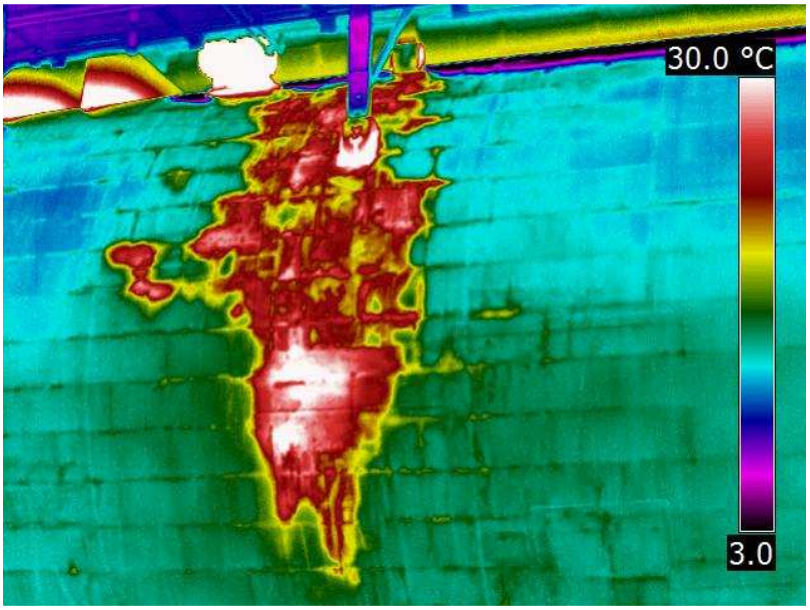
Thermographic CUI Survey

Sample Report

By

Pixel Thermographics Ltd



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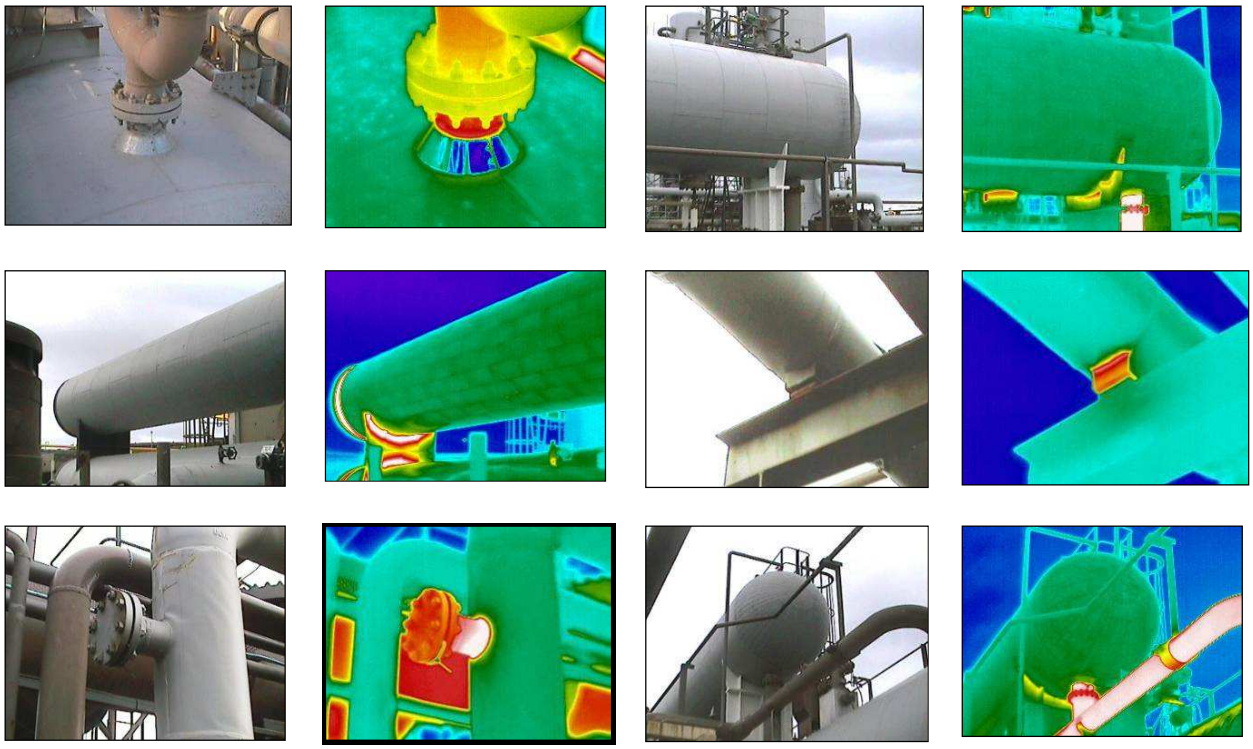
REPORT INFORMATION

Infrared Thermography is an invaluable tool for non-destructive inspection of pipelines, and vessels to identify moisture or water within insulation systems which under certain conditions can promote corrosion under insulation (CUI).

Thermal differences on surfaces of pipework systems or vessels allow trained and experienced Thermographers to identify these areas and duly record images which are included in reports for the client.

This type of inspection can greatly reduce the amount of regular stripping or invasive inspection of insulation on sites and therefore reduces cost and safety implication as these systems are often raised from the ground.

EXAMPLE IMAGES OF GOOD INSULATION



CASE STUDY – INSULATED VESSELS AND PIPEWORK INSPECTION

Thermographic surveys were carried out on an oil refinery on a regular basis to ascertain the location and causes of water ingress within the insulation on vessels and pipework which could result in corrosion under insulation.

Various areas of ingress were identified and the site inspection teams have carried out localised invasive inspections of the areas identified by the Thermographer and confirmed the onset of corrosion of the outer vessel walls.

The images below demonstrate the findings and have allowed the client to rectify the detail which was causing corrosion in several places.

The images below provide an example of moisture intrusion detected during previous inspections and the resultant corrosion under insulation in the same area which was noted during this inspection:

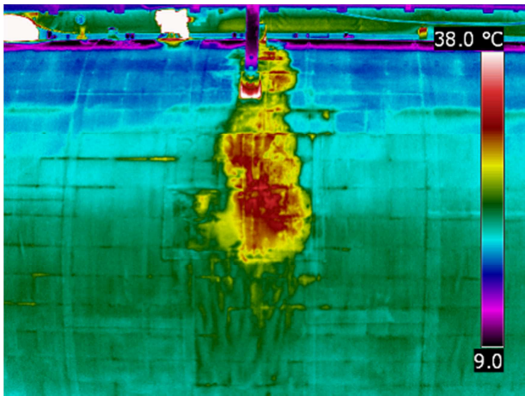


Fig.1 Thermal Image from Previous

Fig.2 Digital Image Showing Section of Removed Insulation with Clear Corrosion Having Commenced

The source of the moisture into the insulation was traced as originating from the walkway support brackets and can be seen in the images below:

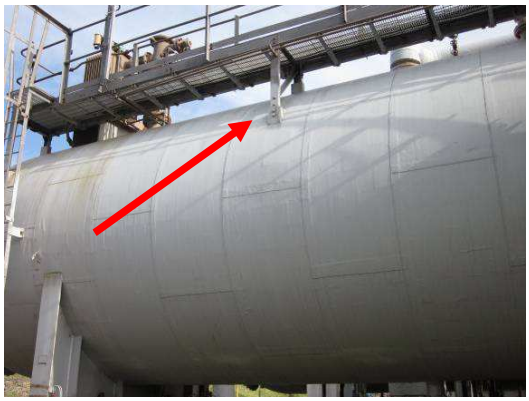


Fig.1 Walkway Gantry Support Bracket

Fig.2 Close up Of Bracket

Contd.

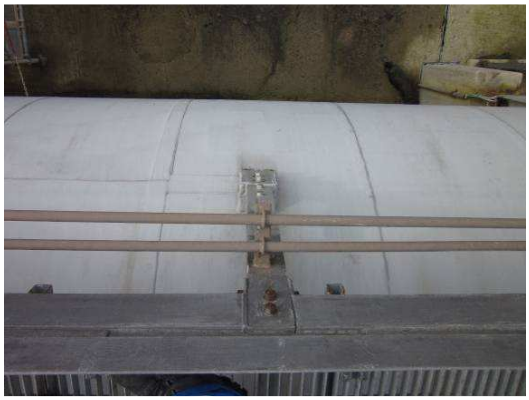


Fig.3 View of Bracket From Above

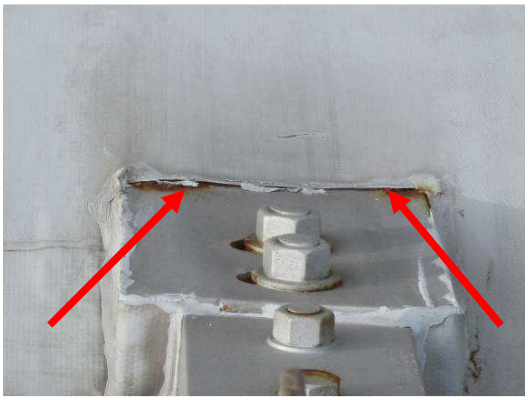


Fig.4 Close up View of Bracket Showing Gap Where Water Enters Insulation

The client has carried out remedial work to the rest of these brackets fitted to approximately 12 other vessels and has therefore prevented significant damage to these vessels

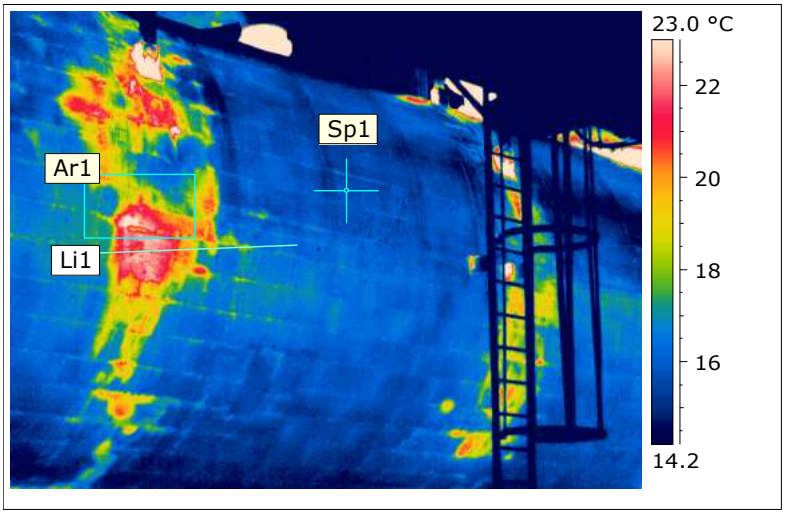
The following pages contain example images of further CUI locations

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_3233.jpg
Item	T-120A
Description	A Train 2nd Stage Desalter
Elevation	West
Location	Centre Right of Vessel
Drawing Number	FLO-STA-PPI-200101
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL38
Emissivity	0.93

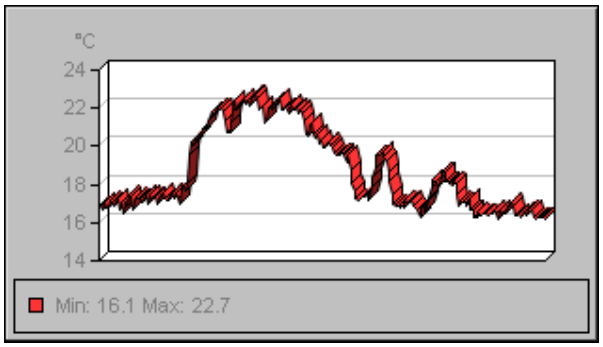
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_3233.jpg
Max Temperature	61.4 °C
Min Temperature	-15.4 °C
Sp1 Temperature	16.0 °C
Ar1 Max. Temperature	23.8 °C
Ar1 Min. Temperature	15.8 °C
Li1 Max. Temperature	22.7 °C
Li1 Min. Temperature	16.1 °C

LINE PROFILE



OBSERVATIONS

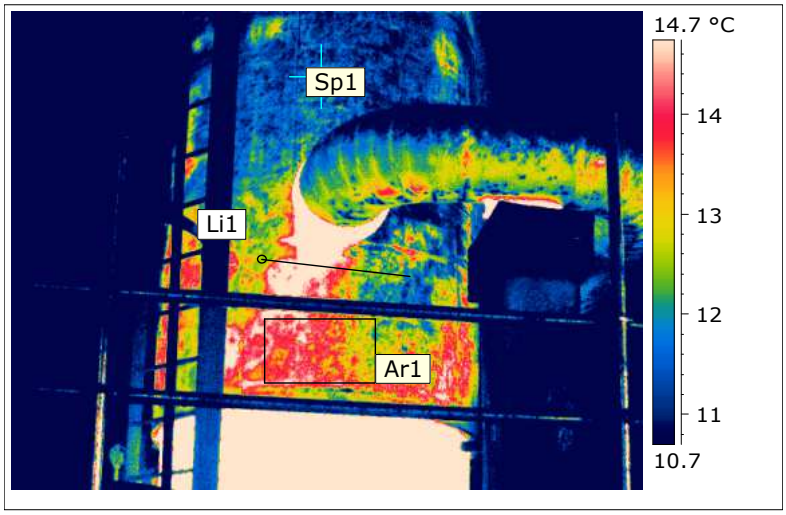
The warm areas of insulation indicate moisture ingress within the insulation. Likely ingress point is via the walkway support leg where it passes through the insulation.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_3298.jpg
Item	V-2102A
Description	A Train Side Draw Scrubber
Elevation	West
Location	Lower Section at 10" Pipe Inlet
Drawing Number	FLO-STA-PPI-20013
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL38
Emissivity	0.93

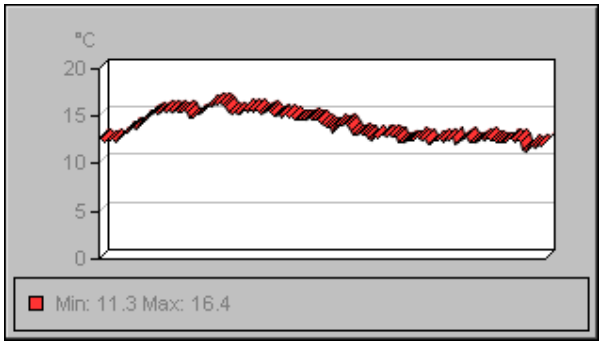
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_3298.jpg
Max Temperature	45.2 °C
Min Temperature	-17.2 °C
Sp1 Temperature	12.2 °C
Ar1 Max. Temperature	15.6 °C
Ar1 Min. Temperature	11.4 °C
Li1 Max. Temperature	16.4 °C
Li1 Min. Temperature	11.3 °C

LINE PROFILE



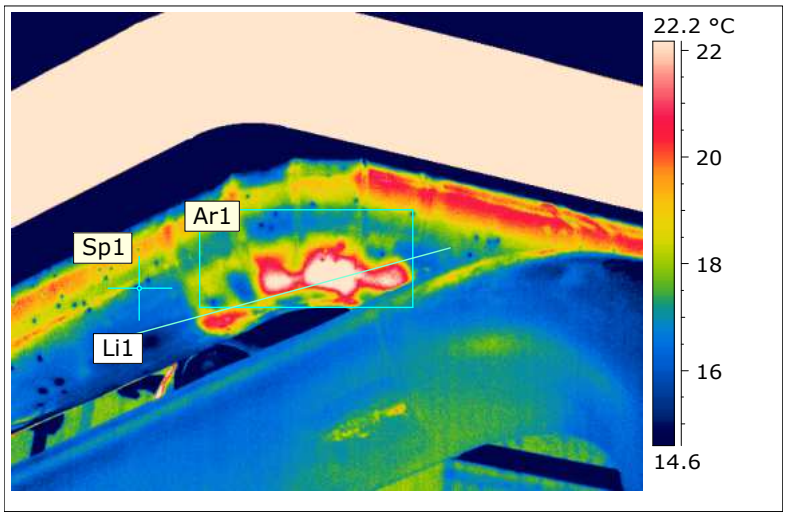
OBSERVATIONS Warm areas of insulation towards the base of the vessel indicate water ingress. Closer inspection revealed a failed seal around the pipe entry point – see small image.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

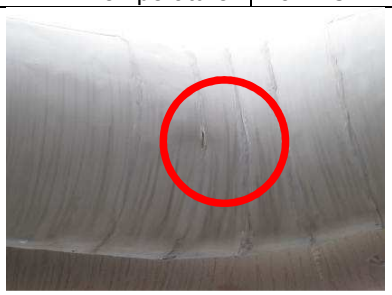
Filename	IR_3251.jpg
Item	12"-PL-5091-L2
Description	A Train
Elevation	
Location	Close to E5001A between T20A and T120A
Drawing Number	
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL38
Emissivity	0.93

RADIOMETRIC IMAGE

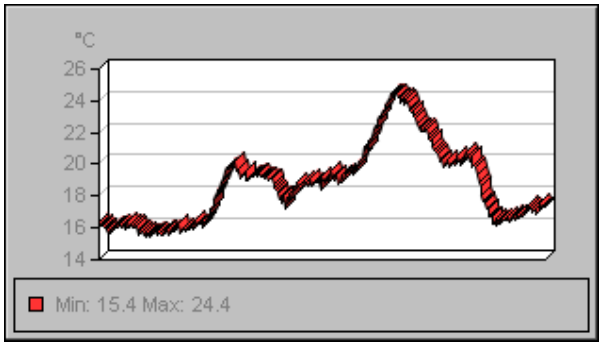


TEMPERATURE DATA

Date	
Filename	IR_3251.jpg
Max Temperature	41.4 °C
Min Temperature	-28.6 °C
Sp1 Temperature	16.7 °C
Ar1 Max. Temperature	25.2 °C
Ar1 Min. Temperature	-8.1 °C
Li1 Max. Temperature	24.4 °C
Li1 Min. Temperature	15.4 °C



LINE PROFILE



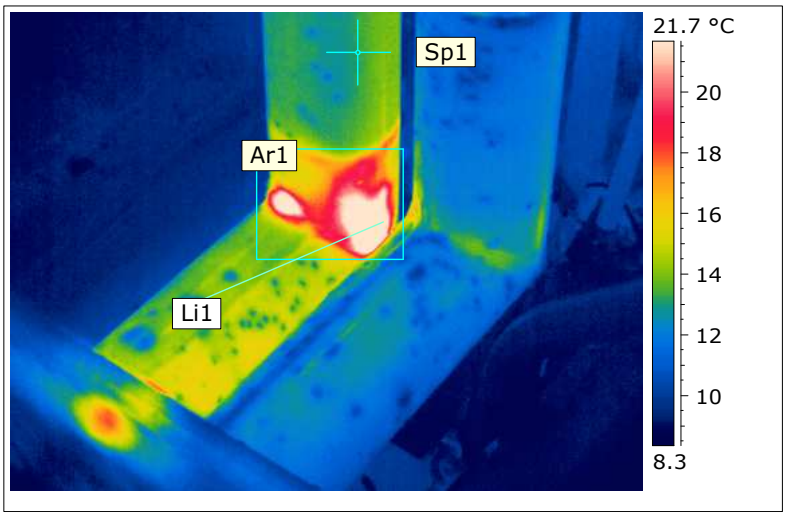
OBSERVATIONS Warm area at bottom of pipe indicates water ingress.
Closer visual inspection revealed a slit in the Ulva cladding towards the back of the pipe – see small image.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_3296.jpg
Item	2"-HO-2101A1-L2
Description	Hot Oil Supply to V2102A
Elevation	N/A
Location	In Gulley by Vessel V-2102A
Drawing Number	ISO No. OH 007
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL38
Emissivity	0.93

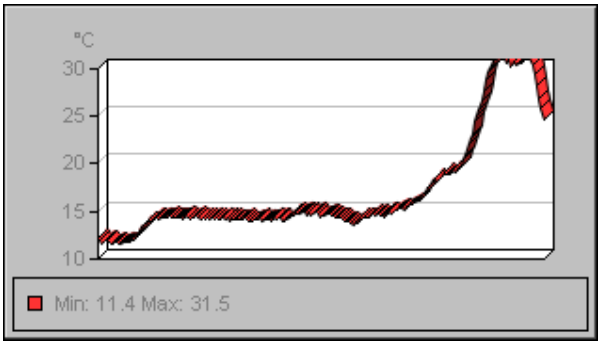
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_3296.jpg
Max Temperature	35.3 °C
Min Temperature	6.3 °C
Sp1 Temperature	13.5 °C
Ar1 Max. Temperature	35.3 °C
Ar1 Min. Temperature	9.1 °C
Li1 Max. Temperature	31.5 °C
Li1 Min. Temperature	11.4 °C

LINE PROFILE



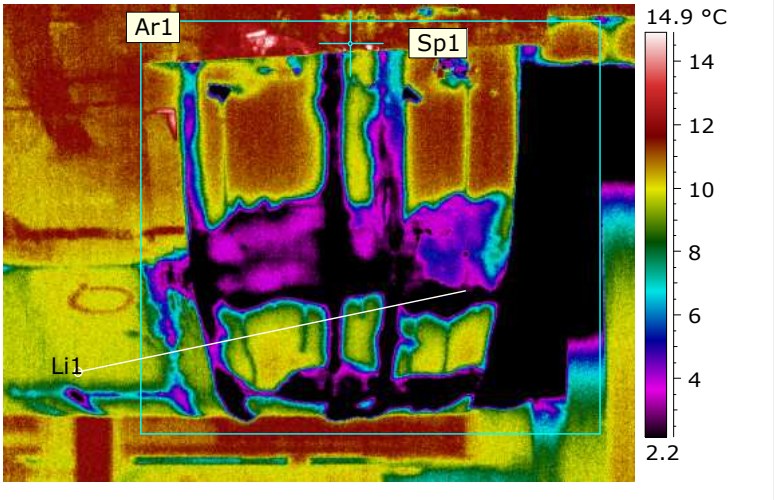
OBSERVATIONS Warm area on insulation indicates water ingress within the insulation at this point.
No visible damage found but area above should be inspected and sealed if required.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_12579.jpg
Item	V-3501 - Surge Drum
Description	Side of Saddle
Elevation	North
Location	
Drawing Number	
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL19
Emissivity	0.70

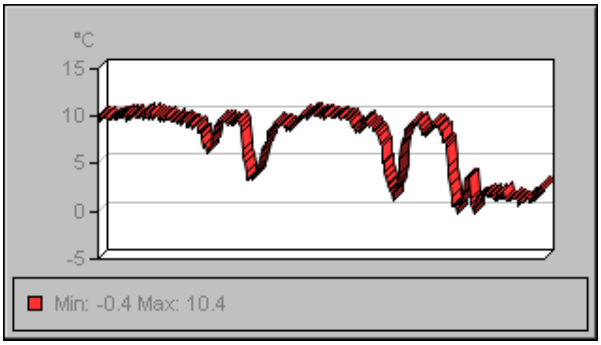
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_12579.jpg
Max Temperature	18.1 °C
Min Temperature	-8.2 °C
Sp1 Temperature	11.7 °C
Ar1 Max. Temperature	18.1 °C
Ar1 Min. Temperature	-8.1 °C
Li1 Max. Temperature	10.4 °C
Li1 Min. Temperature	-0.4 °C

LINE PROFILE



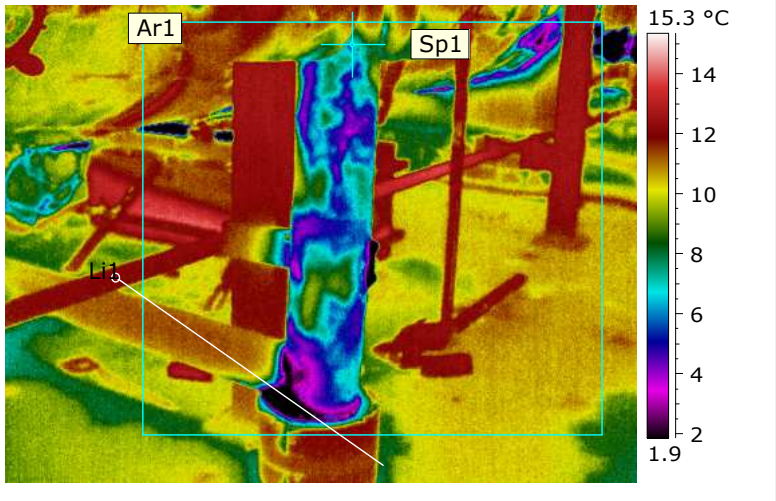
OBSERVATIONS Irregular thermal profile indicates water ingress within this section of insulation which is likely to result in corrosion under insulation.
Visual damage to insulation noted in this area which allows condensation to form and enter the insulation.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_12581.jpg
Item	
Description	
Elevation	
Location	
Drawing Number	
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL19
Emissivity	0.70

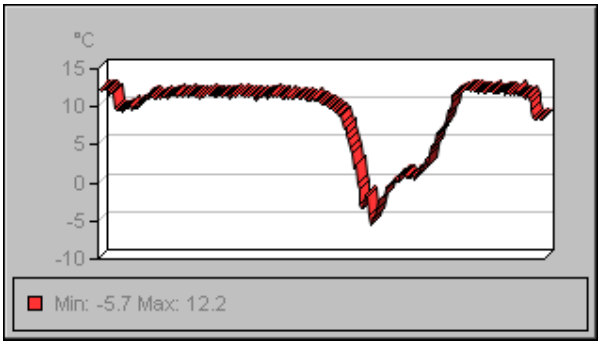
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_12581.jpg
Max Temperature	14.5 °C
Min Temperature	-6.8 °C
Sp1 Temperature	6.2 °C
Ar1 Max. Temperature	14.5 °C
Ar1 Min. Temperature	-6.6 °C
Li1 Max. Temperature	12.2 °C
Li1 Min. Temperature	-5.7 °C

LINE PROFILE



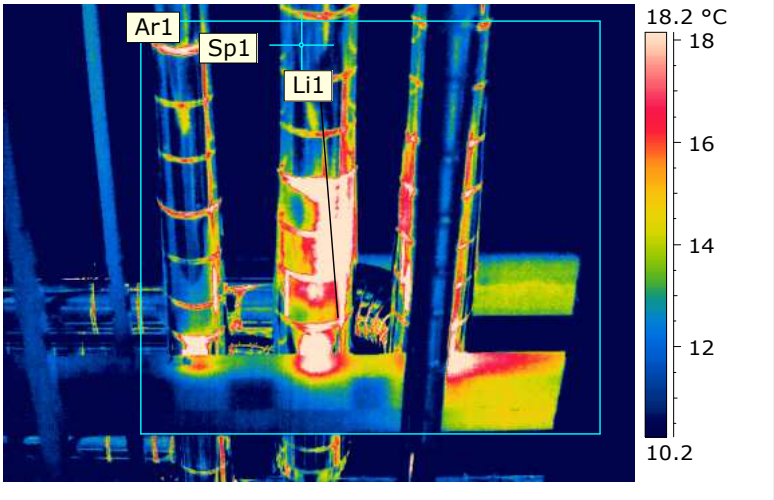
OBSERVATIONS Irregular thermal profile indicates water ingress within this section of insulation which is likely to result in corrosion under insulation.
Open seam at valve spindle noted which allows condensation to form and enter the insulation.

VISUAL IMAGE

EQUIPMENT DESCRIPTION

Filename	IR_4803.jpg
Item	
Description	
Elevation	
Location	
Drawing Number	
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Image Camera Lens	FOL38
Emissivity	0.70

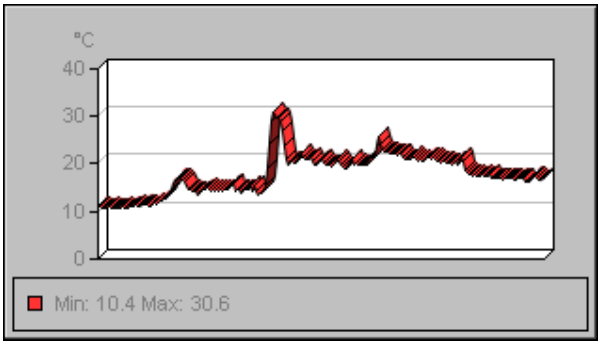
RADIOMETRIC IMAGE



TEMPERATURE DATA

Date	
Filename	IR_4803.jpg
Max Temperature	54.6 °C
Min Temperature	<-20.0 °C
Sp1 Temperature	11.3 °C
Ar1 Max. Temperature	54.6 °C
Ar1 Min. Temperature	<-20.0 °C
Li1 Max. Temperature	30.6 °C
Li1 Min. Temperature	10.4 °C

LINE PROFILE



OBSERVATIONS Thermal profile on steel cladded insulation indicates water ingress which is likely to result in corrosion under insulation.