
Role of GIS and Data Integration in Effective Implementation of the CFR195.

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Sunoco Logistics

- MLP formed to acquire, own and operate refined product and crude oil pipelines and terminal facilities.
- Operates ~ 6000 miles of pipeline, not including joint venture pipelines.
 - ~ 2200 miles of refined product pipelines located in Northeastern and Midwestern states.
 - ~3800 miles of crude oil pipelines located principally in OK, TX.
- Operates a marine terminal in Nederland, TX
 - 17.8 million barrels of storage capacity

Sunoco Logistics System Map



Agenda

- What factors regulate a pipeline?
- How variations in factors affect regulations?
- Implementation Challenges- Why understand pipeline operations?
- Importance of GIS and Data Integration
- Solution to the problem
- Future developments

What factors regulate a pipeline?

- Types of the pipeline
- Proximity to HCA's
- Diameter and MOP (% SMYS) of the line
- Who regulates the pipeline
(Delineation b/w Federal & State Jurisdiction)

Types of the pipeline

Gathering line

- A pipeline with 8.625 inches or less in nominal outside diameter that transports petroleum from a production facility

Trunk line

- A line that is not a gathering line is a Trunk line

Proximity to HCA's

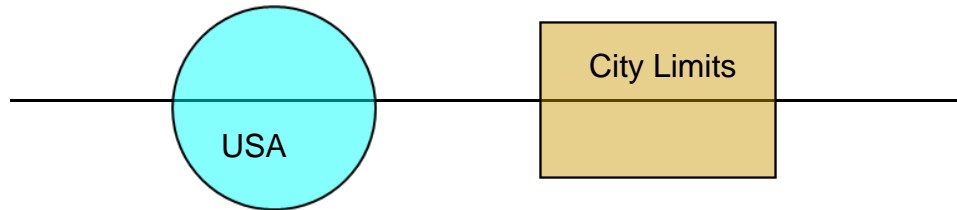
The DOT status of the line segment depends on

- **Direct impact:** Direct impact of the line with HPA, OPA and Navigable water ways.
- **Indirect Impact:** The **proximity**¹ of the line segment to the **unusually sensitive areas**² (USA's).

1. The proximity can be ¼ mile (gathering line) or ½ mile (Trunk line) to USA's .

2. Unusually sensitive areas (USA's) include both Drinking water and Ecological HCA's.

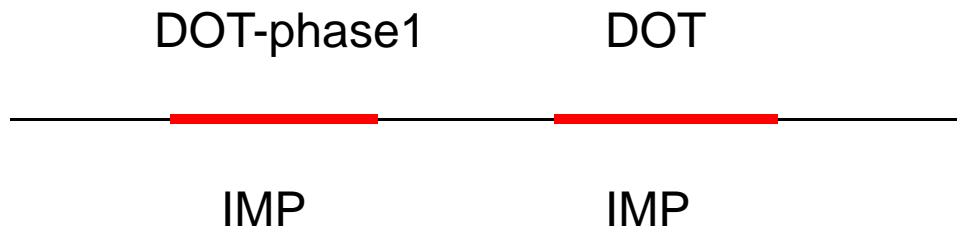
How variations in these factors affect regulations?



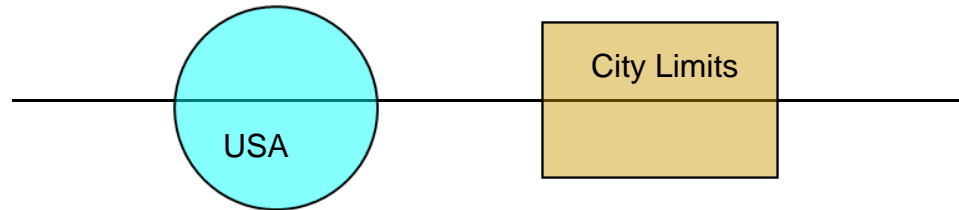
Trunk line

MOP < 20% smys

Diameter=8"



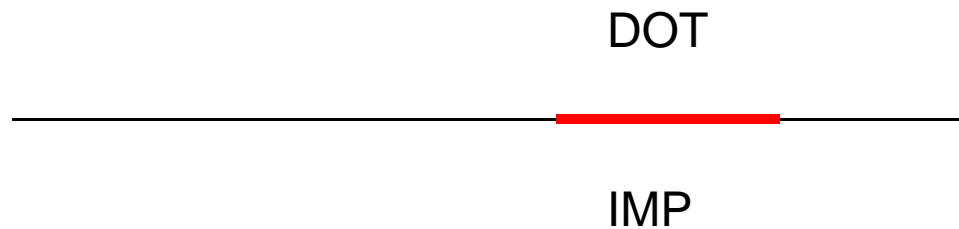
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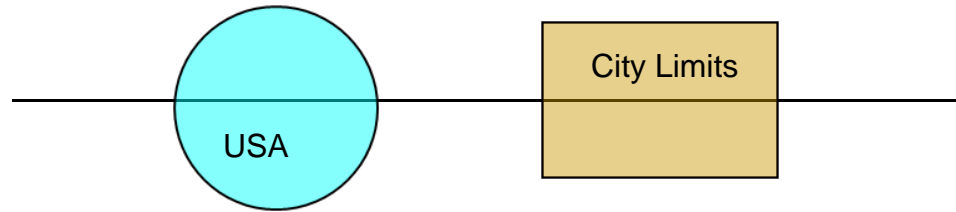
Trunk line

MOP < 20% smys

Diameter = 6"



How variations in these factors affect regulations?



Gathering line
MOP > 20% smys



Diameter = 8"

Not IMP

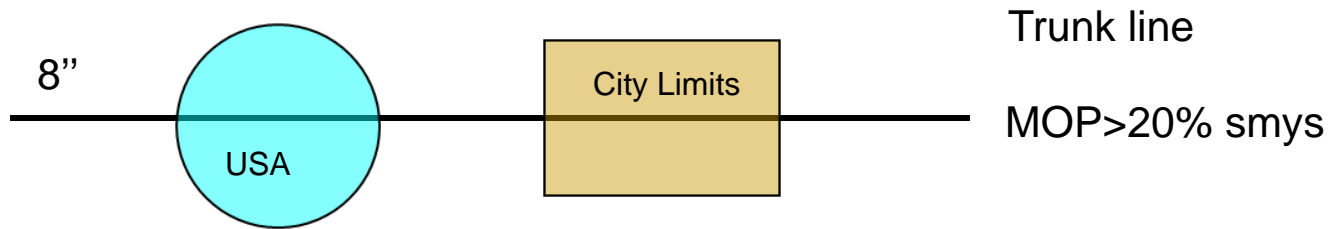
IMP



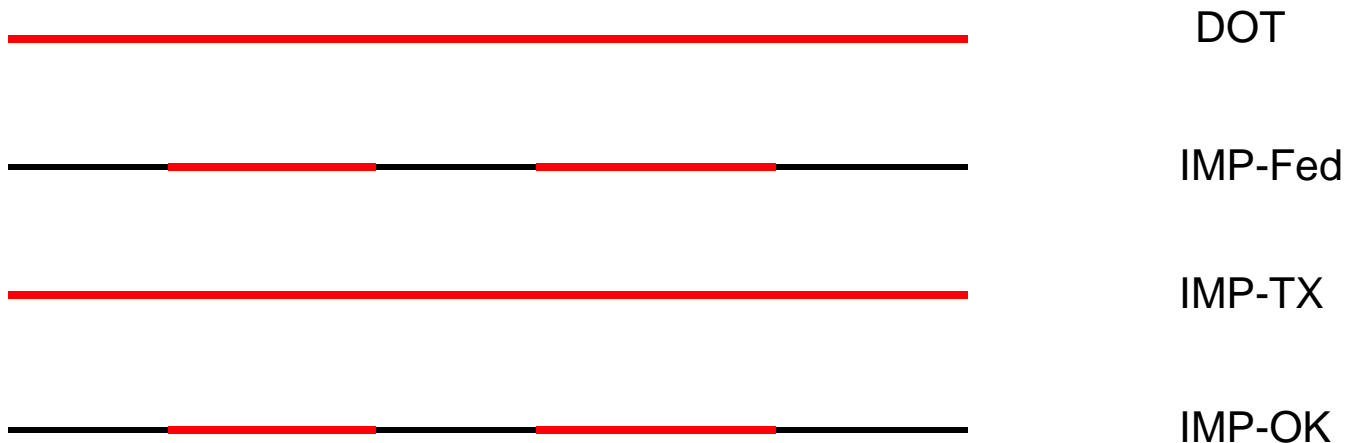
Diameter = 4"

How variations in these factors affect regulations?

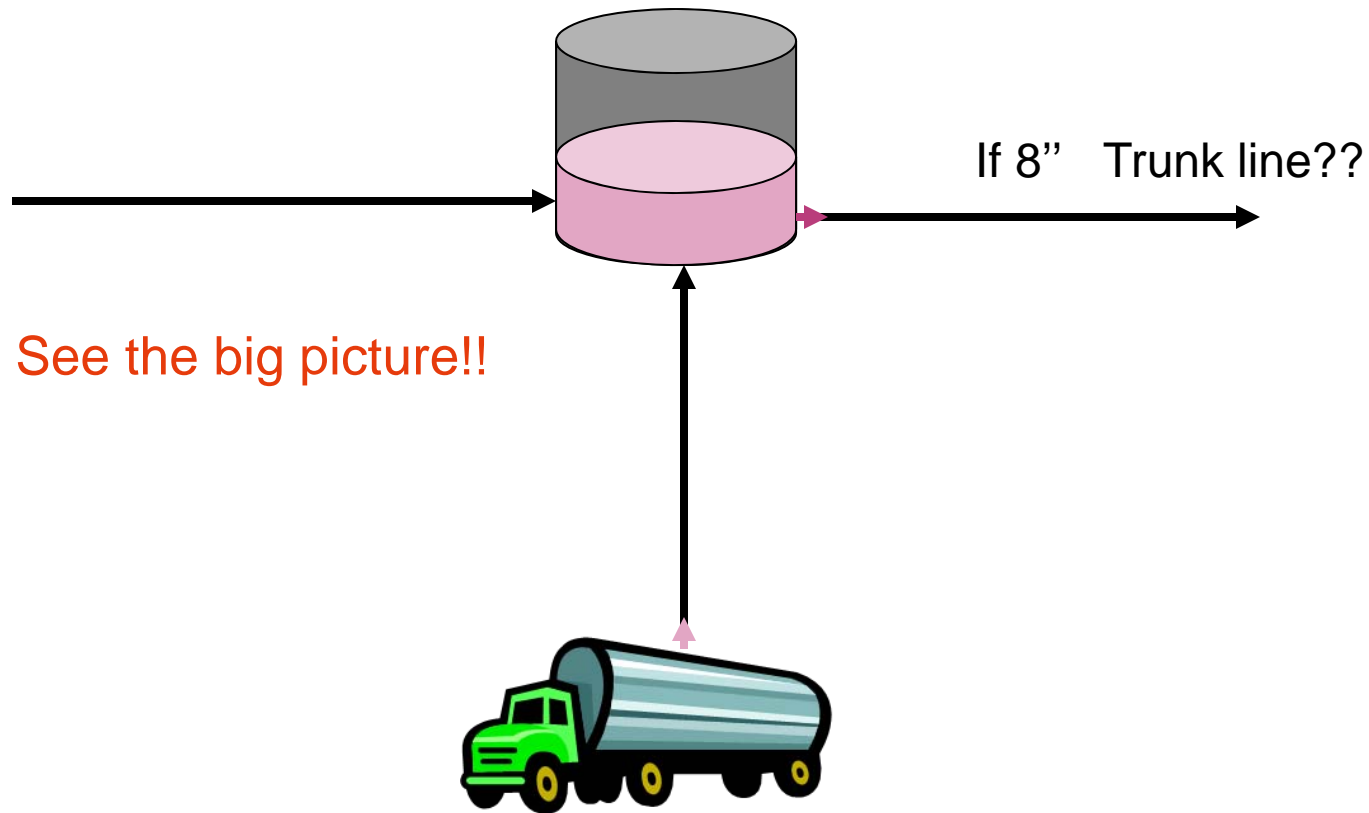
It is important to understand the delineation b/w Federal and State Jurisdiction.



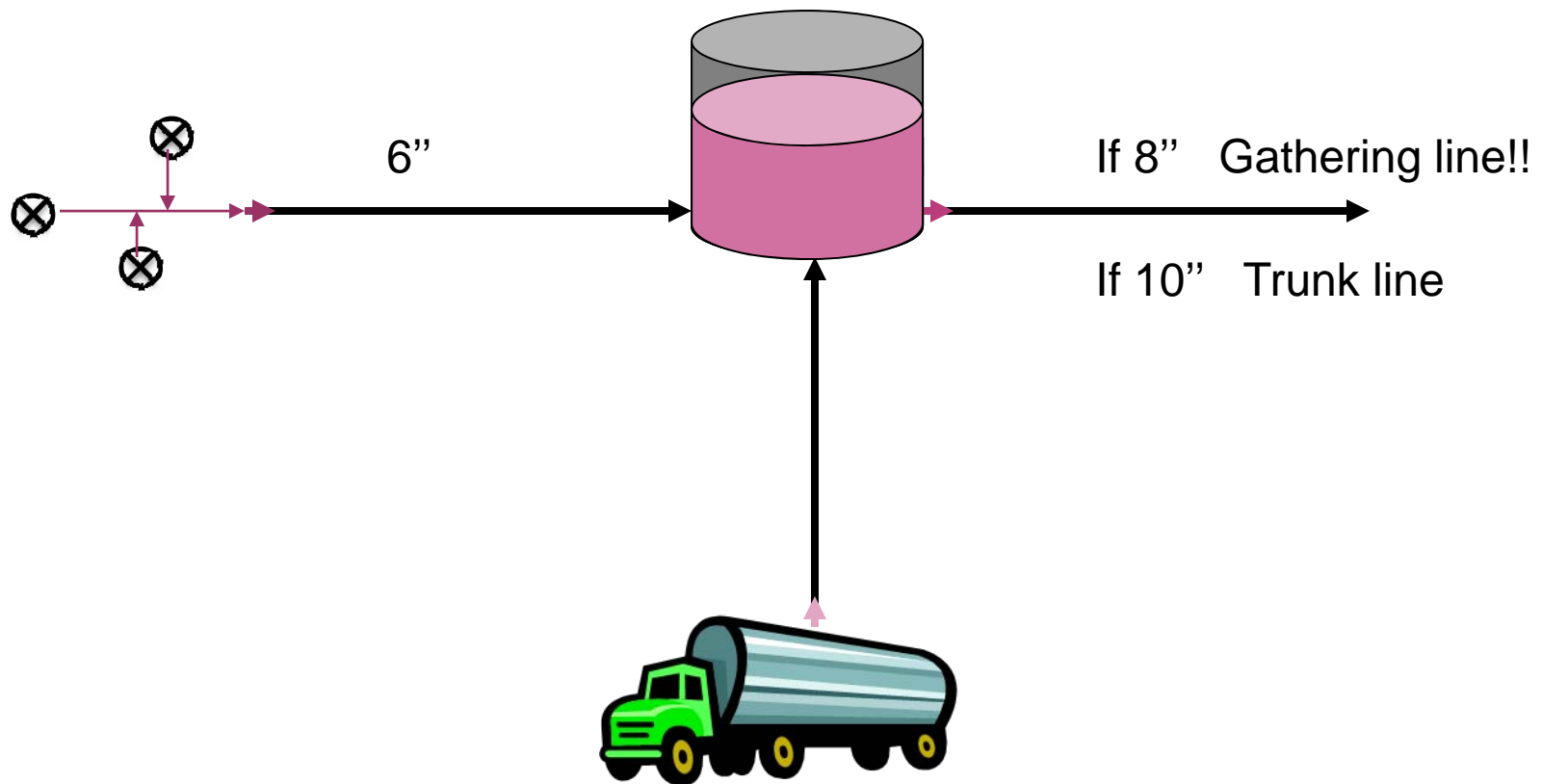
“A Certified State must adopt the same minimal standards but may adopt more stringent standards as long as they are compatible”



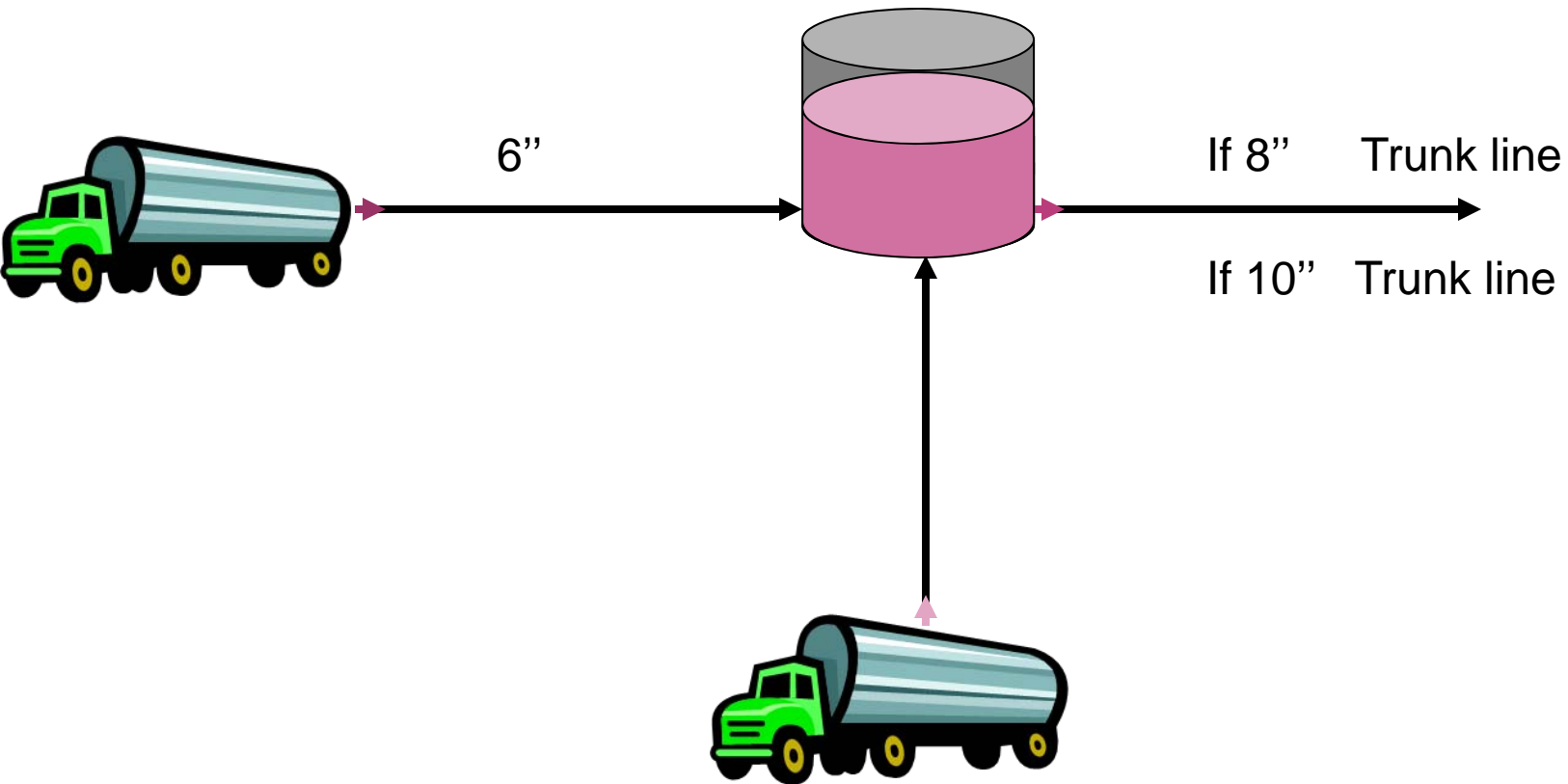
Why understand pipeline operations?



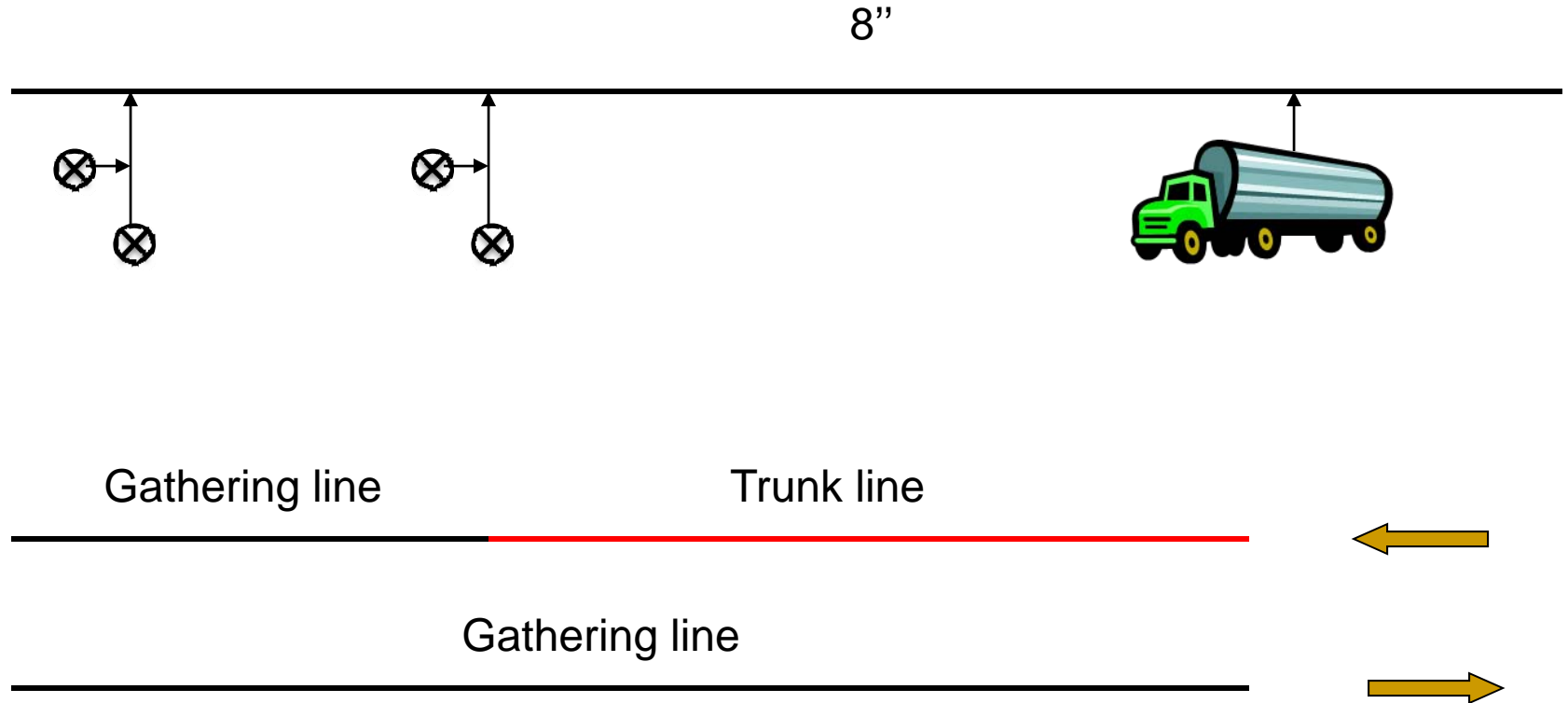
Why understand pipeline operations?



Why understand pipeline operations?



Why understand pipeline operations?



Importance of GIS and Data Integration

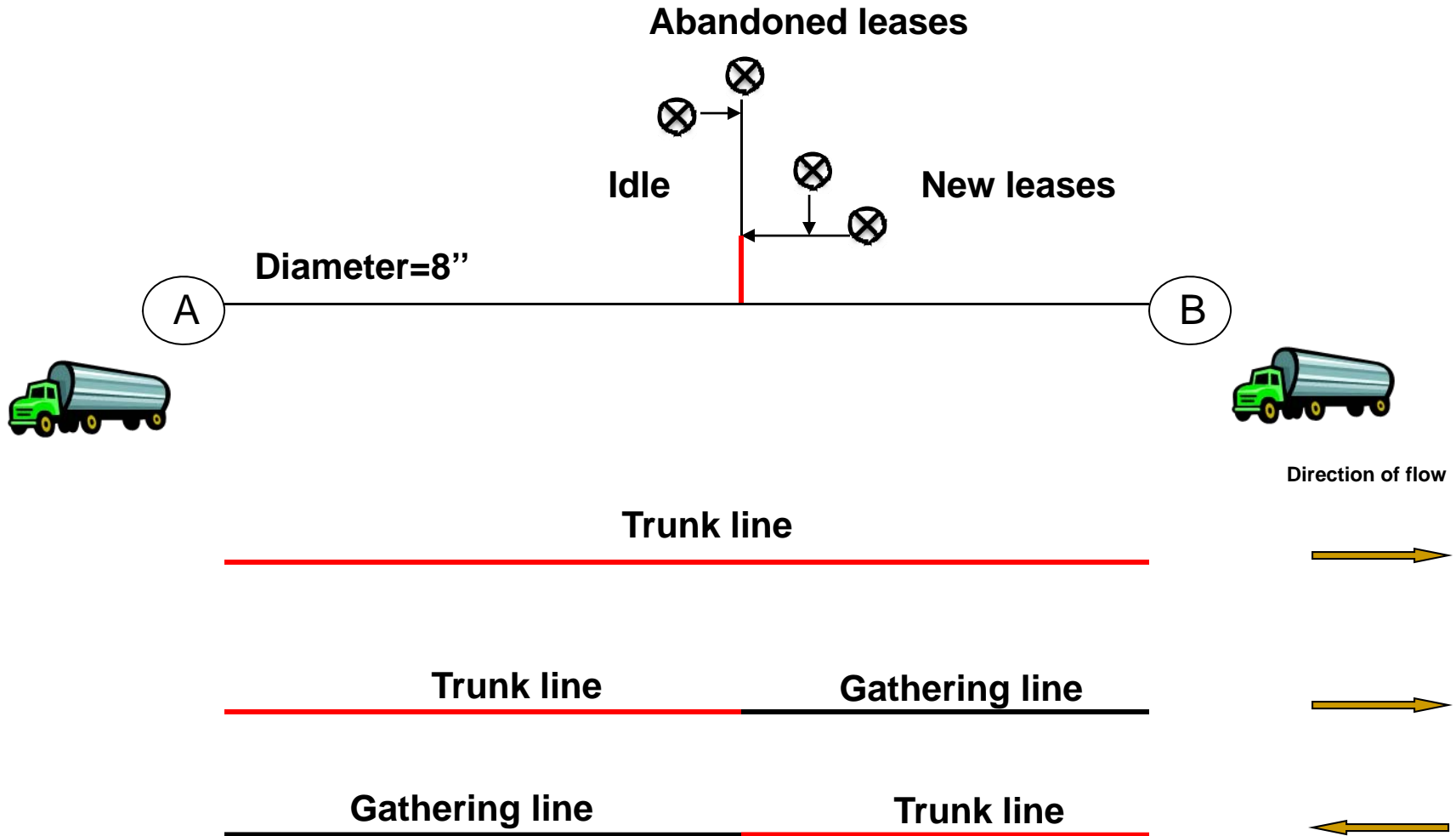


Variations in the factors

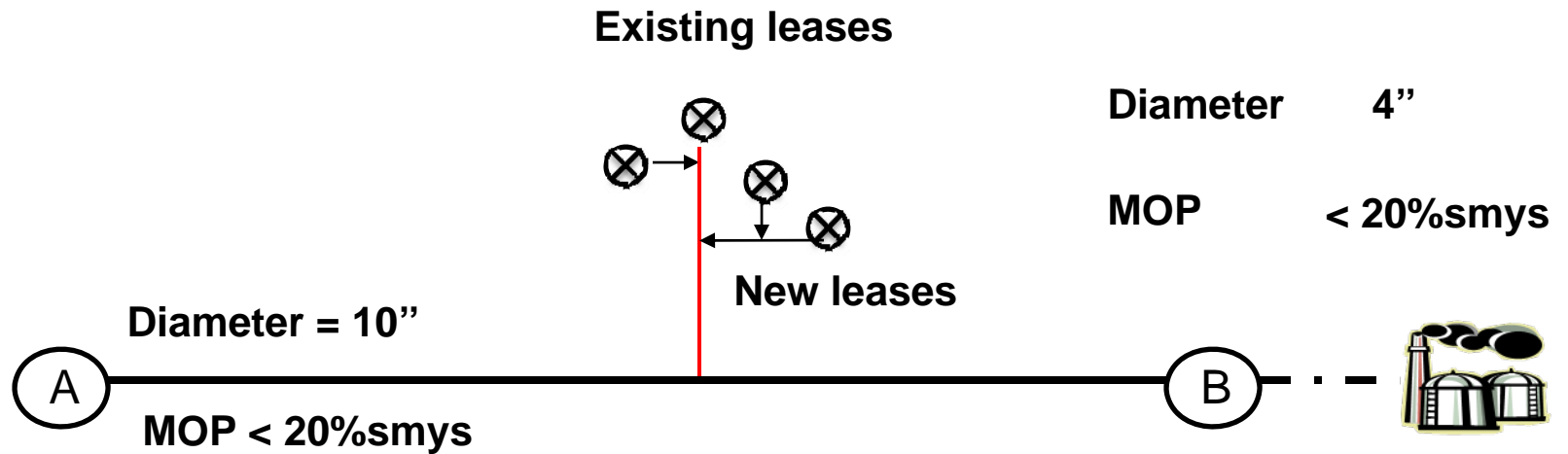
- What causes variations in these factors?

- Why is it important to capture these variations?

Business Scenario



Business Scenario



CASE-1		CASE-2		CASE-3	
Diameter	MOP	Diameter	MOP	Diameter	MOP
4	>20%SMYS	6	<20%SMYS	10	>20%SMYS

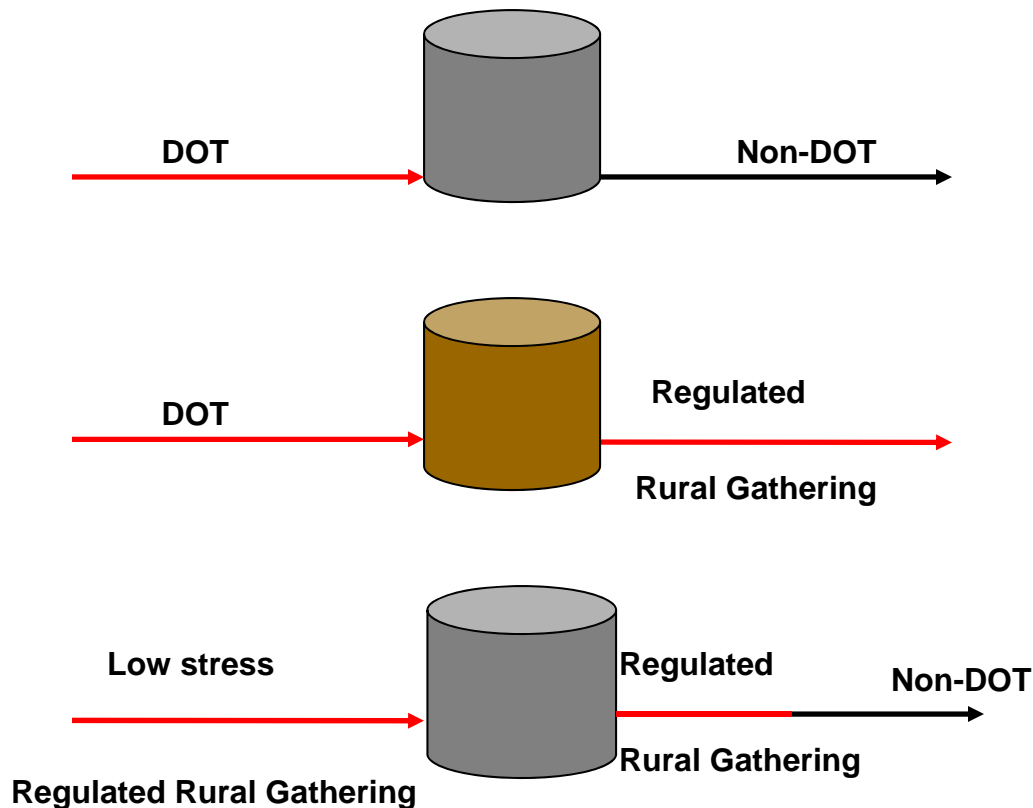
Challenge

Each of these groups is impacted differently by the regulations.

- Integrity Management
- Operations and Maintenance
- ROW
- Corrosion control
- Compliance Group

Importance of regulated segment identification

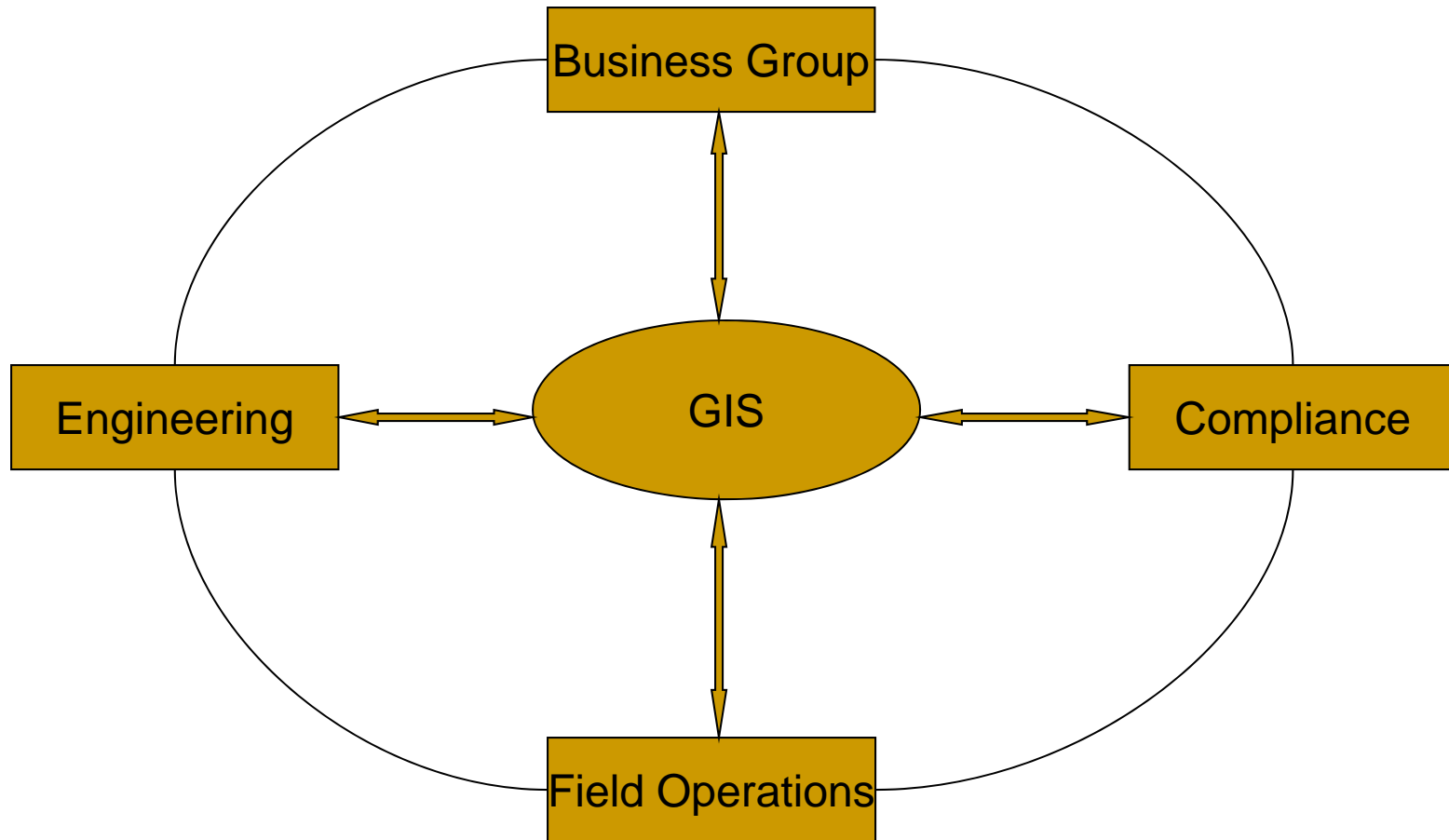
Tanks Scenario



Challenge

- What is the effective way to communicate the Fed/State jurisdictional status to the impacted groups without loss of details?

GIS and Data Integration



Solution

- Framed set of rules.
- Designed a standard template.
- Interpreted the 195 CFR Rules and created a flowchart.
- Automated the process (simulations).
- Applied the output to the GIS system.

Rules- Jurisdictional(DOT) status

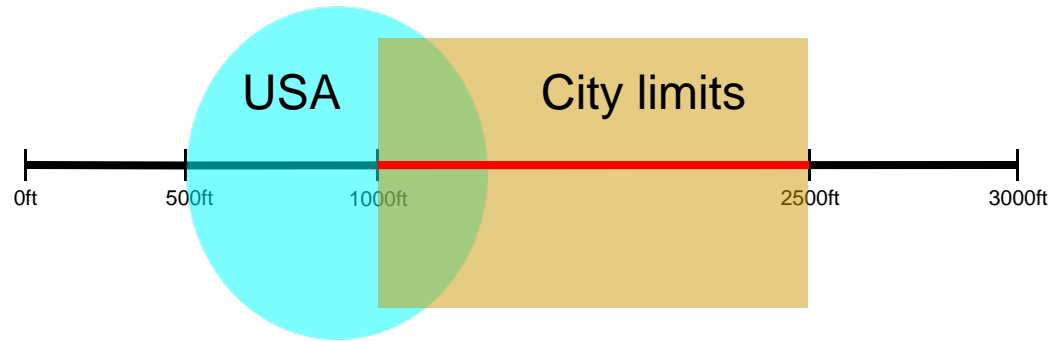
Pipeline should be classified into two basic (atomic) groups.

1. HCA segments:

- These segments must be associated with only **ONE** type of HCA at any given location.
- This can be achieved by the overlap rules.

2. NON-HCA segments

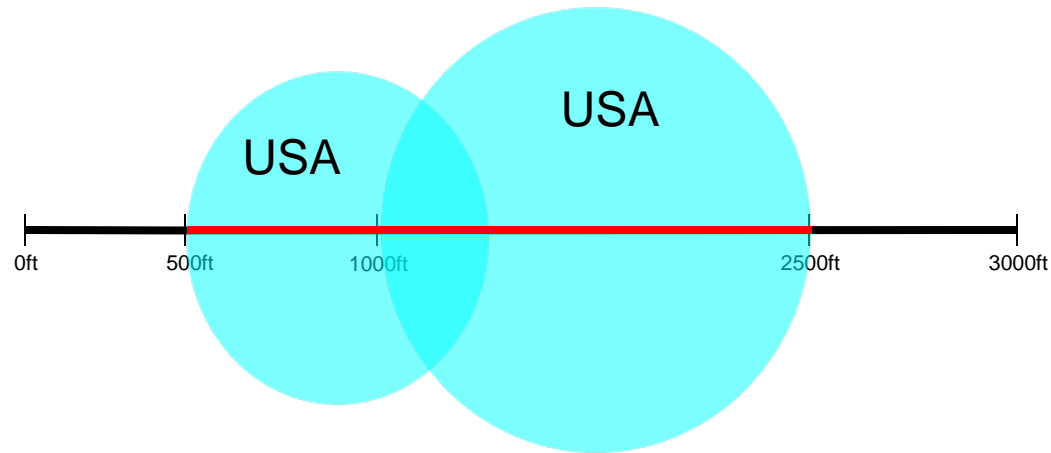
Overlap Rule-1



Beg Station	End Station	HCA
0	500	None
500	1000	USA
1000	2500	HPA
2500	3000	None

If city limits overlaps with USA → city limits prevails over the USA

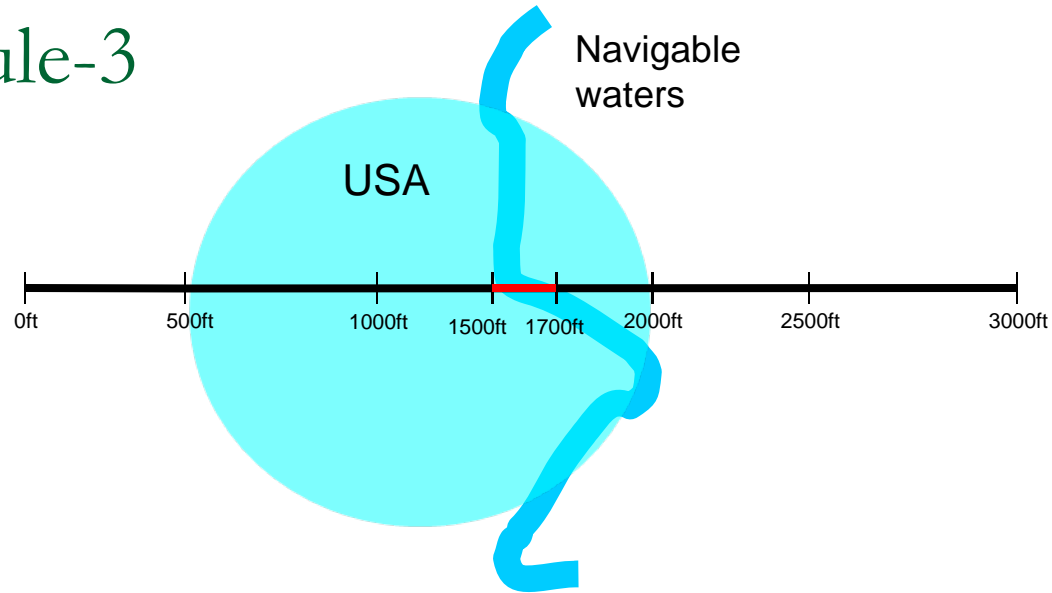
Overlap Rule-2



Beg Station	End Station	HCA
0	500	None
500	2500	USA
2500	3000	None

If two USAs overlap, then both the USAs are aggregated as **ONE** constant USA to determine the HCA segment

Overlap Rule-3



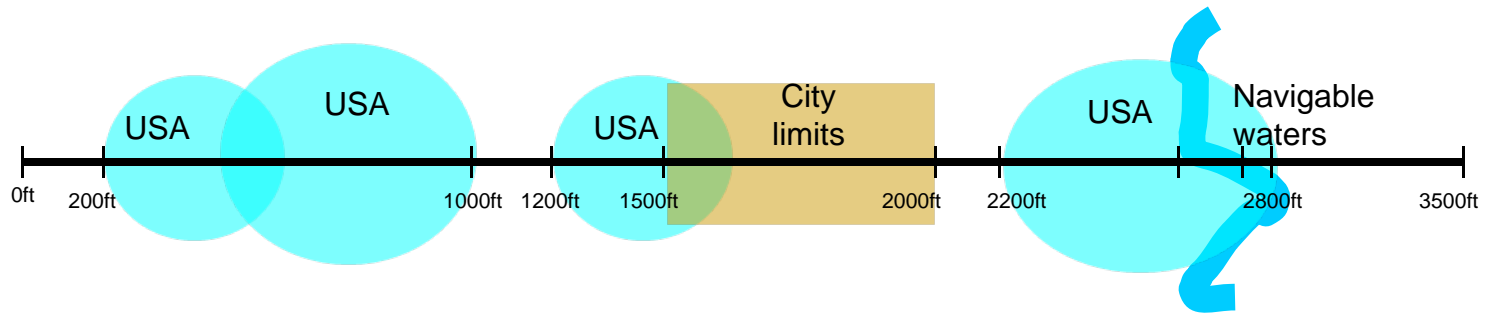
Beg Station	End Station	HCA
0	500	None
500	1500	USA
1500	1700	NW
1700	2000	USA
2000	3000	None

If USA overlaps with Navigable waters → Navigable waters prevails over USA.

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Jurisdiction Identification Template

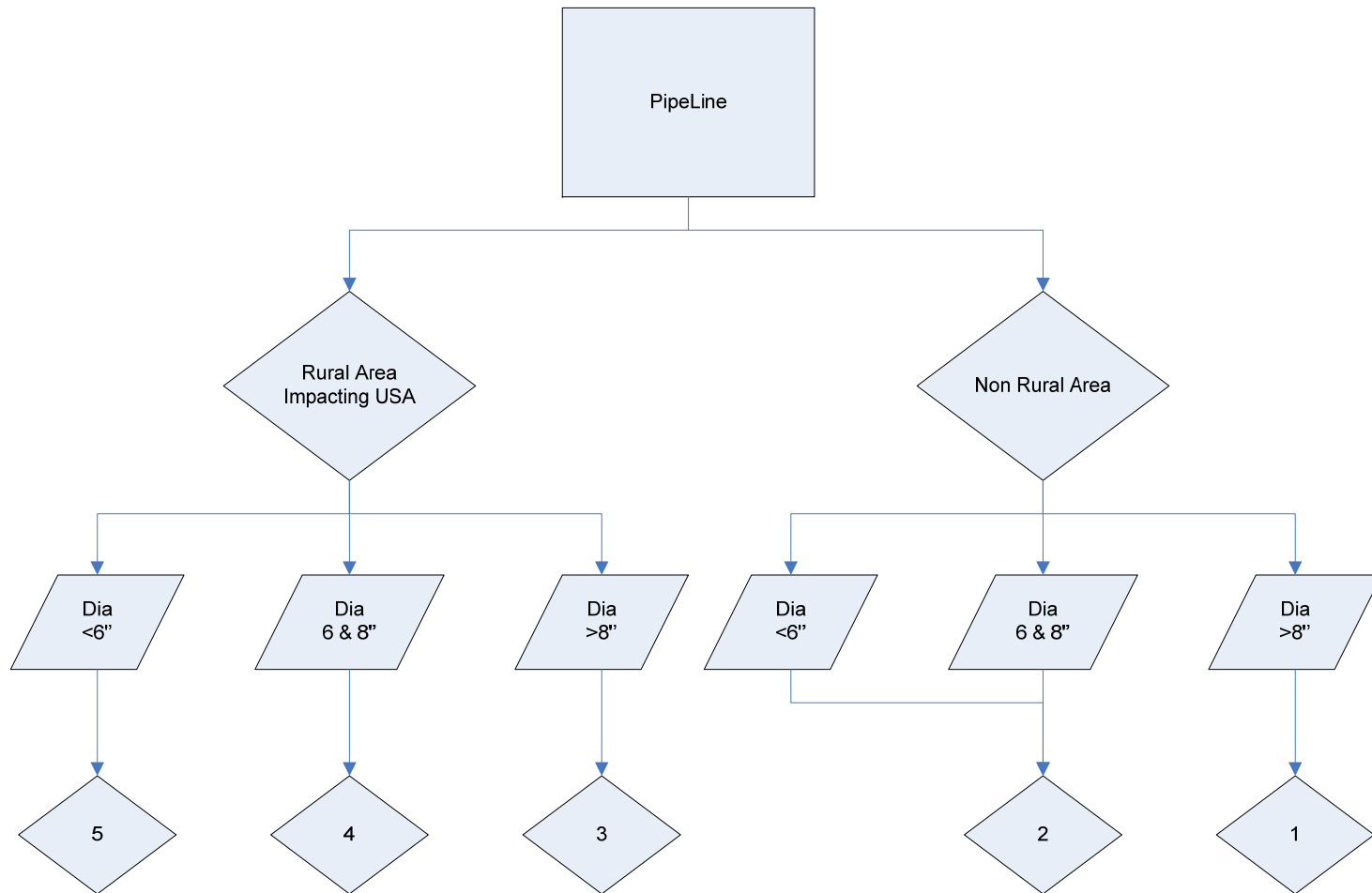


Pipe ID	Beg Sta	End Sta	HPA	OPA	NW	USA	None	Diameter	Line Type	%SMYS
1000	0	200	0	0	0	0	1	8	Gathering	22
1000	200	1000	0	0	0	1	0	8	Gathering	22
1000	1000	1200	0	0	0	0	1	8	Gathering	22
1000	1200	1500	0	0	0	1	0	8	Gathering	22
1000	1500	2000	1	0	0	0	0	8	Gathering	22
1000	2000	2200	0	0	0	0	1	8	Gathering	22
1000	2200	2500	0	0	0	1	0	8	Gathering	22
1000	2500	2700	0	0	1	0	0	8	Gathering	22
1000	2700	2800	0	0	0	1	0	8	Gathering	22
1000	2800	3000	0	0	0	0	1	8	Gathering	22

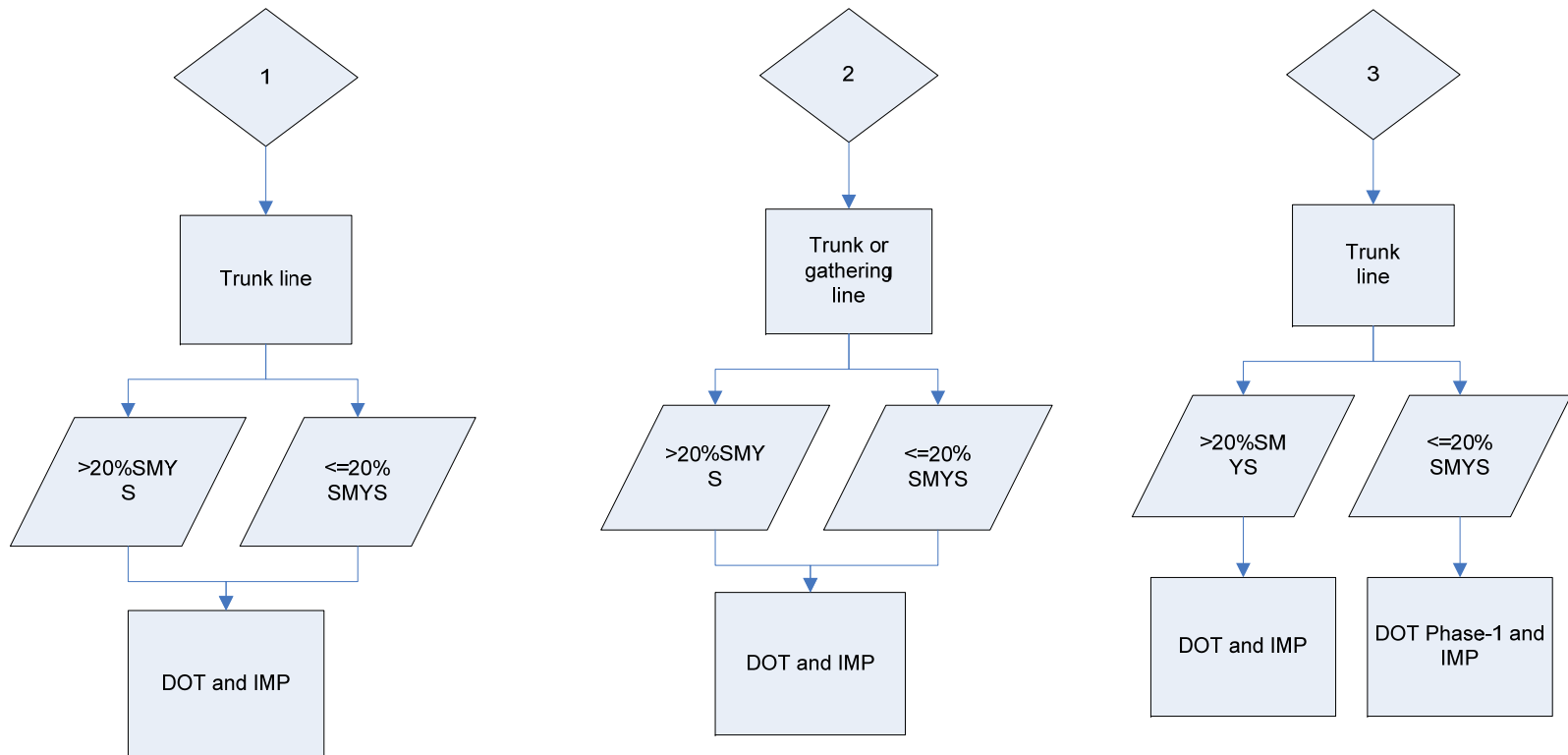
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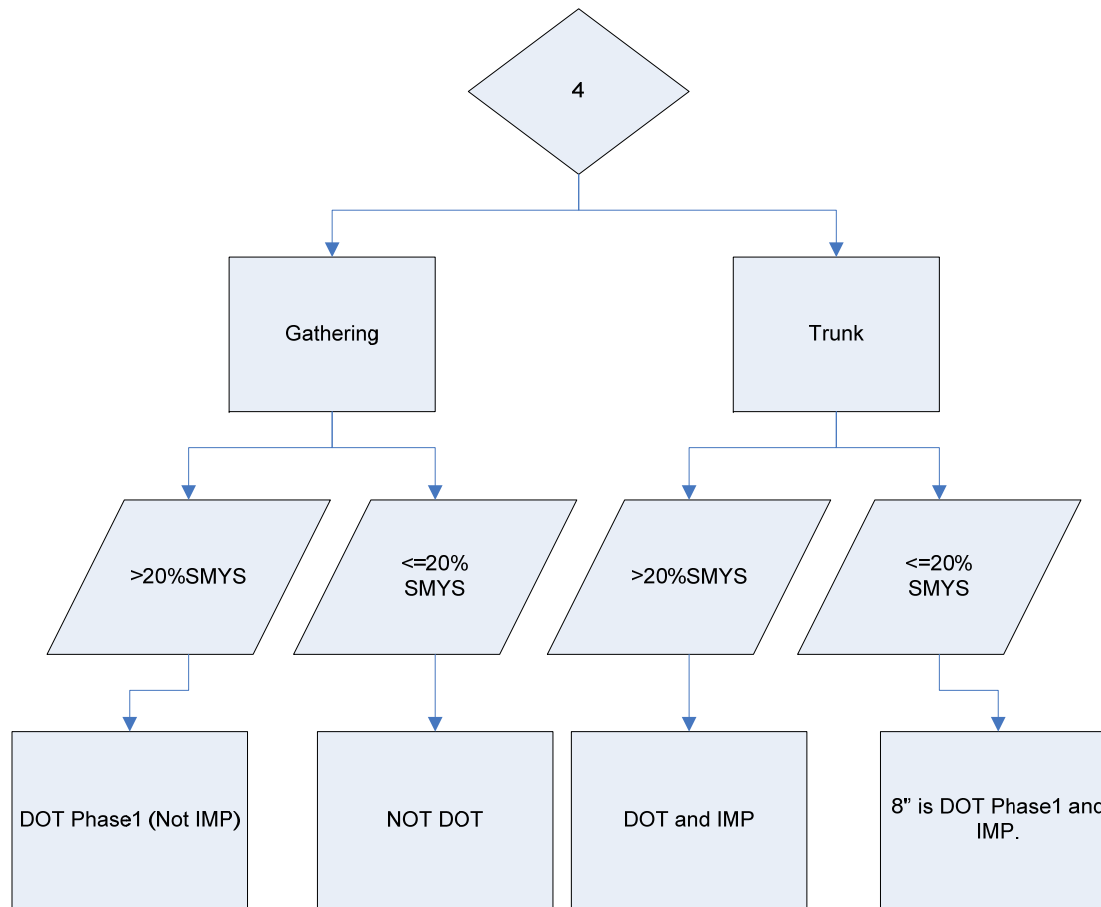
195CFR Rule Interpretation



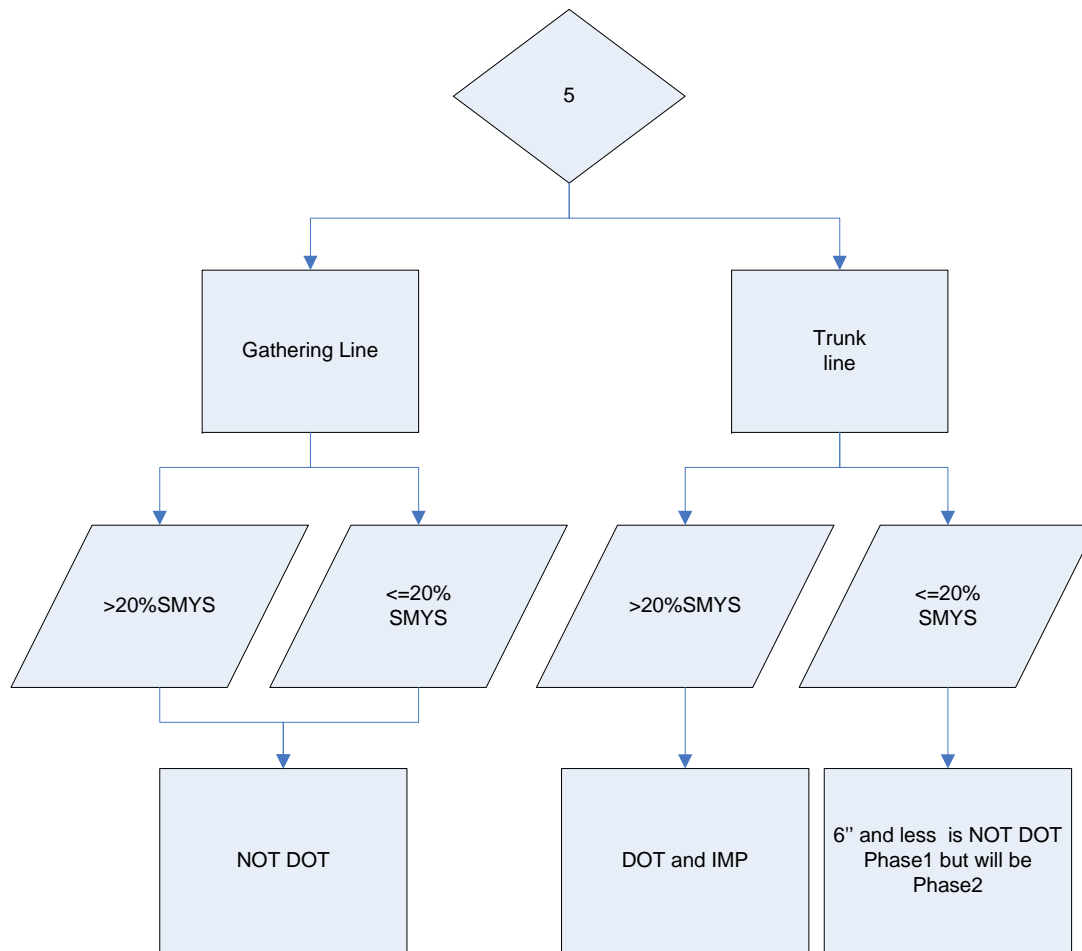
195CFR Rule Interpretation



195CFR Rule Interpretation



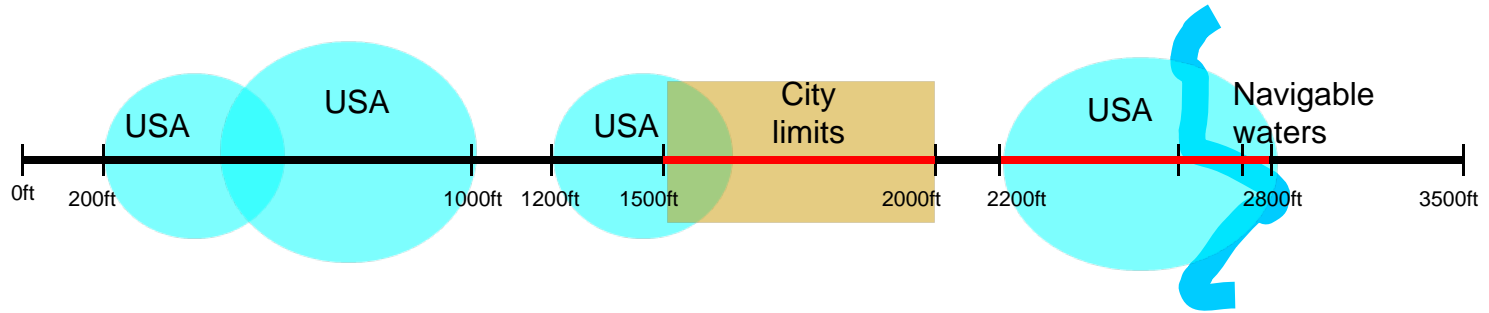
195CFR Rule Interpretation



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How the Algorithm Works?



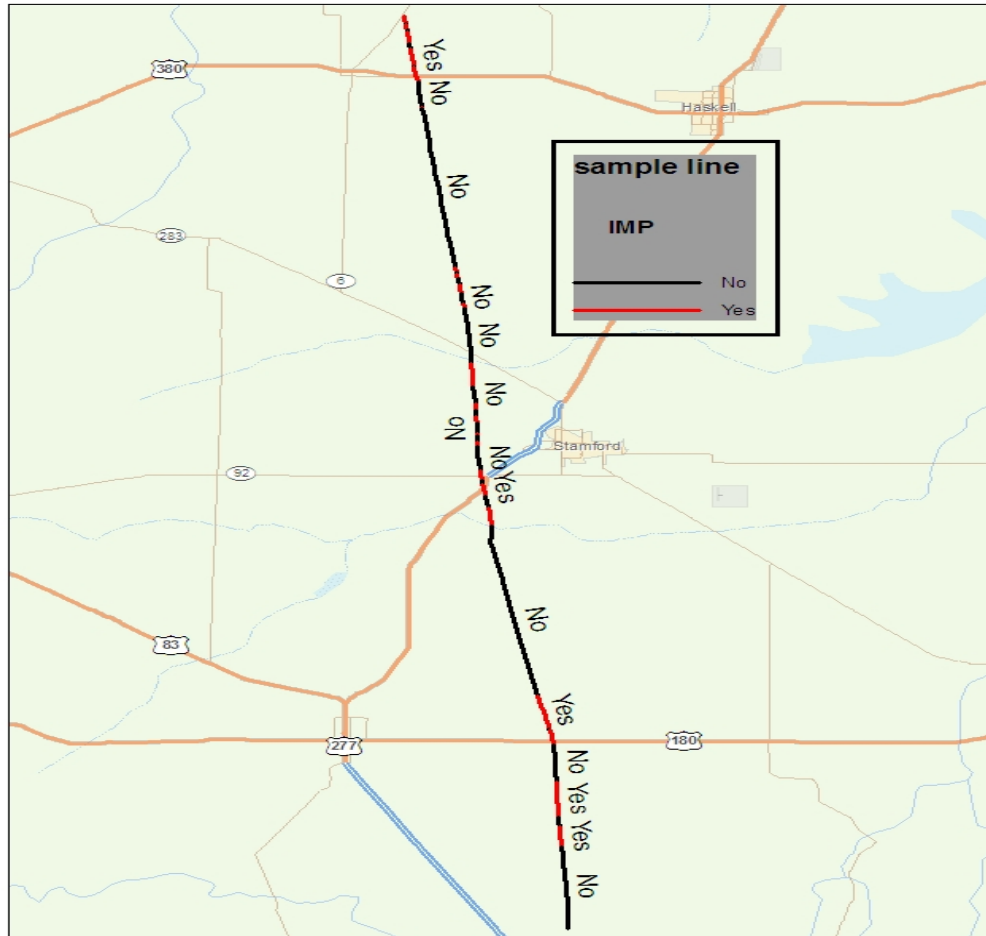
Output of the Simulation

Output



Pipeline ID	Beg station	End station	Jurisdiction	Jurisdiction Type	Jurisdiction Reason	IMP
1000	0	200	No	None	Not impacting HCA's	No
1000	200	1000	Yes	DOT-Phase1-Not IMP	Impacting USA	No
1000	1000	1200	No	None	Not impacting HCA's	No
1000	1200	1500	Yes	DOT-Phase1-Not IMP	Impacting USA	No
1000	1500	2000	Yes	DOT195	In the city limits	Yes
1000	2000	2200	No	None	Not impacting HCA's	No
1000	2200	2500	Yes	DOT-Phase1-Not IMP	Impacting USA	No
1000	2500	2700	Yes	DOT195	Crossing Navigable Waters	Yes
1000	2700	2800	Yes	DOT-Phase1-Not IMP	Crossing Navigable Waters	No
1000	2800	3000	No	None	Not impacting HCA's	No

Output of the Simulation



Advantages of the process

- This process is a subset of the HCA analysis performed every year. The data could be generated in the standard format to determine/verify the Jurisdictional status of the line each year.
- Could be done In-house or contracted to the GIS vendor as part of HCA analysis.
- Helps prioritization of resources for safe operations
- Accurate reporting to the various organizations.

Future Developments

- To develop a reporting tool to calculate the jurisdictional/IMP mileage for the specified line segment.
- To develop a tool to compare the current year's data with the previous year's data to track changes in the DOT/IMP mileage for the affected line segments.



THANK YOU!!