OCC
Pipeline Safety Seminar
September 2011

Construction Issues

Safety – Where are you standing?

Pipe on skids can move and fall. You want to park where!

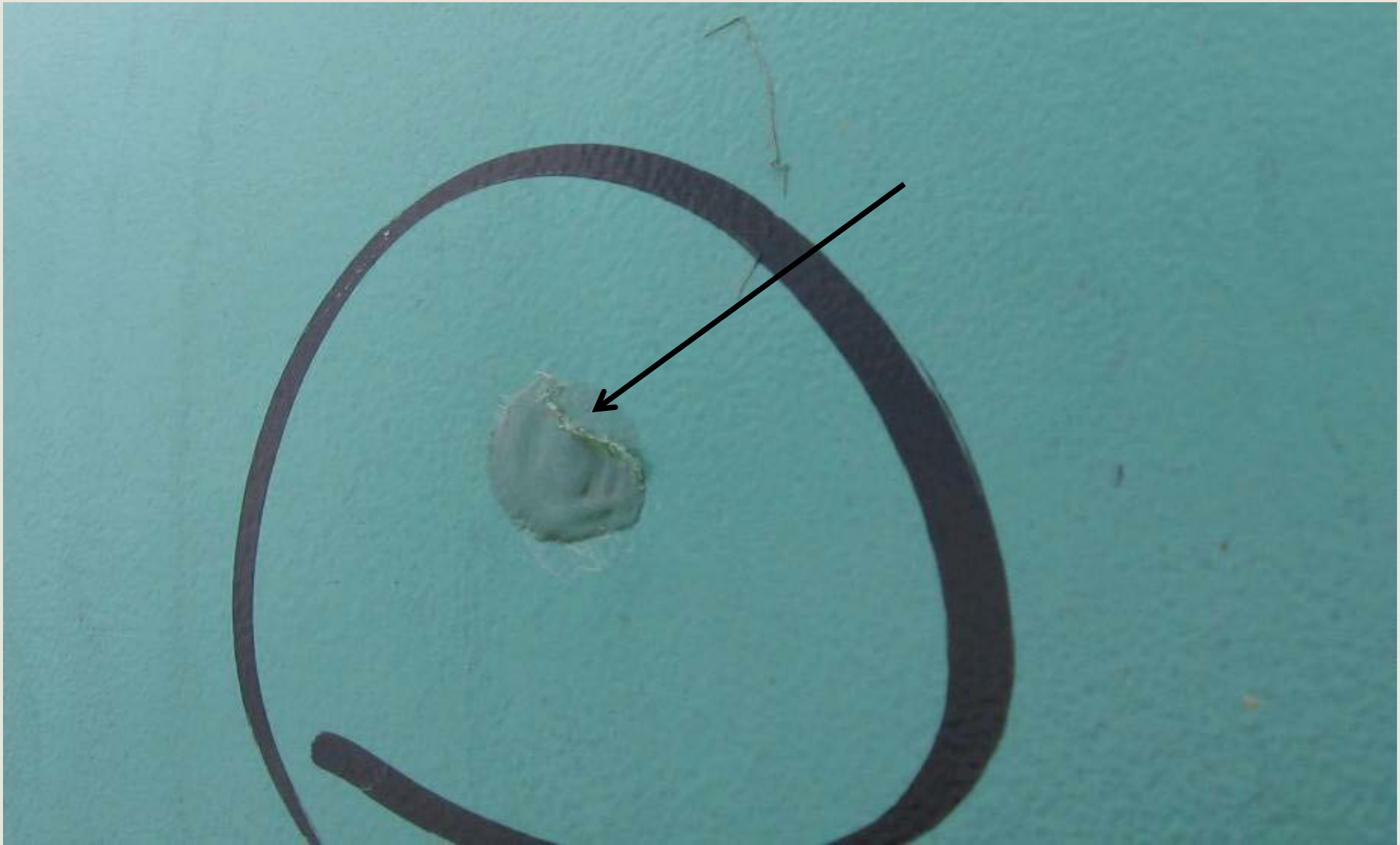
Do you want to be under these wires or near this equipment?

Patch Stick Issues

- Poor application practices.
- Soil stress can remove poorly installed patch stick repairs.
- Heating the patch stick and dripping the product on the coating holiday is not acceptable.

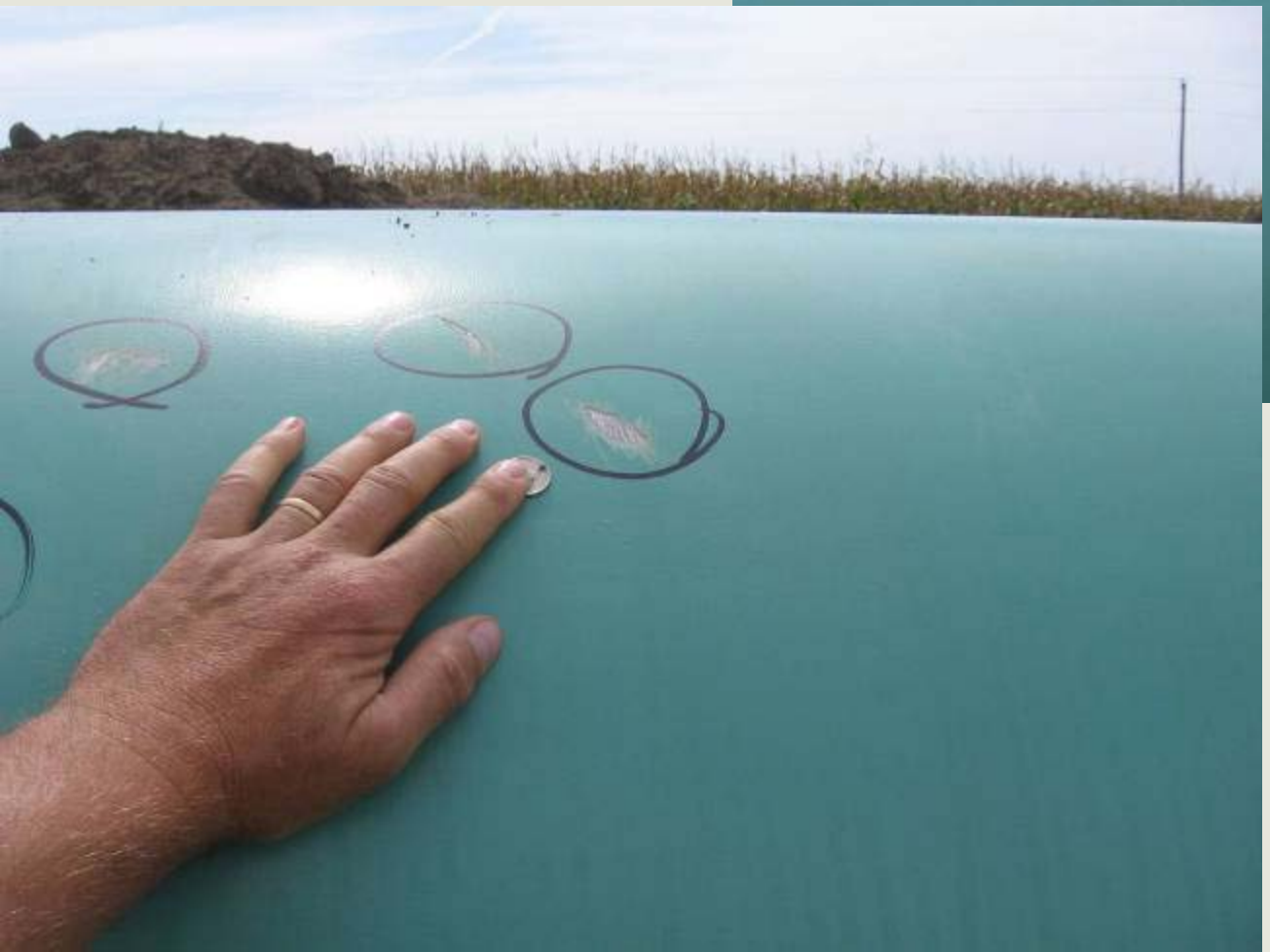
The photo shows a poorly adhered patch stick repair. This was found while uncovering a newly built pipeline.

Manufacturer’s procedures for patch stick application must be followed. The photo shows that a fingernail was able to scratch off an applied patch stick repair

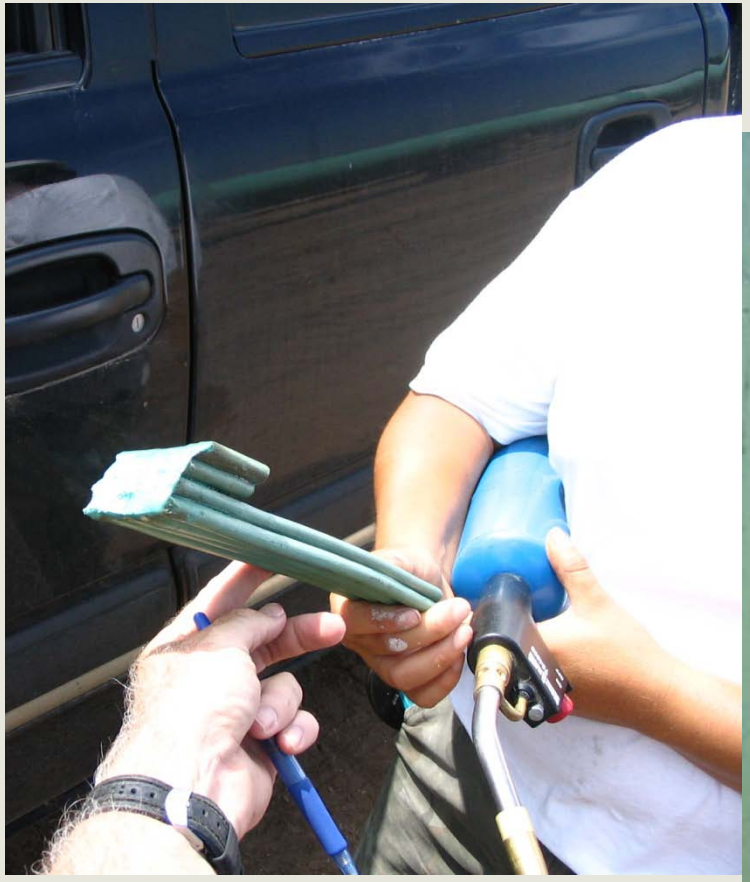


Good patch stick application - notice heated/discolored area around patch, this indicates that the pipe was heated before and during patch stick application

Patch Sticks are only for pinhole or abrasion repair. 2 part epoxy should have been used.



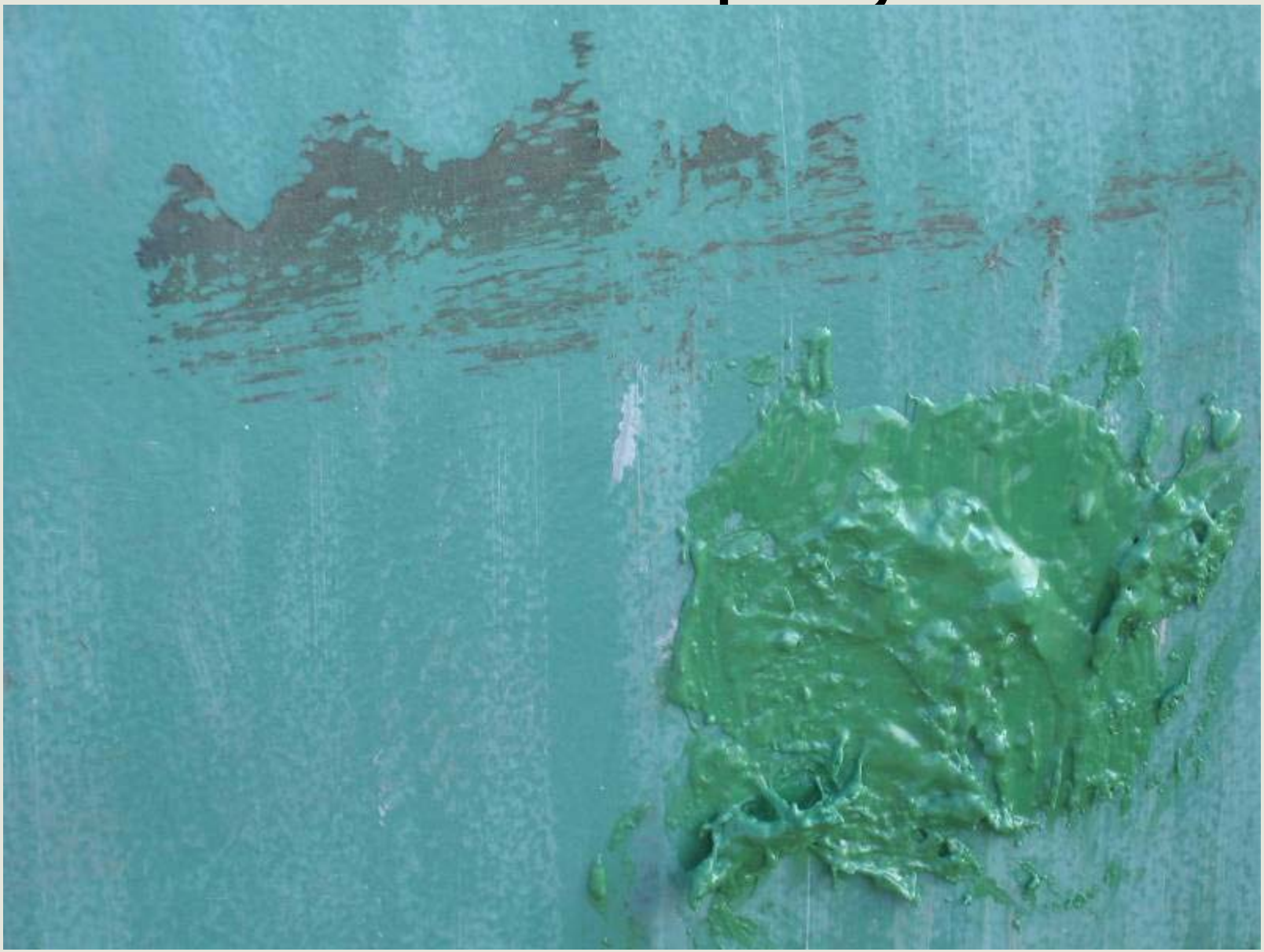
Seriously!!!!



2 part epoxy

- Follow manufacturers instructions
- Preparation required (Sanding = anchor pattern)
- Thoroughly mix product
- Use promptly
- If products starts to cure before application the repair presents the appearance of the next slide

2 Part Epoxy



Electronic Holiday Detection (Jeeping)

- Visual inspection must supplement jeeping
- Problems identified
  - Bent defective spring
  - Not identifying and repairing all “jeeps”
  - Passing over visible holiday without the jeep sounding
  - Based on experience, jeep voltage may need to be set as high as 3500v to detect coating defects

Are the workmen finding coating holidays? Do the workmen operating the jeep have time to find and repair coating holidays?

A bent jeep spring can miss coating holidays

Duct tape can shield coating holidays

- Manipulating the jeep spring over building fiberboard stuck to the pipe is poor practice

Just jeeping at skids only on lowering in is not usually per construction procedures

- Look for coating holidays in the ditch.
- Observing these indicates a problem.


20152+78


2032+68

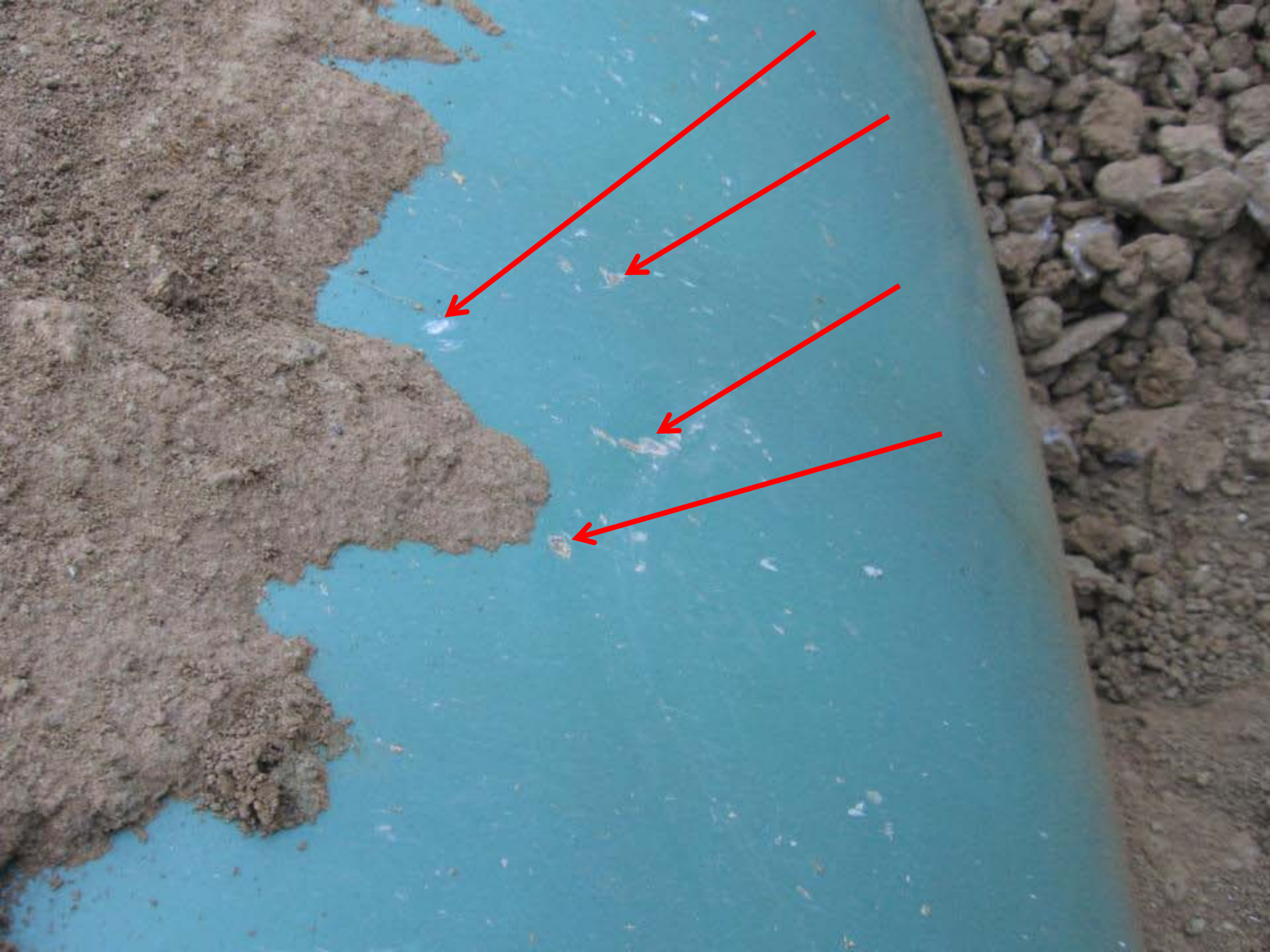
Thin Film Epoxy Issues

- Insufficient heating (3M procedure specify 425 – 488 degrees F - lower temperatures could mean improper curing)
- Over heating during application can be a problem (the coating looks burnt and is unacceptable)
- Poor sandblasting

425°F to 488°F

Girth Weld Coating


DANGER
STAY CLEAR
DANGER
STAY CLEAR



Gouges and Bending

- Gouges – consult procedures
- Acceptable wall thickness?
- < 1% diameter?

Proper burial depth on bores?

Is the pipeline buried deep enough and protected from erosion?

High Mechanized Defect Rate

- Causes
- Pipe sizing issues
- Inexperienced welders
- Start up issues
- X-ray or AUT falling behind eliminates timely feed back. Feed back is a valuable tool to improve weld quality.

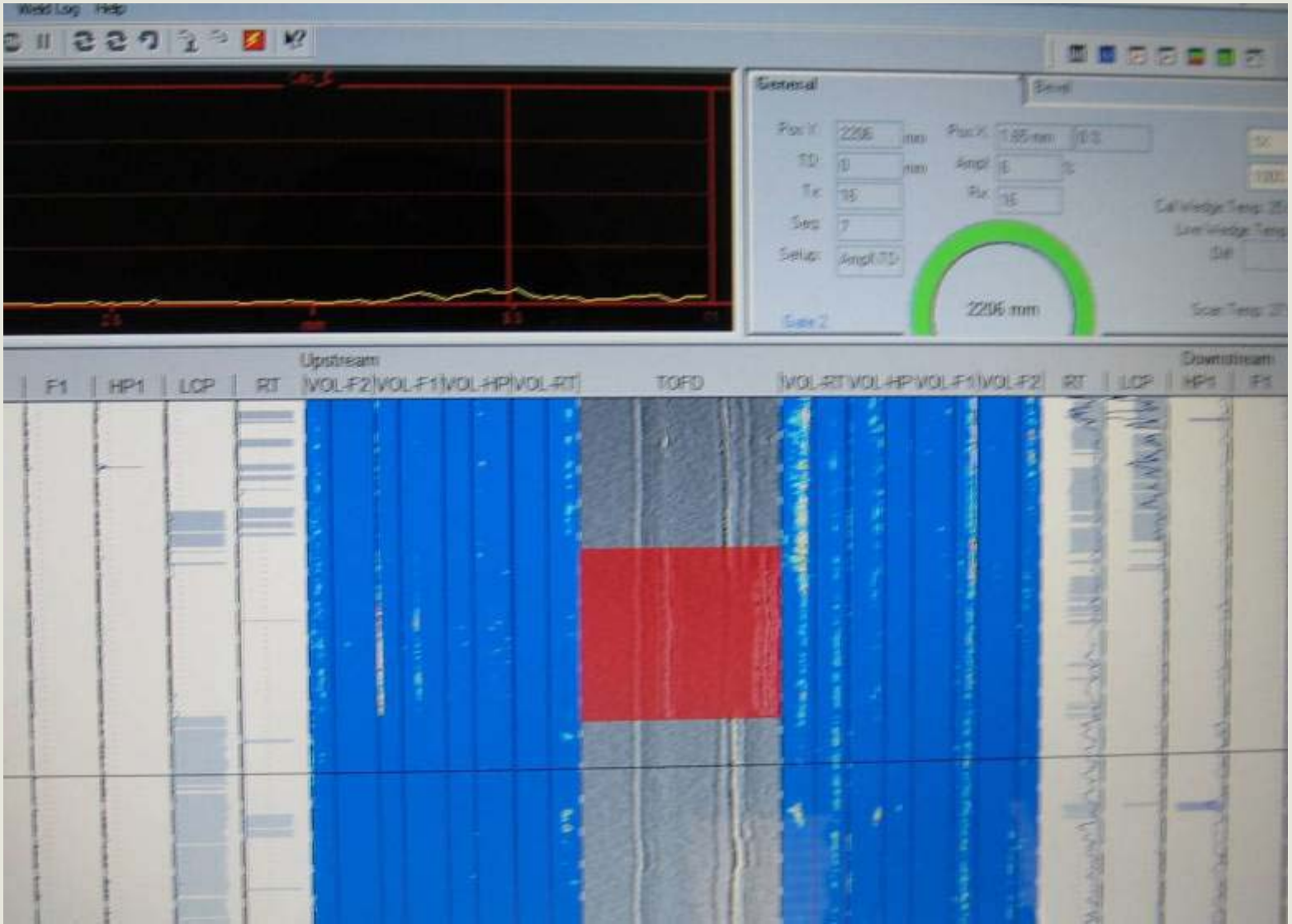
The welding procedure allows how much high-low?

High Mechanized Defect Rate

- PHMSA Concerns:
- Having defects not an issue.
- Defect repair, NDT and tracking is an issue.
- Industry experience usually shows
  - 2 – 10% defect rate on mechanized welding
  - 2 – 7% for semi-automatic welding
  - 2 – 5% on manual welding

Laminations can be an issue especially associated with an 80% waiver

AUT, automated ultrasonic testing, easily shows laminations



Preheat

- Heating the weld joint before welding
- Temperature of the weld joint immediately before the arc is struck.
- Procedures state Contact Pyrometer, or Temperature Indicating Crayon
- Range of preheat values found in the welding procedure

Use of Temperature Indicating Crayon

- Temperature indicating crayons (Tempilstik) are specially formulated to melt at a specific temperature.
- On a cold pipe surface upon heating the mark changes color and melts at the specific temperature
- Used on a hot surface the crayon only indicates the temperature is greater than the specified temperature on the crayon if the crayon melts

Use of Temperature Indicating Crayon

- Applying the crayon on an area adjacent to a weld joint and then heating with a propane torch directed on the mark will give a false temperature indication. In this case the flame heats the crayon mark faster than the pipe. The pipe will not be up to the required temperature.
- The crayon should be used after heating and two different temperature crayons may be necessary to determine the preheat is within the welding procedure.

Temperature Indicating Crayons

The crayon holder specifies the melt temperature.

Preheat

- What should workman do if the weld joint is too cool? (add more heat) What do you do? (document occurrence)
- What does welder do if the weld joint is too hot? (allow joint to cool) If the welder does not wait, what do you do? (document occurrence)

Interpass Temperature

- The temperature at a location near the start position of the welding arc(s) recorded immediately before initiating consecutive pass or passes. (from Appendix A)
- Minimum Interpass Temperature – generally preheat temperature
- Maximum Interpass Temperature – highest temperature allowed to start welding.

- If the procedure states the Maximum Interpass Temperature is 350 degrees F and the pipe measures 360 degrees F – What should welder do before starting to weld? (allow joint to cool) What should you do if the welder starts welding at a temperature above the maximum interpass temperature? (document the observation)

Must follow welding procedure

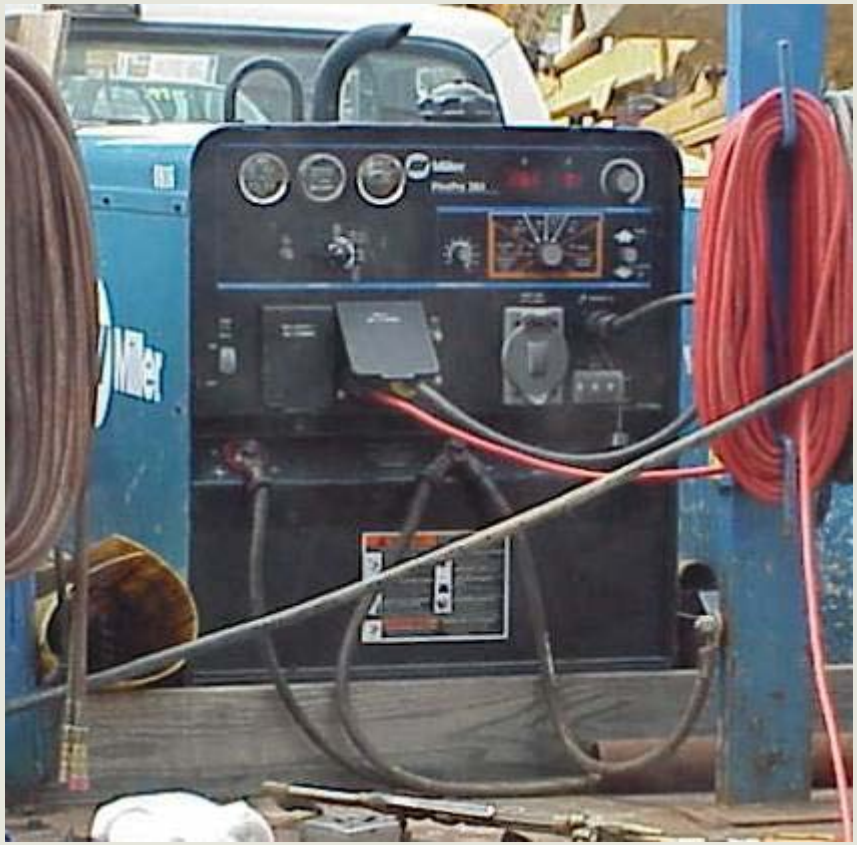
- Some items to check
  - Bevel configuration
  - Electrodes – rods – filler metals
  - Electrical parameters
  - Speed of travel
  - Weld dimensions

Welding Procedures

The procedure states 20 – 40 cfh shielding gas flow rate. Does the photo show an acceptable value? (No)

Electrical Characteristics

- Values displayed on welding machines should be within the range of the WPS.
- Machine is not calibrated but usually close.
- If outside procedure use calibrated clamp-on.




serimax


LOG
UP
DN
NEXT
PREV
Welding Measurements
Lead
Trail
Pass
From Supply Volts V
From Supply Amps A
Wire Speed in/min
Tracking
Travel Speed in/min
Tilt °
Distance From Top in
22.60
222.0
434.1
Vertically & Horizontally
19.9
124.

Welding procedure required 250°F preheat

Band Damage

Welding Band Damage to Coating

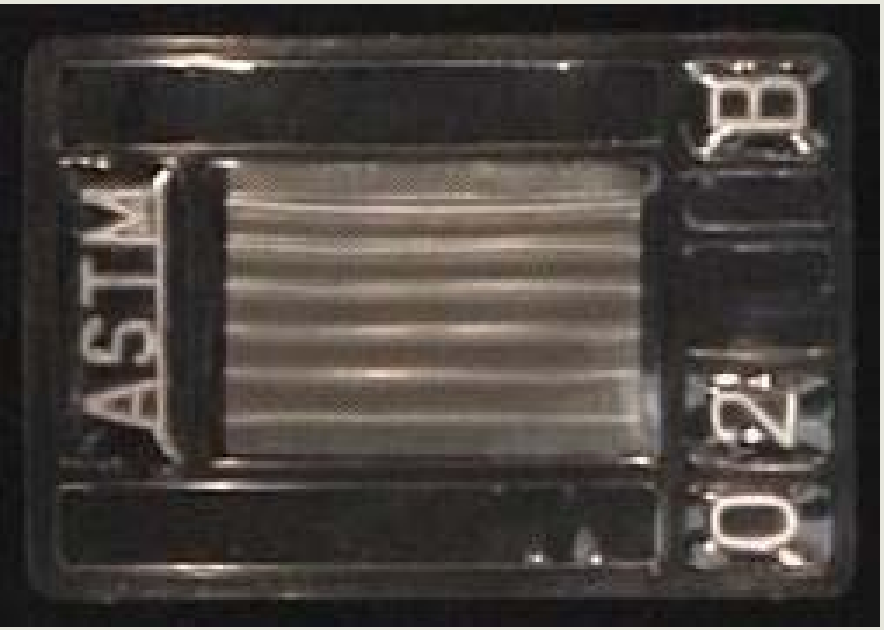
Inspection Requirements

- Large variation in inspector competency
- What are the inspectors responsibilities?
  - Welding inspector must be knowledgeable and competent
  - Verify welding procedure is followed
  - Observe
  - Document
  - Report
  - Correct
  - Work stoppage

Image Quality Indicators

Image Quality Indicators (Penetrameters)

- PHMSA (OPS) recognizes the 20th editions of API 1104. The 20th edition **only** allows the use of Wire Type Image Quality Indicators.



Refer to Table 5 API 1104 20th Edition

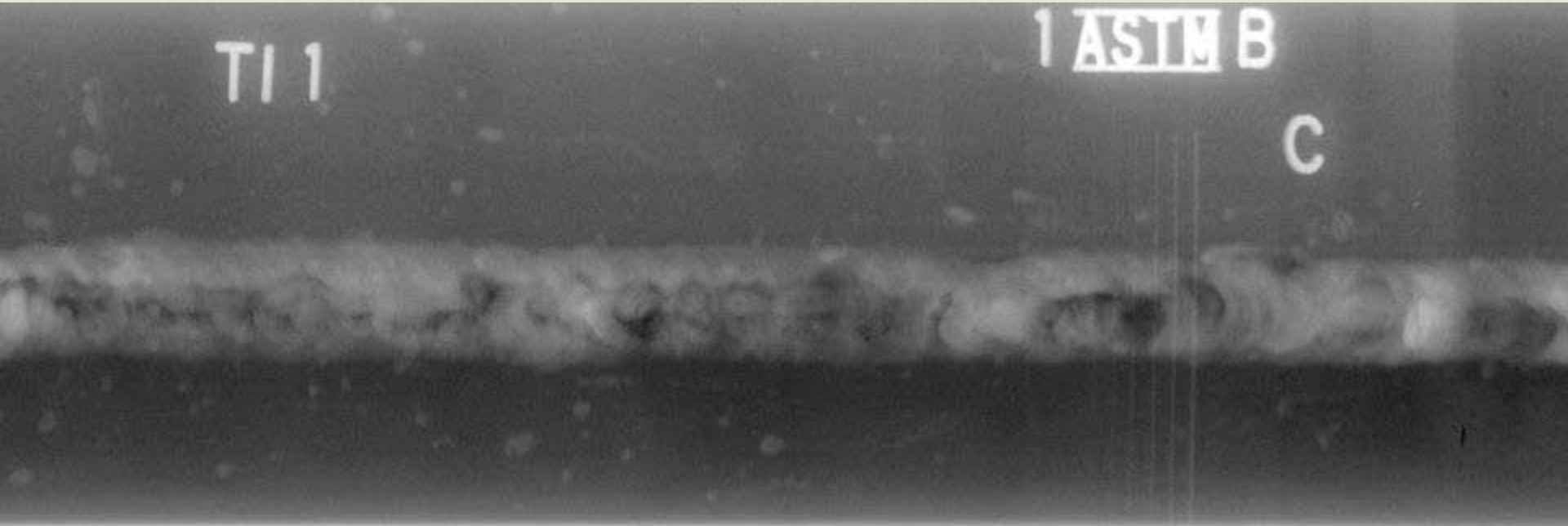
Weld Thickness Inches	Essential Wire Diameter Inches	ASTM Set Letter
0–0.250	0.008	A
> 0.250–0.375	0.010	A or B
> 0.375–0.500	0.013	B
> 0.500–0.750	0.016	B
> 0.750–1.000	0.020	B
> 1.000–2.000	0.025	B

ASTM E 747 IQI
Wire Sizes for A – B Packets

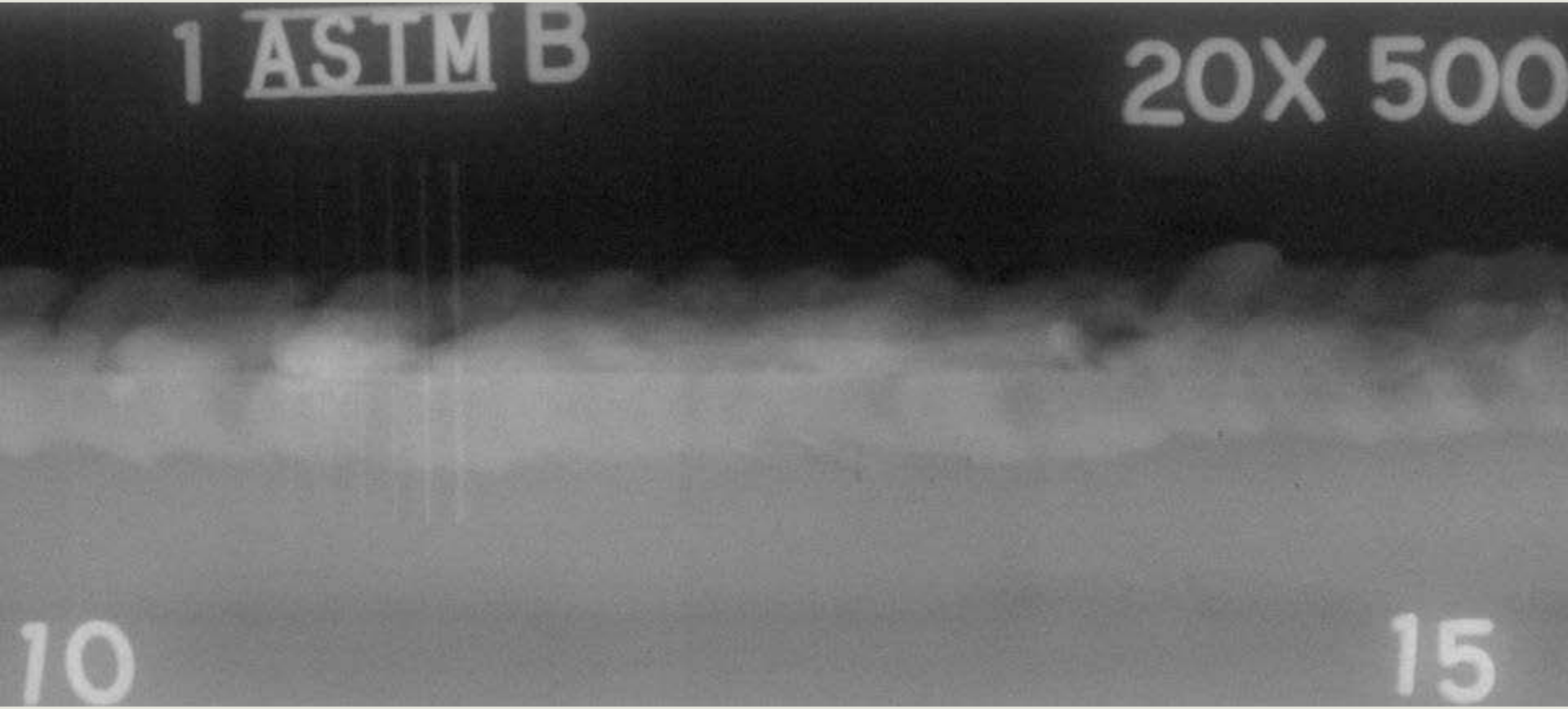
SET A	SET B
0.0032	0.010
0.004	0.013
0.005	0.016
0.0063	0.020
0.008	0.025
0.010	0.032

ASTM Type B Packet

The complete outline of the essential wire must be visible and not obscured by number belt.



Is the radiographic density per API 1104 or operator's procedures?



Radiographic Requirement

- Both Parts 192 and 195 require a certain percentage (based on location or class location) of welds be nondestructively tested and that a percentage of a welders daily work product must be nondestructively tested.
- If the radiographs' image quality indicators are not acceptable, or the radiograph is unacceptable, then there may be insufficient numbers of radiographs to meet the percentage and/or daily requirements of the applicable code.

Radiographic Problems Identified

- Poor radiograph technique - so bad minimum % could not be achieved
- Poor radiograph developing practices
- Fogged Film and/or artifacts
- Radiographs too dark or light – Density (H&D) out of operator’s specification or API specification
- Improper or poor radiographic interpretation
- Missing one or more segments of the weld radiograph
- Segments of radiographs do not overlap
- Missing radiographs when compared to weld maps

Radiographic Problems Identified continued

- No repair radiograph
- Radiographed wrong defect area (multiple repairs)– should be able to match up unrepaired areas of repair radiograph to original radiograph
- Numbering irregularities (Changed numbers with magic marker)
- Radiographing same weld twice or multiple times and changed weld identification numbers
- IQI issues – essential wire not visible
- Poor radiographic technique used on transition welds – especially if there is a large difference in thickness

Facility Locations	Welds >6”	# films poor quality	# require repair	# duplicated
Location1	357	52	5	0
Location 2	1093	147	8	0
Location 3	333	55	4	0
Location 4	346	131	11	0
Location 5	310	20	9	0
Location 6	823	106	8	0
Location 7	895	26	4	0
Location 8	215	14	3	0
Location 9	716	16	0	0
Location 10	139	16	0	0
Location 11	139	54	0	53
Location 12	391	83	3	9
Location 13	150	43	3	0
Location 14	526	77	4	0
Location 15	913	144	29	21
Location 16	1400	187	9	141
Location 17	1126	486	17	89

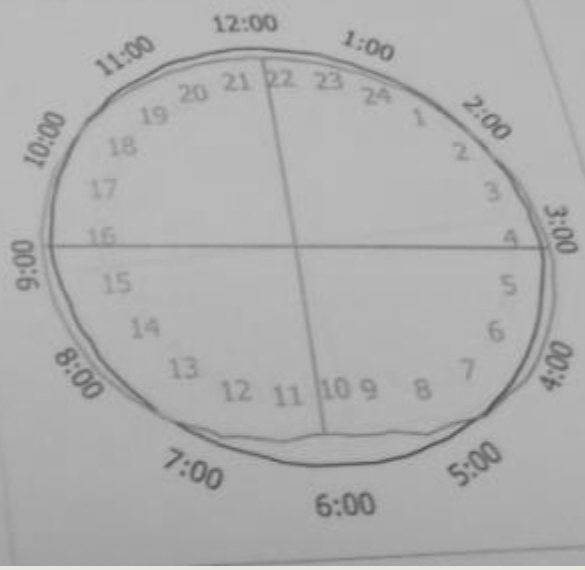

CAT


CAT
CAT


Seriously???

Enduro Sta: 24+43.50 Customer Sta: 28908+29.8
Wall Thickness: 0.555 in
Min CSD: 38.782 in Max CSD: 42.159 in
Deformation - Ovality
Orientation: 06:06
Depth : 2.023 in
%OD : 4.818 %
Length: 546.00 in
Affects girth weld
Field Reported

Upstream Weld # (West Weld): IAMG-0030
Downstream Weld # (East Weld): IAMG-0031



Prig #
Cust #
29640+45.50
29623+38
29823+08.0
29831+09
Valve
0.585/0.74
30.06 deg Up & Right Turn
0.740/0.689
Valve
44.2 deg Down Turn

Enduro Sta: 364+36.00 Customer Sta: 29823+08.0
Wall Thickness: 0.740 in
Min CSD: 34.108 in Max CSD: 41.624 in
Deformation - Dent with associated ovality
Orientation: 11:58

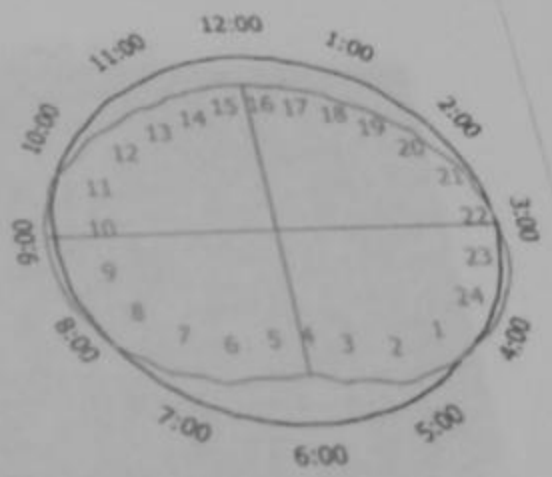
	Dent	Ovality	Total
Size:	1.194 in	2.579 in	3.773 in
%OD:	2.843 %	6.141 %	8.985 %
Length:	18.00 in	324.000 in	324.000 in
Width:	58.28 in		

Estimated dent size after excavation: 1.194 in
Affects girth weld
Field Reported

Possible Debris

Upstream Weld # (West Weld): IFT-205
Downstream Weld # (East Weld): IFT-229

AJ called in 809-349A3 survey



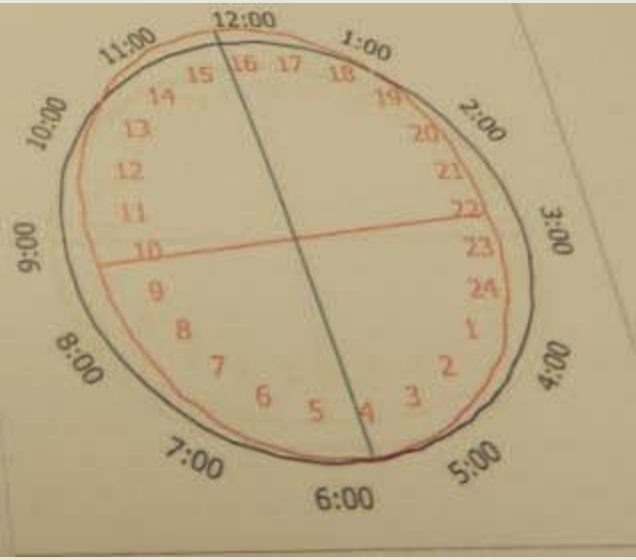
Wall Thickness: 0.888 in
Min CSD: 37.615 in Max CSD: 41.747 in
Deformation - Ovality
Orientation: 02:50
Depth : 1.982 in
%OD : 4.720 %
Length: 144.00 in
Affects girth weld
Field Reported

Upstream Weld # (West Weld): IHTT-60
Downstream Weld # (East Weld): IHTT-58R

809-509B2 Survey Station: 29741+65.6

This "trimmed to fit" bend appears to be under stress. Further analysis will be needed in this area to verify.

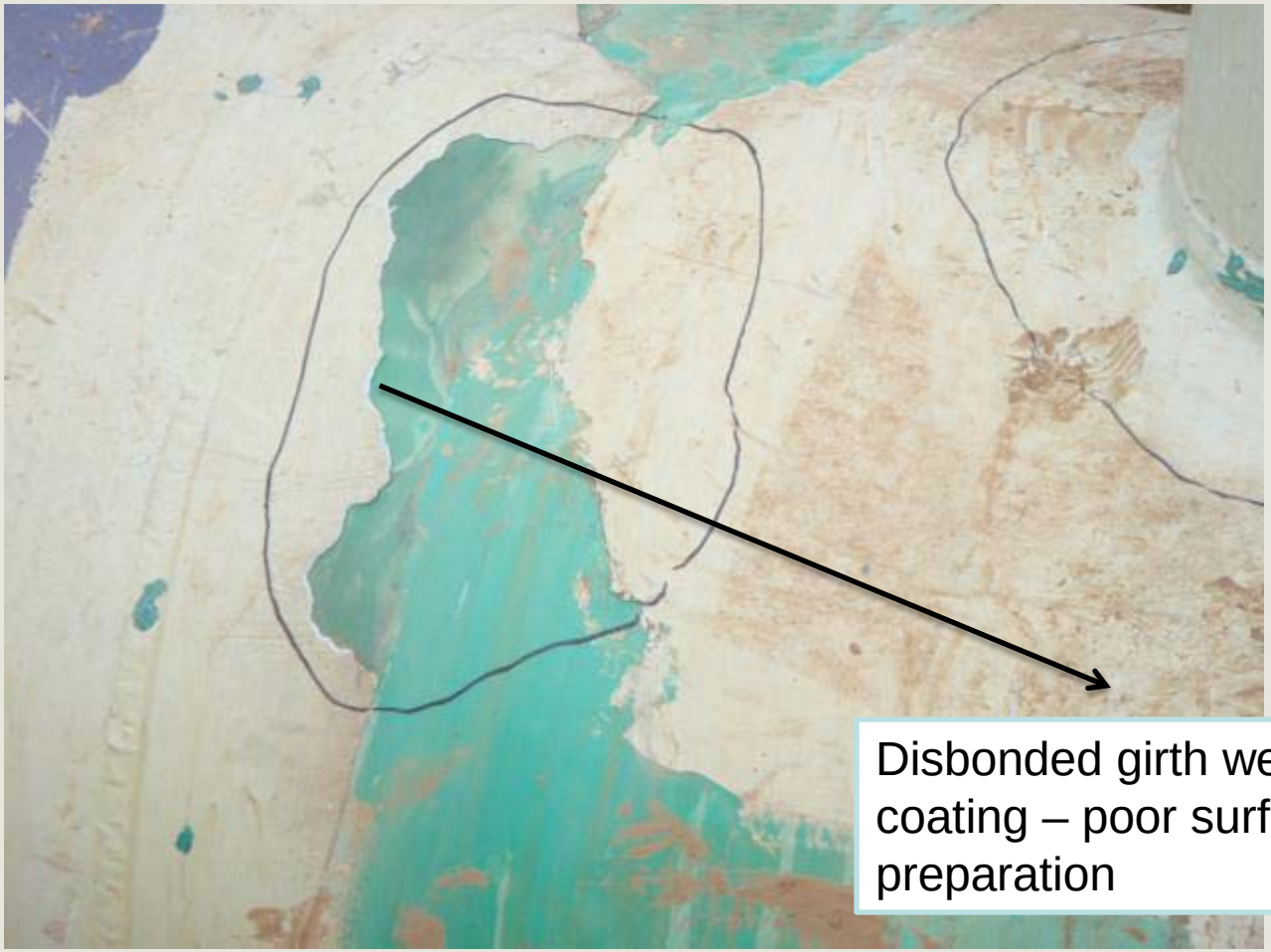
Possible stress located at this bend. A measurement for stress on this bend will not be very accurate due to the debris induced vibration seen on the upstream side of this factory bend.



Anomaly Dig

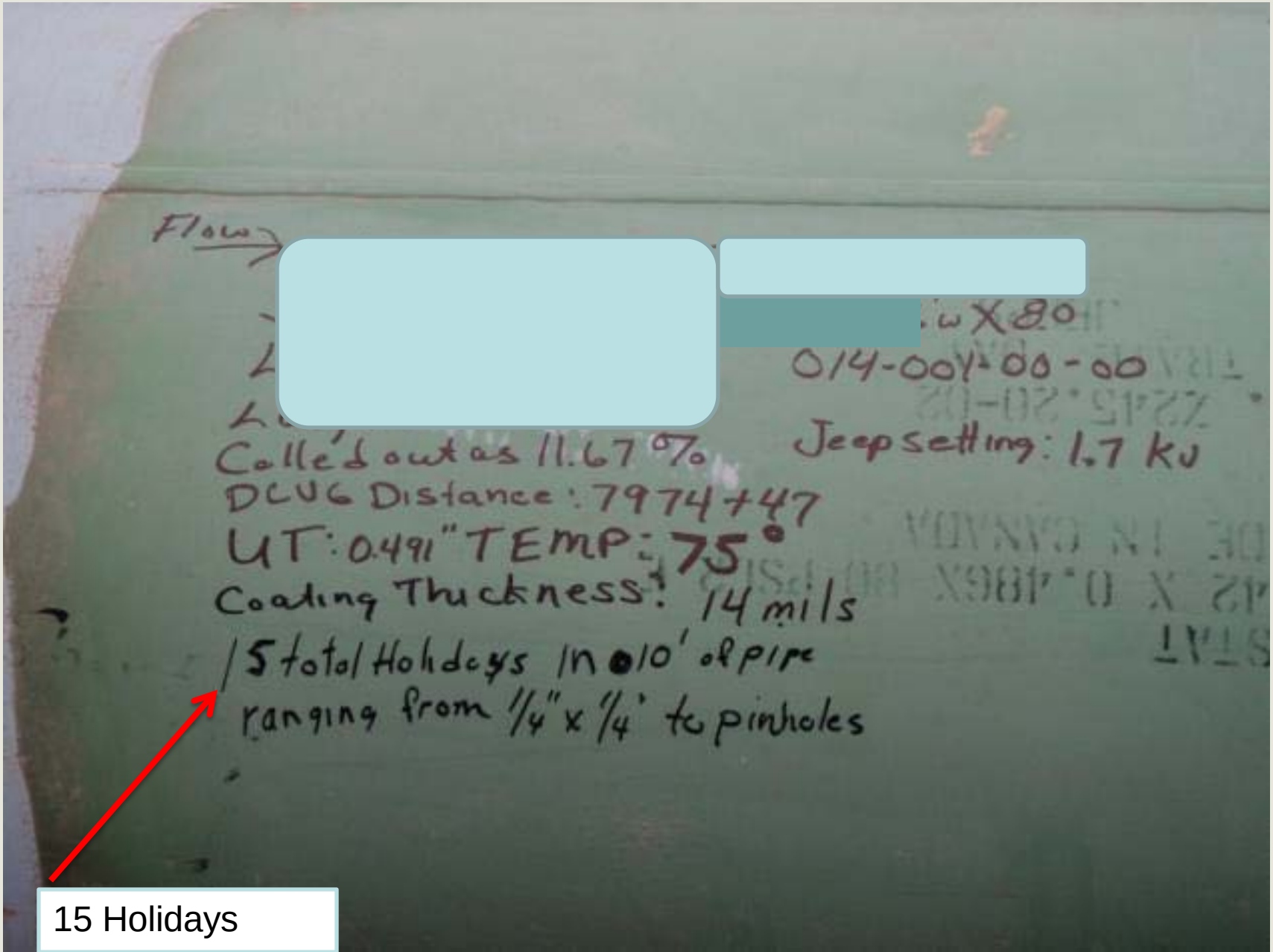
Pipe on Solid Rock

DCVG Dig on First Phase

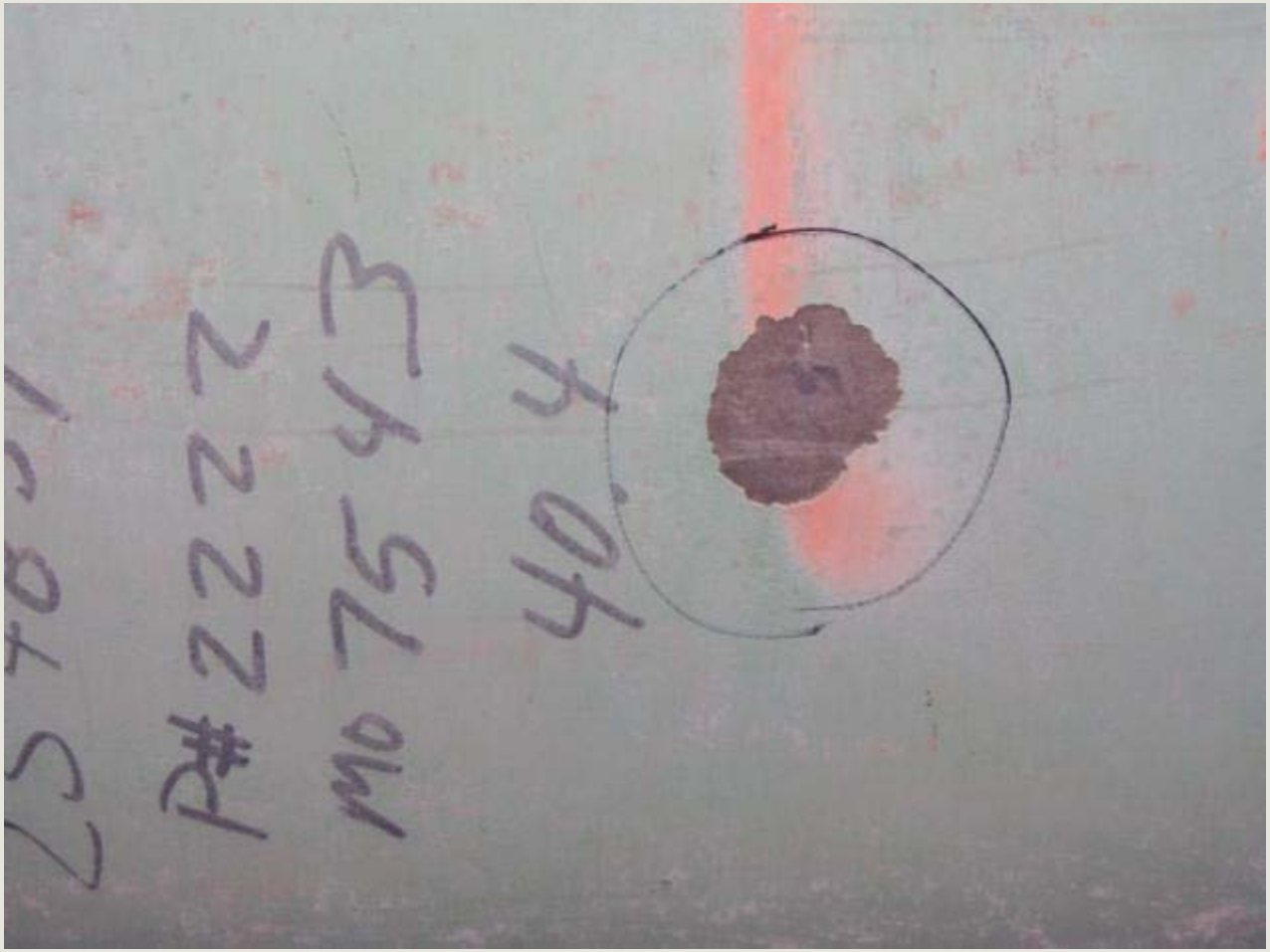


Disbonded girth weld coating – poor surface preparation

DCVG Dig


Flow
Called out as 11.67%
DCVG Distance: 7974+47
UT: 0.491" TEMP: 75°
Coating Thickness: 14 mils
15 total Holidays in 10' of pipe
ranging from 1/4" x 1/4" to pinholes
Jeep setting: 1.7 kV
15 Holidays

DCVG Dig



DCVG Dig on First Phase – Girth Weld Coating Mixed with Backfill

- §192.317 Protection from hazards.
- (a) The operator must take all practicable steps to protect each transmission line or main from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads.

Are there sufficient weights?

Protected from rocks in the ditch?

Pipe Defect – Does remaining wall thickness meet requirements of API 5L?

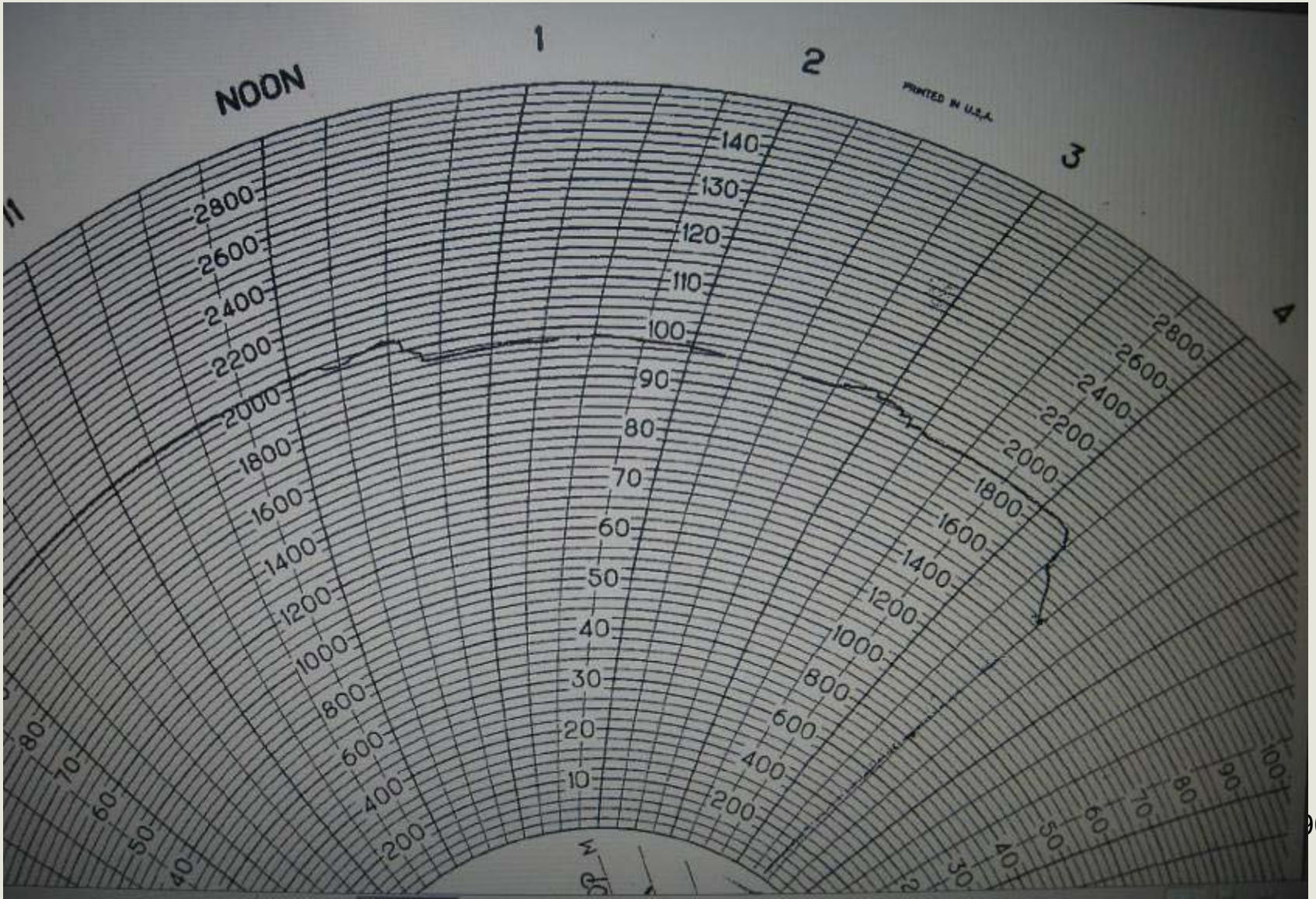
Long Seam Location 195.212

Grinding Remaining W.T.

Hydrotest

- Procedures should include provisions for cold weather testing (if not see next slide)
- Pressures should be maintained at least 8 hours for buried piping. Any pressure decline should be investigated. A second pressure test may be warranted. (See chart of failed test)

Chart shows pressure loss last 3 ½ hours



Arc Burns

- Arc burns are not acceptable on high pressure gas pipelines and liquid pipelines.
- The following slides show that arc burns can happen during internal back welding.

The external weld was completed in the trench box. Then the welder crawled inside and completed the back weld. This was a transition weld between 0.740 and 0.486 wall thickness pipe. The welder struck the arc multiple times inside the pipe and missed the bevel multiple times.

Inspection Tips

- Notify Operator contact. Be considerate.
- Naturally an adversarial relationship.
- Be professional and courteous.
- Observe
- Ask questions then listen.
- Take notes
- Take photographs
- Know locations
- Know construction procedures and operator’s plans and procedures.
- Argue or not? Pick your battles.
- Report
- Do not direct contractor or employee’s actions
- Direct contractor questions to the inspection company (take note of occurrence and report; ask yourself why is the workman asking you questions about construction practices)

Mile Post – Engineering Station

- 4356+05

- 435605 / 5280 = 82.5 = MP

Lessons Learned

- Ineffective Contract Inspection - Much more Operator Oversight Needed
- Some Jobs – Particularly Coating - are an Issue
- Mechanized Welding can Work Well – However, much care and attention needed at Startup
- Some Spread Contractors Needed Extra Attention
- The Combination of Poor Inspection and a Contractor Not Following Procedures Can Lead to Major Problems
- Deadline Urgency from the Operator is an Issue
  - Contract Incentives for early completion

Quiz

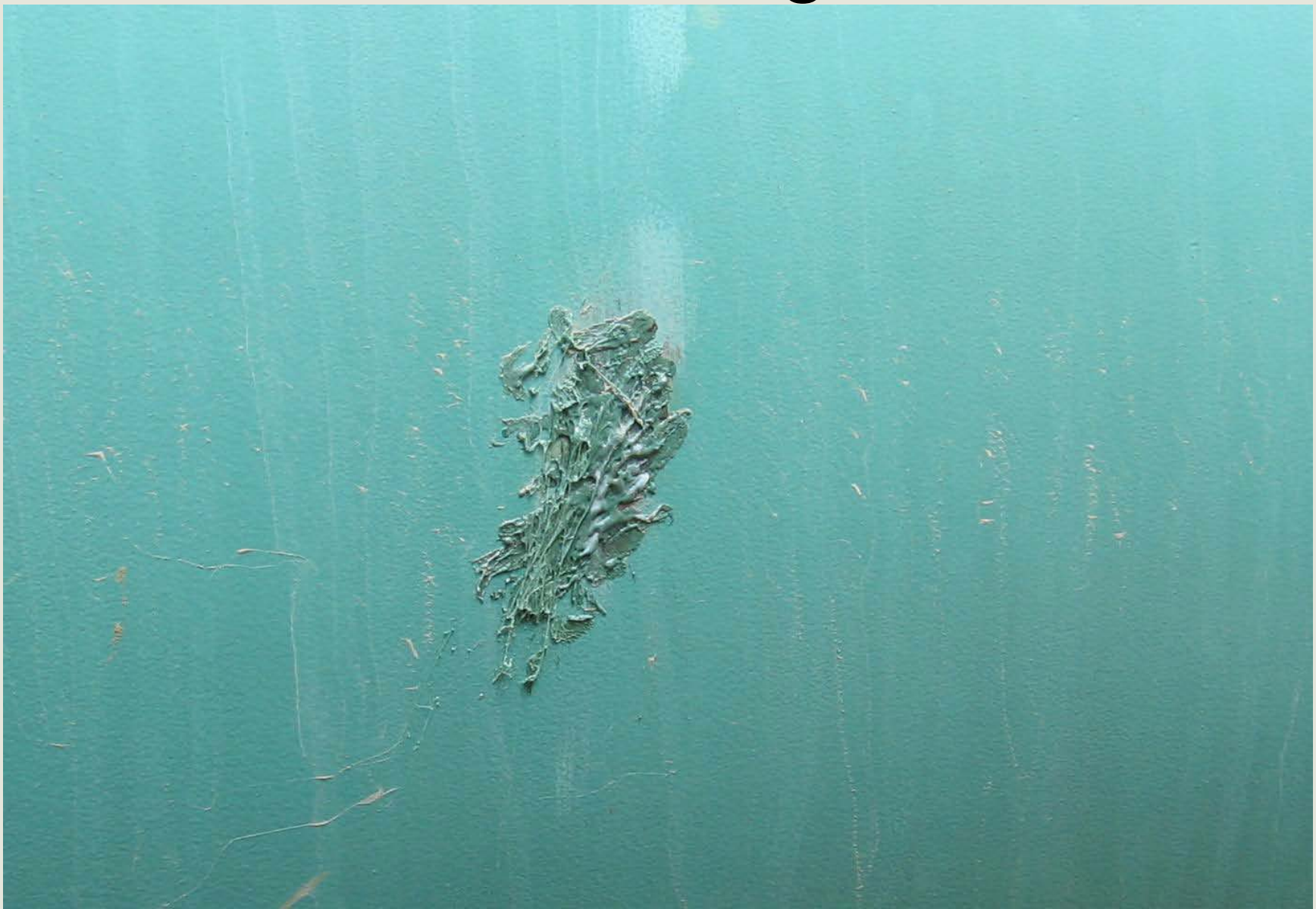
Guess what's wrong associated with welder qualifications

Denso 7200 – What's up?

What is wrong with this coated girth weld?

What is wrong with this lowered-in pipe?

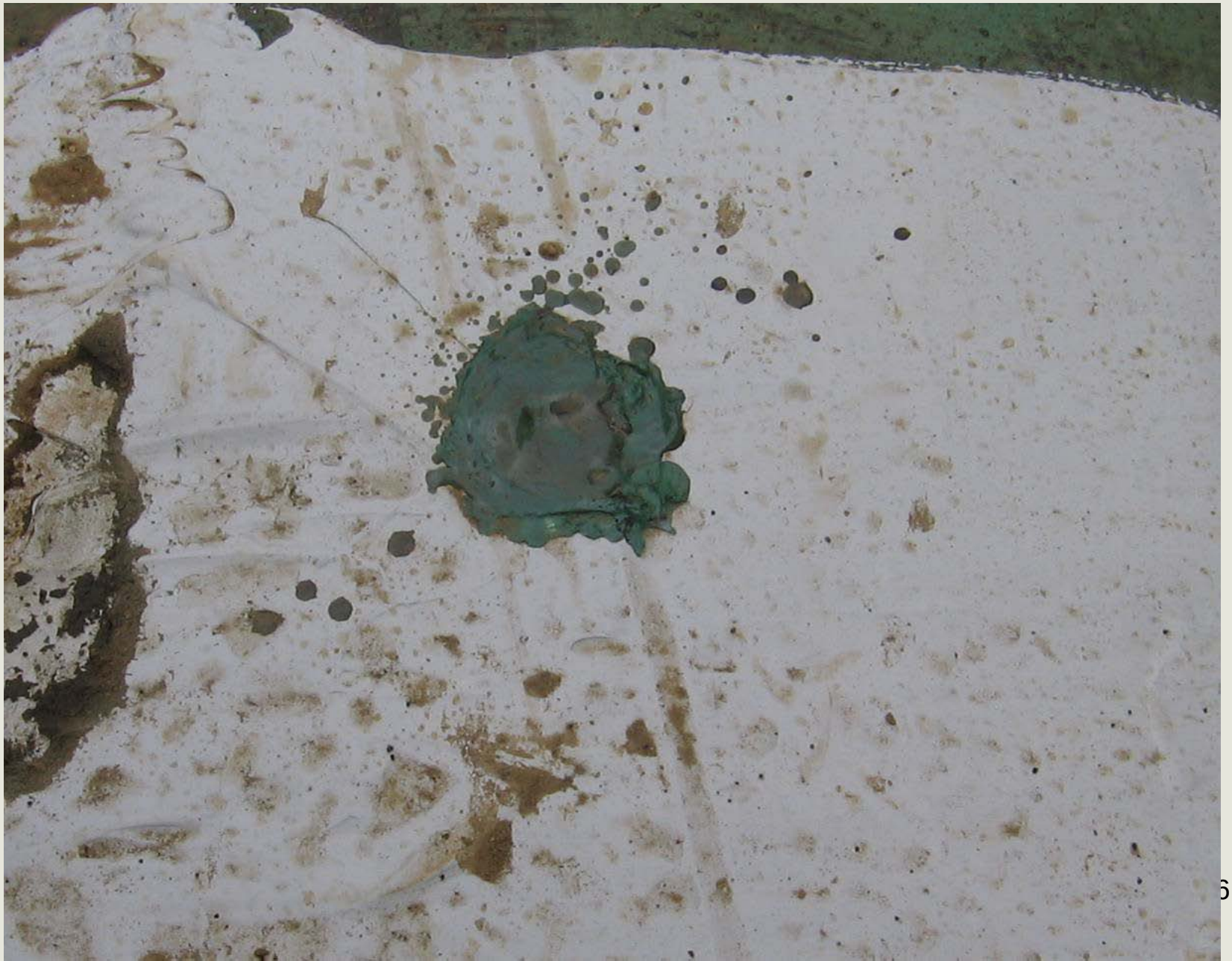
Guess what wrong with this?



Any idea what happened?

What’s up here? Who’s at fault?

What is this?



Anything out of the ordinary?

What caused this coating damage

What caused this reoccurring coating defect?

What is going on here? Hint associated with welding.

What’s up with this thin film epoxy coating ?

The gauge measures 7/16”. Is this okay?

Thoughts?

Contact Information

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