G2 INTEGRATED SOLUTIONS | Managing Risk
Assuring Compliance
Optimizing Performance

HCA ANALYSIS & DRINKING WATER UNUSUALLY SENSITIVE AREA ASSESSMENT

MANAGING DOLLARS AND SENSE

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Houston, Texas

Perceptions of Environmental

Expense$$$$

Liability!!!

Savings$$$$

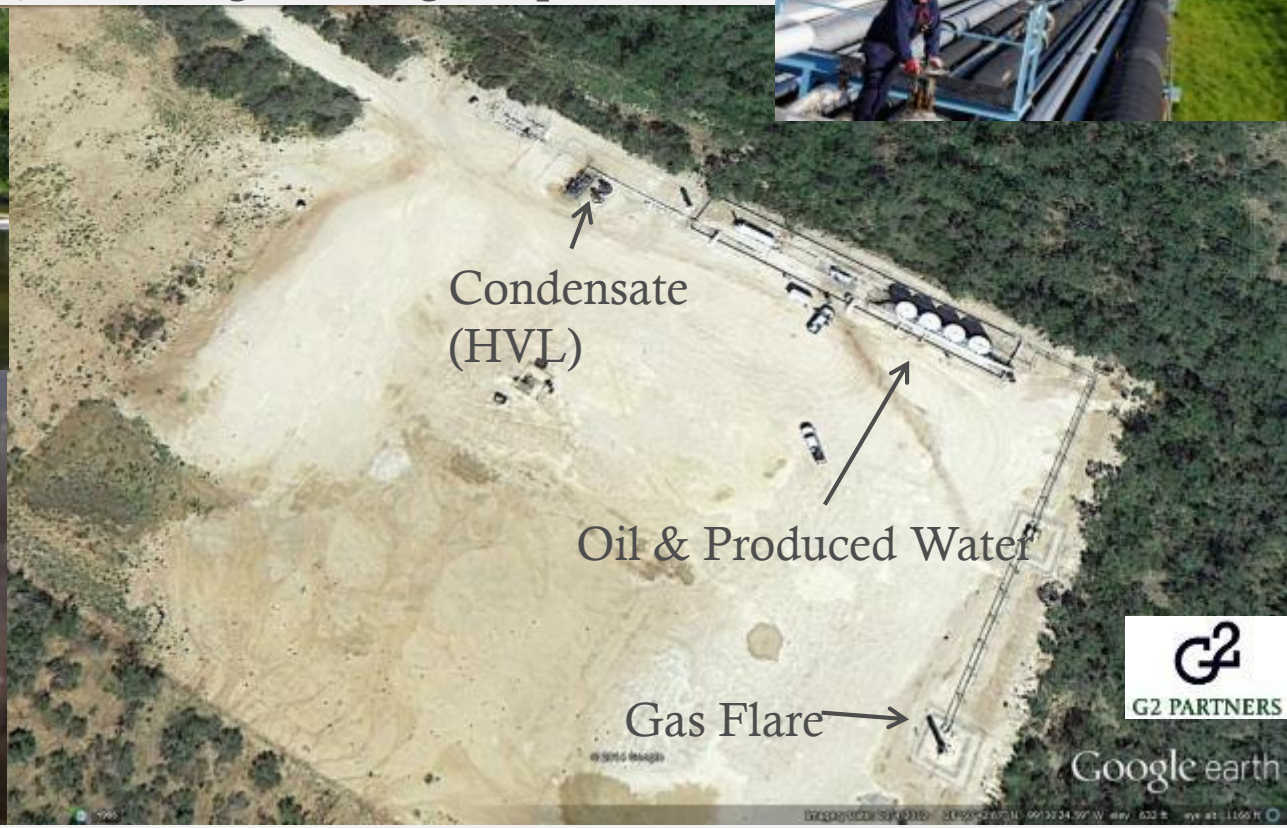
Protection!!!

Outline

- Intro to pipeline and risks
- High Consequence Areas (HCAs) and their significance
- Unusually Sensitive Areas (USAs)
  - The regulations
  - Standard practices, risks, and expense
  - A better approach for identifying and defining them
  - The pipeline contents matter also!
- Conclusions

Petroleum Pipelines and Risks

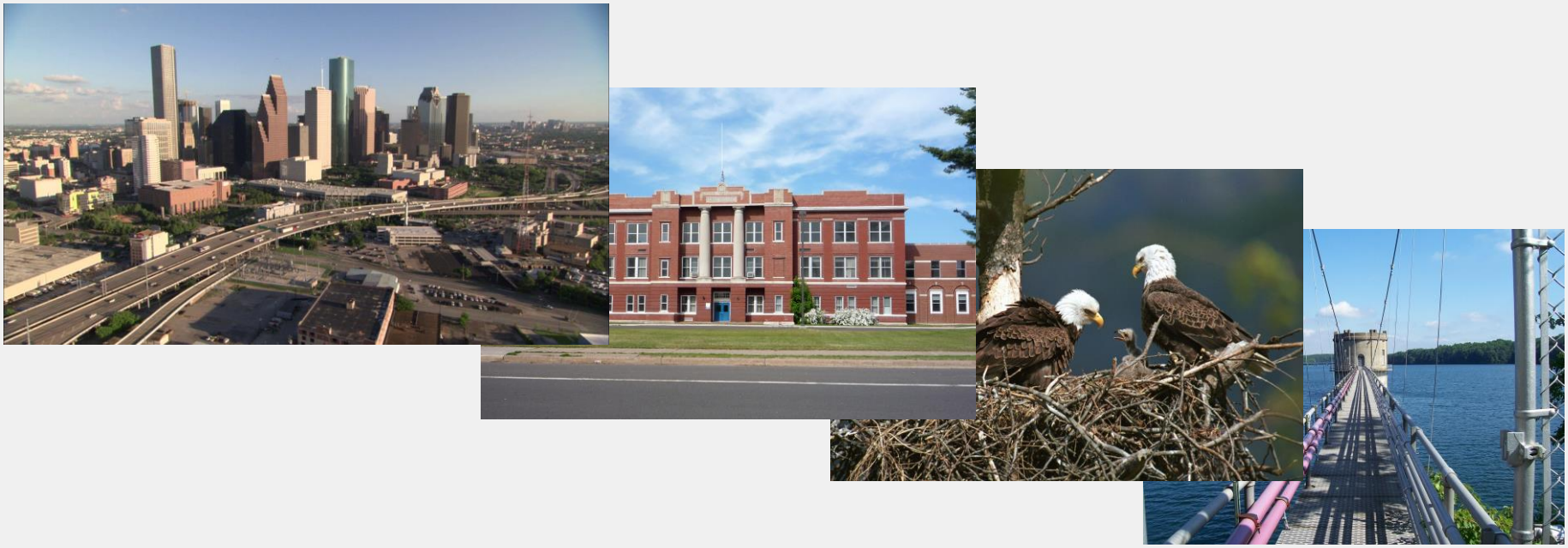
- Natural gas,
- Crude oil, and
- High volatile liquids (HVL), including natural gas liquids.



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – HCA & SIGNIFICANCE

Federal Regulations (49 CFR 192 and 49 CFR 195) require additional maintenance for, and protection to, *High Consequence Areas (HCAs).*



For federally-regulated liquid pipelines, HCAs include human and natural resource receptors:

High consequence area means:

(1) A *commercially navigable waterway,* which means a waterway where a substantial likelihood of commercial navigation exists;

(2) A *high population area,* which means an urbanized area, as defined and delineated by the Census Bureau, that contains 50,000 or more people and has a population density of at least 1,000 people per square mile;

(3) An *other populated area,* which means a place, as defined and delineated by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area;

(4) An *unusually sensitive area,* as defined in § 195.6.

From § 195.450

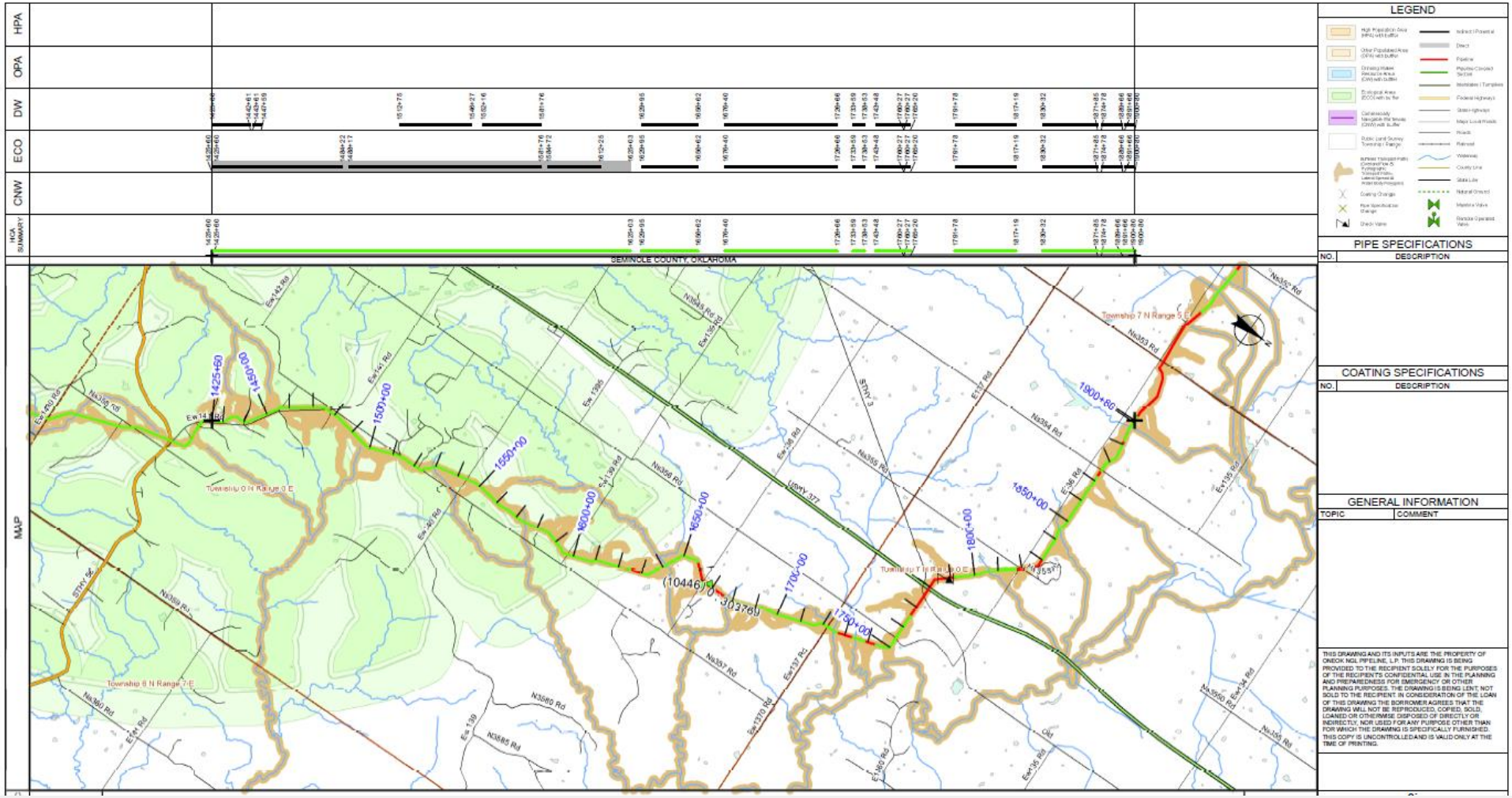
Regulations (§ 195.452) specifically address managing hazardous liquid pipelines in HCAs.

Which pipelines are covered by this section? This section applies to each hazardous liquid pipeline and carbon dioxide pipeline that could affect a high consequence area, including any pipeline located in a high consequence area unless the operator effectively demonstrates by risk assessment that the pipeline could not affect the area.

What this means is that if a worst case release from a portion of pipeline could reach an HCA, that portion is treated as HCA pipeline. A worst case release is typically modeled by a guillotine cut through the pipe during weather conditions that would promote the widest possible dispersal of the product.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

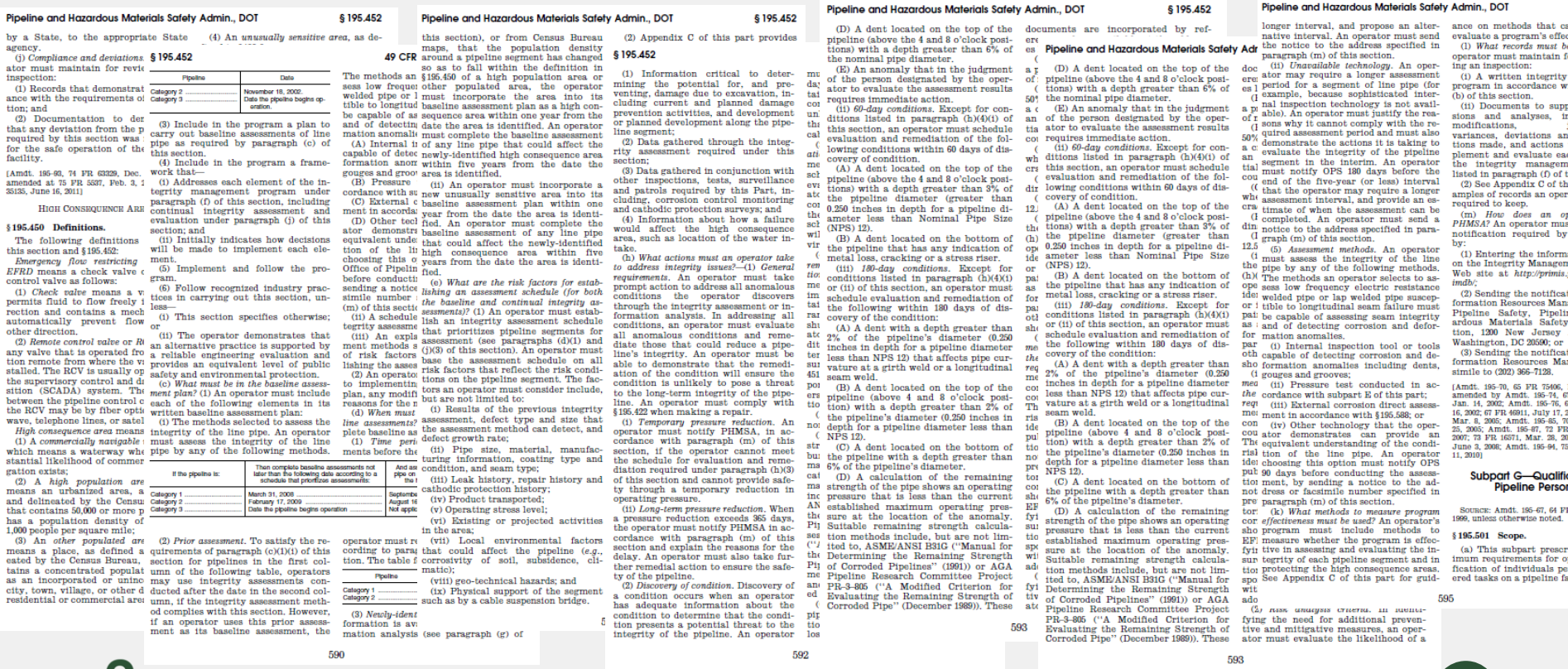
MANAGING DOLLARS AND SENSE – HCA & SIGNIFICANCE



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – HCA & SIGNIFICANCE

If a release from a segment of a pipeline could affect an HCA, that portion of the pipeline is subject to seven pages of additional regulations:



Pipeline and Hazardous Materials Safety Admin., DOT § 195.452

by a State, to the appropriate State agency.

(j) *Compliance and deviations.* ator must maintain for revie inspection:

(1) Records that demonstrat ance with the requirements o tion; and

(2) Documentation to der that any deviation from the p required by this section was for the safe operation of the facility.

[Amdt. 195-93, 74 FR 63329, Dec. amended at 75 FR 5537, Feb. 3, 35135, June 16, 2011]

HIGH CONSEQUENCE ARE

§ 195.450 Definitions.

The following definitions this section and § 195.452:

Emergency flow restricting EFRD means a check valve control valve as follows:

(1) *Check valve* means a v permits fluid to flow freely rection and contains a mech automatically prevent flow other direction.

(2) *Remote control valve* or *R* any valve that is operated fro tion remote from where the v stalled. The RCV is usually op the supervisory control and da sition (SCADA) system. The between the pipeline control c the RCV may be by fiber optic wave, telephone lines, or satel

High consequence area means

(1) A *commercially navigable* which means a waterway whe stantial likelihood of commer gation exists;

(2) A *high population are* means an urbanized area, a and delineated by the Censu that contains 50,000 or more p has a population density of 1,000 people per square mile;

(3) An *other populated are* means a place, as defined a eated by the Census Bureau, tains a concentrated popula as an incorporated or unin city, town, village, or other d residential or commercial are

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Pipeline and Hazardous Materials Safety Admin., DOT § 195.452

(4) An *unusually sensitive area*, as de-

§ 195.452 49 CFR

Pipeline	Date
Category 2	November 18, 2002.
Category 3	Date the pipeline begins operation.

(3) Include in the program a plan to carry out baseline assessments of line pipe as required by paragraph (c) of this section.

(4) Include in the program a framework that—

(i) Addresses each element of the integrity management program under paragraph (f) of this section, including continual integrity assessment and evaluation under paragraph (j) of this section; and

(ii) Initially indicates how decisions will be made to implement each element.

(5) Implement and follow the program.

(6) Follow recognized industry practices in carrying out this section, unless—

(i) This section specifies otherwise; or

(ii) The operator demonstrates that an alternative practice is supported by a reliable engineering evaluation and provides an equivalent level of public safety and environmental protection.

(c) *What must be in the baseline assessment plan?* (1) An operator must include each of the following elements in its written baseline assessment plan:

(i) The methods selected to assess the integrity of the line pipe. An operator must assess the integrity of the line pipe by any of the following methods.

If the pipeline is:	Then complete baseline assessments not later than the following date according to a schedule that prioritizes assessments:	And as pipe on the l
Category 1	March 31, 2008	Septembe
Category 2	February 17, 2009	August 1
Category 3	Date the pipeline begins operation	Not applic

(2) *Prior assessment.* To satisfy the requirements of paragraph (c)(1)(i) of this section for pipelines in the first column of the following table, operators may use integrity assessments conducted after the date in the second column, if the integrity assessment method complies with this section. However, if an operator uses this prior assessment as its baseline assessment, the

operator must r cording to para tion. The table f

Pipeline
Category 1
Category 2

(3) *Newly-ident* formation is av mation analysis

(see paragraph (g) of

Pipeline and Hazardous Materials Safety Admin., DOT § 195.452

The methods an sess low freque welded pipe or l tible to longitud be capable of as and of detectin mation anomali

(A) Internal t capable of detec formation anom gouges and groo

(B) Pressure cordance with su

(C) External c ment in accorda

(D) Other tech ator demonstra equivalent unde tion of the lit choosing this o Office of Pipelin before conducti sending a notice simile number

(m) of this sectio

(ii) A schedule tegrity assessme

(iii) An explan ment methods s of risk factors lishing the asses

(2) An operato to implementin plan, any modifi reasons for the n

(d) *When must line assessments?* plete baseline as

(1) *Time peri* ments before the

this section), or from Census Bureau maps, that the population density around a pipeline segment has changed so as to fall within the definition in §195.450 of a high population area or other populated area, the operator must incorporate the area into its baseline assessment plan as a high consequence area within one year from the date the area is identified. An operator must complete the baseline assessment of any line pipe that could affect the newly-identified high consequence area within five years from the date the area is identified.

(ii) An operator must incorporate a new unusually sensitive area into its baseline assessment plan within one year from the date the area is identified. An operator must complete the baseline assessment of any line pipe that could affect the newly-identified high consequence area within five years from the date the area is identified.

(e) *What are the risk factors for establishing an assessment schedule (for both the baseline and continual integrity assessments)?* (1) An operator must establish an integrity assessment schedule that prioritizes pipeline segments for assessment (see paragraphs (d)(1) and (j)(3) of this section). An operator must base the assessment schedule on all risk factors that reflect the risk conditions on the pipeline segment. The factors an operator must consider include, but are not limited to:

(i) Results of the previous integrity assessment, defect type and size that the assessment method can detect, and defect growth rate;

(ii) Pipe size, material, manufacturing information, coating type and condition, and seam type;

(iii) Leak history, repair history and cathodic protection history;

(iv) Product transported;

(v) Operating stress level;

(vi) Existing or projected activities in the area;

(vii) Local environmental factors that could affect the pipeline (*e.g.*, corrosivity of soil, subsidence, climatic);

(viii) geo-technical hazards; and

(ix) Physical support of the segment such as by a cable suspension bridge.

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(2) Appendix C of this part provides

§ 195.452

(1) Information critical to determining the potential for, and preventing, damage due to excavation, including current and planned damage prevention activities, and development or planned development along the pipeline segment;

(2) Data gathered through the integrity assessment required under this section;

(3) Data gathered in conjunction with other inspections, tests, surveillance and patrols required by this Part, including, corrosion control monitoring and cathodic protection surveys; and

(4) Information about how a failure would affect the high consequence area, such as location of the water intake.

(h) *What actions must an operator take to address integrity issues?*—(1) *General requirements.* An operator must take prompt action to address all anomalous conditions the operator discovers through the integrity assessment or information analysis. In addressing all conditions, an operator must evaluate all anomalous conditions and remediate those that could reduce a pipeline's integrity. An operator must be able to demonstrate that the remediation of the condition will ensure the condition is unlikely to pose a threat to the long-term integrity of the pipeline. An operator must comply with §195.422 when making a repair.

(i) *Temporary pressure reduction.* An operator must notify PHMSA, in accordance with paragraph (m) of this section, if the operator cannot meet the schedule for evaluation and remediation required under paragraph (h)(3) of this section and cannot provide safety through a temporary reduction in operating pressure.

(ii) *Long-term pressure reduction.* When a pressure reduction exceeds 365 days, the operator must notify PHMSA in accordance with paragraph (m) of this section and explain the reasons for the delay. An operator must also take further remedial action to ensure the safety of the pipeline.

(2) *Discovery of condition.* Discovery of a condition occurs when an operator has adequate information about the condition to determine that the condition presents a potential threat to the integrity of the pipeline. An operator

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(D) A dent located on the top of the pipeline (above the 4 and 8 o'clock positions) with a depth greater than 6% of the nominal pipe diameter.

(E) An anomaly that in the judgment of the person designated by the operator to evaluate the assessment results requires immediate action.

(ii) *60-day conditions.* Except for conditions listed in paragraph (h)(4)(i) of this section, an operator must schedule evaluation and remediation of the following conditions within 60 days of discovery of condition.

(A) A dent located on the top of the pipeline (above the 4 and 8 o'clock positions) with a depth greater than 3% of the pipeline diameter (greater than 0.250 inches in depth for a pipeline diameter less than Nominal Pipe Size (NPS) 12).

(B) A dent located on the bottom of the pipeline that has any indication of metal loss, cracking or a stress riser.

(iii) *180-day conditions.* Except for conditions listed in paragraph (h)(4)(i) or (ii) of this section, an operator must schedule evaluation and remediation of the following within 180 days of discovery of the condition:

(A) A dent with a depth greater than 2% of the pipeline's diameter (0.250 inches in depth for a pipeline diameter less than NPS 12) that affects pipe curvature at a girth weld or a longitudinal seam weld.

(B) A dent located on the top of the pipeline (above 4 and 8 o'clock position) with a depth greater than 2% of the pipeline's diameter (0.250 inches in depth for a pipeline diameter less than NPS 12).

(C) A dent located on the bottom of the pipeline with a depth greater than 6% of the pipeline's diameter.

(D) A calculation of the remaining strength of the pipe shows an operating pressure that is less than the current established maximum operating pressure at the location of the anomaly. Suitable remaining strength calculation methods include, but are not limited to, ASME/ANSI B31G (''Manual for Determining the Remaining Strength of Corroded Pipelines'' (1991)) or AGA Pipeline Research Committee Project PR–3–805 (''A Modified Criterion for Evaluating the Remaining Strength of Corroded Pipe'' (December 1989)). These

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documents are incorporated by ref-

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(D) A calculation of the remaining strength of the pipe shows an operating pressure that is less than the current established maximum operating pressure at the location of the anomaly. Suitable remaining strength calculation methods include, but are not limited to, ASME/ANSI B31G (''Manual for Determining the Remaining Strength of Corroded Pipelines'' (1991)) or AGA Pipeline Research Committee Project PR–3–805 (''A Modified Criterion for Evaluating the Remaining Strength of Corroded Pipe'' (December 1989)). These

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longer interval, and propose an alternative interval. An operator must send the notice to the address specified in paragraph (m) of this section.

(ii) *Unavailable technology.* An operator may require a longer assessment period for a segment of line pipe (for example, because sophisticated internal inspection technology is not available). An operator must justify the reasons why it cannot comply with the required assessment period and must also demonstrate the actions it is taking to evaluate the integrity of the pipeline segment in the interim. An operator must notify OPS 180 days before the end of the five-year (or less) interval that the operator may require a longer assessment interval, and provide an estimate of when the assessment can be completed. An operator must send a notice to the address specified in paragraph (m) of this section.

(5) *Assessment methods.* An operator must assess the integrity of the line pipe by any of the following methods. The methods an operator selects to assess low frequency electric resistance welded pipe or lap welded pipe susceptible to longitudinal seam failure must be capable of assessing seam integrity and of detecting corrosion and deformation anomalies.

(i) Internal inspection tool or tools capable of detecting corrosion and deformation anomalies including dents, gouges and grooves;

(ii) Pressure test conducted in accordance with subpart E of this part;

(iii) External corrosion direct assessment in accordance with §195.588; or

(iv) Other technology that the operator demonstrates can provide an equivalent understanding of the condition of the line pipe. An operator choosing this option must notify OPS 90 days before conducting the assessment, by sending a notice to the address or facsimile number specified in paragraph (m) of this section.

(k) *What methods to measure program effectiveness must be used?* An operator's program must include methods to measure whether the program is effective in assessing and evaluating the integrity of each pipeline segment and in protecting the high consequence areas. See Appendix C of this part for guid-

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ance on methods that can evaluate a program's effecti

(1) *What records must be* operator must maintain for ing an inspection:

(i) A written integrity m program in accordance wit (b) of this section.

(ii) Documents to suppor sions and analyses, incl modifications, ju variances, deviations and tions made, and actions ta plement and evaluate each the integrity management listed in paragraph (f) of thi

(2) See Appendix C of this samples of records an operat required to keep.

(m) *How does an ope PHMSA?* An operator must notification required by t by:

(1) Entering the informat on the Integrity Manageme Web site at *http://primis.ph imdb/*;

(2) Sending the notificatio formation Resources Manag Pipeline Safety, Pipeline ardous Materials Safety tion, 1200 New Jersey A Washington, DC 20590; or

(3) Sending the notificatio formation Resources Mana simile to (202) 366-7128.

[Amdt. 195-70, 65 FR 75406, De amended by Amdt. 195-74, 67 F Jan. 14, 2003; Amdt. 195-76, 67 16, 2002; 67 FR 46911, July 17, 200 Mar. 8, 2005; Amdt. 195-85, 70 F 25, 2005; Amdt. 195-87, 72 FR 3 2007; 73 FR 16571, Mar. 28, 2008; June 3, 2008; Amdt. 195-94, 75 F 11, 2010]

Subpart G—Qualifica Pipeline Personn

SOURCE: Amdt. 195-67, 64 FR 1999, unless otherwise noted.

§ 195.501 Scope.

(a) This subpart prescrib imum requirements for ope fication of individuals perfo ered tasks on a pipeline faci

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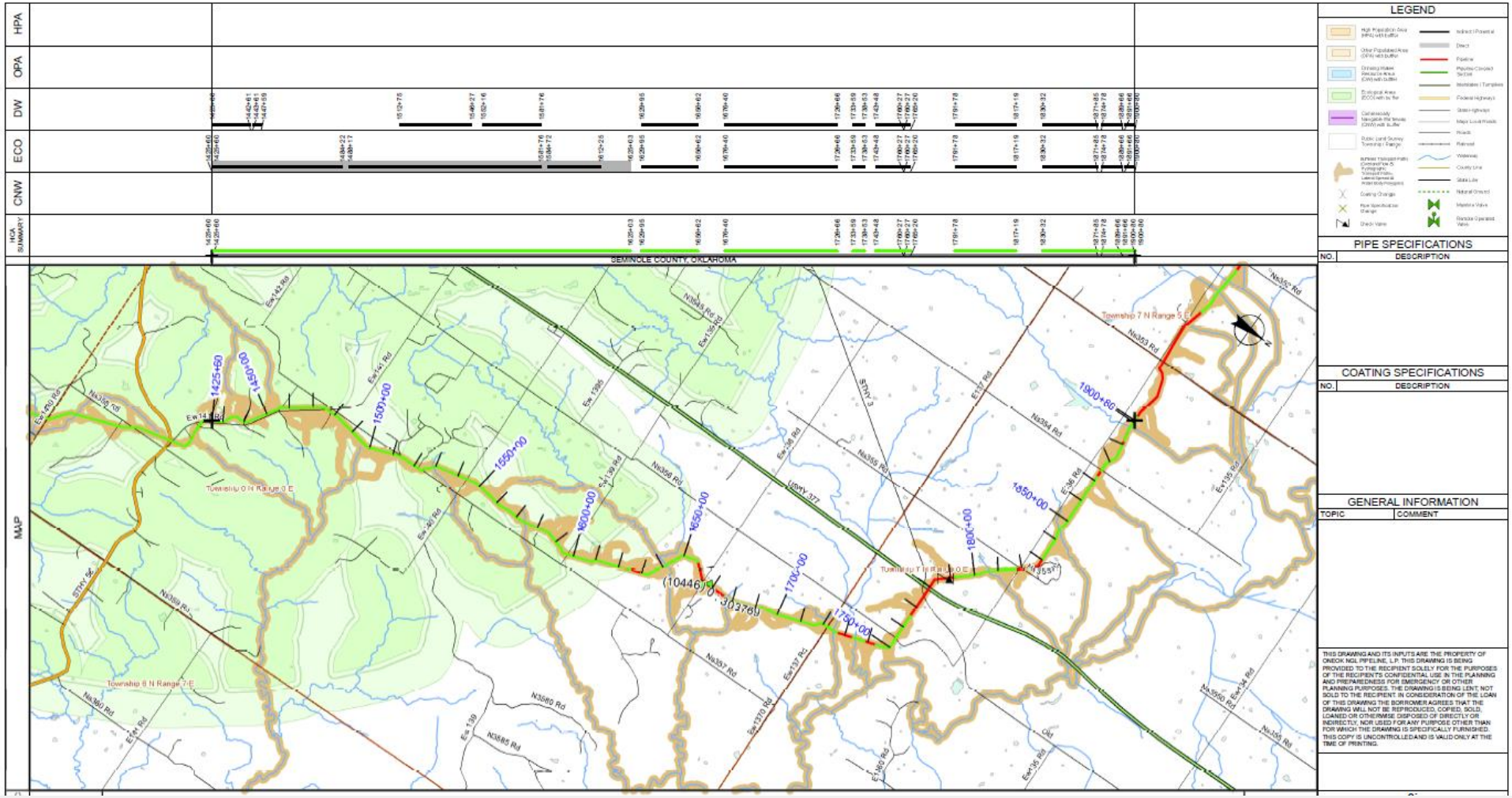
INTEGRATED SOLUTIONS

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – HCA & SIGNIFICANCE



§ 195.6 Unusually Sensitive Areas (USAs).

As used in this part, a USA means a drinking water or ecological resource area that is unusually sensitive to environmental damage from a hazardous liquid pipeline release.

Besides constituting HCAs, proximity to USAs is also used to categorize and set regulatory criteria for some pipelines (§ 195.11-rural regulated gathering lines; § 195.12-low-stress pipelines in rural areas).

Drinking Water USAs include:

(1) Surface water;

(2) Groundwater wells;

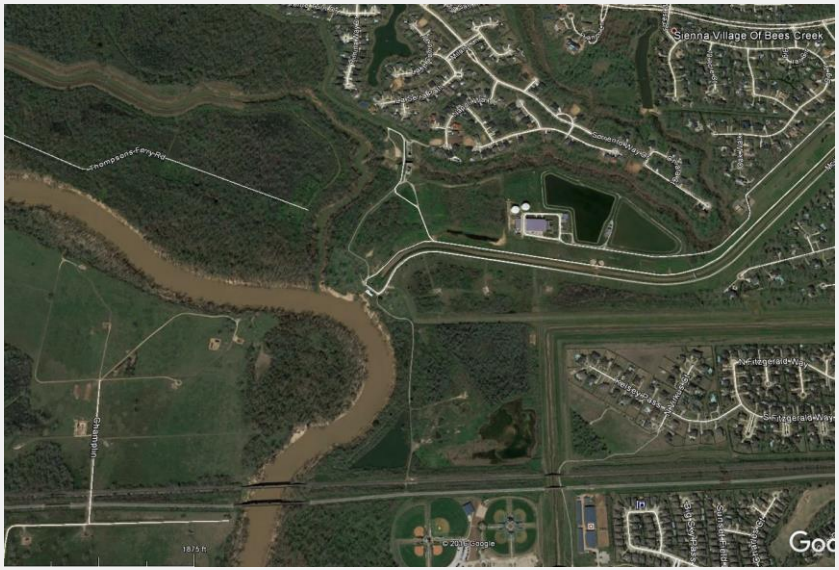
(3) Especially vulnerable aquifers.

Honing in on Drinking Water USAs:

(1) The water intake for a **Community Water System (CWS)** or a **Nontransient Non-community Water System (NTNCWS)** that obtains its water supply primarily from a surface water source and does not have an adequate alternative drinking water source;

Honing in on Drinking Water USAs:

(1) The water intake for a Community Water System (CWS) or a Nontransient Non-community Water System (NTNCWS) that obtains its water supply primarily from a **surface water source** and does not have an adequate alternative drinking water source;



Honing in on Drinking Water USAs:

(2) The Source Water Protection Area (SWPA) for a CWS or a NTNCWS that obtains its water supply from a **Class I or Class IIA** aquifer and does not have an adequate alternative drinking water source. Where a state has not yet identified the SWPA, the Wellhead Protection Area (WHPA) will be used until the state has identified the SWPA

Class I Aquifer means an aquifer that is surficial or shallow, permeable, and is highly vulnerable to contamination. Class I aquifers include:

1. Unconsolidated aquifers . . .
2. Soluble or fractured bedrock aquifers . . .
3. Semi-consolidated aquifers . . .
4. Covered aquifers with less than 50' of low permeability cover . . .

Class IIa aquifer means a Higher Yield Bedrock Aquifer that is consolidated and is moderately vulnerable to contamination.

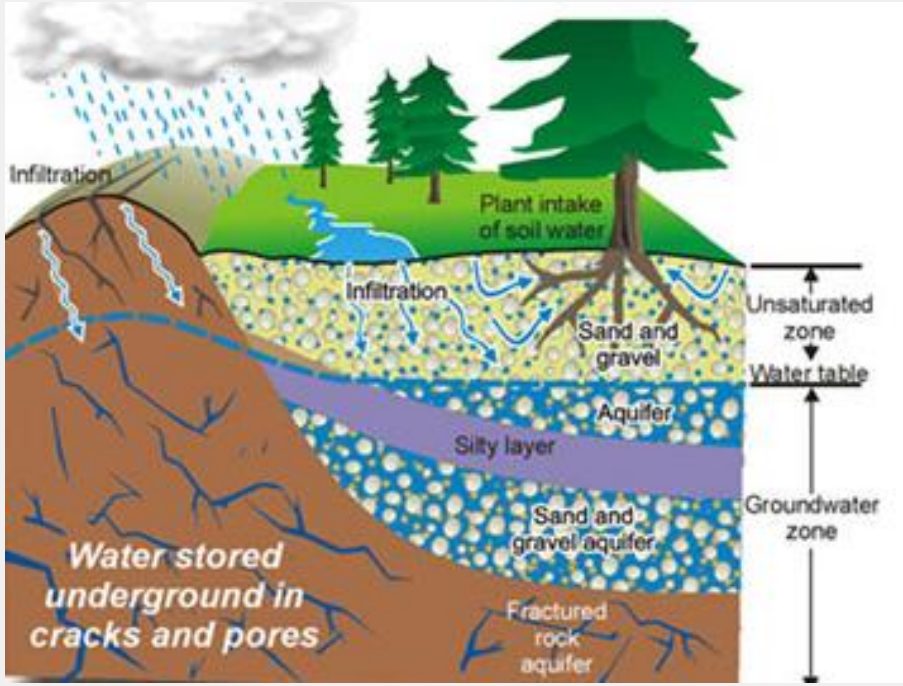
HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – USA REGULATIONS

Class I Aquifer means an aquifer that is surficial or shallow, permeable, and is highly vulnerable to contamination. Class I aquifers include:

1. Unconsolidated aquifers . . .
2. Soluble or fractured bedrock aquifers . . .
3. Semi-consolidated aquifers . . .
4. Covered aquifers with less than 50' of low permeability cover . . .

Class IIa aquifer means a Higher Yield Bedrock Aquifer that is consolidated and is moderately vulnerable to contamination.



Honing in on Drinking Water USAs:

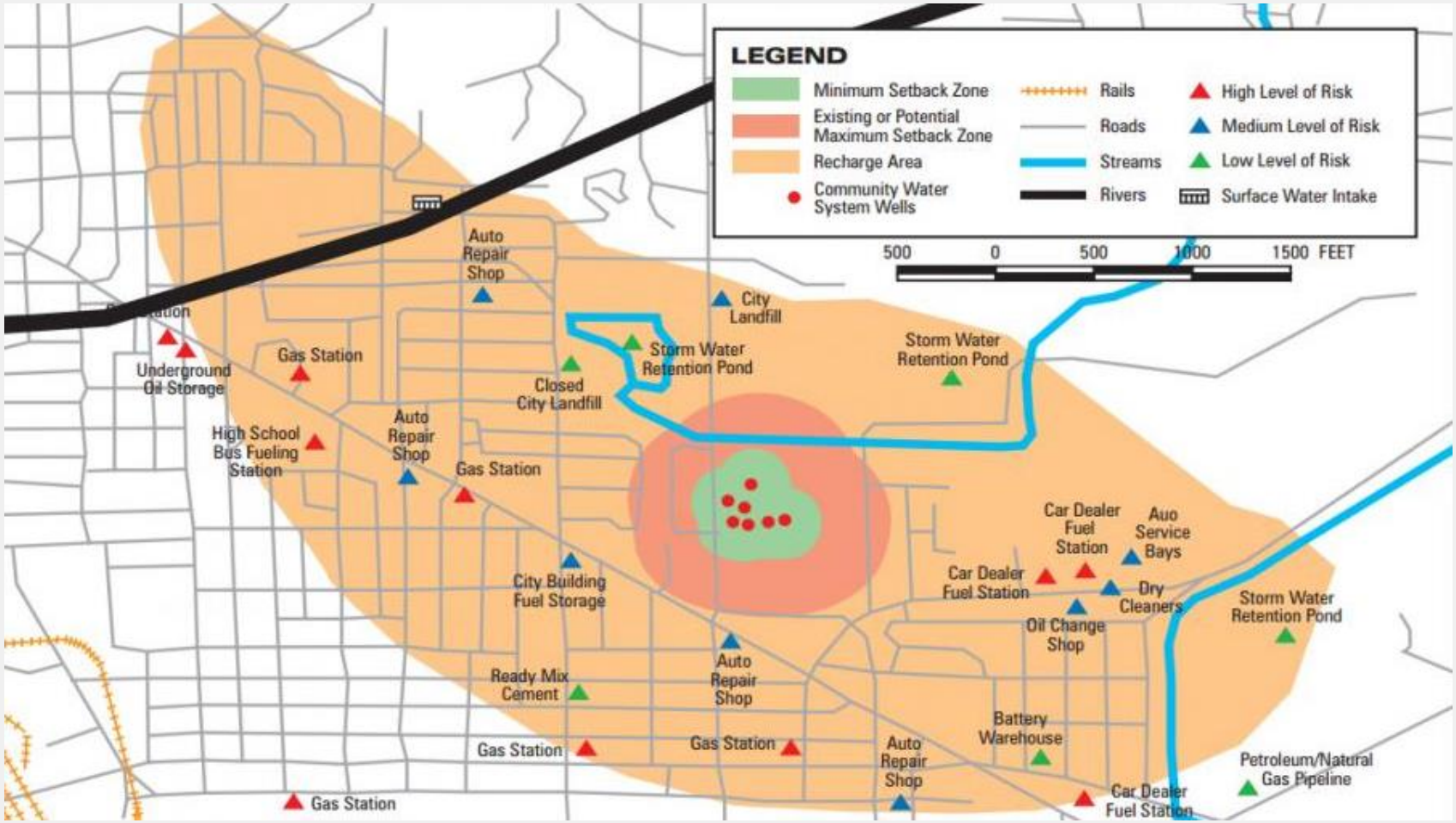
(2) The **Source Water Protection Area (SWPA)** for a CWS or a NTNCWS . .. .Where a state has not yet identified the SWPA, the **Wellhead Protection Area (WHPA)** will be used until the state has identified the SWPA.

Source Water Protection Area (SWPA) means the area delineated by the state for a public water supply system (PWS) or including numerous PWSs, whether the source is ground water or surface water or both, as part of the state source water assessment program (SWAP) approved by EPA under section 1453 of the Safe Drinking Water Act.

Wellhead Protection Area (WHPA) means the surface and subsurface area surrounding a well or well field that supplies a public water system through which contaminants are likely to pass and eventually reach the water well or well field.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – USA REGULATIONS

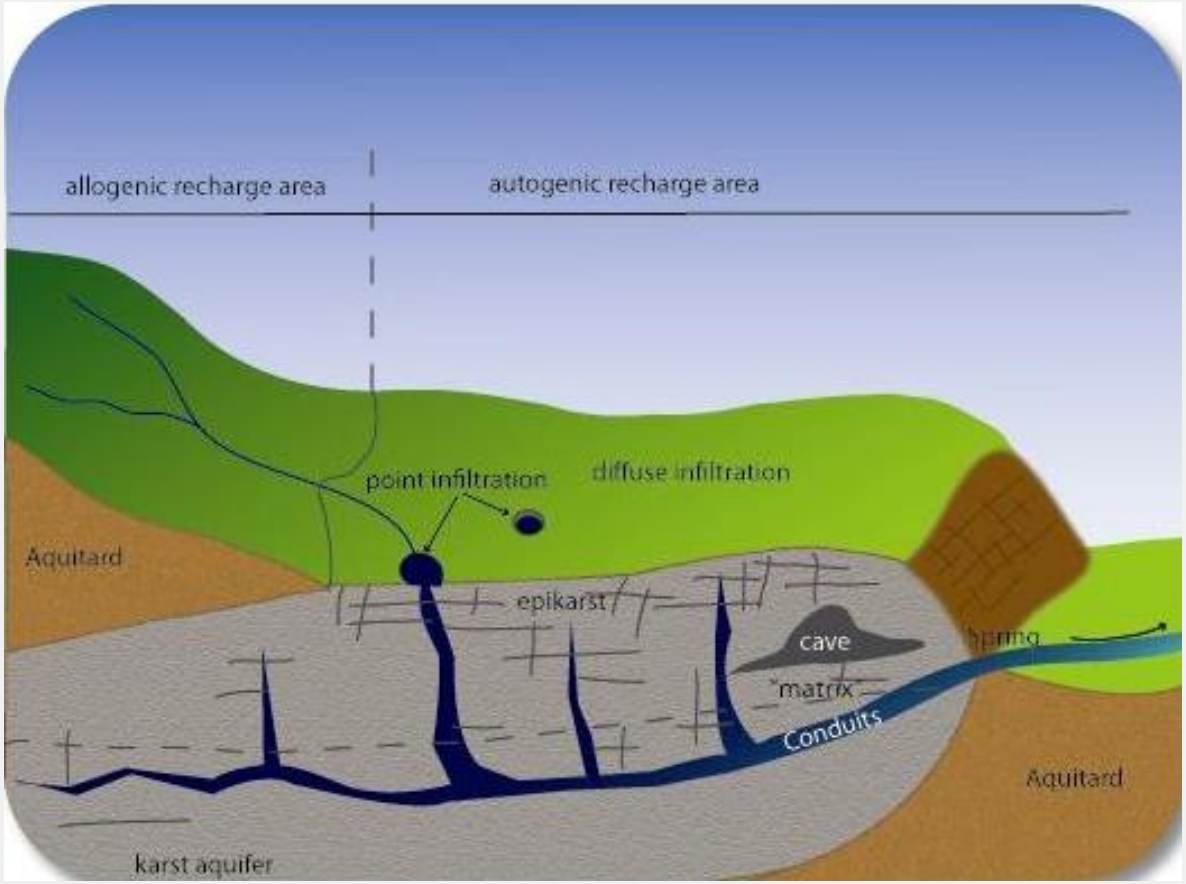


Honing in on Drinking Water USAs:

(3) The sole source aquifer recharge area where the sole source aquifer is a karst aquifer in nature.

Sole source aquifer (SSA) means an area designated by the U.S. Environmental Protection Agency under the Sole Source Aquifer program as the ''sole or principal'' source of drinking water for an area. Such designations are made if the aquifer's **ground water supplies 50% or more of the drinking water** for an area, and if that aquifer were to become contaminated, it would pose a public health hazard. A sole source aquifer that is **karst in nature** is one composed of limestone where the porosity is derived from connected solution cavities. They are often cavernous, with high rates of flow.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – USA REGULATIONS

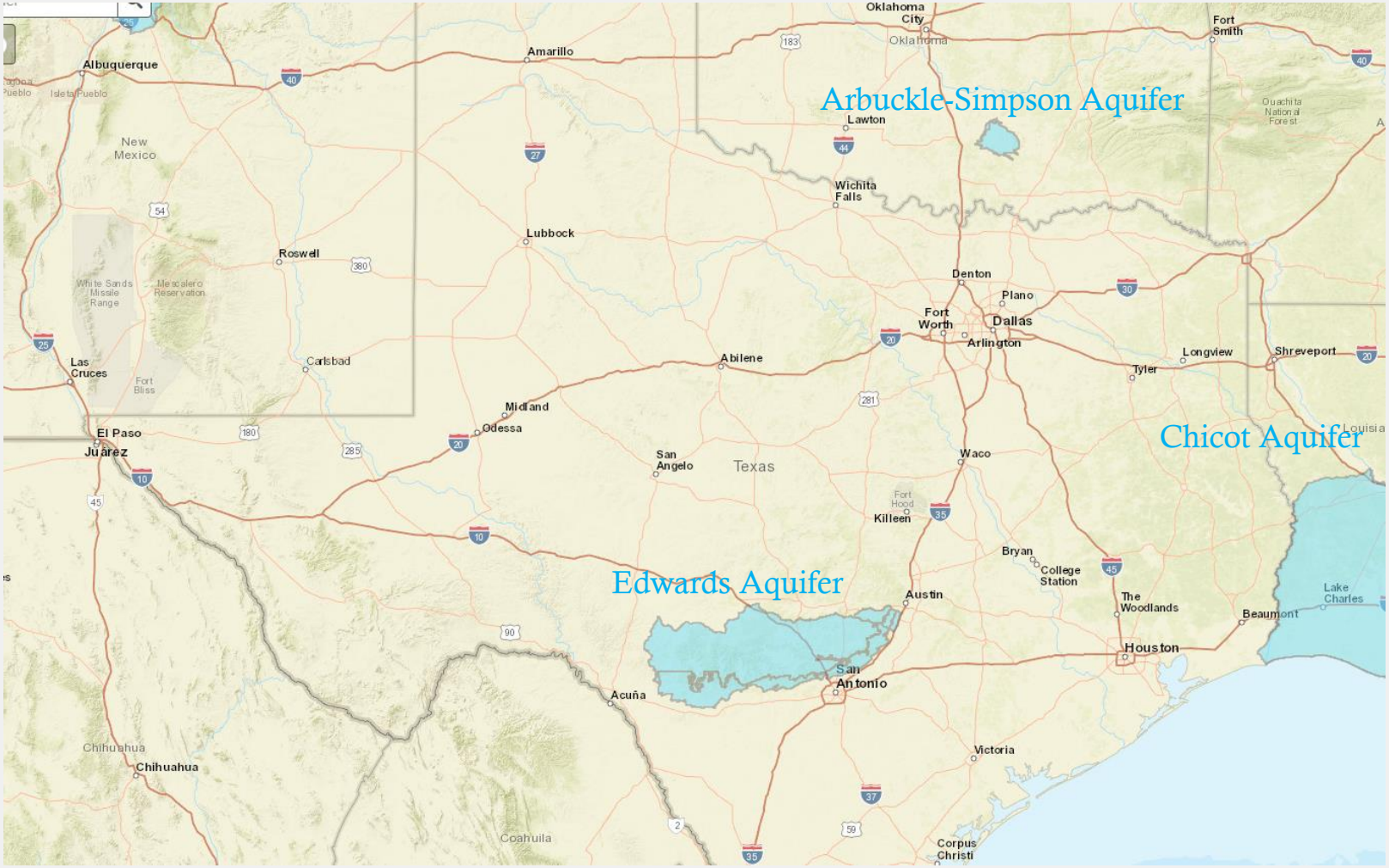


Karst Aquifers

- High velocity flow
- Labyrinth makes flow predictions virtually impossible and remediation difficult!

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – USA REGULATIONS



In a nutshell:

Drinking Water USAs are public water supplies—both surface- and groundwater—that are susceptible to damage resulting from the release from a liquids pipeline (regulated under 49 CFR 195). Drinking water include a point (intake or well) and a protection area around the point.

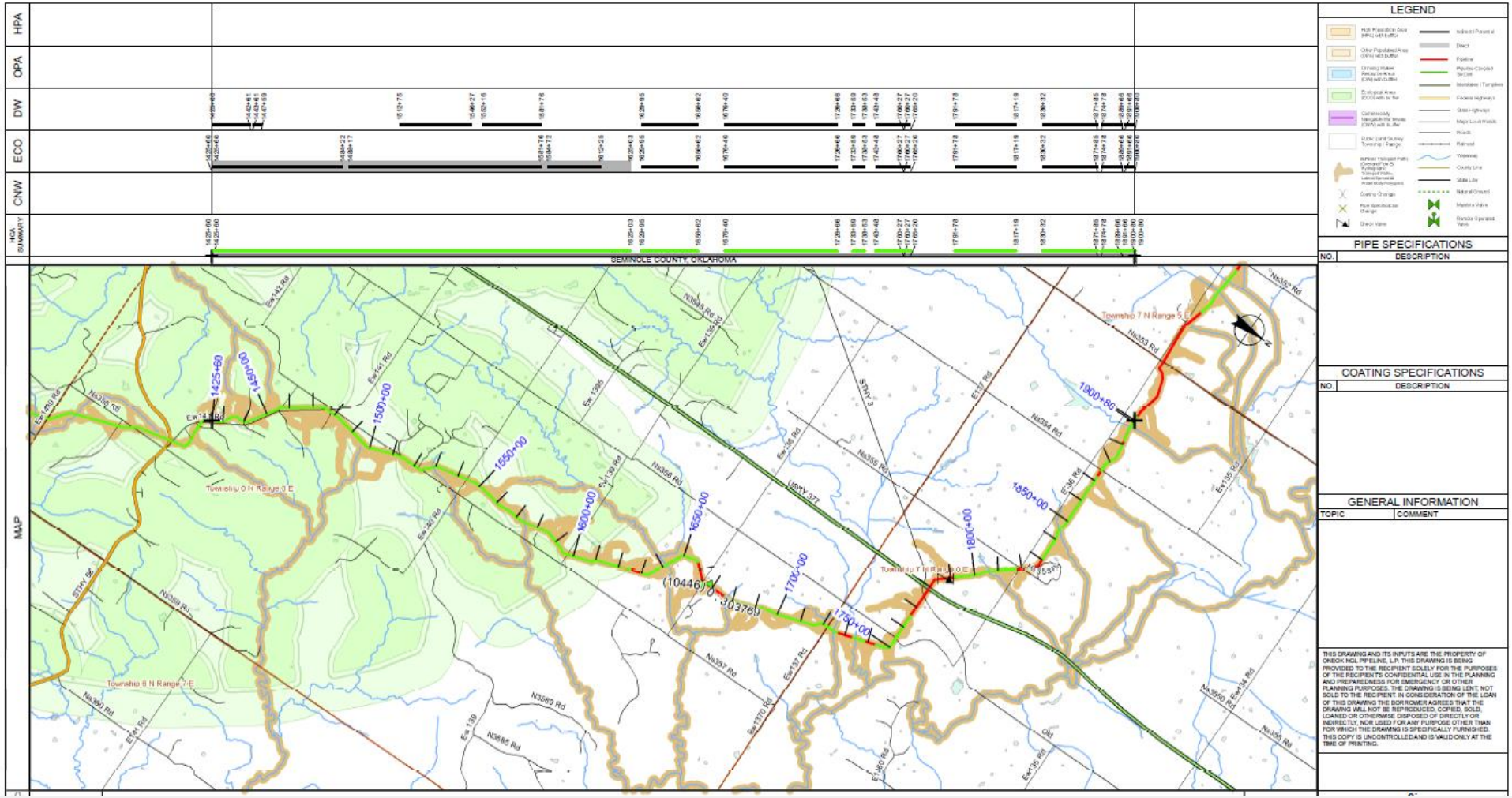
- The regs prescribe what is protected, and the prescription is fairly well defined.
- The regs do not prescribe the procedures one should use to identify the USAs.
- The National Pipeline Mapping System (NPMS) is not mentioned or prescribed within the Unusually Sensitive Area discussion.

How Are USAs Typically Identified and Used?

- Most operators utilize the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration's (PHMSA) National Pipeline Mapping System (NPMS) data to identify USAs.
- When conducting a study, such as an HCA analysis, pipeline operators can request Drinking Water and/or Ecological USA data from PHMSA.
- If a modeled pipeline release intersects an HCA (including USAs), operators designate that portion of pipeline as "HCA".
- If a modeled release from the pipeline doesn't reach a USAs or another HCA, no designation is assigned.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – HCA & SIGNIFICANCE



- Inherent assumptions to this approach are:
  1. The USA data set from PHMSA is accurate and complete.
  2. Protection areas are reasonable and scientifically sound.
  3. The only factor that is important regarding a pipeline's relationship to the USA is distance.
- If assumptions aren't true, there is risk that:
  - Real USAs are not being adequately protected.
  - Money is being spent unnecessarily to protect non-existent, misplaced, and/or over-estimated HCAs.

Let's test the assumptions for Drinking Water USAs

Are the USA datasets from PHMSA accurate and complete?

Most NPMS Drinking Water USA datasets were:

- Collected in 2001,
- Published in 2002, and
- Contain public water supply data published by states during the early to mid 1990's, and likely gathered well before publication dates.
- Intended to be updated at least every five years, but that has not happened.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

Source_Information:

Source_Citation:

Citation_Information:

Originator: Texas Natural Resources Conservation Commission (TNRCC)
Publication_Date: 1997
Title:
Wellhead Protection Areas: whpa.dbf
Geospatial_Data_Presentation_Form: spreadsheet
Publication_Information:

Publication_Place: Austin, TX
Publisher: TNRCC

Online_Linkage: http://www.tnrcc.state.tx.us/water/wu/swap/swp.html

Type_of_Source_Media: online
Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 1997

Source_Currentness_Reference:
publication date

Source_Citation_Abbreviation:
none
Source_Contribution:
Wellhead protection area information

Source_Information:

Source_Citation:

Citation_Information:

Originator: Oklahoma Department of Environmental Quality (ODEQ)
Publication_Date: 1996
Title:
Community and NonCommunity Wells, Surface Water Intakes: SRCINFO.mdb
Geospatial_Data_Presentation_Form: spreadsheet
Publication_Information:

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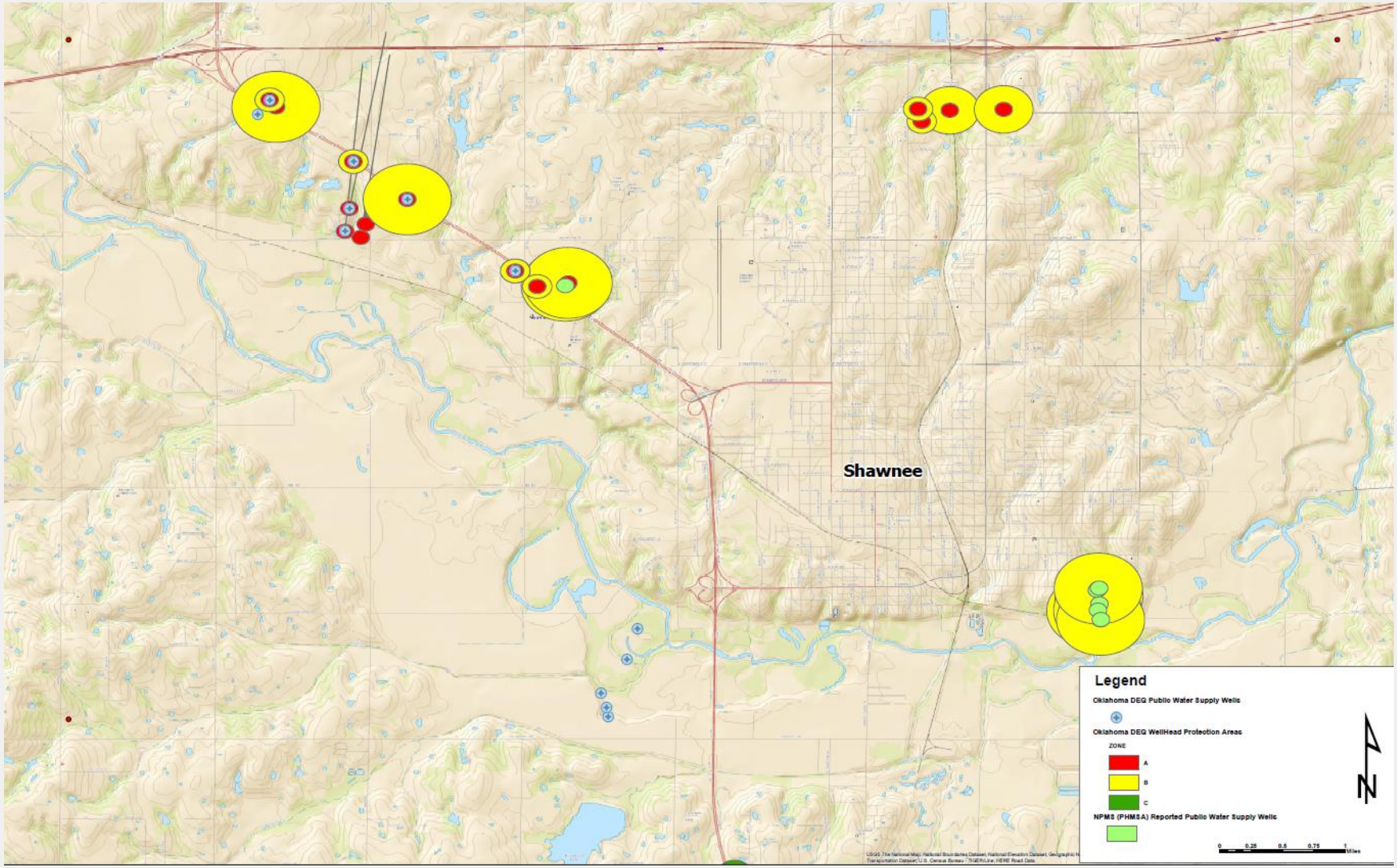
HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

NPMS Drinking Water USA data:

- Misses many public water supplies, including all installed since the late 1990's;
- Includes historic public water supplies that are no longer used;
- Includes some groundwater wells which appear to have never been public water supply wells (misidentified?); and
- Includes public water supplies which appear to be inaccurately mapped (seem to be in the wrong coordinate system).

The first assumption, that the USA dataset from PHMSA is complete and accurate, is not valid.

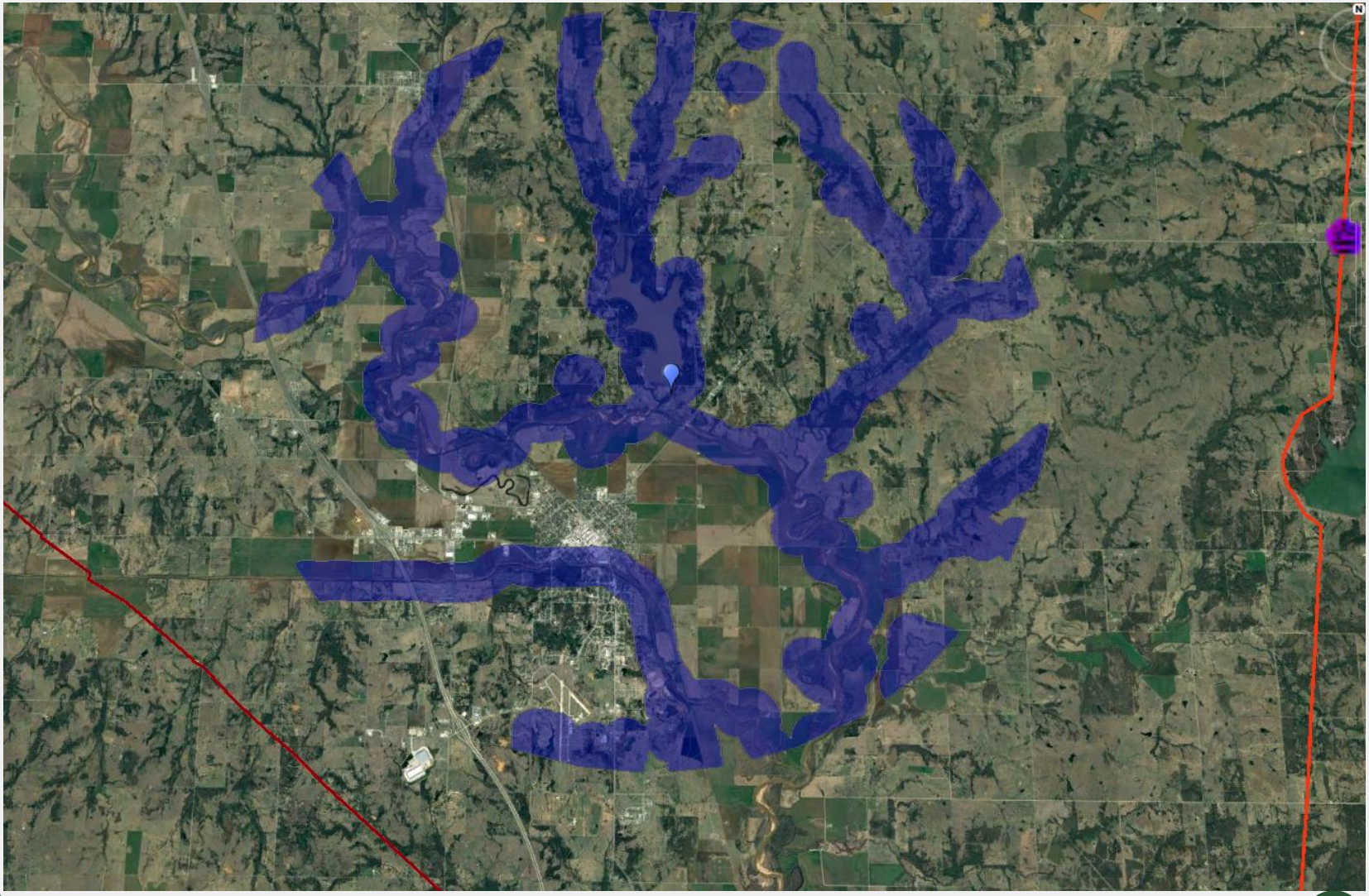
Are NPMS Drinking Water USA protection areas reasonable and scientifically sound?

Let's look at surface water intakes first.

The NPMS drinking water USAs set up a buffer within a set radius (five miles) of the surface water intake. The buffer area includes all of the topographically low areas within the radius.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES



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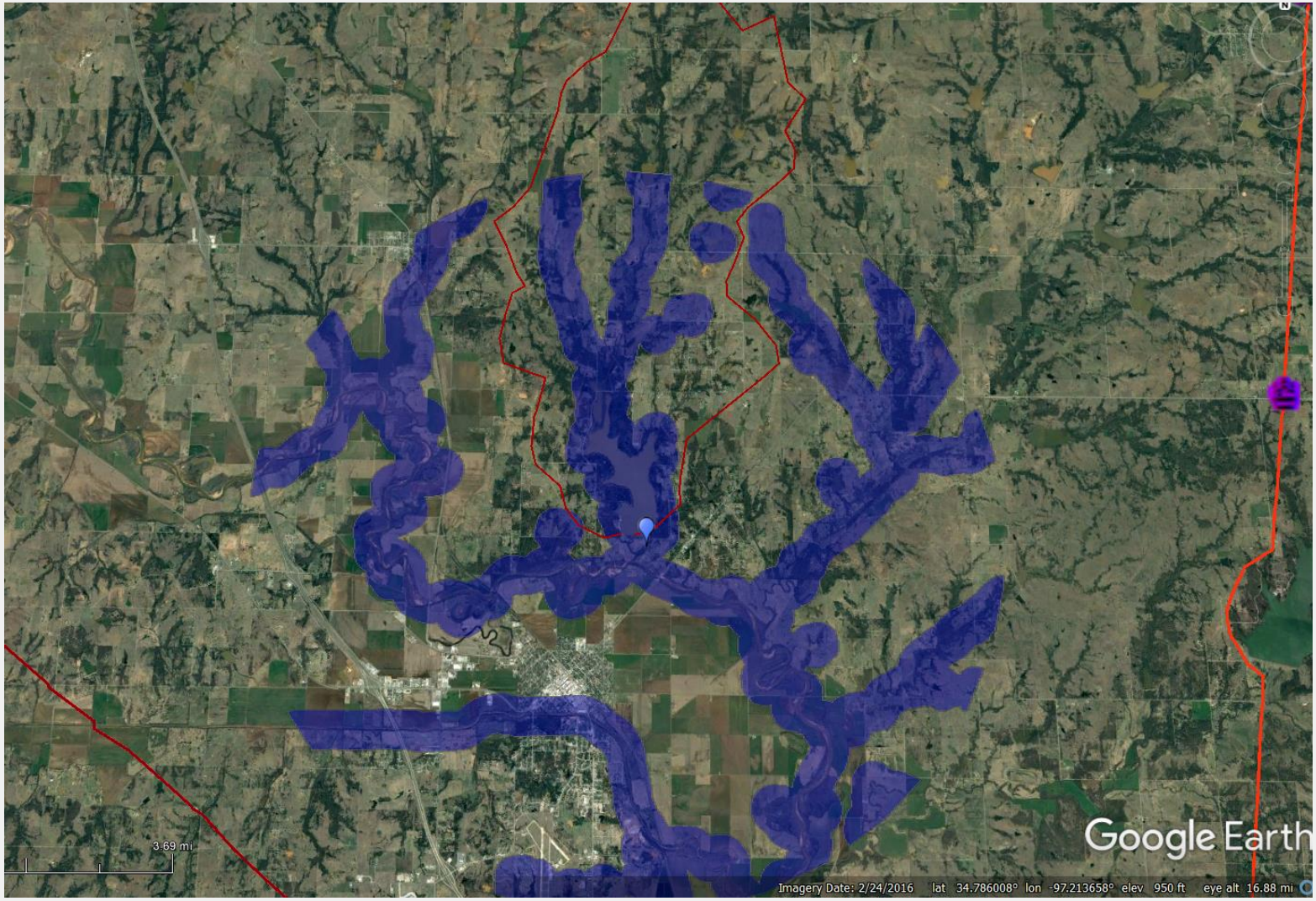
MANAGING DOLLARS AND SENSE – STANDARD PRACTICES



Let's consider NPMS groundwater USA data now.

NPMS drinking water USA protection areas around groundwater wells are generally a set diameter, that is NOT directly related to the well attributes that are indicative of susceptibility to impact:

- Well age,
- Well depth,
- Well construction details (casing, seal),
- Soil characteristics,
- Groundwater depth,
- Groundwater flow direction, and
- Subsurface geology (including confining layers above used aquifer).

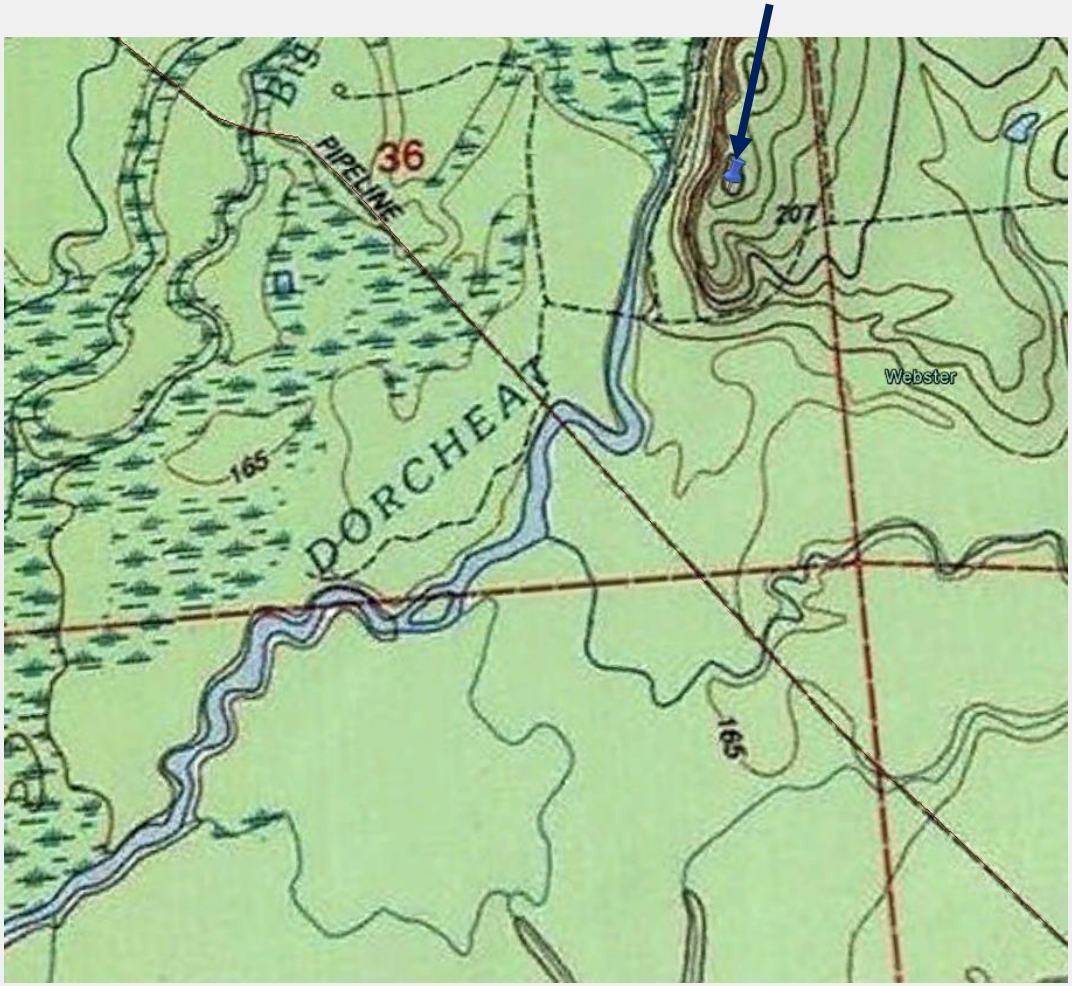
In many cases, the NPMS protection areas/buffer zones do not agree with state-recommended protection areas.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

Another Example

It is very unlikely that this 60' deep groundwater well in an unconfined aquifer would be affected by a release from the pipeline approximately 0.25 miles to the southwest because of elevation differences and the general southward directed groundwater flow in this area.



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

Arbitrary buffer distances and reliance upon using a uniform geometry for buffer shapes may result in unreasonable and unsound drinking water USAs. Also, key data that provides a lot of insight about the likelihood of impact to public water supplies is ignored. Factors other than distance from a pipeline can be very important in assessing likelihood of impact for a public water supply.

None of the three assumptions upon which the use of NPMS drinking water USA data is based are valid.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

An operator, member of the public or other government agency may view and download the data from the NPMS home page . . .

However, it is an operator's responsibility to ensure that it has identified all high consequence areas that could be affected by a pipeline segment. An operator is also responsible for periodically evaluating its pipeline segments to look for population or environmental changes that may have occurred around the pipeline and to keep its program current with this information.

From § 195, Appendix C

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – STANDARD PRACTICES

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH

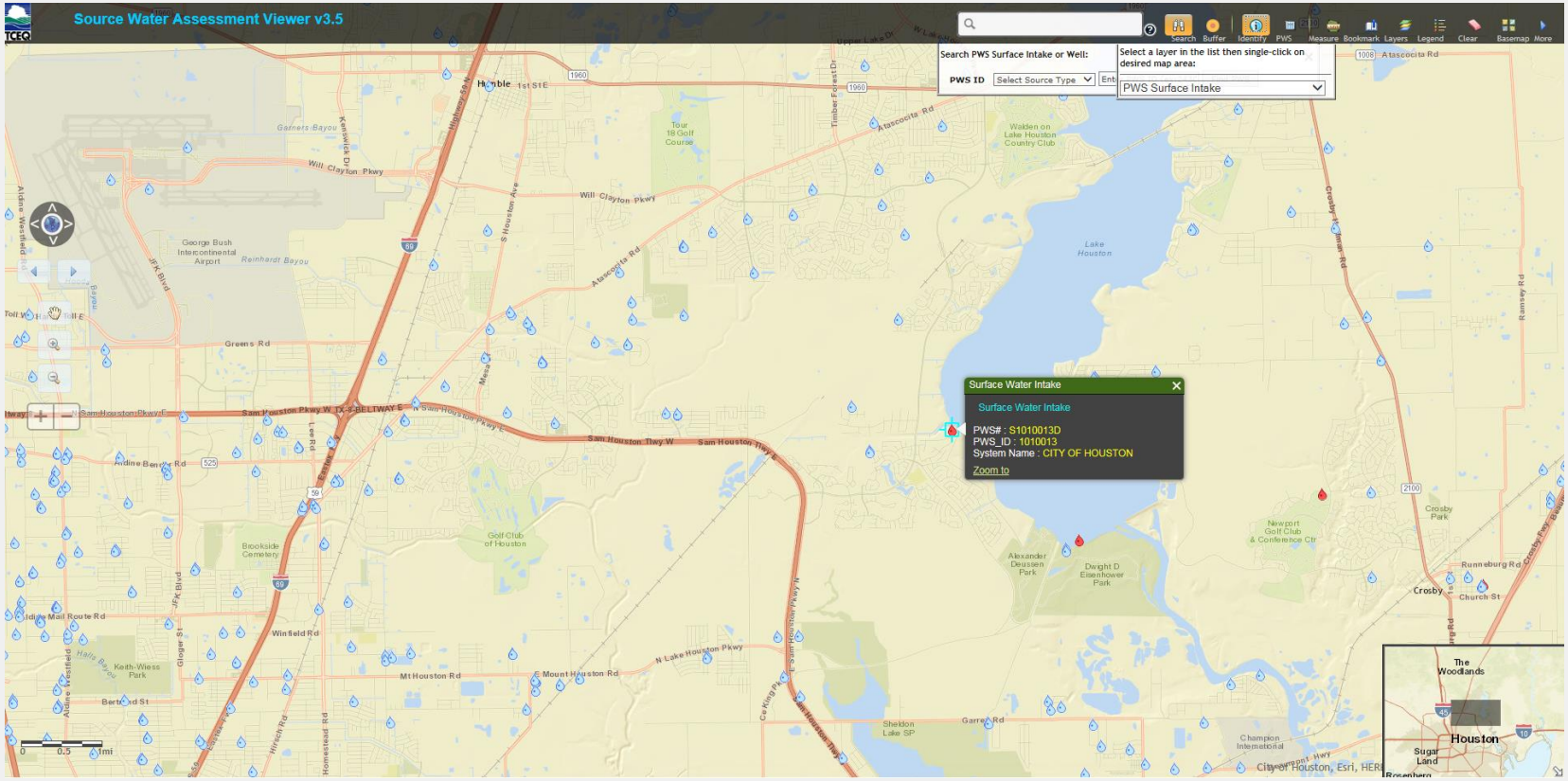
A better approach is to:

- Use current drinking water PWS data and verify locations with aerial photos and/or other secondary sources, where possible.
- Collect information about the PWSs that can be used to create protection areas/buffer zones and define the USAs.
- Develop algorithms to define and plot the buffer zones.
- Identify "bad" NPMS data and provide explanation for exclusion from HCA assessment (for auditors).
- Assess whether or not USAs could be affected by a release.
- Get buy-in from appropriate regulatory agencies when excluding NPMS data and/or modifying buffer zones.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

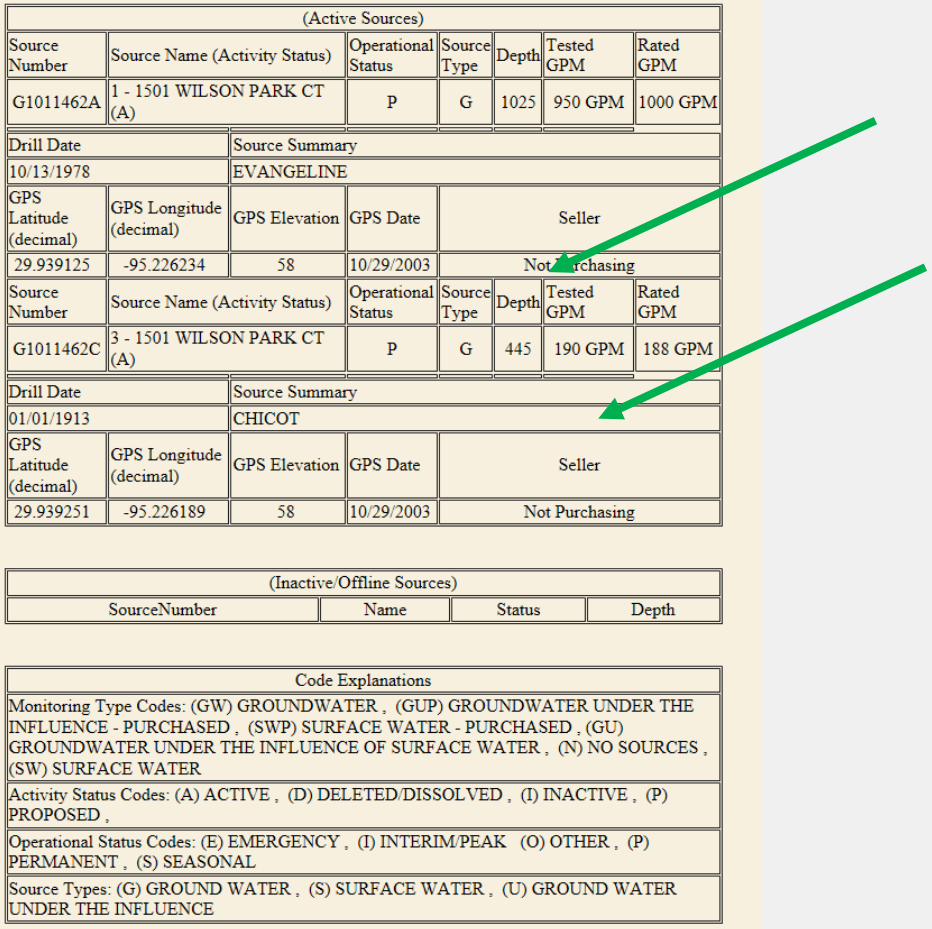
MANAGING DOLLARS AND SENSE – A BETTER APPROACH

Current public water supply data is available from state agencies. This is typically current to at least the past 12 months.



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – A BETTER APPROACH

Many of the state agencies that oversee public water supply data and mapping also provided detailed information about the water supplies.



(Active Sources)

Source Number	Source Name (Activity Status)	Operational Status	Source Type	Depth	Tested GPM	Rated GPM
G1011462A	1 - 1501 WILSON PARK CT (A)	P	G	1025	950 GPM	1000 GPM

Drill Date	Source Summary			
10/13/1978	EVANGELINE			
GPS Latitude (decimal)	GPS Longitude (decimal)	GPS Elevation	GPS Date	Seller
29.939125	-95.226234	58	10/29/2003	Not Purchasing

Source Number	Source Name (Activity Status)	Operational Status	Source Type	Depth	Tested GPM	Rated GPM
G1011462C	3 - 1501 WILSON PARK CT (A)	P	G	445	190 GPM	188 GPM

Drill Date	Source Summary			
01/01/1913	CHICOT			
GPS Latitude (decimal)	GPS Longitude (decimal)	GPS Elevation	GPS Date	Seller
29.939251	-95.226189	58	10/29/2003	Not Purchasing

(Inactive/Offline Sources)

SourceNumber	Name	Status	Depth

Code Explanations
Monitoring Type Codes: (GW) GROUNDWATER , (GUP) GROUNDWATER UNDER THE INFLUENCE - PURCHASED , (SWP) SURFACE WATER - PURCHASED , (GU) GROUNDWATER UNDER THE INFLUENCE OF SURFACE WATER , (N) NO SOURCES , (SW) SURFACE WATER
Activity Status Codes: (A) ACTIVE , (D) DELETED/DISSOLVED , (I) INACTIVE , (P) PROPOSED ,
Operational Status Codes: (E) EMERGENCY , (I) INTERIM/PEAK (O) OTHER , (P) PERMANENT , (S) SEASONAL
Source Types: (G) GROUND WATER , (S) SURFACE WATER , (U) GROUND WATER UNDER THE INFLUENCE

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – A BETTER APPROACH

Cross-referencing the public water supply databases with other publicly-available databases can provide information about well construction, soil conditions, bedrock, and other characteristics that are important in assessing likelihood of impact from a release.

Drilling End Date	3/9/1970
Drilling Method	Mud (Hydraulic) Rotary
Borehole Completion	Gravel Pack w/Perforations

Other Well Number	
Previous State Well Number	
Reporting Agency	Texas Water Development Board
Created Date	7/20/1995
Last Update Date	

Remarks	Owners well #1. Cemented from 0 to 306 feet. Well is also gravel packed.

Casing

Diameter (in.)	Casing Type	Casing Material	Schedule	Gauge	Top Depth (ft.)	Bottom Depth (ft.)
6	Blank	Steel			0	306
3	Blank	Steel			291	306
3	Screen	Steel			306	321

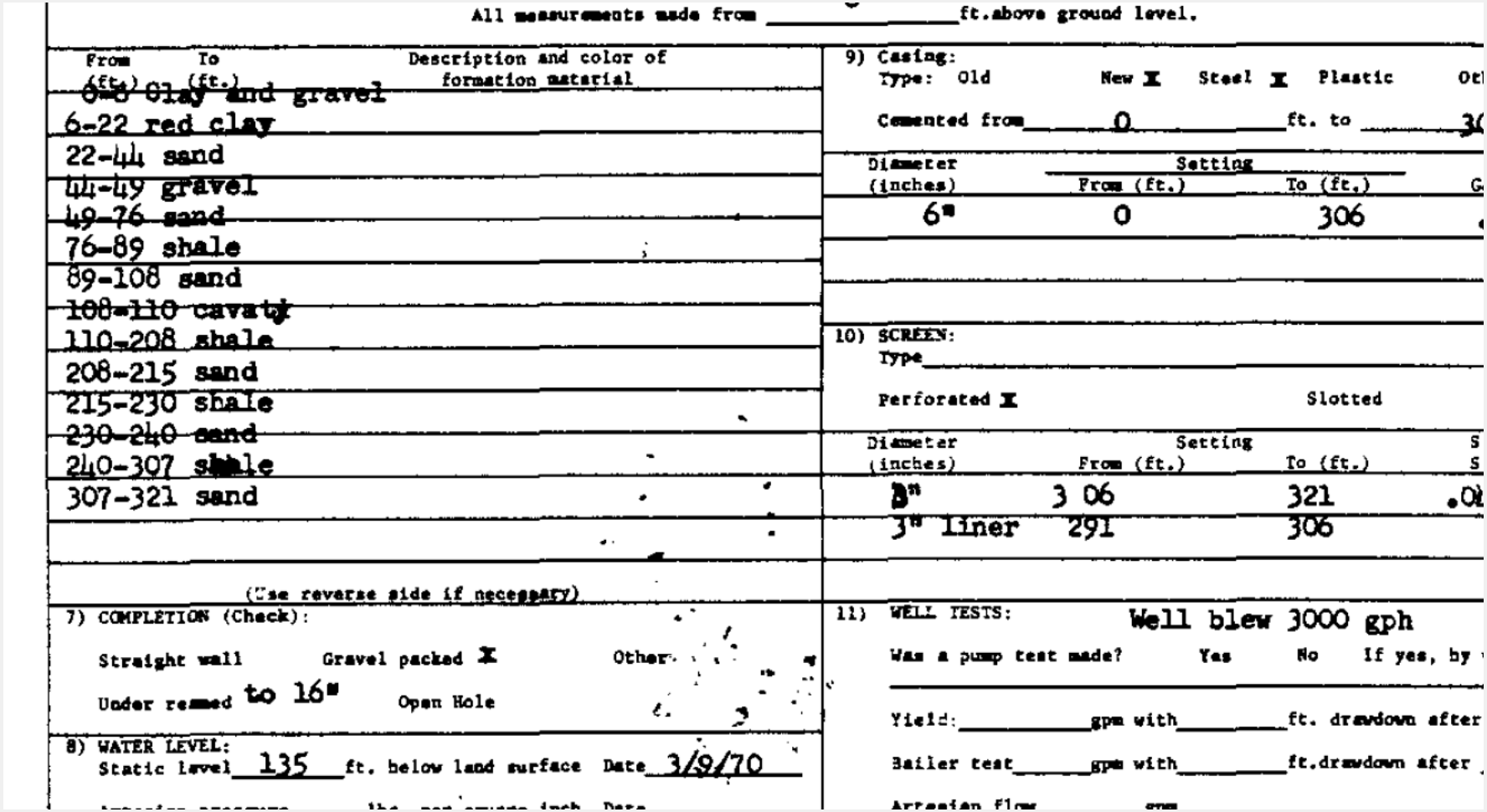
Well Tests - No Data

Lithology - No Data

Annular Seal Range - No Data

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH



All measurements made from _____ ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0-6	clay and gravel	
6-22	red clay	
22-44	sand	
44-49	gravel	
49-76	sand	
76-89	shale	
89-108	sand	
108-110	cavity	
110-208	shale	
208-215	sand	
215-230	shale	
230-240	sand	
240-307	shale	
307-321	sand	

(Use reverse side if necessary)

7) COMPLETION (Check):
Straight wall Gravel packed X Other
Under reamed to 16" Open Hole

8) WATER LEVEL:
Static level 135 ft. below land surface Date 3/9/70

9) Casing:
Type: Old New X Steel X Plastic Oth
Cemented from 0 ft. to 30

Diameter (inches)	Setting From (ft.)	To (ft.)	G
6"	0	306	

10) SCREEN:
Type
Perforated X Slotted

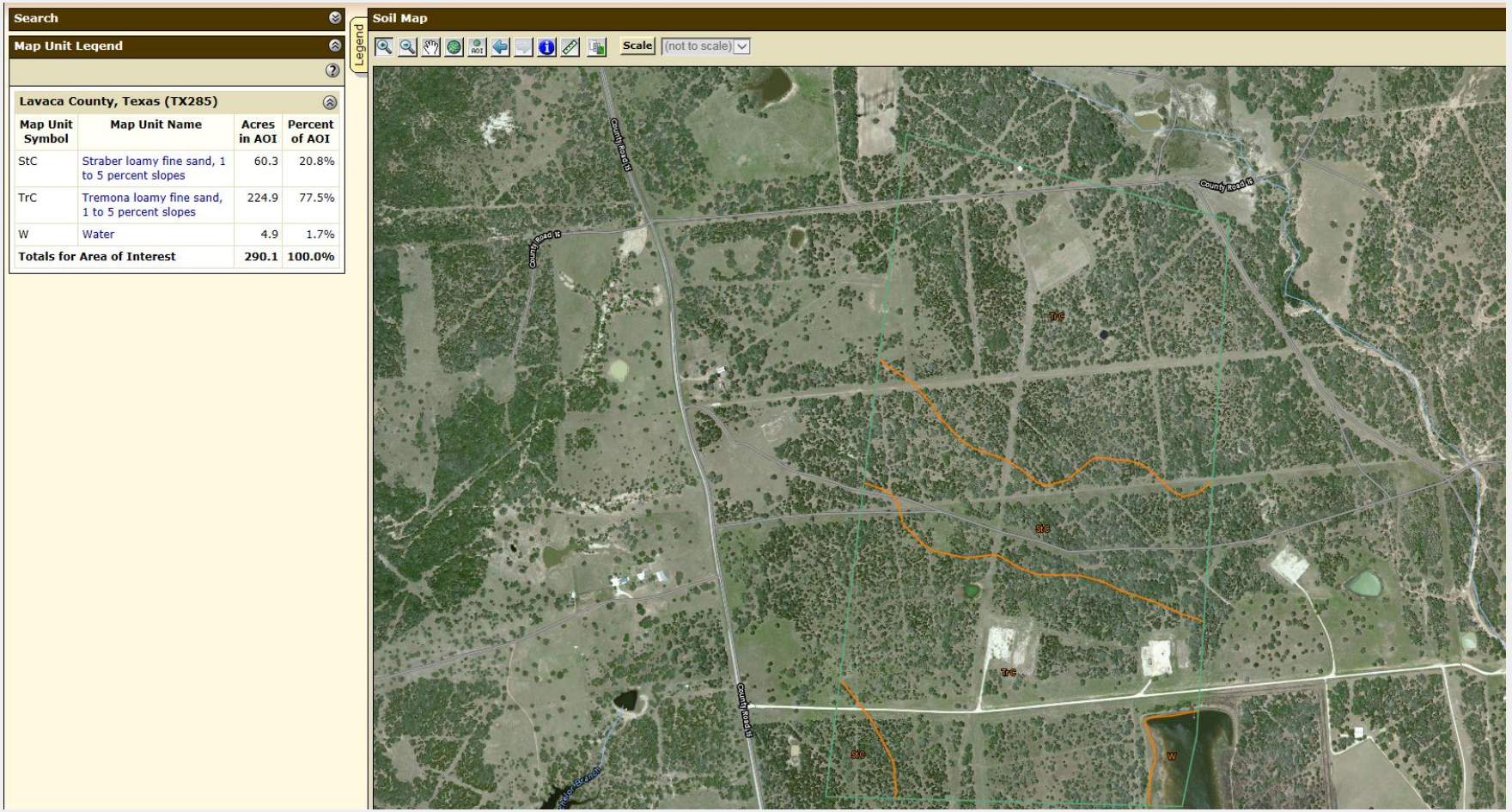
Diameter (inches)	Setting From (ft.)	To (ft.)	S S
3"	306	321	.0
3" liner	291	306	

11) WELL TESTS: Well blew 3000 gph
Was a pump test made? Yes No If yes, by
Yield: _____ gpm with _____ ft. drawdown after
Bailer test _____ gpm with _____ ft. drawdown after
Artesian flow gpm

Well geology and construction

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH

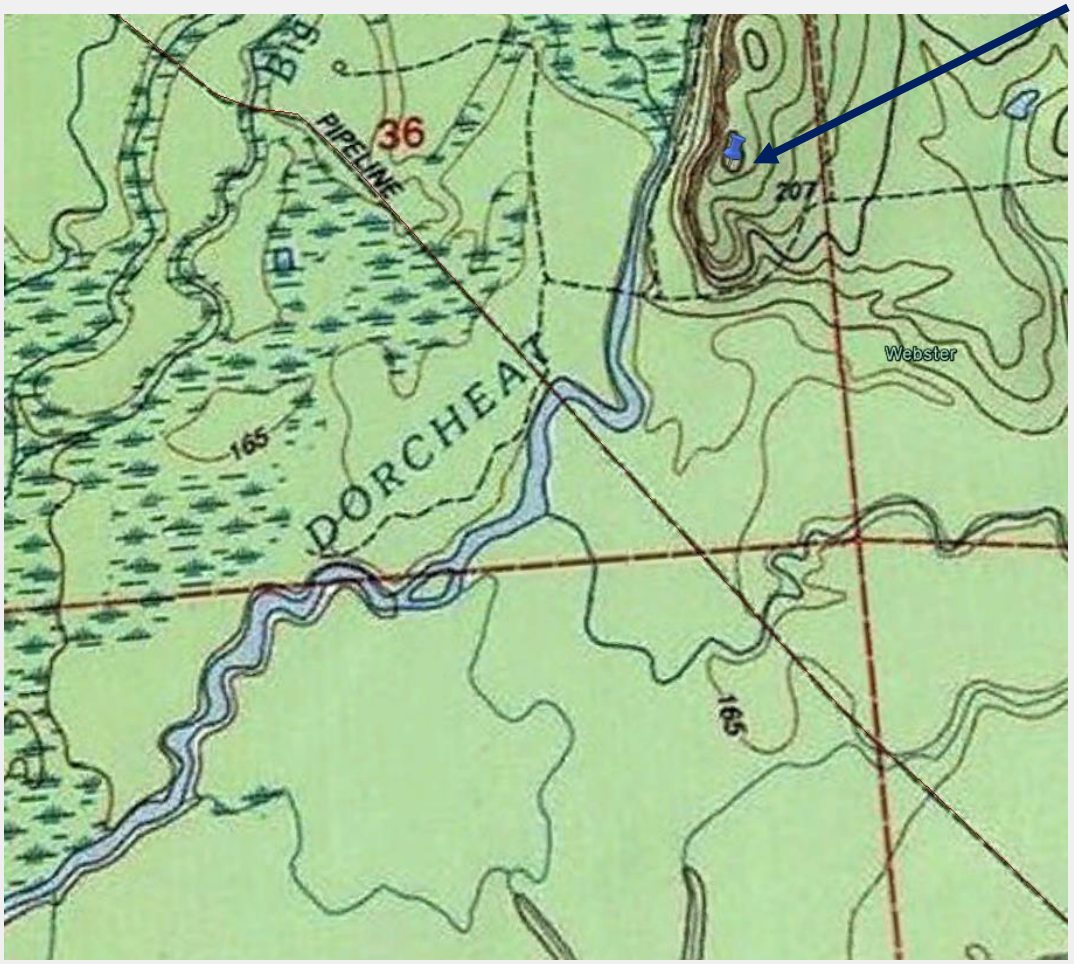


Area soil, bedrock geology, groundwater depth and flow . . .

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH

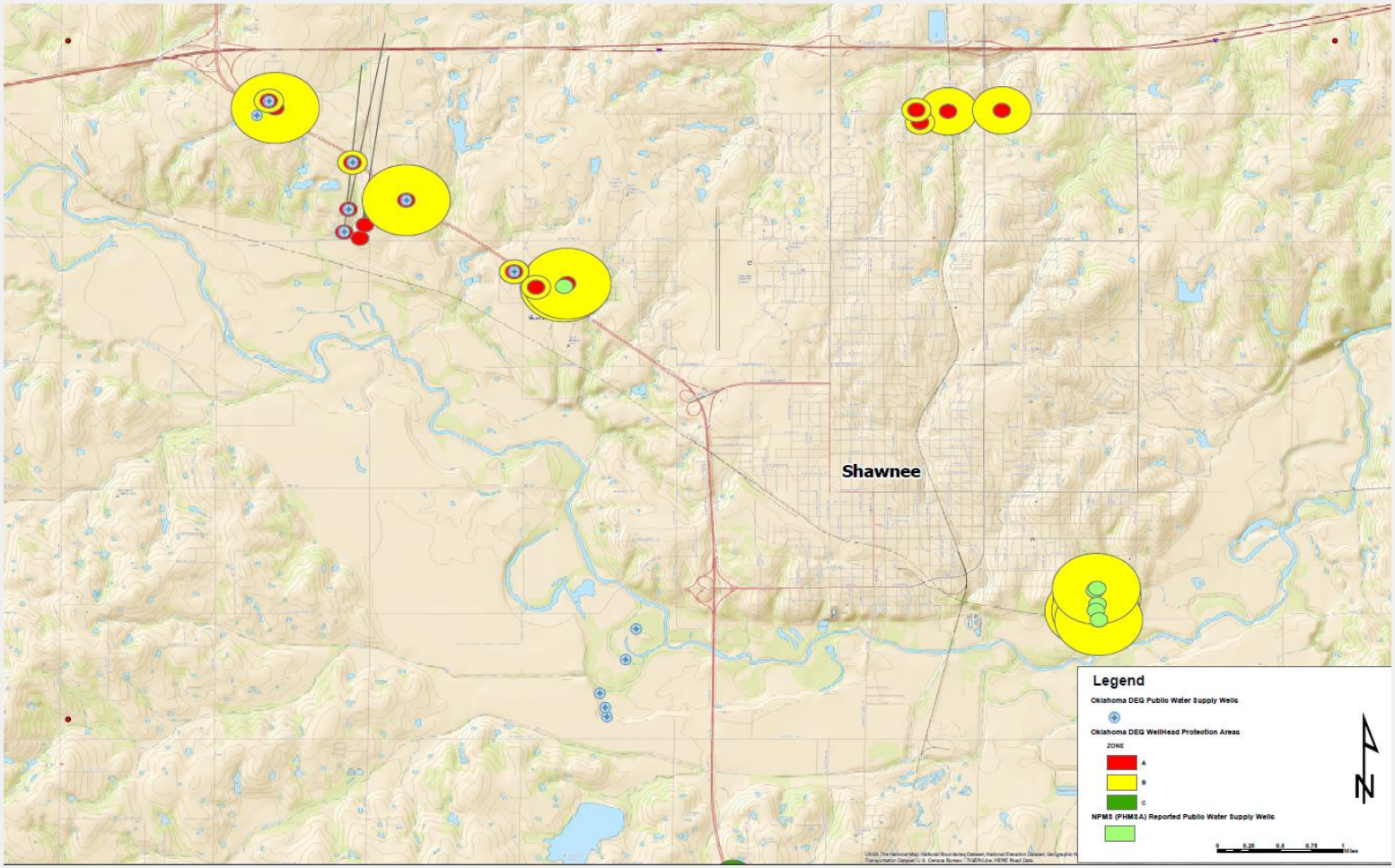
Current public water supply data can be accurately plotted and data about the water supply engineering, construction, and surrounding 3-D physical setting can be stored as attributes in GIS.



Well geology and construction

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – A BETTER APPROACH

Some states have well developed SWPAs/WPAs:



HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH

- For states that do not have well-developed SWPAs/WPAs, well construction and environmental data can be used to calculate risk-based protection areas/buffer zones, and buffer zones are used to construct USA polygons.
- A 60’ deep, uncased well in unconfined sand should have a larger protection area than a 600’ deep, cased well that has 200 feet of impermeable rock above the aquifer!

Depth to First Screen		Cased?		Cemented and/or sealed?		100' of at least 20'-thick impermeable zones above seal (verified)?		At least two 20'-thick impemeable zones above seal (verified)?		At least one 10' thick impermeable zone above seal (verified)?		Buffer Zone Diameter
218	400	Yes	0	Yes	0	Yes	0	Yes	0	Yes	0	400
365	400	Yes	0	Yes	0	No	200	Yes	0	Yes	0	600
500	300	Yes	0	Yes	0	No	200	Yes	0	Yes	0	500
150	500	Yes	0	Yes	0	No	200	No	200	No	400	1300
575	300	Yes	0	Yes	0	No	200	Yes	0	Yes	0	500
180	500	Yes	0	No	200	No	200	No	200	No	400	1500
256	400	Yes	0	No	200	No	200	Yes	0	Yes	0	800
389	400	Yes	0	Yes	0	No	200	Yes	0	Yes	0	600
320	400	Yes	0	Yes	0	No	200	No	200	No	400	1200

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)
MANAGING DOLLARS AND SENSE – A BETTER APPROACH

Incorrectly plotted/identified NPMS drinking water data can also be plotted, stored, and explained in GIS attribute tables .

TABLE 1: POTENTIAL UNUSUALLY SENSITIVE AREAS

PHMSA-IDENTIFIED PUBLIC WATER SUPPLIES: DEFUNCT

ngitude	Interpretation
6.805938°	Not a PWS, per ODEQ. No groundwater wells (public, domestic, irrigation, or other) are mapped at this location, and there is no surface water body at the location.
7.389058°	May be recharge area, but is upslope of pipeline. Not USA
6.933695°	No longer PWS
6.605949°	No longer PWS
6.600793°	No longer PWS
6.608683°	No surface water body or permitted groundwater well is located here, and ODEQ does not list a PWS or WHPA in this vicinity.
6.878309°	PHMSA plots this as a PWS SWI, but it is not. According to ODEQ, it is a WHPA, with a discrete radius.
6.877426°	May be recharge area. It is across drainage divide from pipeline. Not USA.
7.291965°	No longer PWS
7.046066°	No longer PWS
6.379378°	This is part of the Walnut Creek drainage basin, completely different and separated from the Okemah Lake PWS drainage basin. The small reservoirs in this area are not PWS lakes and are therefore not DW USAs.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – A BETTER APPROACH

USAs which would not be impacted because of topography, groundwater flow direction, water supply construction characteristics, or other reasons can be explained in GIS attribute tables.

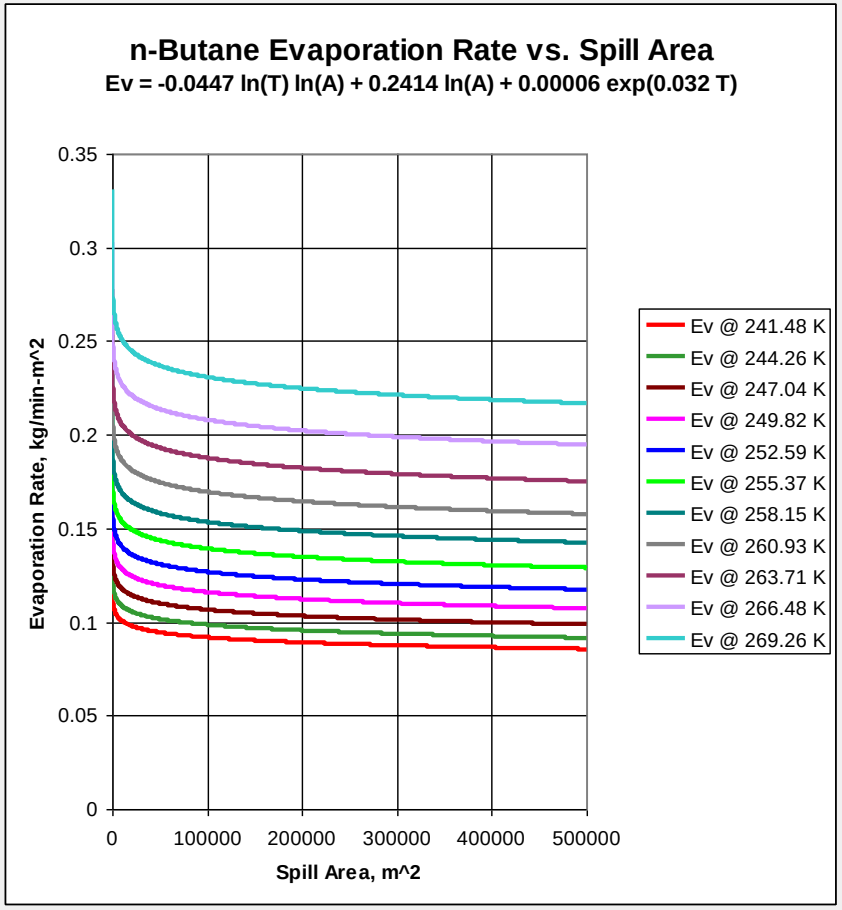
-96.514643°	The SWI for the PWS is > 9 miles downstream from the pipeline, and a damned reservoir is located downstream of the pipeline and upstream of the PWS.
-96.323872°	A pipeline release could potentially drain into the Walnut Creek drainage basin, completely different and separated from the Okemah Lake PWS drainage basin. The small reservoirs in this area are not PWS lakes and are therefore not DW USAs. There are also numerous apparent weirs between the pipeline and PWS SWI.
	Pipeline crosses drinking water supply

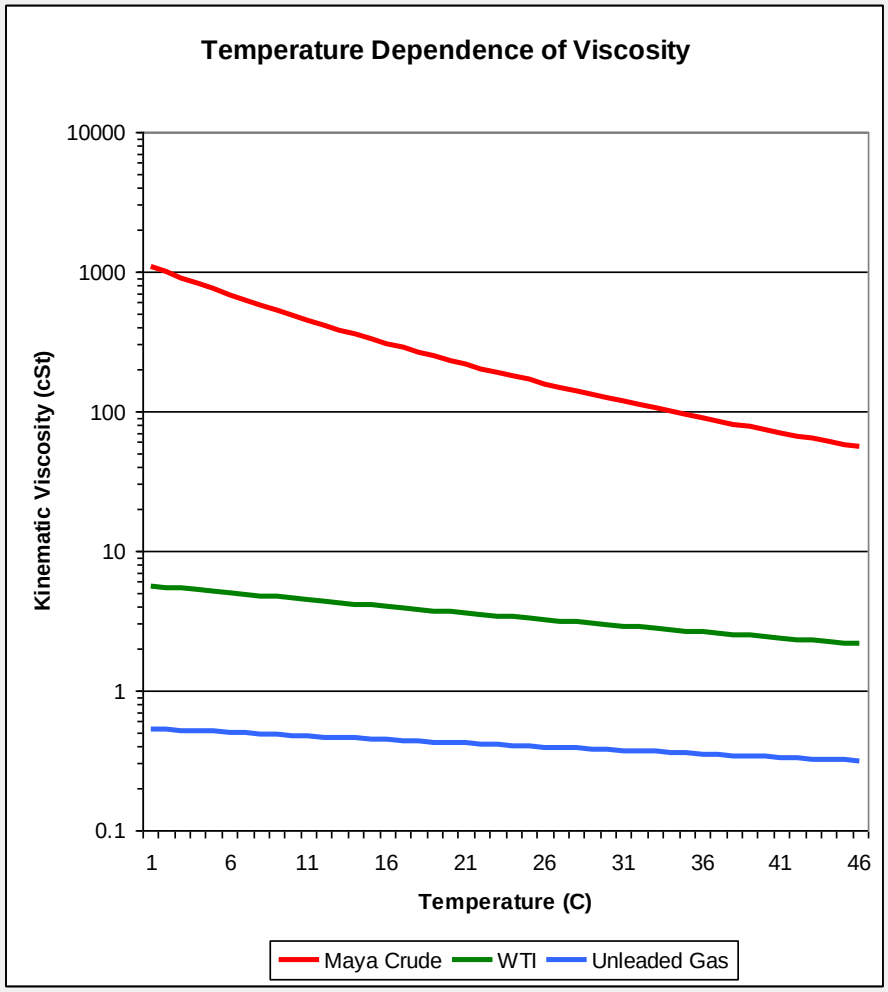
The result of these efforts is a drinking water USA data set that:

- Contains current public water supply information,
- Excludes inaccurate information,
- Has criteria for exclusion of inaccurate information tied to the appropriate data points,
- Identifies USAs which would not be impacted by worst-case pipeline releases and has justifications for "no impact" characterization attached to the data points.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – PIPELINE CONTENTS MATTER TOO!





HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – CONCLUSIONS

- USAs are public water supply and ecological resource areas, afforded special protection as HCAs under liquid pipeline regulations (49 CFR 195).
- Three HCA truths:
  1. Requisite protection of HCAs cost money.
  2. Protecting misidentified HCAs is a waste of money.
  3. Not correctly identifying HCAs = exposure to risk & liability.
- Almost all industry-standard USA analyses utilizes NPMS data, which is not current and contains known inaccuracies.
- NPMS USA data include large, arbitrary buffer zones, resulting in relatively large amounts of HCA-designated pipeline.

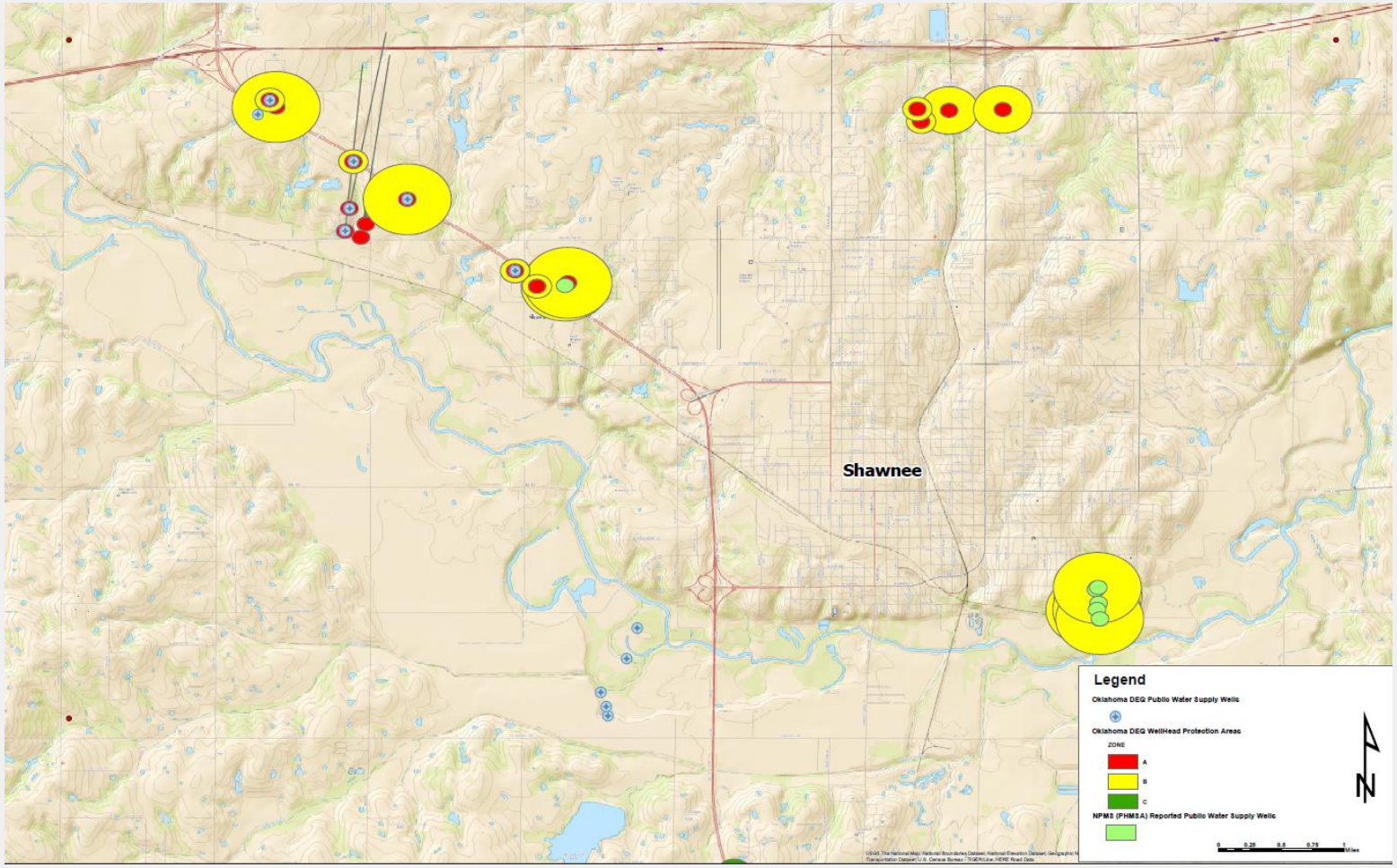
HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE – CONCLUSIONS

- A better process is built upon integrating current, publicly-available data about USAs.
- Inaccurate NPMS USA data is easily identifiable, and justification for exclusion and/or revision should be available.
- Buffer zones around public water supply and ecological resources can be defined using science-based algorithms.
- Model impacts to HCAs with actual product characteristics.
- This process and resultant HCA maps have received accolades from pipeline and environmental regulatory agencies.
- The process typically results in:
  - ✓Identification of USAs that traditional analyses miss, and
  - ✓An overall reduction of HCA-designated pipeline.

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE



Use precious $$ to protect real sensitive receptors—not bad data!

HCA ANALYSIS & UNUSUALLY SENSITIVE AREAS (USAs)

MANAGING DOLLARS AND SENSE