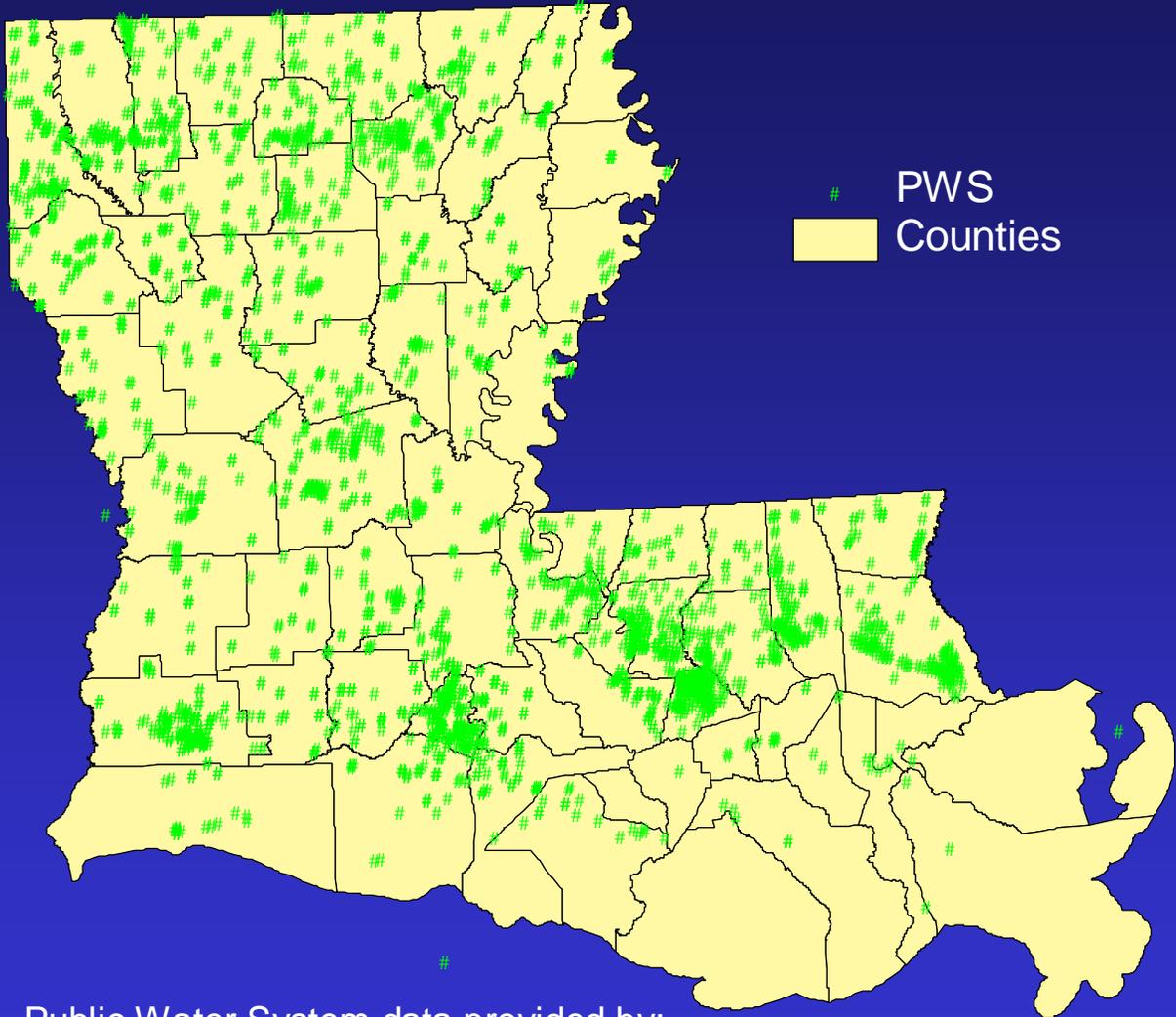
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Public Water Systems

PWS Data from Louisiana (invhast.dbf)

PWS_ID	SUPPLYNAME	PARISH	SYSTEMTYPE
1001001	TOWN OF CHURCH POINT W S	ACADIA	C
1001002	CITY OF CROWLEY-LAWCO	ACADIA	C
1001003	VILLAGE OF ESTHERWOOD-WS	ACADIA	C
1001004	TOWN OF IOTA - WATER SUP	ACADIA	C
1001005	VILLAGE OF MERMENTAU-W S	ACADIA	C
1001006	VILLAGE OF MORSE - WATER	ACADIA	C
1001007	CITY OF RAYNE WATER SYST	ACADIA	C
1001011	S.W.LA. DEVELOPMENTAL CT	ACADIA	C
1001013	COUNTRY COURT M H P	ACADIA	C
1001015	COUNTRY VILLAGE T.P.	ACADIA	C

Public Water Systems



Public Water System data provided by:
Louisiana Office of Public Health

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Aquifer Maps

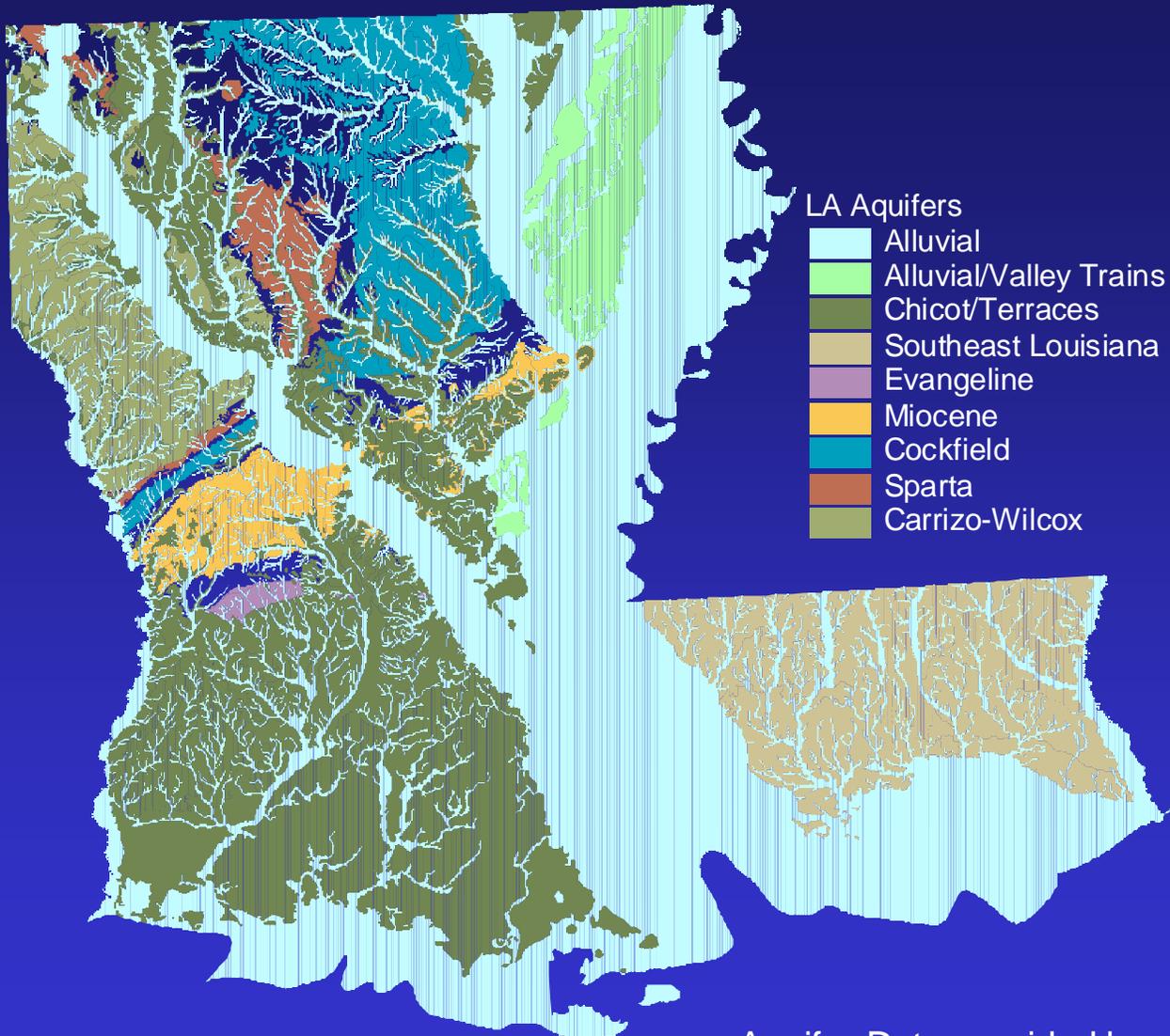
State-accepted aquifer boundaries

Aquifer outcrop and/or subcrop delineations

Aquifer boundaries may be delineated from other state-accepted digital sources

The model could be limited to only source information in PWS data if no aquifer boundaries are available

Aquifer Maps



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Aquifer Data provided by:
Louisiana Department of Environmental Quality

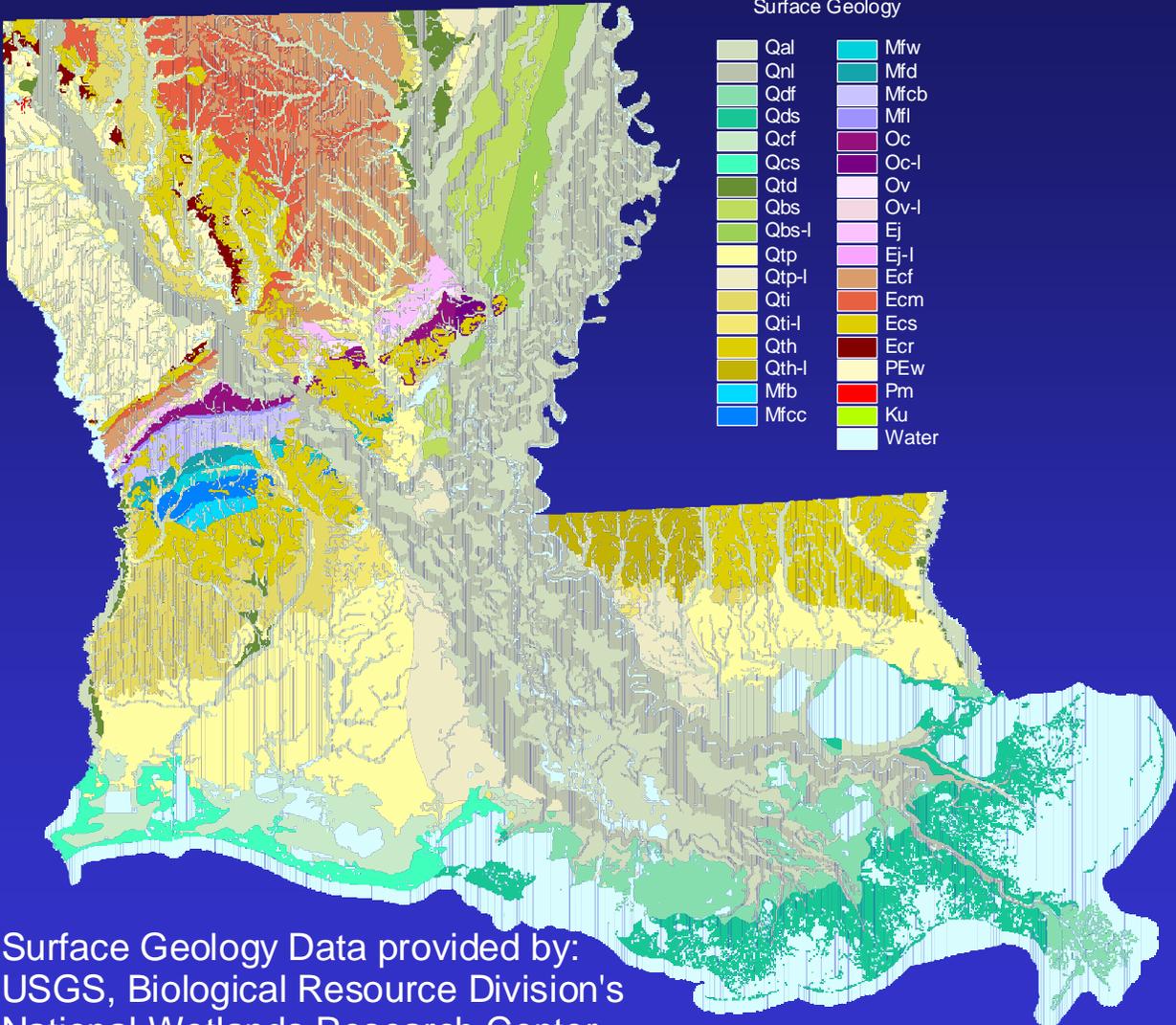
Surface Geology Maps

State-accepted surface geology

May be used to delineate aquifer outcrop boundaries

Assist in Pettyjohn classification

Surface Geology Maps



Surface Geology Data provided by:
USGS, Biological Resource Division's
National Wetlands Research Center

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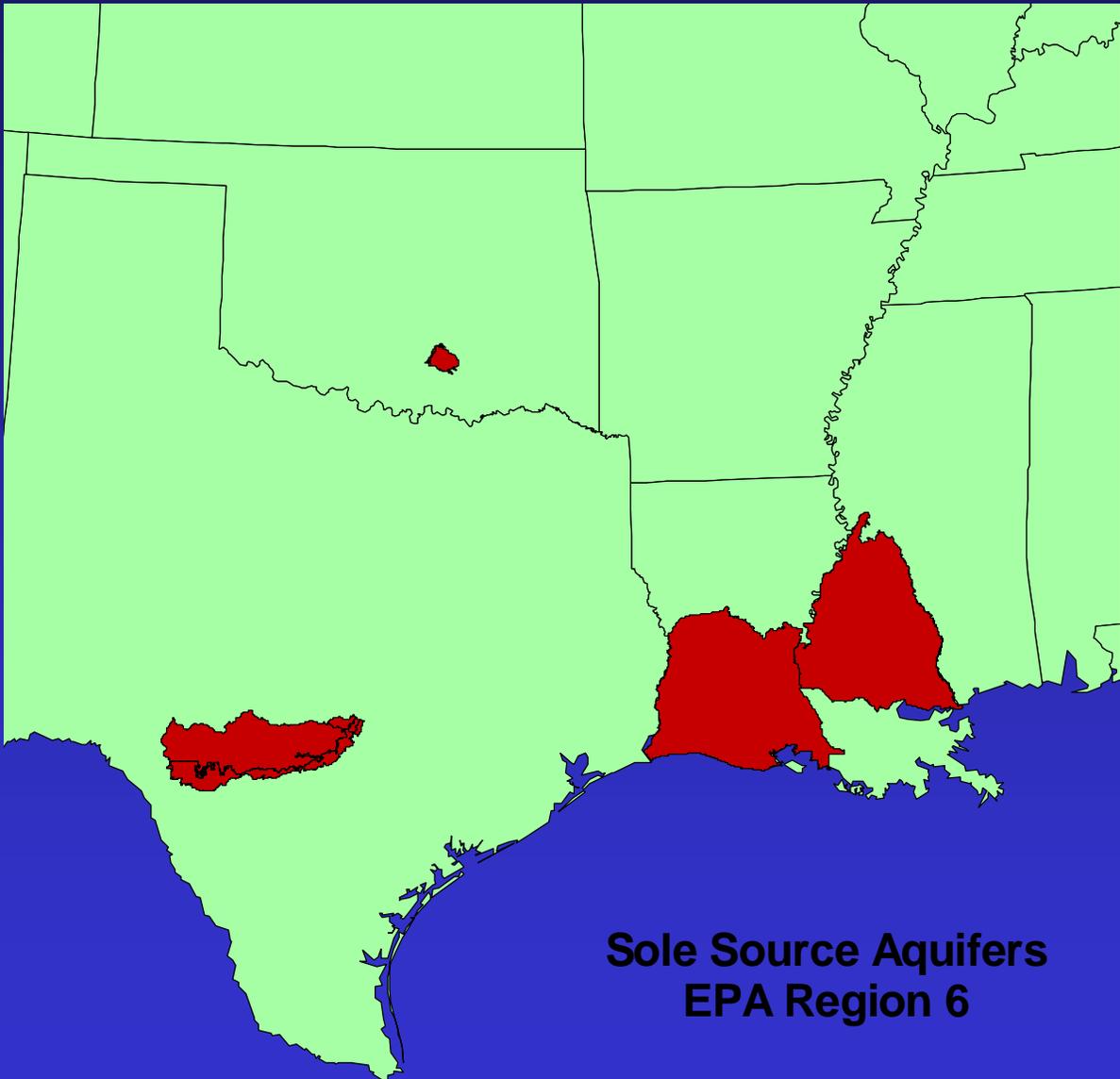
Sole Source Aquifer Maps

Areas designated as “sole or principal” source of drinking water for an area.

Supplies at least 50 percent of drinking water consumed in the area.

Boundaries of SSA used to provide extra protection for vulnerable groundwater systems located within SSAs

Sole Source Aquifer Maps



**Sole Source Aquifers
EPA Region 6**

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Wellhead Protection Areas

Fixed-Radius or Zone-Defined

Default fixed-radius of 2000 ft. used when
WHPAs are not available

Used to delineate USAs

Wellhead Protection Areas

WHPA Data from Texas (whpa.dbf)

PWS_ID	LATITUDE	LONGITUDE	WHP_AREA_R
0920016	322620	0945718	1320.00000
0920016	322641	0945716	1320.00000
0920016	322714	0945653	1320.00000
0940020	293807	0981554	3550.00000
0940020	293745	0981648	3350.00000
0940020	293745	0981650	3350.00000
1070025	321624	0953824	3000.00000
1070025	321624	0953824	3000.00000
1070025	321624	0953818	3000.00000
1070034	321750	0955055	1320.00000

Adequate Alternative Source

Separate task to identify Public Water Systems with an adequate alternative source

Only systems that were considered preliminary USAs were contacted

Adequate Alternative Source

AAS Data from Louisiana used by model

PWS_ID	ALTSOURCE	TIMEFRAME
1001006	No	Unknown
1001018	No	Unknown
1001021	No	Unknown
1005035	Yes	Less than 1 Week
1005040	No	Unknown
1005046	No	Unknown
1005059	No	Unknown
1005074	Yes	1 Week to 1 Month
1005082	No	Unknown
1005085	No	Unknown

Data Preparation

Source Aquifer Reference Table

Guidelines for Pettyjohn Classification

Guidelines Reference table

Source Aquifer Reference Table

Standardize source aquifer information from
PWS data

Simplifies Guidelines for Pettyjohn
classification

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Source Aquifer Reference Table

Source Reference Table from Texas

FER	DESCRIPTIO	SRE_AQU
BTV	SALT BOLSON DEPOSITS AND TERTIARY VOLCANICS	WESTE
CFX	SEYMOUR FORMATION AND CLEAR FORK GROUP	SEYMOU
LBL	SALT BOLSON AQUIFER	WESTE
NTF	SANTA FE FORMATION	UNK
YCZ	SEYMOUR AND CHOZA FORMATIONS	SEYMOU
YMR	SEYMOUR FORMATION	SEYMOU
AHK	TAHOKA FORMATION	UNK
AOG	TAHOKA AND OGALLALA FORMATIONS	UNK
DAS	TAHOKA FORMATION, FREDERICKSBURG GROUP, AND ANTLERS SAND	EDWARDS,T
RCL	TERRACE GRAVEL, INCLUDING LEONA FORMATION	LIPAN

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Guidelines for Pettyjohn Classification

Based on data available for each state

Developed by geologists

USGS Groundwater Atlas used as the
primary source for geological
characteristics of aquifer

Texas Guidelines

Rule 17 (Blaine Aquifer)

- Any wells in the Blaine aquifer outcrop belt (Permian Pease River Group; Dog Creek Shale, Blaine Gypsum; Blaine Formation) that source that aquifer at depths less than or equal to 450 ft. are Class Ib, because the anhydrite and gypsum in that unit are commonly cavernous. Wells within the Blaine deeper than 450 ft. are unknown. This is based on a maximum thickness of 400 ft. (Segment 4 Atlas, USGS, 1996) plus a conservative buffer of 50 ft. Wells sourcing the subcrop of the aquifer are Class III (or Class III-v if the confining unit thickness is variable or unknown), because younger overlying units create confining conditions.

Guidelines Reference Table

Based on Guidelines for Pettyjohn
Classification

Used by model to assign groundwater
systems a Pettyjohn Class

Guidelines Reference Table

Guidelines reference table from Texas

SRE_AQUIF	CLASS	MIN_DEPTH	MAX_DEPTH	DESCRIPTIO	RULE_NUM
DOCKUM_OUT	IIa	0	900		15
DOCKUM_OUT	UNK	900	0		15
DOCKUM_SUB	IIa	0	0		15
CAPITAN_OUT	Ib	0	1200		16
CAPITAN_OUT	UNK	1200	0		16
BLAINE_OUT	Ib	0	450		17
BLAINE_OUT	UNK	450	0		17
BLAINE_SUB	III	0	0		17

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Drinking Water Model

Notable Exception 1 – TNCWS

Filter Criteria 1 – Surface Water Sources

Filter Criteria 2 – Groundwater Candidates

- Validate Source Aquifer

Filter Criteria 2 –Classification (Validated Source

- Assign Source Aquifer

Filter Criteria 2 –Classification (Assigned Source)

Drinking Water Model

Notable Exception 2 – Non-vulnerable systems

Filter Criteria 3 – SSA Consideration

Adequate Alternative Source Consideration

Drinking Water Model

Notable Exception 1 – TNCWS

- Designate Transient Noncommunity Water Systems as ESAs

Drinking Water Model

Filter Criteria 1 – Surface Water Systems

- Identify Surface Water Systems
- Open water features buffered at ¼ mile inland within a 5-mile radius of surface water system represent area of USA
- Louisiana Surface Water Systems

Drinking Water Model

Filter Criteria 2 – Groundwater Candidates

– Identify groundwater systems

Drinking Water Model

Validate or Assign Source Aquifer

- Essential for assigning Pettyjohn Class to groundwater wells
- Validate the source aquifer for wells that specify a source aquifer
- Assign source aquifer to wells that have ambiguous or unspecified source information

Drinking Water Model

Validate Source Aquifer

- Aquifer outcrop and subcrop boundaries are available
 - Verify that well is located within its source aquifer
- Only aquifer outcrop boundaries are available
 - Verify that well is located within its source aquifer
 - Wells located outside aquifer outcrop are checked interactively
- Louisiana Groundwater Systems

Drinking Water Model

Source Aquifer not verified

- If well depth is shallow (≤ 50 ft), well is considered to source a shallow or surficial aquifer and is assigned a Class I
- Otherwise, USA candidacy cannot be determined because source, location, or depth of well could be incorrect

Drinking Water Model

Filter Criteria 2 –Classification (Validated Source)

SRE_AQUIF	CLASS	MIN_DEPTH	MAX_DEPTH	DESCRIPTIO	RULE_NUM
DOCKUM_OUT	IIa	0	900		15
DOCKUM_OUT	UNK	900	0		15
DOCKUM_SUB	IIa	0	0		15
CAPITAN_OUT	Ib	0	1200		16
CAPITAN_OUT	UNK	1200	0		16
BLAINE_OUT	Ib	0	450		17
BLAINE_OUT	UNK	450	0		17
BLAINE_SUB	III	0	0		17

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Drinking Water Model

Assign Source Aquifer

- PWS data contain some wells without source aquifer information
 - Underlying aquifers and wells nearby are checked
- Louisiana Groundwater Systems

Drinking Water Model

Assign Source Aquifer

- PWS data contain no source aquifer information
 - Well's location and depth are used

Drinking Water Model

Filter Criteria 2 –Classification (Assigned Source)

SRE_AQUIF	CLASS	MIN_DEPTH	MAX_DEPTH	DESCRIPTIO	RULE_NUM
DOCKUM_OUT	IIa	0	900		15
DOCKUM_OUT	UNK	900	0		15
DOCKUM_SUB	IIa	0	0		15
CAPITAN_OUT	Ib	0	1200		16
CAPITAN_OUT	UNK	1200	0		16
BLAINE_OUT	Ib	0	450		17
BLAINE_OUT	UNK	450	0		17
BLAINE_SUB	III	0	0		17

Drinking Water Model

Notable Exception 2 – Non-vulnerable Systems

- Designate groundwater wells with Class IIb, IIc, or III as ESAs

Drinking Water Model

Filter Criteria 3 – Sole Source Aquifers

- Groundwater well is located within SSA
 - Fixed-radius WHPA is doubled and used to delineate preliminary USAs
 - Zone-defined WHPA is used to delineate preliminary USAs
- Groundwater well is located outside SSA
 - Fixed-radius and zone-defined WHPAs are used to delineate preliminary USAs

Drinking Water Model

Adequate Alternative Source Consideration

Result	California	Louisiana	Texas
Yes	1060 (35%)	461 (59%)	2686 (47%)
No	305 (10%)	199 (25%)	1032 (18%)
Some Do, Some Don't	28 (1%)	0 (0%)	239 (4%)
No Answer	1632 (54%)	125 (16%)	1792 (31%)

Drinking Water Model

Adequate Alternative Source Consideration

- Final USAs are determined from preliminary USAs and Public Water Systems with no adequate alternative source
 - Systems that have no alternative source
 - Systems with alternative source lasting less than one month
 - Note: Systems without alternative source information are considered ESAs

Drinking Water Model

Final Drinking Water USAs

– California

- 14,205,577.3 sq. km (3.09%)

– Louisiana

- 6,953,682.5 sq. km (4.75%)

– Texas

- 9,494,835.1 sq. km (1.35%)