



San Bruno Update

Accufacts Inc. Key Observations to
Washington State Citizens Committee on Pipeline Safety

May 17, 2012

Today's Brief Perspective

- Clear up rupture myths
- Observations from CPUC/ALJ Decision/Rulemaking 11-02-019 Process
 - Attempt to comply with several NTSB recommendations
 - Many thousands of documents, data requests, testimonies & workshops in public domain
- Accufacts' Perspective
 - San Bruno Raises Serious Questions About Gas Transmission Integrity Management Programs (TIMP)

San Bruno Pipe Rupture

- Rupture clearly not caused by pipe bursting project!
 - NTSB Report clearly resolved
 - INGAA & CPUC Independent Review Panel (IP) Reports both wrong on pipe bursting as contributor or cause!
 - Credit to NTSB in remaining neutral/factual during frustrating complex investigation

The San Bruno Rupture (cont.)

- 30-inch pipe “pups” installed in 1956 relocation
- Apparently never hydrotested to industry standards of the time (ASA B31.1.8-1955)
 - Required hydrotest records to be maintained for life of pipeline
- Failed at a poor longitudinal seam weld on a short pup
 - Failure a combination of ductile tear (high pressure) & pressure fluctuations (pressure cycling)
- Not standard grade pipe
- Rupture occurred below MAOP of 400 psig
 - From operator initiated upset
 - Took ~ 95 minutes to stop the flow of gas

San Bruno Pipe Rupture Site

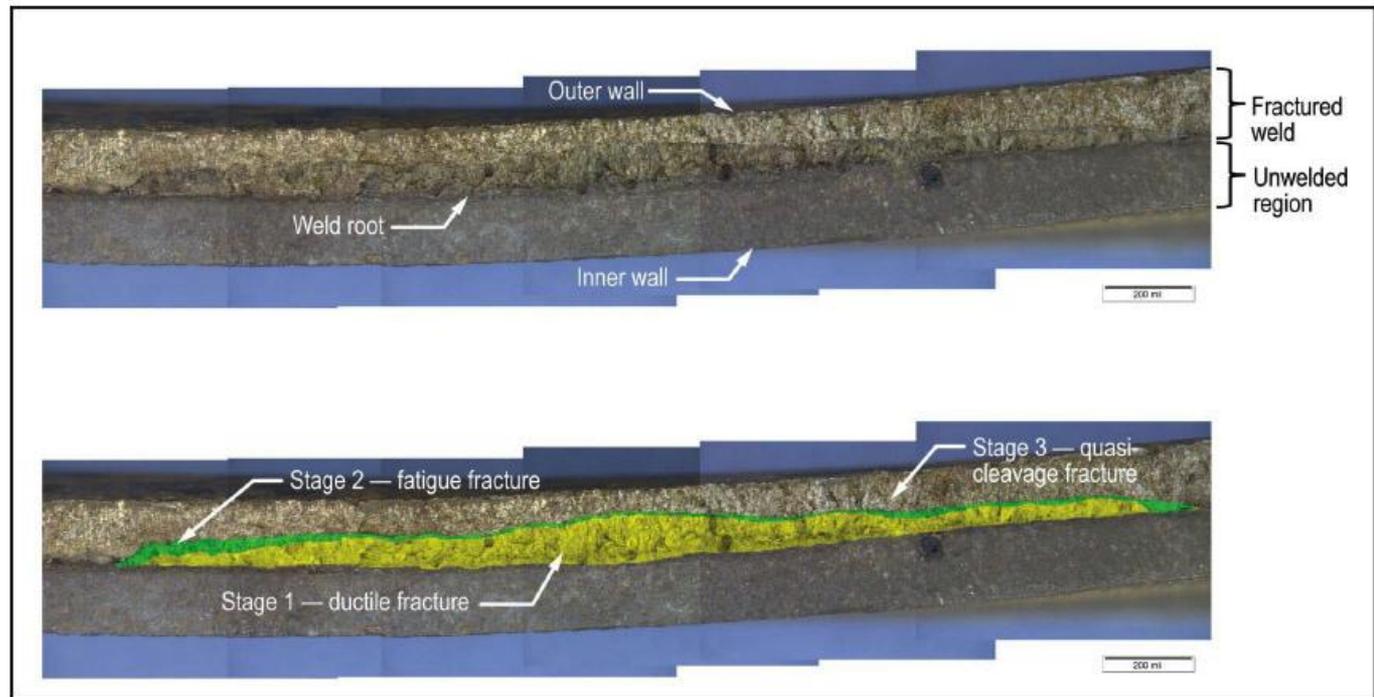


Figure 21. Pictures highlighting rupture initiation site in pup 1 longitudinal seam.

From NTSB Report on San Bruno Rupture

San Bruno Pipe Rupture Site

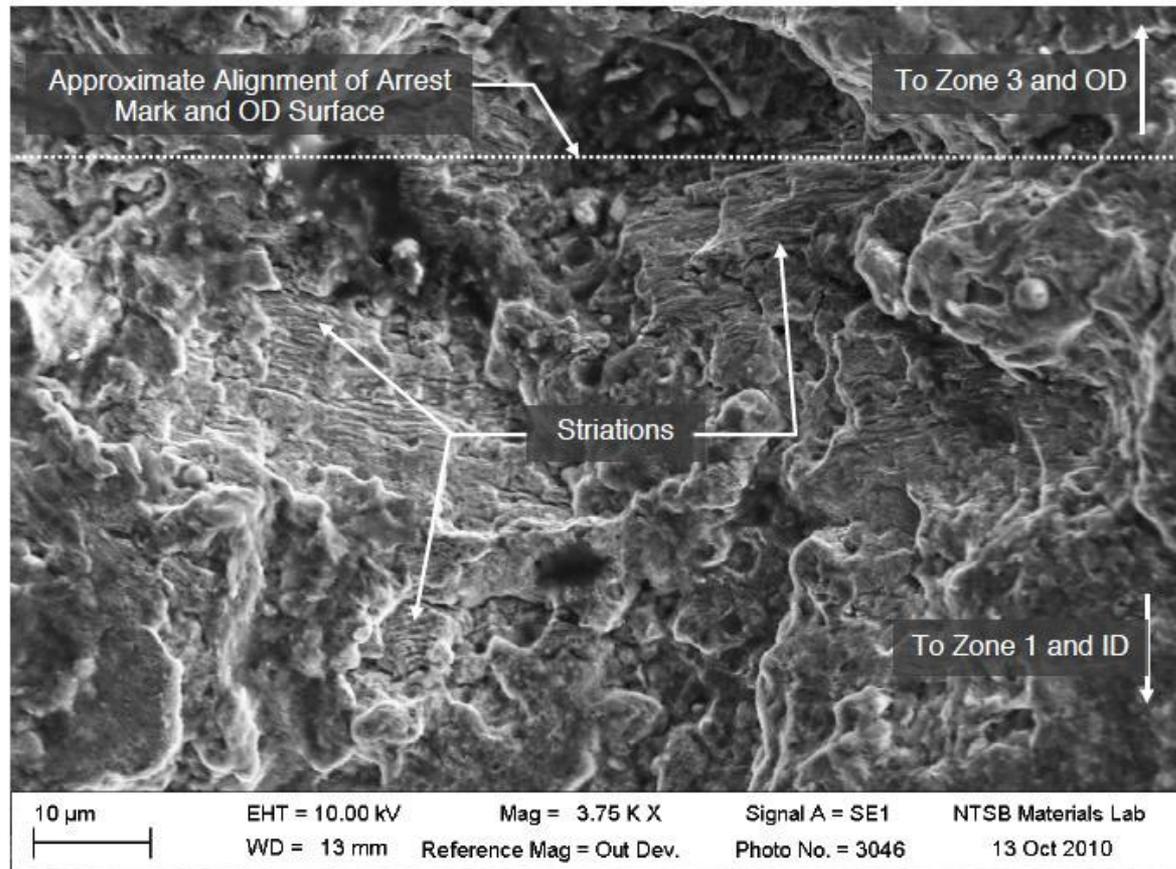


Figure 39: Scanning electron micrograph from zone 2 of the initiation site near the 22 inch mark. Striated features were observed on the fracture surface.

From NTSB Metallurgical Report showing pressure cycle striations

The San Bruno Rupture (cont.)

- Unanswered questions from NTSB Report
 - What caused weld to go unstable, and when?
 - Interactive threats apparently not being addressed!
 - How long did it take for pressure cycles to induce rupture?
 - Why was MAOP so low?
 - Adequacy of grandfathered MAOP and/or TIMP approaches?
 - Why did it take so long to stop the flow of gas?

Serious Gas Transmission Issues

- 1) Transmission overpressure events
- 2) Hydrotesting procedures
- 3) TIMP concerns
- 4) Pressure Cycling Threats
- 5) Inadequate industry standards
- 6) New vs old pipeline misperceptions
- 7) PIR's in gas TIMP
- 8) Valving spacing/automation
- 9) Emergency response / SCADA

Transmission Overpressure Events

Pressure Spiking

Intentionally raising pressures to preserve MAOP in TIMP HCAs?

Operating overpressure excursions

Pressures $>$ MAOP but $<$ allowed accumulation

Using “critical safeties” as regulators?

Operating pressures $>$ MAOP + “safety”
accumulation

Never supposed to occur

When does new federal overpressure reporting law go into effect?

Hydrotesting Procedures

Hydrotesting testimony in CPUC process not credible!

High probability of serious inexperience, or false testimony

Obstacles to higher stress hydrotest bogus

Creates appearance of trying to avoid test failures

In 2011 PG&E performed:

Hydrotests on ~160 miles of transmission

~ 1/3 tested to minimum 90% SMYS

The majority at much lower % SMYS

Only two serious hydrotest failures and one leak.

Hydrotesting Procedures (cont.)

Confusing MAOP new pipe and TIMP in-service pipe hydrotests

Subpart J MAOP test basically a new pipe test

TIMP seam hydrotests assessment for older in-service pipe different

SMYS - a pipe property that can't be varied/changed by operator

Hydrotesting protocols in California need to be publicly vetted and open to peer review

No confidence in PG&E hydrotest protocol

Hydrotest records and claimed costs should be independently audited in detail

TIMP Concerns

California Transmission

Contains the two gas transmission companies with greatest mileage of HCAs within a state

Approximately 12% of the nations HCA's of 20,400 miles*

San Bruno rupture has uncovered serious questions on TIMP

A powerful risk management approach, or a tool for legal loopholes?

High probability of loss in public's confidence

U.S. has lost its lead in pipeline integrity management regulation

* From PHMSA 2010 report

TIMP Concerns (cont.)

TIMP is records based!

Lack or loss of critical records, even for grandfathered systems!

Extremely poor risk assessments (RA)

Not addressing all pipe segment risks

Misapplication or overuse of Direct Assessment at expense of ILI or hydrotests

~ 78 % of PG&E's Base Assessment Plan relied on DA!

Assumptions of anomaly “stability” possible red flag

Interactive threats not being considered

Misapplication of pressure cycling analysis

Pressure spiking can seriously negate cycle analysis for seam risks

Engineering best guessing to fill in for missing critical records can be fatal!

Many states poorly prepared, insufficiently funded, inadequately staffed, inexperienced, or improperly trained for TIMP

Pressure Cycling Threats

Usually associated with seam anomalies of older vintage pipelines

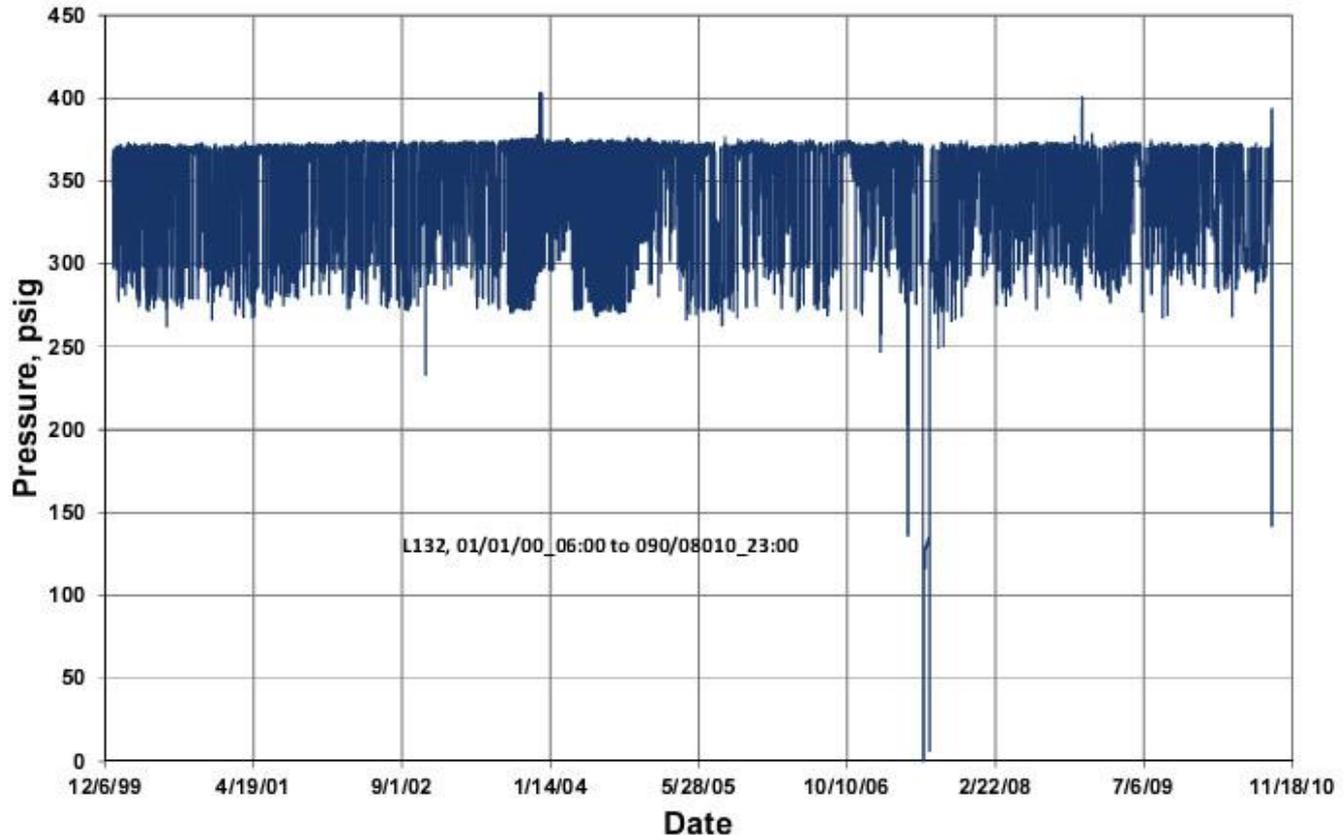
Assuming anomaly stability needs more scientific peer & public review

Critical assumptions may not be in sync with actual operation

Especially for not prudently hydrotested systems!

Pressure cycling can be much greater for many local vs interstate gas transmission systems

Pressure Cycling Threats (cont.)



A local gas transmission pipeline in California.

Anyone want to argue that gas transmission pipelines don't pressure cycle?

Pressure Cycling Threats (cont.)

Is SCADA data available and, more importantly, relevant?

SCADA data can seriously understate the cycle spectrum

Time to failure prediction sensitive to minimum % SMYS test

The lower the minimum tested SMYS, the shorter the years to failure

What's the initial potential seam anomaly size (depth and length)?

Overpressure events can seriously shorten time to failure cycling estimates

Cycling analysis on pipelines requires very large safety margins

Industry standards on cycling guidance may be very incomplete

Inadequate Industry Standards

Incorporation into U.S. Pipeline Safety Regulation

A way to dilute pipeline safety regulations without proper public feedback

Industry controlled – limited public access restricts feedback

Industry can weaken standards, not strengthen

Standards getting dummed down?

Too long, too complex for simple technical issues

Example - ASME B31.8 851.12.1 - 2007 Pressure Test Levels for in service pipelines, in subsection:

(a) - At least 90% SMYS, or

(c) - Minimum 1.10 x MAOP?

How did subpart (c) get approved, and which subsection rules?

New vs Old Pipeline

Serious misperception in this area

- Lots of old pipe properly managed is just fine

- On older vintage pipe, should be able to clearly identify why replacement decision is merited

Too many new pipelines not fine!

- Lowering / weakening of industry standards

 - API 5L

 - Girth weld radiological inspections need improvement

- Loss of QA/QC checks and balances

New pipelines aren't always better than old pipelines

- Seeing too many ruptures in new pipelines

- New pipe just shifts the risk threats if not prudently managed

- PHMSA working on this issue for new pipe

PIR in TIMP

PIR = Potential Impact Radius for rupture

Much discussion / many misapplications

Never to be a siting tool, but first pass TIMP screening tool

For San Bruno Rupture

PIR = 414 ft

Serious damage > 750 ft

For the record PIR is not “area,” as R stands for radius

San Bruno indicates more work needed on PIR for larger diameter pipe

Require aerial photo to PHMSA within days of all gas ruptures

Latest ANPRN suggest PHMSA knows!

Valve Spacing/Automation

Still much misinformation / propaganda on RCVs and ASVs!

Is gas transmission “local or interstate”?

Local transmission usually means much greater cycling threats

Triage goal drives valve automation / spacing decision

California has set rupture triage target of a maximum of 30 minutes

Valve spacing / actuator decision driven mainly by three phases:

Response time (identify rupture / initiate valve closure)

Time to physically close valves time (especially long for larger manual valves)

Isolation blowdown time after valve closed

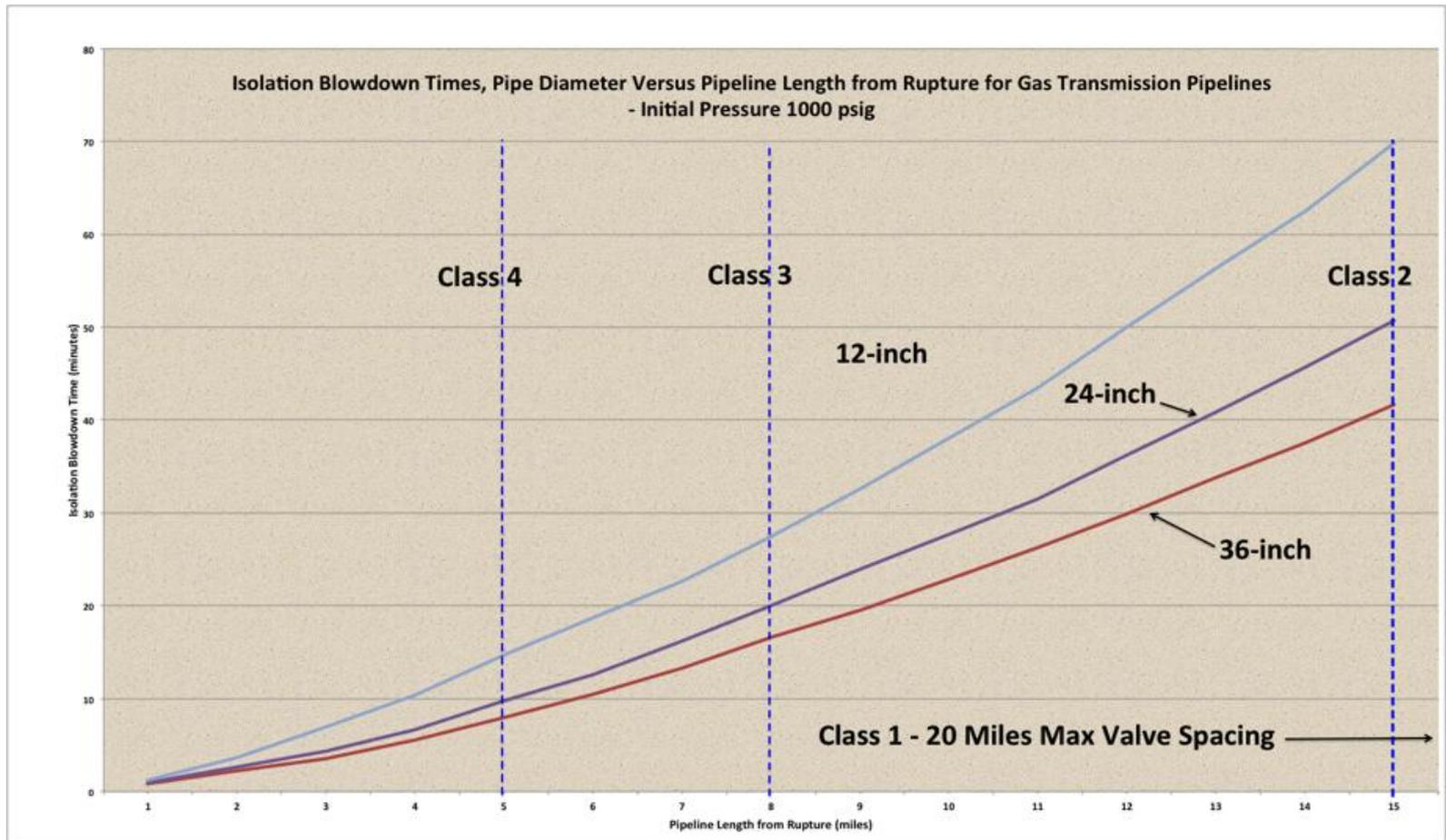
Diameter

Valve Spacing

MAOP

Friction factor

Gas Transmission Rupture Isolation Blowdown Times vs Pipeline Diameter & Length



From industry study capturing transient flow rupture dynamics

Valve Spacing Automation (cont.)

Paradigm shift required by many in industry

We are talking HCAs!

One hour response not credible

Forget the most damage occurs in 5 minutes spin

It is time for “smart automated valves”

NTSB and PHMSA get it!

Follow process safety management approach

Valve automation isn't free!

Design and install correctly

Don't overload the control center operator!

Properly designed ASVs much faster than RCVs

PHMSA has started the valve study process required by new law

Emergency Response / SCADA

SCADA gas rupture detection much harder than it looks

Major control center deficiency signs:

- Overloading Control Room with wrong information and equipment

 - Control center operator set up to fail

 - Alarm overload?

- Mixing major gas transmission and distribution operations

 - Vastly different emergency response

 - Different command / control

Not using Incident Command System

- When does control room hand off?

Emergency Response / SCADA (cont.)

Emergency Response Plans (ERPs)

Confusing valving decisions on rupture

“Time to triage” goal drives valve decisions

Recognize control room’s critical role in early stages of rupture

ERP solutions not that difficult nor that complicated!

New federal CRM regulation not clearly understood

Concluding Comments

PG&E appears to not be an isolated situation

State CPUC/CPSD appears spread too thin

Underfunded, understaffed, inexperienced, past ownership of events leading to San Bruno

Many demands confusing safety priorities

Confusing ratemaking and pipeline safety

Ignoring obligations of TIMP

Accufacts' Recommendations

PHMSA needs to take lead of CPSD in management of TIMP programs

- State with the largest HCA mileage in the country

- CPUC decision process not adequately addressing federal TIMP requirements for in service pipelines

- PHMSA has specialized TIMP technical knowledge, experience, and skill

- Develop TIMP Compliance Plan for PG&E within two months

 - Indicate priorities/timelines, and be made public

 - Define prescriptive actions to assure rapid compliance

 - Independent of CPUC ratemaking process

States cannot ignore or violate minimum federal pipeline safety regulations (especially TIMP)