



Joint Stock Company  
Scientific & Production Association  
**Spetsneftegaz**

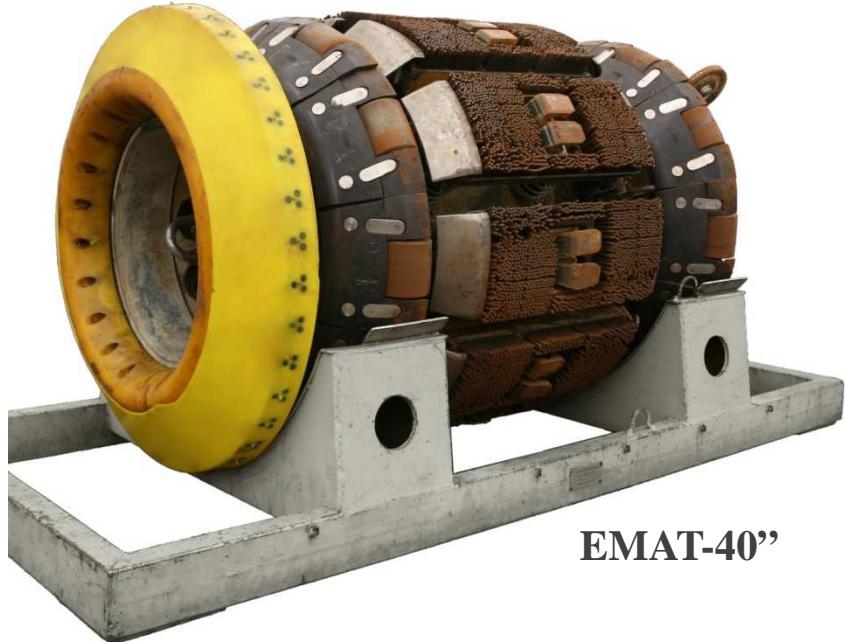
## EMAT TECHNOLOGIES

DETECTION OF PIPELINE CRACKS  
CHECK UP OF COATING QUALITY

 RUSSIA



# EMAT in-line inspection tools of big diameters



**EMAT-40"**



**EMAT-56"**



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# Pipe Pull-through Test Stands at Spetsneftegaz Production Base



Check up of disbanded coating zones  
In pipe pull-through test stands with  
various types of coatings

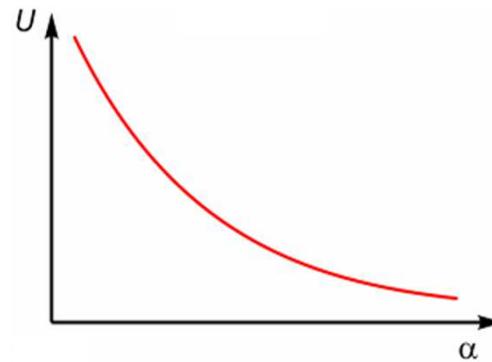
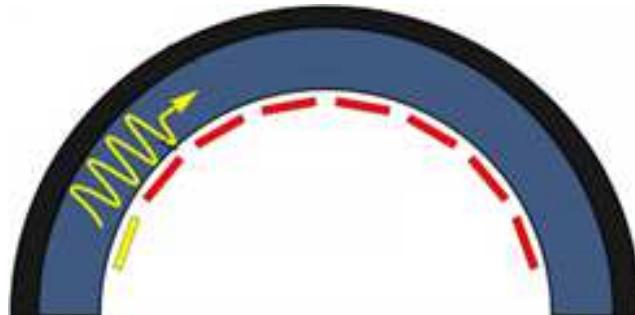


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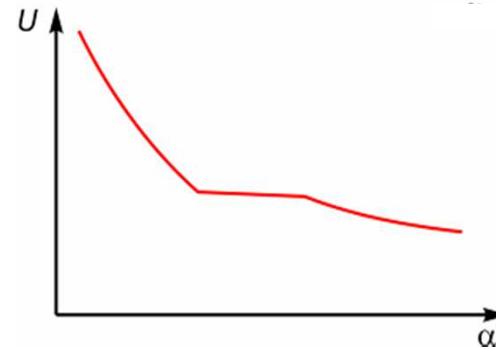
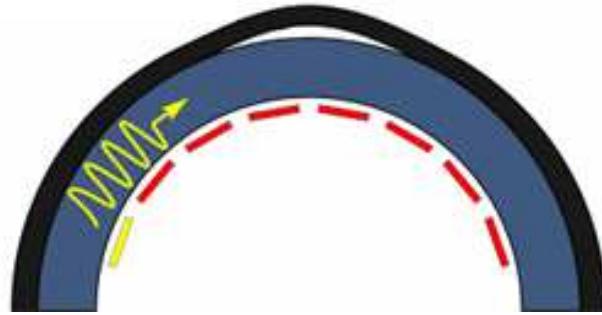
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# Physical Principles of Pipe Disbonded Coating Check-up



Well bonded pipe coating



Disbonded coating



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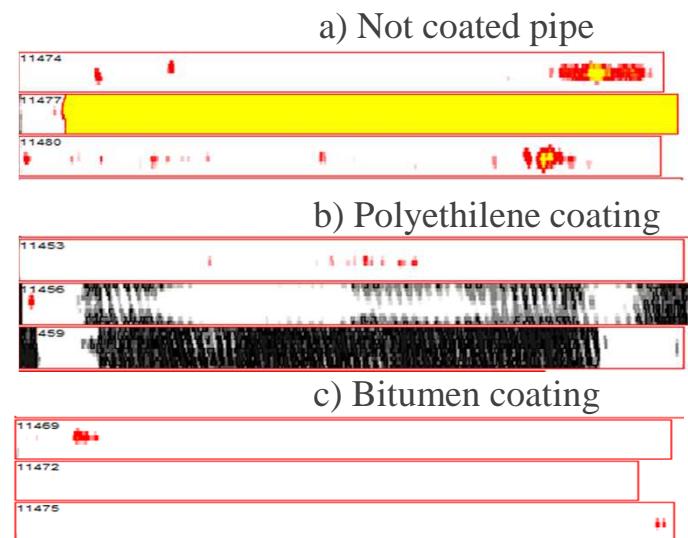
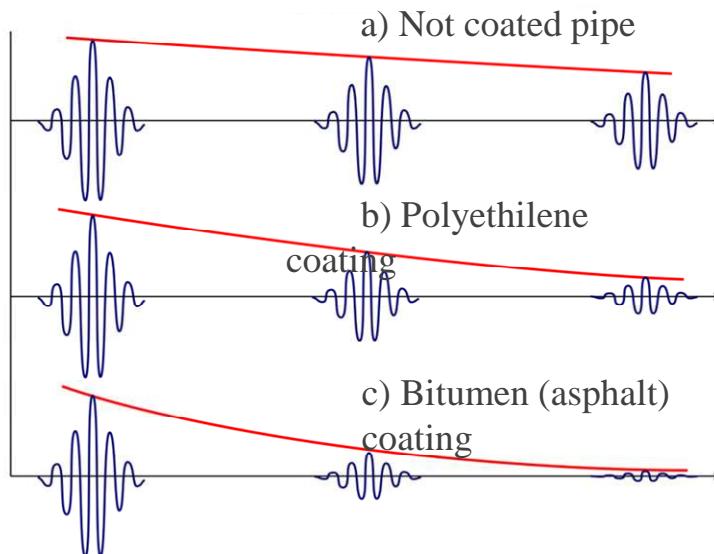
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# Types of pipeline coatings

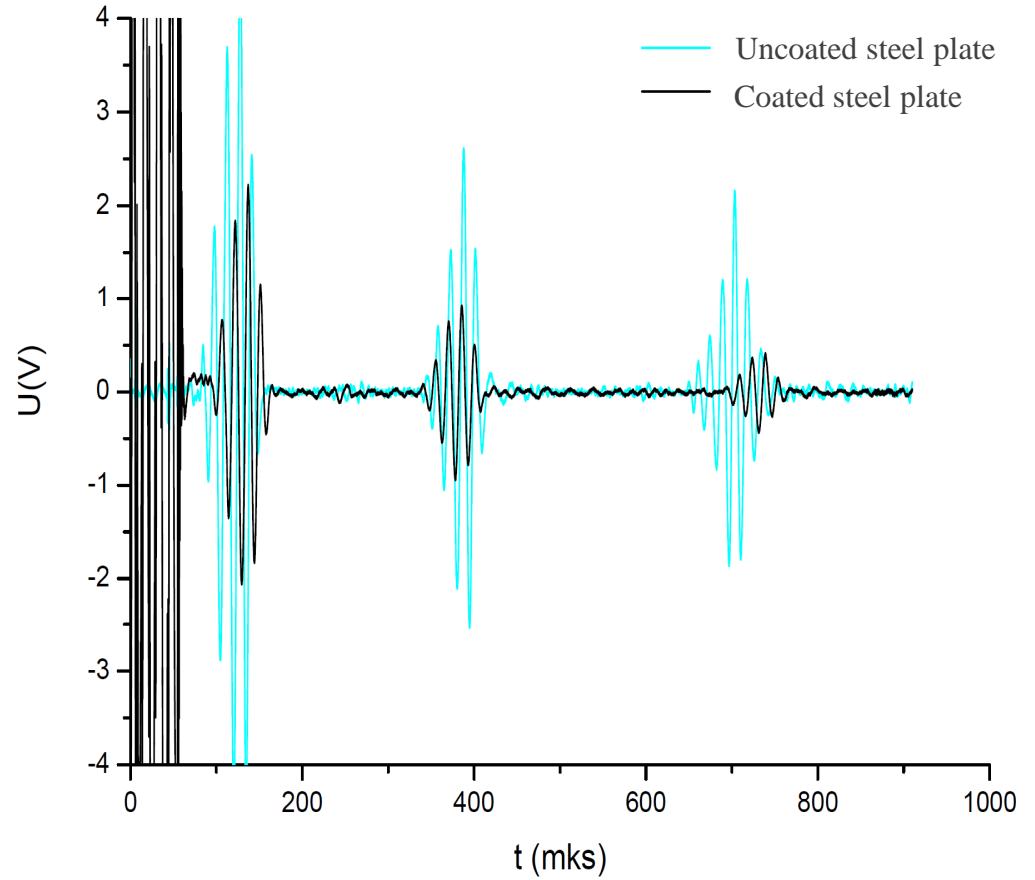
Absorption factors of acoustic waves in various types of pipeline coatings:

- a) Weak attenuation of acoustic wave in uncoated pipe. Maximum (yellow color) on EMAT inspection plot.
- b) Intermediate attenuation of acoustic wave in a pipe with polyethylene coating (black and red colors on EMAT inspection plot).
- c) Strong attenuation of acoustic wave in a pipe with bitumen (asphalt) coating. Minimum signal (white color) on EMAT inspection plot.



# Laboratory tests of EMAT signals

Assessment of acoustic wave attenuation (absorption)



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# Tests of Spetsneftegaz EMAT-56" ILI tool

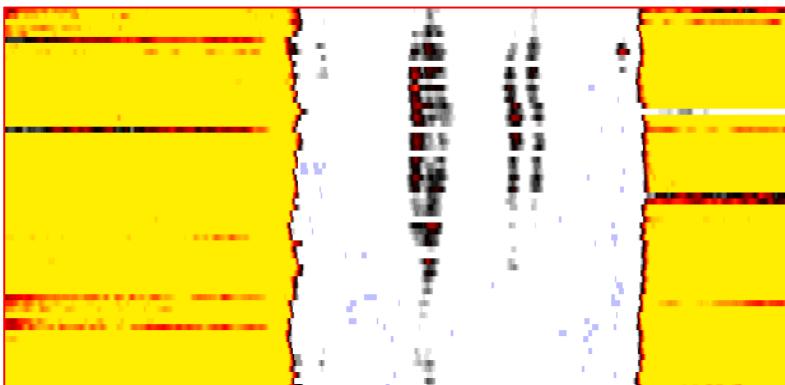
Detection of a coated pipe on the background of uncoated pipes



Yellow color on EMAT inspection plot shows an uncoated pipe.

White color shows coated pipe.

Black stripes on EMAT inspection plot testify to not compactly bonded overlapping coating edges.



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# Tests of EMAT-56" ILI tool

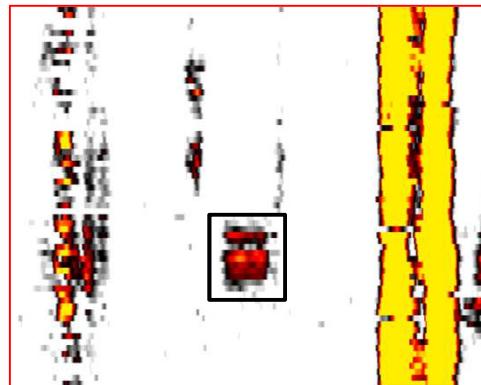
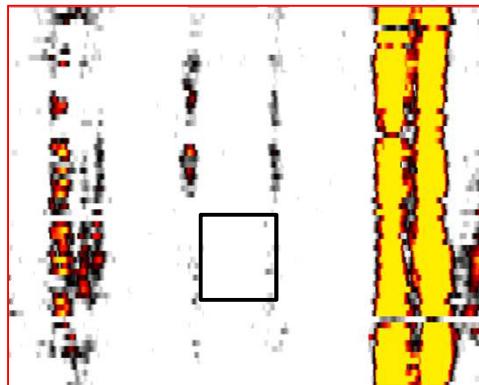
## Assessment of minimum disbonded coating defect



EMAT inspection plots of pipe pull through test stand

a) with full pipe coating

b) with cut out coating piece.



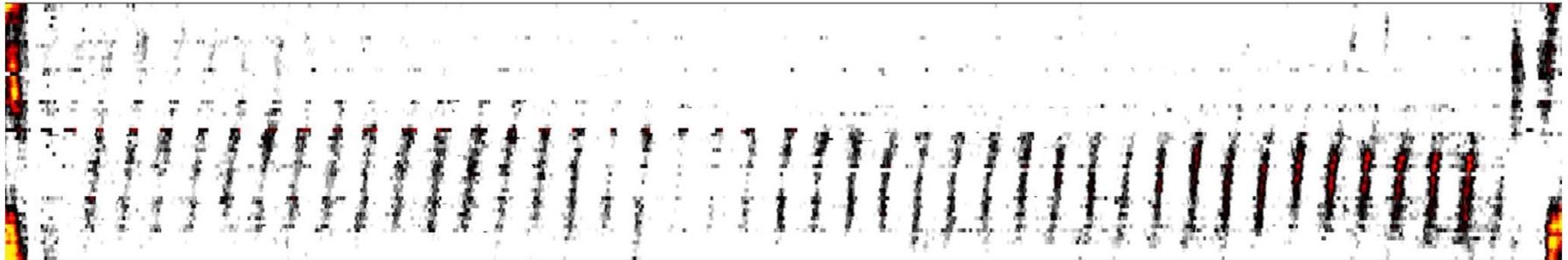
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# EMAT inspection in Urengoi – Novopskov Trunk Gas Pipeline in Russia

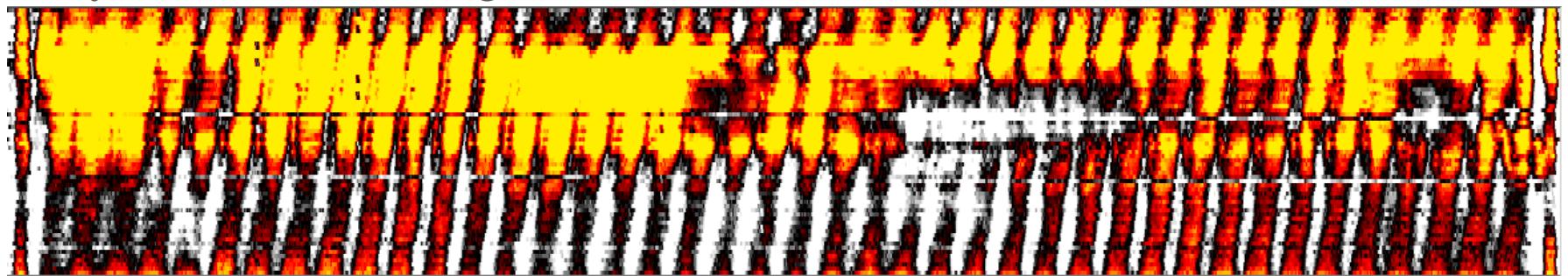
Good coating



Partially disbonded coating



Fully disbonded coating zone



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## Crack detection by EMAT-56" ILI tool in Urengoi – Novopskov Trunk Gas Pipeline Section in Russia

Total 531 zones of stress corrosion cracks were detected:

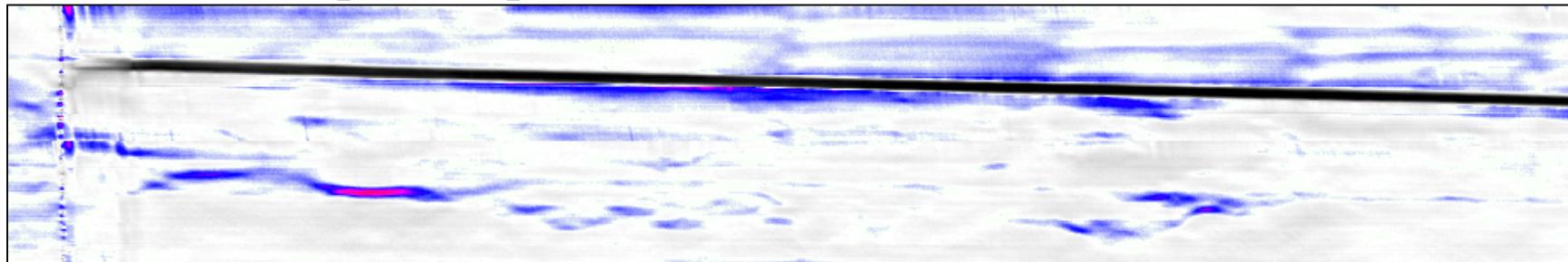
245 SCC zones 10-20% p.w.t. deep

104 SCC zones 20-30% p.w.t. deep

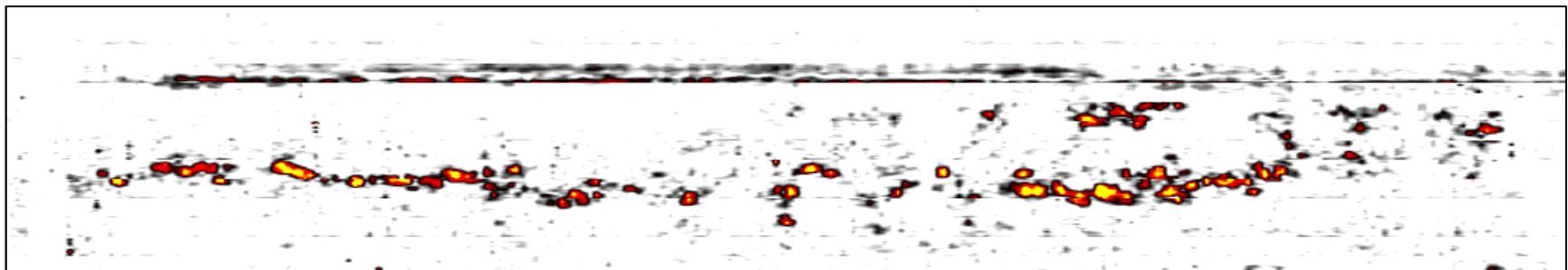
113 SCC zones 30-40% p.w.t. deep

44 SCC zones 40% p.w.t. deep

EMAT-56" inspection plot



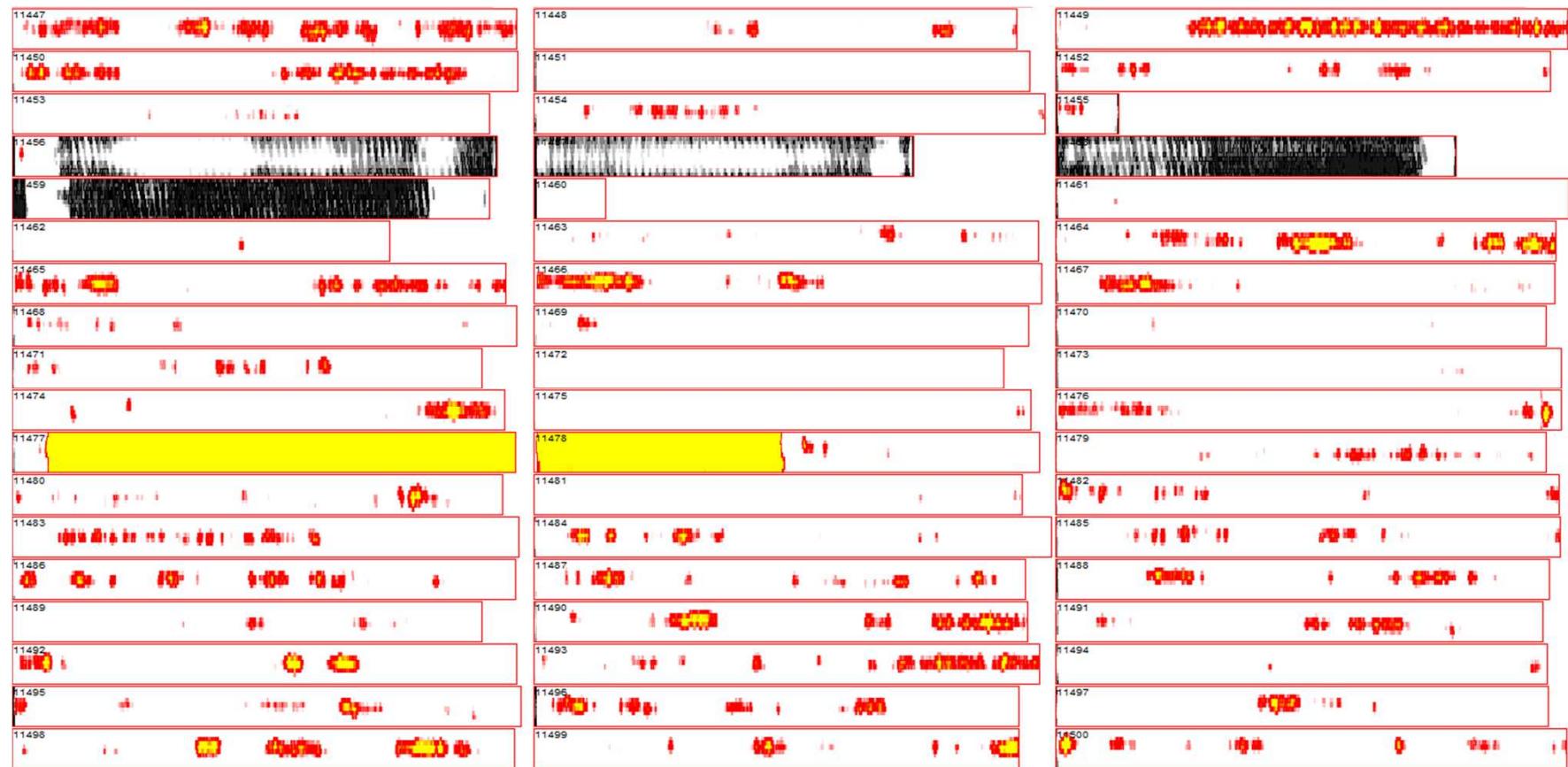
Color reconstruction of SCC defects on EMAT-56" inspection plot



# EMAT inspection in 40" trunk gas pipeline in the Middle East

## Pipe Tally

Bitumen coating, polyethylene coating, uncoated pipe



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# EMAT-40" Inspection

## Air crossing of uncoated pipeline



Satellite photo shows air crossing of uncoated pipeline with red marker points.

Photo of uncoated pipeline air crossing.



EMAT data.



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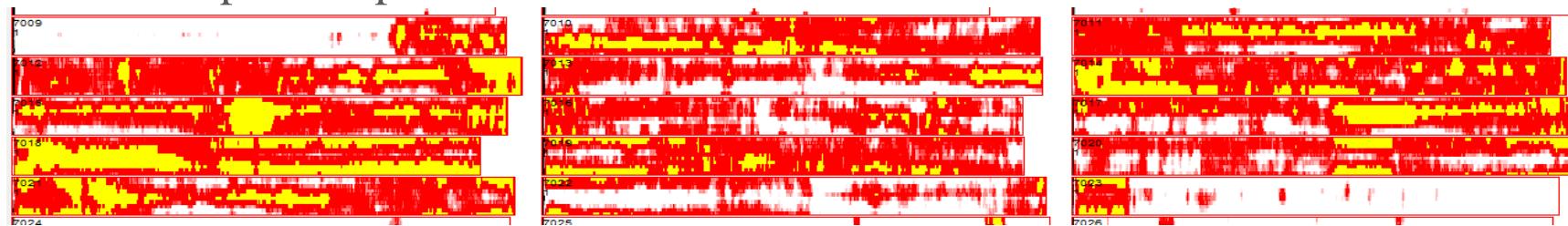
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# EMAT-40" inspection plot. Disbonded coating of the gas pipeline in river valley.



Satellite photo of a pipeline in river valley with severely damaged coating

EMAT inspection plot



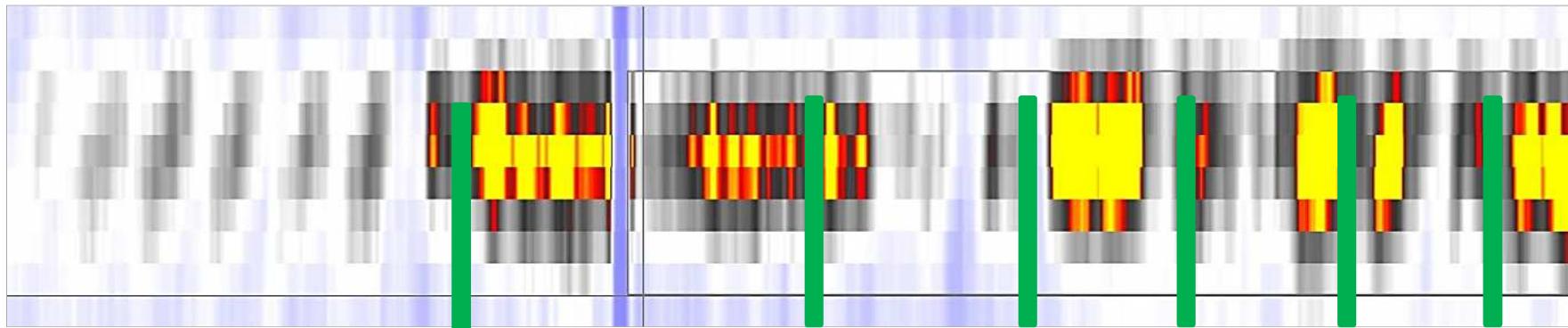
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# Results of check-up digging excavations of 40" trunk gas pipeline in vicinity of Saint – Petersburg, Russia

## Disbonded coating zones



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