

# Three Rivers Fountain

## Computer Radiography of The Murray Statue

April 2017



**Three Rivers Fountain**









# Fabrication and the Statue mountings failure



# Preliminary Evaluation

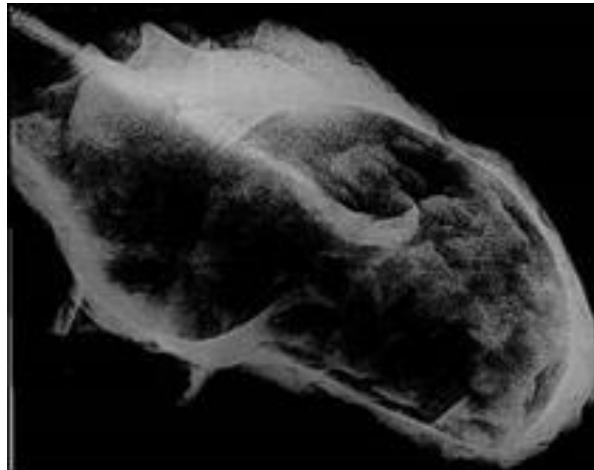


## Developing the Inspection Test Plan provided numerous challenges:

- Mountings failed requiring repair for re-mounting onto granite base. Impact damage resulted in numerous sections dismembered.
- Porous surfaces are not suitable for penetrant test due to residue & permanent staining.
- Cast aluminium is severely pitted with significant wall loss visually evident.
- Cast Statue with welded sections, weld zones are weathered to an even surface appearance.
- Visual evidence of cracking at some critical points– joining of arms etc.

# Computer Radiography Results

## Head section

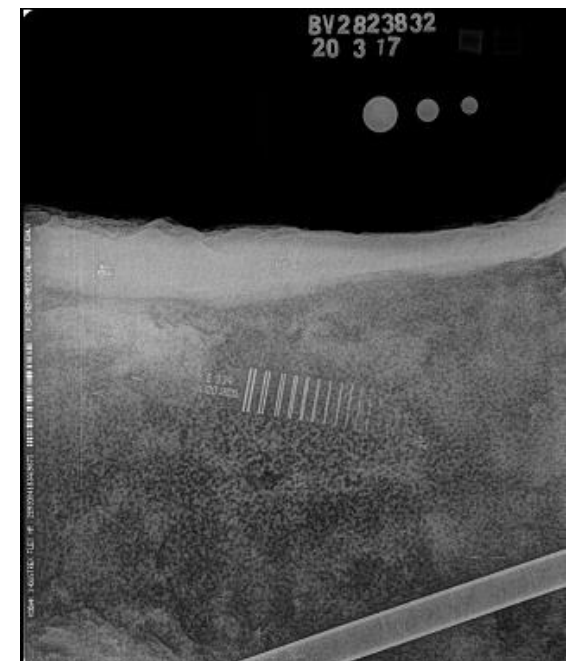
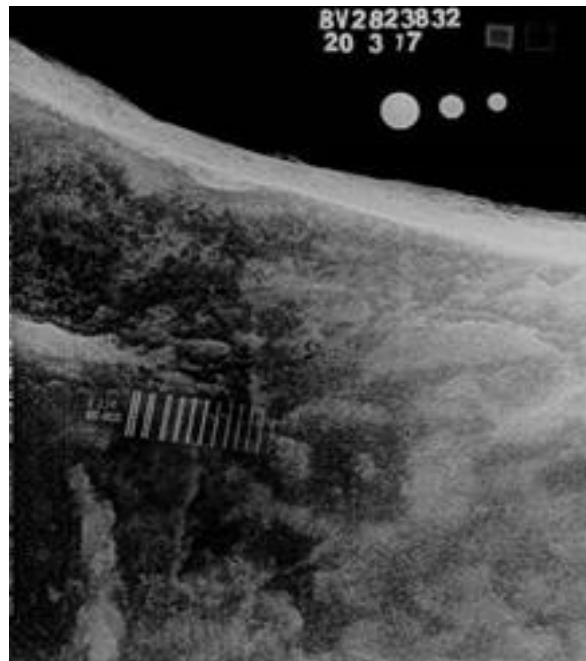


<5mm wall  
thickness evident





# Torso

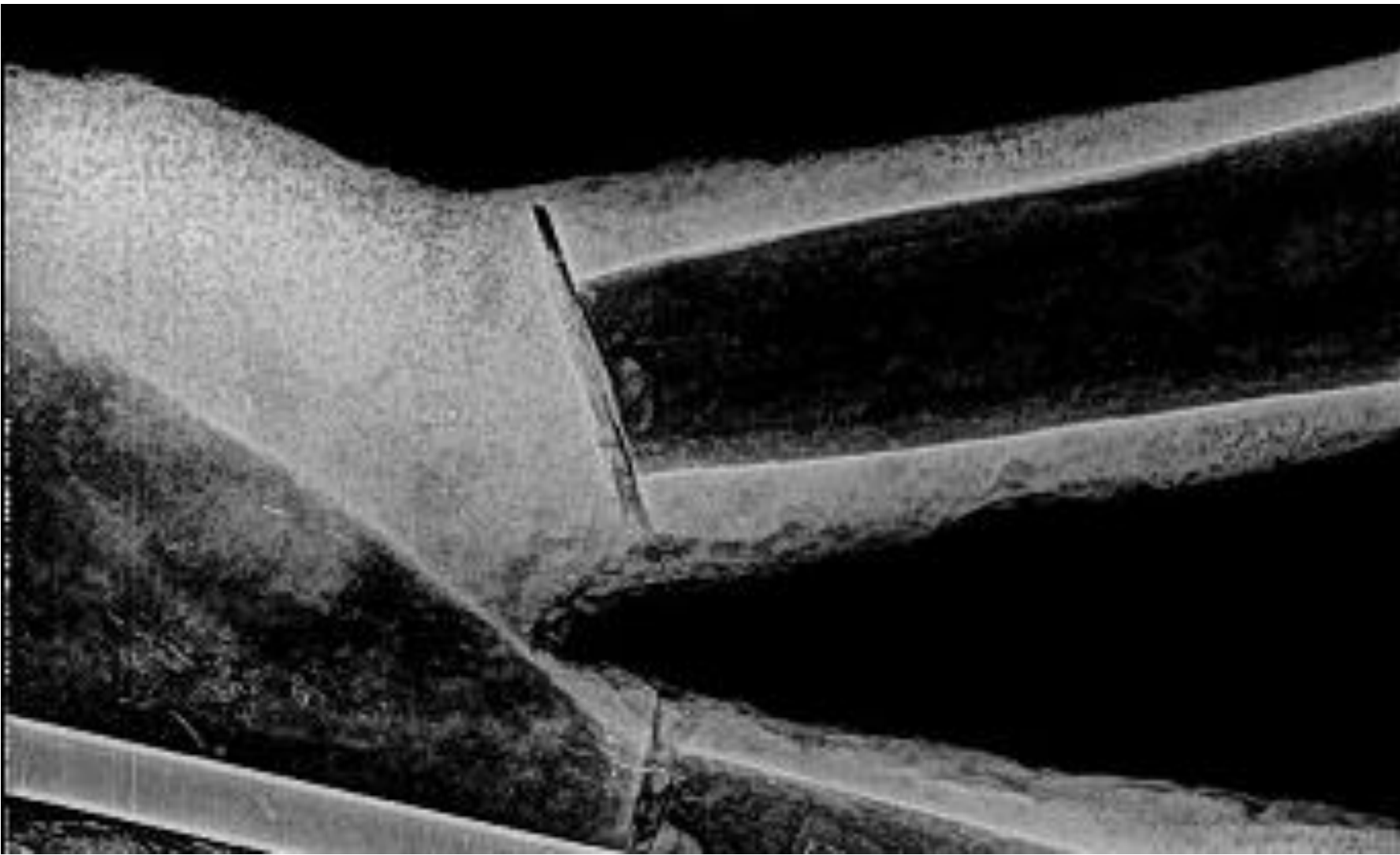


No evidence of  
cracking- Thickness  
> 10mm



# Upper torso and arms





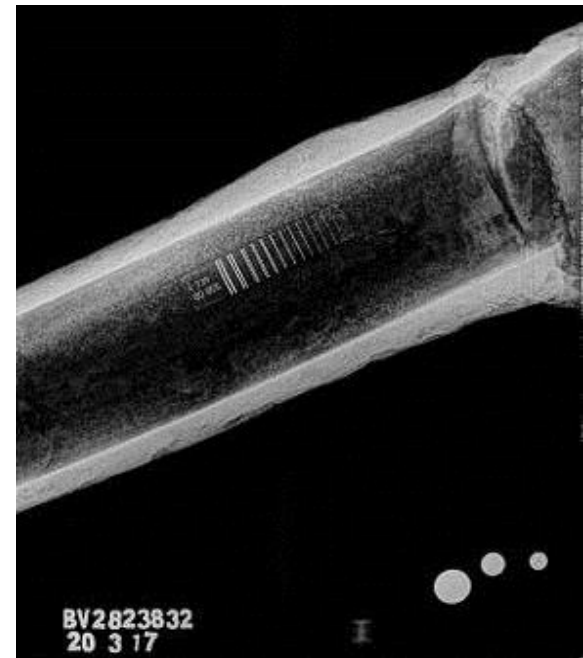
# Arms to hand section

Incomplete weld penetration with cracking evident in the weld and parent metal in the lower arm section

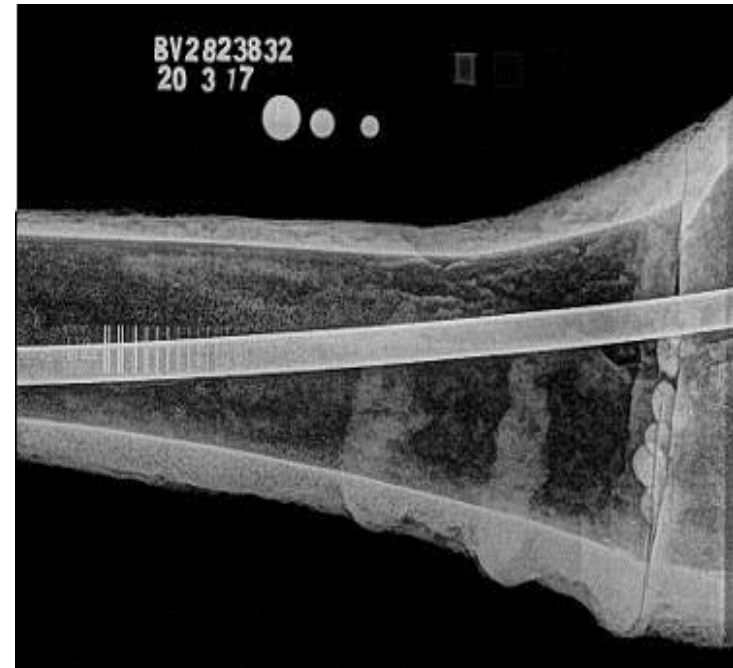


# Upper arms

Pitting evident  
with parent  
metal  
thickness  
> 6mm



Welded section  
indicates a  
partial  
penetrated  
weld with  
cracking  
evident.



# Ibis

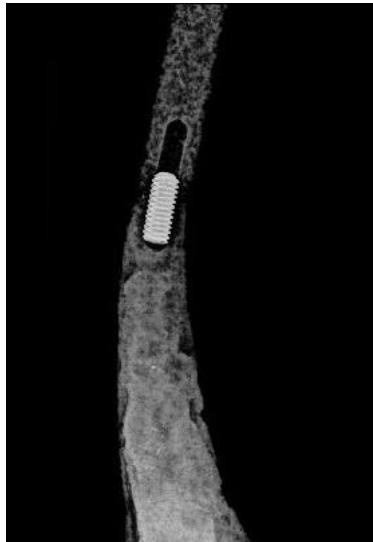




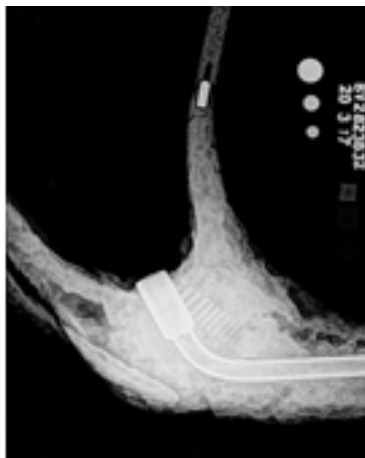
# X-ray images of Ibis

Visible areas of corrosion evident, wall loss located at the neck area below the head and the lower beak adjacent to the metal insert.

Parent metal thickness  $>10\text{mm}$   
Water pipe cast into head section.



Beak section showing metal insert

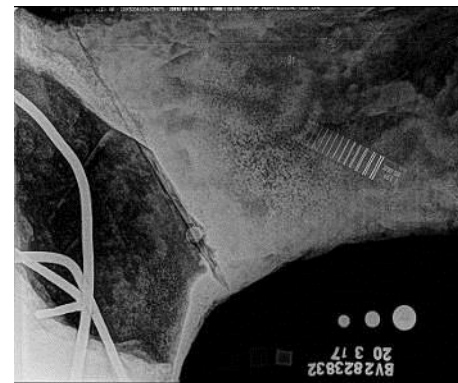
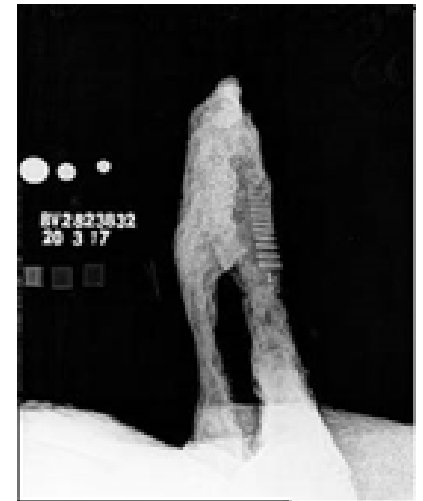


Head section

Neck section

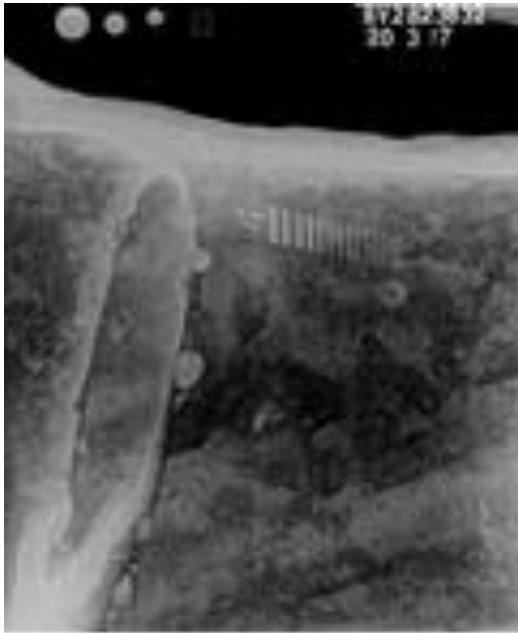


Feet



Attached wing

# Lower section

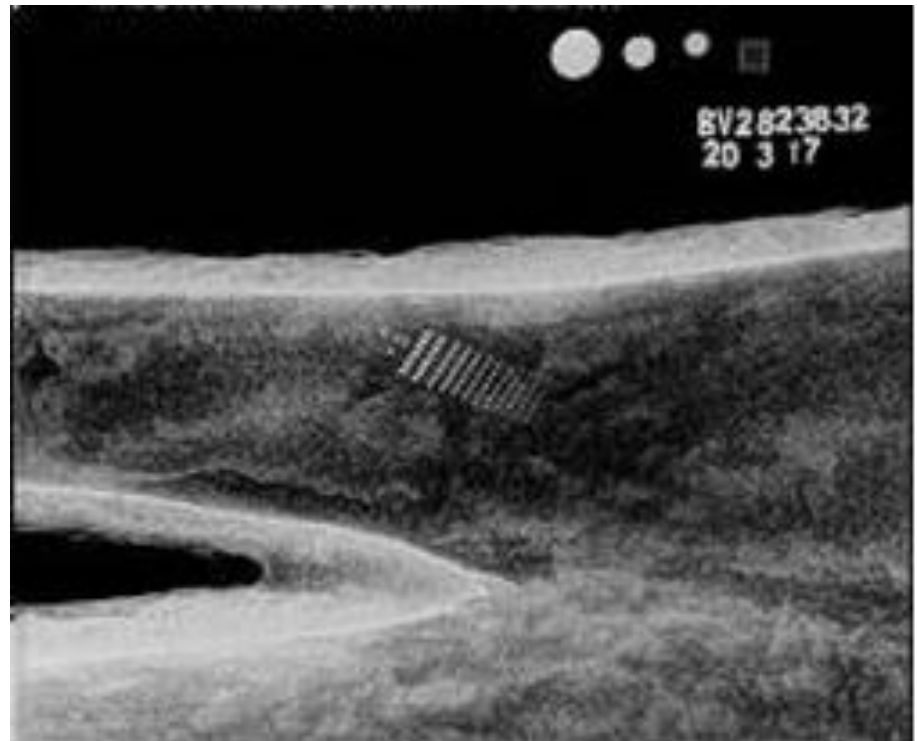


Weld connection of  
leg to hip and leg to  
foot with no  
evidence of cracking.

No significant wall  
loss evident



# Foot & thigh



No significant wall loss evident

# Technical information

<b>Job Details:</b>	<b>Three Rivers Statue– Murray Figure</b>		
<b>Job Location:</b>	<i>Adelaide South Australia</i>	<b>Inspection Date:</b>	<i>20.03.2017</i>
<b>Technician(s):</b>	<i>Mike Feltham / Michael Nichol</i>	<b>Construction Code:</b>	<i>Not specified</i>
<b>Weld Process:</b>	<i>Not Specified</i>	<b>Acceptance Code:</b>	<i>Report findings</i>
<b>Equipment:</b>	<i>Rigaku 250kV X-Ray</i>	<b>Material:</b>	<i>Cast Aluminum– not further Specified</i>
<b>Screens:</b>	<i>Kodak Industrex HPX– 1 Plate Scanner Copper 0.4mm</i>	<b>Grade or Other:</b>	<i>Not supplied</i>
<b>IQI Type:</b>	<i>Duplex IQI ASTM E2002</i>	<b>Surface Cond.:</b>	<i>As cast, welded, / pitted &amp; corroded</i>
<b>Film:</b>	<i>Kodak Flex HR Image Plates</i>	<b>Technique:</b>	<i>Profile</i>
<b>Processing Details:</b>	<i>Industrex Digital Viewing Software</i>	<b>Energy:</b>	<i>110 @ 5mA</i>

# Conclusions

Computerised radiography effectively identified:

- ▶ Numerous areas of parent metal loss < 6mm.
- ▶ Identified welded joint preparations and configuration
- ▶ Weld penetration
- ▶ Prior (unknown) repairs to the statue
- ▶ Cracking evident at critical change of sections
- ▶ Damage sustained from impact not evident by visual inspection

The test results delivered a comprehensive structural evaluation for further developing the repair procedure.



# Summary

Computerised radiography conducted on the Murray Statue provided an exciting opportunity to deliver this case study to the broader NDT community.

The lifecycle of many significant artworks, statues and fountains may be overlooked as key pieces of infrastructure requiring regular maintenance and inspection.

# Thank you



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