Pipeline Emergency Response – Case Study

Appomattox, Virginia, September 14, 2008

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Goals and Priorities

> Goal is Zero

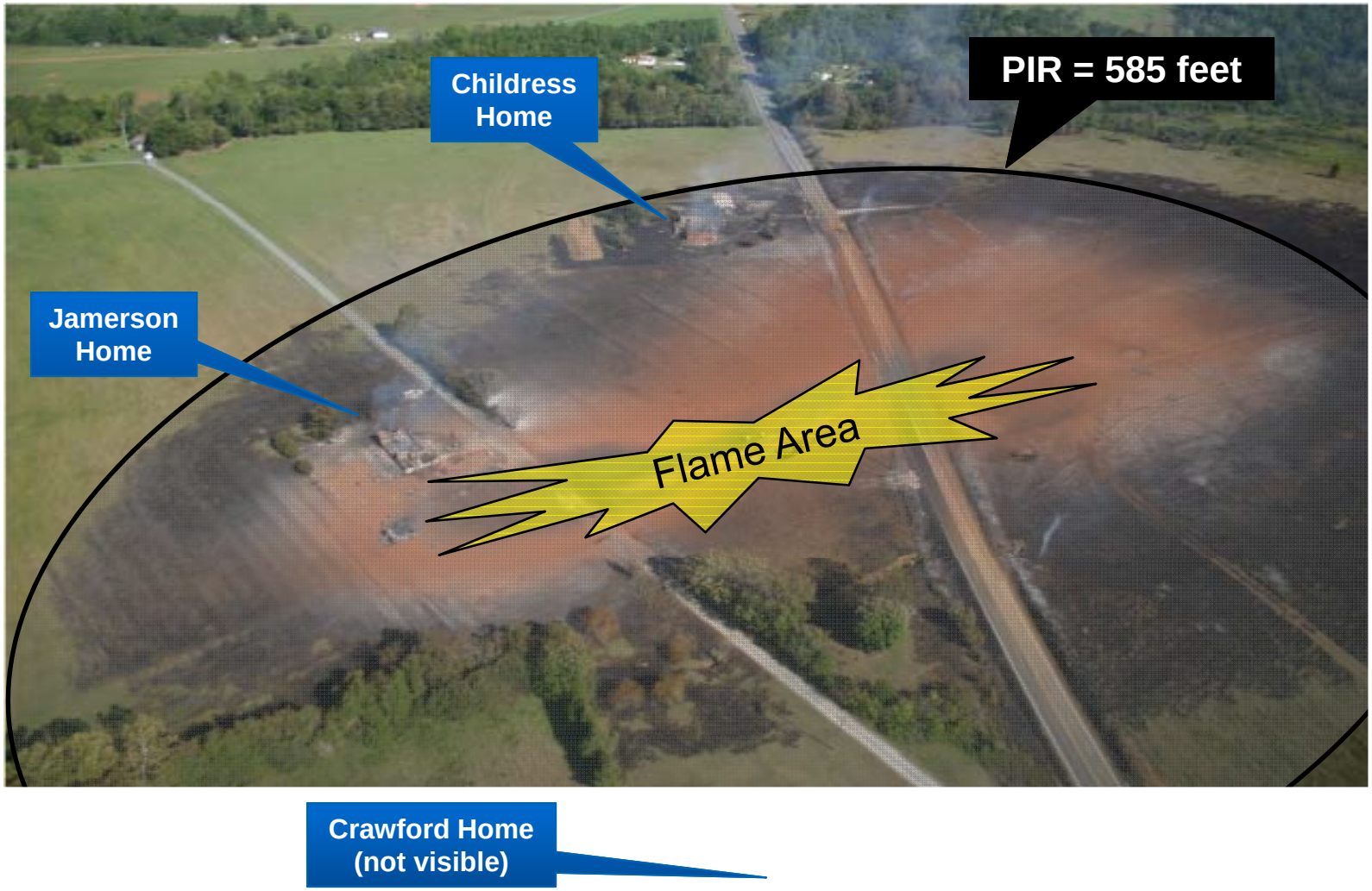
- Prevent all failures
- Prepare for failures

> Priority is Life, then Property

- Fatalities, injuries or escape → First minutes
- Property damage → Start to finish

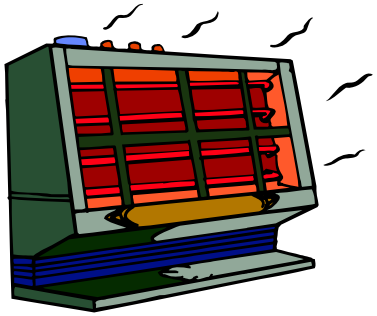
Potential Impact Radius (PIR)

Based on pressure and diameter and *approximates* the area of damage



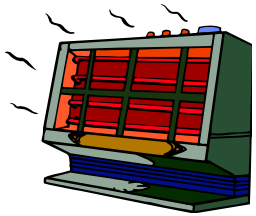
Radiant Heat Dosage

1,500 BTU / hour-square foot

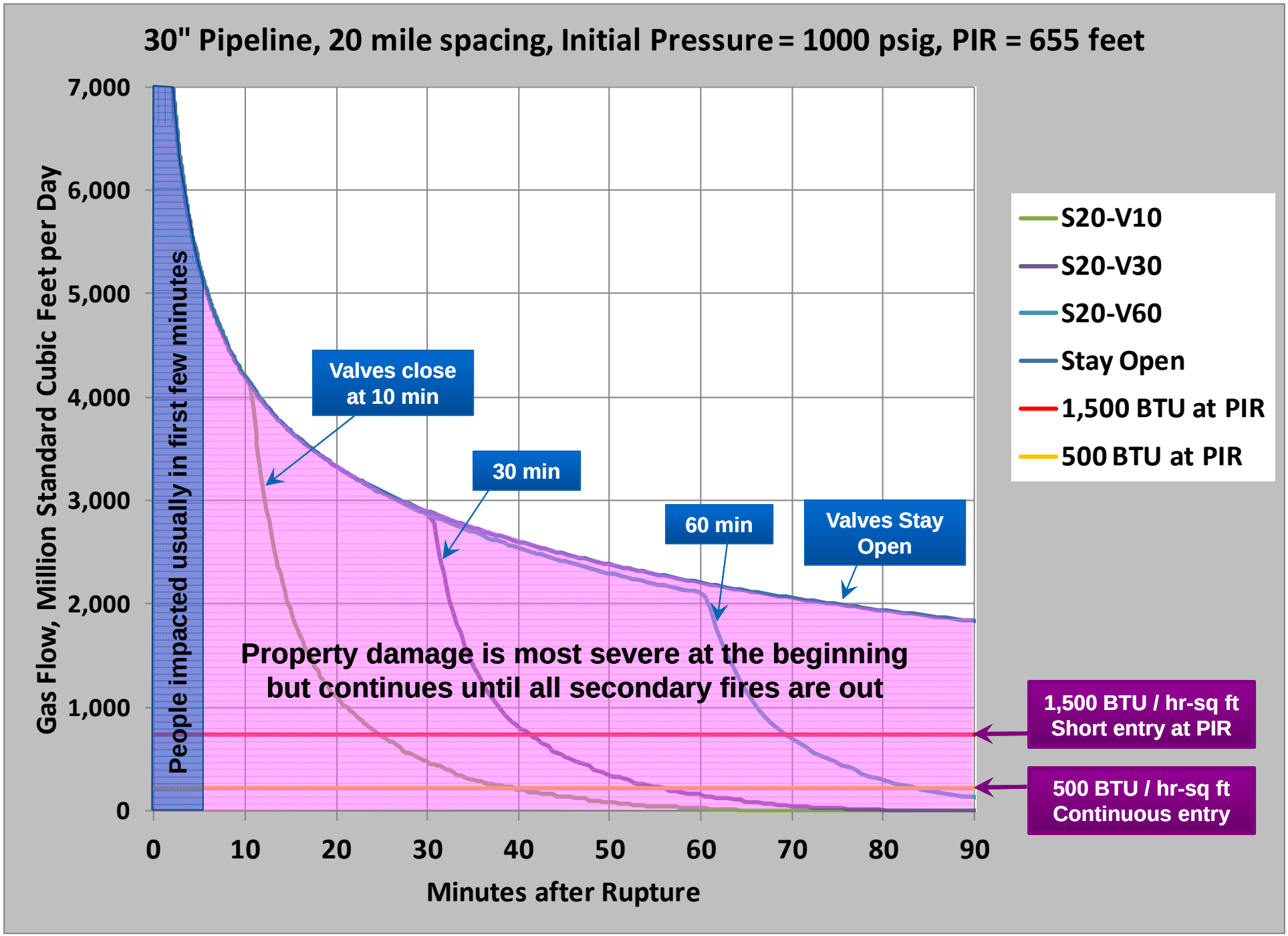


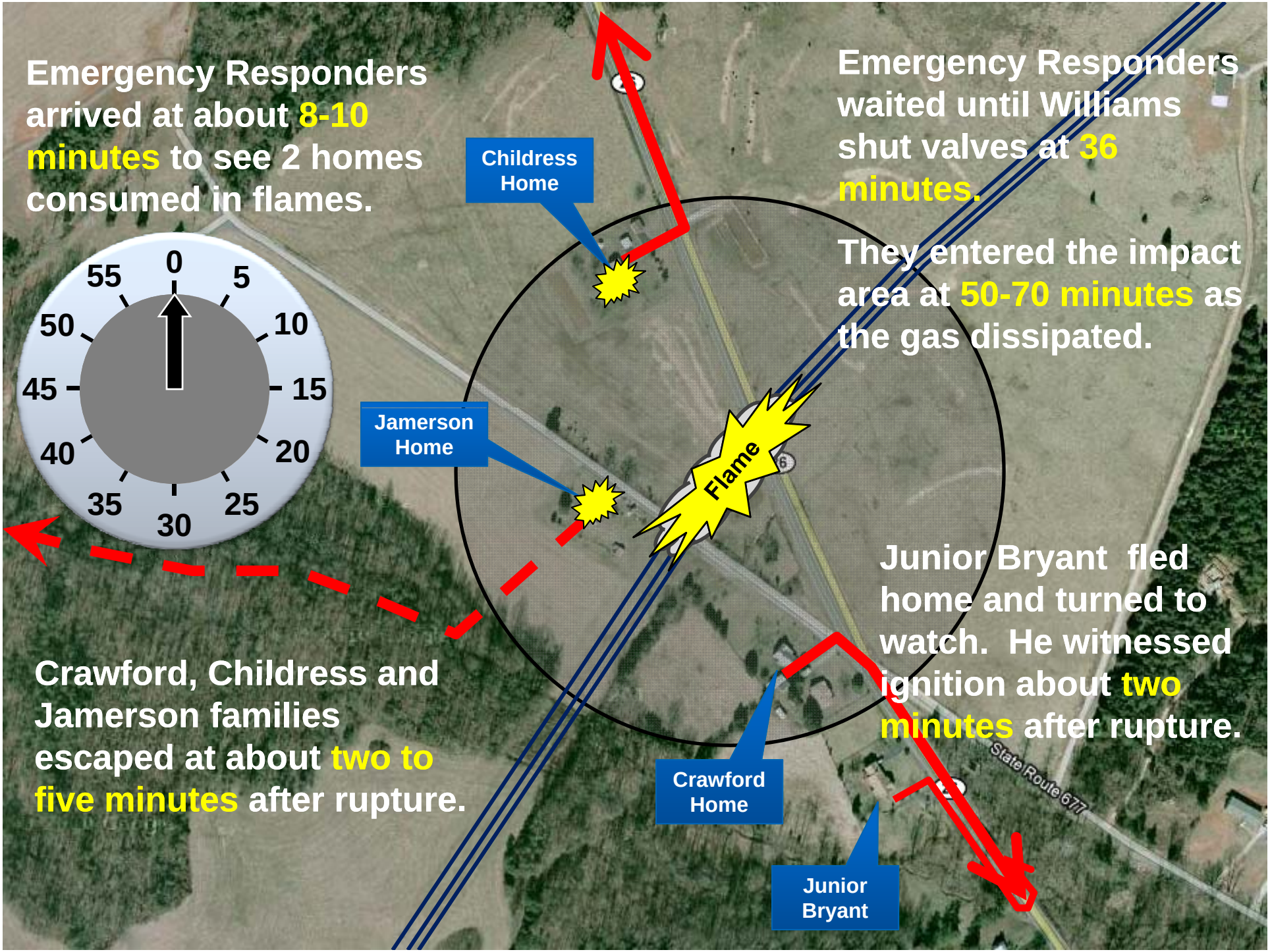
An emergency responder can enter the area *for a few minutes*.

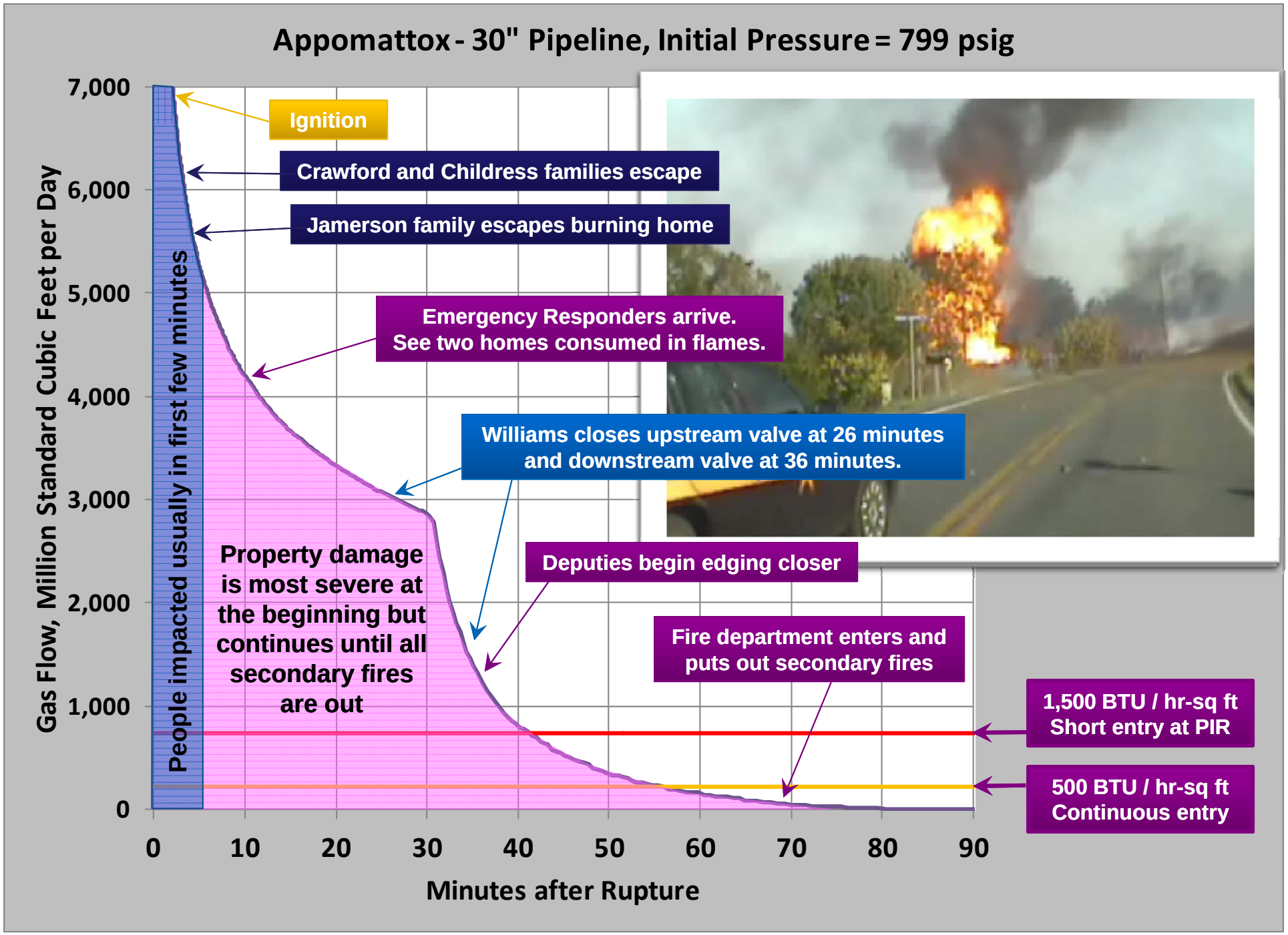
500 BTU / hour-square foot

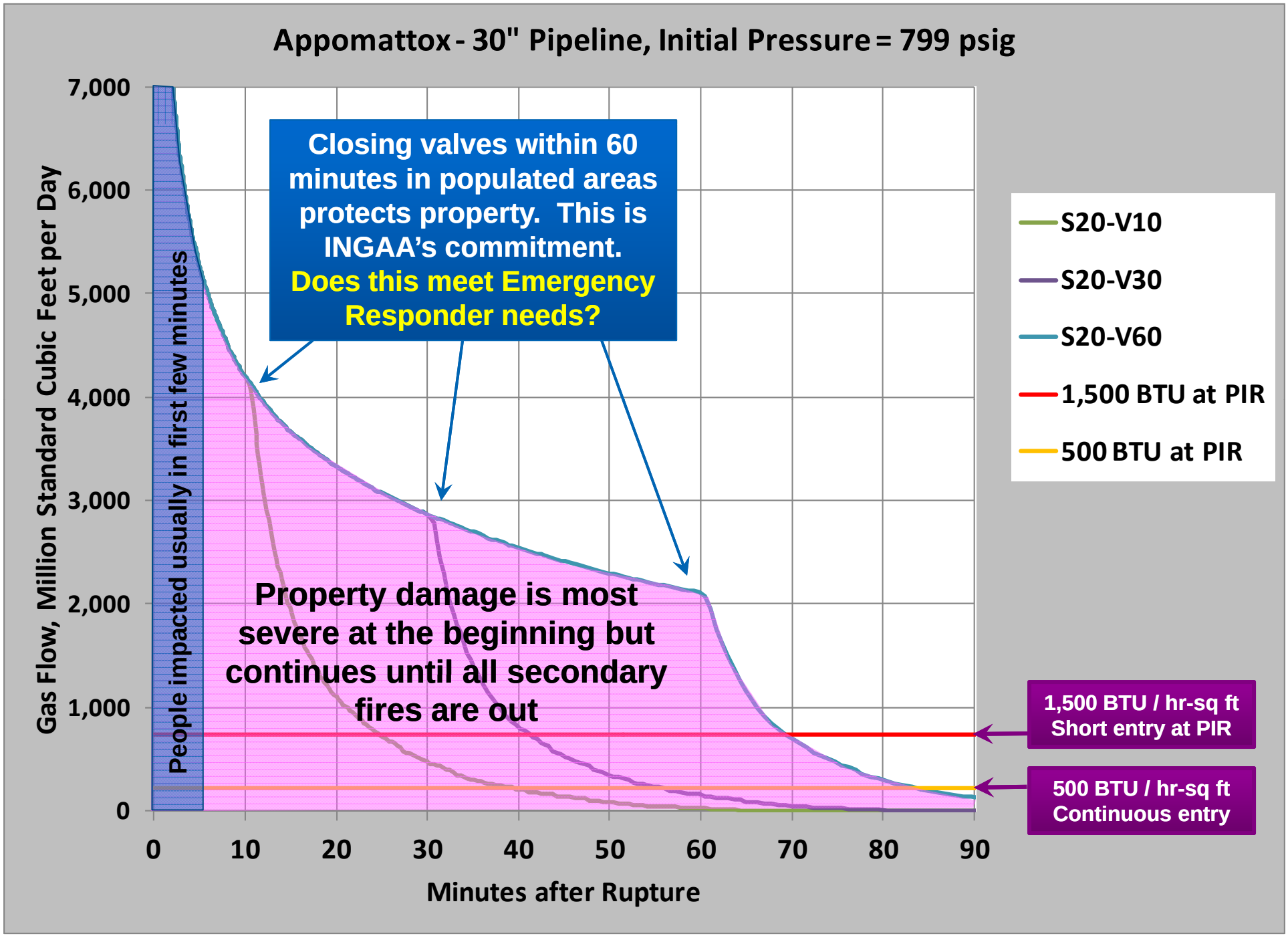


An emergency responder can work in the area *continuously*.


30" Pipeline, 20 mile spacing, Initial Pressure = 1000 psig, PIR = 655 feet
Gas Flow, Million Standard Cubic Feet per Day
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
Minutes after Rupture
People impacted usually in first few minutes
Valves close at 10 min
30 min
60 min
Valves Stay Open
Property damage is most severe at the beginning but continues until all secondary fires are out
S20-V10
S20-V30
S20-V60
Stay Open
1,500 BTU at PIR
500 BTU at PIR
1,500 BTU / hr-sq ft Short entry at PIR
500 BTU / hr-sq ft Continuous entry


Emergency Responders arrived at about 8-10 minutes to see 2 homes consumed in flames.
Emergency Responders waited until Williams shut valves at 36 minutes.
They entered the impact area at 50-70 minutes as the gas dissipated.
Junior Bryant fled home and turned to watch. He witnessed ignition about two minutes after rupture.
Crawford, Childress and Jamerson families escaped at about two to five minutes after rupture.
Childress Home
Jamerson Home
Crawford Home
Junior Bryant
Flame
State Route 677
0
5
10
15
20
25
30
35
40
45
50
55


Appomattox - 30" Pipeline, Initial Pressure = 799 psig
Gas Flow, Million Standard Cubic Feet per Day
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
Minutes after Rupture
People impacted usually in first few minutes
Ignition
Crawford and Childress families escape
Jamerson family escapes burning home
Emergency Responders arrive.
See two homes consumed in flames.
Williams closes upstream valve at 26 minutes
and downstream valve at 36 minutes.
Property damage
is most severe at
the beginning but
continues until all
secondary fires
are out
Deputies begin edging closer
Fire department enters and
puts out secondary fires
1,500 BTU / hr-sq ft
Short entry at PIR
500 BTU / hr-sq ft
Continuous entry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2,000
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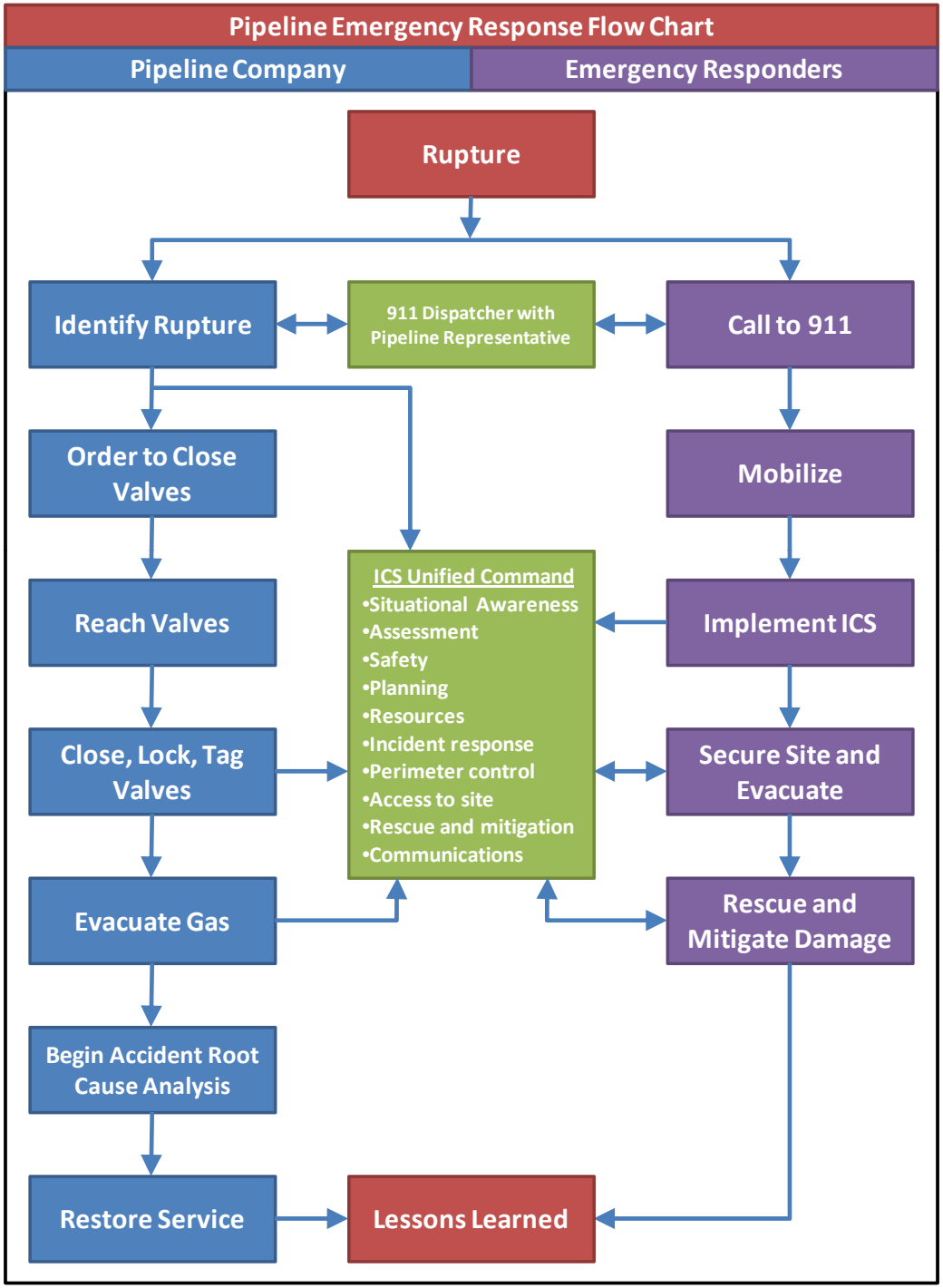
0
0
10
20
30
40
50
60
70
80
90
Minutes after Rupture
People impacted usually in first few minutes
Closing valves within 60 minutes in populated areas protects property. This is INGAA's commitment.
Does this meet Emergency Responder needs?
Property damage is most severe at the beginning but continues until all secondary fires are out
S20-V10
S20-V30
S20-V60
1,500 BTU at PIR
500 BTU at PIR
1,500 BTU / hr-sq ft
Short entry at PIR
500 BTU / hr-sq ft
Continuous entry

Prescriptive versus Performance

	Prescriptive	Performance
Regulations are a …	List of rules	Performance expectation
Decisions are based on …	Adherence to rules	Mitigating risk
Residents …	Received a brochure	*Understand*
Emergency Responders …	Received a contact	*Understand*
Valves need to be …	Automated	Closed promptly
Audits show …	Were *rules* followed?	*Effectiveness*
The focus is …	Compliance	Safety

Incident Mitigation Management


Pipeline Emergency Response Flow Chart
Pipeline Company
Emergency Responders
Rupture
Identify Rupture
911 Dispatcher with Pipeline Representative
Call to 911
Order to Close Valves
Mobilize
Reach Valves
ICS Unified Command
•Situational Awareness
•Assessment
•Safety
•Planning
•Resources
•Incident response
•Perimeter control
•Access to site
•Rescue and mitigation
•Communications
Implement ICS
Close, Lock, Tag Valves
Secure Site and Evacuate
Evacuate Gas
Rescue and Mitigate Damage
Begin Accident Root Cause Analysis
Restore Service
Lessons Learned