

VACIS® IP6500 Integrated Inspection System Scanning Technology for the Petroleum Industry

Science Applications International Corporation
Security and Transportation Technology Business Unit

January 2010



VACIS® IP6500 Scanning Tests

Introduction



SAIC conducted scanning tests to distinguish liquids and targets in tanker trucks and barrels.



VACIS® IP6500 Scanning Tests

Test configurations



We scanned a variety of test configurations using tanker trucks, chemical drums, and metal targets.



VACIS® IP6500 Scanning Tests

Scanning operation



The scanning operation was the same as at typical VACIS IP6500 sites.

We scanned each configuration at 16 km/h. Each truck drove through the VACIS system without stopping. Each scan started automatically.



VACIS® IP6500 Scanning Tests

Scanning operation



The VACIS operator monitored the scanning operation from the booth.



VACIS® IP6500 Scanning Tests

Capturing and analyzing images



Scanning images were captured and enhanced using the standard VACIS Viewer software.

The screenshot displays the VACIS IP6500 Controller software interface. At the top, there are four status indicators: Source Status (Red), System Status (Yellow), X-Ray Status (Green), and RPM Status (Red). Below these are buttons for 'Reset Event' and 'Reinitialise'. A 'Normalization' section includes 'Start' and 'Progress' buttons. The main interface is divided into several panels: a 'Transaction Manager' on the left with search filters and a list of transactions; a central image window showing a scan of a truck with a 'Contrast Stretch' dialog box overlaid; and a 'Photo Window' on the right showing three photo thumbnails. The bottom status bar shows 'Analyst Operator Diagnostic' and 'X: 341, Y: 130, I: 65534'.

Transaction	Disposition	Creation Date
SequenceNumber - 01000172 : 1/7/2010 11:27:32	Unresolved	1/7/2010 11:27:32
SequenceNumber - 01000171 : 1/7/2010 11:20:05	In Process	1/7/2010 11:20:05
SequenceNumber - 01000170 : 1/7/2010 11:19:00	Unresolved	1/7/2010 11:19:00
SequenceNumber - 01000169 : 1/7/2010 11:13:30	Unresolved	1/7/2010 11:13:30
SequenceNumber - 01000168 : 1/7/2010 11:12:23	Unresolved	1/7/2010 11:12:23
SequenceNumber - 01000167 : 1/7/2010 11:11:23	In Process	1/7/2010 11:11:23
SequenceNumber - 01000166 : 1/7/2010 11:10:17	Unresolved	1/7/2010 11:10:17
SequenceNumber - 01000165 : 1/7/2010 11:09:06	In Process	1/7/2010 11:09:06

Test 1 – Fuel Tanker with Target

Test configuration



The truck drove through the VACIS system without stopping. The VACIS scan started automatically. The VACIS scan penetrated 2.44 meters of diesel fuel and the steel tank.

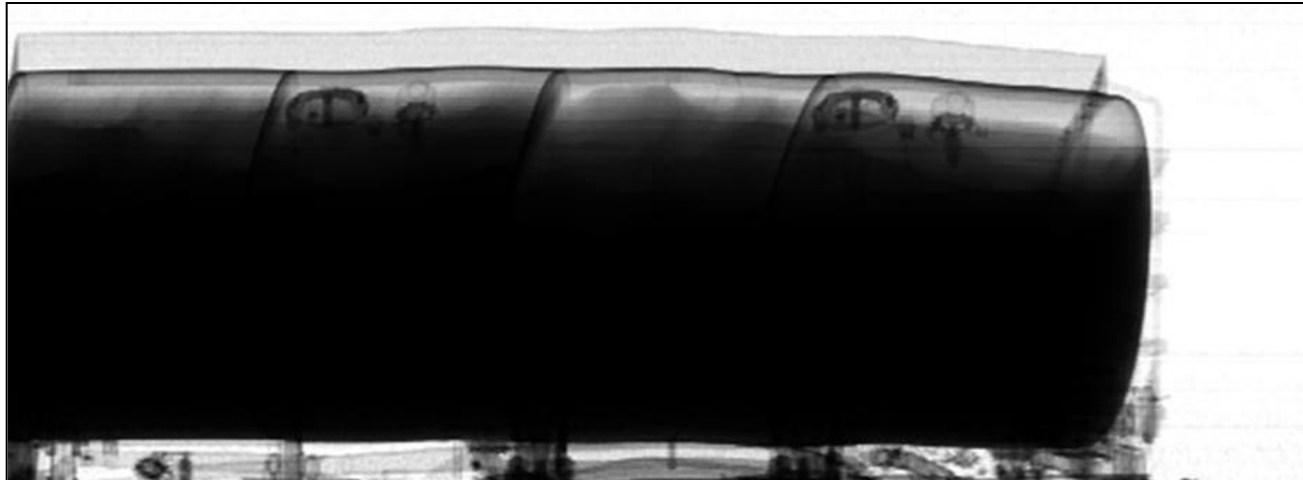


Test 1 – Fuel Tanker with Target

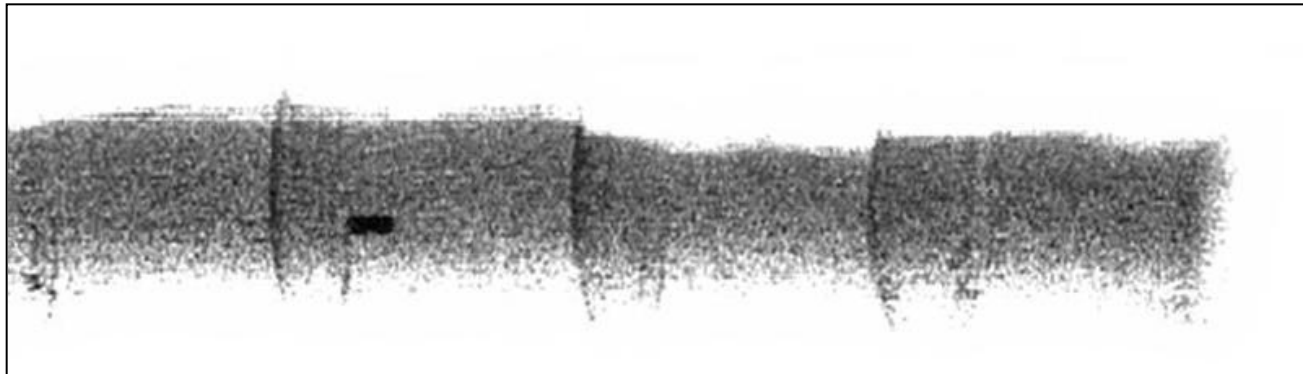
Scanning images – comparison



Original



Enhanced
(contrast stretch)

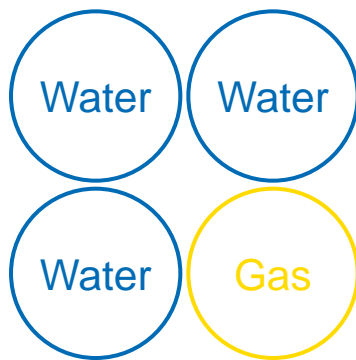


Test 2 – Gasoline Hidden behind Water

Test configuration



The truck drove through the VACIS system without stopping. The scan started automatically.



One drum of gasoline hidden behind three drums of water

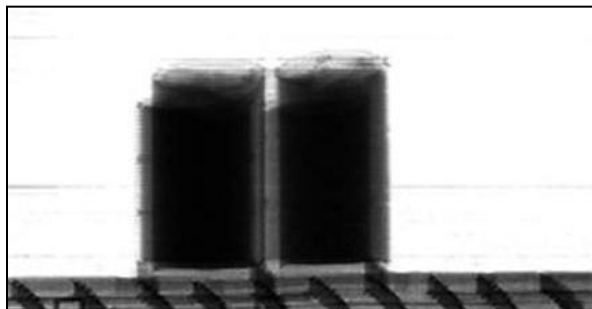


Test 2 – Gasoline Hidden behind Water

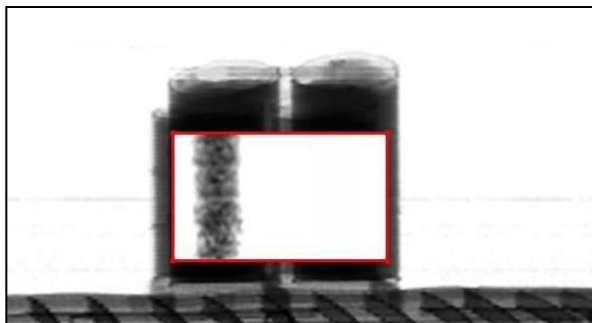
Scanning images – comparison



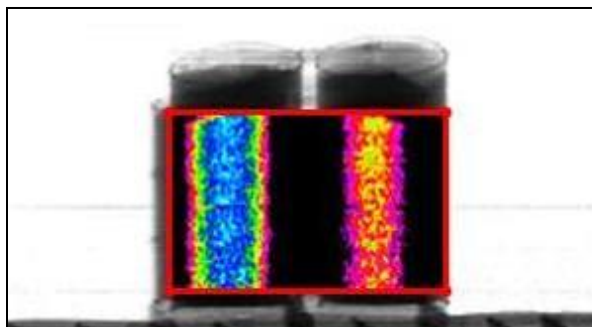
Original



Enhanced
(contrast stretch)

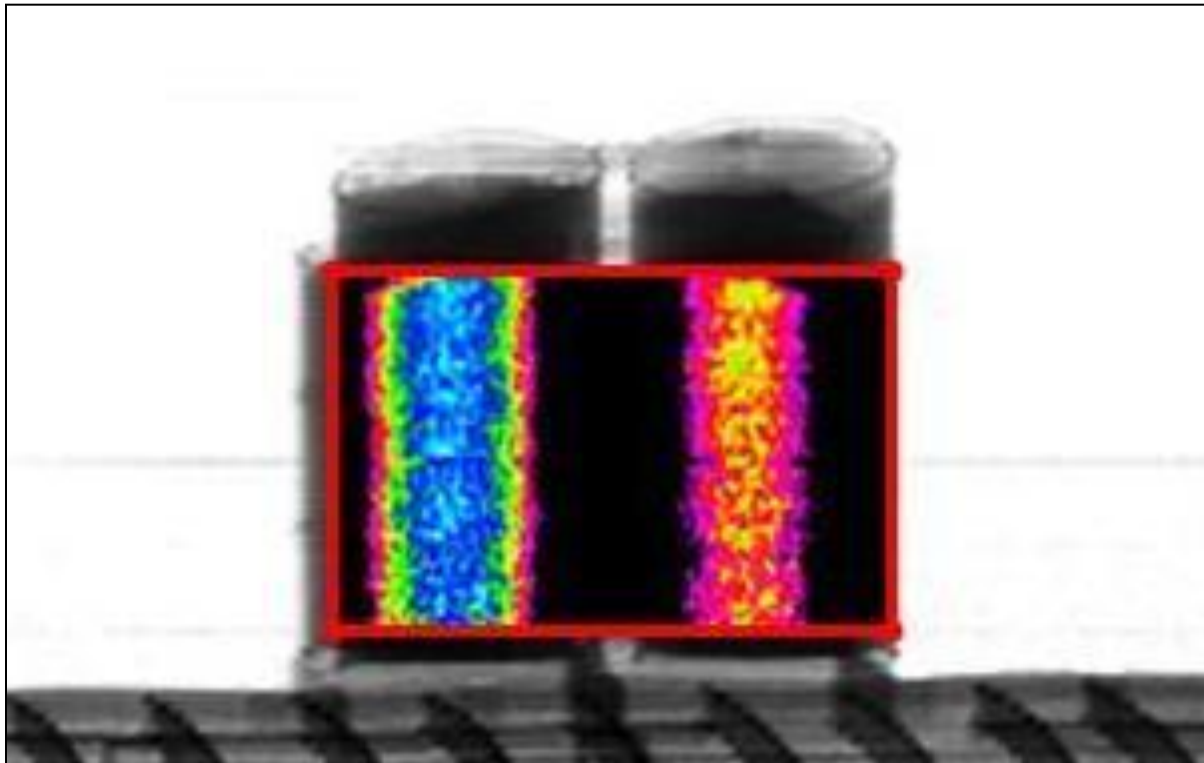


Enhanced
(contrast stretch
and color)



Test 2 – Gasoline Hidden behind Water

Enhanced scanning image – contrast stretch and color

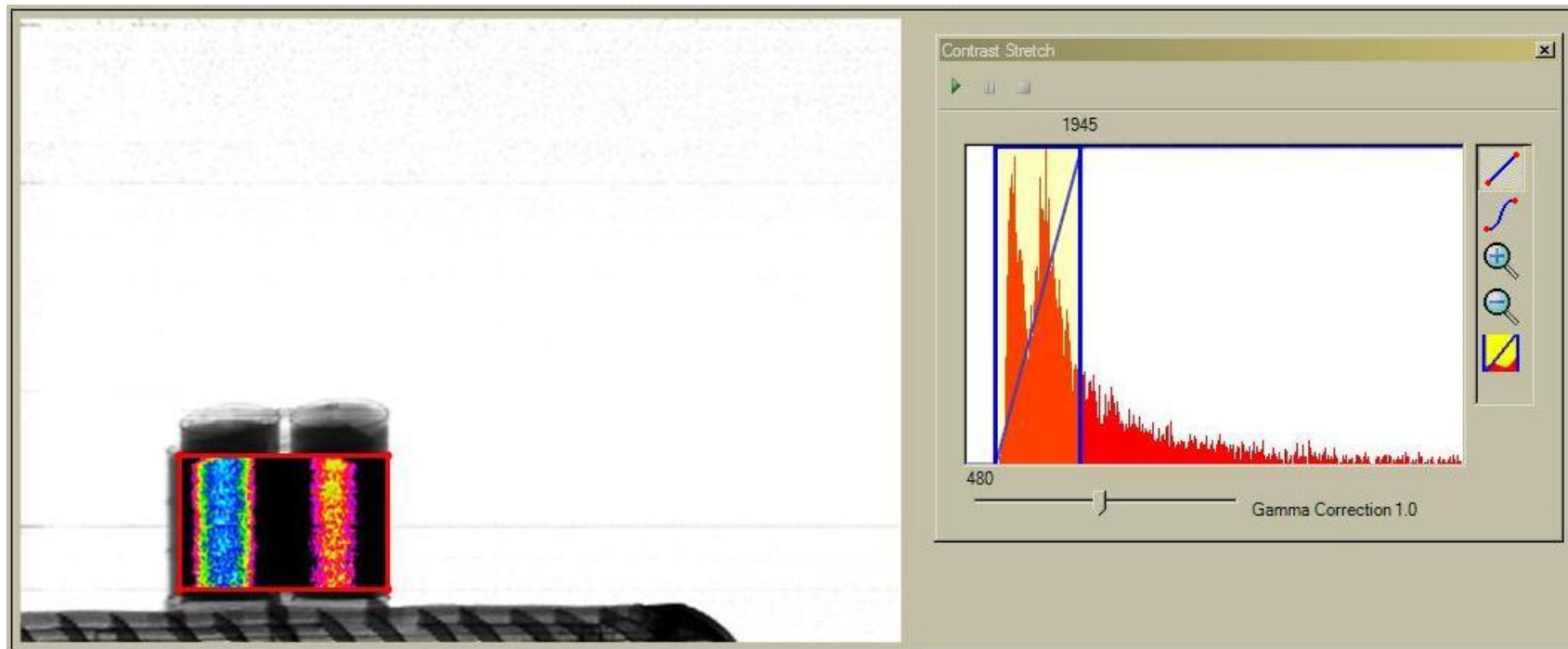


Test 2 – Gasoline Hidden behind Water

Enhanced scanning image with histogram



Peaks at the densities of water and gasoline



Test 3 – Mixture of Propane and Water

Test configuration



Steel tank with a mixture of propane and water

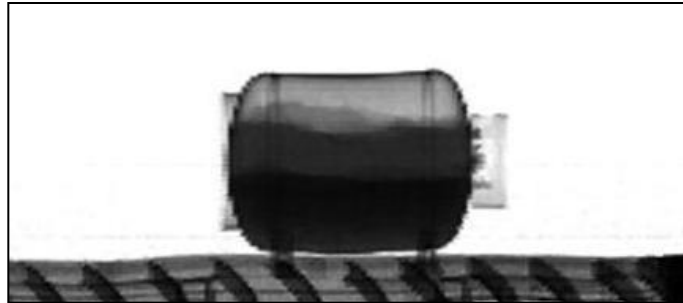


Test 3 – Mixture of Propane and Water

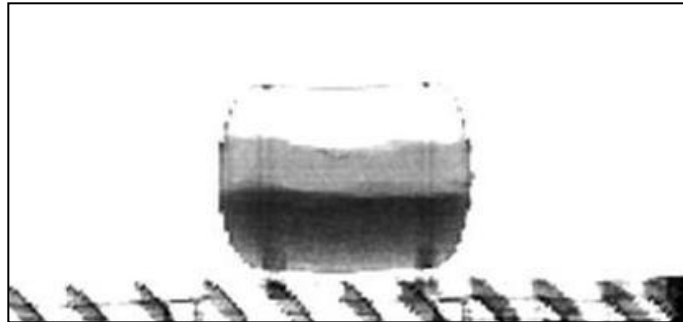
Scanning images – comparison



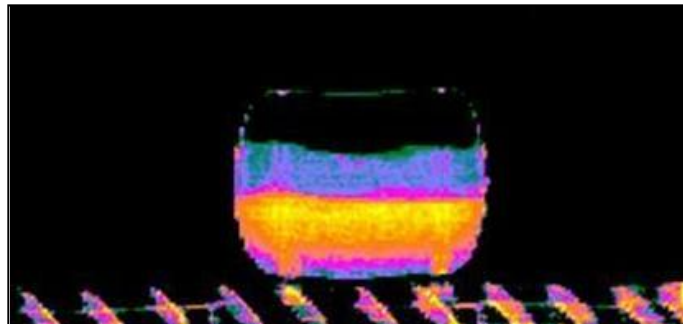
Original



Enhanced
(contrast stretch)

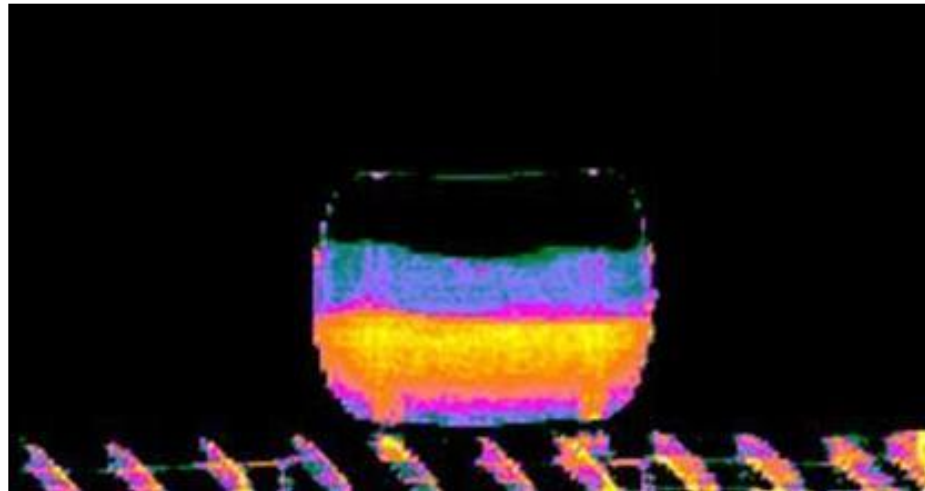


Enhanced
(contrast stretch
and color)



Test 3 – Mixture of Propane and Water

Enhanced scanning image – contrast stretch and color



Test 4 – Propane and Water with Target

Test configuration



Aluminum object behind the propane tank

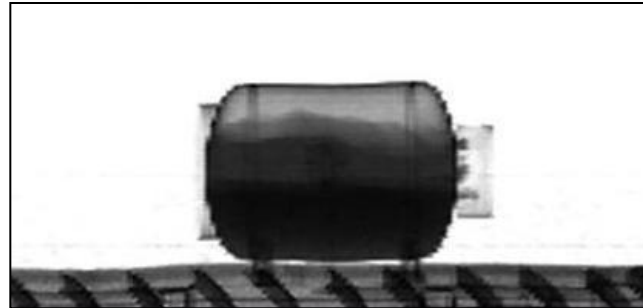


Test 4 – Propane and Water with Target

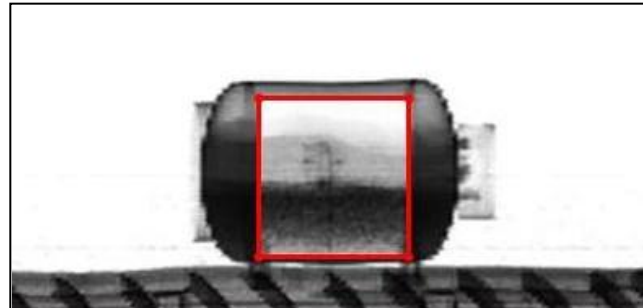
Scanning images – comparison



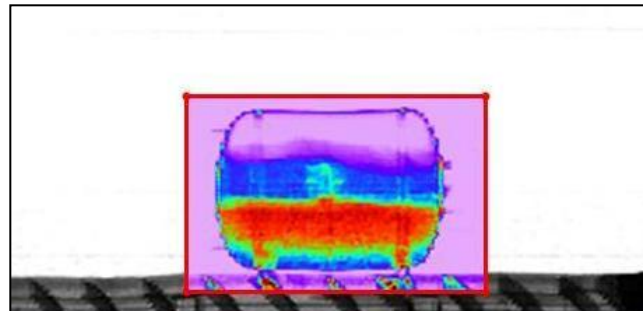
Original



Enhanced
(contrast stretch)

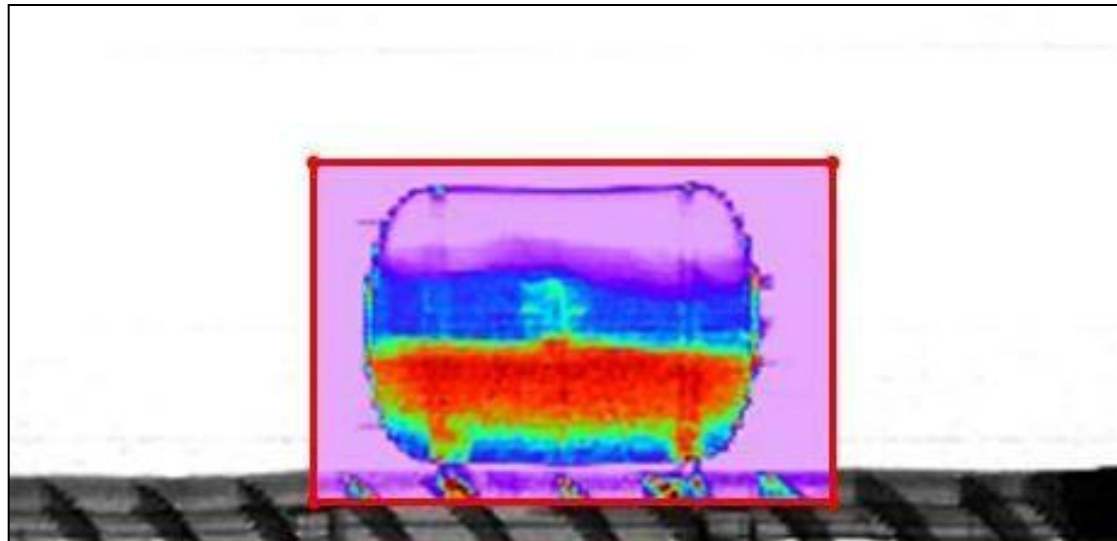


Enhanced
(contrast stretch
and color)



Test 4 – Propane and Water with Target

Enhanced scanning image – contrast stretch and color



Test 5 – Water, Diesel Fuel and Gasoline

Test configuration



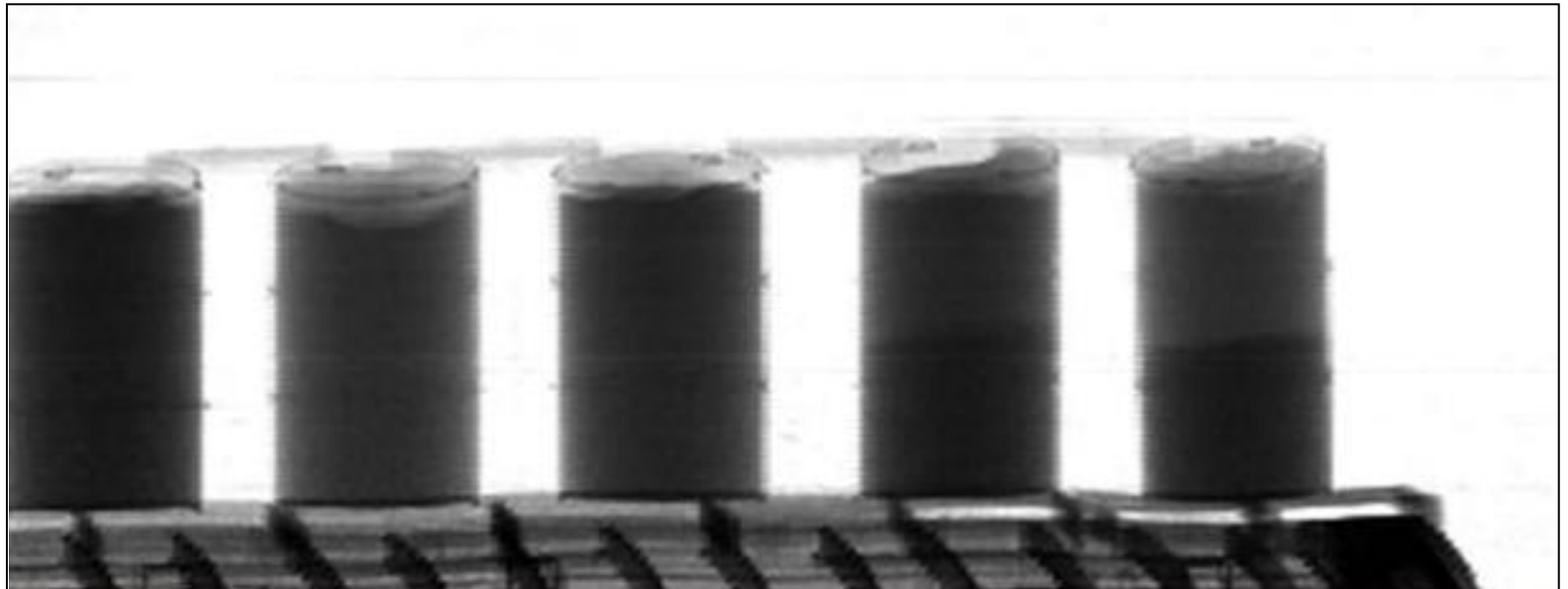
Five drums filled with:

- ▶ Water
- ▶ Gasoline
- ▶ Diesel fuel
- ▶ Mixture of diesel fuel and water
- ▶ Mixture of gasoline and water



Test 5 – Water, Diesel Fuel and Gasoline

Original scanning image



Water

Gasoline

Diesel

Diesel
Water

Gasoline
Water

Test 5 – Water, Diesel Fuel and Gasoline

Enhanced scanning image – contrast stretch



Water

Gasoline

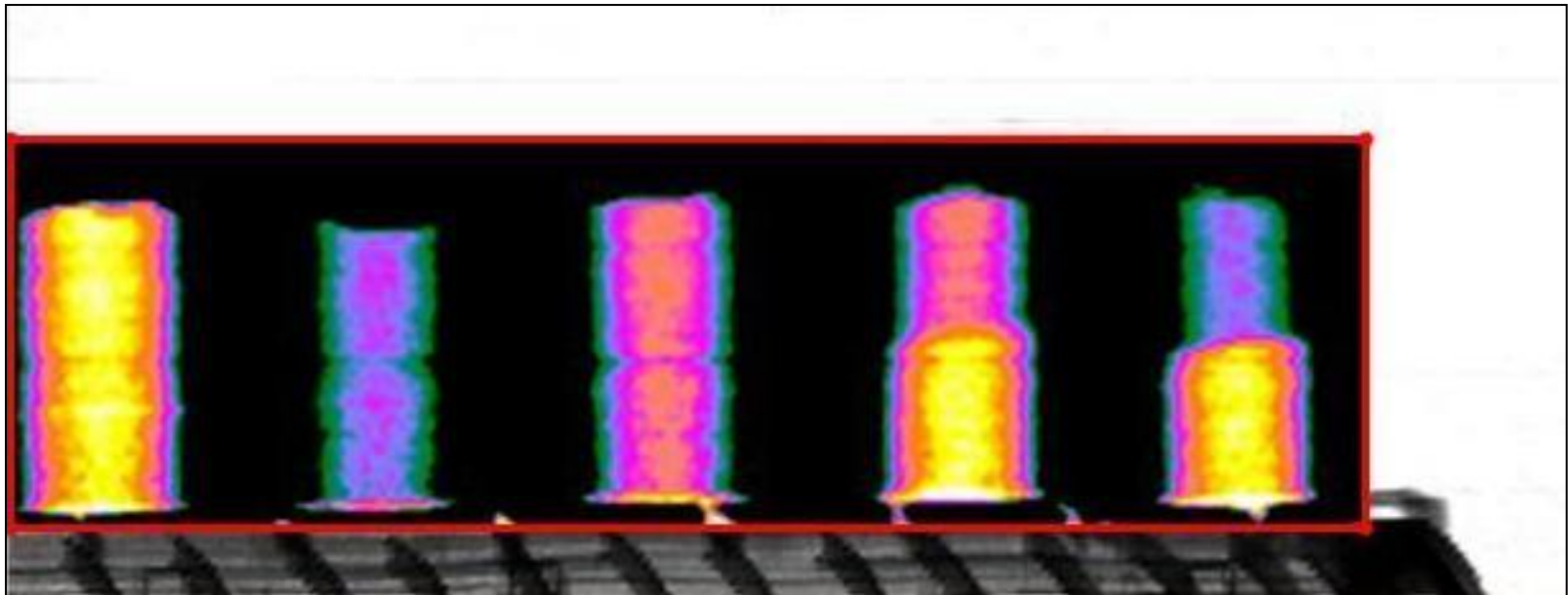
Diesel

Diesel
Water

Gasoline
Water

Test 5 – Water, Diesel Fuel and Gasoline

Enhanced scanning image – contrast stretch and color



Water

Gasoline

Diesel

Diesel
Water

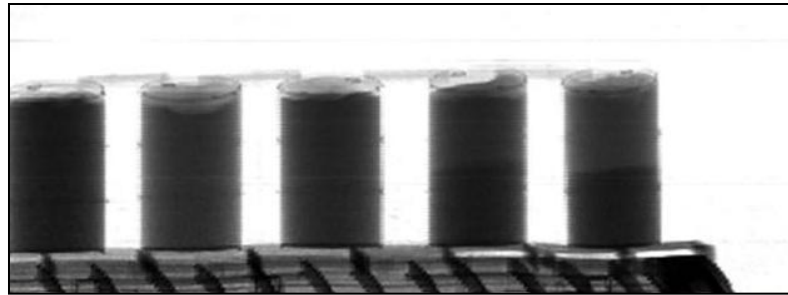
Gasoline
Water

Test 5 – Water, Diesel Fuel and Gasoline

Scanning images – comparison



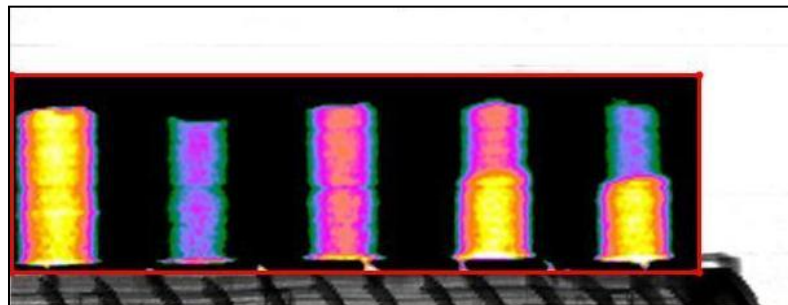
Original



Enhanced
(contrast stretch)

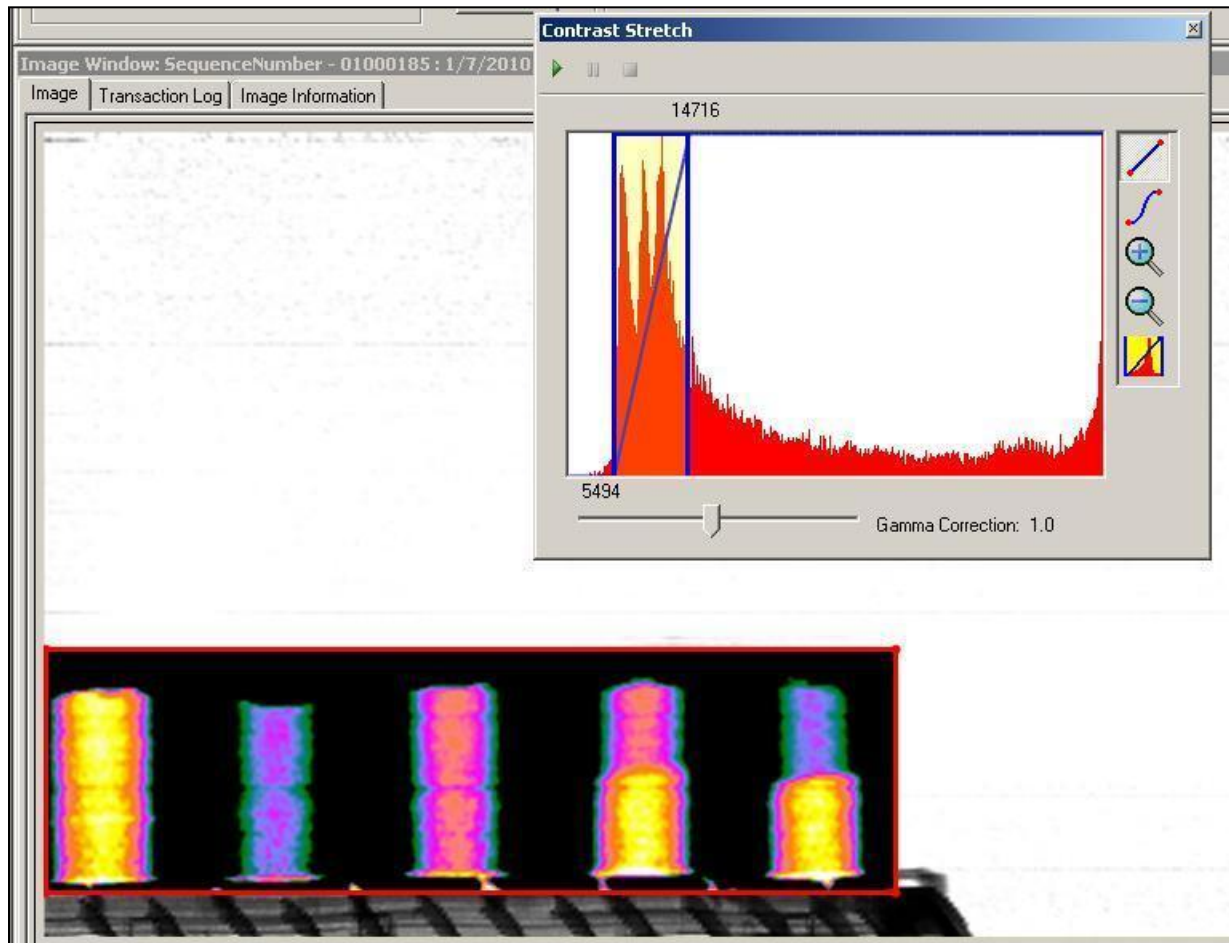


Enhanced
(contrast stretch
and color)



Test 5 – Water, Diesel Fuel and Gasoline

Enhanced scanning image with histogram



Peaks at the densities of water, diesel and gasoline

Test 6 – Drums with Targets

Test configuration



Metal objects imaged through drums:

- ▶ Steel clamps
- ▶ Lead bricks

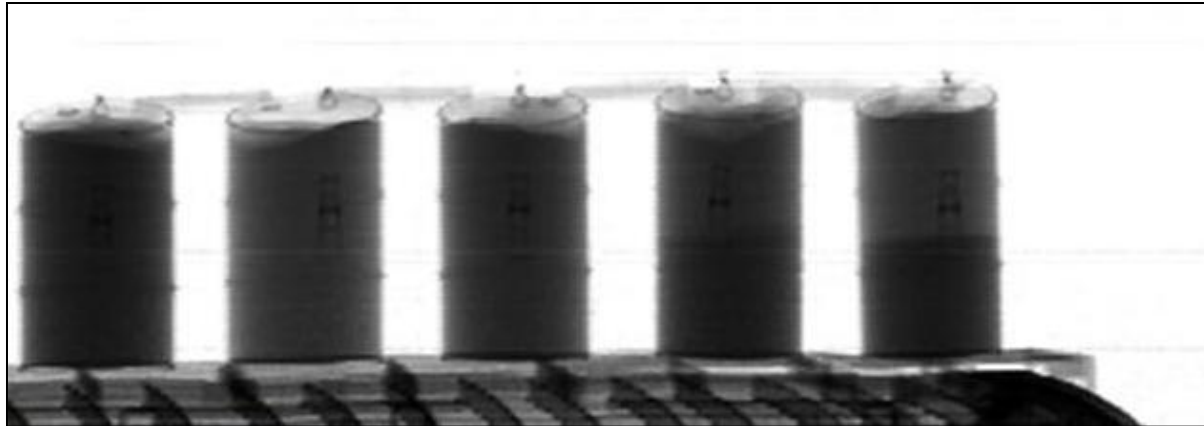


Test 6 – Drums with Targets

Scanning images – comparison



Original



Enhanced
(contrast stretch)

