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# **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

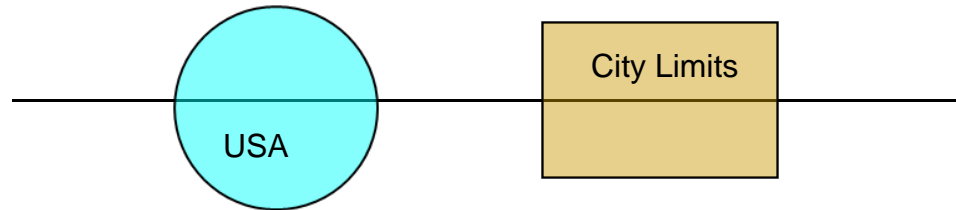
- **Direct impact:** Direct impact of the line with HPA, OPA and Navigable water ways.
- **Indirect Impact:** The **proximity**<sup>1</sup> of the line segment to the **unusually sensitive areas**<sup>2</sup> (USA's).

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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.

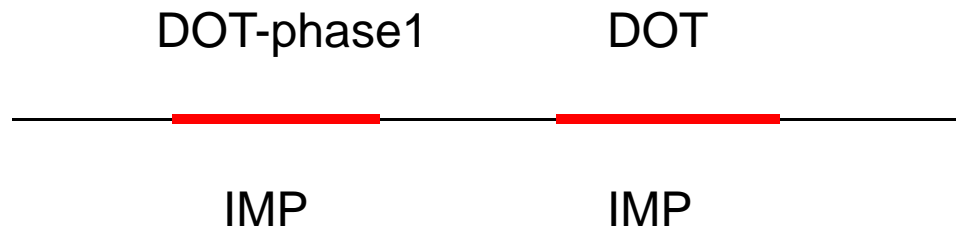
# How variations in these factors affect regulations?



Trunk line

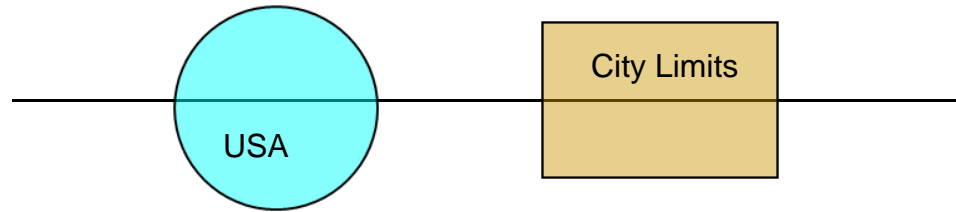
MOP < 20% smys

Diameter=8"





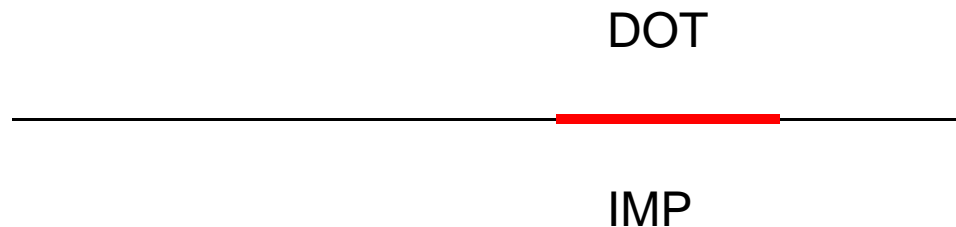
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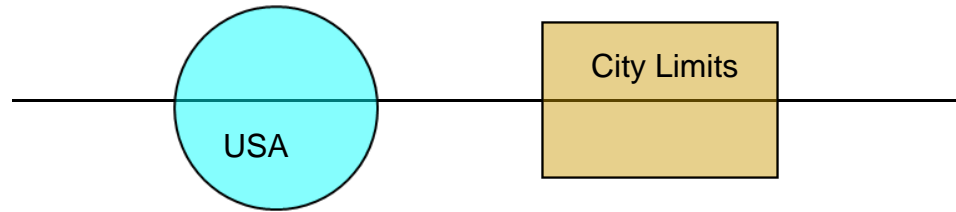
Trunk line

MOP < 20% smys

Diameter = 6"



# How variations in these factors affect regulations?



Gathering line

MOP > 20% smys

DOT-phase1

DOT



Diameter=8"

Not IMP

IMP



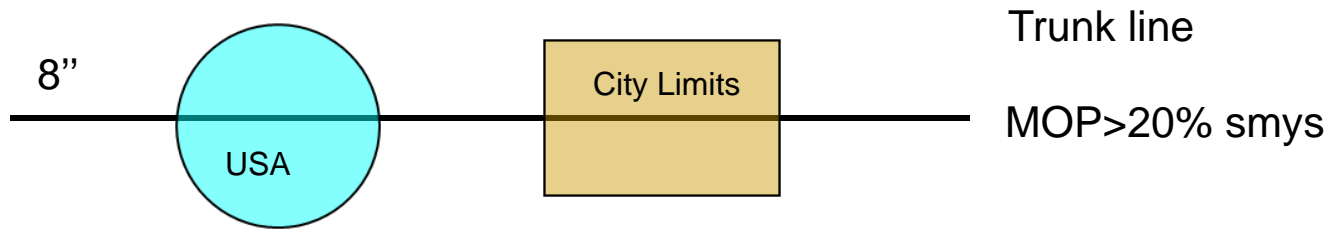
Diameter=4"

DOT

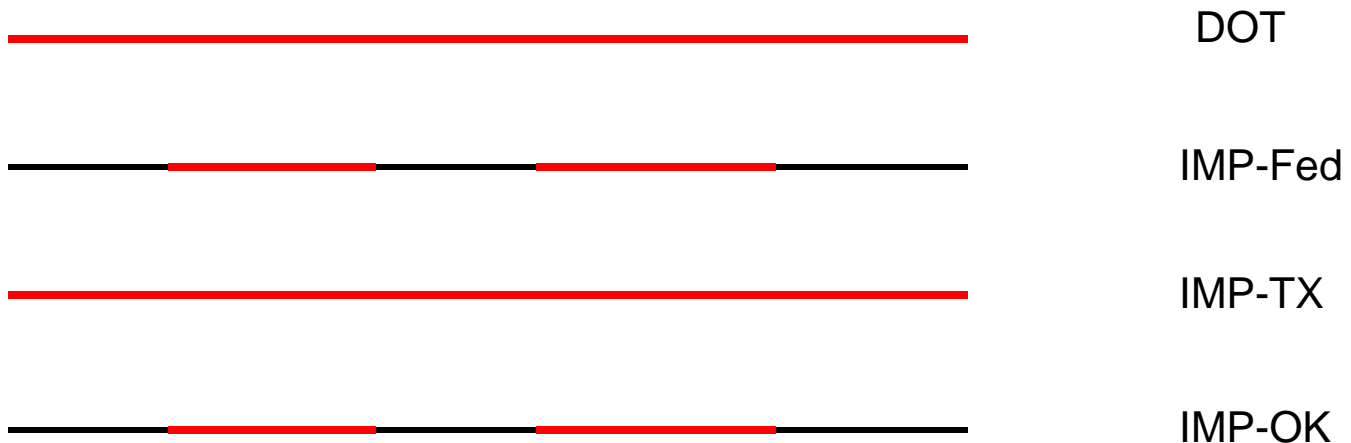
IMP

# How variations in these factors affect regulations?

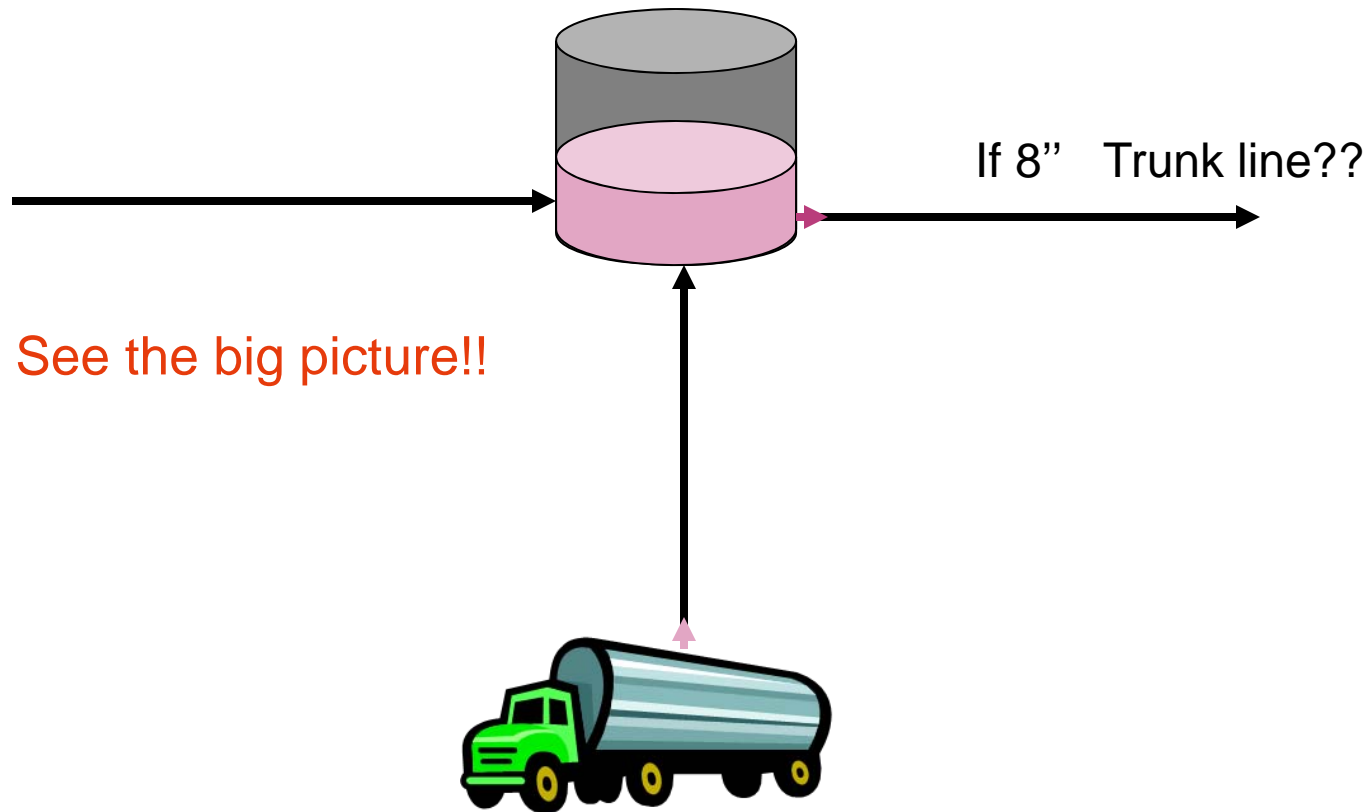
It is important to understand the delineation b/w Federal and State Jurisdiction.



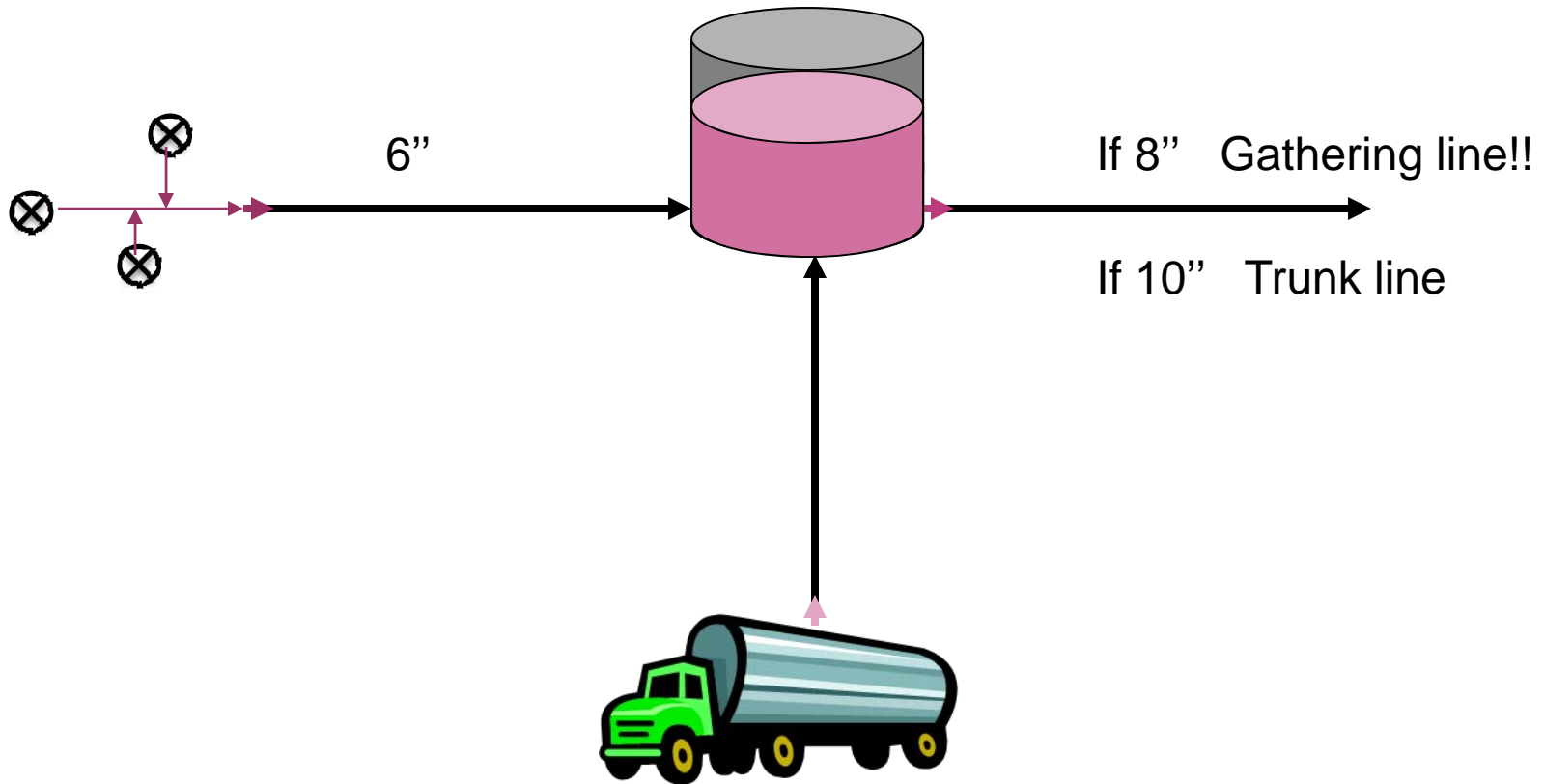
“A Certified State must adopt the same minimal standards but may adopt more stringent standards as long as they are compatible”



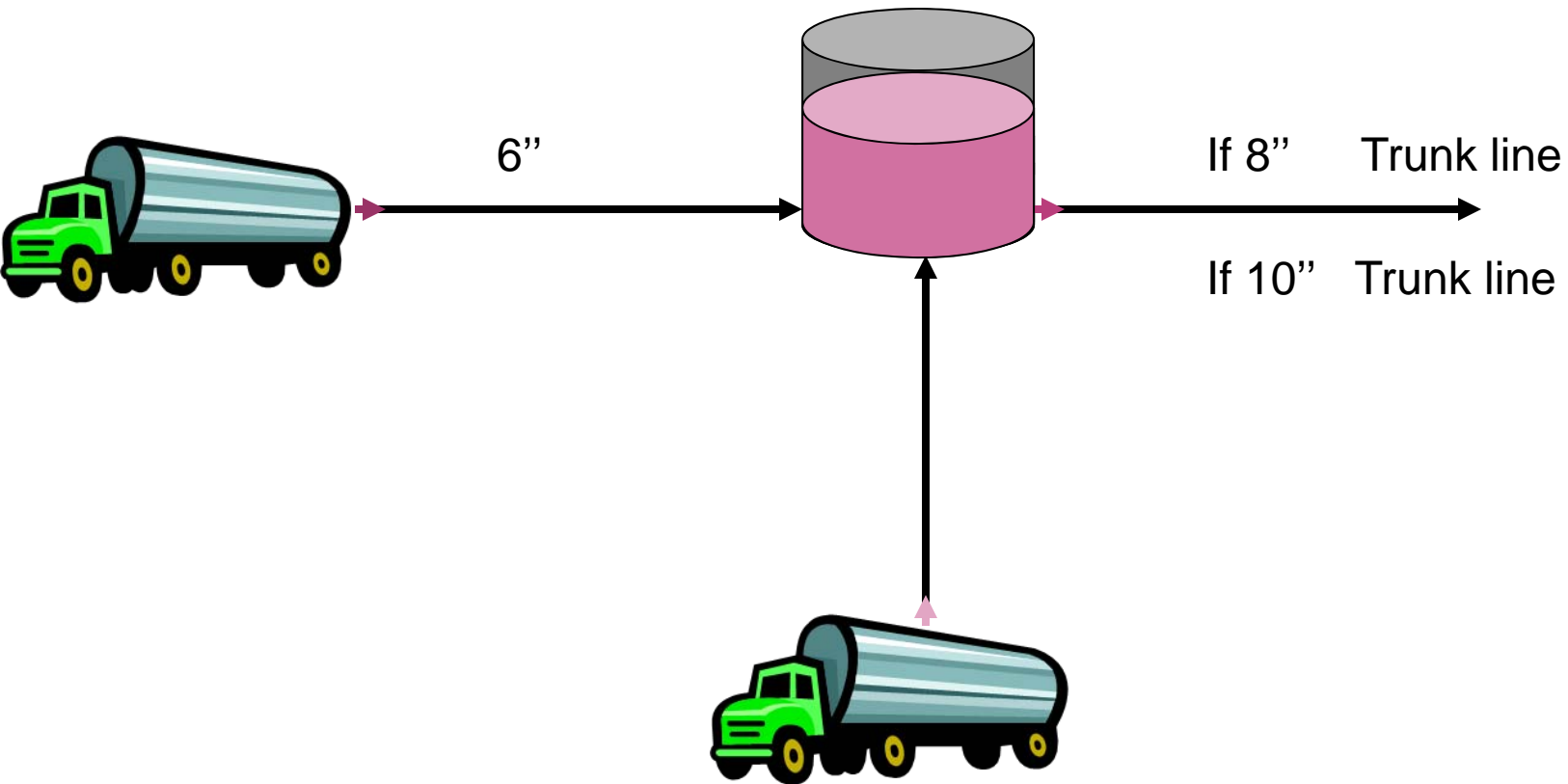
# Why understand pipeline operations?



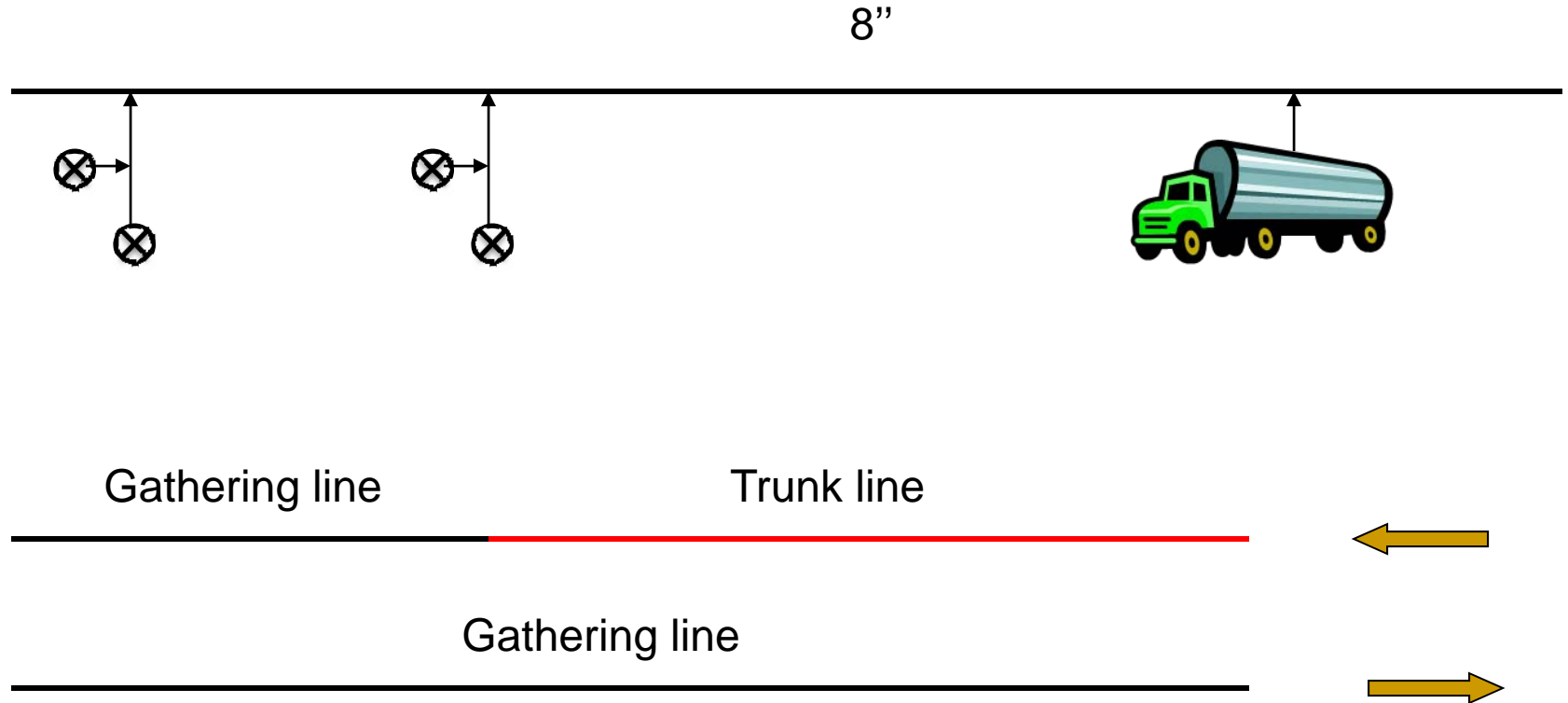
# Why understand pipeline operations?



# Why understand pipeline operations?



# Why understand pipeline operations?



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# Importance of GIS and Data Integration



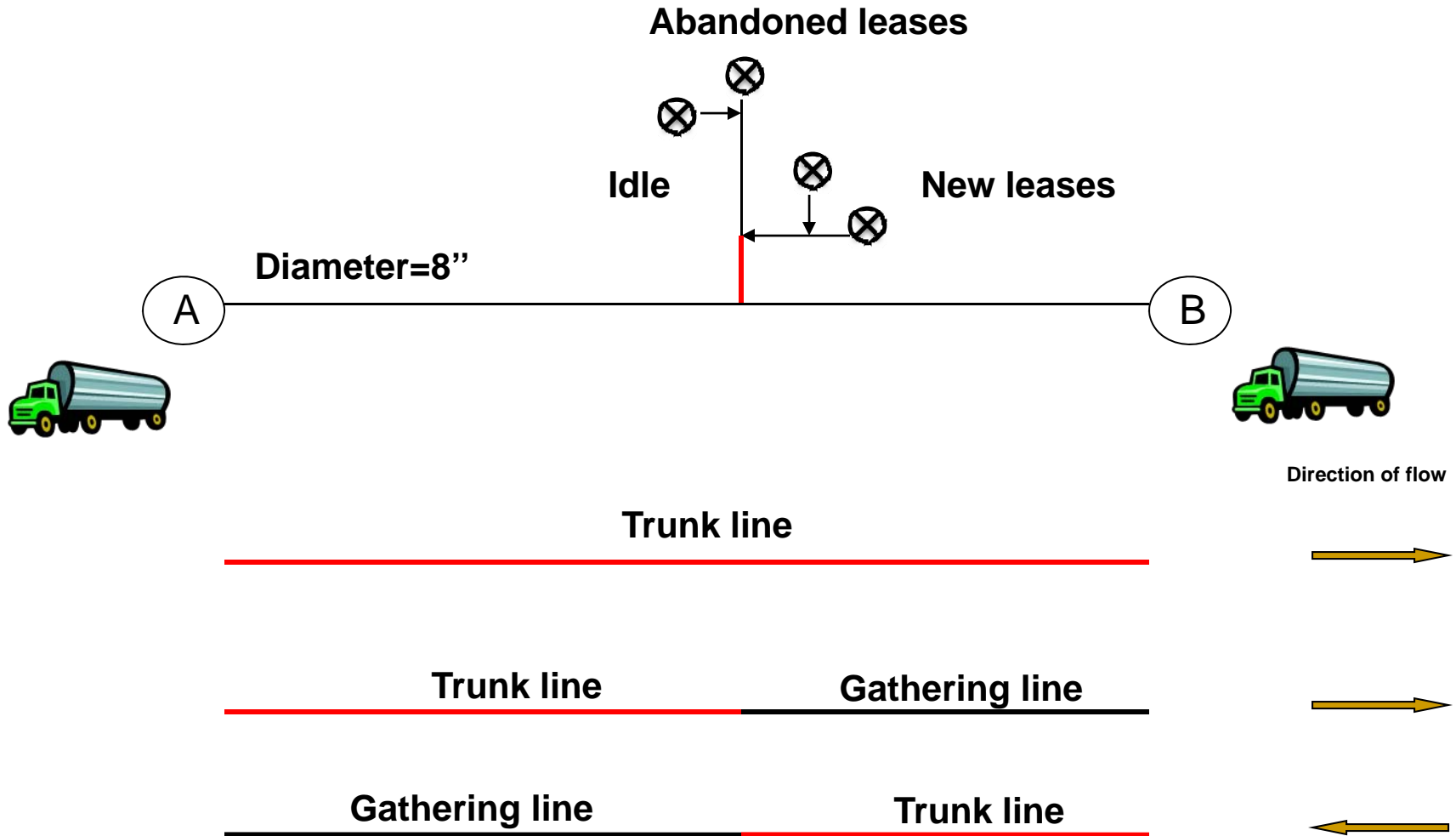


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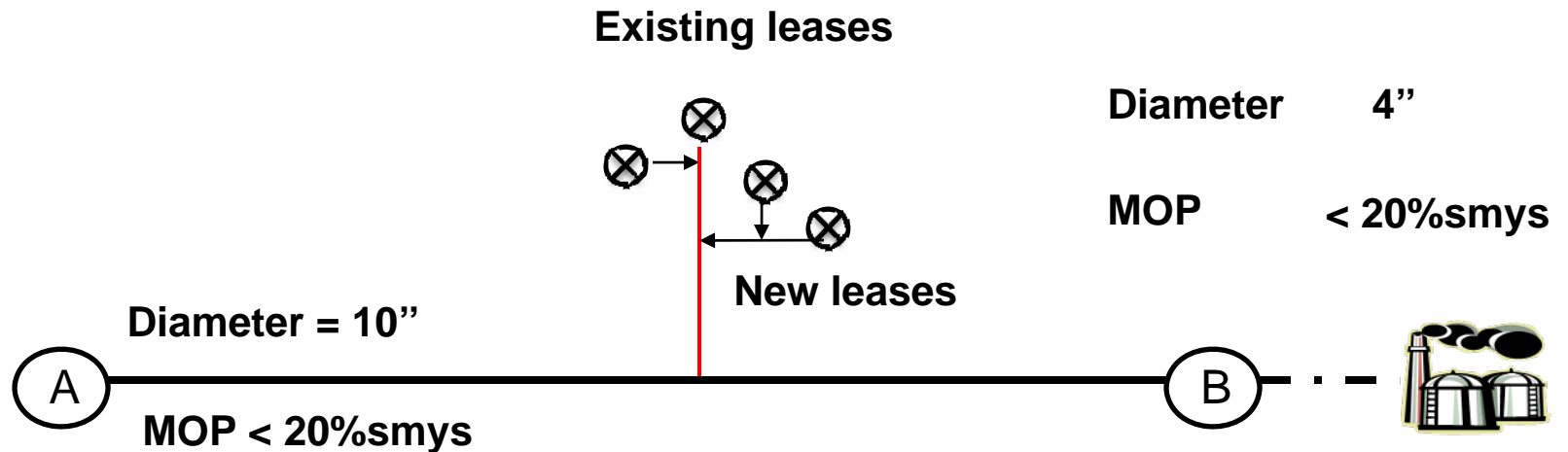
# Variations in the factors

- 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

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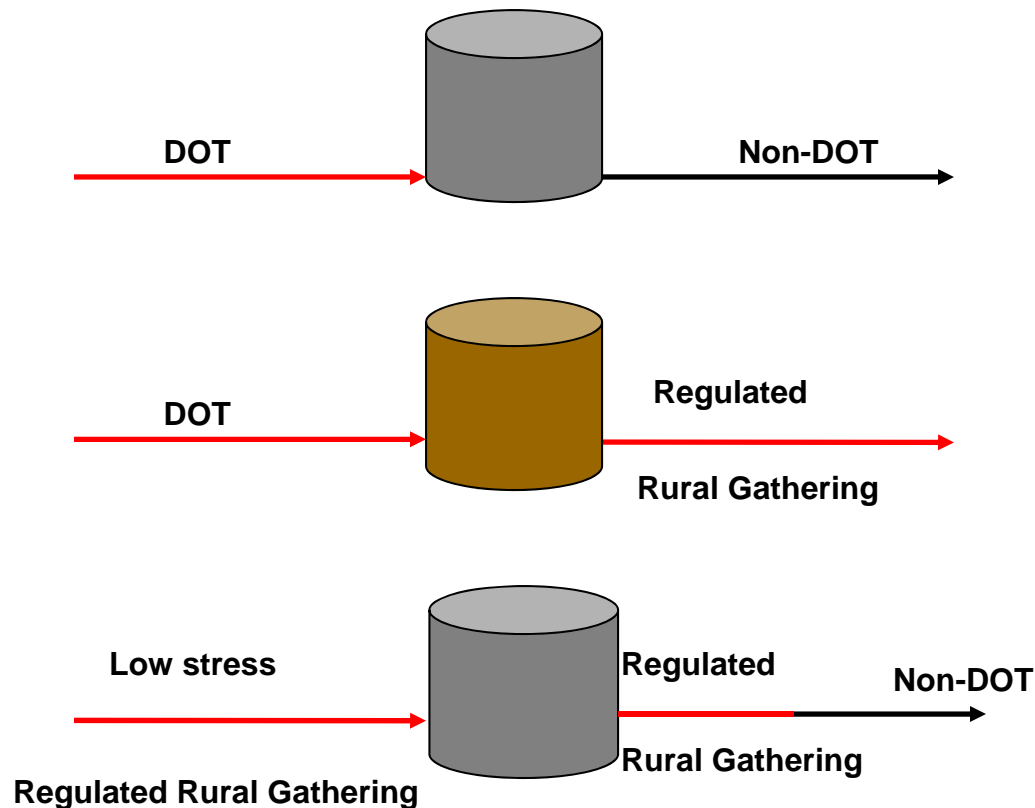
# Challenge

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

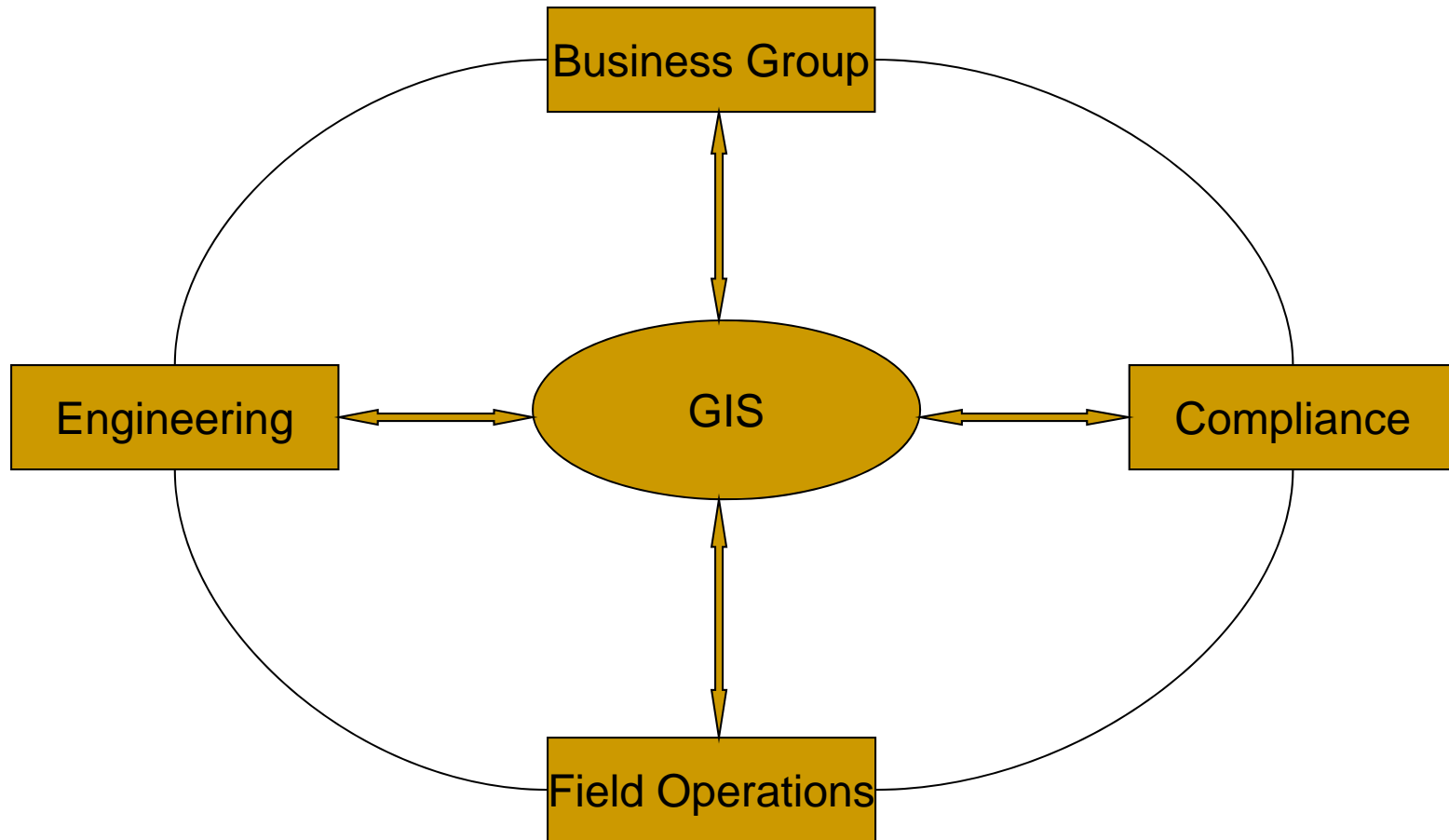
## Tanks Scenario



# 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



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# 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

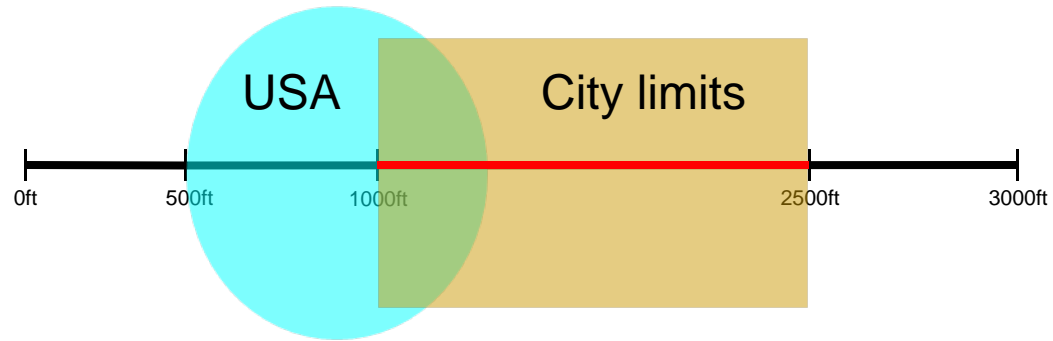
Pipeline should be classified into two basic (atomic) groups.

## 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

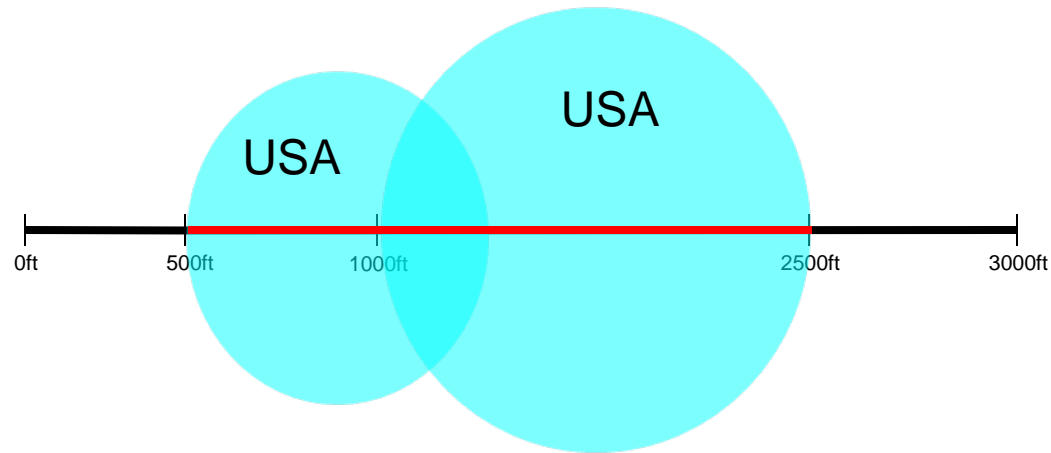
# Overlap Rule-1



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

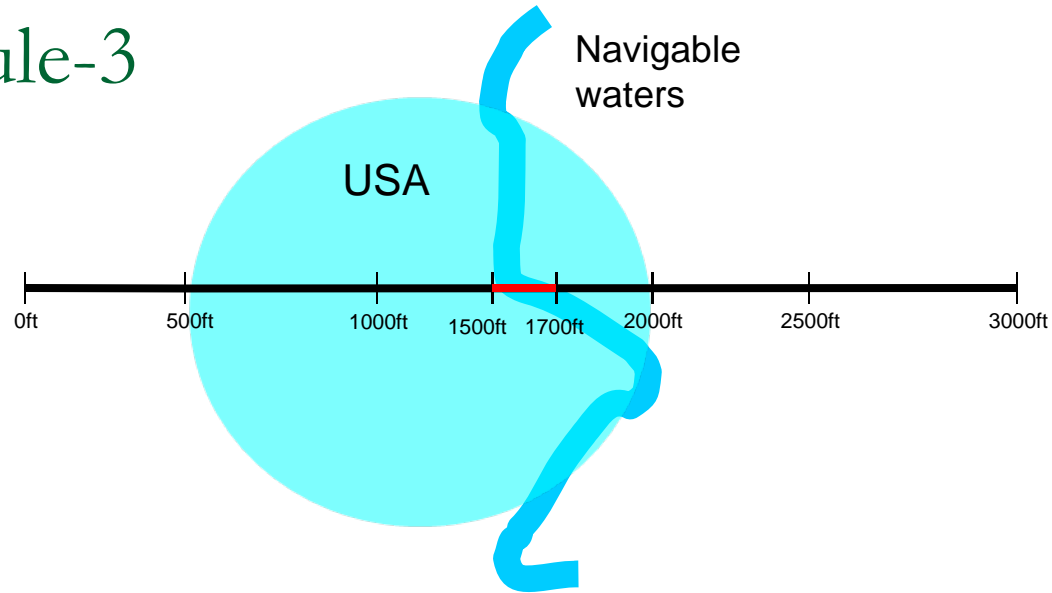
# Overlap Rule-2



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

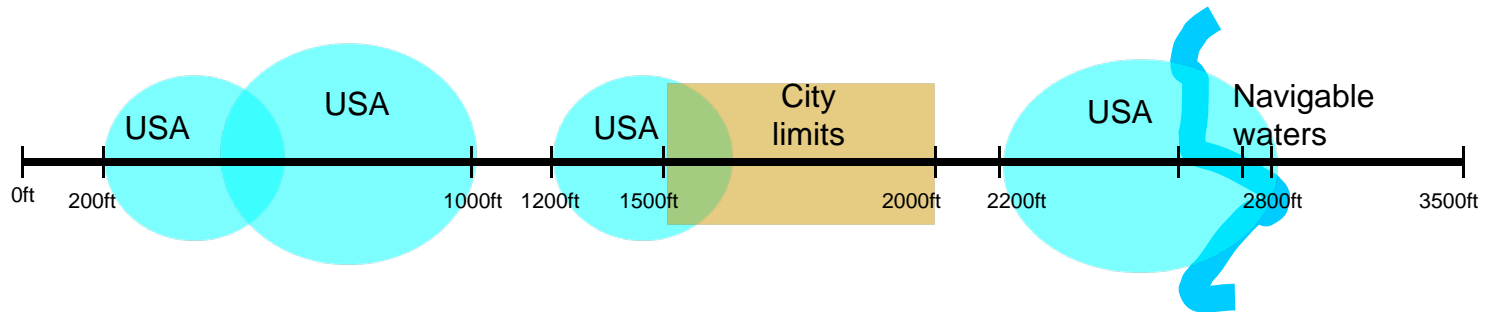
If USA overlaps with Navigable waters → Navigable waters prevails over USA.

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# Jurisdiction Identification Template



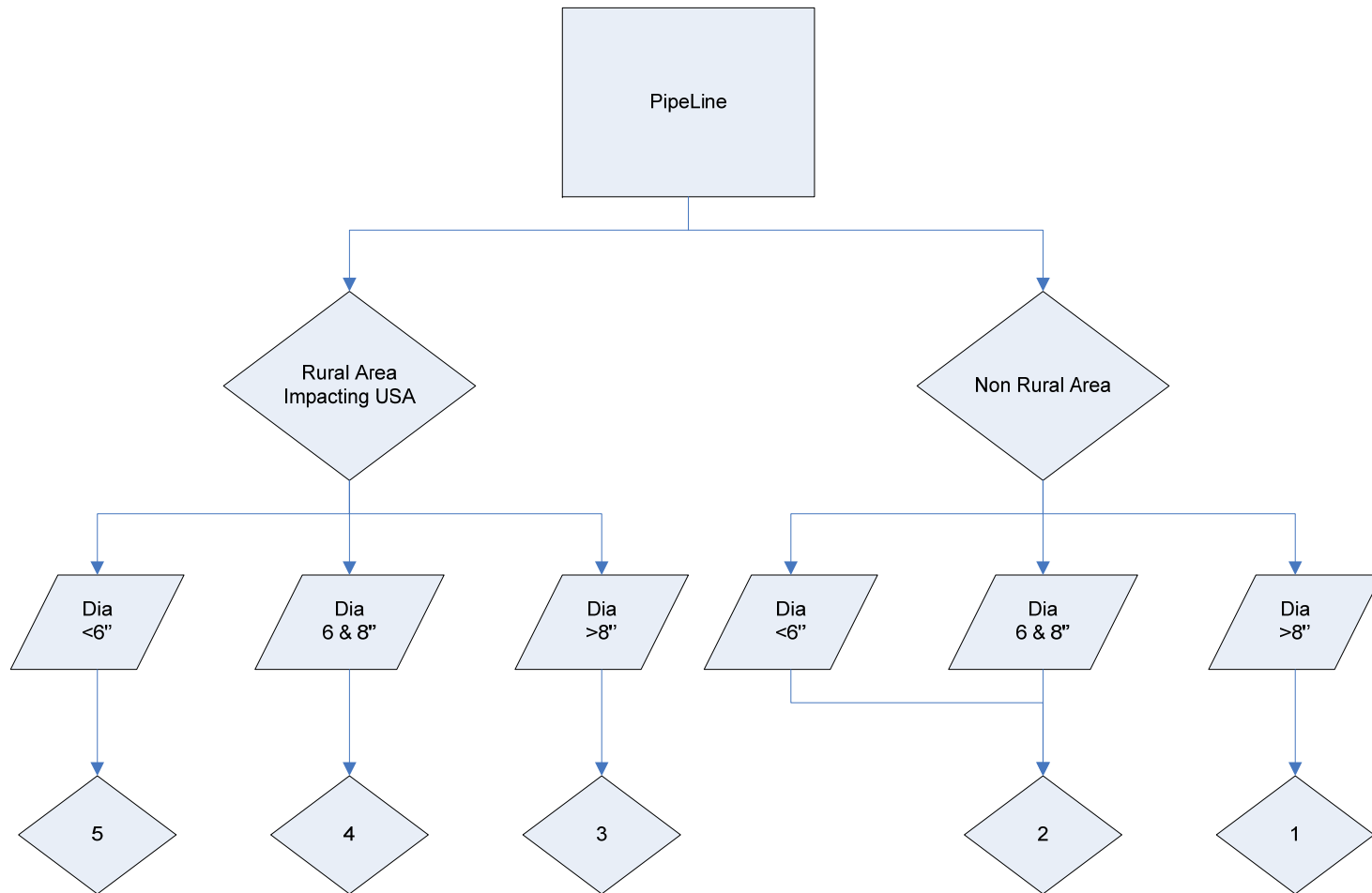
Pipe ID	Beg Sta	End Sta	HPA	OPA	NW	USA	None	Diameter	Line Type	%SMYS
1000	0	200	0	0	0	0	1	8	Gathering	22
1000	200	1000	0	0	0	1	0	8	Gathering	22
1000	1000	1200	0	0	0	0	1	8	Gathering	22
1000	1200	1500	0	0	0	1	0	8	Gathering	22
1000	1500	2000	1	0	0	0	0	8	Gathering	22
1000	2000	2200	0	0	0	0	1	8	Gathering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

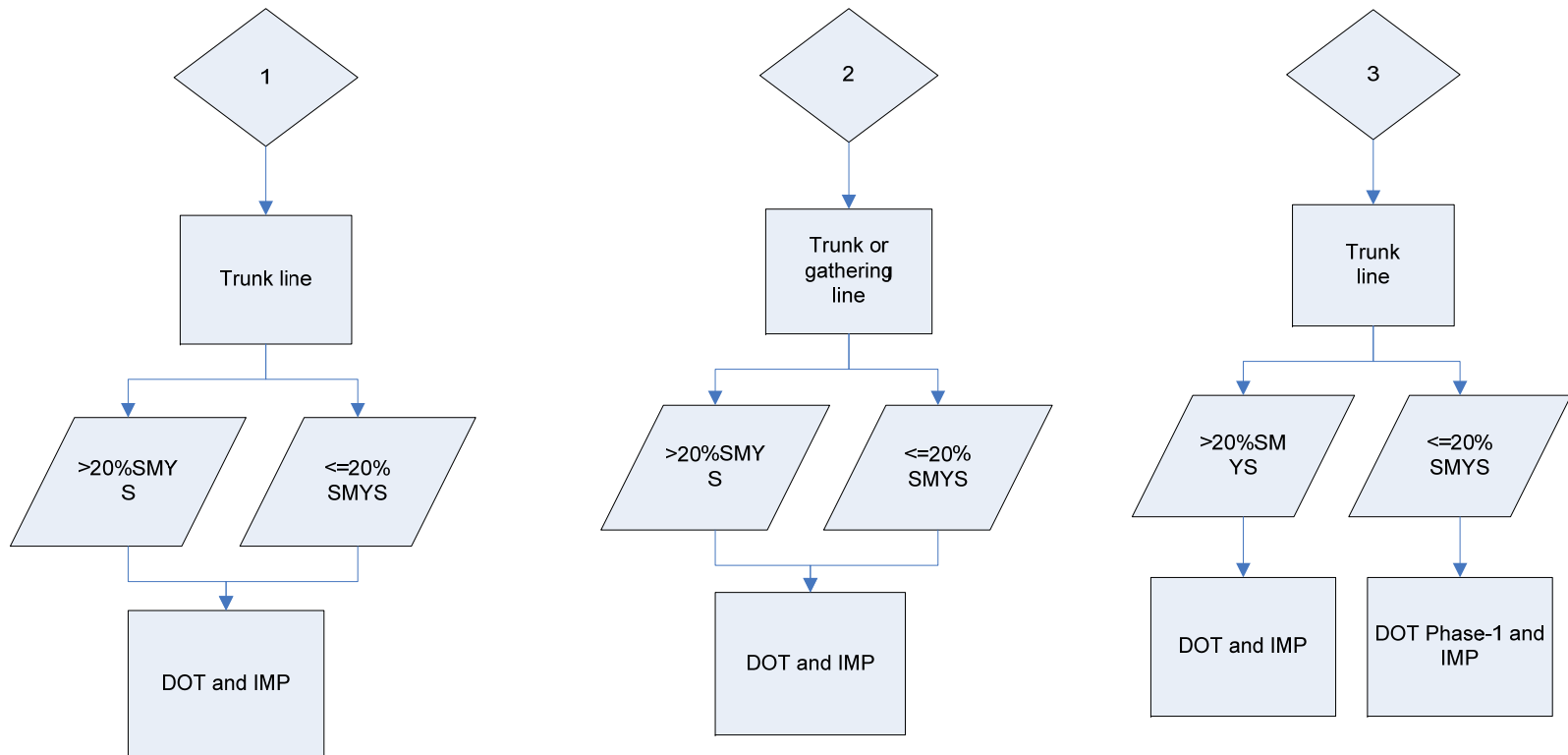
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# 195CFR Rule Interpretation

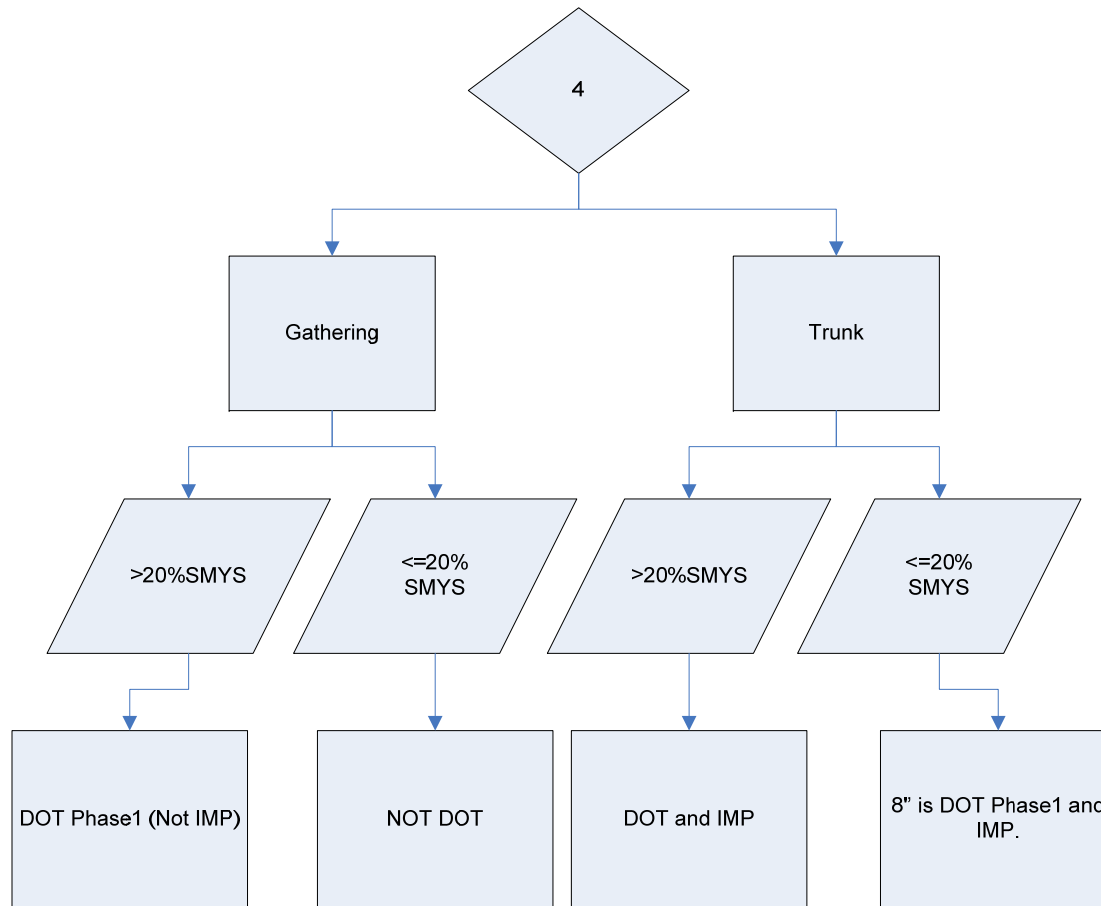




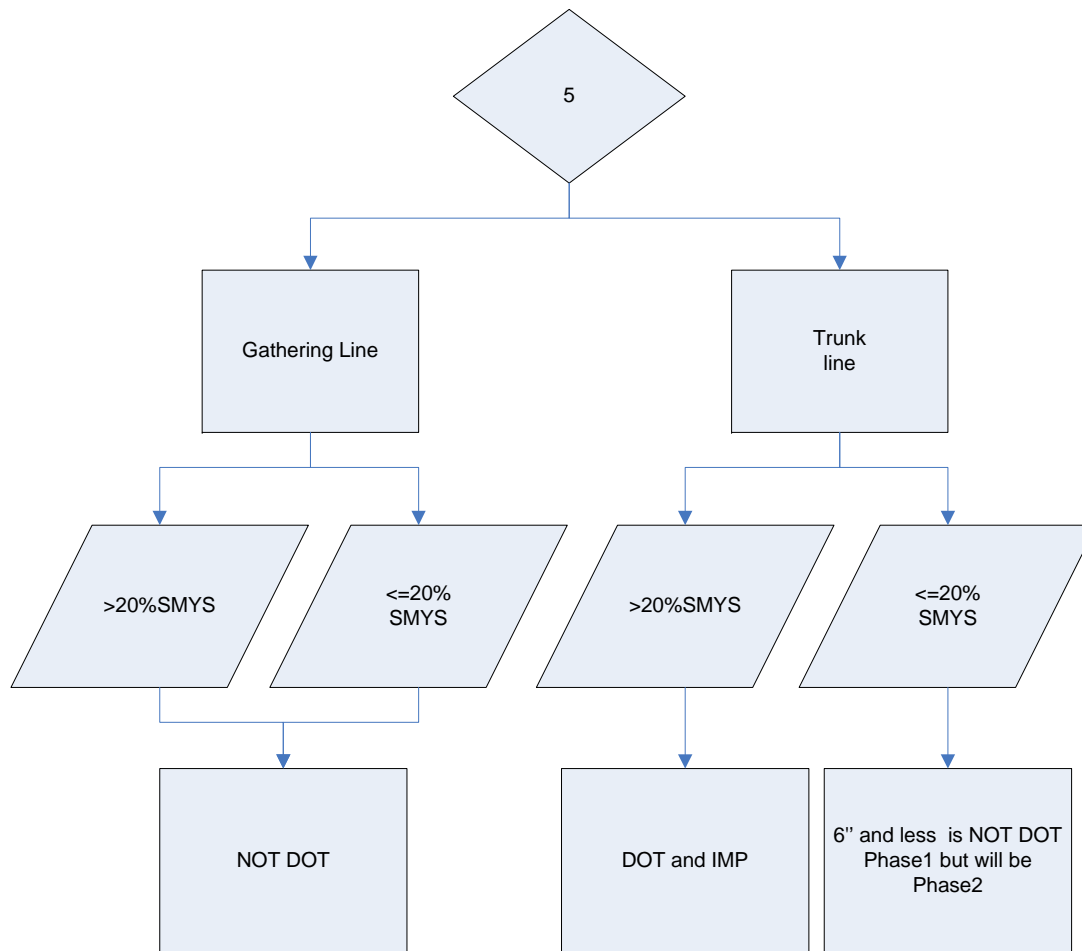
# 195CFR Rule Interpretation



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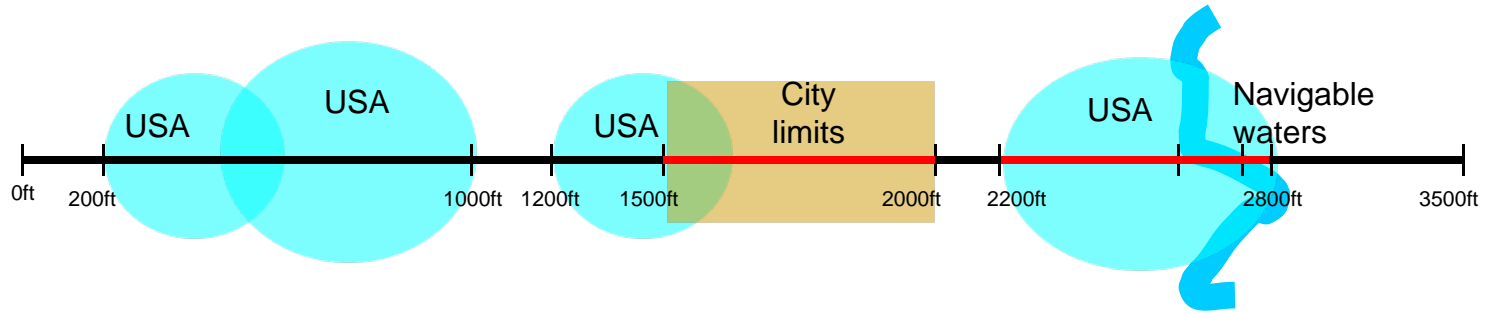
# 195CFR Rule Interpretation



# Solution


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# How the Algorithm Works?



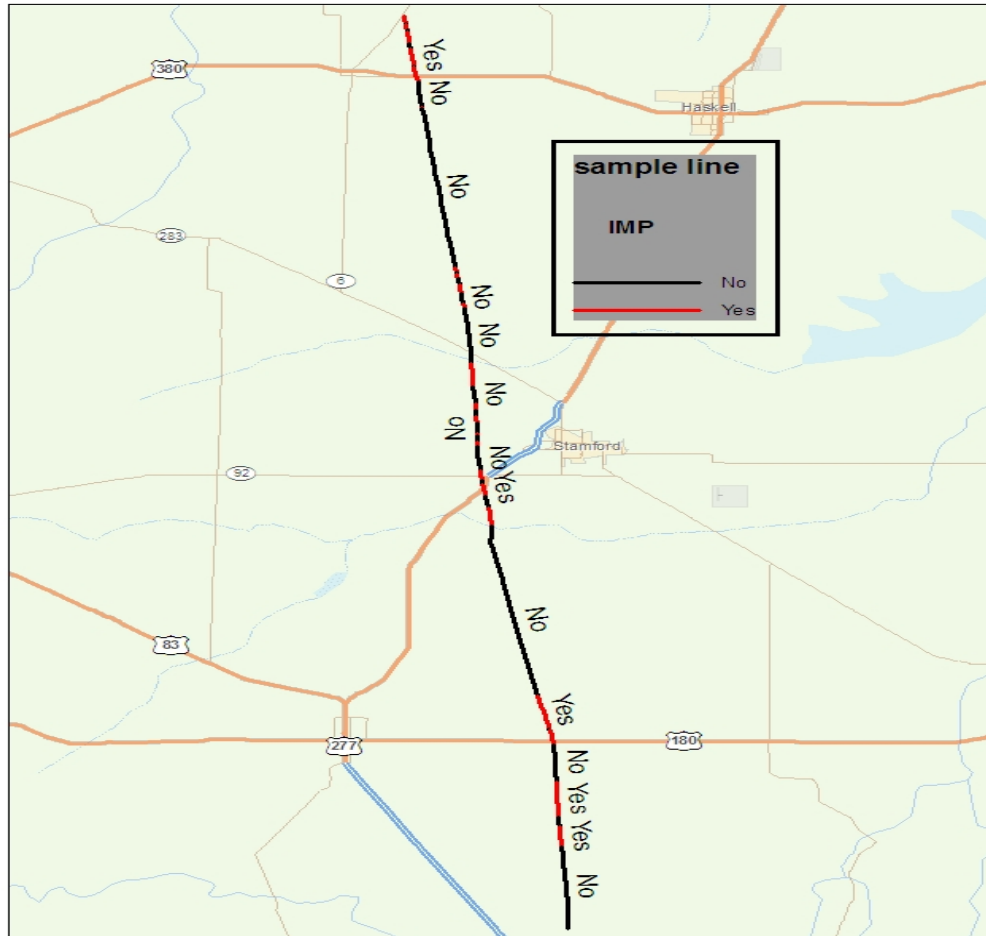
# Output of the Simulation

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



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# 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.



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# 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.



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THANK YOU!!