



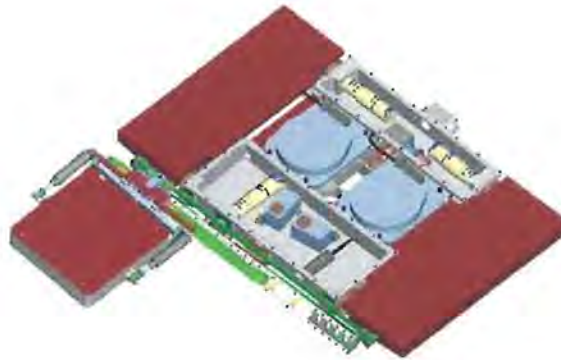
**HITACHI**

GE Hitachi Nuclear Energy  
International, LLC

Report 6538-177011-BN1-RPV  
DRF-0000-0148-4541 Rev.0  
BKW FMB Energie AG  
Kernkraftwerk Mühleberg  
August 2012



**Final Report for:**  
**2012 Reactor Pressure Vessel  
Base Metal Examination**  
**BKW FMB Energie AG**  
**Prepared By:**  
**GE Hitachi - International**  
**KKM Order: BST-ZFP-2012/1002**



Prepared By:

Date: 31-Aug-12

Reviewed By:

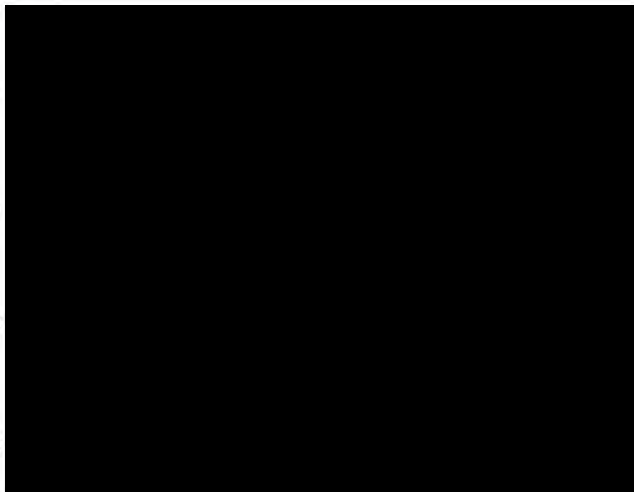
Date: 31-AUG-12

Approved By:

Date: 31.AUG.12

Approved By:

Date: 03. Sept. 12





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August 2012

**IMPORTANT NOTICE REGARDING**

**CONTENTS OF THIS REPORT**

Please Read Carefully

The only undertakings of the GE Hitachi Nuclear Energy International Company (GEHI) respecting information in this document are contained in the contract between BKW FMB Energie AG and GEHI, BKW Purchase Order No. BST-NT-2012/1002, effective September 3, 2012, and nothing contained in this document shall be construed as changing the contract. The use of this information by anyone other than BKW FMB Energie AG, or for any purpose other than that for which it is intended is not authorized: and with respect to any unauthorized use, GE makes no representation or warranty, express or implied, and assumes no liability as to the completeness, accuracy or usefulness of the information contained in this document, or that its use may not infringe privately owned rights.

The performance of onsite activities and deliverables per customer purchase order BST-NT-2012/1002, effective September 3, 2012 were performed under the GE Hitachi's QA program requirements. The delivery of this final report concludes that the contract scope identified in the purchase order meets all requirements for the current outage.

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**SECTION 1  
RPV Examination Summary****1. Introduction**

During the period of 25 August, 2012 through 27 August, 2012, GE Hitachi International (GEH-I) performed automated ultrasonic (UT) examinations at KKM. The base material was examined from the inside diameter (ID) in a 500 mm wide section of the reactor pressure vessel, approximately located at 22° Az. for its entire accessible length, extending from the flange elevation down to the shroud support plate.

Limitations that were encountered in this scan area include the feedwater spargers, core spray piping, jet pump diffuser and the shroud support plate.

No reportable indications were found during the straight beam examinations.

No reportable indications were found during the angle beam examinations.

Geometric indications were recorded from the RPV flange, OD insulation support bracket attachments, vessel circumferential welds, shell course thickness transitions, and ID clad roll (full V path). Indications from water coupled signals from the examination scanner and entry surface noise were evaluated and determined to be non-relevant.

The 2012 examination data shows that there were no fabrication type reflectors or other adverse conditions present in the scanned areas.

**2. Order No.**

This work was performed in accordance with BKW FMB Energie AG, Order No. BST-ZFP-2012/1002.

**3. References**

- GE Hitachi Nuclear Energy document 386HA480, "Certification of Nondestructive Test Personnel" a SWEDAC accepted standard for Ultrasonic Testing and SS - EN 473.
- General Electric document GE-ADM-1002, Version 5, "Procedure for Nondestructive Examination Data Review and Analysis of Recorded Indications".
- General Electric document GE-ADM-1005, Version 0, "Procedure for Zero Reference and Data Recording for Nondestructive Examinations".
- General Electric document KKM-ADM-1065, Version 0, "Procedure for the Linearity Checks on Micro Tomoscan Data Acquisition System Linearity", with DRR 12-27.





- General Electric document GEH-UT-728, Version 0, "Procedure for the Examination of the KKM Forged Reactor Pressure Vessel Base Material from the Inside Surface with the Z-Scan UT System (Switzerland)".

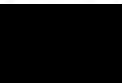
**4. Personnel**

Personnel performing data acquisition for ultrasonic examinations are qualified in accordance with GE document 386HA480, Revision 24 and meet the requirements in the examination procedures.

Personnel performing data analysis for ultrasonic examinations are qualified in accordance with GE document 386HA480, Revision 24, and meet the requirements in the examination procedures. Additionally the Level III Data Analysts are PDI qualified for invessel RPV examinations.

The following GE individuals took part in the KKM 2012 automated invessel reactor pressure vessel examinations. Reference the QA report binder for personnel requiring certifications.

<u>Name</u>	<u>Position</u>
• [REDACTED]	Project Manager
• [REDACTED]	Project Engineer
• [REDACTED]	Project Level III / UT Data Analyst
• [REDACTED]	UT Level III Data Analyst
• [REDACTED]	UT Level II Data Acquisition
• [REDACTED]	UT Level II Data Acquisition
• [REDACTED]	UT Level II Data Acquisition
• [REDACTED]	UT Level II Data Acquisition
• [REDACTED]	Electrical Engineer
• [REDACTED]	Electrical Engineer
• [REDACTED]	Mechanical Engineer





## **5. Qualifications**

The reactor pressure vessel base material examinations performed at KKM are not required as scheduled inservice examinations and no specific demonstration requirements apply.

The examination procedure was based on the requirements of the 2010 Edition of ASME Section III and Section V including SA-388/SA-388M.

The examination procedure was evaluated and approved by representatives of KKM, the SVTI-N and ENSI.

The UT Level III data analysts were qualified in accordance with GE Hitachi Nuclear Energy document 386HA480, a SWEDAC accepted standard for Ultrasonic Testing and SS - EN 473.

The UT Level III data analysts hold current PDI certificates for automated invessel ultrasonic testing of reactor pressure vessels in accordance with ASME Section XI, Appendix VIII, Supplements 4 and 6.

## **6. Examination Coverage**

Ultrasonic examinations were performed in accordance with GEH-UT-728 Version 0. The areas subject to examination are illustrated in Figure 1.

The straight beam examination was performed using four (4) 0° longitudinal wave search units. The 0° search units were located in all four extremities of the search unit package, Figure 2. This provides for the maximum amount of coverage with a significant amount of overlap. Most areas were examined by all four search units. The straight beam coverage is illustrated in Figures 4 and 5.

The angle beam examination was performed using four (4) 45° transverse wave search units. The 45° search units were oriented with the sound beams directed in four orthogonal directions; looking; up, clockwise, down and counter-clockwise in the package, Figure 2. This provides for the maximum amount of coverage with most areas of the scanned volume being examined from four beam directions. The angle beam coverage is illustrated in Figures 6 through 9.





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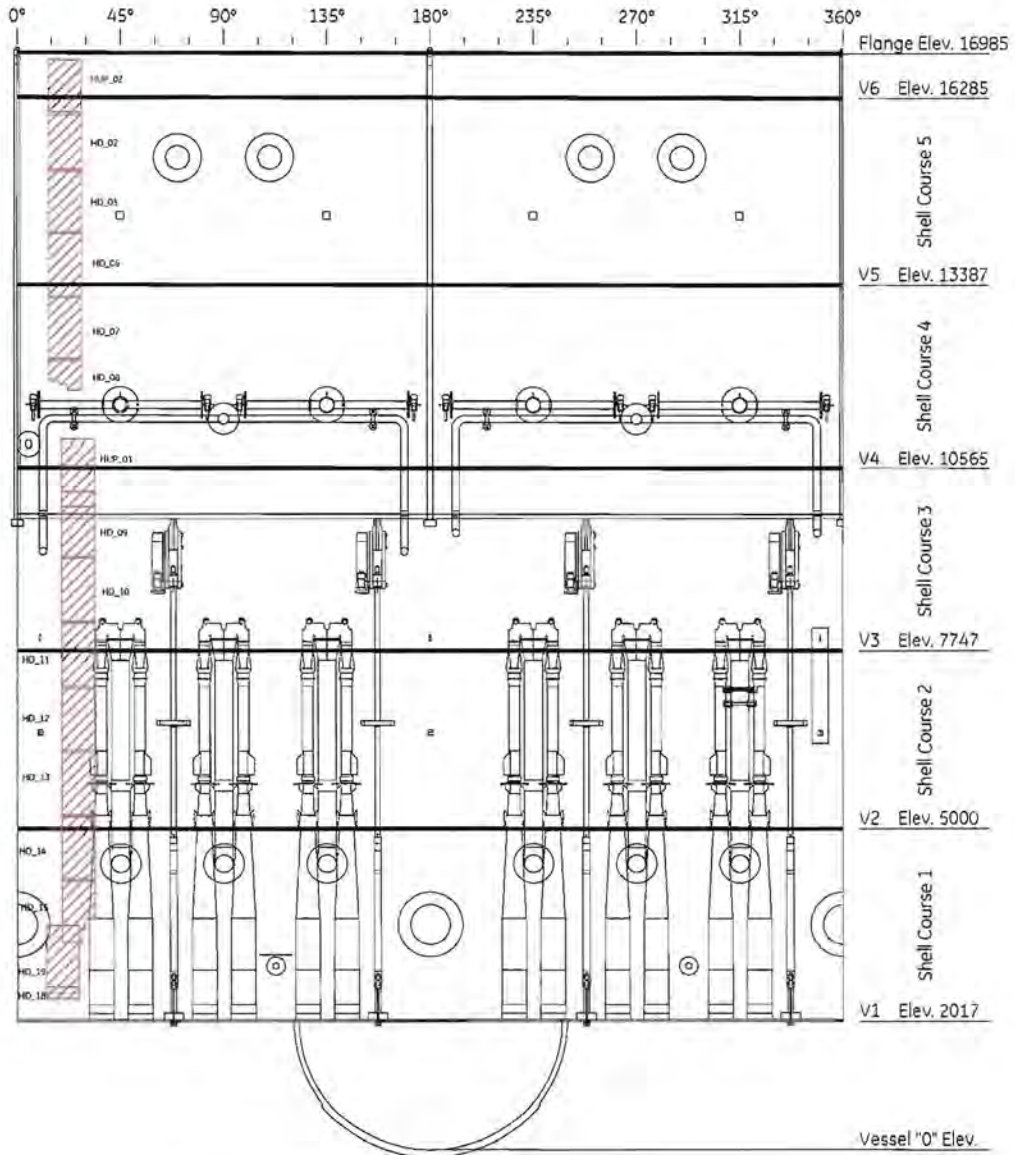


Figure 1 - Scanned Area Map for the KKM RPVID Exams





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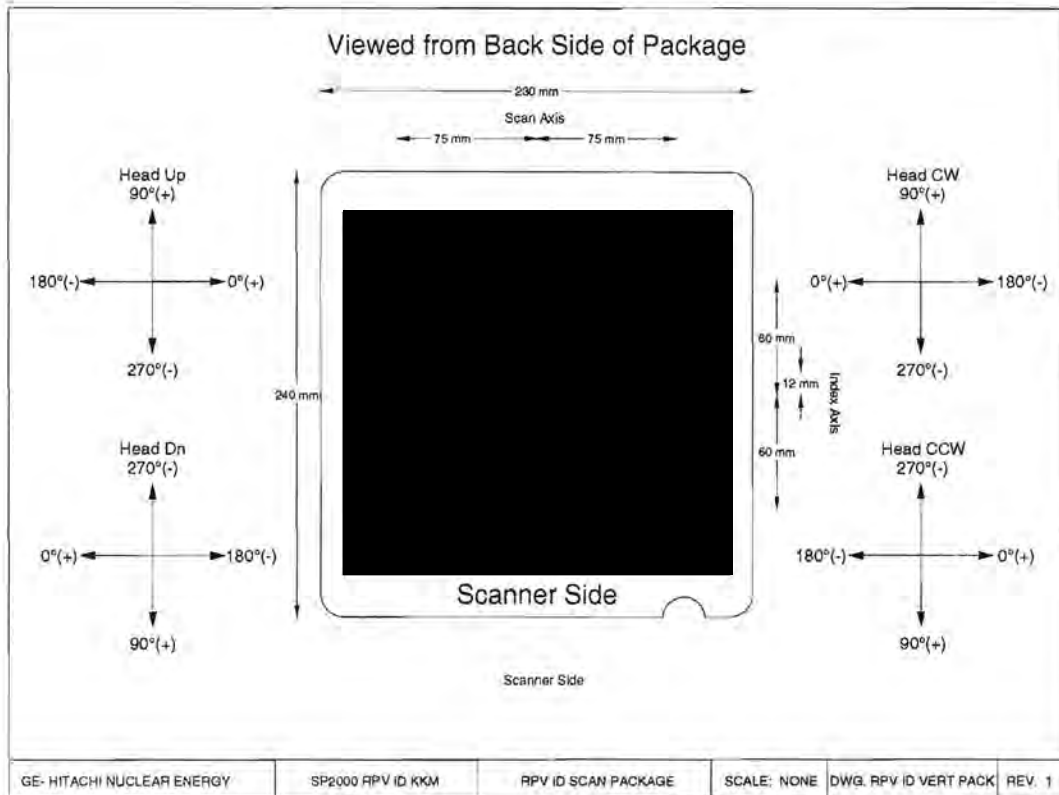


Figure 2 – RPVID Search Unit Package for KKM

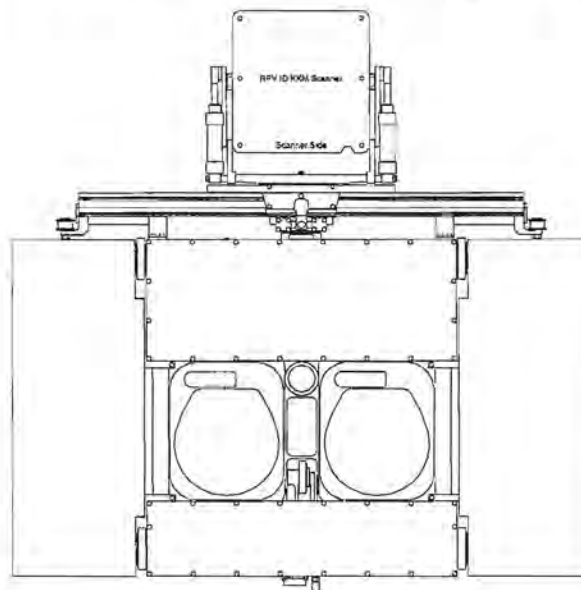


Figure 3 – RPVID Scanner for KKM





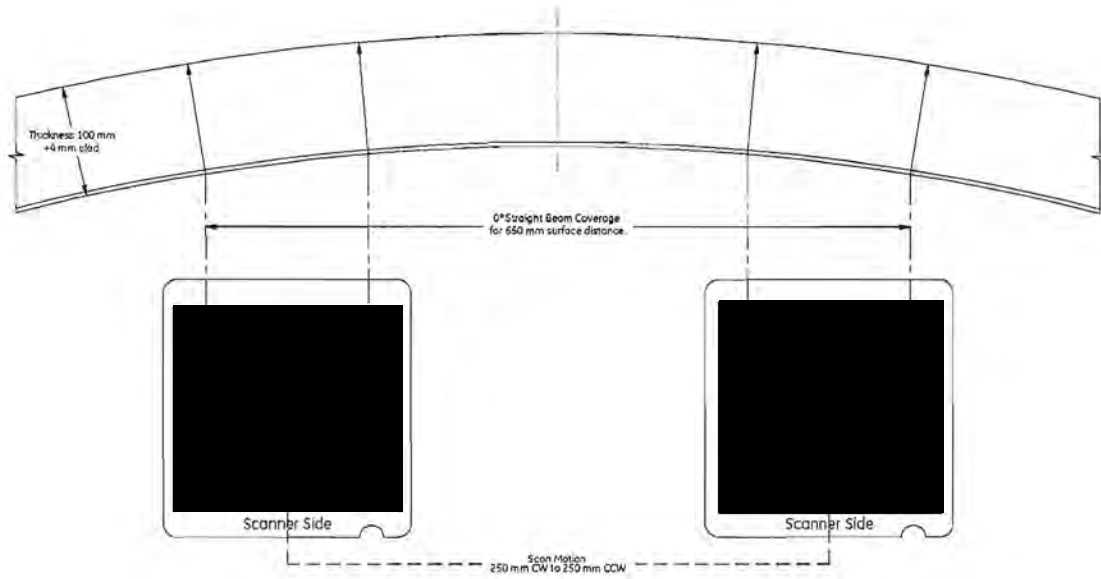


Figure 4 - 0° Straight Beam Coverage for 100mm T Areas

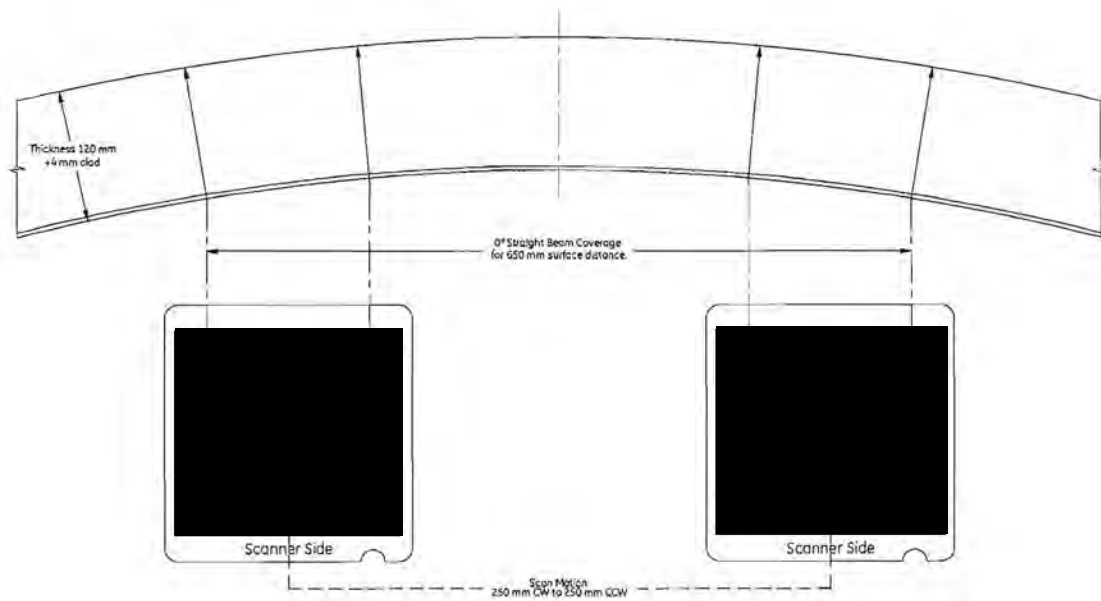


Figure 5 - 0° Straight Beam Coverage for 120mm T Areas



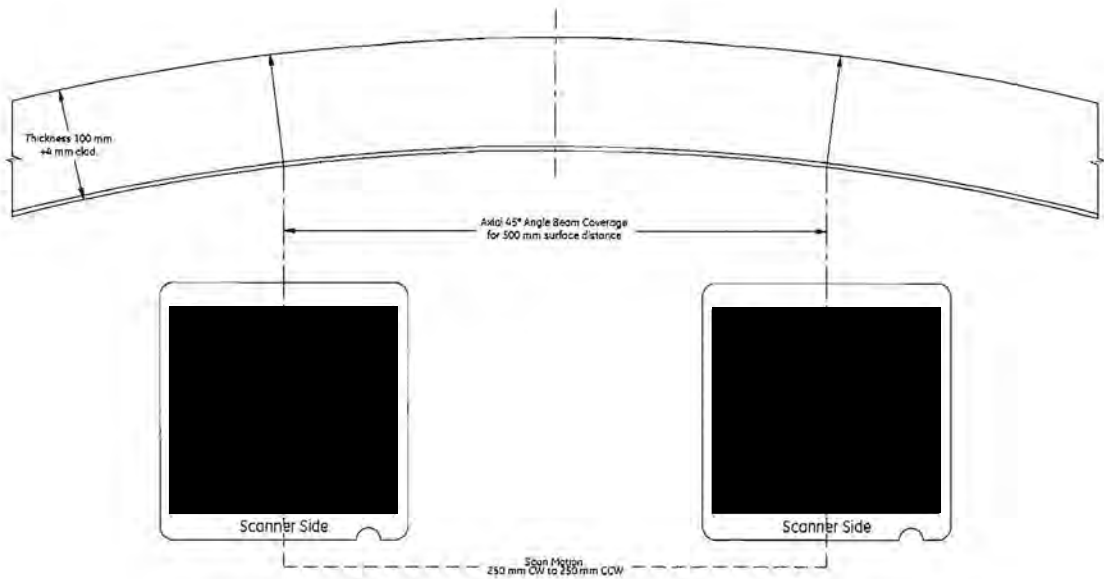


Figure 6 - Axial 45° Angle Beam Coverage for 100mm T Areas

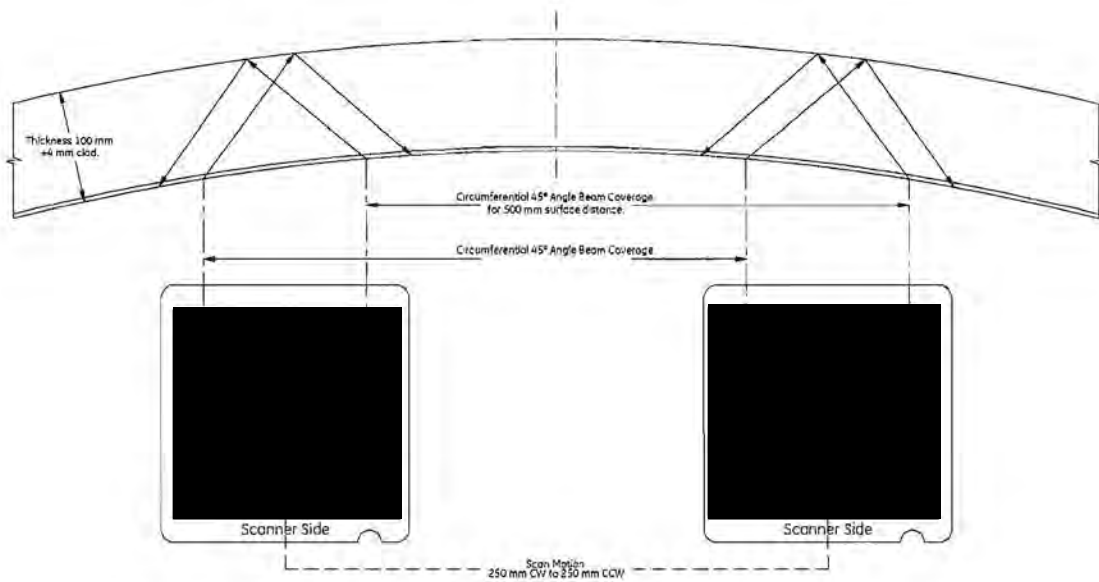


Figure 7 - Circumferential 45° Angle Beam Coverage for 100mm T Areas



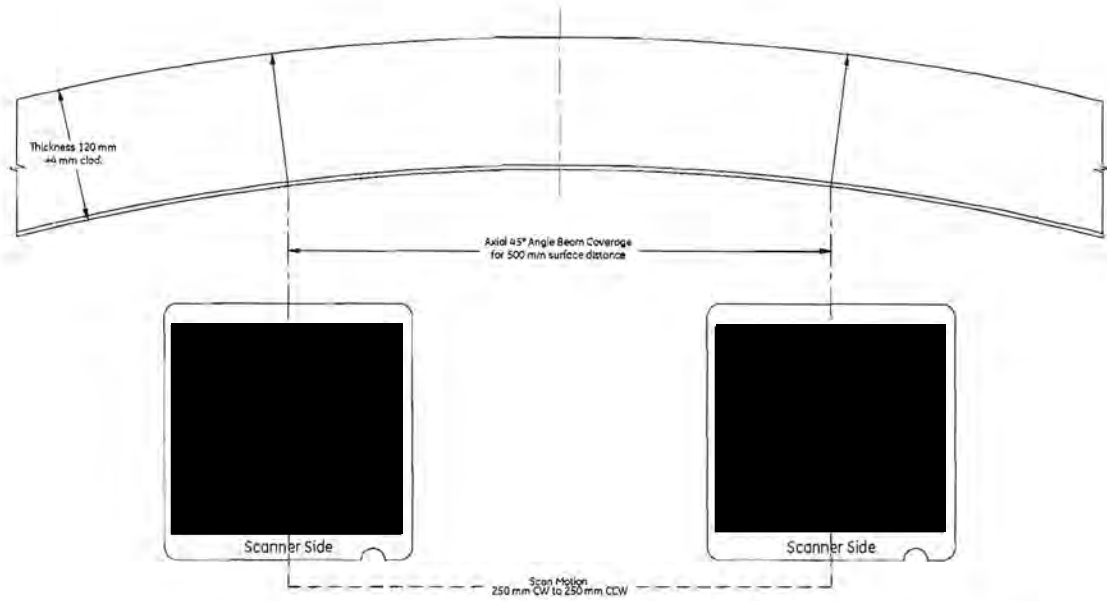


Figure 8 – Axial 45° Angle Beam Coverage for 120mm T Areas

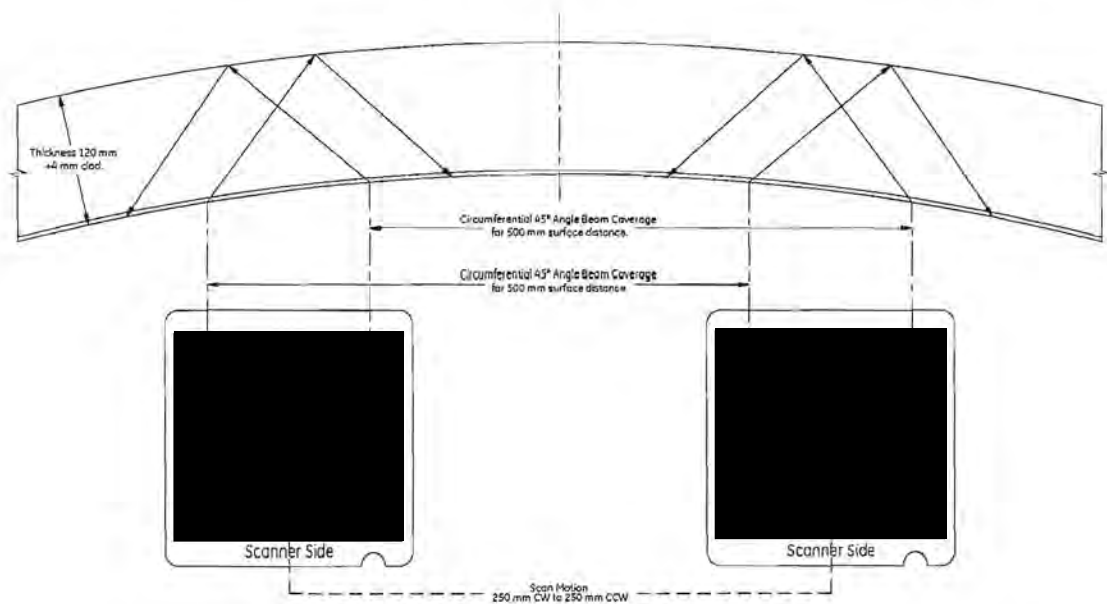


Figure 9 – Circumferential 45° Angle Beam Coverage for 120mm T Areas





## 7. Equipment

### Z Scan™ Acquisition System

The data acquisition system is comprised of a Z Scan UT conventional ultrasonic system pulser / receiver unit and desktop PC utilizing Ultra Vision software. The Z Scan UT unit is an 8 channel ultrasonic system that operates in either the pulse-echo or pitch-catch modes.

Each hardware channel is individually programed and may be assigned to multiple software channels allowing for the same search unit to be operated in both the logarithmic or linear modes if required. Each software channel is calibrated separately for time base and amplitude.

The system will pulse each software channel and then digitizes the entire waveform in video or radio frequency (RF) formats. These waveforms are recorded and the stored waveforms can be used to construct various data viewing formats; UT waveforms "A-scan", volume corrected top view "C-scan", volume corrected side views "B-scan", volume corrected end views "D-scan".

### UltraVision™ Data Analysis Workstation

The UltraVision Version 1.2R7 was used for the evaluation of ultrasonic data. The data is displayed with any combination of time or amplitude in A-scan, B-scan, C-scan and D-scan views, with 1024 X 768 pixel resolutions. The UltraVision software permits any desired manipulation of the A, B, C or D-scan images.

Cross-sectional weld detail may be overlaid on the Volume-Corrected image presentation to show dimensional relationship between the component geometry and the location of ultrasonic reflectors. An adjustable color palette is provided for image enhancement. Each image or specific region therein, can be selectively enlarged.

GE data analysts have used the UltraVision software to successfully demonstrate the complete range of flaw detection and sizing capabilities in the PDI Reactor Pressure Vessel Program at the EPRI NDE Center.

### *Ultrasonic Data Analysis*

This illustration in Figure 10 depicts the perspective of the ultrasonic data images with respect to the component being examined. The screen print in Figure 11 illustrates a standard format for the analysis of reactor pressure vessel conventional ultrasonic data.



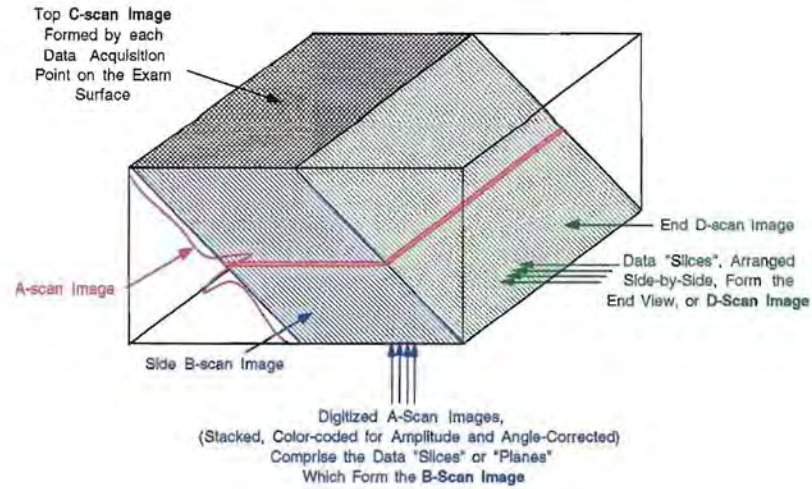


Figure 10 - Display Views

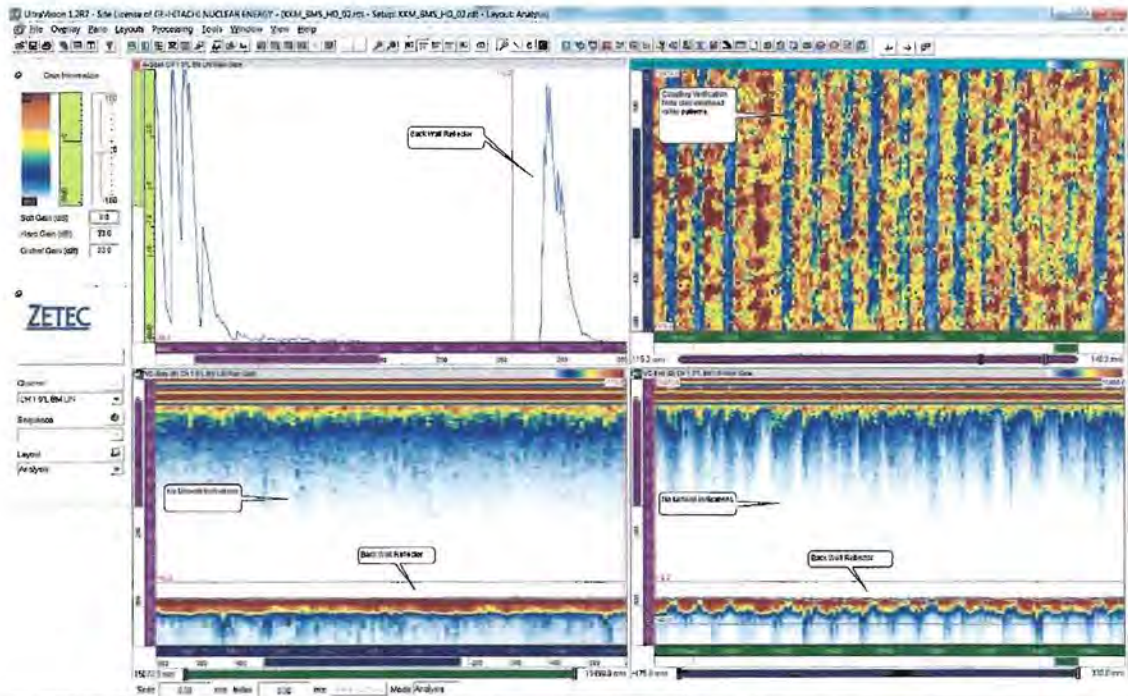


Figure 11 - Example of a Standard Analysis Format





**Results**

Straight Beam Examination

During the analysis of the straight beam data coupling efficiency was verified by evaluating the back wall reflection response. The back wall reflection was affected by the as welded clad inside surface of the vessel and average variations in the back wall of 6 dB were observed, which is an expected condition. Loss of back wall reflection was observed where the OD surface was not parallel to the ID surface, which is an expected condition. These areas are located where the thicknesses of the vessel changes and also at the vessel flange.

No areas of reduced back wall reflection associated with mid wall reflectors were detected. No mid wall reflectors exceeding the registration level were detected. No mid wall reflectors were observed.

Angle Beam Examination

During the analysis of the angle beam data, coupling efficiency was verified by evaluating the inside surface clad roll reflection recorded by the full V examination. The clad roll reflection was affected by the as welded clad inside surface of the vessel resulting in characteristic patterns in the top view displays. These patterns were used to verify coupling efficiency.

No reflectors associated with surface flaws were detected. No mid wall reflectors exceeding the registration level were detected.

Summary of Examination Results

Straight Beam Exams - 0° Base Material	No recordable indications were detected.
Angle Beam Exams - 45°S Looking Clockwise.	No recordable indications were detected.
Angle Beam Exams - 45°S Looking Counter Clockwise.	No recordable indications were detected.
Angle Beam Exams - 45°S Looking Up.	No recordable indications were detected.
Angle Beam Exams - 45°S Looking Down.	No recordable indications were detected.

Indications from geometric reflectors were evaluated and determined to be non-relevant.





Coverage Achieved (Figure 3)

85%	Shell Course 1 (V1 to V2)	Scanning was limited due to the shroud support plate and jet pump diffusers.
100%	Shell Course 2 (V2 to V3)	Scanning was not limited.
100%	Shell Course 3 (V3 to V4)	Scanning was not limited.
73%	Shell Course 4 (V4 to V5)	Scanning was limited due to the feedwater spargers and core spray piping.
100%	Shell Course 5 (V5 to V6)	Scanning was not limited.

**8. Conclusions**

Calibrations, examinations, and evaluations were performed in the presence of representatives from SVTI and KKM.

The final results were presented to KKM and SVTI on 3-September-2012 reference Sections 2 through Section 7.

This examination is complete and accepted by SVTI, KKM, and GE Hitachi International.





File Names & Scan Directions

The examination scan files are named using the format:

KKM\_BMS\_HUP\_01

KKM Base Material Survey\_Head Up Scanner Configuration \_File number 1.

KKM\_BMS\_HD\_07

KKM Base Material Survey\_Head Down Scanner Configuration \_File number 7.

The ultrasonic channels are named using the following format:

Ch 1 0°L BM LIN (Transducer 1, 0°L Base Material Exam Linear Amplifier)

Ch 2 0°L BM LIN (Transducer 2, 0°L Base Material Exam Linear Amplifier)

Ch 3 0°L BM LIN (Transducer 3, 0°L Base Material Exam Linear Amplifier)

Ch 4 0°L BM LIN (Transducer 4, 0°L Base Material Exam Linear Amplifier)

Ch 1 0°L BM LOG (Transducer 1, 0°L Base Material Exam Logarithmic Amplifier)

Ch 2 0°L BM LOG (Transducer 2, 0°L Base Material Exam Logarithmic Amplifier)

Ch 3 0°L BM LOG (Transducer 3, 0°L Base Material Exam Logarithmic Amplifier)

Ch 4 0°L BM LOG (Transducer 4, 0°L Base Material Exam Logarithmic Amplifier)

Ch 5 45°T LKUP (Transducer 5, 45° Shear wave, Transverse to welds, Looking Up in vessel)

Ch 6 45°T LKCW (Transducer 6, 45° Shear wave, Parallel to welds, Looking Clockwise in vessel)

Ch 7 45°T LKDN (Transducer 7, 45° Shear wave, Transverse to welds, Looking Down in vessel)

Ch 8 45°T LKCC (Transducer 8, 45° Shear wave, Parallel to welds, Looking Counterclockwise in vessel)







## Examination Results Legend - (Explanation)

- A). No Recordable Indications:
  - No indications meeting or exceeding the registration level were recorded. May be applied when other non-relevant or geometric reflectors are commented.
- B). Recordable Indications:
  - An indication meeting or exceeding the registration level or other recording criteria was identified. Requires an explanation of the flaw type and an evaluation of the flaw for acceptance.
- C). OD Surface Geometry – Thickness Transitions:
  - Geometric reflectors from the outside surface of the component due to thickness changes documented by a design drawing review or 0° evaluations.
- D). OD Surface Geometry - Attachment:
  - Geometric reflectors from the outside surface of the component due to attachments documented by a design drawing review or 0° evaluations.
- E). OD Surface Geometry:
  - Geometric reflectors from the outside surface of the component other than the listed geometry.
- F). ID Surface Geometry:
  - Geometric reflectors from the inside surface of the component other than the listed geometry. This does not include the normal clad roll observed in full V-path exams.
- G). ID Surface Geometry - Attachment:
  - Geometric reflectors from the inside surface of the component due to internal attachments documented by drawing review or visual observations.
- H). Electrical Noise (RFI):
  - Transient noise induced into the system through plant electrical systems and ground loops. An acceptable condition for analysis without loss of coverage unless noted otherwise.
- I). Weld Discontinuity:
  - Reflectors from inclusions or other discontinuities within the weld nugget deposited during the welding process.
- J). Beam Redirect:
  - While scanning over the clad surface with the shear wave transducer, the shear-wave signal is redirected to the outside surface at an angle less than the original angle generated within the base metal. Typically seen at a 0° impingement angle.

Note - Indication patterns such as normal entry surface noise, clad roll, and water coupled reflectors may be identified in the screen prints but not listed in the data report form.

<b>BKW</b>	BKW FMB ENERGIE AG KERNKRAFTWERK MÜHLEBERG		<h1>Prüfprotokoll</h1> <h2>Ultrasonic Examination</h2>		<b>U-12/22</b>
					<b>Page 1 of 9</b>
Prüfzeitpunkt: <b>ISI OUTAGE 2012</b>			Exam.Date::25-27, August, 2012		
<b>Prüfobjekt</b>	System: <b>002</b>		MKZ, Nr: <b>002 A 0001</b>		Wst. Gr.: Ferrit mit Plattierung
	Komponente / Abschnitt: <b>REAKTORDRUCKBEHÄLTER</b>		Prüfbereich: <b>See Figure 3</b>		
<b>Dokumente</b>	WP-Nummer:	WP-Lfd-Nr.	SK:	Examination Type:	Detail Prüfblatt:
	..		<b>1</b>	<b>Base Material Examination based on ASME Section III 2010 Edition</b>	-
	Prüfvorschrift:	Rev.:	BPP:	Lfd. Nr.:	Zchng.-Nr.:
	<b>GEH-UT-728 V.0</b>		<b>WCP: GEH-UT-728 V0 Rev. 0</b>	-	-
<b>Equipment</b>	<input checked="" type="checkbox"/> Ultravision Z-Scan Version 1.2 Rev. 7 (1.2R7) <input checked="" type="checkbox"/> GEH-I RPV ID Scanner <input checked="" type="checkbox"/> Ultravision™ Workstation Version 1.2 Rev.7 (1.2R7)				
<b>Description and Results</b>	<p>2012 Reactor Pressure Vessel Base Material Exams:</p> <p>Examinations were performed in the area illustrated in Figure 3 during the 2012 Outage at KKM.</p> <p>Straight and angle beam examinations were performed in a 500 mm wide section of the reactor pressure vessel, located at 22° Az., extending from the flange elevation down to the shroud support plate. Limitations that were encountered in this scan area include the feedwater spargers, core spray piping, jet pump diffuser and shroud support plate.</p> <p>Examination Results:</p> <p>No reportable indications were found during the straight beam examinations.</p> <p>No reportable indications were found during the angle beam examinations.</p> <p>Geometric indications were recorded from the RPV flange, OD insulation support bracket attachments, vessel circumferential welds, shell course thickness transitions, and ID clad roll (full V path). Indications from water coupled signals from the examination scanner and entry surface noise were evaluated and determined to be non-relevant.</p> <p>The 2012 examination data shows that there were no fabrication type reflectors or other adverse conditions present in the scanned areas.</p> <p>Conclusions:</p> <p>Calibrations, examinations, and evaluations were performed in the presence of representatives from SVTI and KKM. This examination is complete and accepted by SVTI, KKM and GEH-I and documented in GEH-I Report 6538-181058-BN1-RPVID. For examination procedures, personnel certifications and equipment certifications reference GEH-I-QA-01.</p> <p>A more detailed description of the examination may be found in the following pages.</p>				
<b>GEH-I</b>		<b>Prüfaufsicht</b>	<b>Werksachverständiger, Sachbearbeiter</b>		<b>SVTI</b>
Datum: 29.Aug.2012		Visum:	Datum: <b>29.08.2012</b>		Datum: <b>29.08.2012</b>

**Examination Requirements**

KKM and GE Hitachi performed examinations of selected areas of the KKM Reactor Pressure Vessel base material based on the requirements of the 2010 Edition of ASME Section III. The examination was intended to confirm that the original Reactor Pressure Vessel fabrication non-destructive examinations were effective and that the base material of the KKM vessel was in the proper material condition with no fabrication related or other adverse conditions present.

The 2010 Edition of ASME Section III, NB-2542.1 requires examinations for forgings in accordance with Article 5 of Section V. The acceptance standards are defined in Section III NB-2542.2. GE Hitachi's examination techniques were developed to comply with these requirements to the extent possible with the vessels current operational status.

ASME Section V, Article 23, SA-388/SA-388M is intended for the in process examination of forgings prior to their final field assembly. For reactor pressure vessels this would have been prior to the application of clad to the inside surface.

**Straight Beam Exams**

ASME Section III, NB-2542.2(b) *Straight Beam Special Rule for Vessel Shell Sections* provides the acceptance standards for vessel shell forgings detected with straight beam techniques.

(1) A ring forging made to fine grain melting practice and used for vessel shell sections shall be unacceptable if the results of the straight beam radial examination show one or more reflectors producing a continuous complete loss of back reflection accompanied by continuous indications on the same plane that cannot be encompassed with a circle whose diameter is 3 in. (75 mm) or one-half of the wall thickness, whichever is greater.

(2) In addition, two or more reflectors smaller than described in (1) above shall be unacceptable unless separated by a minimum distance equal to the greatest diameter of the larger reflector or unless they may be collectively encompassed by the circle described in (1) above.

Note - Complete loss of back reflection is assumed when the back reflection falls below 5% full calibration screen height, reference NB-2542.2(a). Note - The reduction of a 75% FSH reflector to 5% FSH equals a 24 dB decrease in amplitude.

The straight beam examinations were performed using the techniques described in SA-388 section 8.2 *Straight-Beam Examination*. A registration level was established in addition to the techniques described in section 8.2.2.1 *Back-Reflection Technique*. [REDACTED]

**Angle Beam Exams**

ASME Section III, NB-2542.2(c) *Angle Beam Rule* provides the acceptance standards for vessel shell forgings detected with angle beam techniques.

(c) A forging shall be unacceptable if the results of angle beam examinations show one or more reflectors which produce indications exceeding in amplitude the indication from the appropriate calibration notches.

ASME Section V, Article 5, T-571.2 Forgings and Bars, provides the inspection requirements for forged materials as used at KKM.

The examinations were based on the requirements of SA-388/SA-388M. Angle beam examinations are required in both the axial and circumferential directions.

The angle beam examination was performed using the techniques described in SA-388 section 8.3 *Angle Beam Techniques - Rings and Hollow Forgings*: The normal practice for the examination of ring forgings is to machine calibration notches in the actual component for use as the calibration standard. GE Hitachi used the 25 mm long ID and OD notches in KKM's ASME basic calibration block (Figure 1) as a substitute for the calibration reflectors specified in SA-388 section 8.3.3 due to KKM being operational.

A registration level was established in addition to the techniques described in section 8.3.3. [REDACTED]



### Deviations from Fabrication Examinations

The following deviations from the original Section III examination requirements for the angle beam examination were made.

- (1) The vessel is clad with stainless steel to a nominal thickness of 4 mm. The original examination would have been performed in the non-clad as forged or machined surface.
- (2) The calibration block is 148 mm in thickness. The original calibration material or actual component thickness was 100 mm or 120 mm in thickness.
- (3) The calibration block is flat and the original calibration reflectors would have been oriented in both the axial and circumferential axis.

GE Hitachi's position is that these deviations from the SA-388 requirements did not adversely affect the intended examination based on the following.

- (1) The examination system recorded the entire A-scan information without any threshold applied. All reflectors present were recorded and available for review. The influence of the clad material was compensated for in analysis by applying software controlled gain. Additionally the vessel clad condition is a design condition that cannot be changed in service.
- (2) The use of a calibration block thicker than the material to be inspected resulted in an equal or slightly more sensitive examination.
- (3) Calibration block curvature is addressed in ASME Section 5, Article 4, J-433(e) *Welds in Materials Greater than 20 in. (500 mm)*. Which states "...Alternatively, a flat basic calibration block may be used provided the minimum convex, concave, and compound curvature radius to be examined is greater than the critical radius determined by Appendix A." Note – The reference to Appendix A is in error the correct reference is Appendix G. Material curvature is a non-critical factor on materials greater than 20 in. in diameter provided certain conditions have been met in accordance with Section V, Appendix G. These conditions only apply to convex surface materials and the flat block is acceptable for use.

### In vessel Examination

GE Hitachi inspected an area 500 mm wide centered on the 22° Azimuth of the vessel. The examination was performed from the full accessible length of the vessel extending from the flange surface to the shroud support plate reference Figure 3. This examination area passes through all five shell courses of the vessel and represents all fluence conditions experienced by the vessel in service. Scanning of this length was limited due to the feedwater spargers, core spray piping, jet pump diffusers and shroud support plate.

### Straight Beam Examination

The straight beam examination was performed using four (4) 0° longitudinal wave search units. The 0° search units were located in all four extremities of the search unit package, reference Figure 2. This provides for the maximum amount of coverage with a significant amount of overlap. Most areas were examined by all four search units. Reference Figure 4 for an example of a straight beam analysis display.

During the analysis of the straight beam data coupling efficiency was verified by evaluating the back wall reflection response. The back wall reflection was affected by the as welded clad inside surface of the vessel and average variations in the back wall of 6 dB were observed which is an expected condition. Loss of back wall reflection was observed where the OD surface was not parallel to the ID surface which is an expected condition. These areas are located where the thicknesses of the vessel changes and also at the vessel flange.

No areas of reduced back wall reflection associated with mid wall reflectors were detected. No mid wall reflectors exceeding the registration level were detected. No mid wall reflectors were observed.

Angle Beam Examination

The angle beam examination was performed using four (4) 45° transverse wave search units. The 45° search units were oriented with the sound beams directed in four orthogonal directions; looking up, clockwise, down and counter-clockwise (Figure 2). This provides for the maximum amount of coverage with most areas of the scanned volume being examined from four beam directions.

During the analysis of the angle beam data, coupling efficiency was verified by evaluating the inside surface clad roll reflection recorded by the full V examination. The clad roll reflection was affected by the as welded clad inside surface of the vessel resulting in characteristic patterns in the top view displays. These patterns were used to verify coupling efficiency. Reference Figure 5 for an example of an angle beam analysis display.

No reflectors associated with surface flaws were detected. No mid wall reflectors exceeding the registration level were detected.

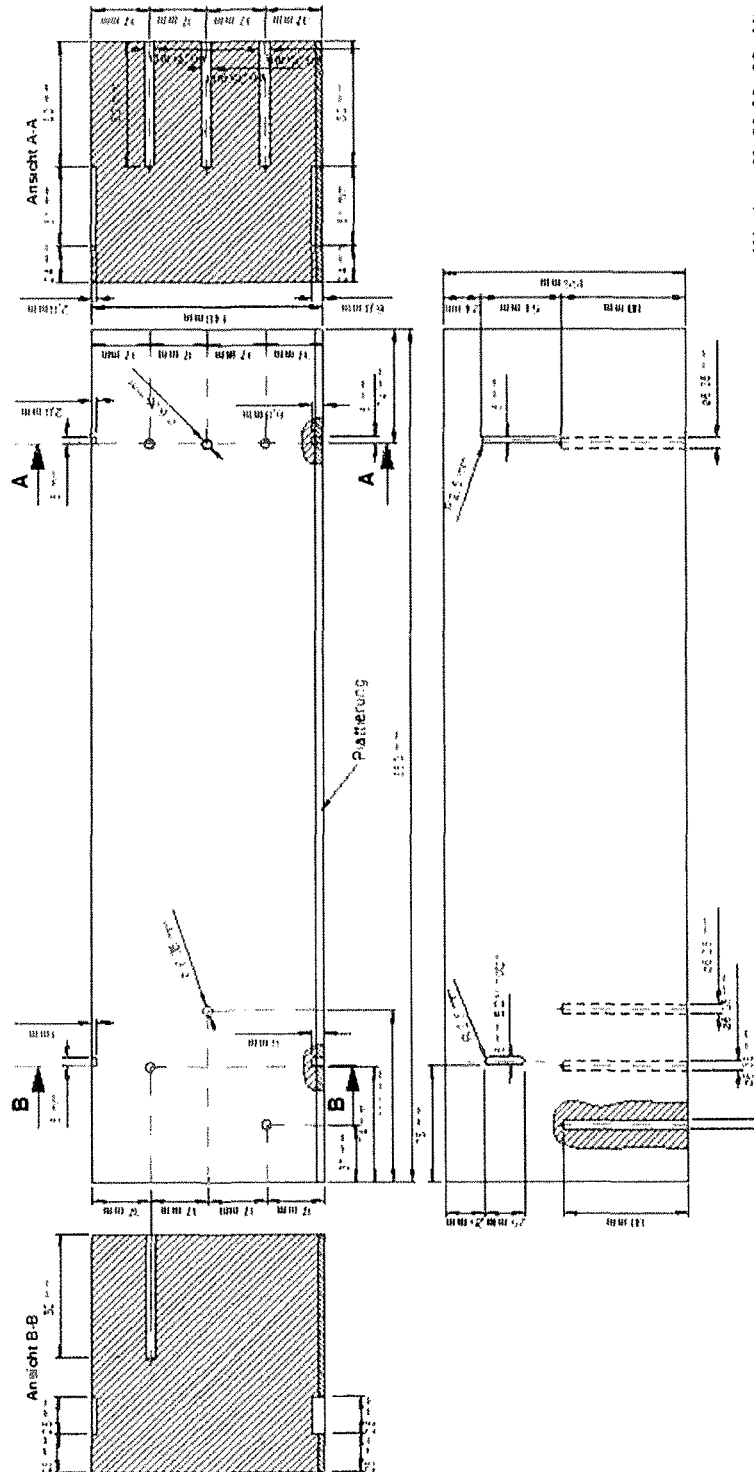
Summary of Examination Results

Straight Beam Exams – 0° Base Material	No recordable indications were detected.
Angle Beam Exams – 45°S Looking Clockwise.	No recordable indications were detected.
Angle Beam Exams – 45°S Looking Counter Clockwise.	No recordable indications were detected.
Angle Beam Exams – 45°S Looking Up.	No recordable indications were detected.
Angle Beam Exams – 45°S Looking Down.	No recordable indications were detected.

Indications from geometric reflectors were evaluated and determined to be non-relevant.

Coverage Achieved (Figure 3)

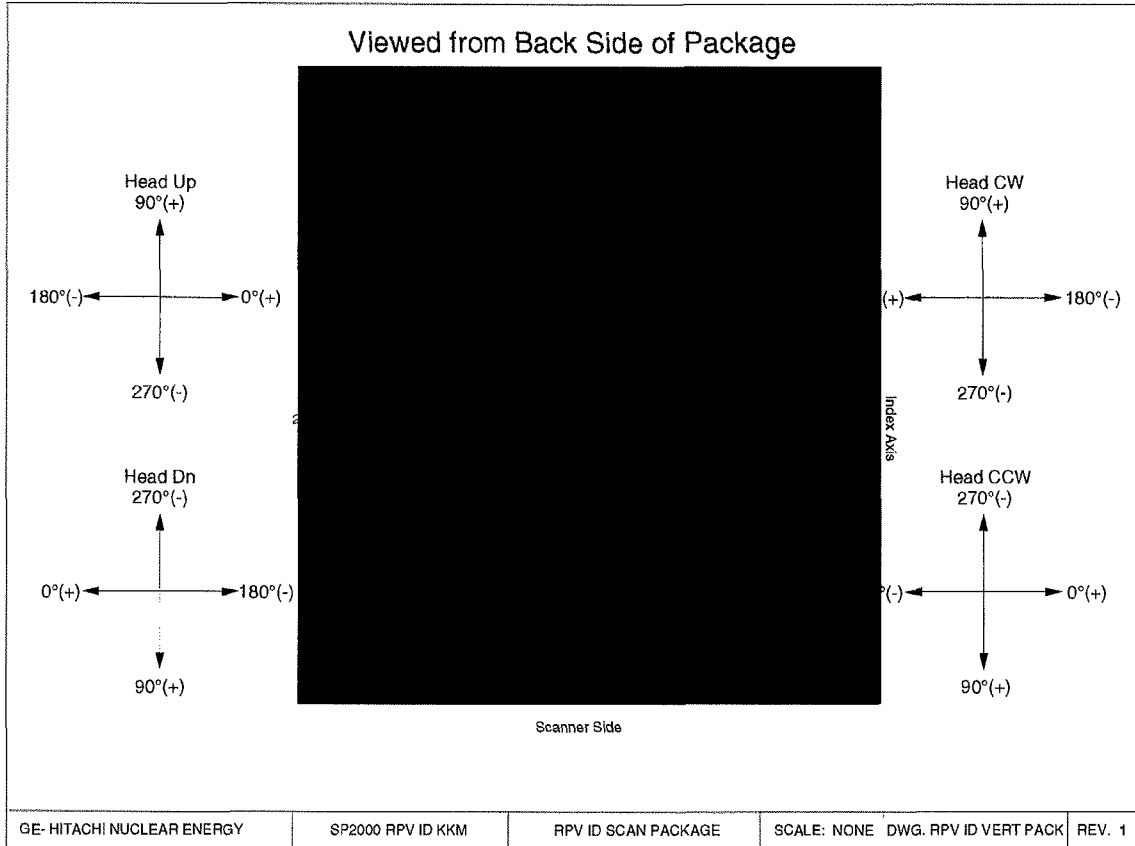
85%	Shell Course 1 (V1 to V2)	Scanning was limited due to the shroud support plate and jet pump diffusers.
100%	Shell Course 2 (V2 to V3)	Scanning was not limited.
100%	Shell Course 3 (V3 to V4)	Scanning was not limited.
73%	Shell Course 4 (V4 to V5)	Scanning was limited due to the feedwater spargers and core spray piping.
100%	Shell Course 5 (V5 to V6)	Scanning was not limited.



Werkstoff: 20 Mn Mo Ni

Maßstab: 1 : 2

Figure 1 – KKM ASME Basic Calibration Block



**Figure 2 – RPVID Search Unit Package for KKM**



KKM Reactor Pressure Vessel

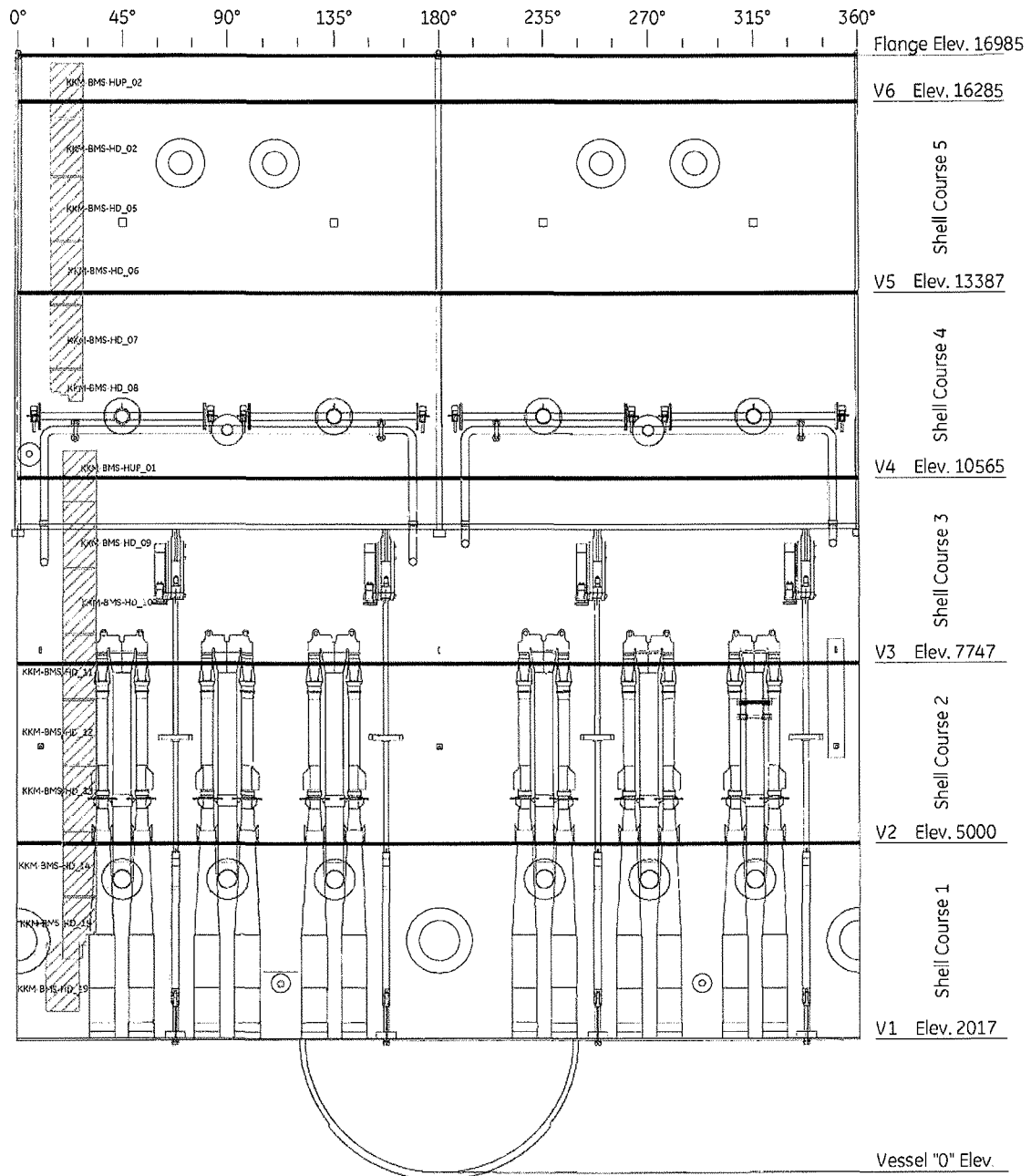


Figure 3 – Scanned Area Map for KKM RPVID Exams



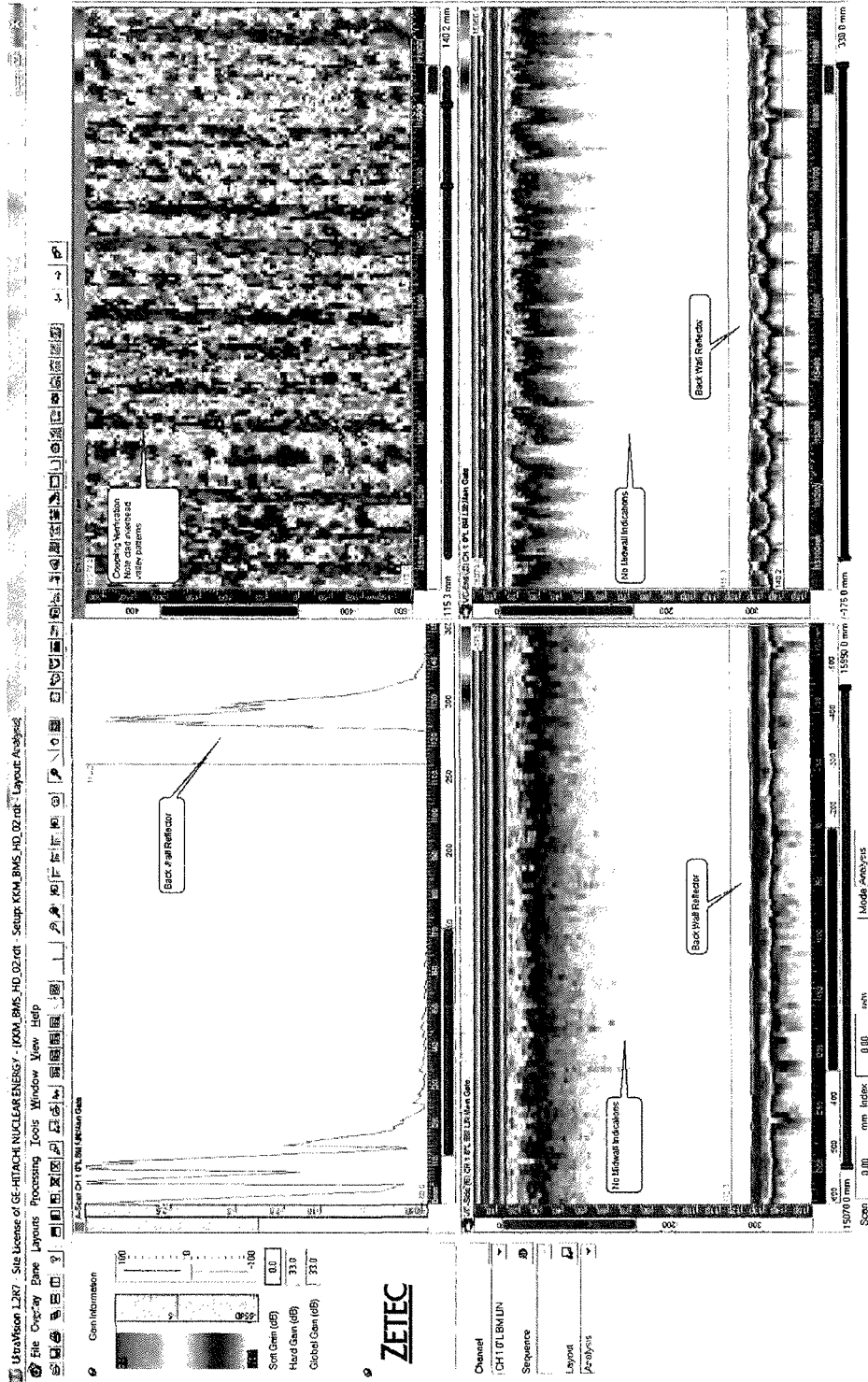


Figure 4 – Example of a Straight Beam Display from a KKM Shell Course

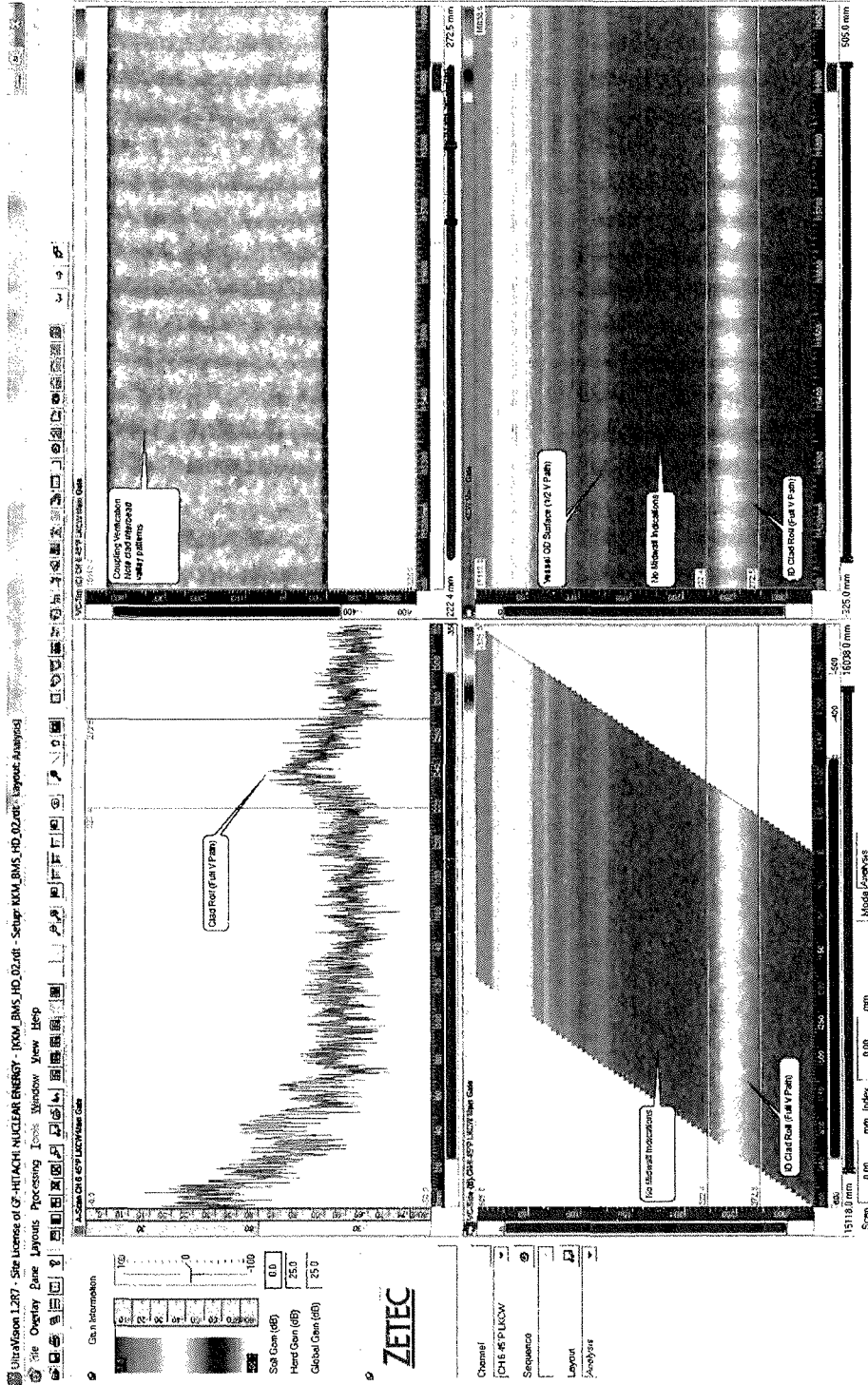


Figure 5– Example of an Angle Beam Display from a KKM Shell Course



**HITACHI**

# Examination Summary Sheet

Report No.:  
RPV-2012-001

Site:	KKM	Component ID:	Base Material Survey				
Outage:	181058	Configuration:	Reactor Pressure Vessel Base Material				
System:	RPV	ASME Cat:	N/A	ASME Item:	N/A	Aug. Requirements:	N/A

Exams Performed:	Calibration Sheet(s):	Calibration Block:	Procedure:	Examination Personnel:	NDE Level:	Date:
0°L BM	RPV-CAL-001/005	KKM ASME BSC	GEH-UT-728 V0	[REDACTED]	II / II	27-08-12
0°L BM	RPV-CAL-002/006	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
0°L BM	RPV-CAL-003/007	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
0°L BM	RPV-CAL-004/008	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
45° T LKUP	RPV-CAL-009	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
45° P LKCW	RPV-CAL-010	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
45° T LKDN	RPV-CAL-011	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12
45° T LKCC	RPV-CAL-012	KKM ASME BSC	GEH-UT-728 V0		II / II	27-08-12

**Comments:**

The ultrasonic examination results were acceptable to the 2010 Edition, ASME Section III.

Automated scans were performed from the ID surface in accordance with procedure GEH-UT-728 V.0, using 0° Longitudinal wave and 45° Transverse wave search units.

Automated scanning was restricted due to the feedwater spargers, core spray piping, jet pump diffuser, and the shroud support plate.

No recordable indications were detected. No indications exceeding the registration level were detected.

This is an initial examination and no previous data was available for review.

Shell Course 1 Achieved Coverage = 85%

Shell Course 2 Achieved Coverage = 100%

Shell Course 3 Achieved Coverage = 100%

Shell Course 4 Achieved Coverage = 73%

Shell Course 5 Achieved Coverage = 100%

The examination results were compared with data report N/A from N/A outage with  No Change  
 These examinations were performed under Work Order: N/A  Change

This summary and the following data sheets have been reviewed and accepted by the following personnel:

	<u>III</u>	<u>1 SEPT 2012</u>		<u>03/09/12</u>
Prepared By:	Level:	Date:	KKM Reviewed By:	Date:
				<u>03.09.12</u>
			SVII Reviewed By:	Date:



HITACHI

SP2000 RPV Examination Data Sheet

Project: KKM
Component: RPV Base Material Survey

Report No.: RPV-2012-001

Table with columns: File, Scan Type, Ch. 1, Ch. 2, Ch. 3, Ch. 4, Ch. 5, Ch. 6, Ch. 7, Ch. 8, Ch. 9, Ch. 10, Ch. 11, Ch. 12. Rows include scan data for files KKM\_BMS\_HD\_01 through KKM\_BMS\_HUP\_02.

Comments: The symbol ~ indicates "No entry required" or "Not Applicable". See comments sheet for definition of indication codes.

Analyzed by [Redacted]

KKM Base Material Survey Results

Section 3, Page 2 of 142



## Examination Results Legend - (Explanation)

A). No Recordable Indications:

- No indications meeting or exceeding the registration level were recorded. May be applied when other non-relevant or geometric reflectors are commented.

B). Recordable Indications:

- An indication meeting or exceeding the registration level or other recording criteria was identified. Requires an explanation of the flaw type and an evaluation of the flaw for acceptance.

C). OD Surface Geometry – Thickness Transitions:

- Geometric reflectors from the outside surface of the component due to thickness changes documented by a design drawing review or 0° evaluations.

D). OD Surface Geometry - Attachment:

- Geometric reflectors from the outside surface of the component due to attachments documented by a design drawing review or 0° evaluations.

E). OD Surface Geometry:

- Geometric reflectors from the outside surface of the component other than the listed geometry.

F). ID Surface Geometry:

- Geometric reflectors from the inside surface of the component other than the listed geometry. This does not include the normal clad roll observed in full V-path exams.

G). ID Surface Geometry - Attachment:

- Geometric reflectors from the inside surface of the component due to internal attachments documented by drawing review or visual observations.

H). Electrical Noise (RFI):

- Transient noise induced into the system through plant electrical systems and ground loops. An acceptable condition for analysis without loss of coverage unless noted otherwise.

I). Weld Discontinuity:

- Reflectors from inclusions or other discontinuities within the weld nugget deposited during the welding process.

J). Beam Redirect:

- While scanning over the clad surface with the shear wave transducer, the shear-wave signal is redirected to the outside surface at an angle less than the original angle generated within the base metal. Typically seen at a 0° impingement angle.

Note - Indication patterns such as normal entry surface noise, clad roll, and water coupled reflectors may be identified in the screen prints but not listed in the data report form.

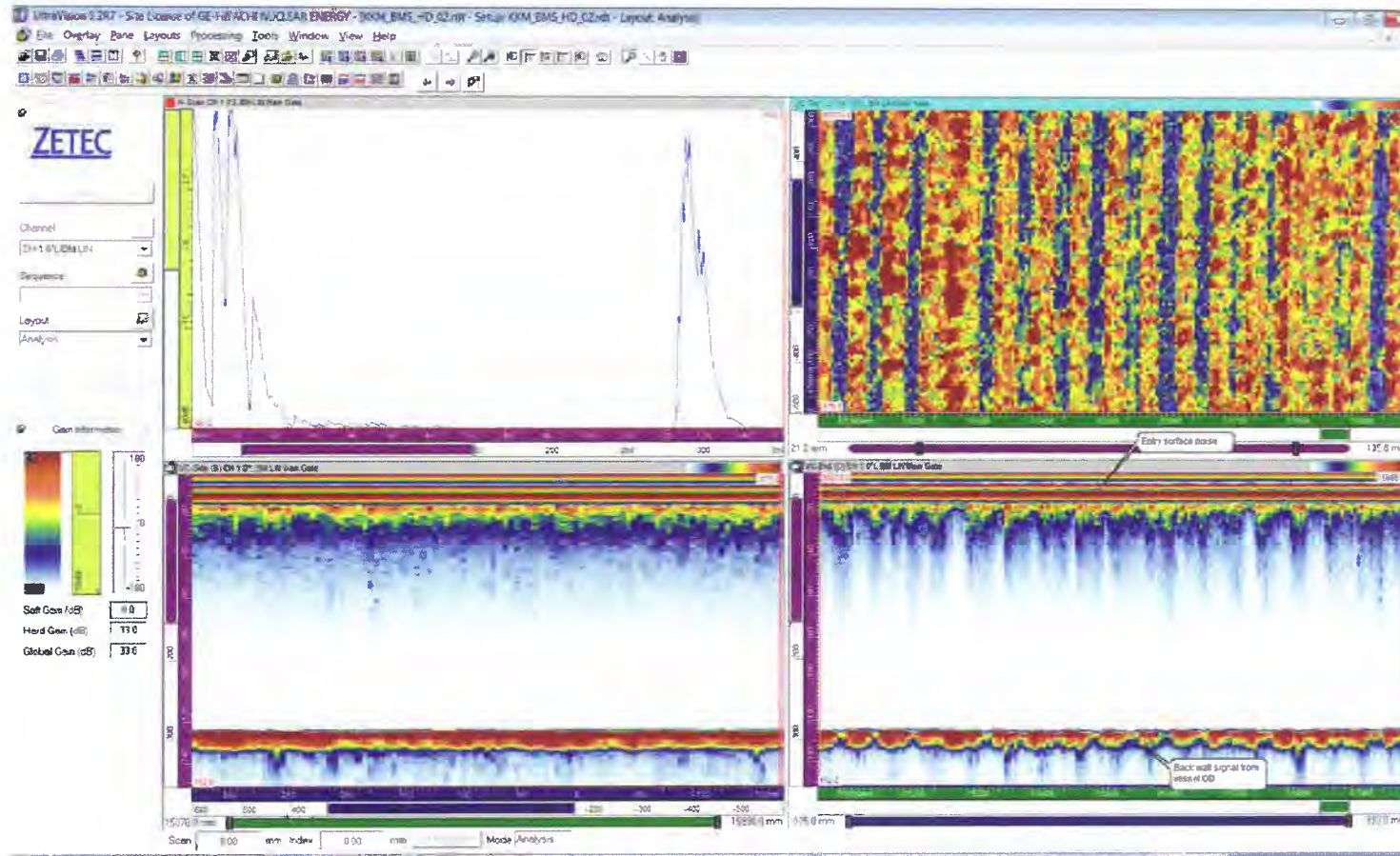




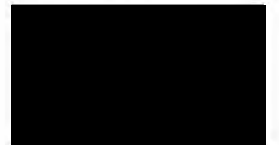
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 1 - 0° straight beam scan

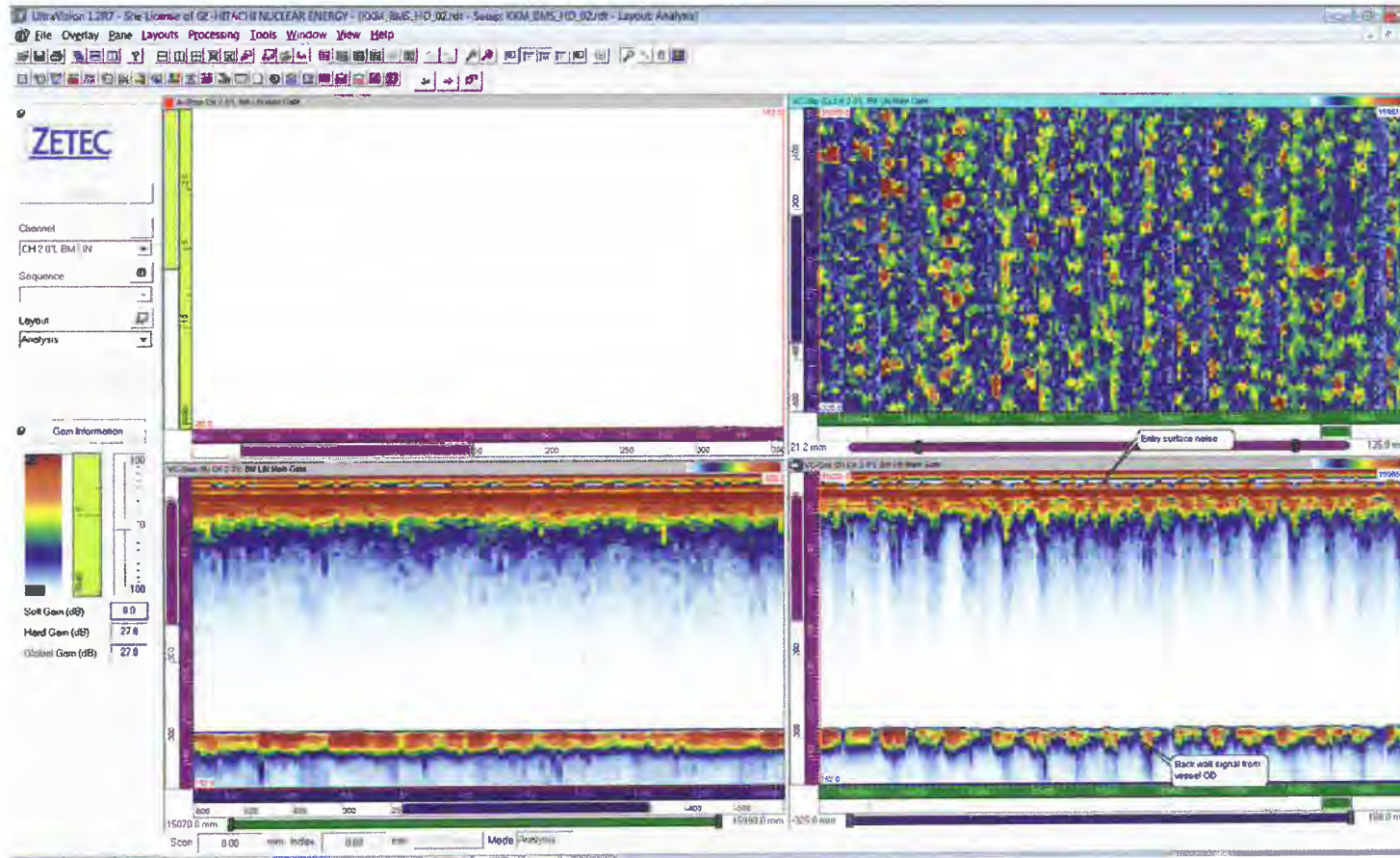




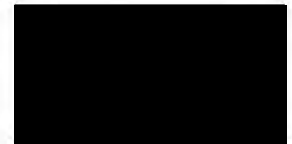
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 2 - 0° straight beam scan

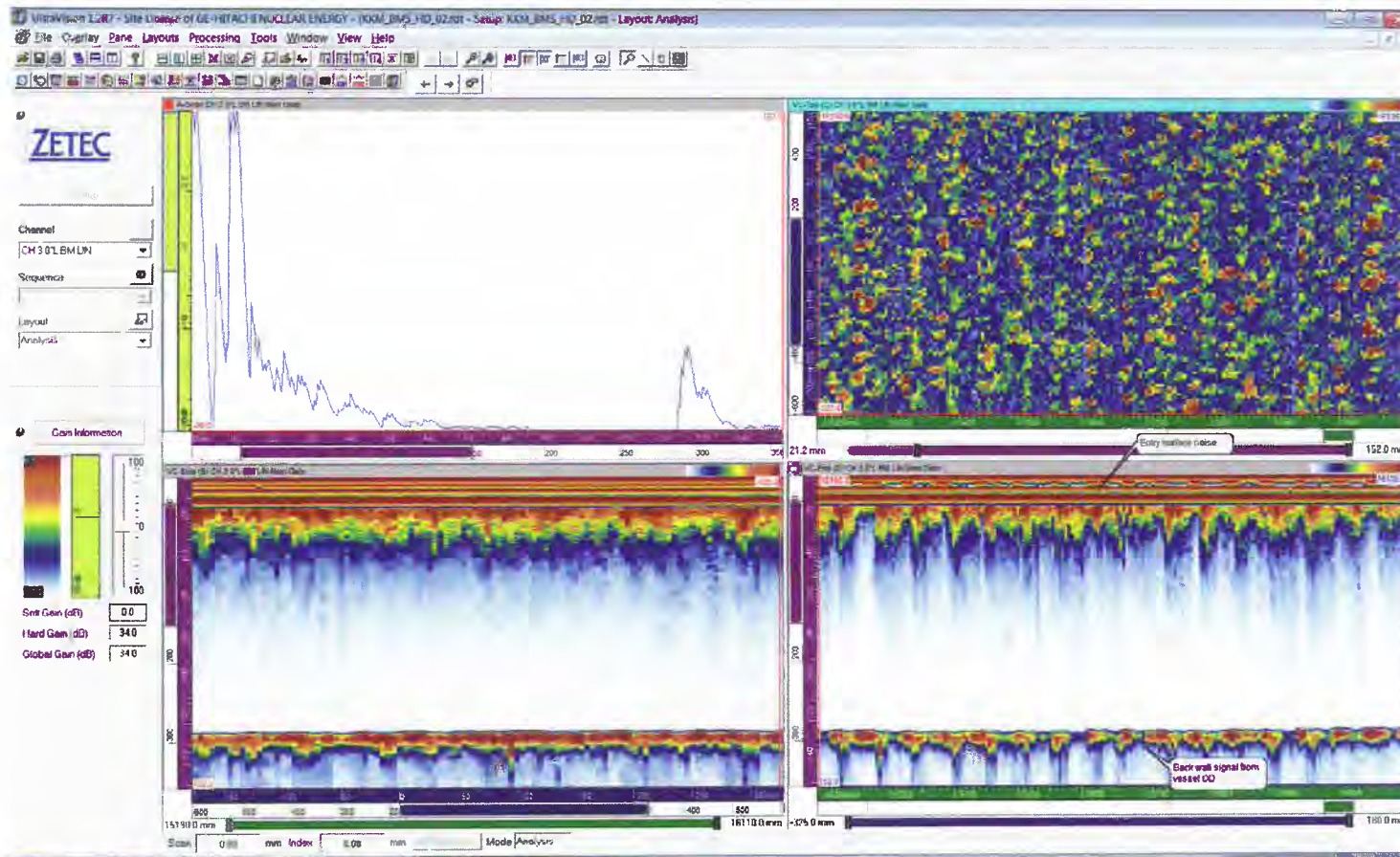




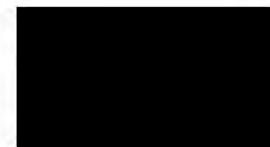
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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 3 - 0° straight beam scan



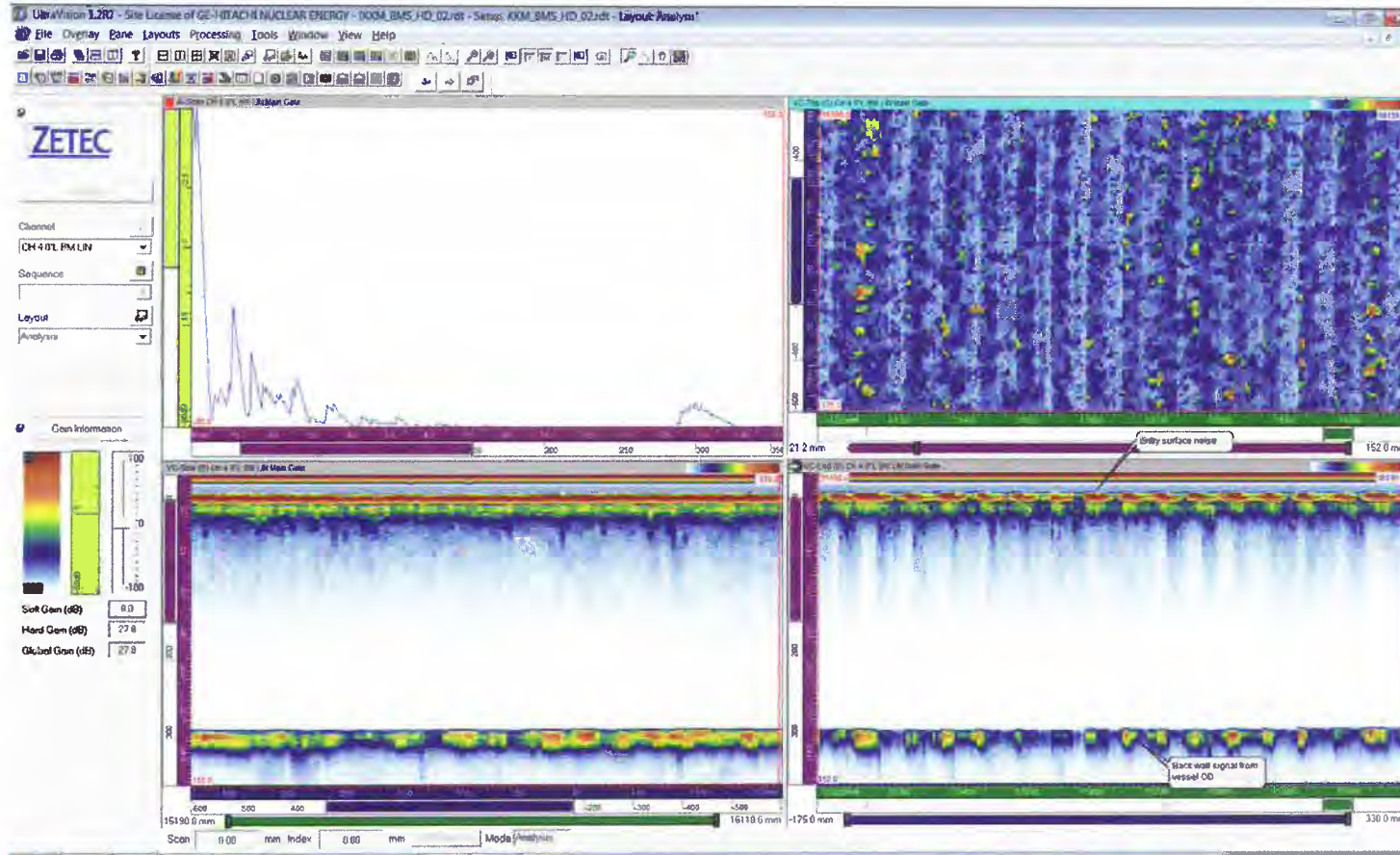




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 4 - 0° straight beam scan

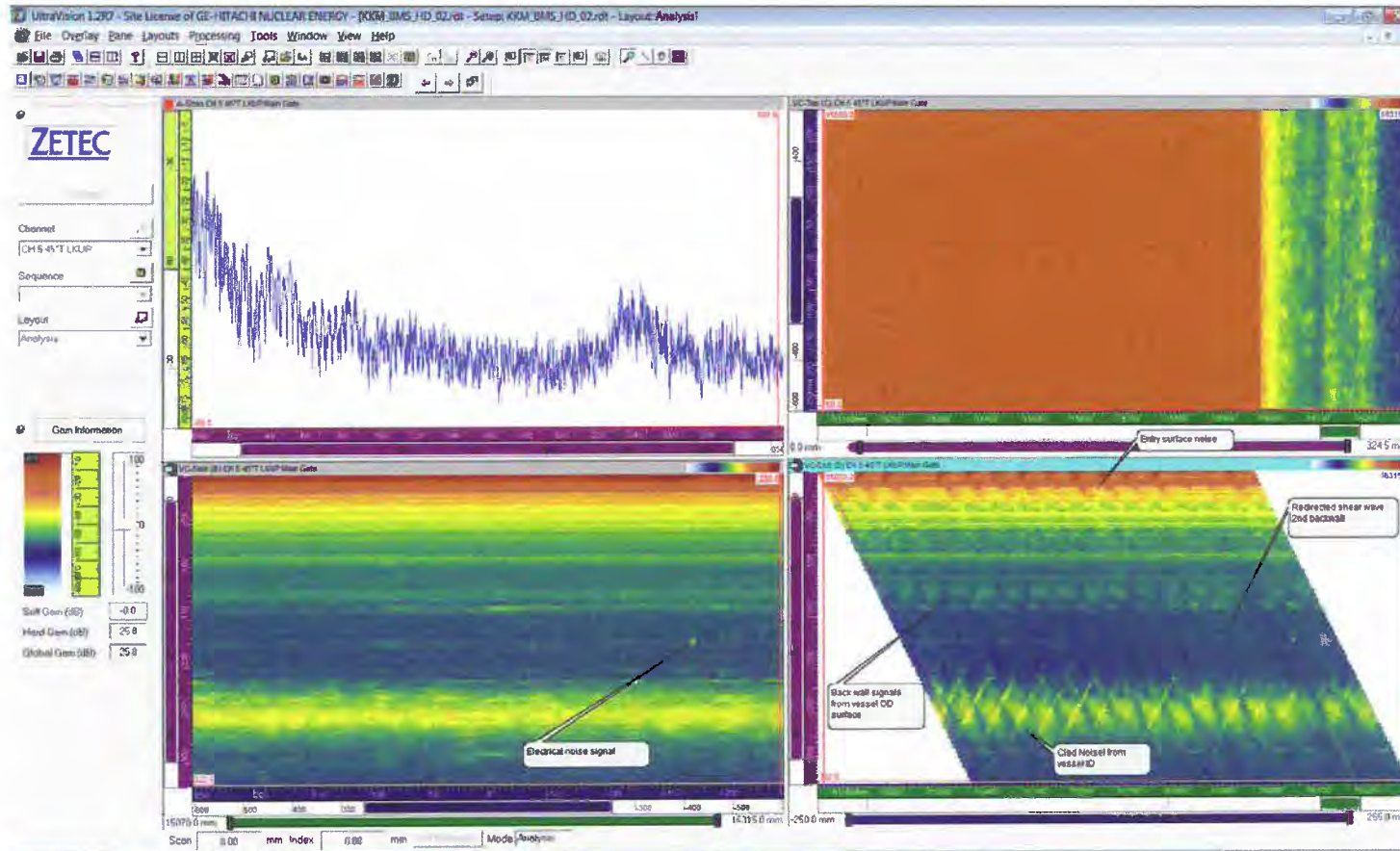




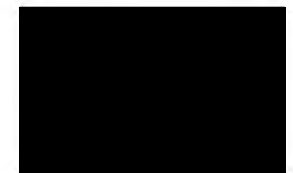
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 5 - 45° angle beam scan search unit looking up

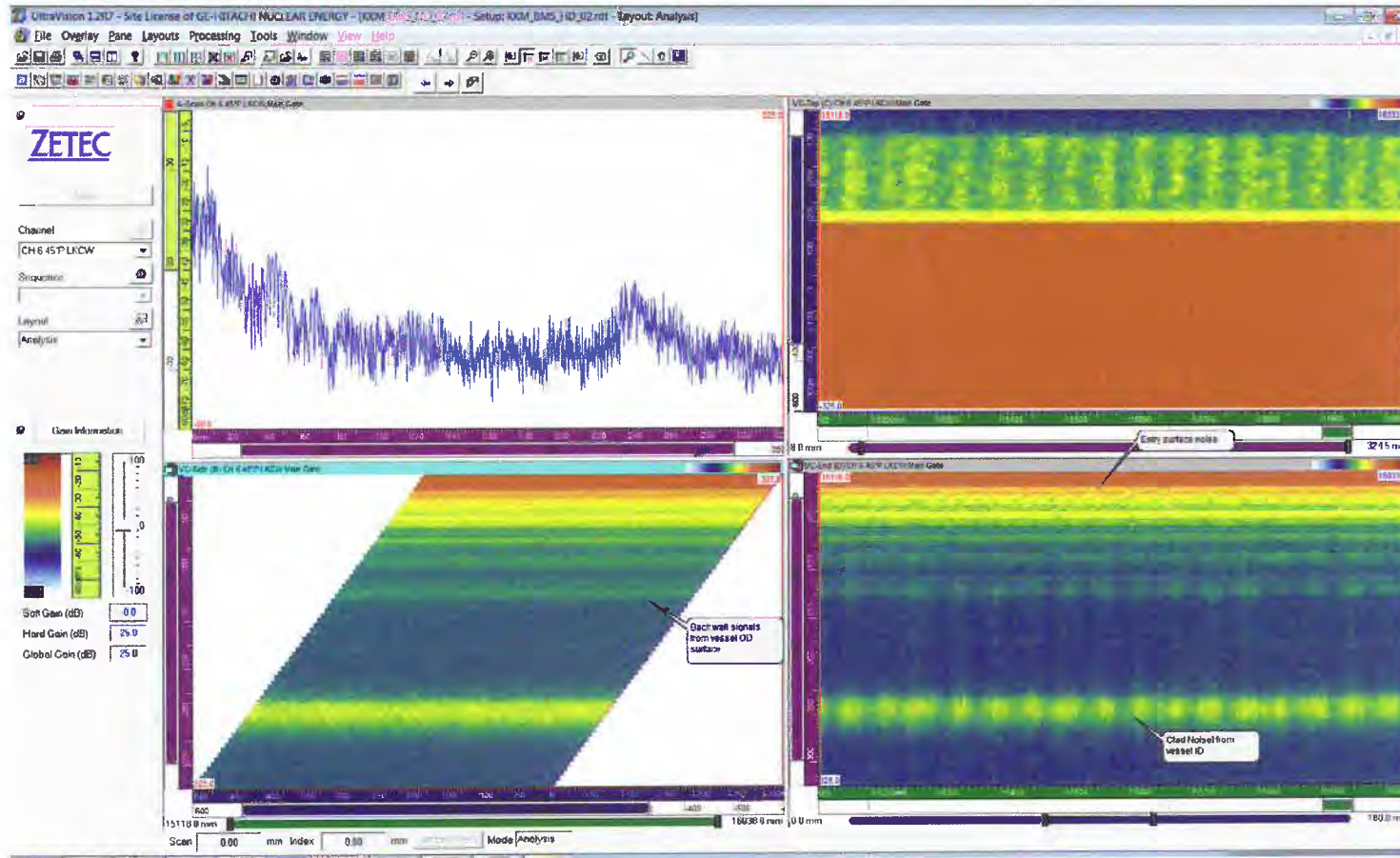




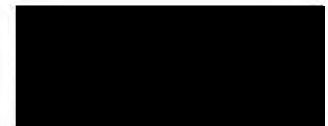
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 6 - 45° angle beam scan search unit looking clockwise

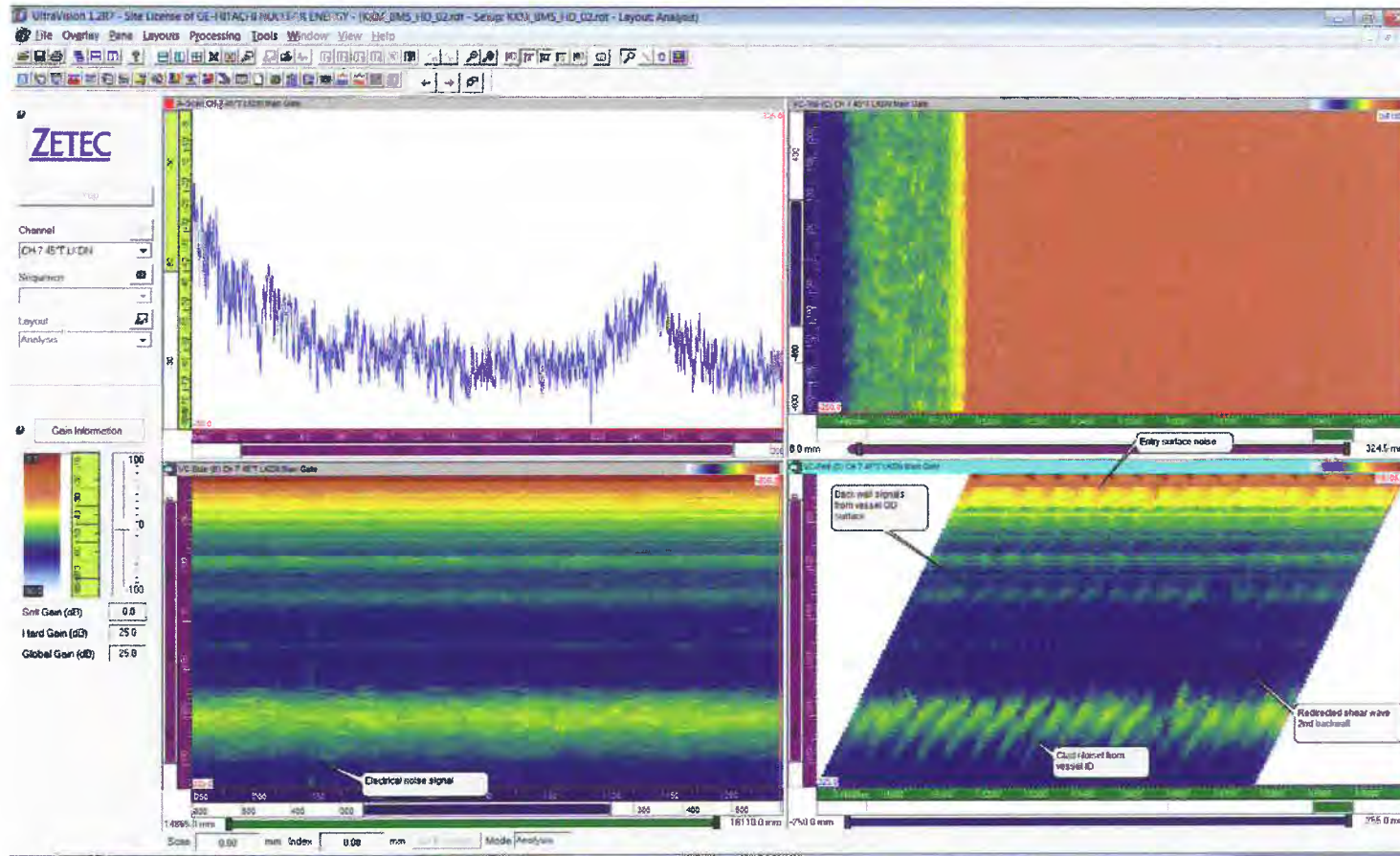




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 7 - 45° angle beam scan search unit looking down

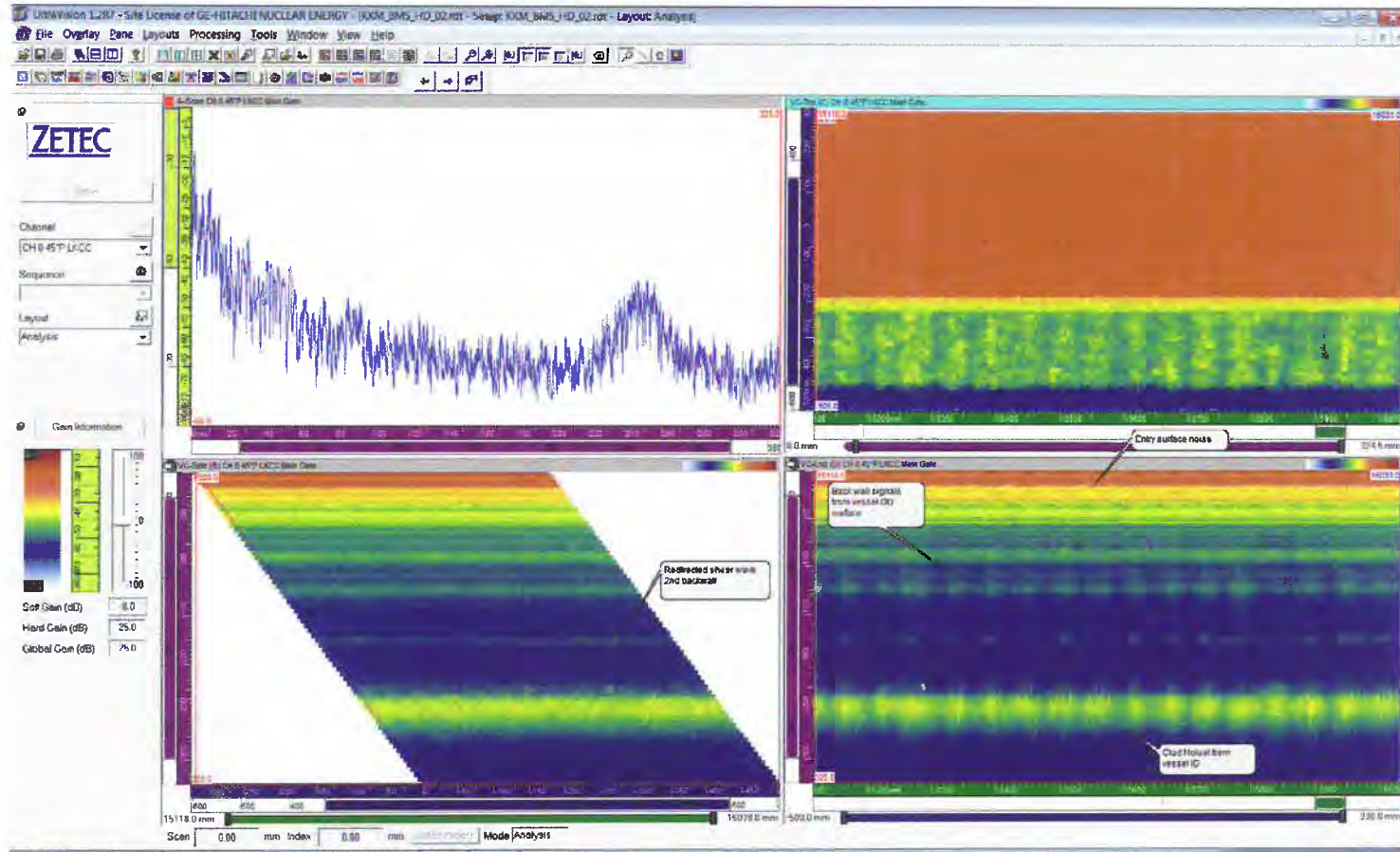




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_02



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

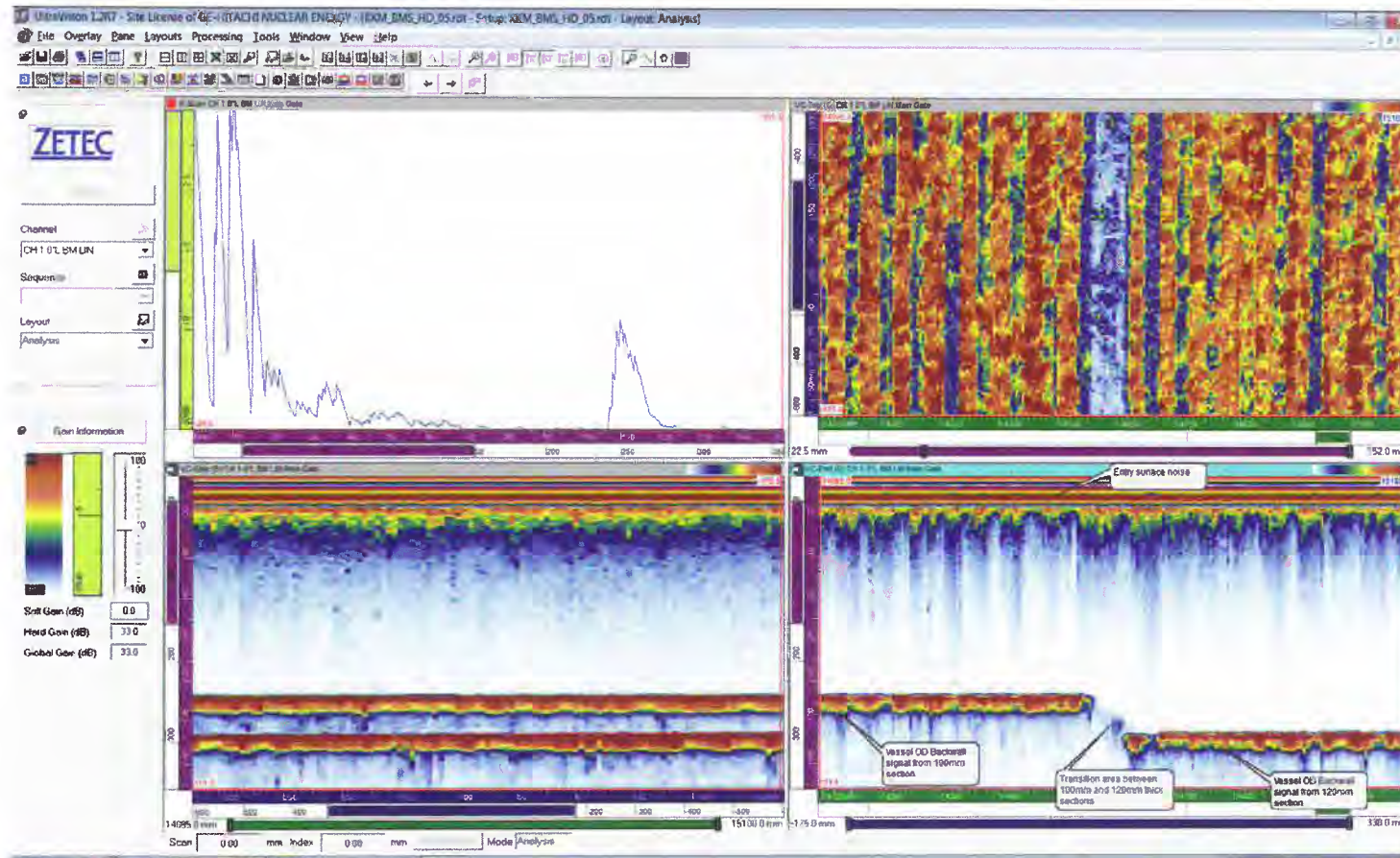




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 1 - 0° straight beam scan

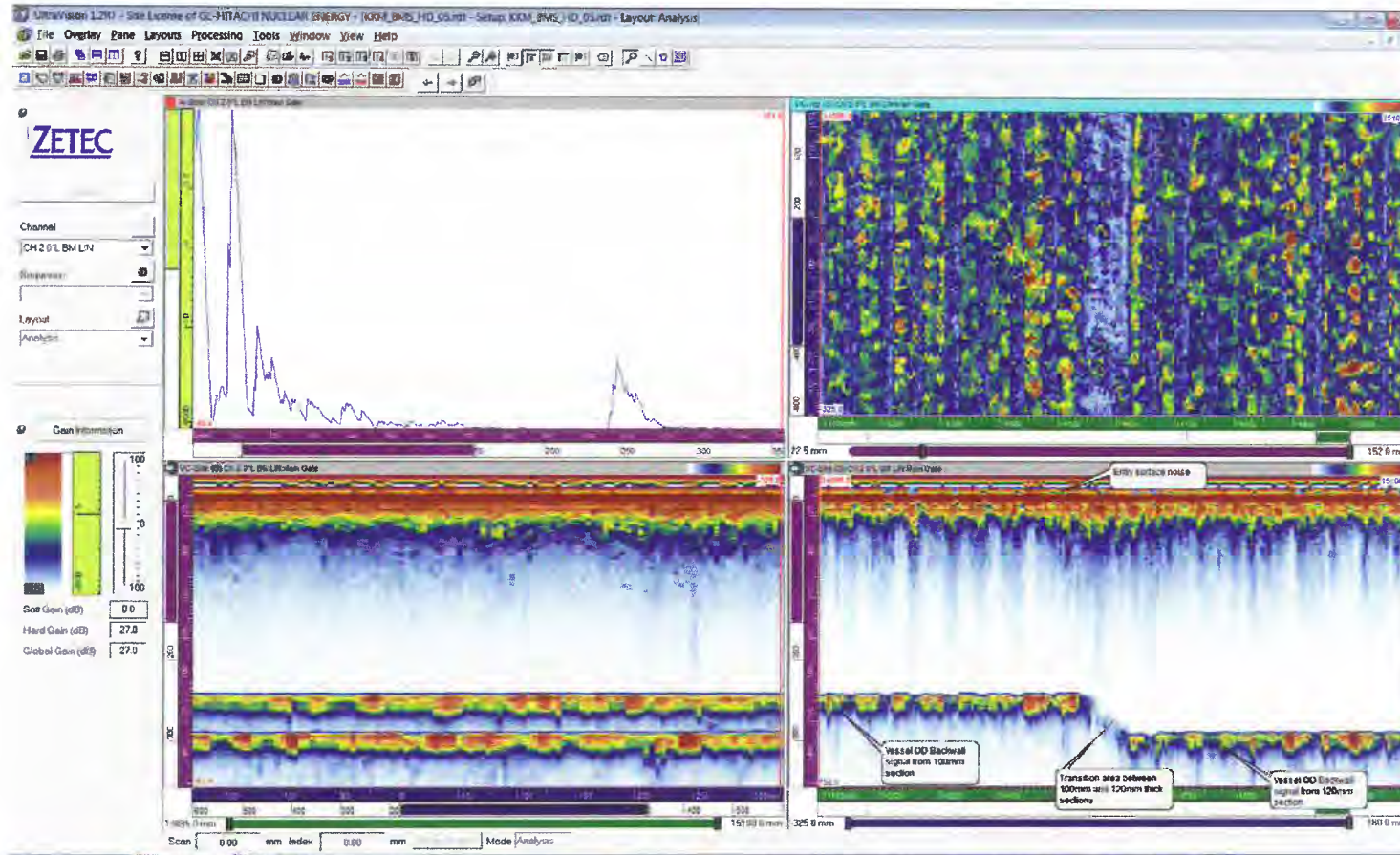




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 2 - 0° straight beam scan

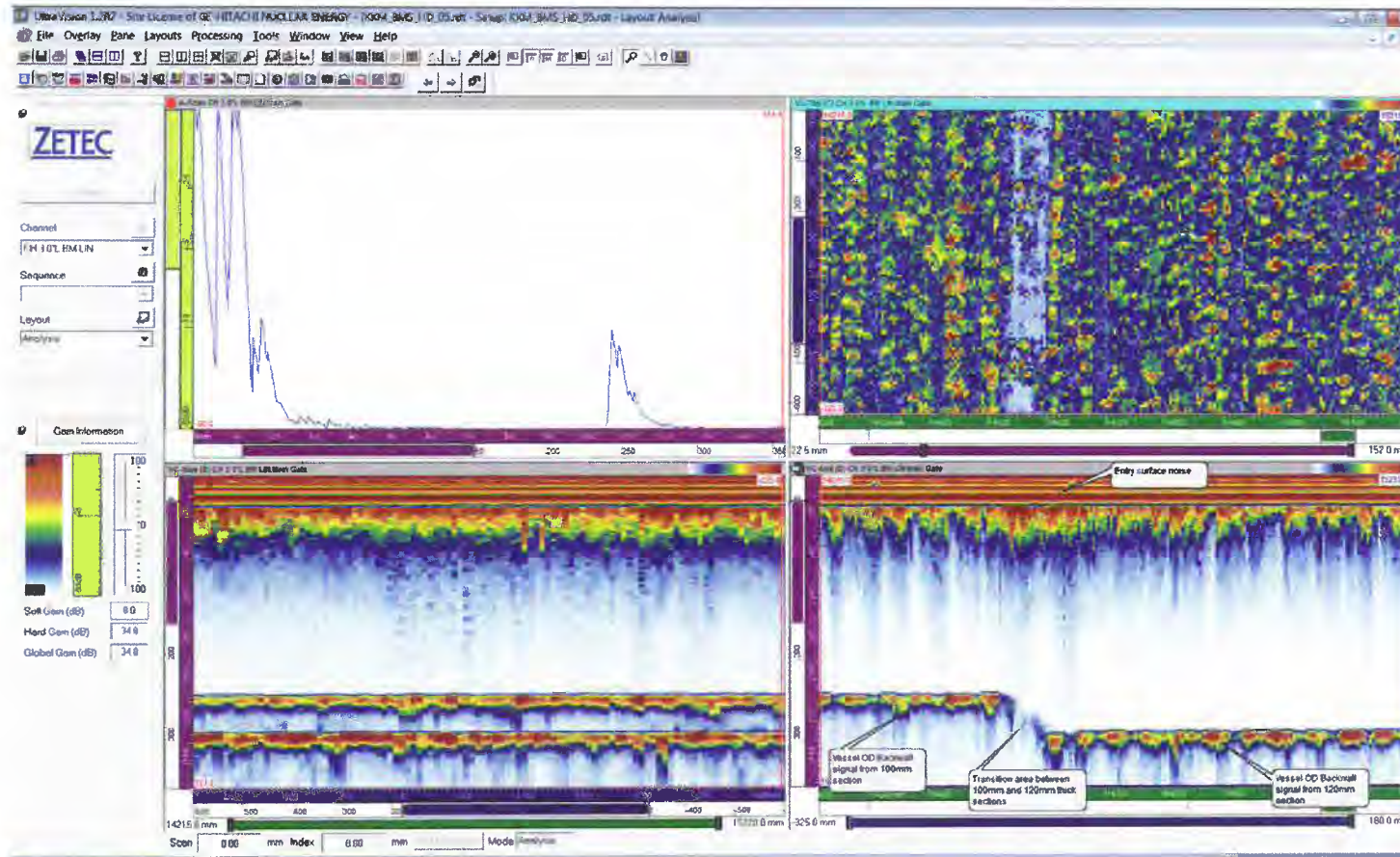




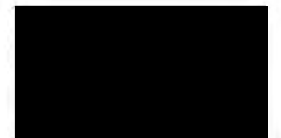
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 3 - 0° straight beam scan



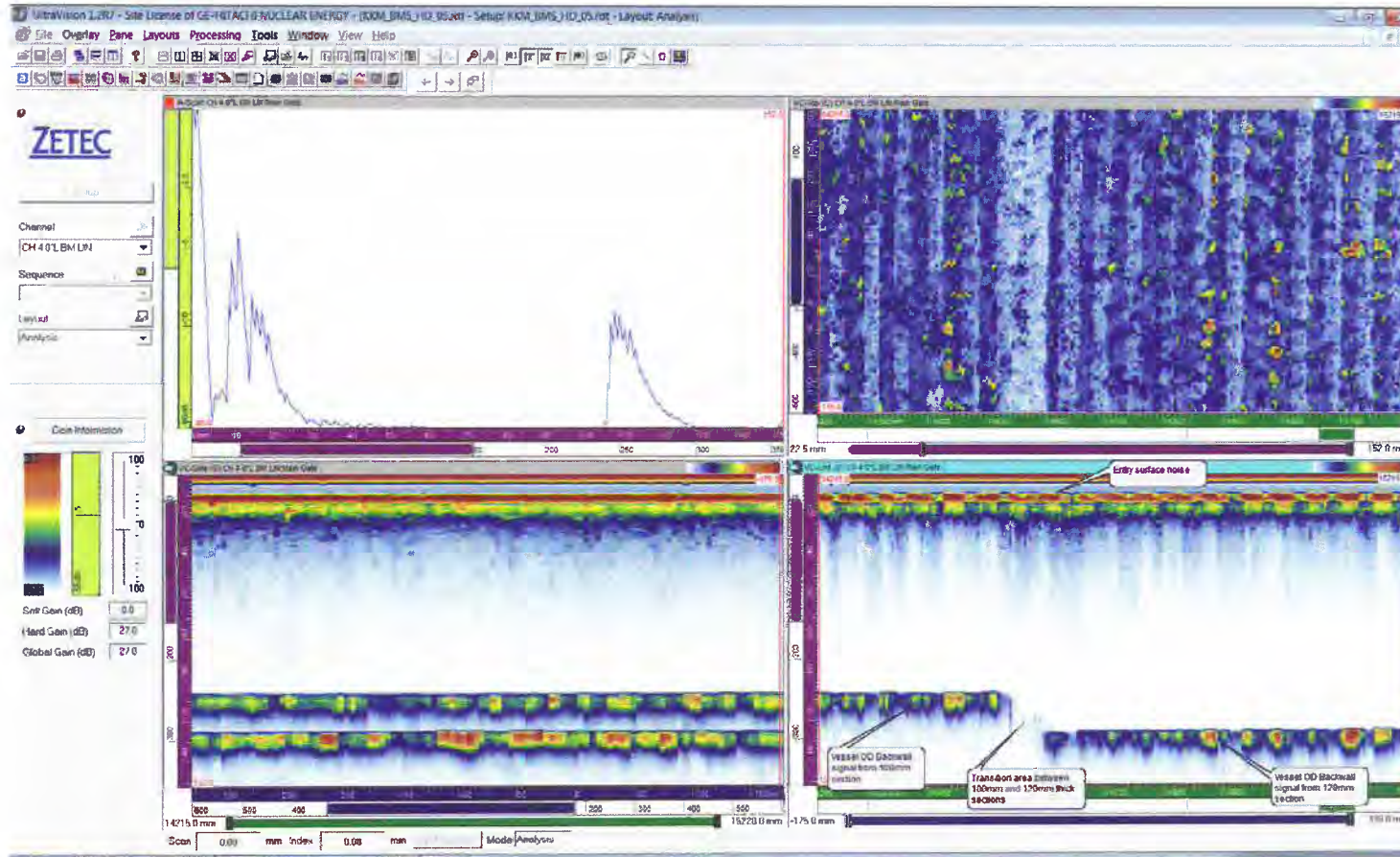




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 4 - 0° straight beam scan

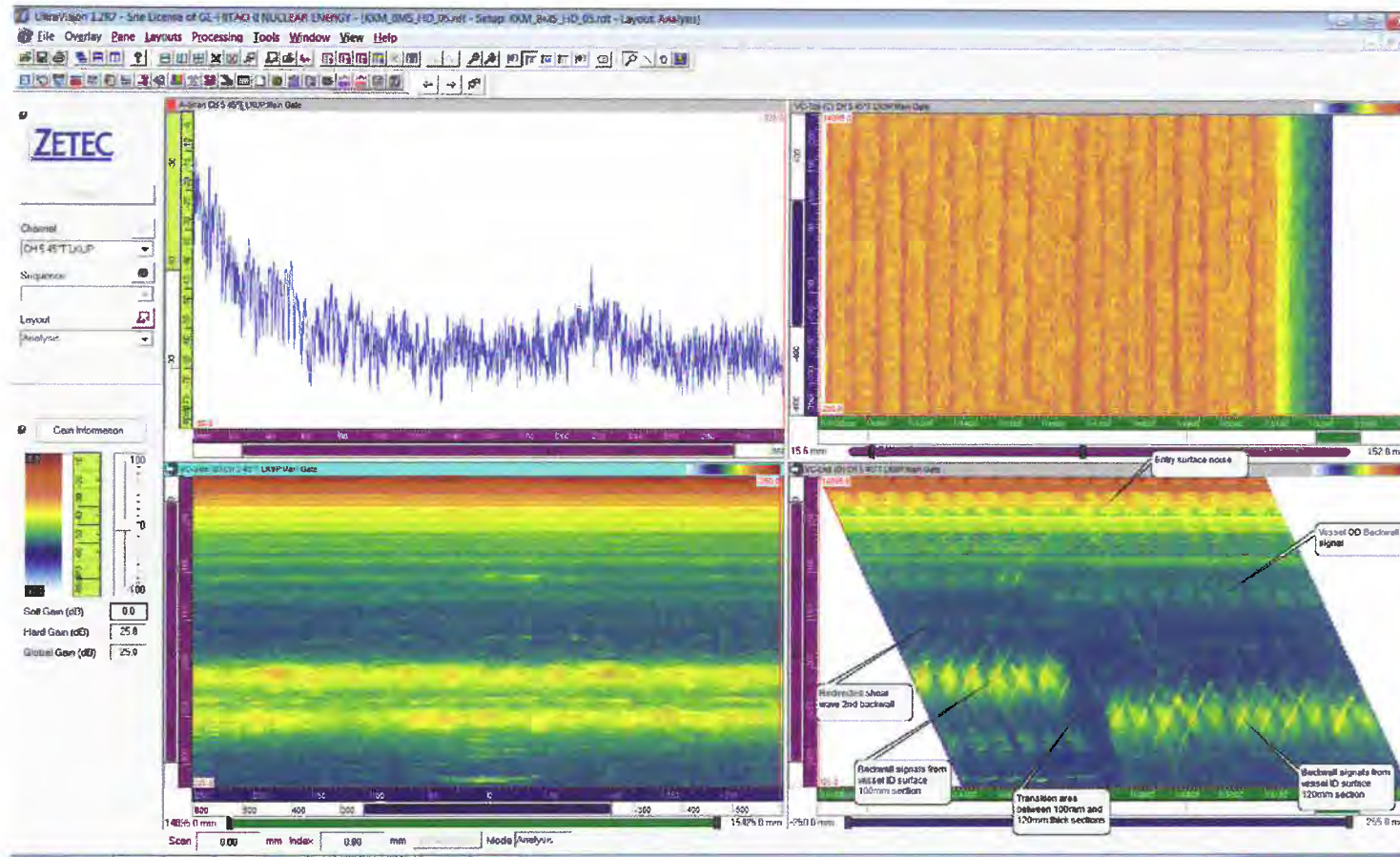




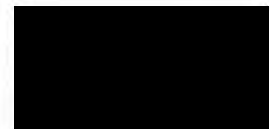
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 5 - 45° angle beam scan search unit looking up

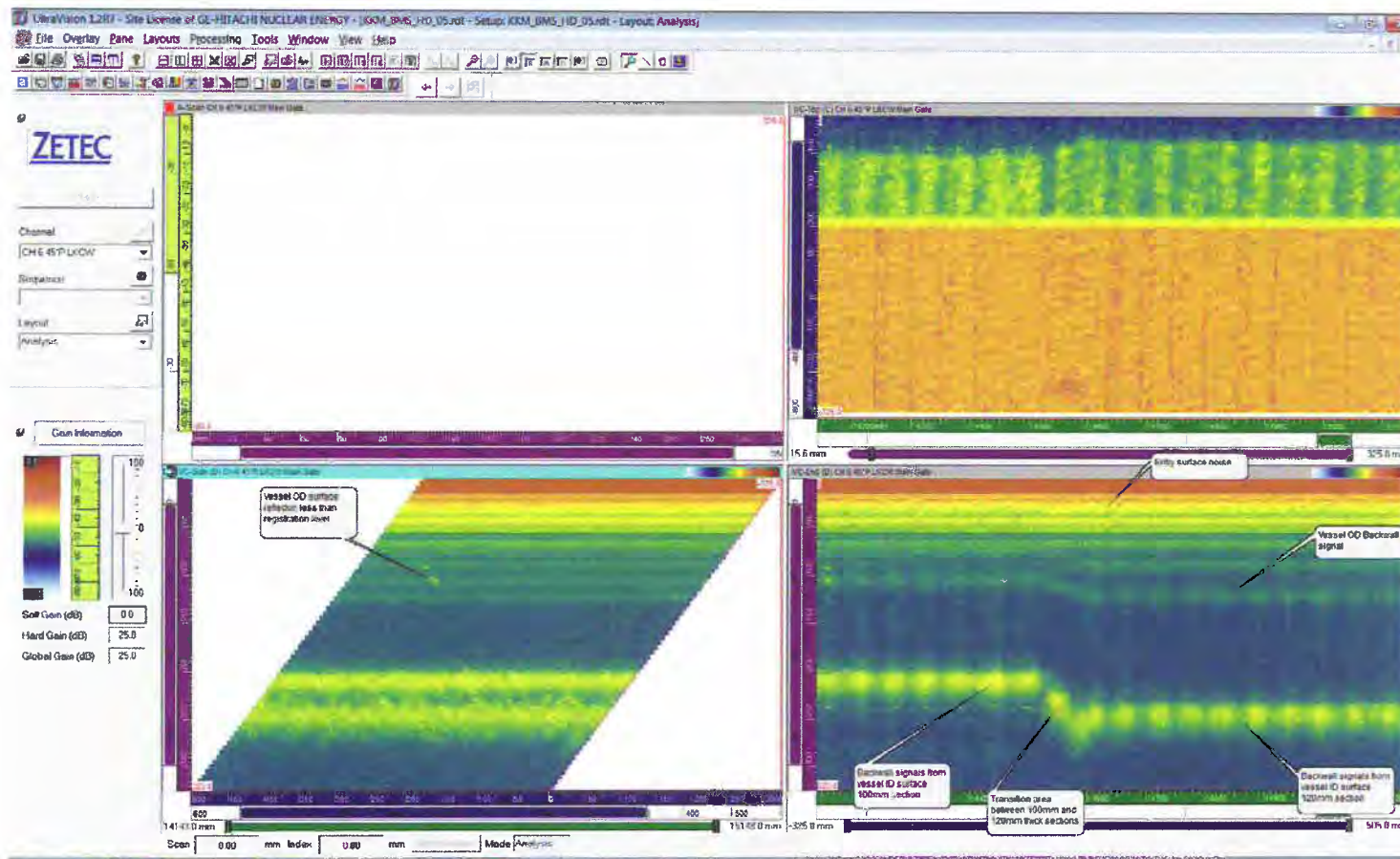




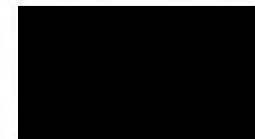
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 6 - 45° angle beam scan search unit looking clockwise

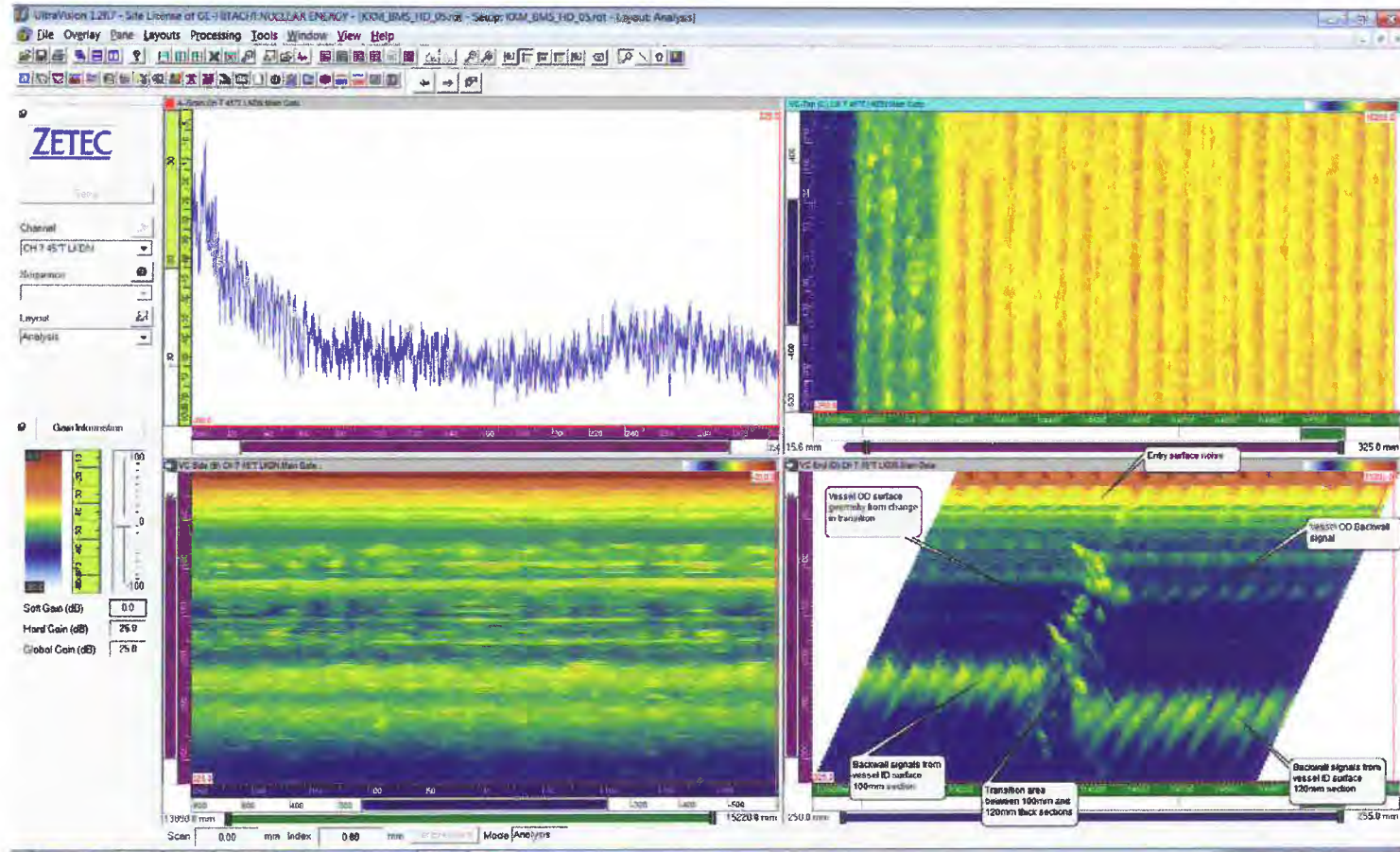




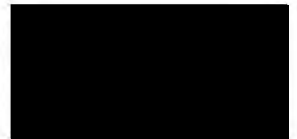
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 7 - 45° angle beam scan search unit looking down

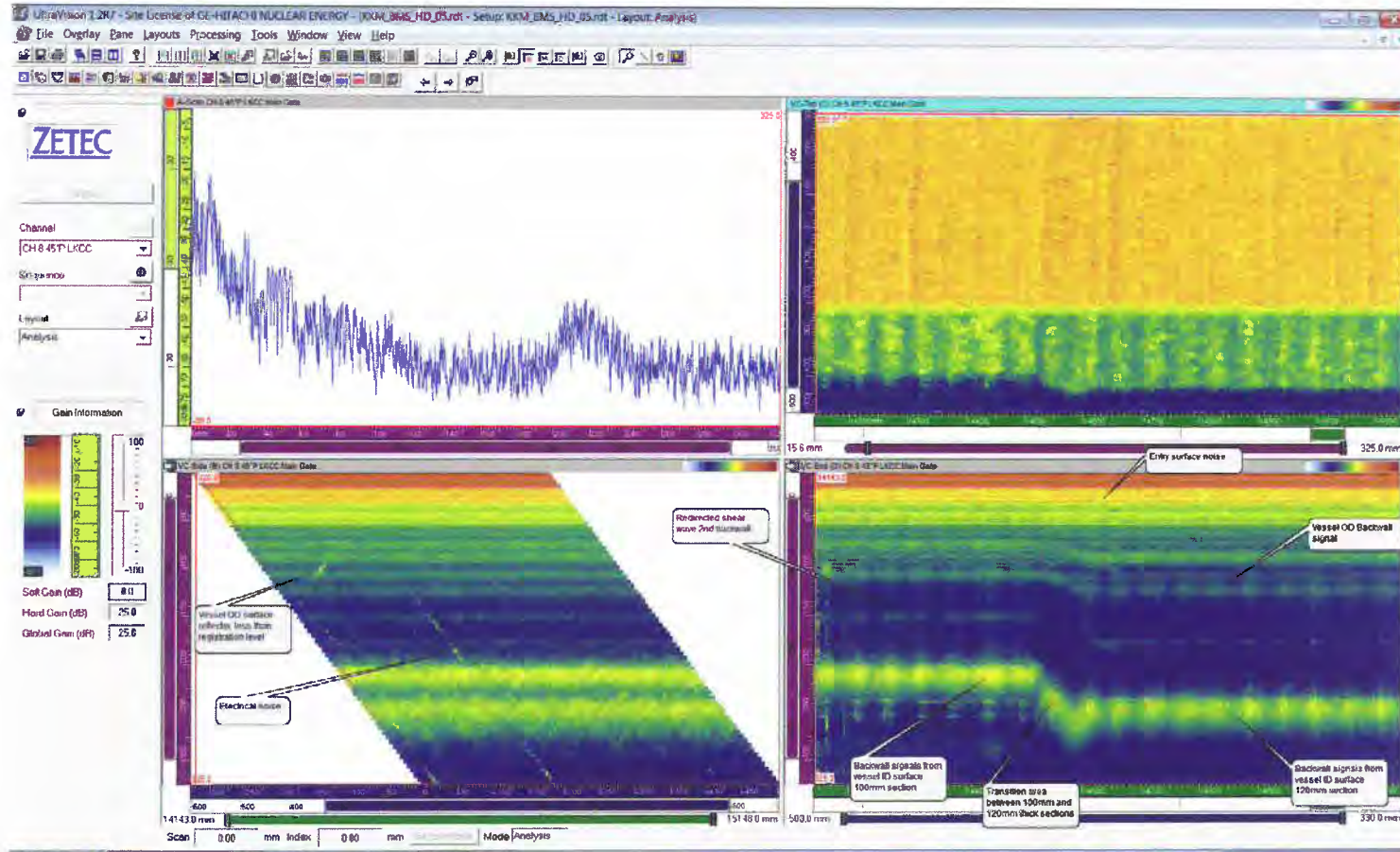




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_05



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

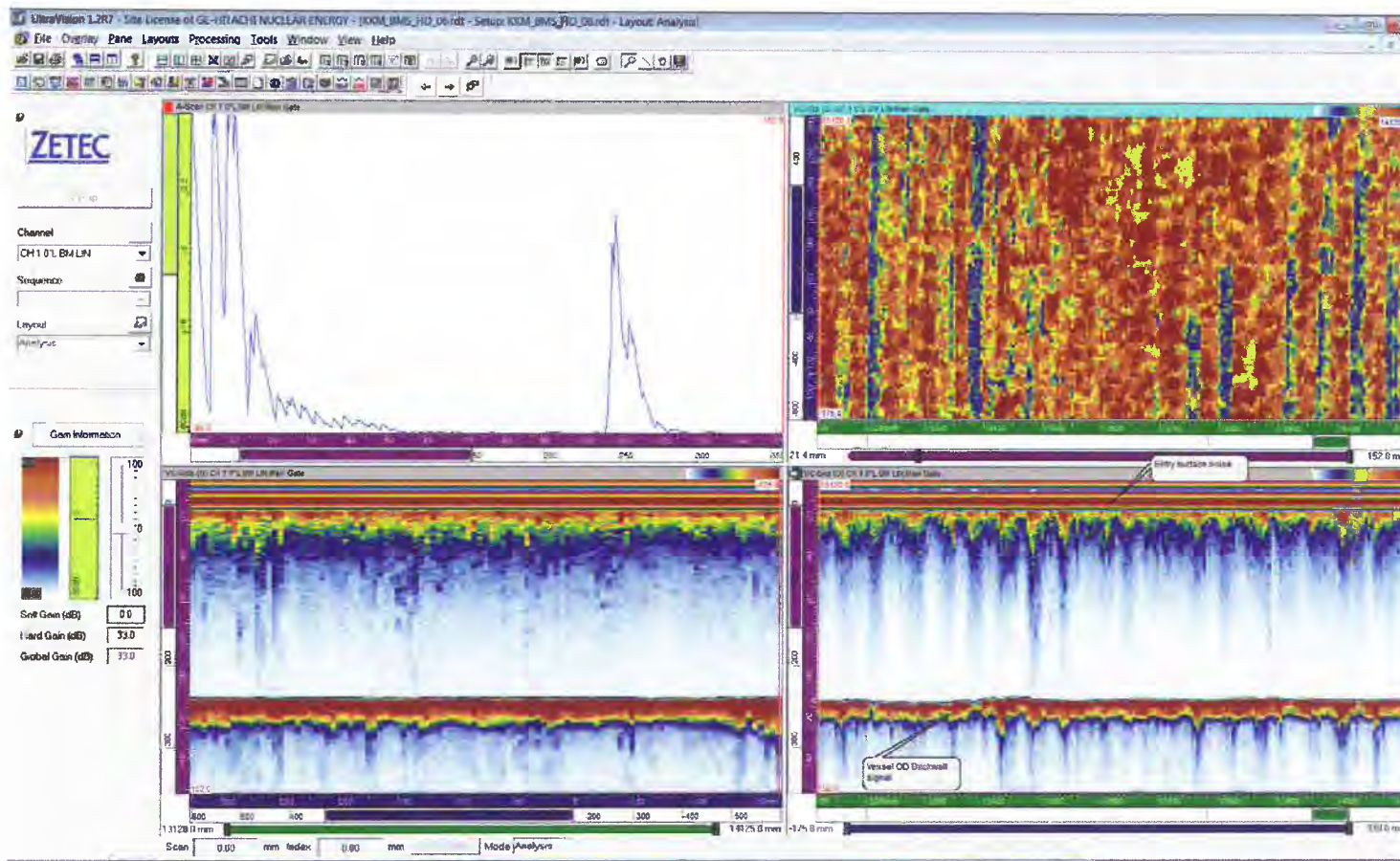




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 1 - 0° straight beam scan

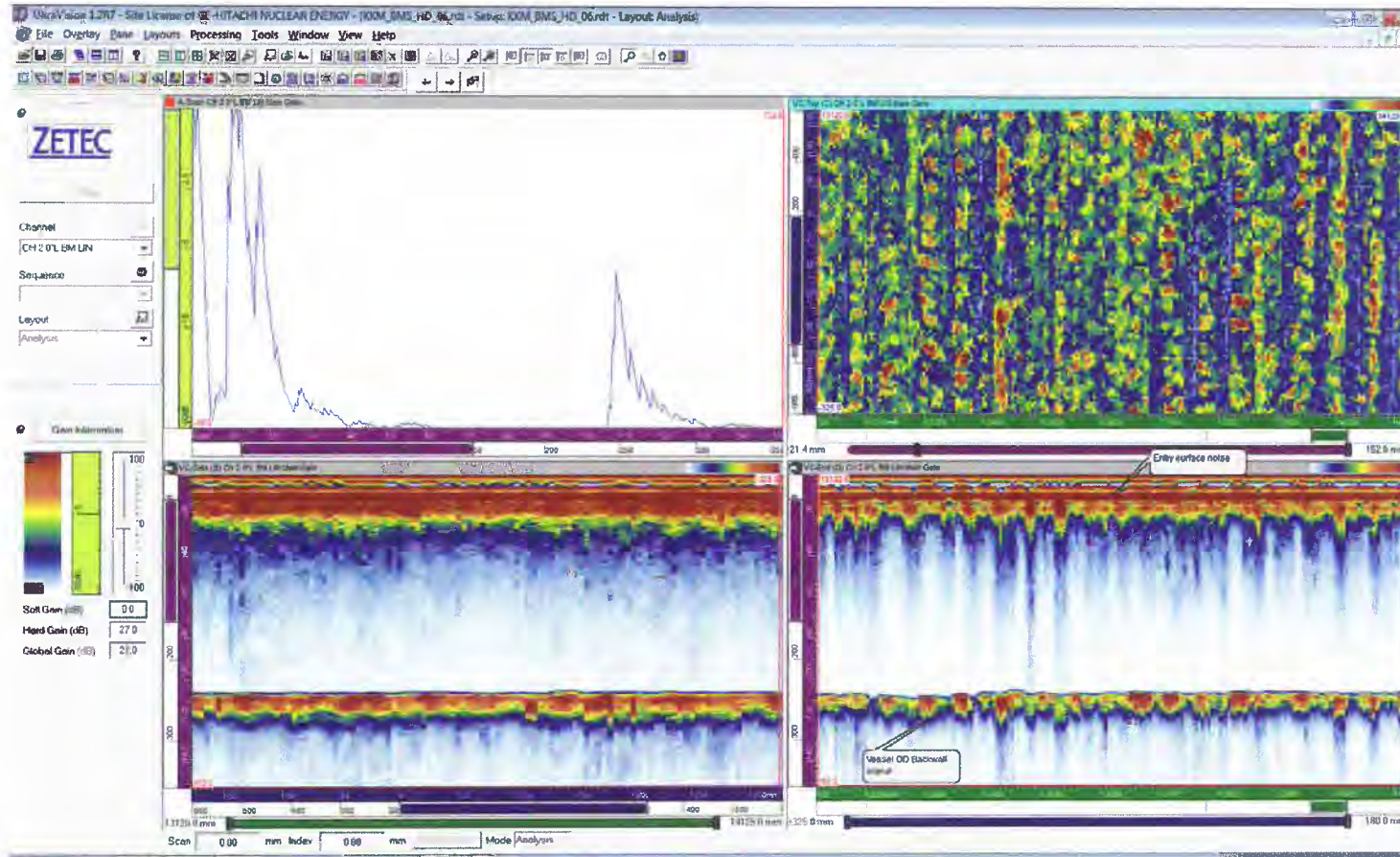




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 2 - 0° straight beam scan

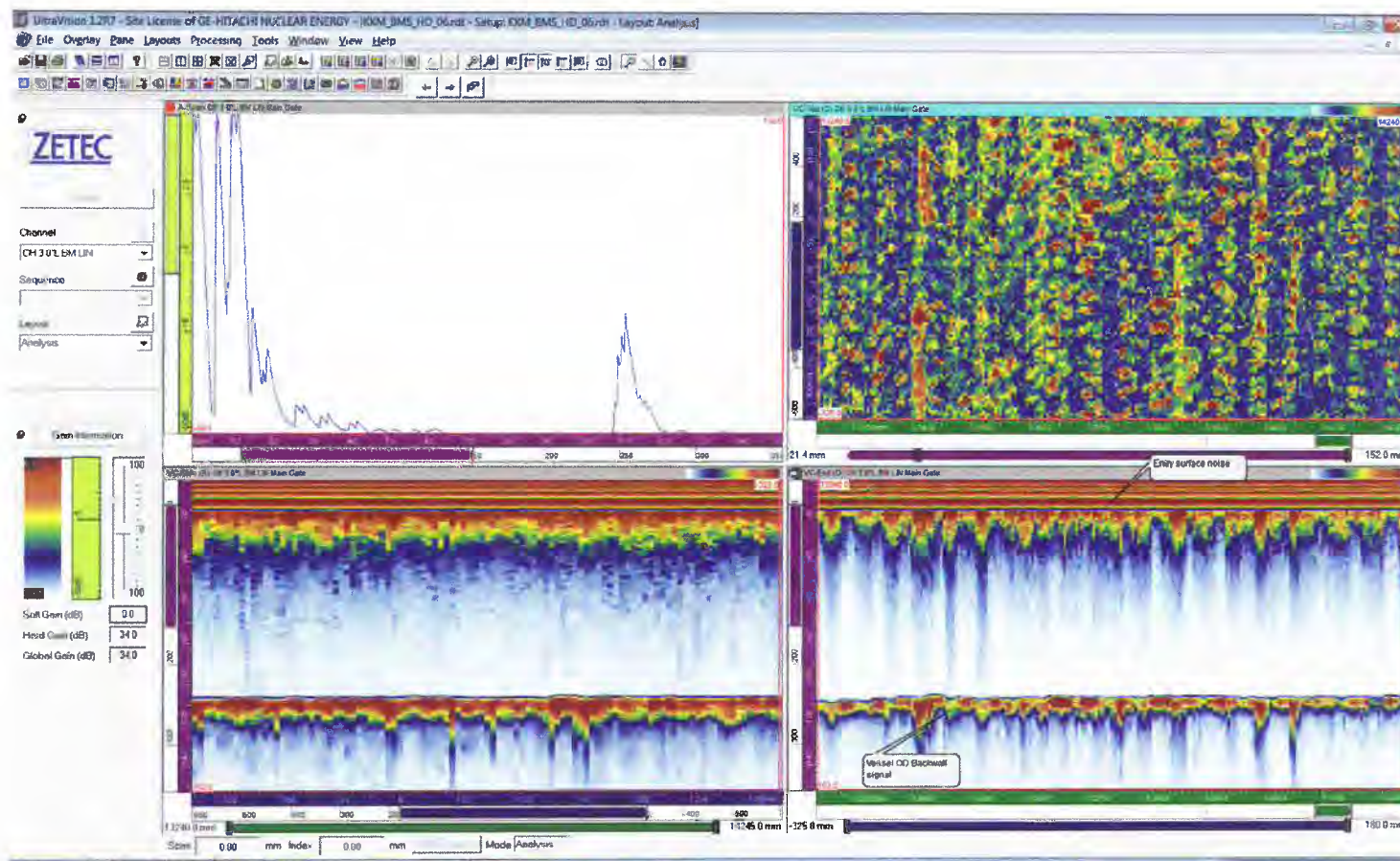




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 3 - 0° straight beam scan



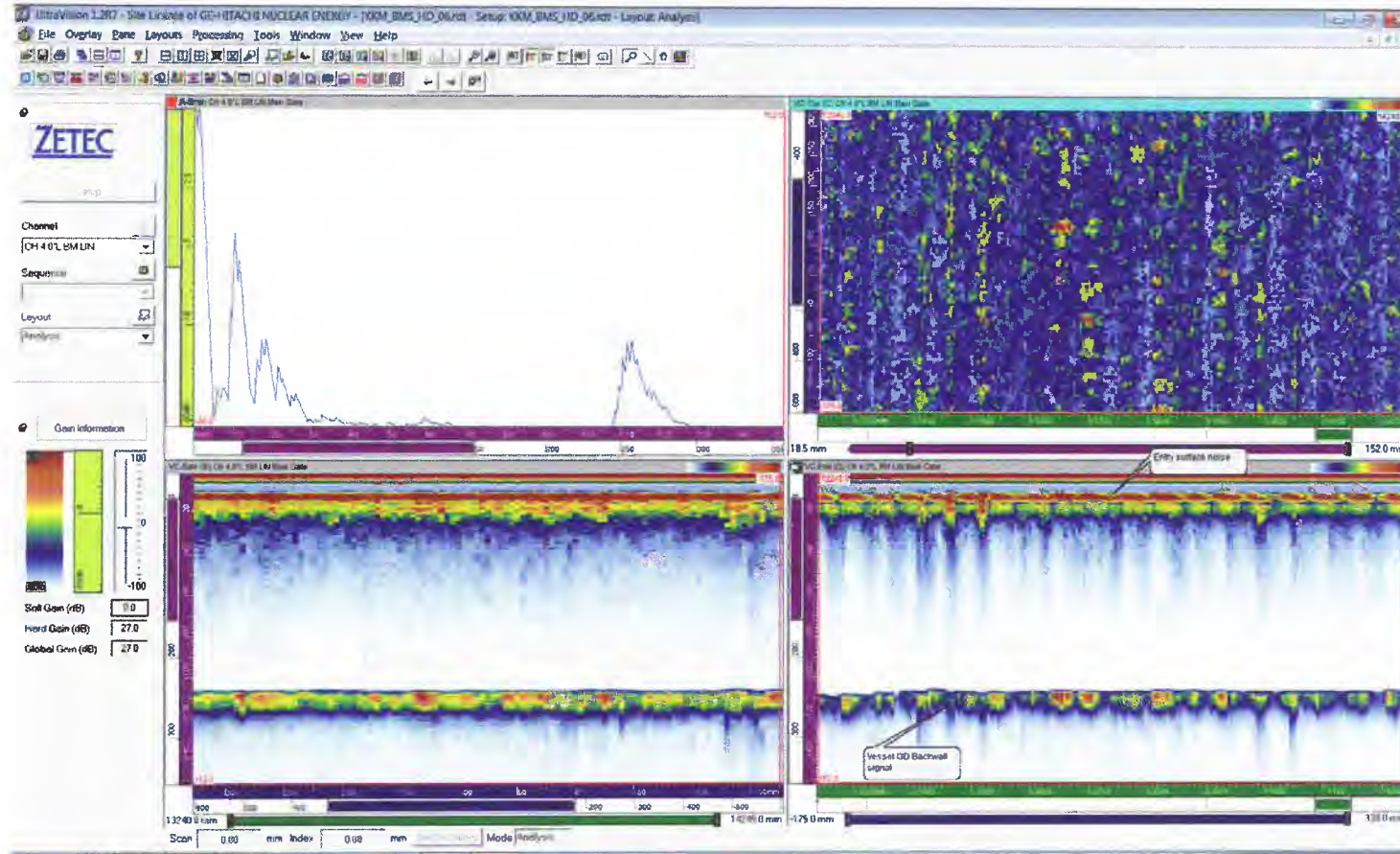




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 4 - 0° straight beam scan

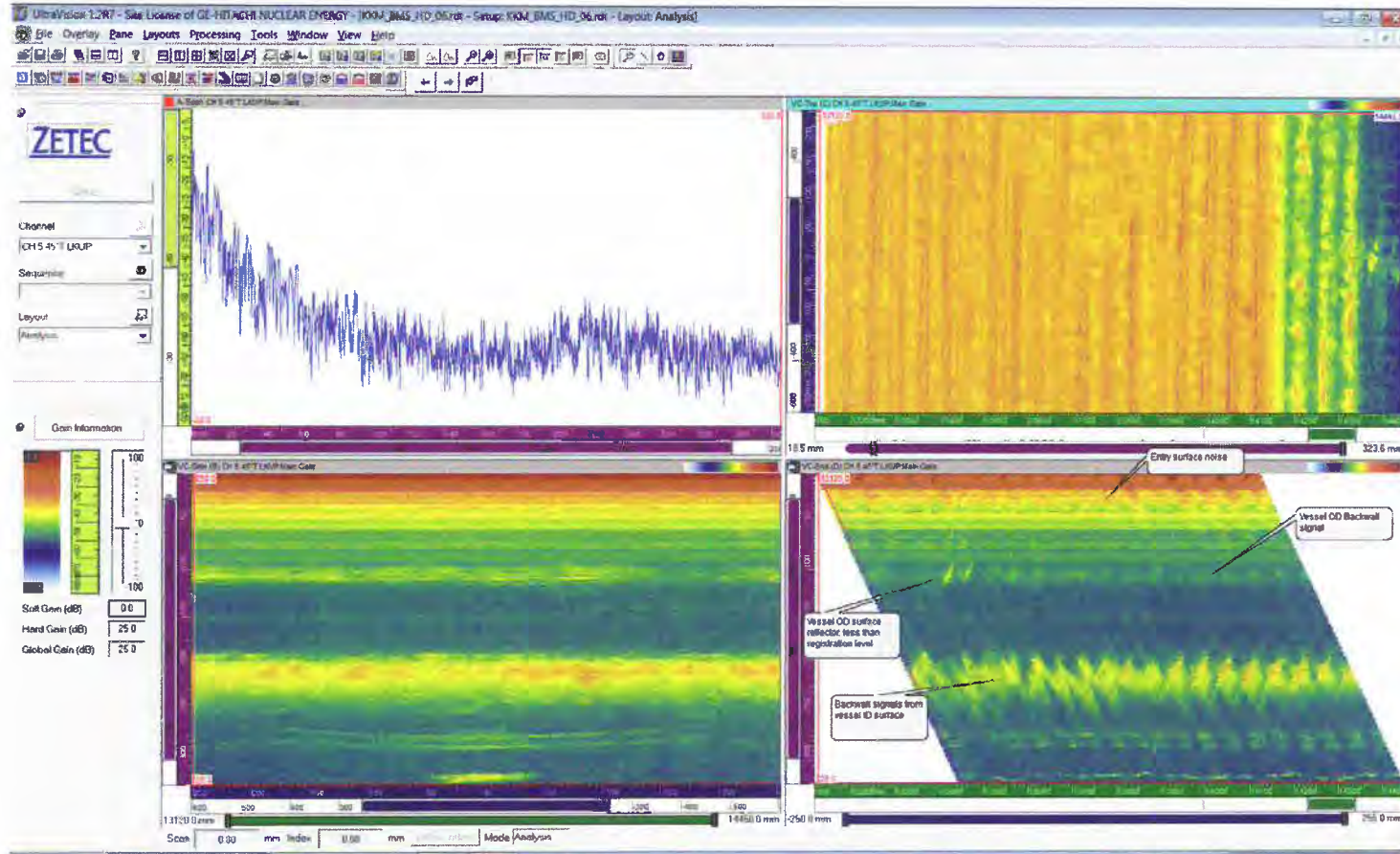




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 5 - 45° angle beam scan search unit looking up

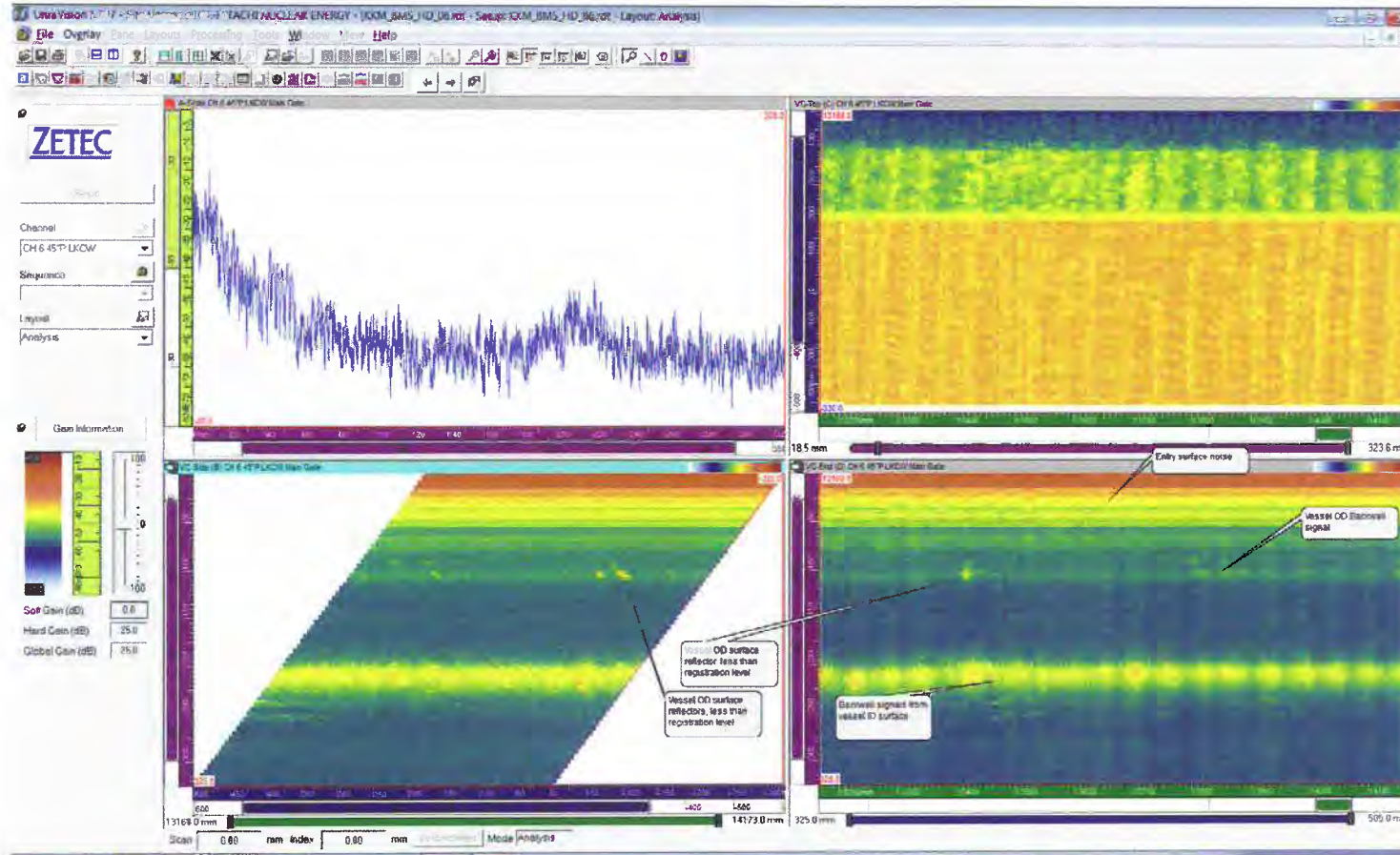




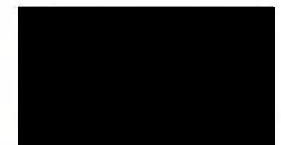
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 6 - 45° angle beam scan search unit looking clockwise

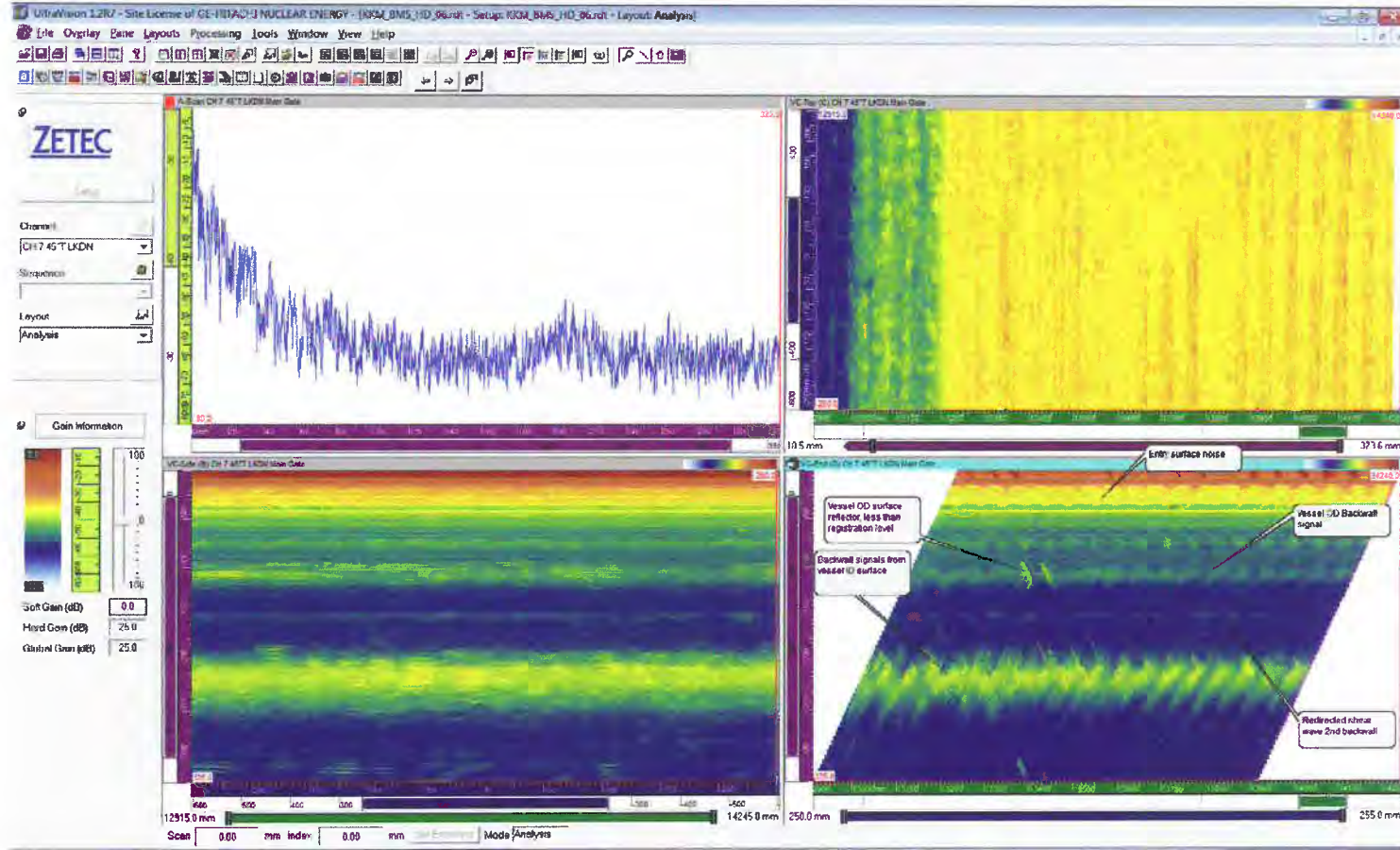




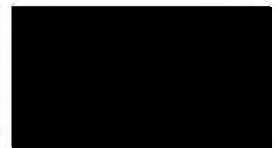
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06



Channel 7 - 45° angle beam scan search unit looking down

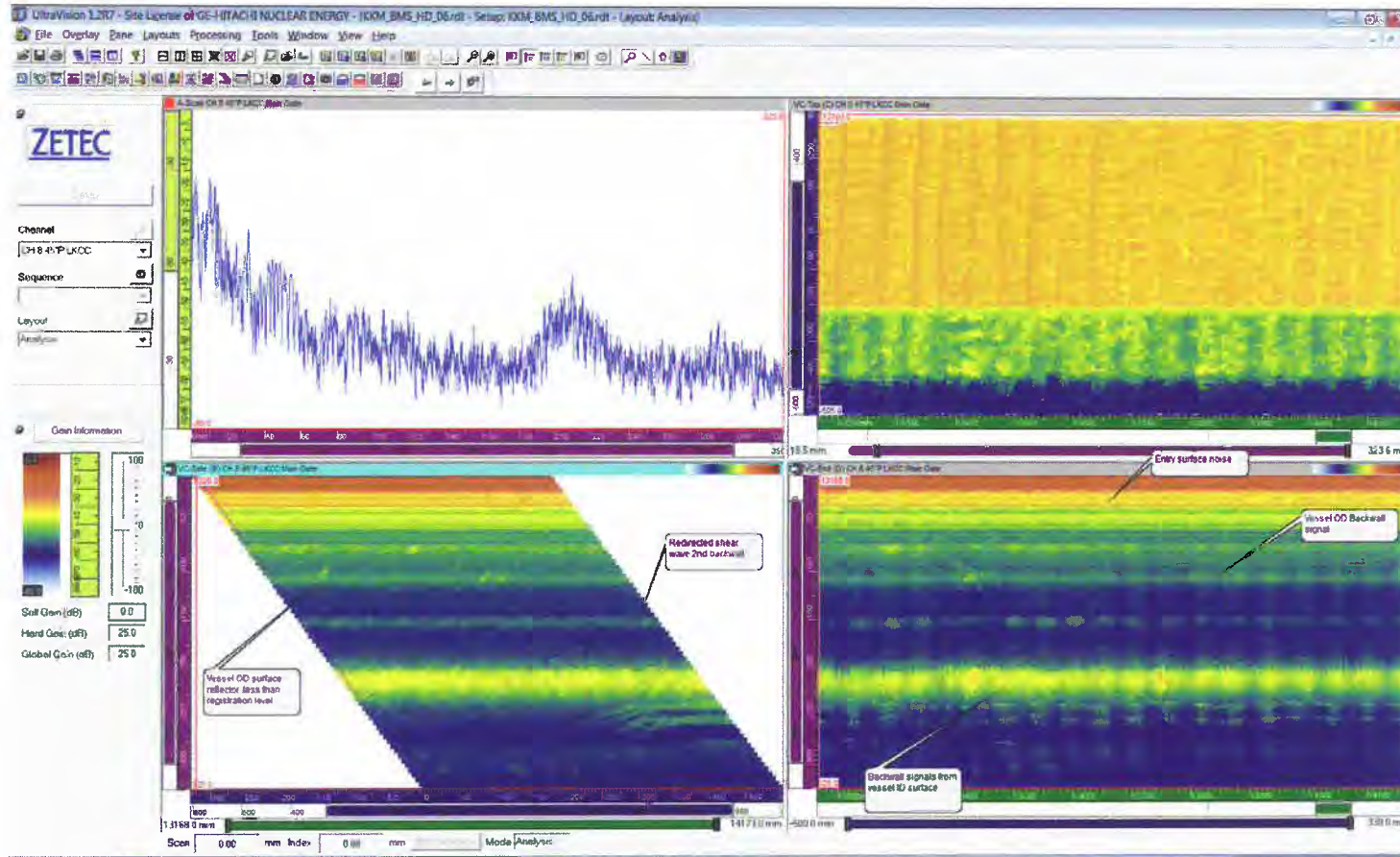




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_06

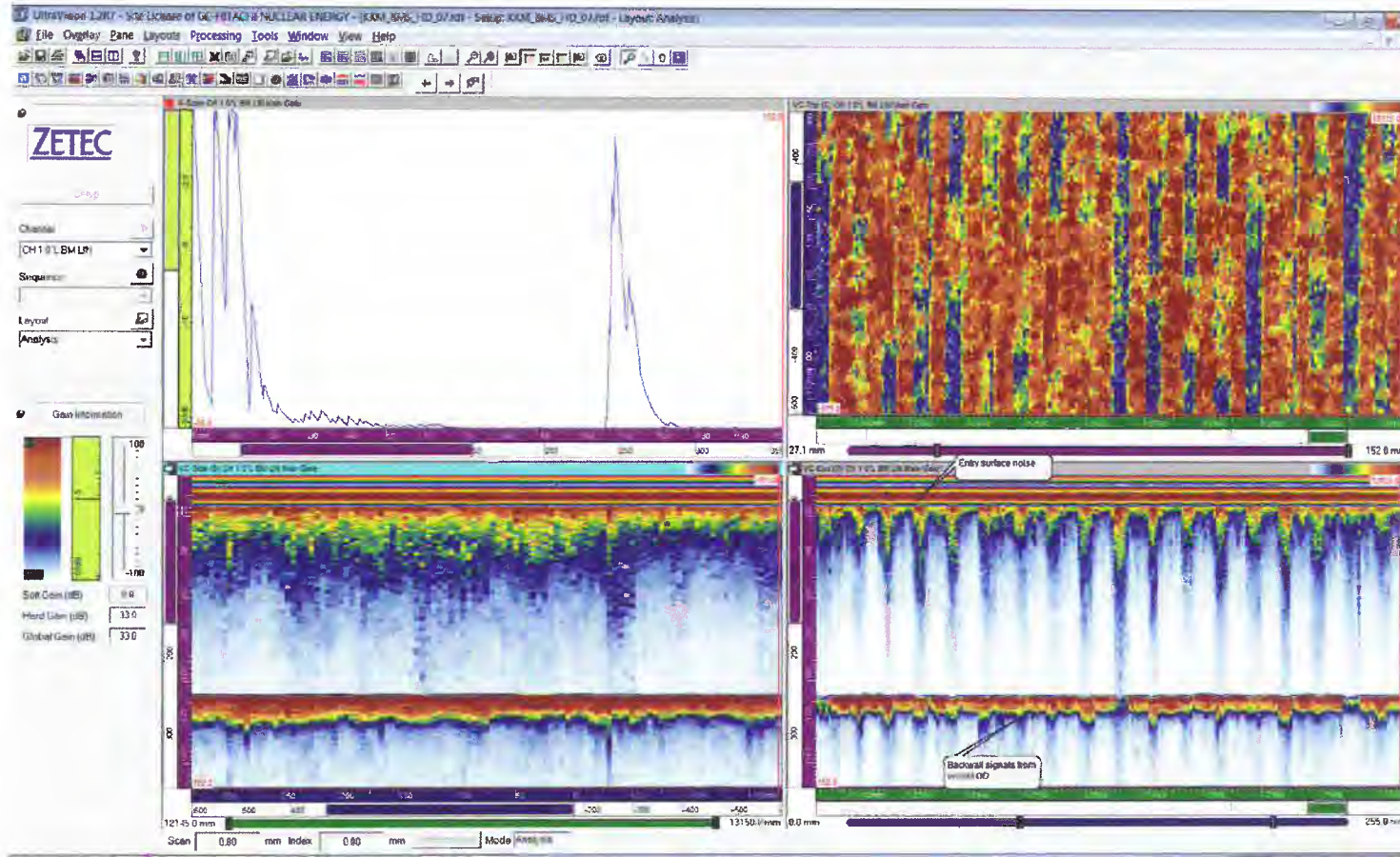




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 1 - 0° straight beam scan

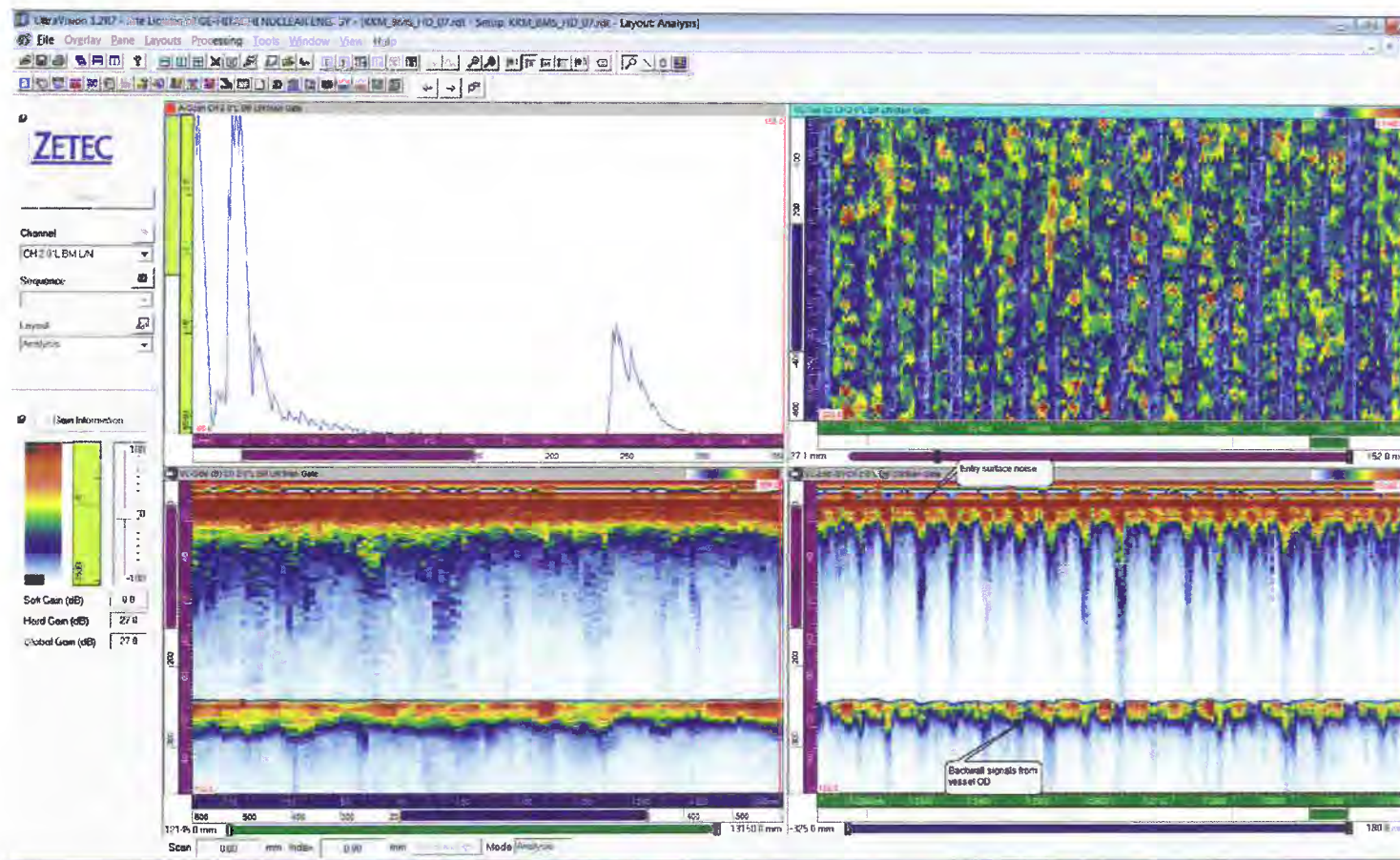




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 2 - 0° straight beam scan

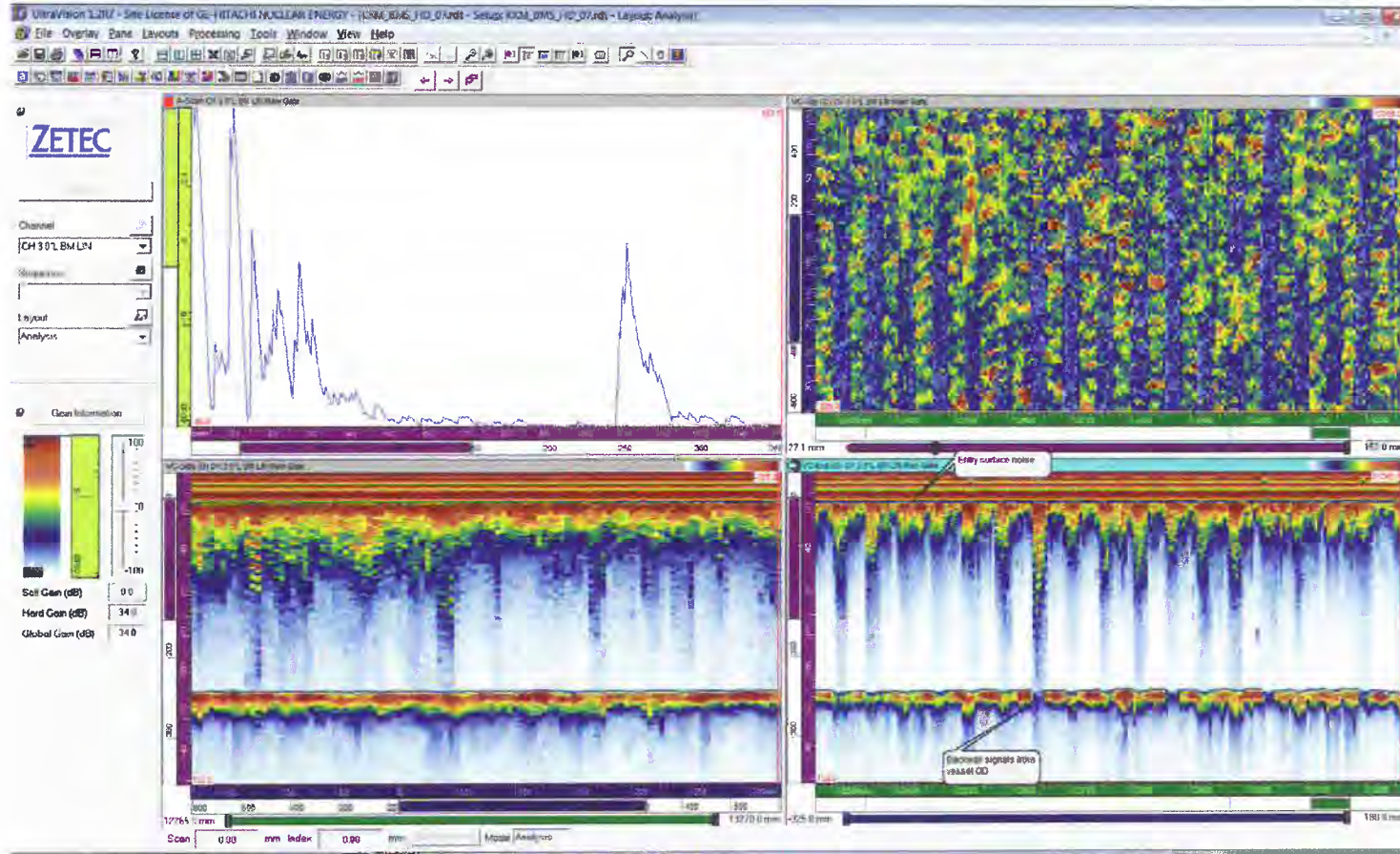




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 3 - 0° straight beam scan



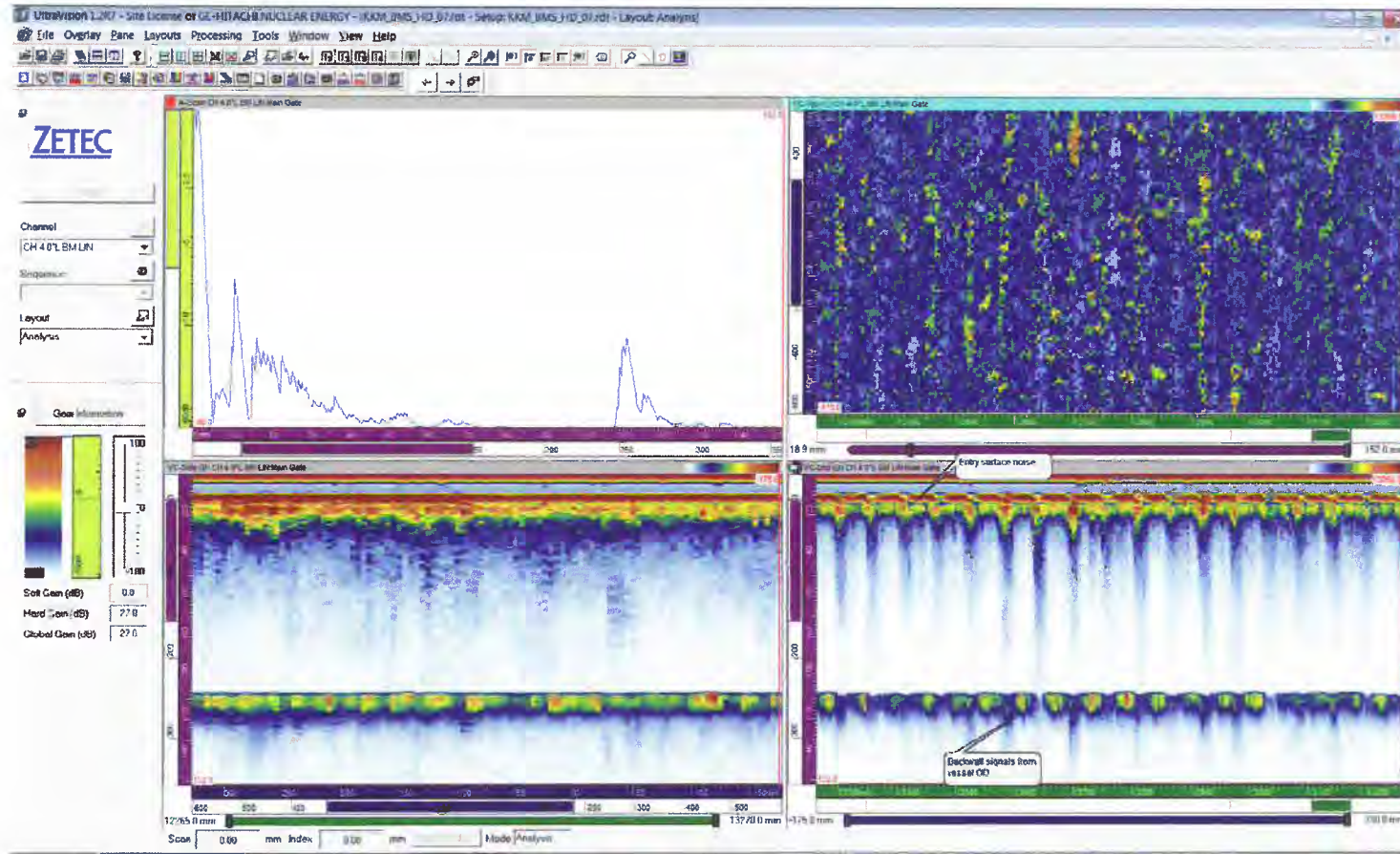




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 4 - 0° straight beam scan

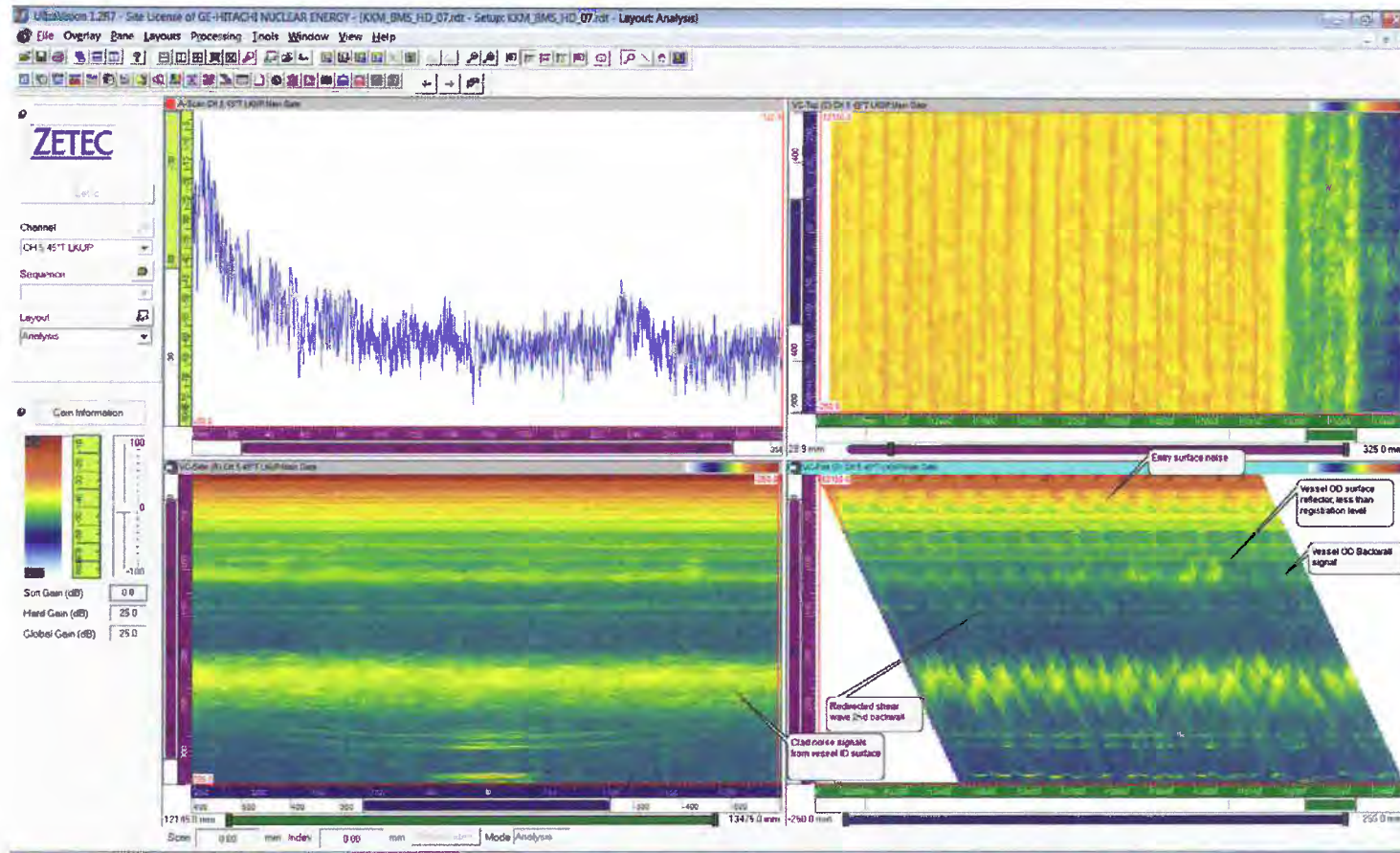




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 5 - 45° angle beam scan search unit looking up

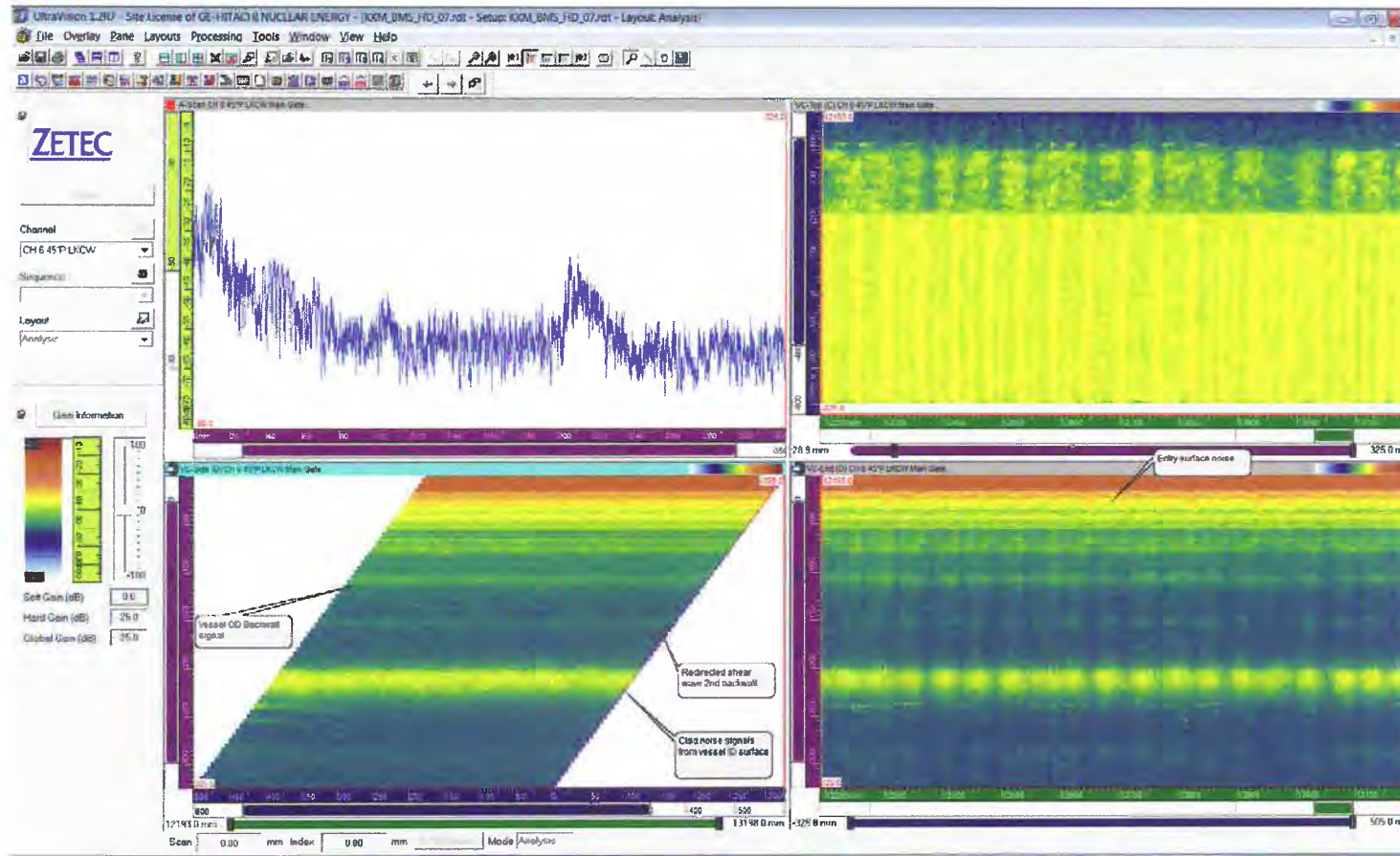




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 6 - 45° angle beam scan search unit looking clockwise

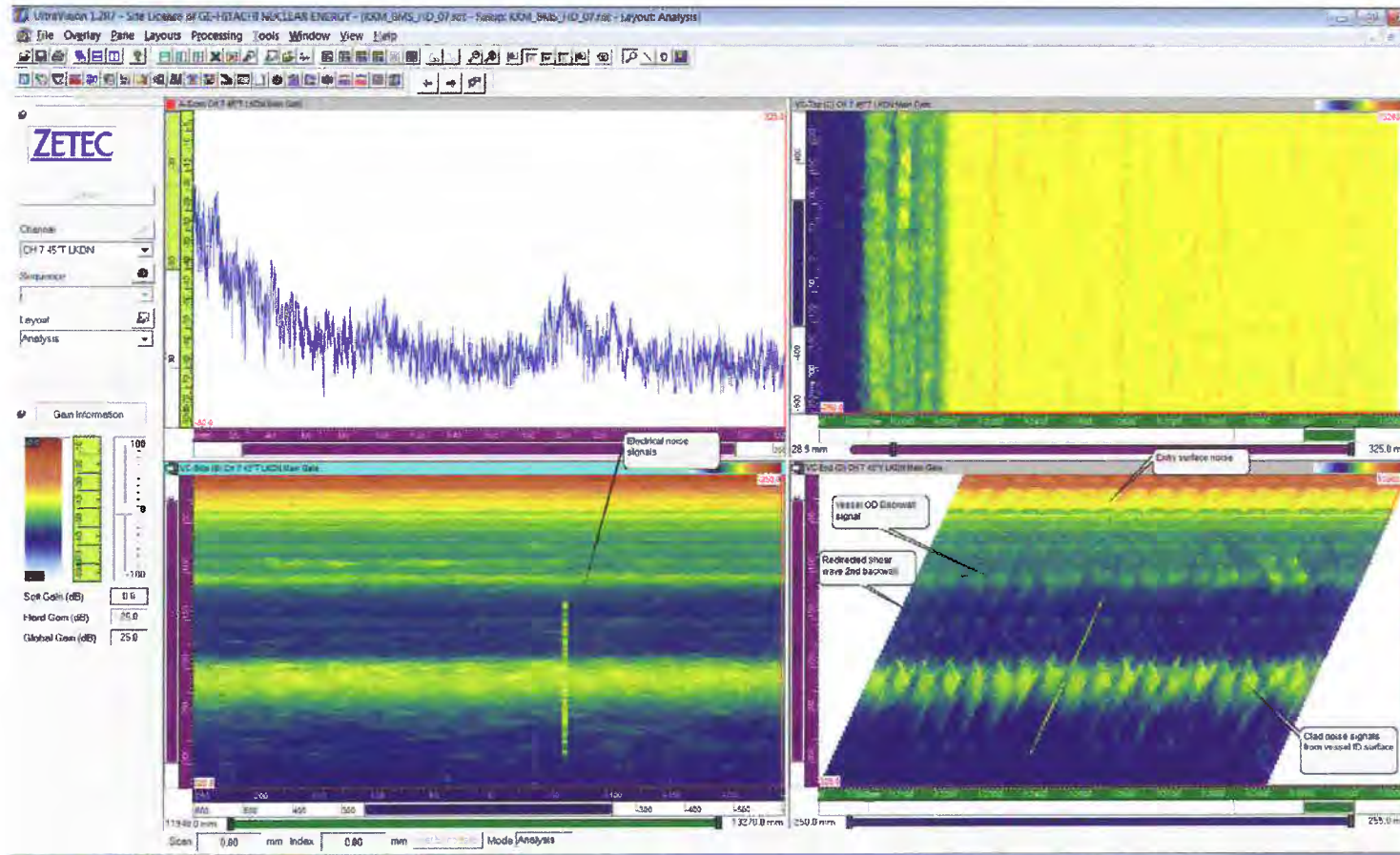




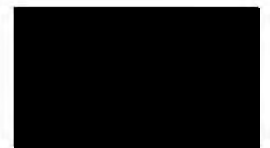
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 7 - 45° angle beam scan search unit looking down

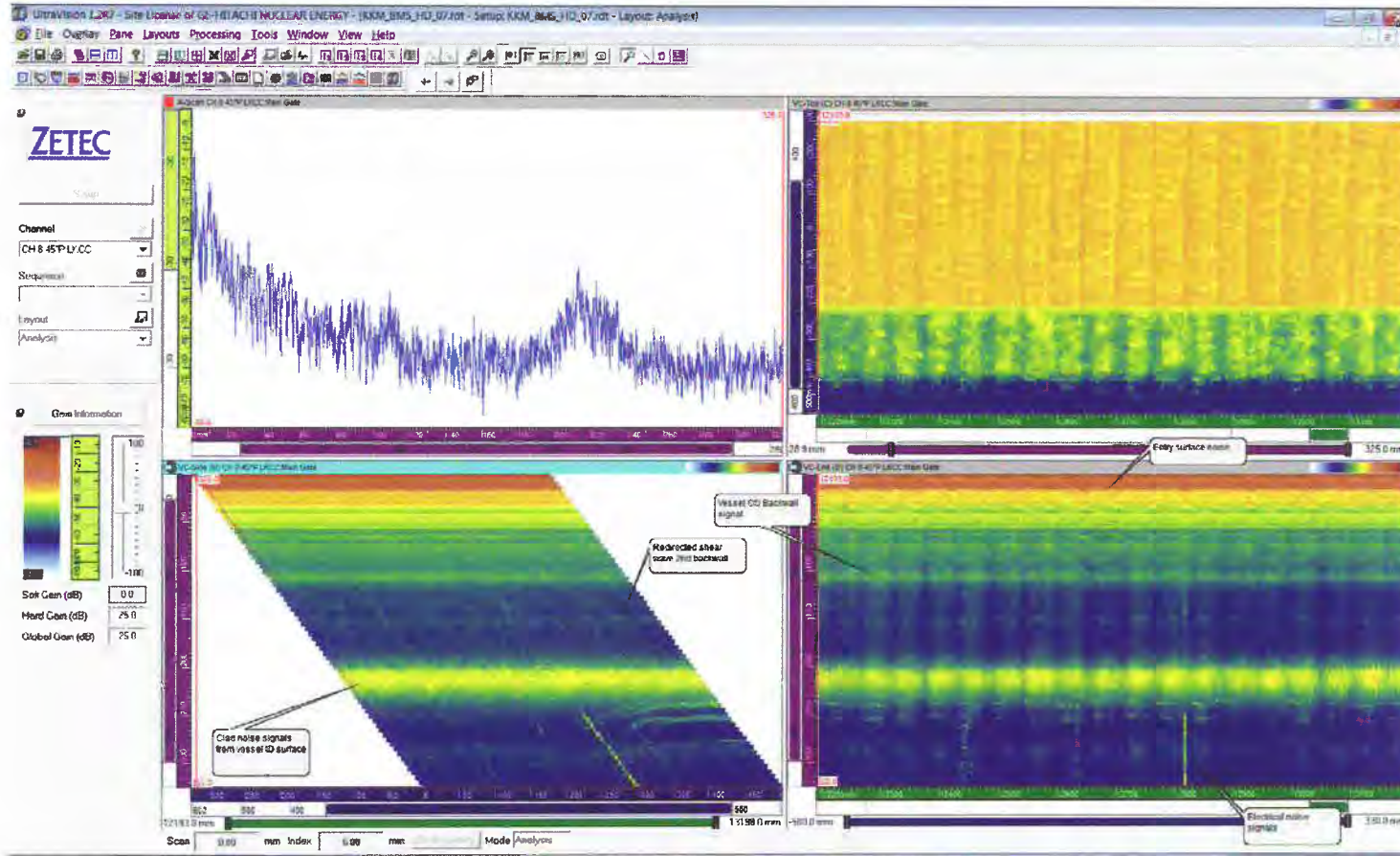




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_07



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

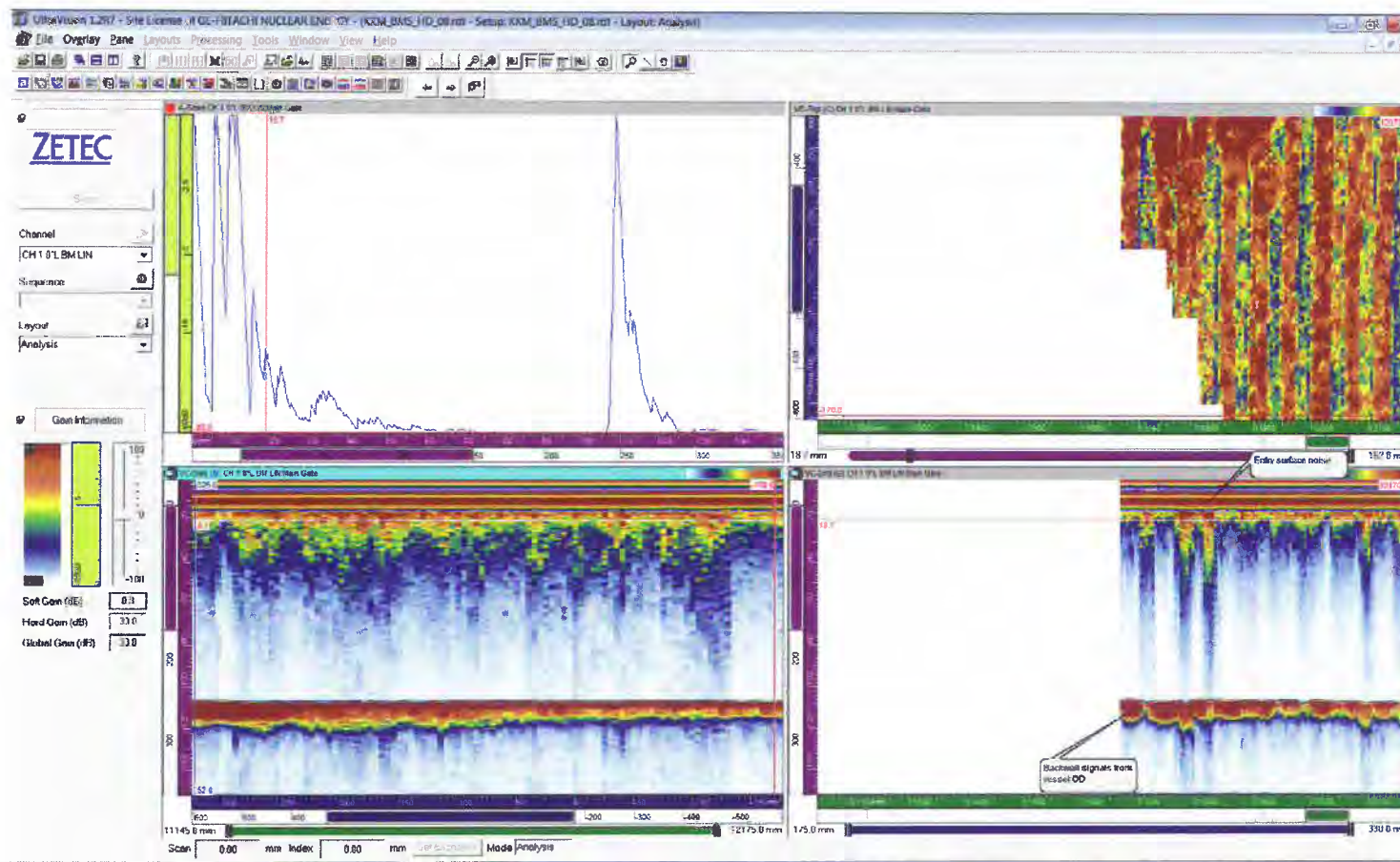




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 1 - 0° straight beam scan

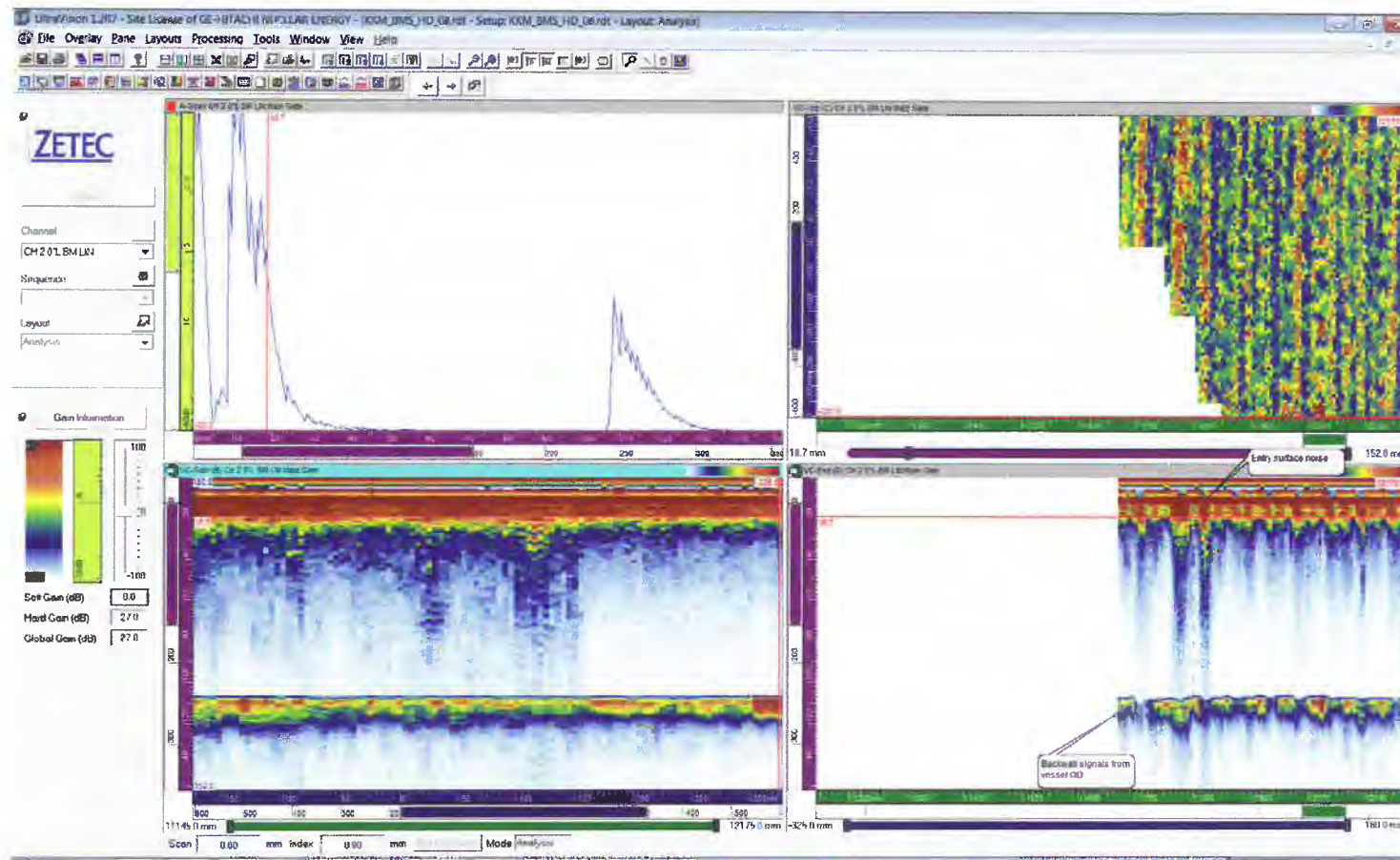




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 2 - 0° straight beam scan

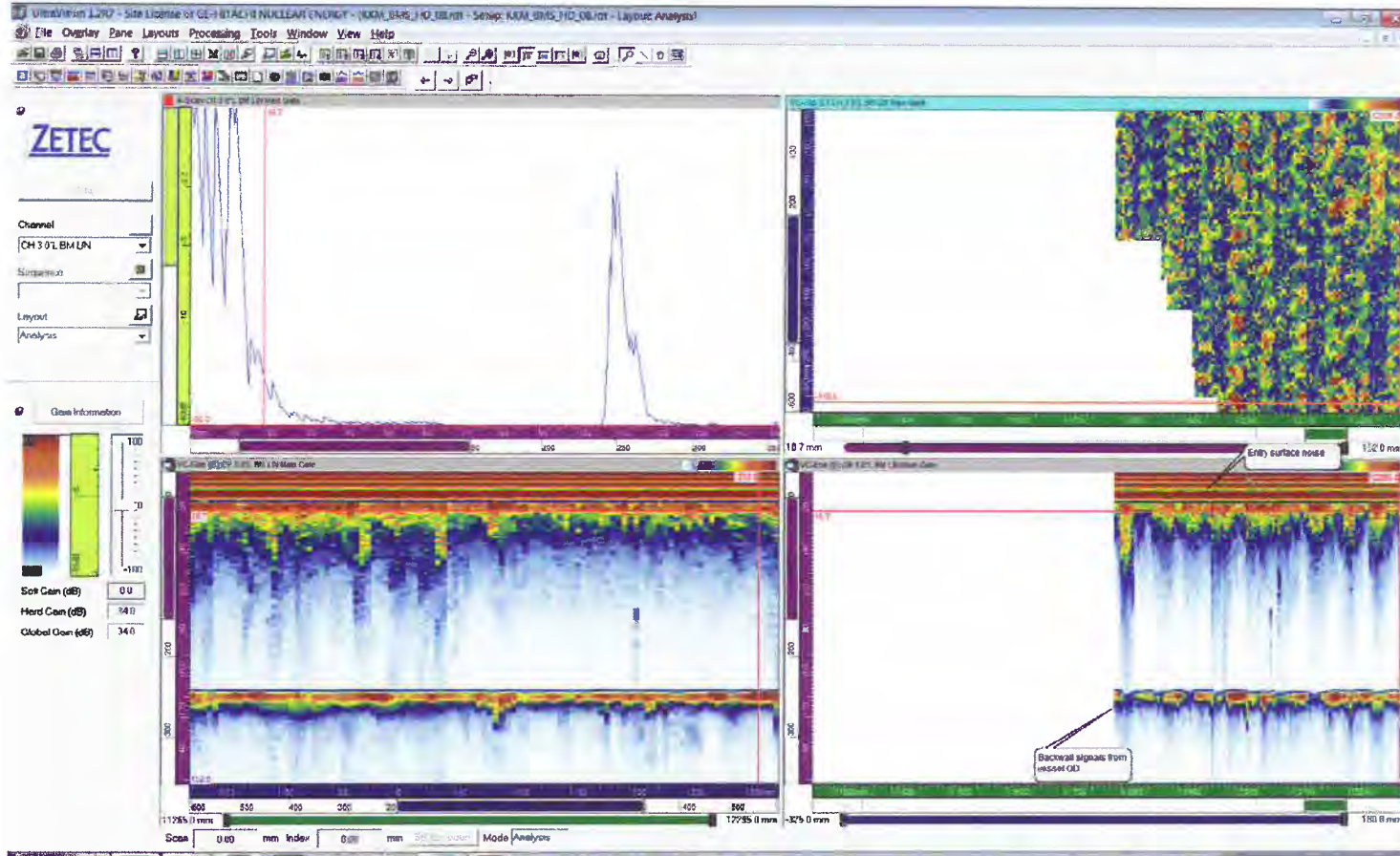




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 3 - 0° straight beam scan



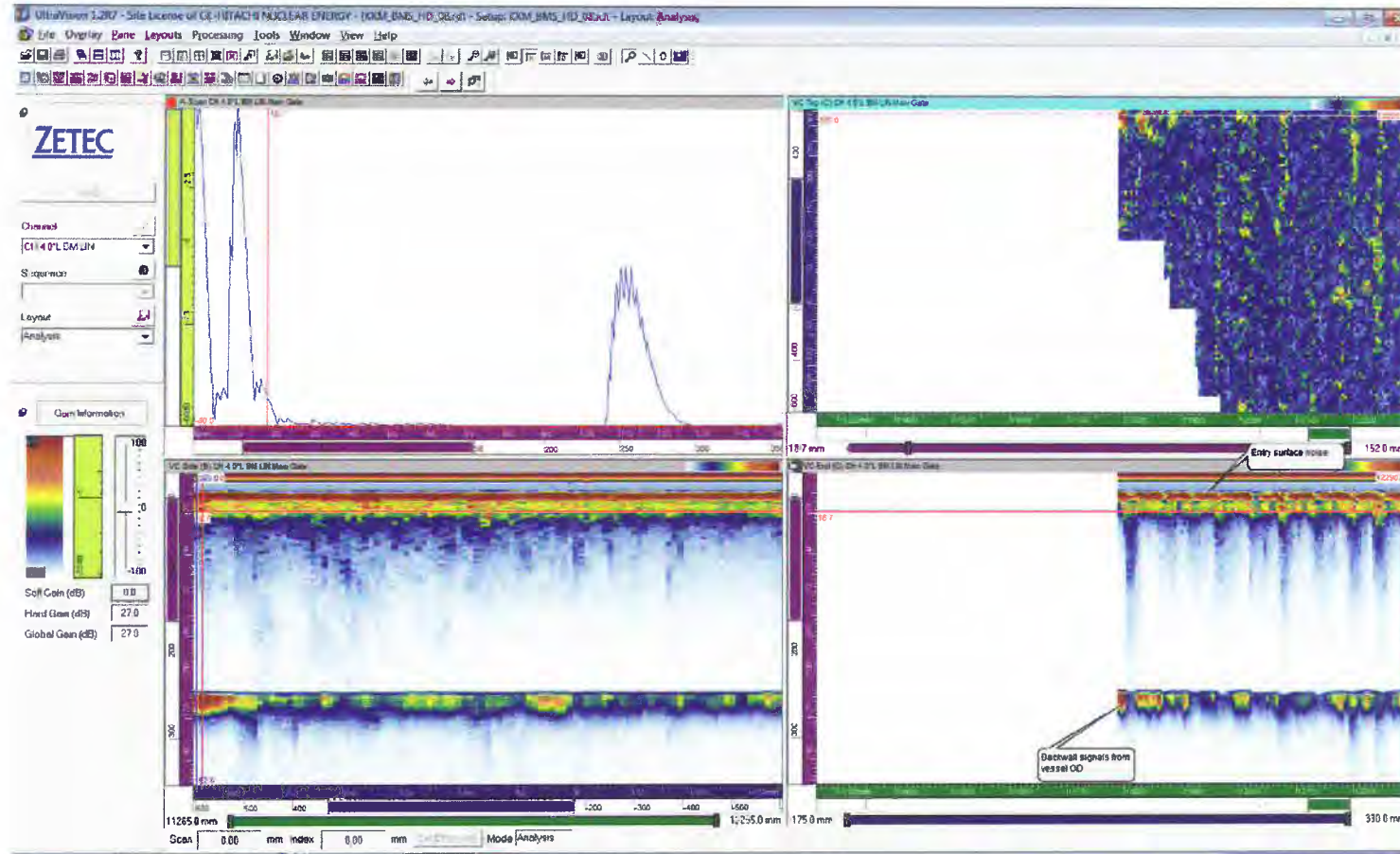




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 4 - 0° straight beam scan

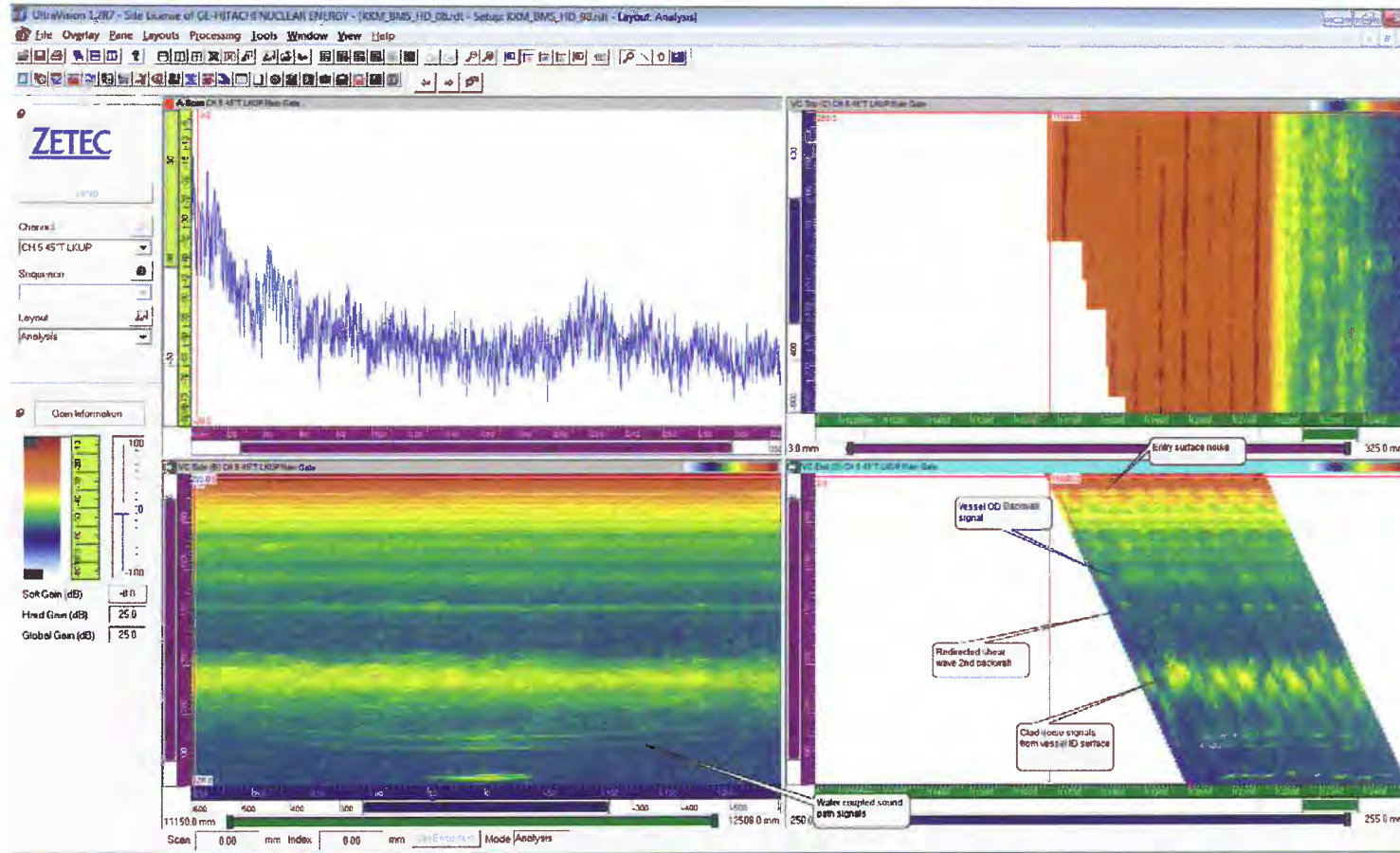




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 5 - 45° angle beam scan search unit looking up

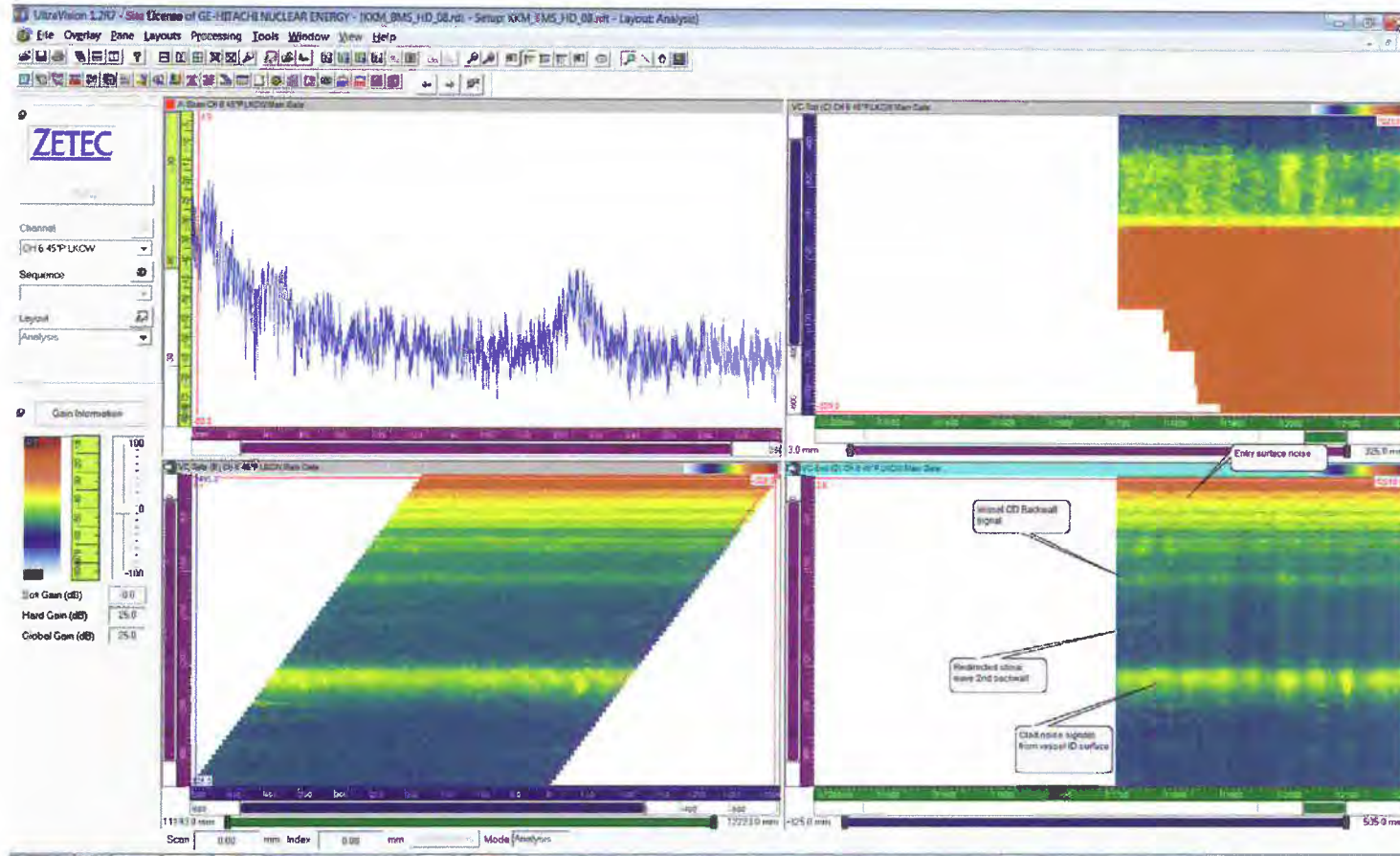




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 6 - 45° angle beam scan search unit looking clockwise

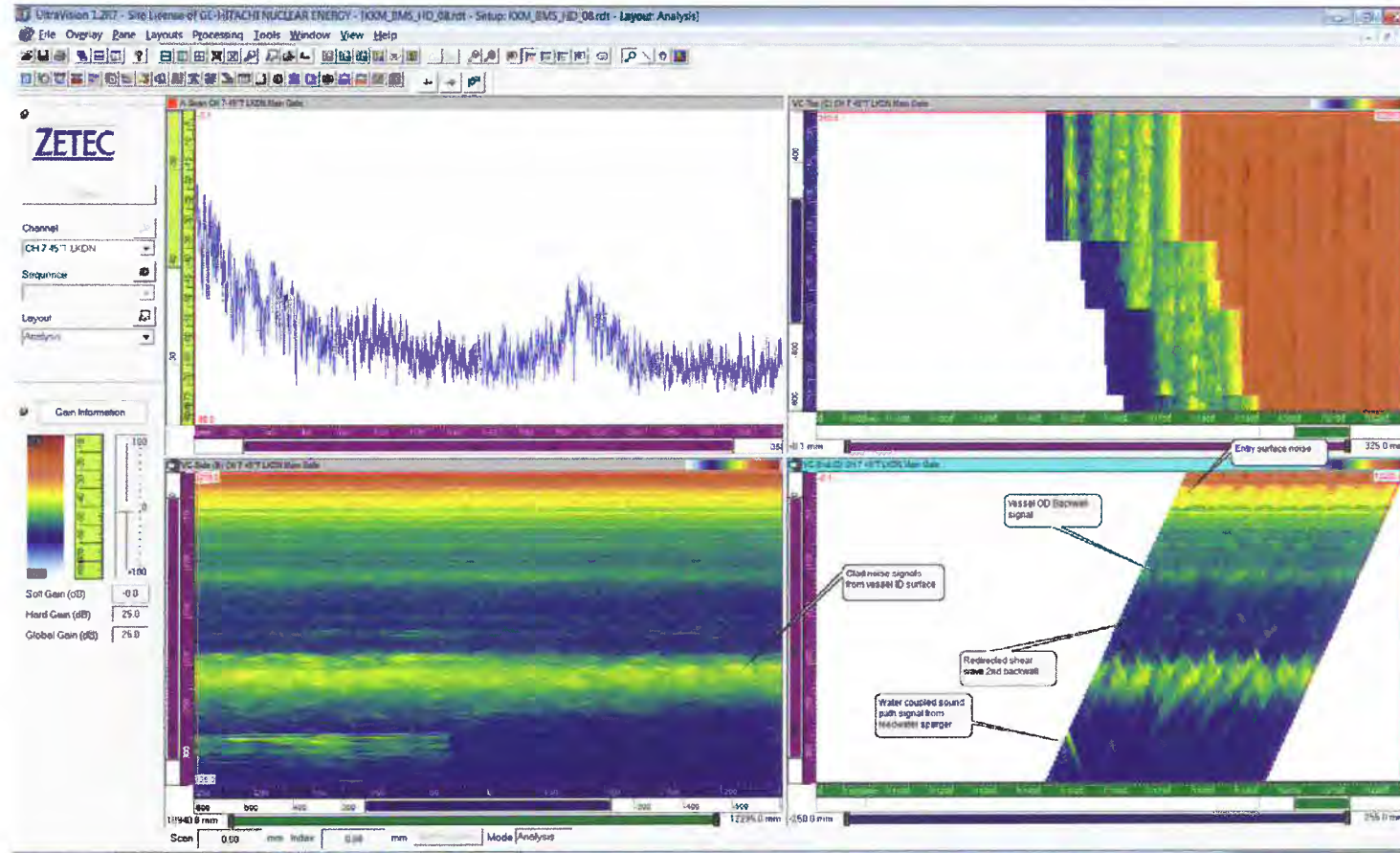




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 7 - 45° angle beam scan search unit looking down

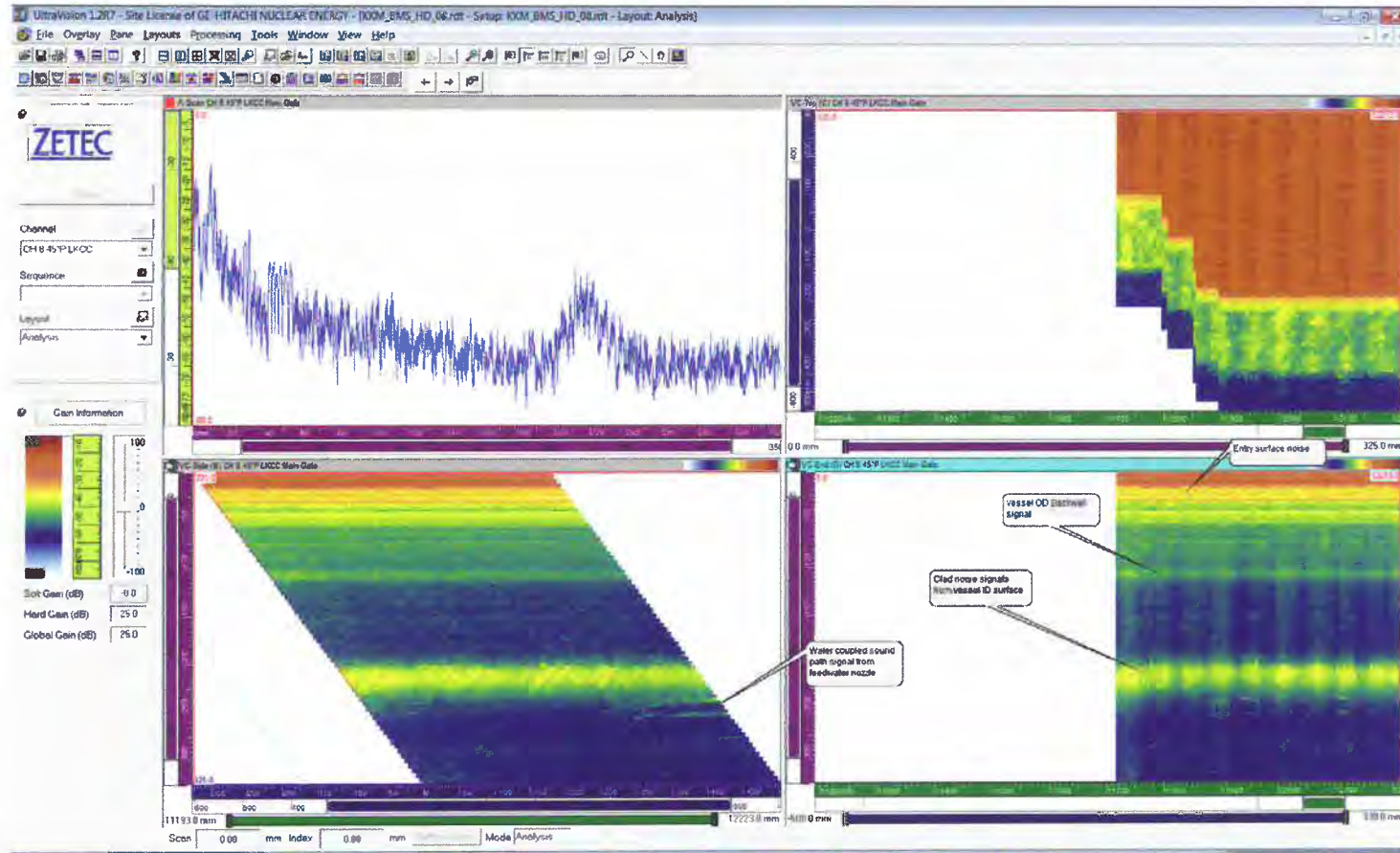




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_08



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

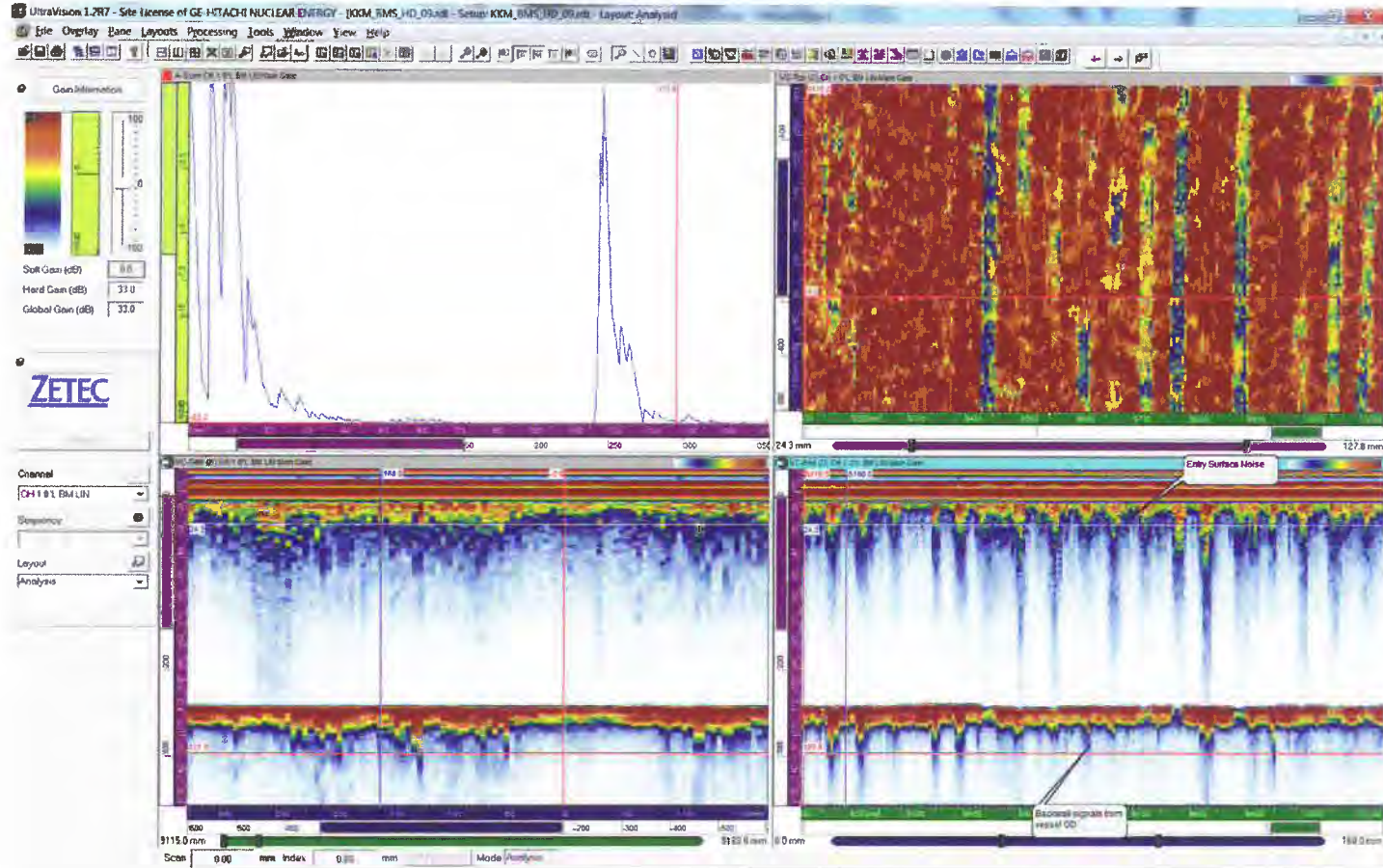




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 1 - 0° straight beam scan

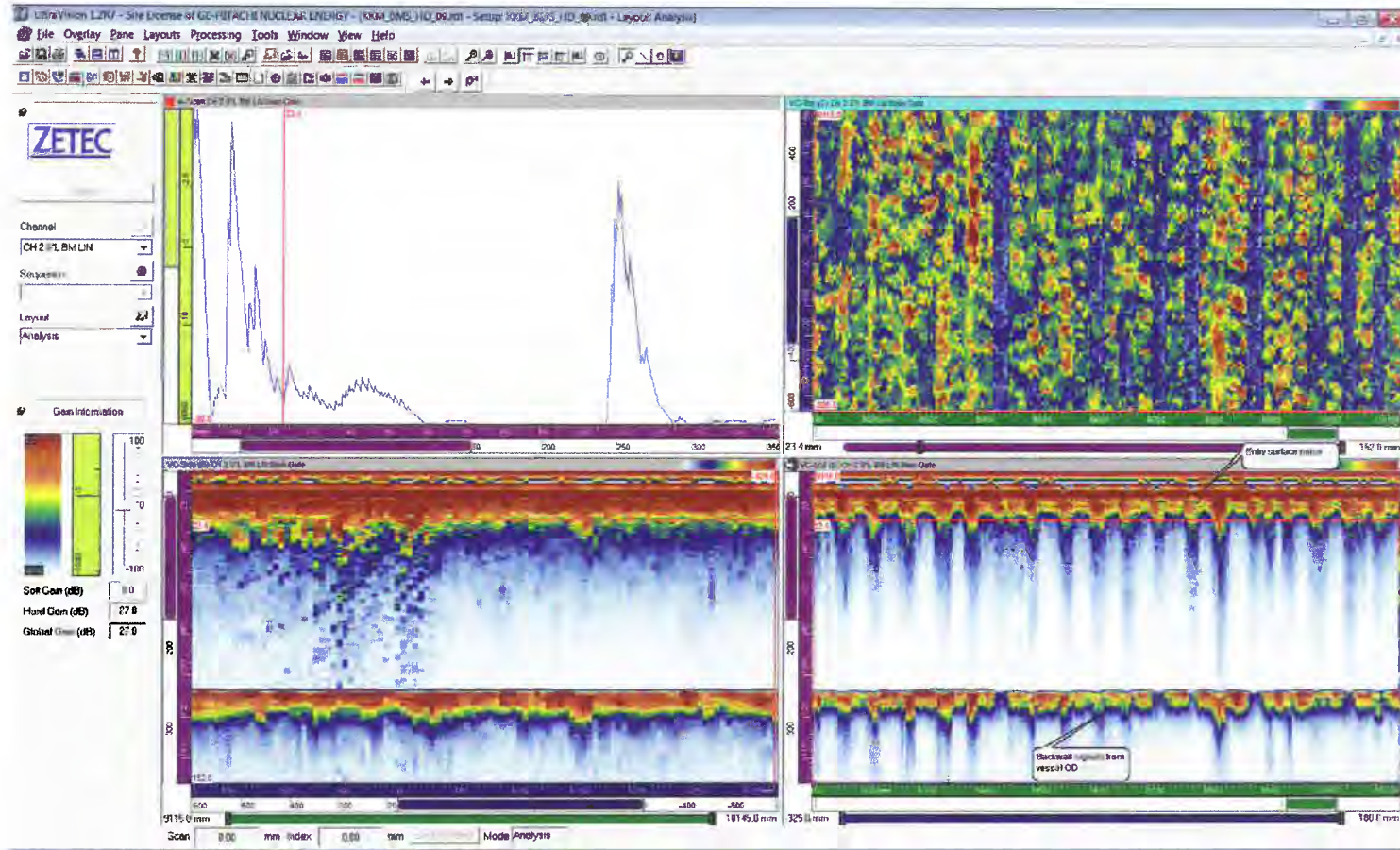




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 2 - 0° straight beam scan

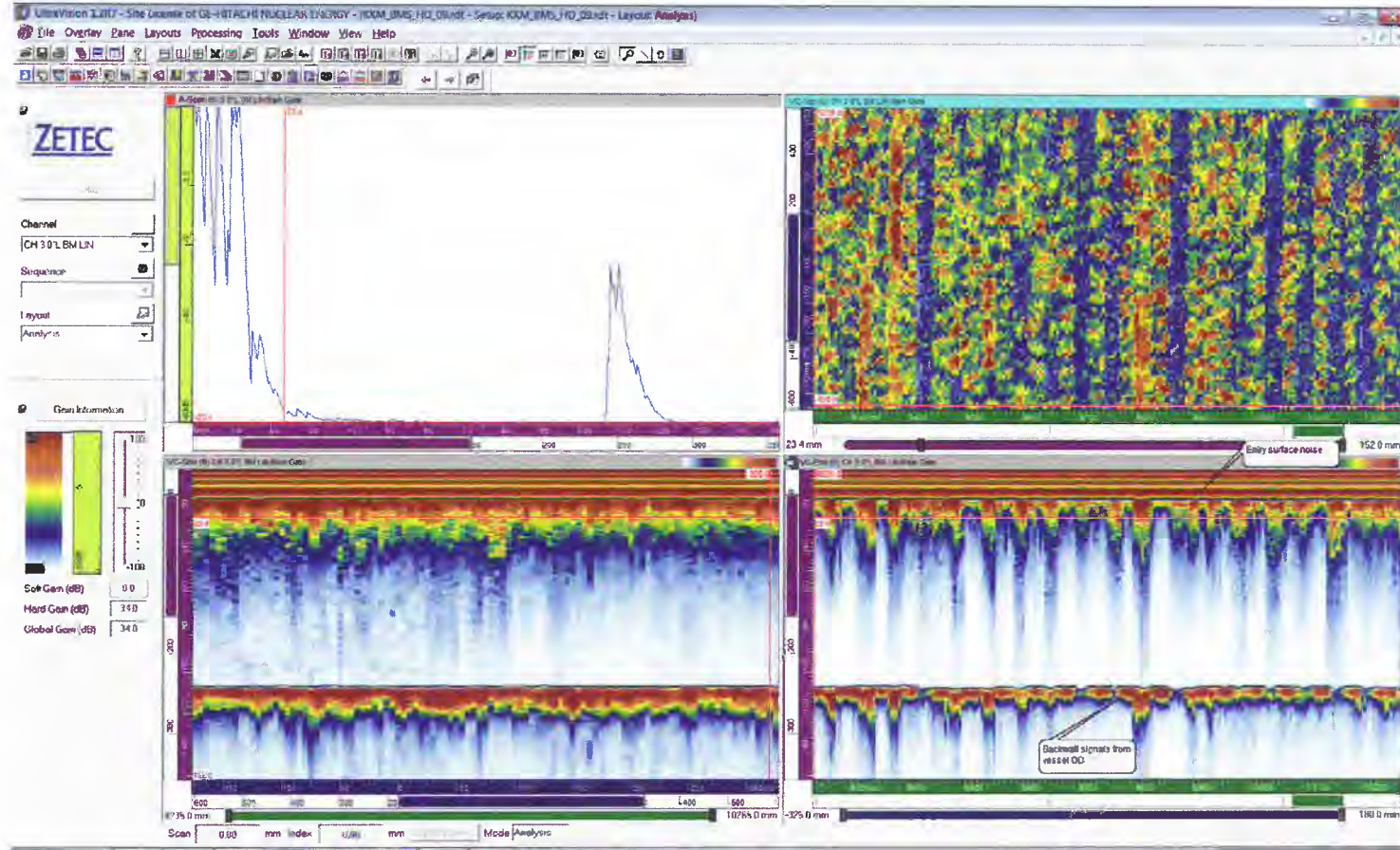




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 3 - 0° straight beam scan



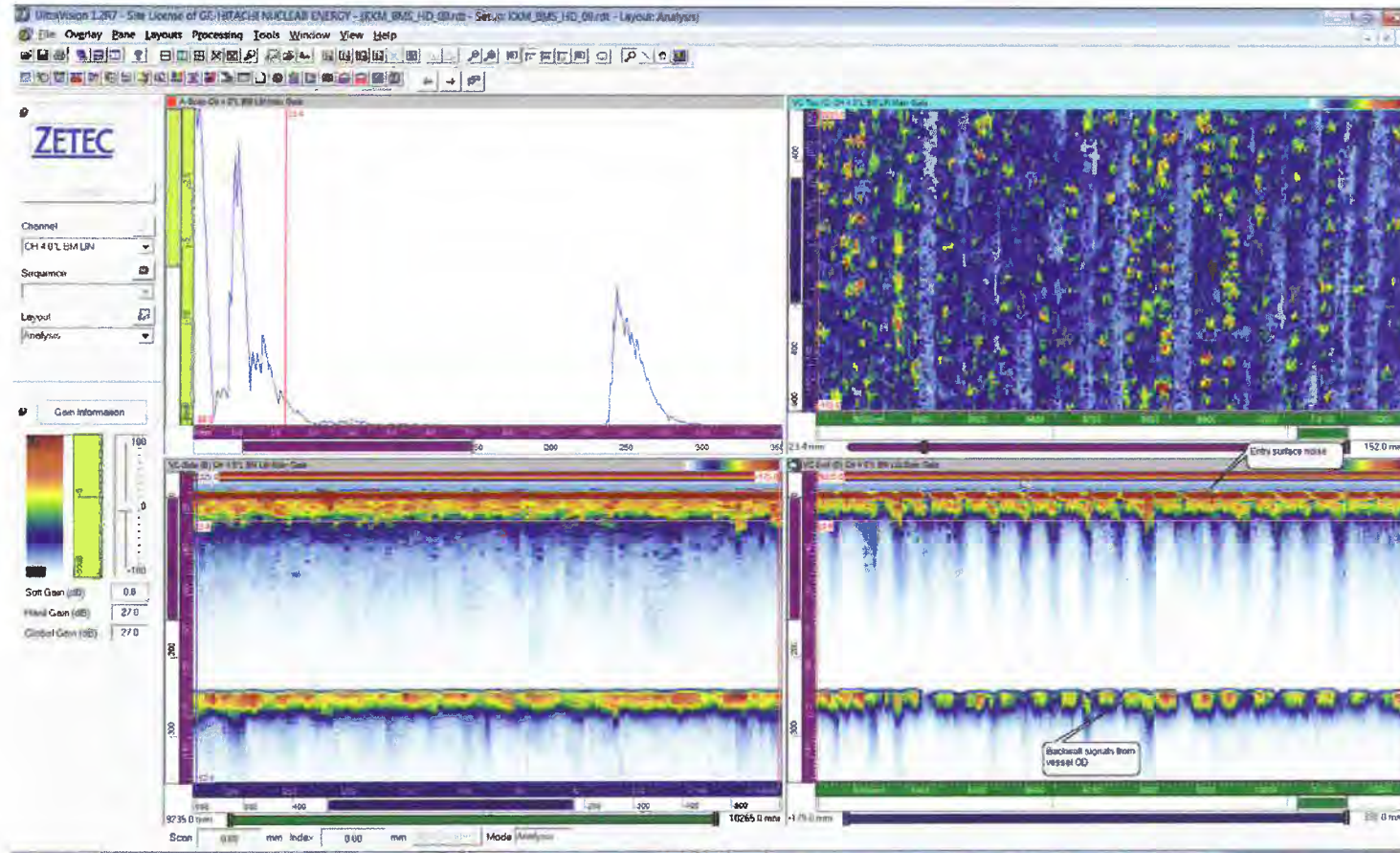




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 4 - 0° straight beam scan

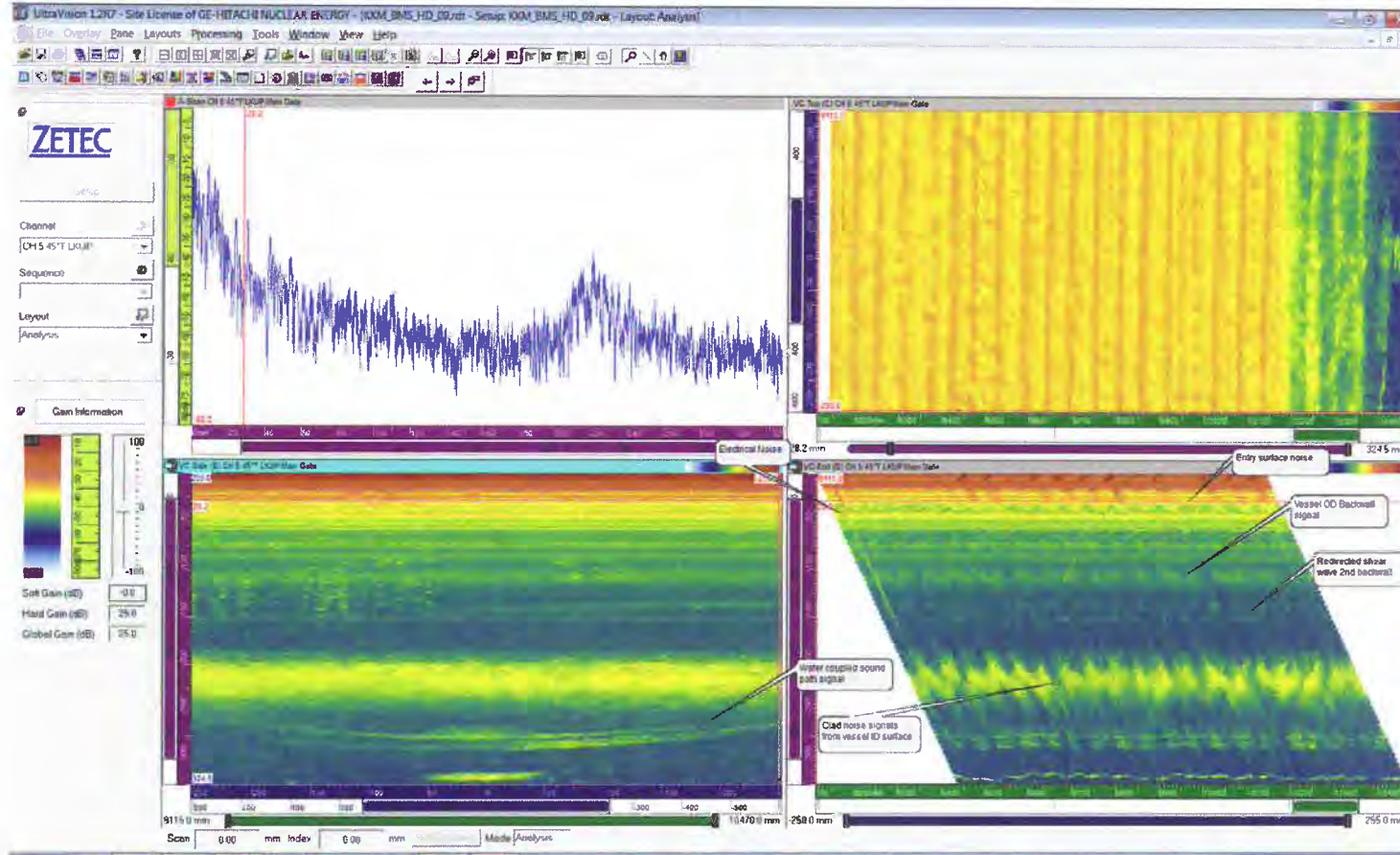




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 5 - 45° angle beam scan search unit looking up

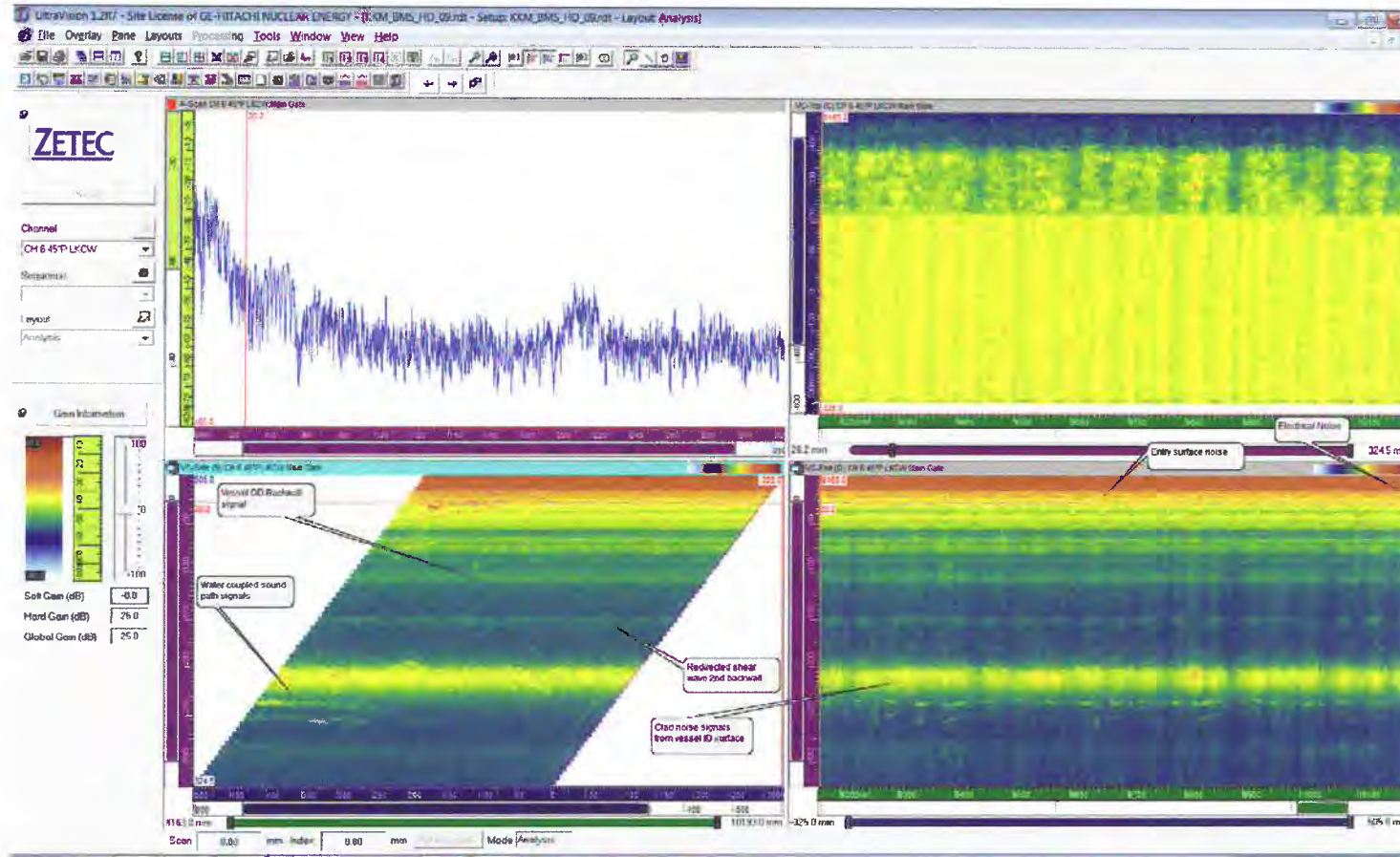




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 6 - 45° angle beam scan search unit looking clockwise

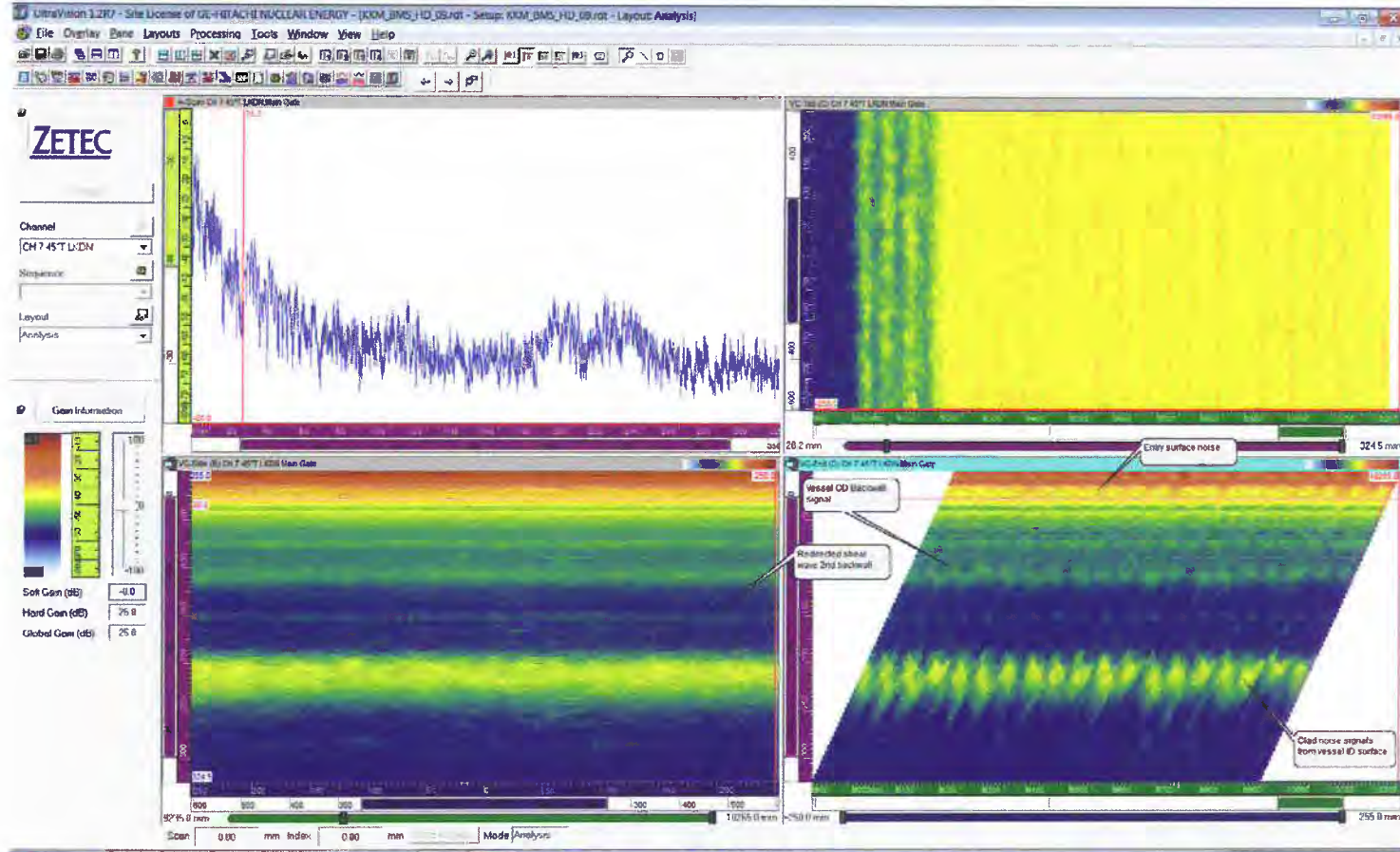




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 7 - 45° angle beam scan search unit looking down

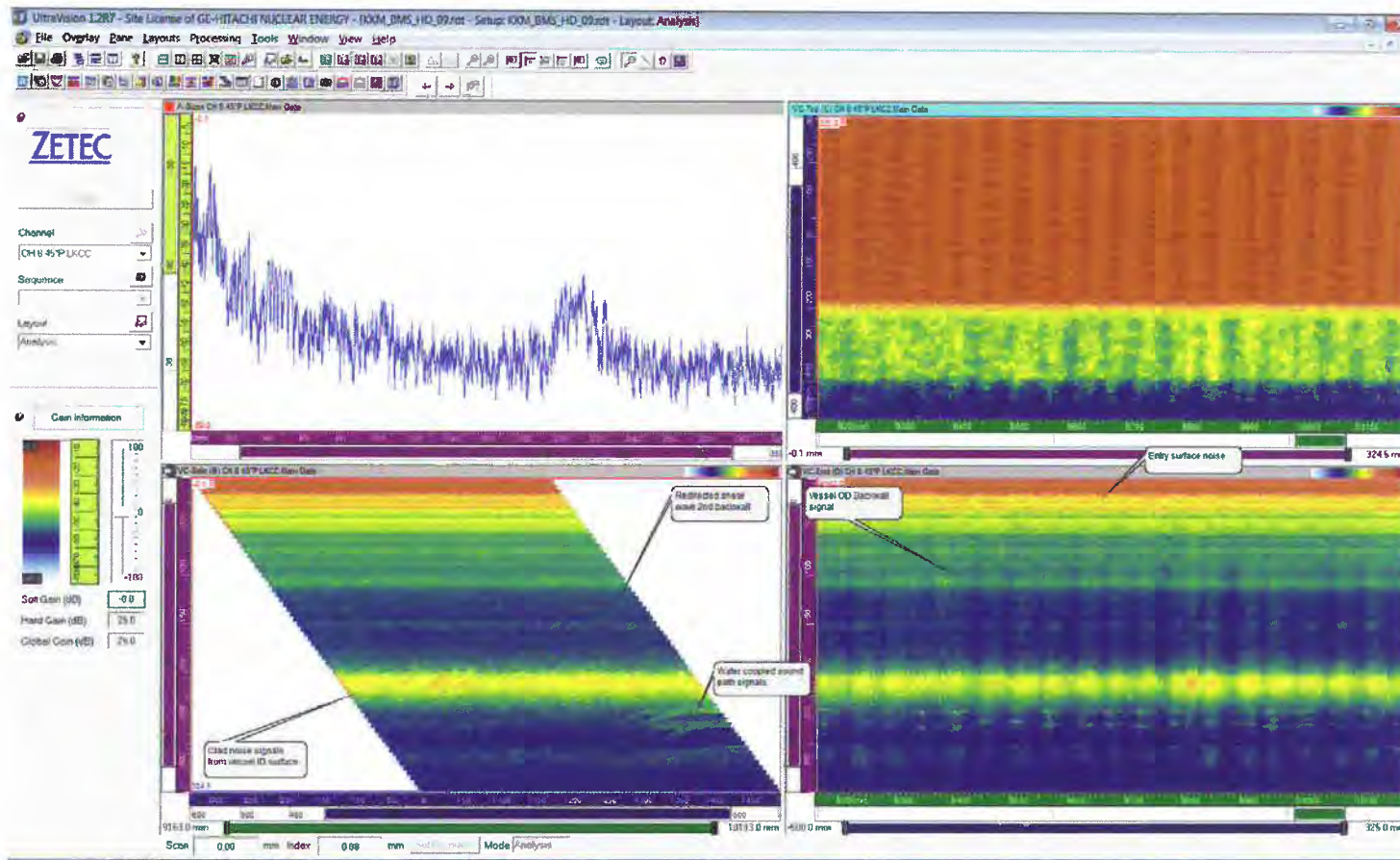




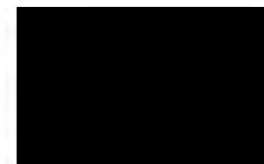
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_09



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

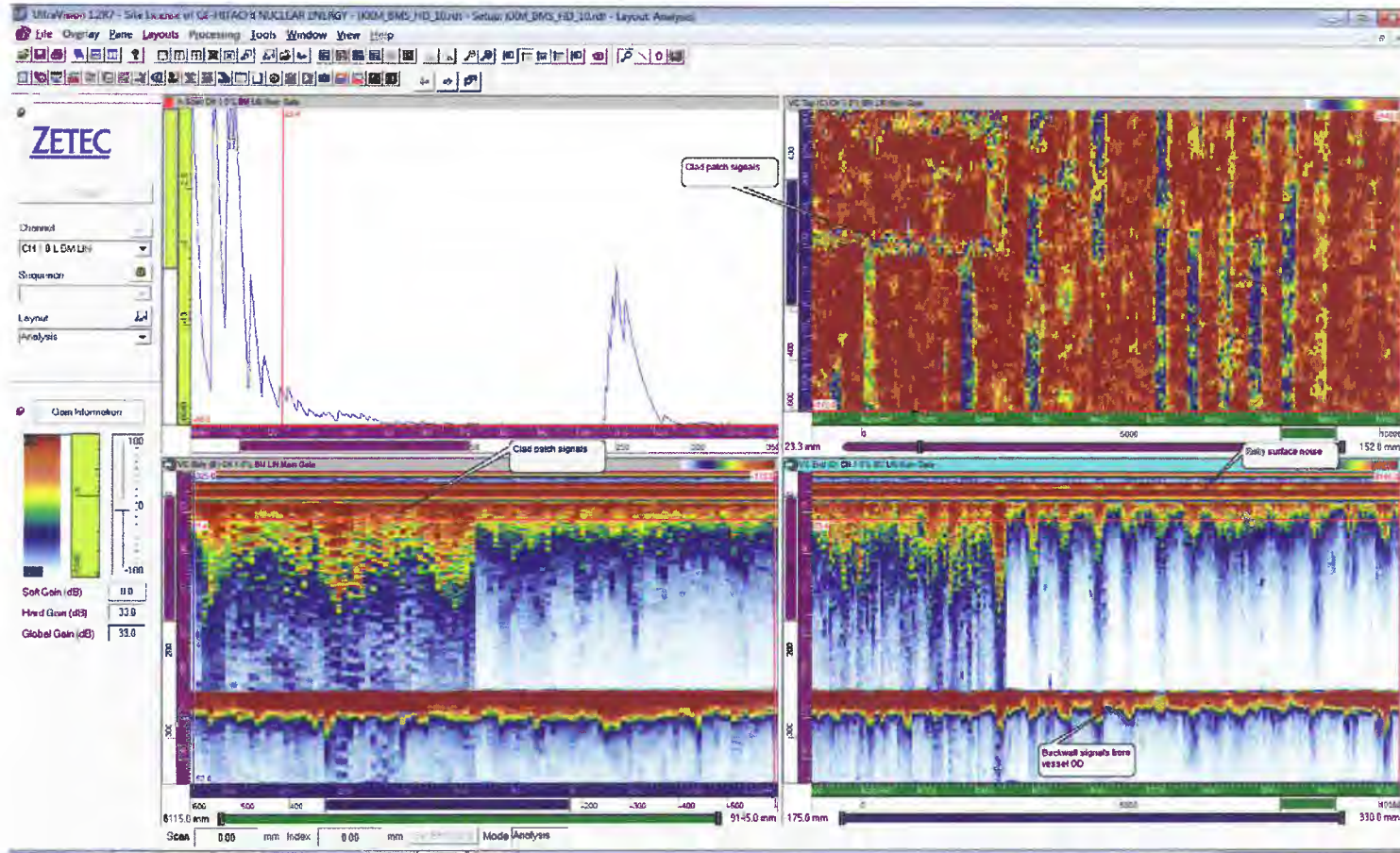




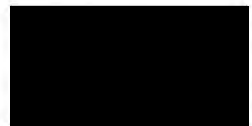
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 1 - 0° straight beam scan

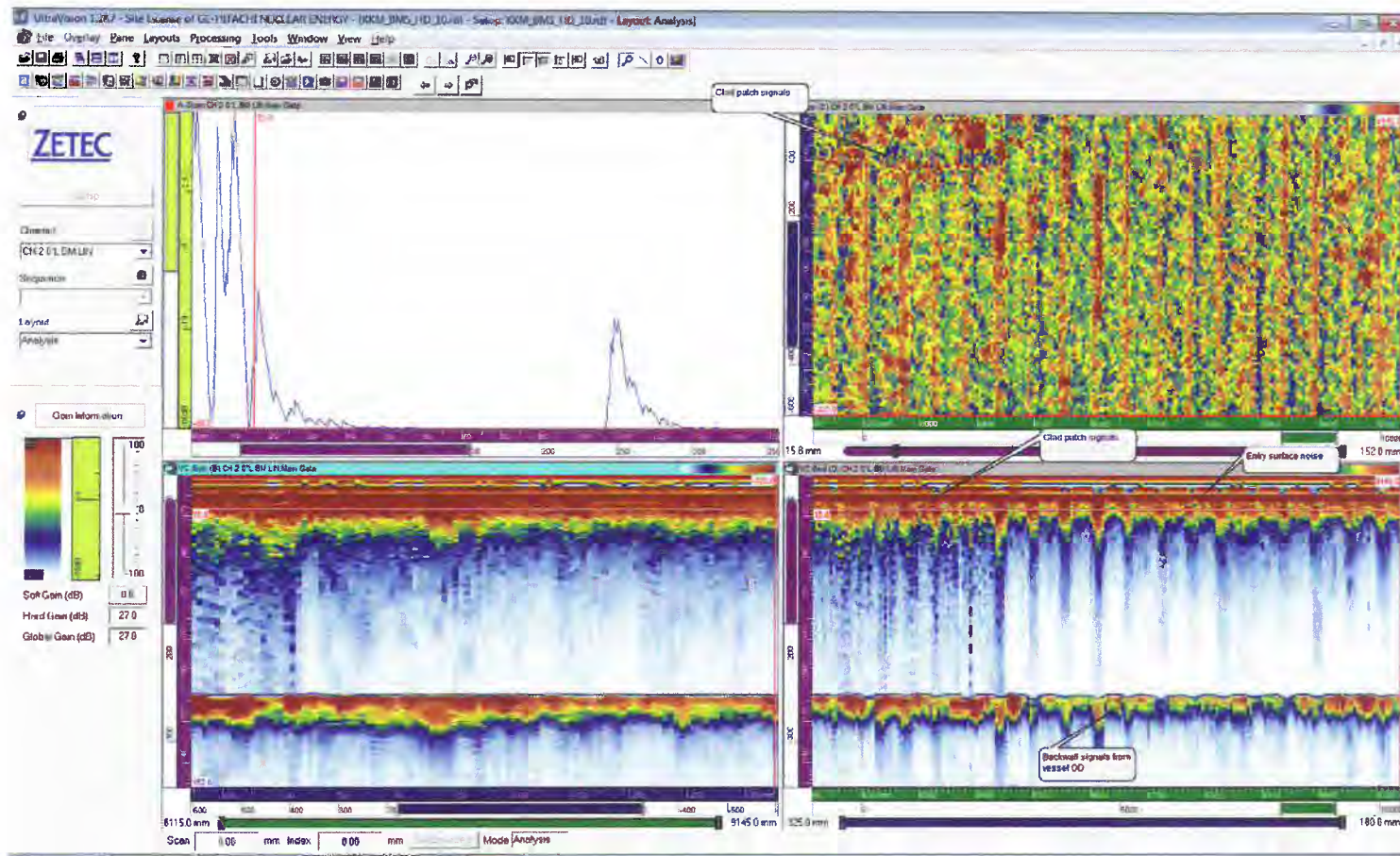




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 2 - 0° straight beam scan

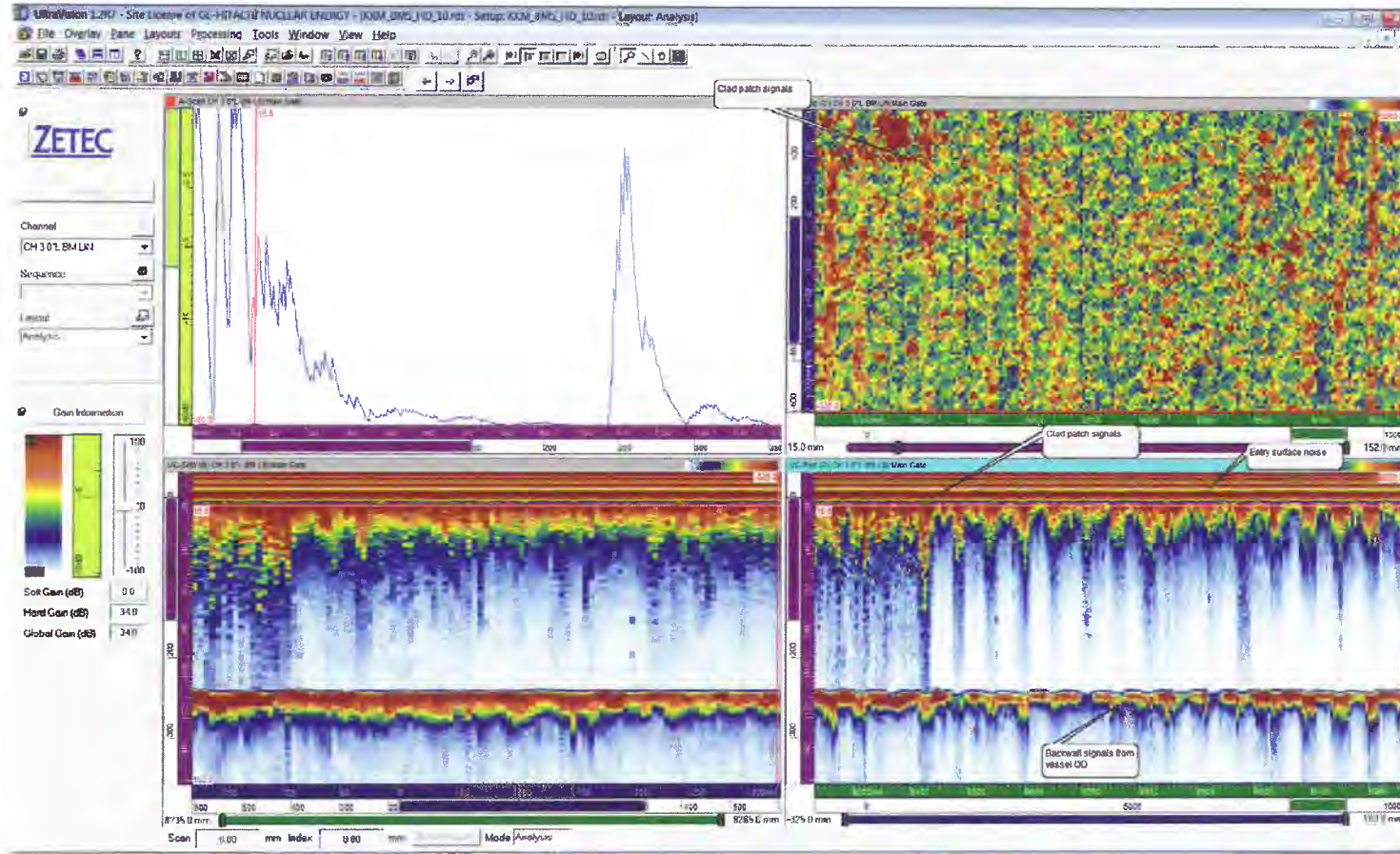




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 3 - 0° straight beam scan



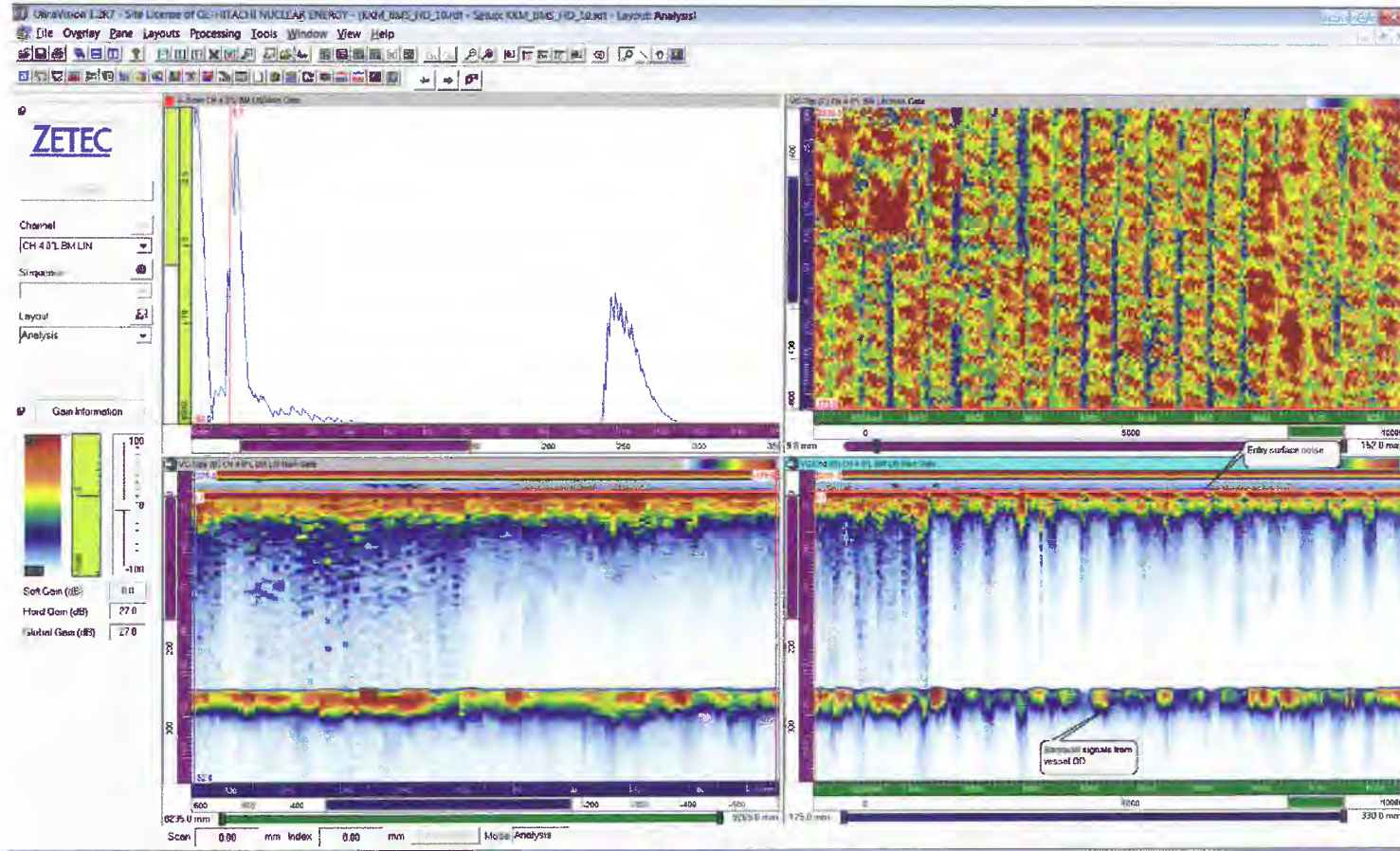




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 4 - 0° straight beam scan

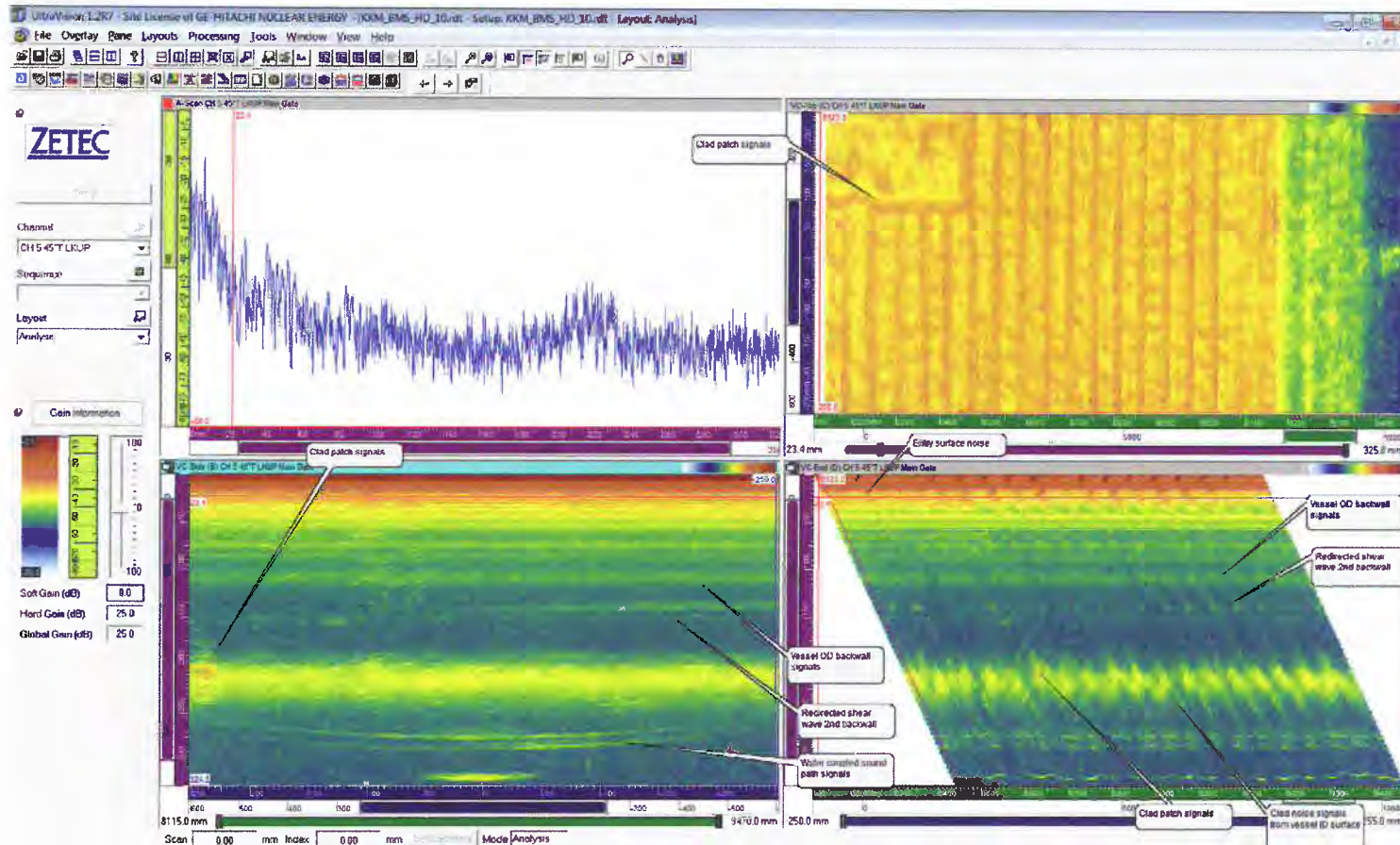




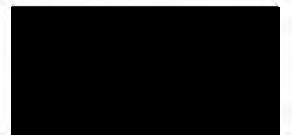
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 5 - 45° angle beam scan search unit looking up

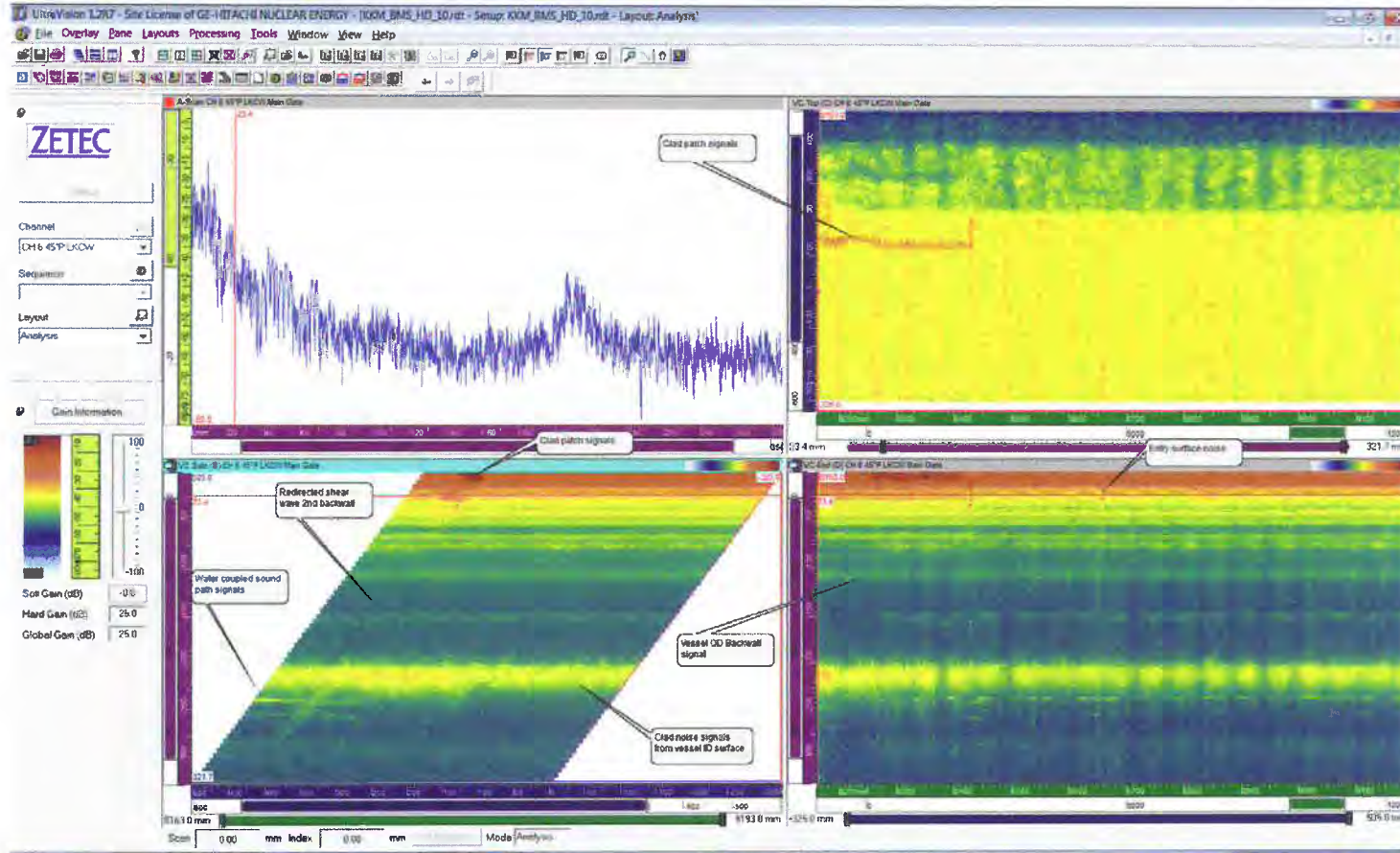




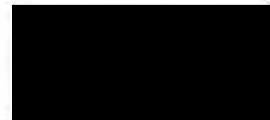
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 6 - 45° angle beam scan search unit looking clockwise

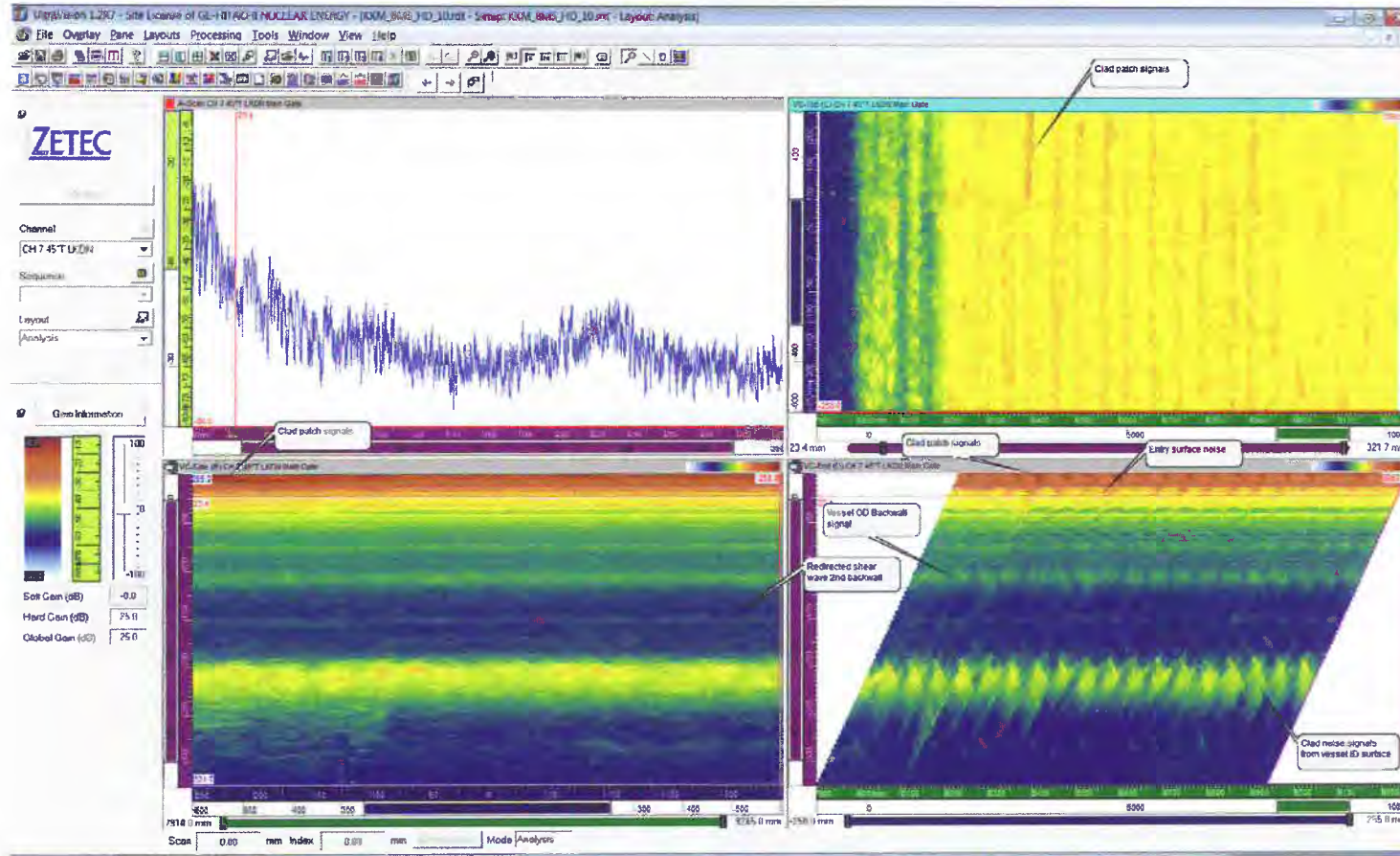




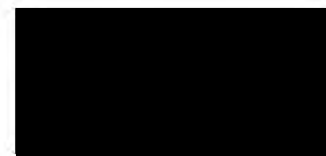
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 7 - 45° angle beam scan search unit looking down

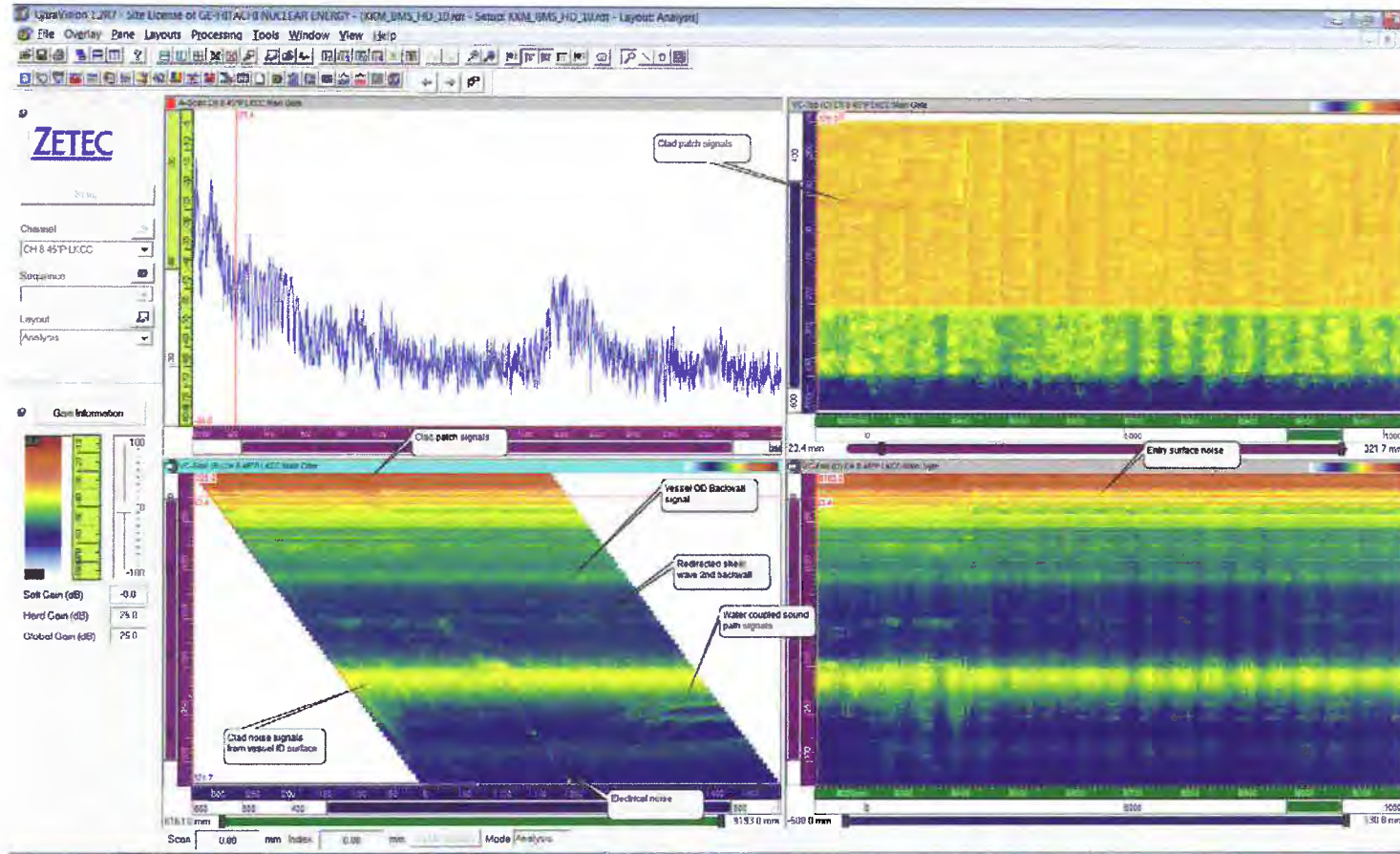




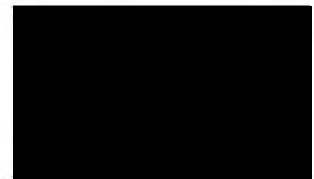
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_10



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

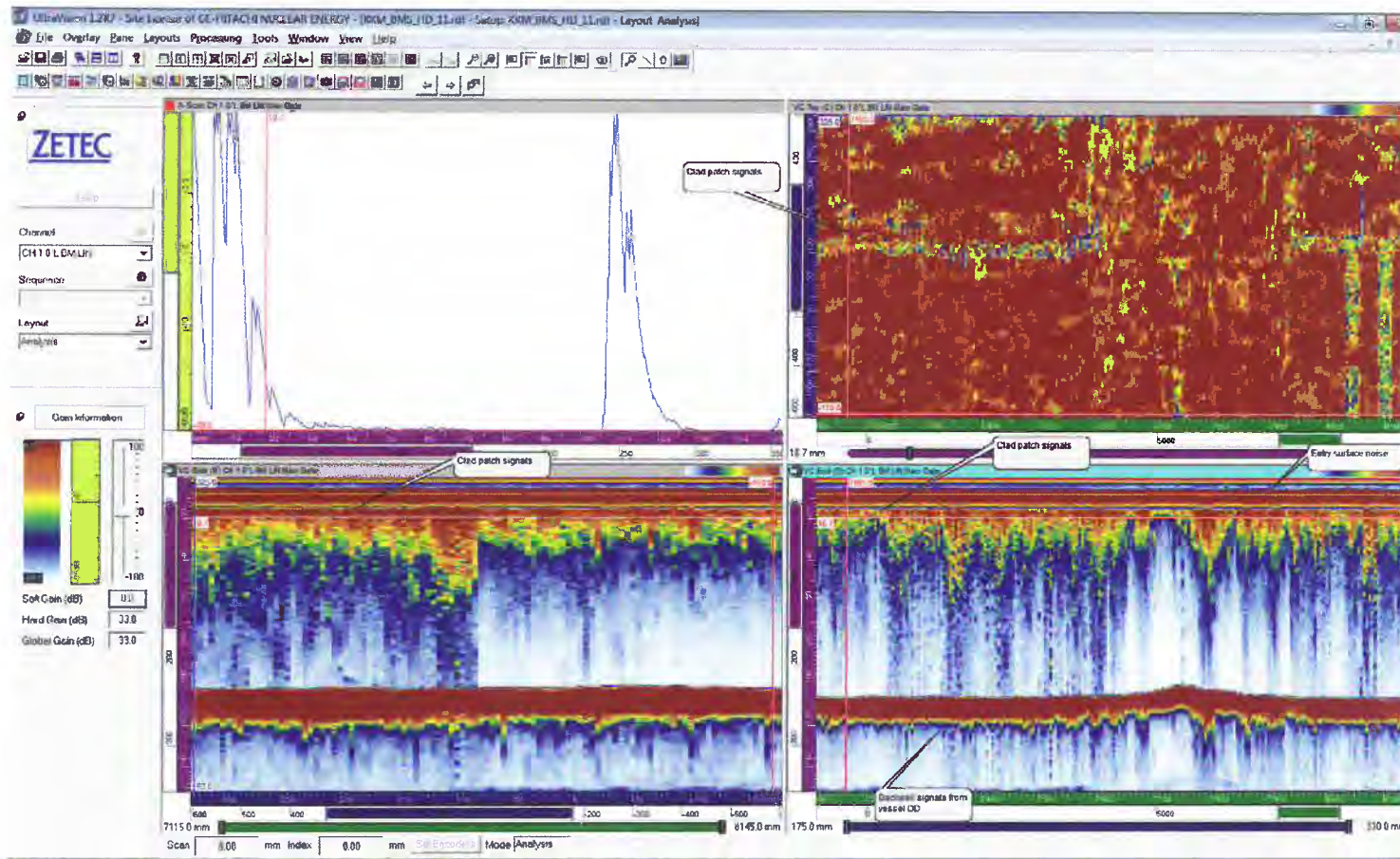




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 1 - 0° straight beam scan

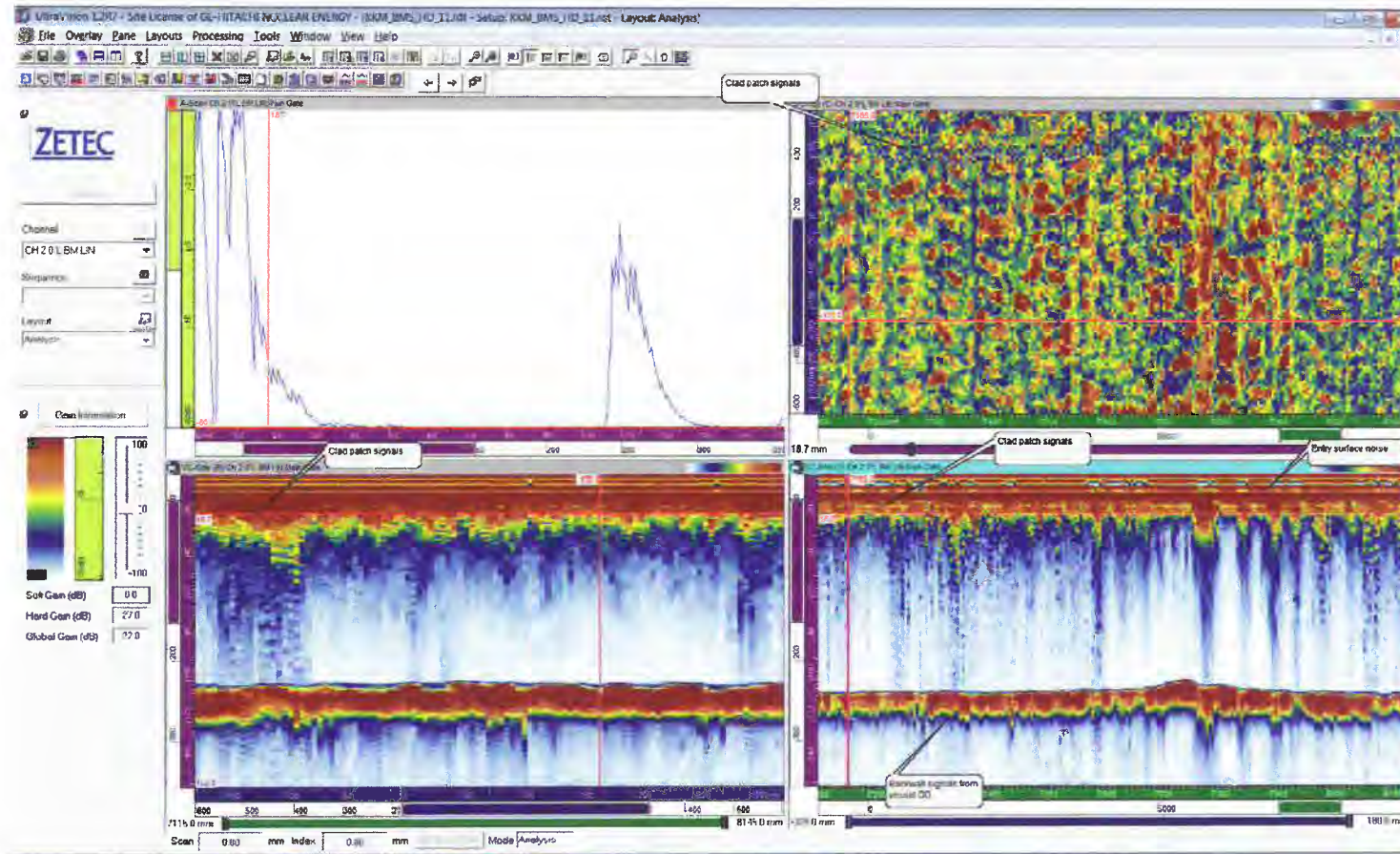




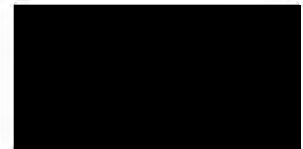
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 2 - 0° straight beam scan

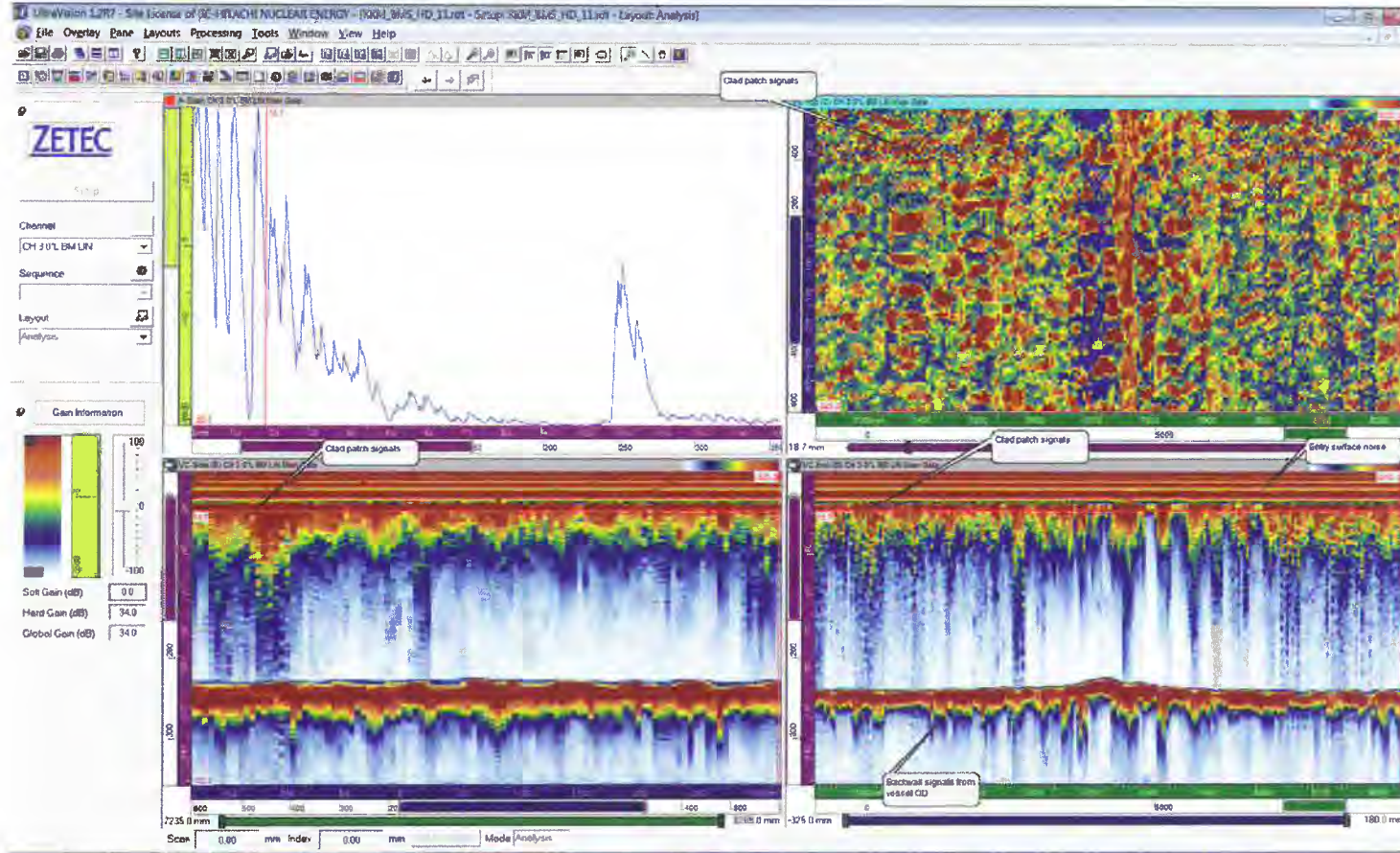




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 3 - 0° straight beam scan



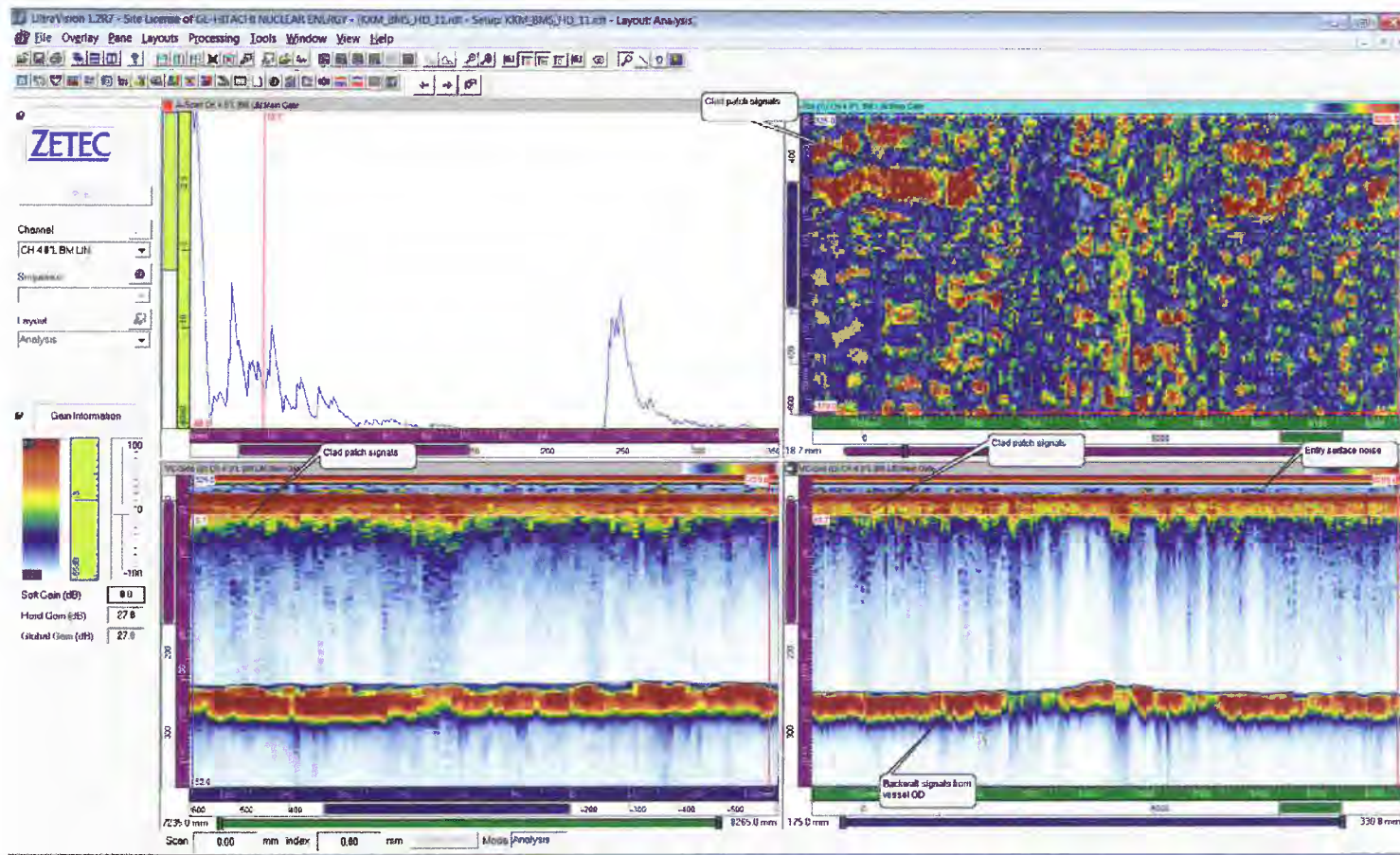




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 4 - 0° straight beam scan

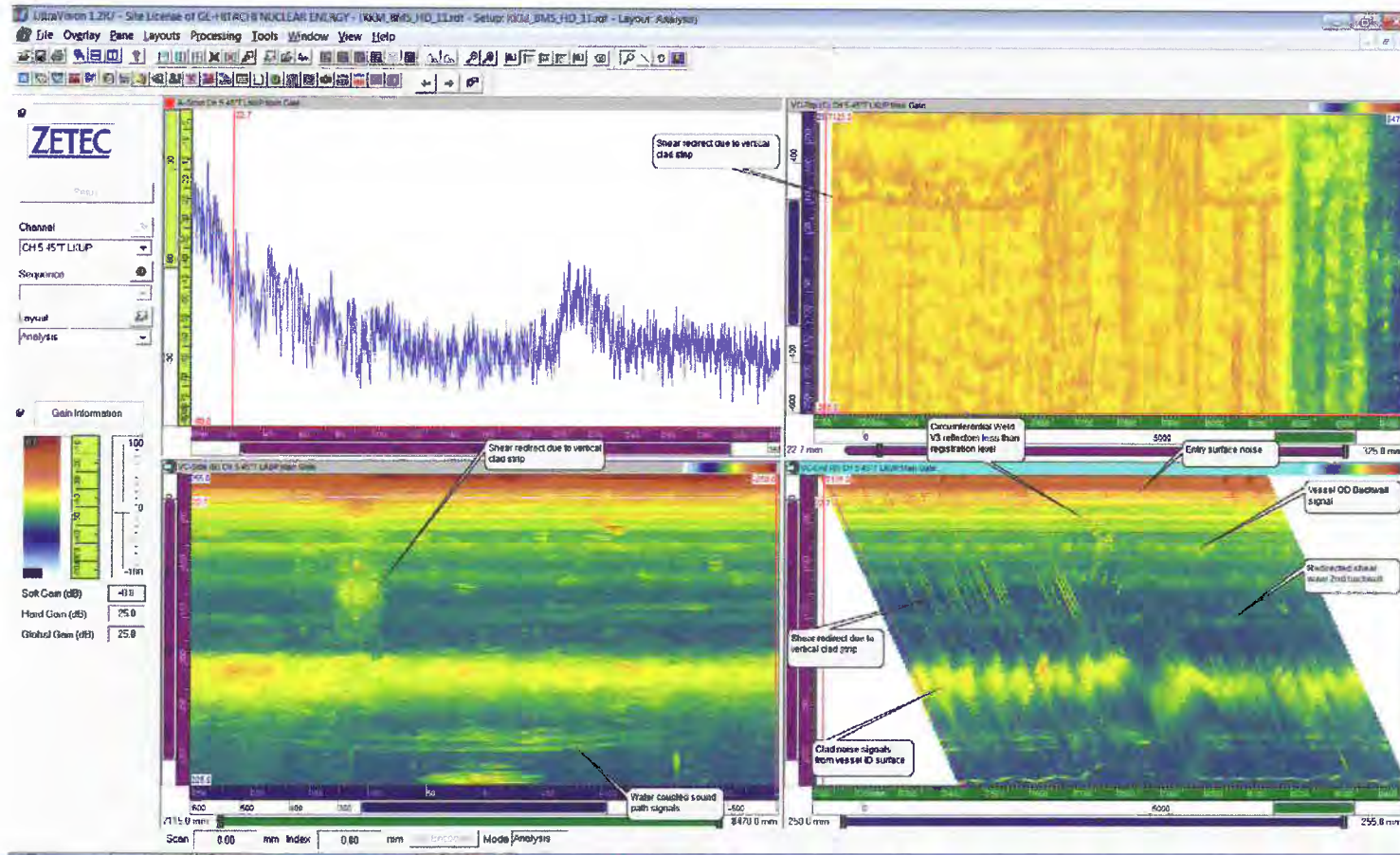




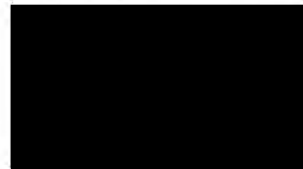
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 5 - 45° angle beam scan search unit looking up

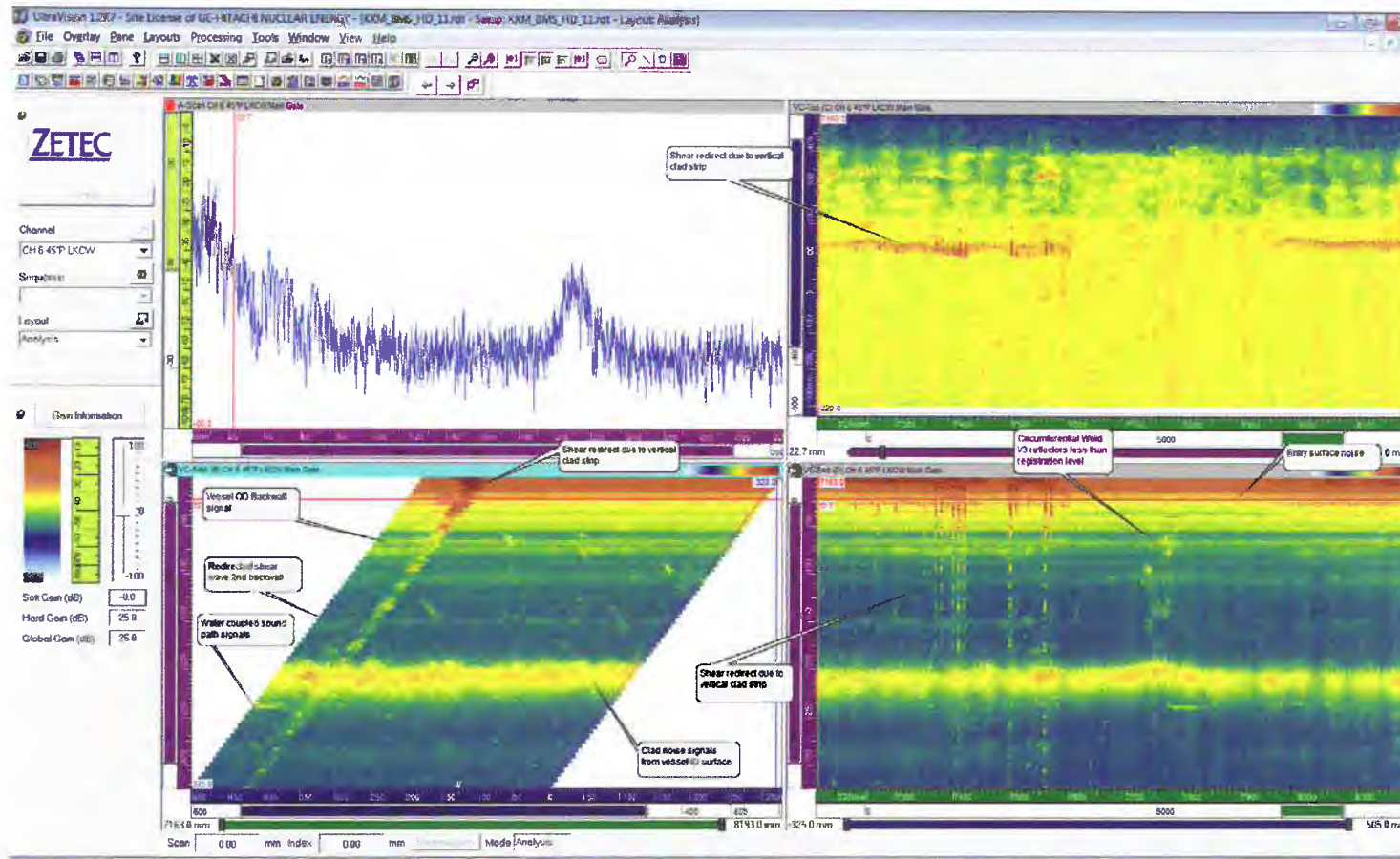




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 6 - 45° angle beam scan search unit looking clockwise

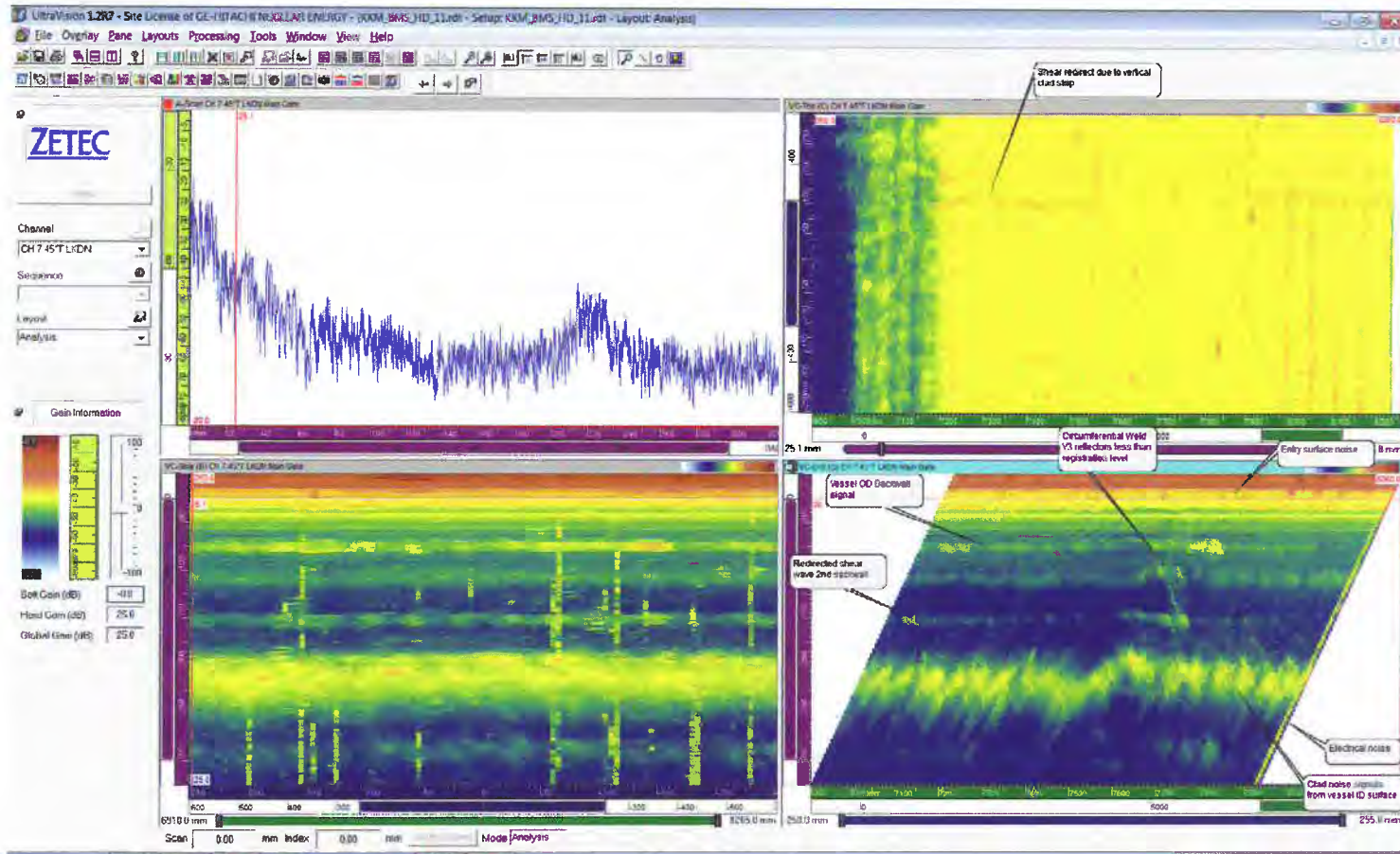




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 7 - 45° angle beam scan search unit looking down

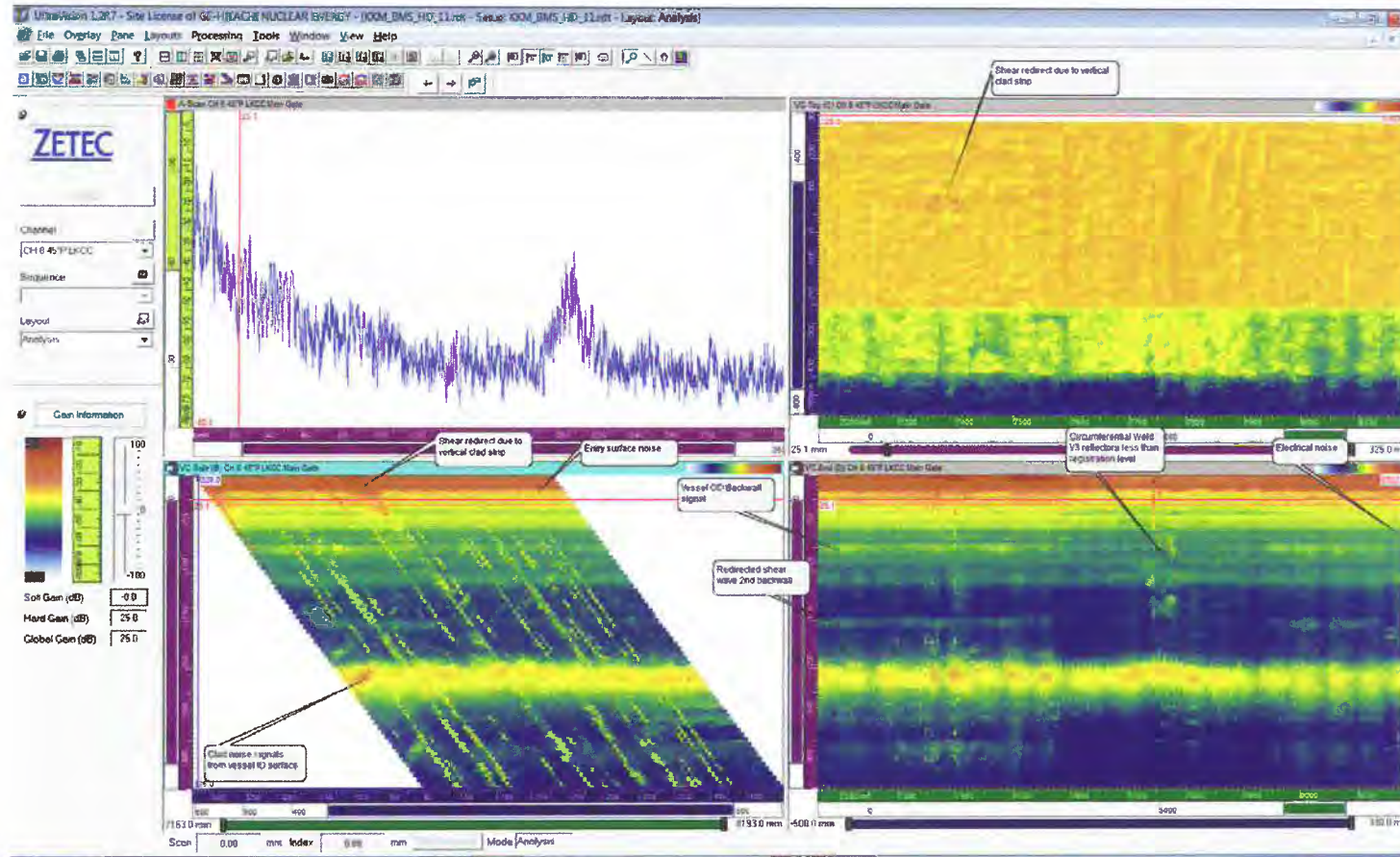




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_11



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

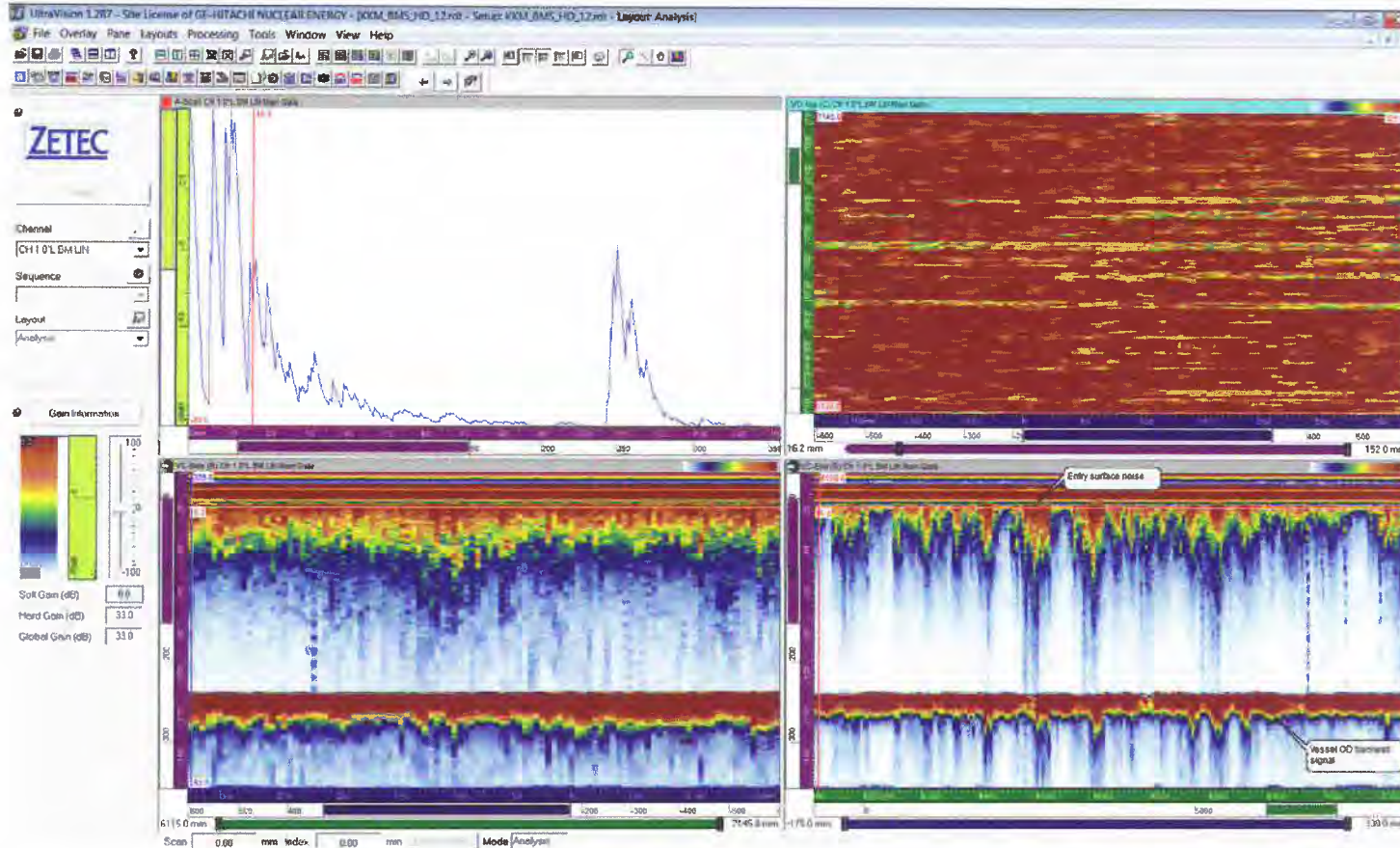




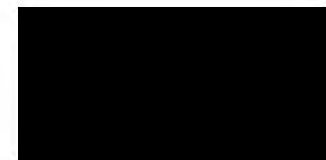
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 1 - 0° straight beam scan

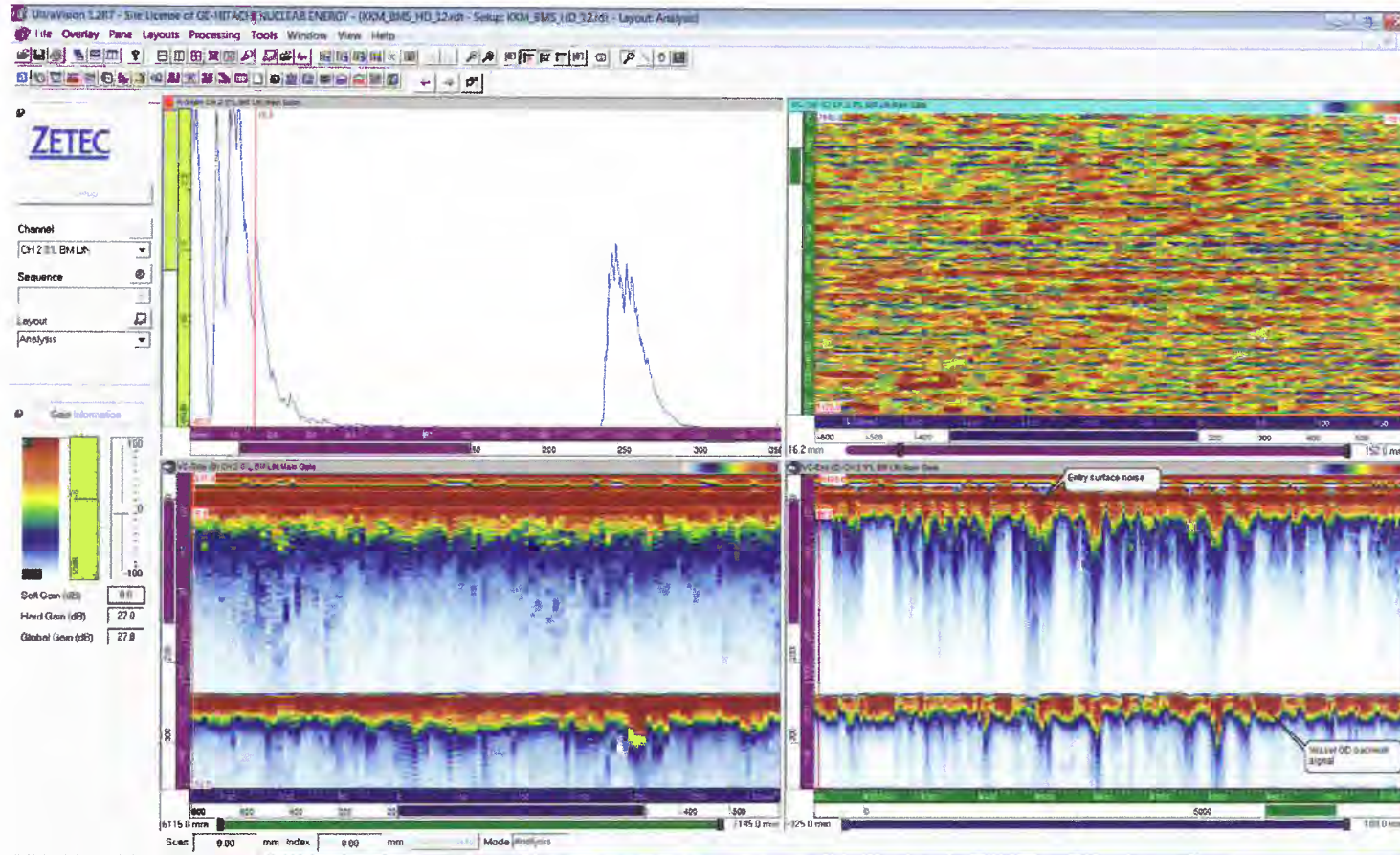




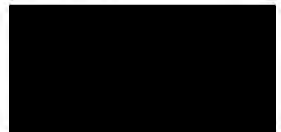
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 2 - 0° straight beam scan

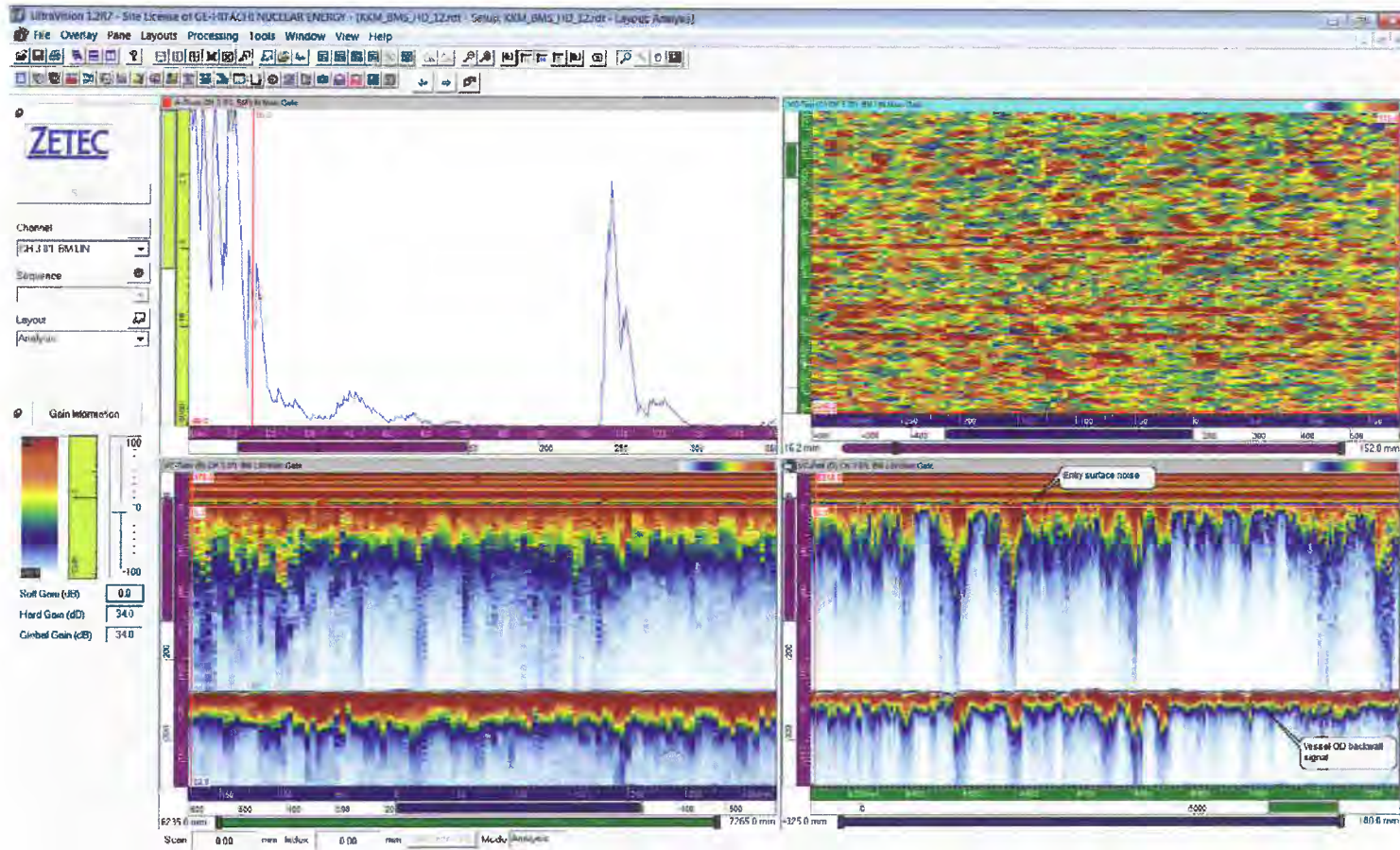




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 3 - 0° straight beam scan



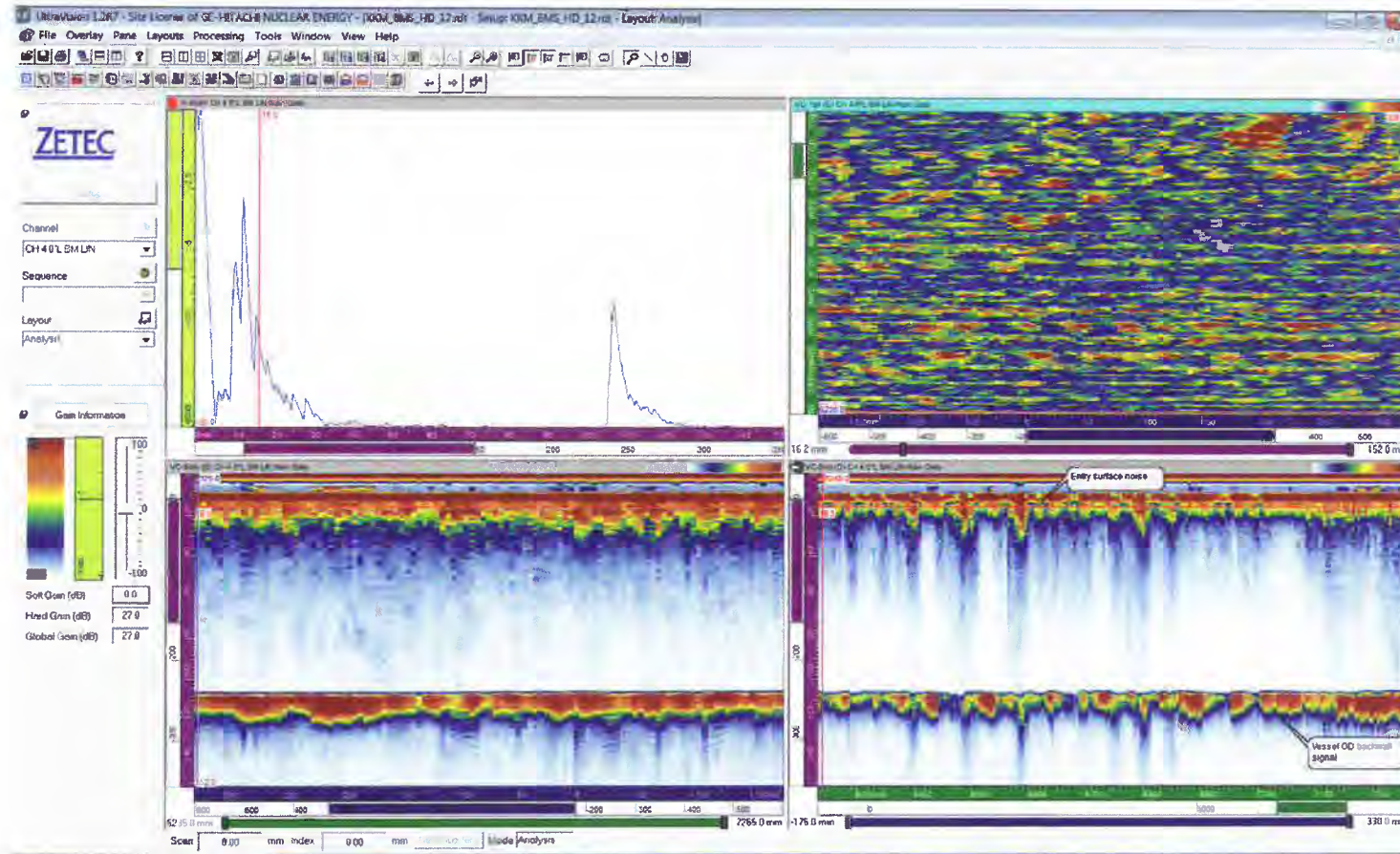




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 4 - 0° straight beam scan

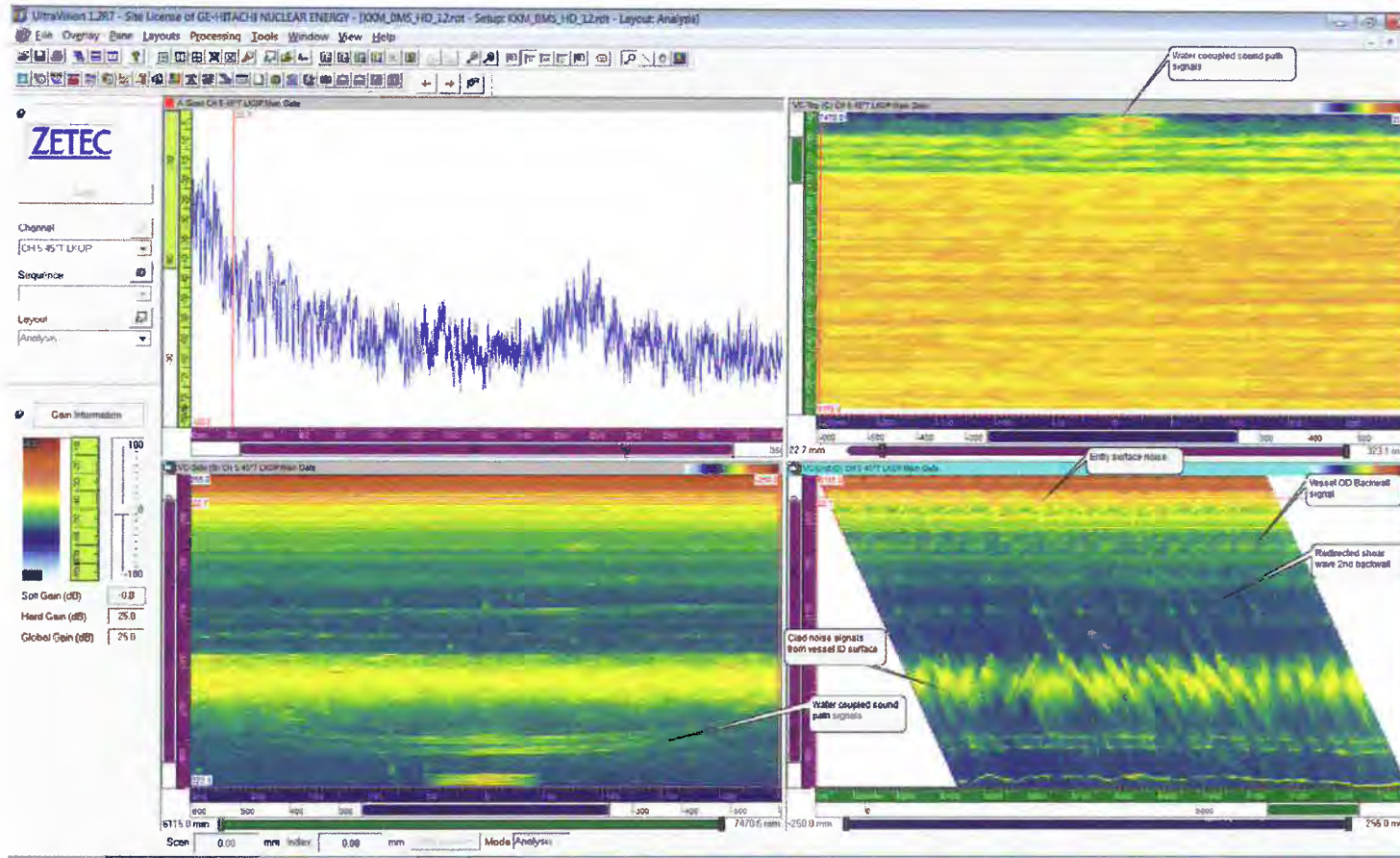




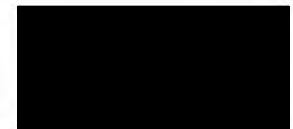
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 5 - 45° angle beam scan search unit looking up

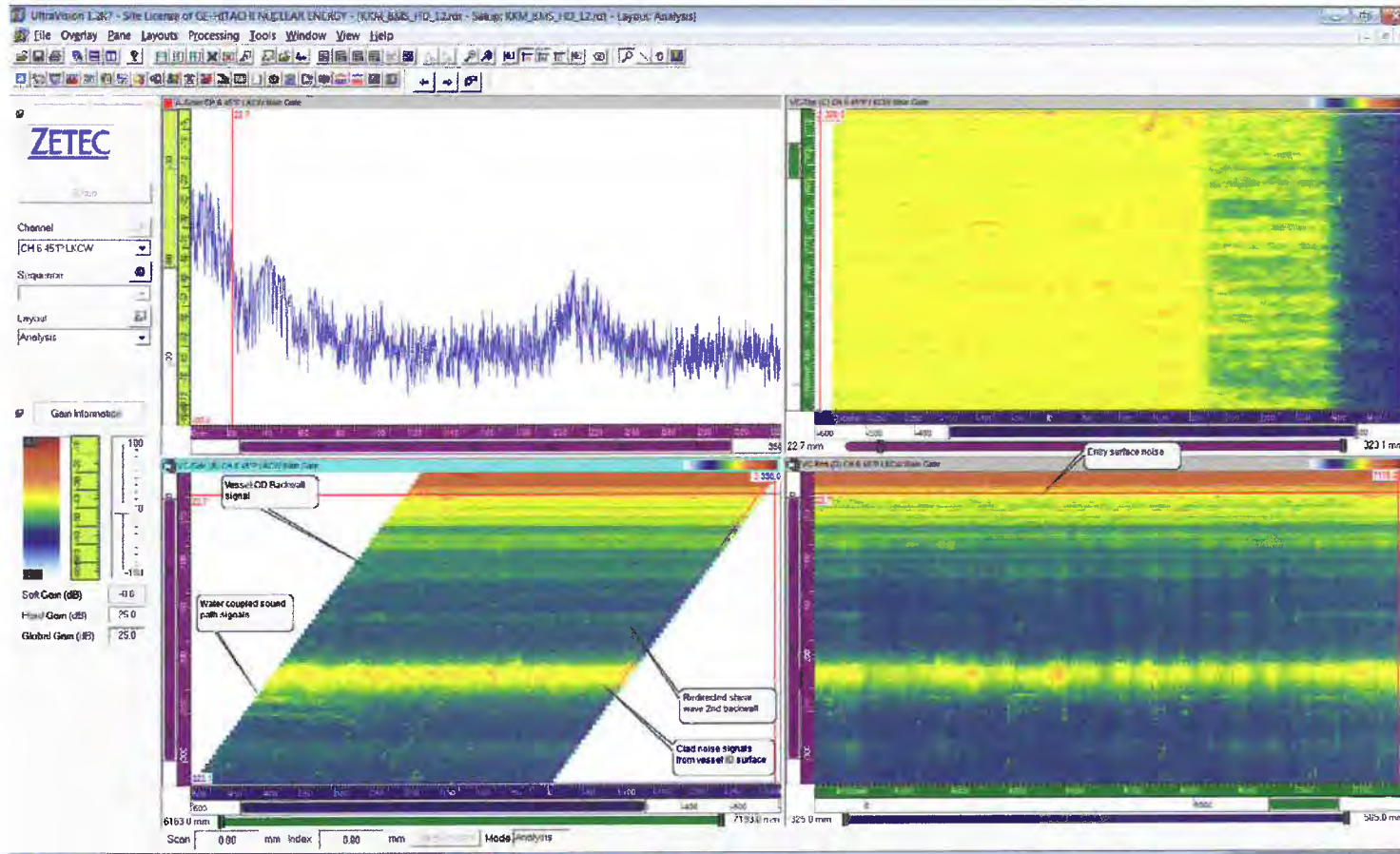




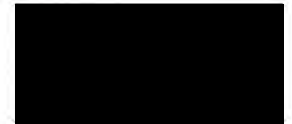
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 6 - 45° angle beam scan search unit looking clockwise

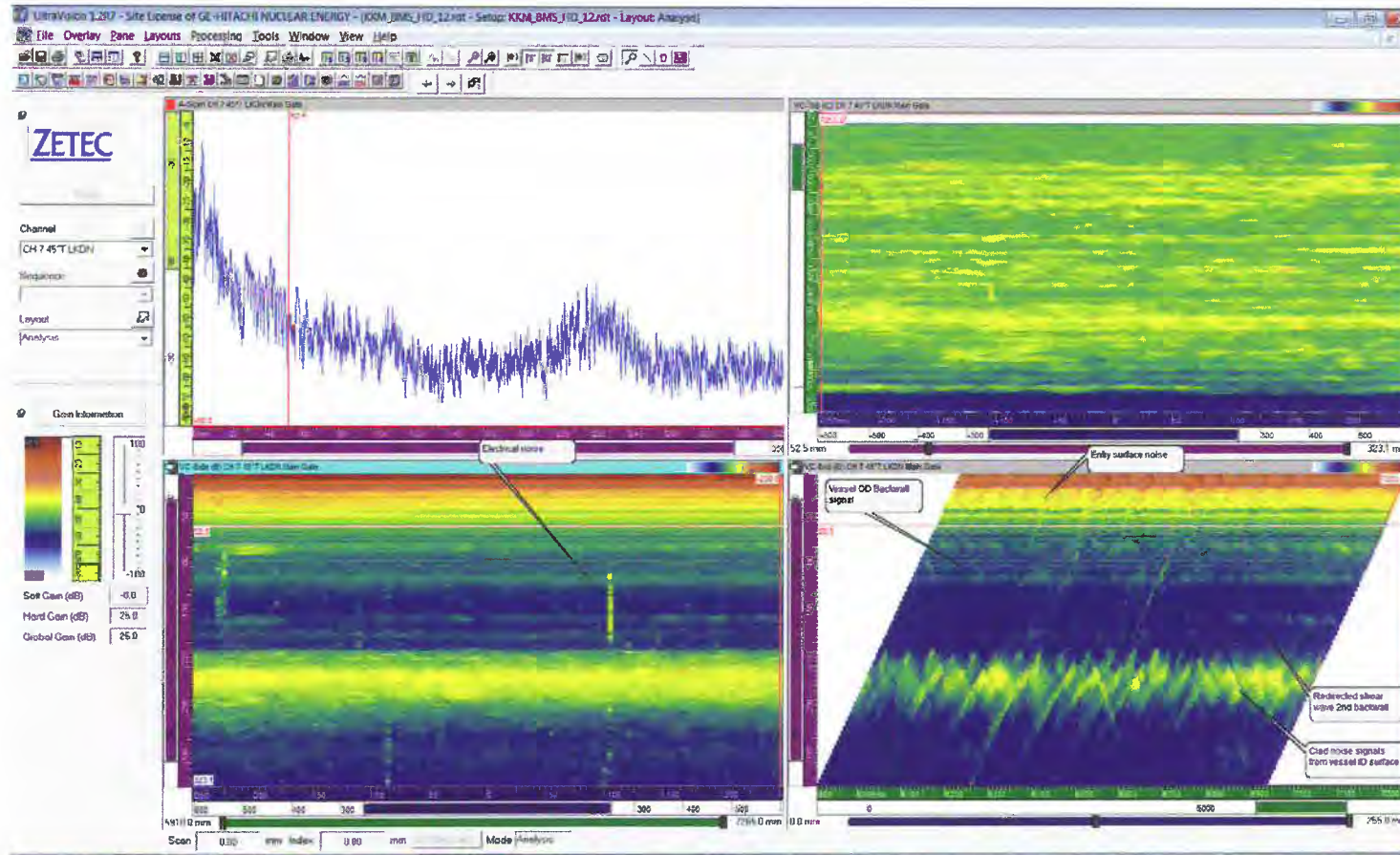




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 7 - 45° angle beam scan search unit looking down

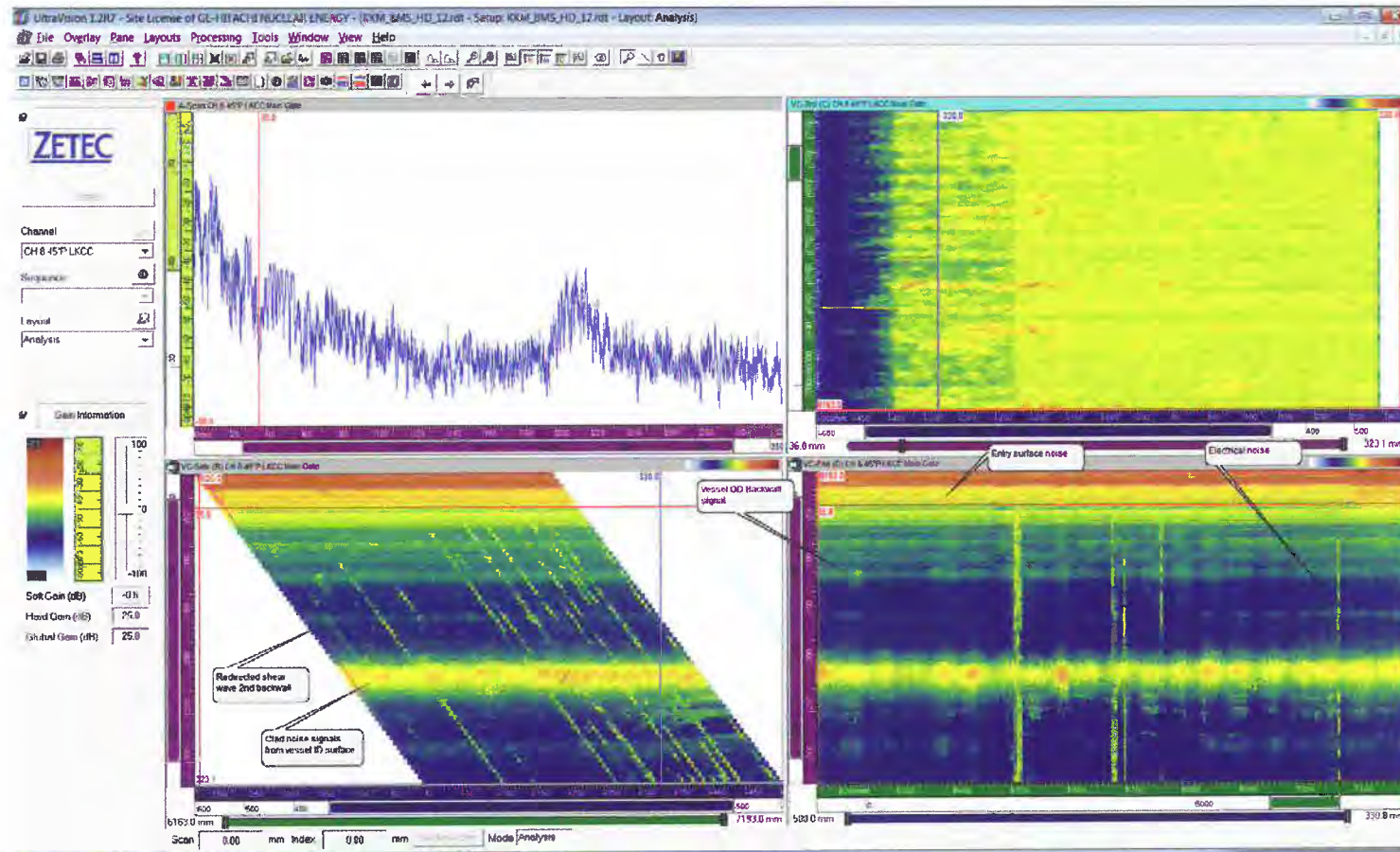




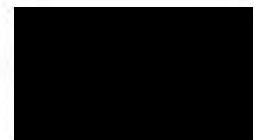
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_12



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

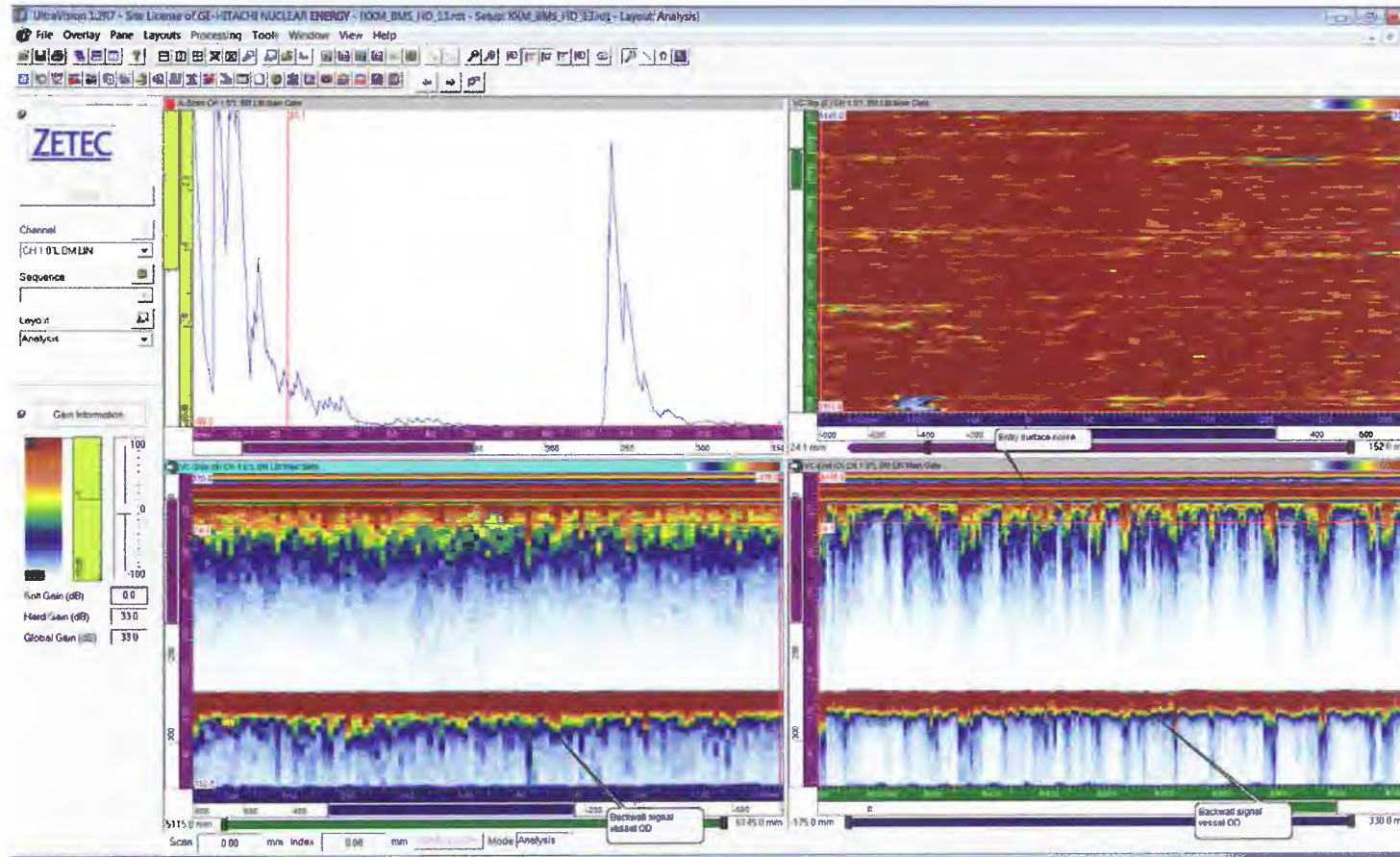




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 1 - 0° straight beam scan

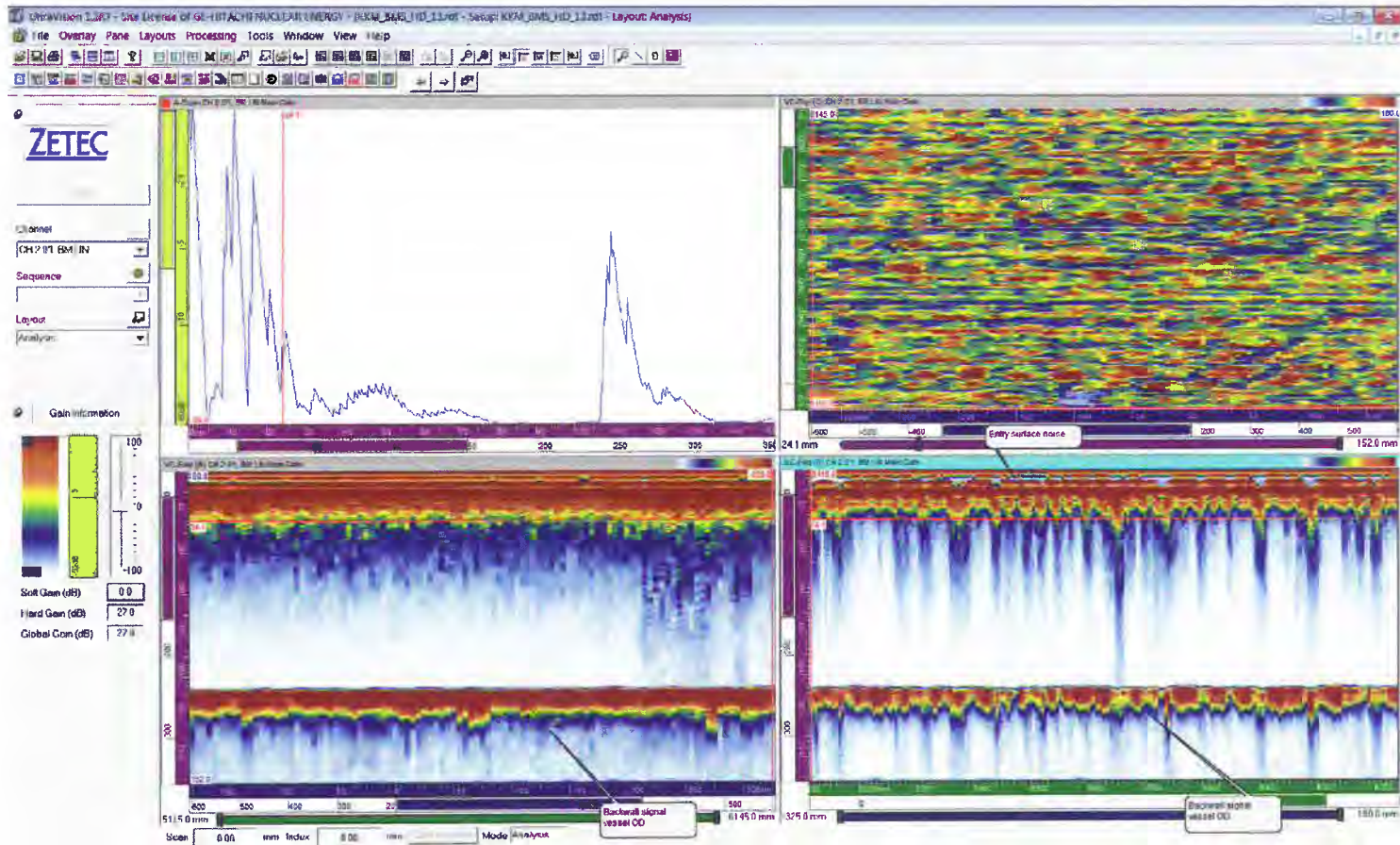




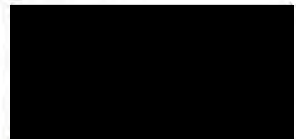
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 2 - 0° straight beam scan

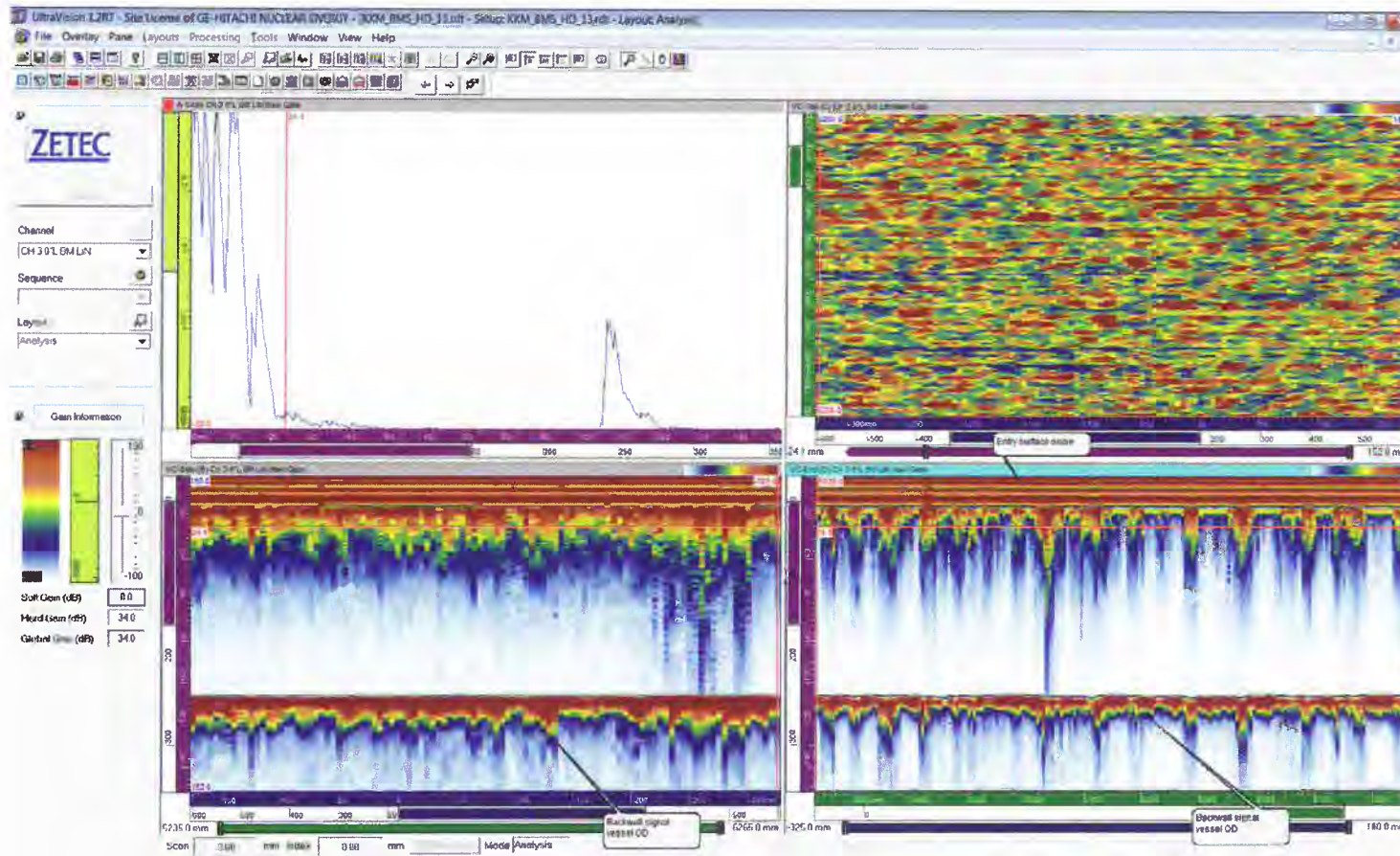




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 3 - 0° straight beam scan



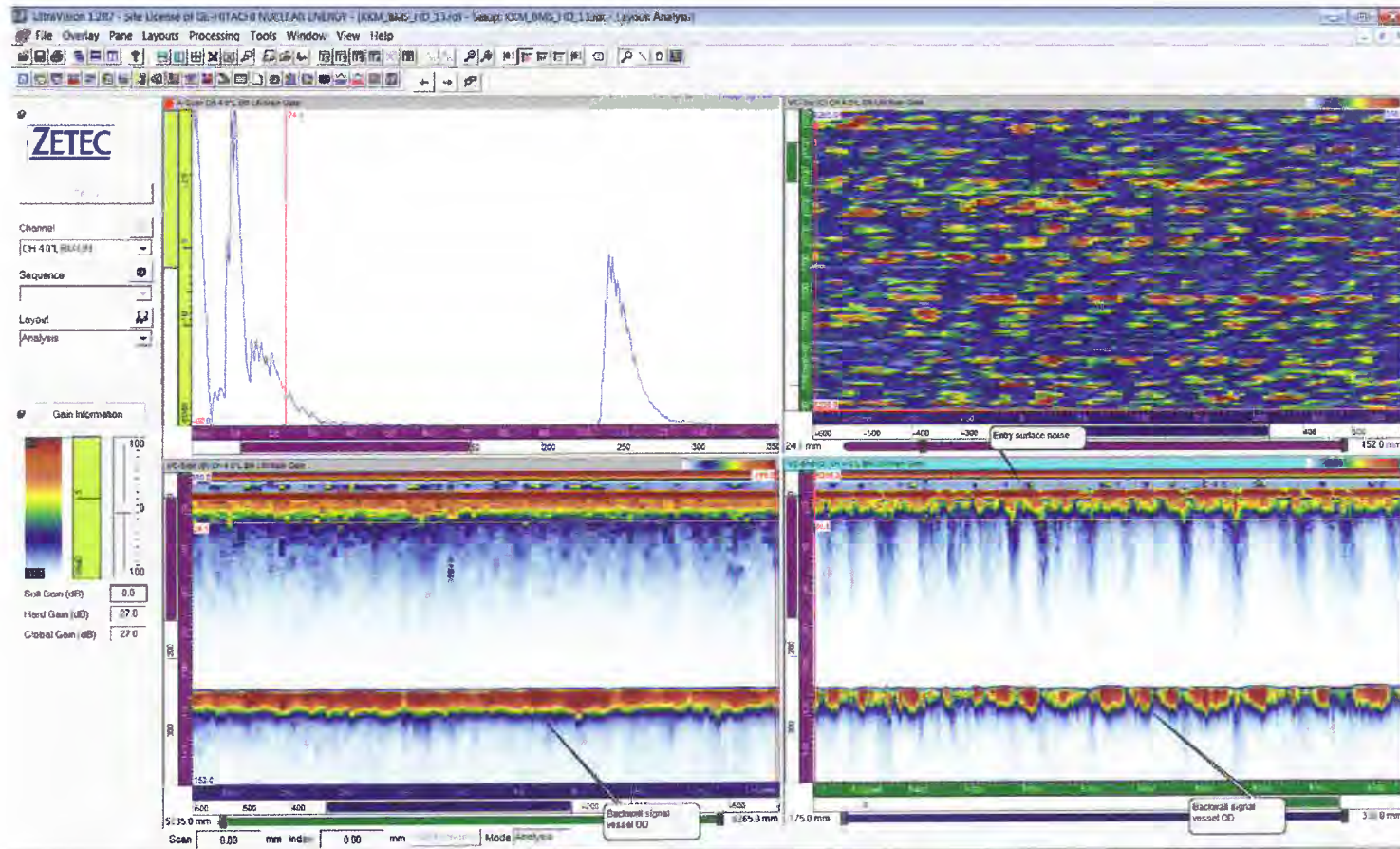




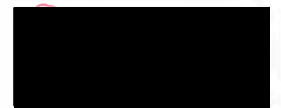
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 4 - 0° straight beam scan

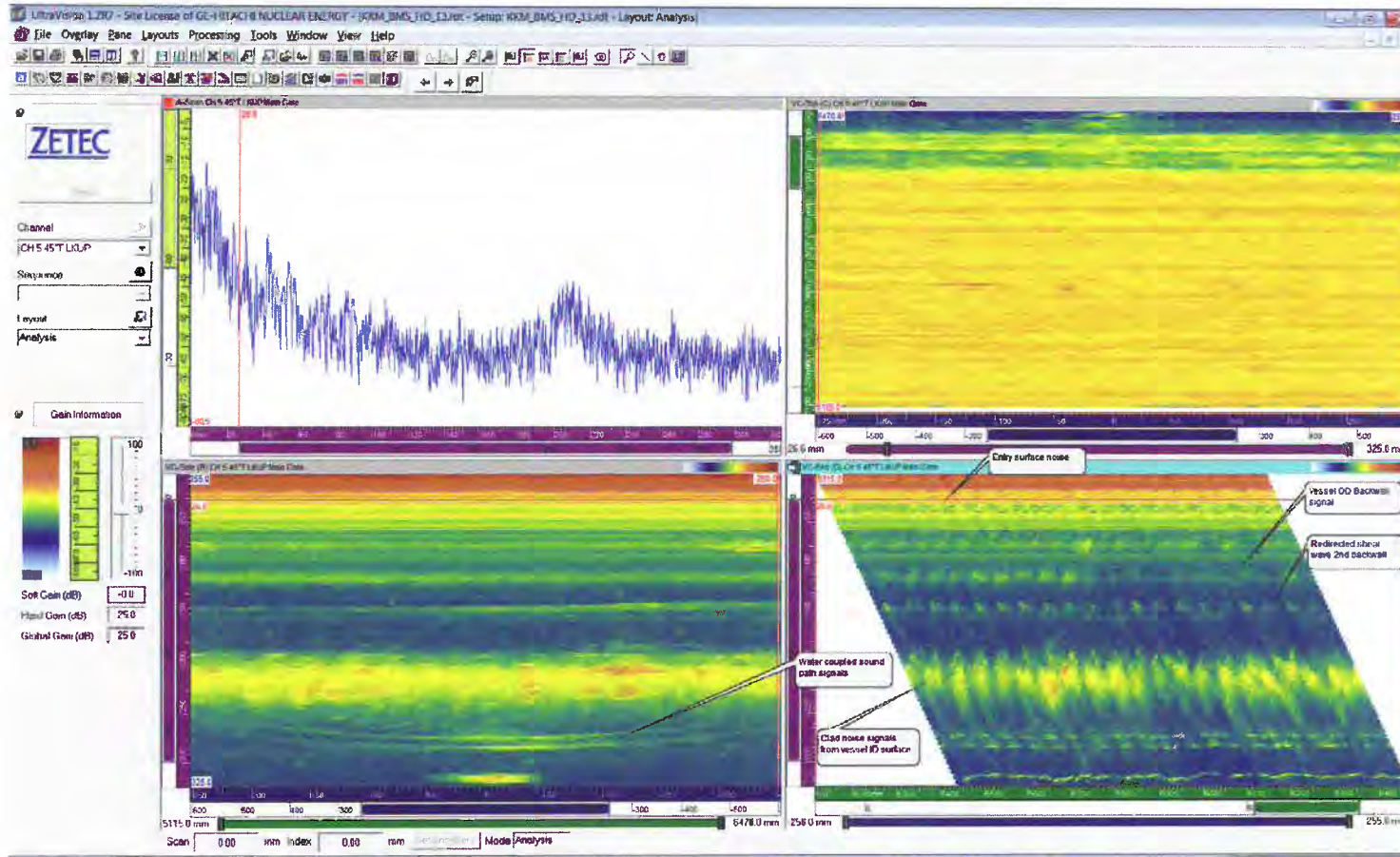




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 5 - 45° angle beam scan search unit looking up

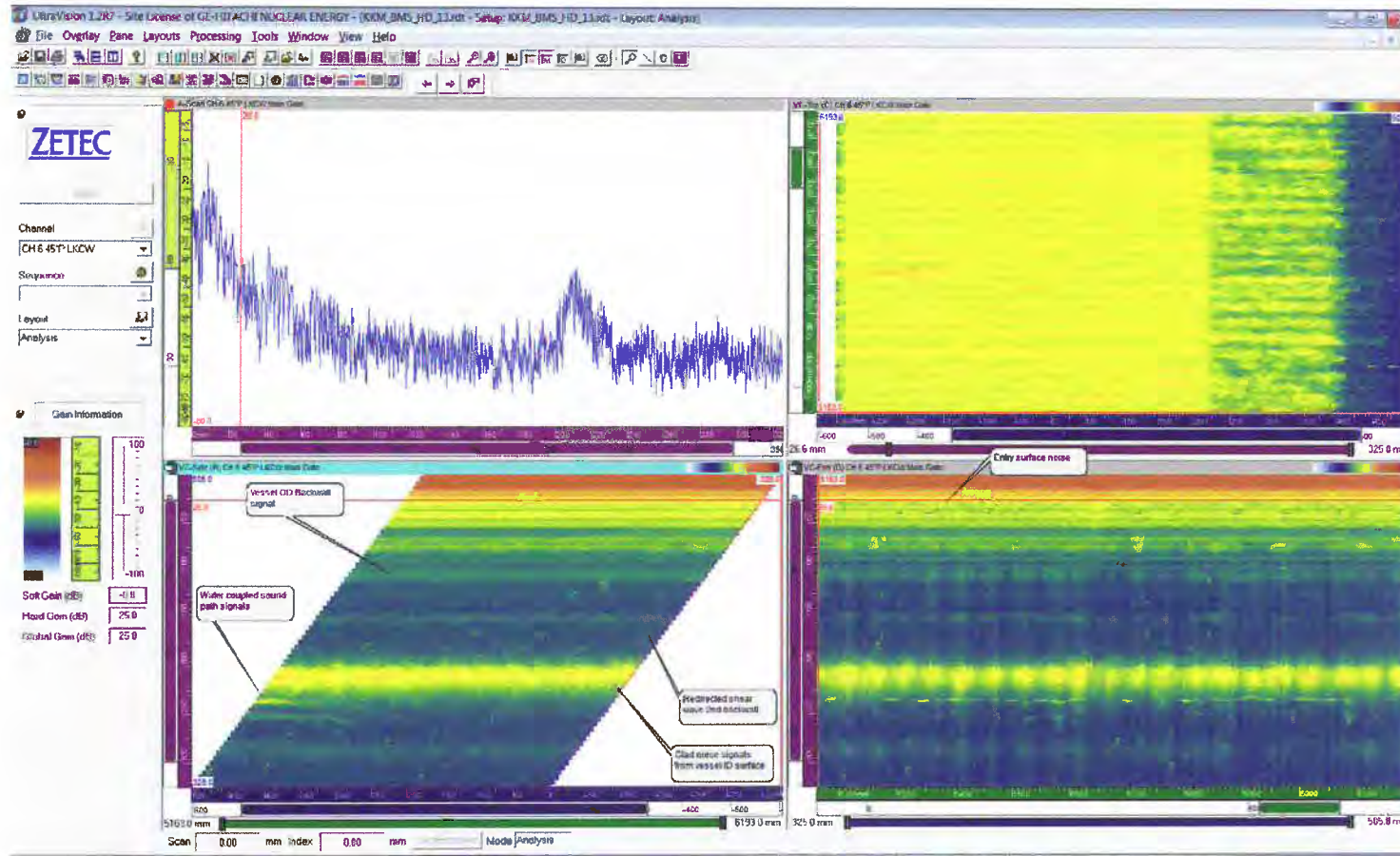




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 6 - 45° angle beam scan search unit looking clockwise

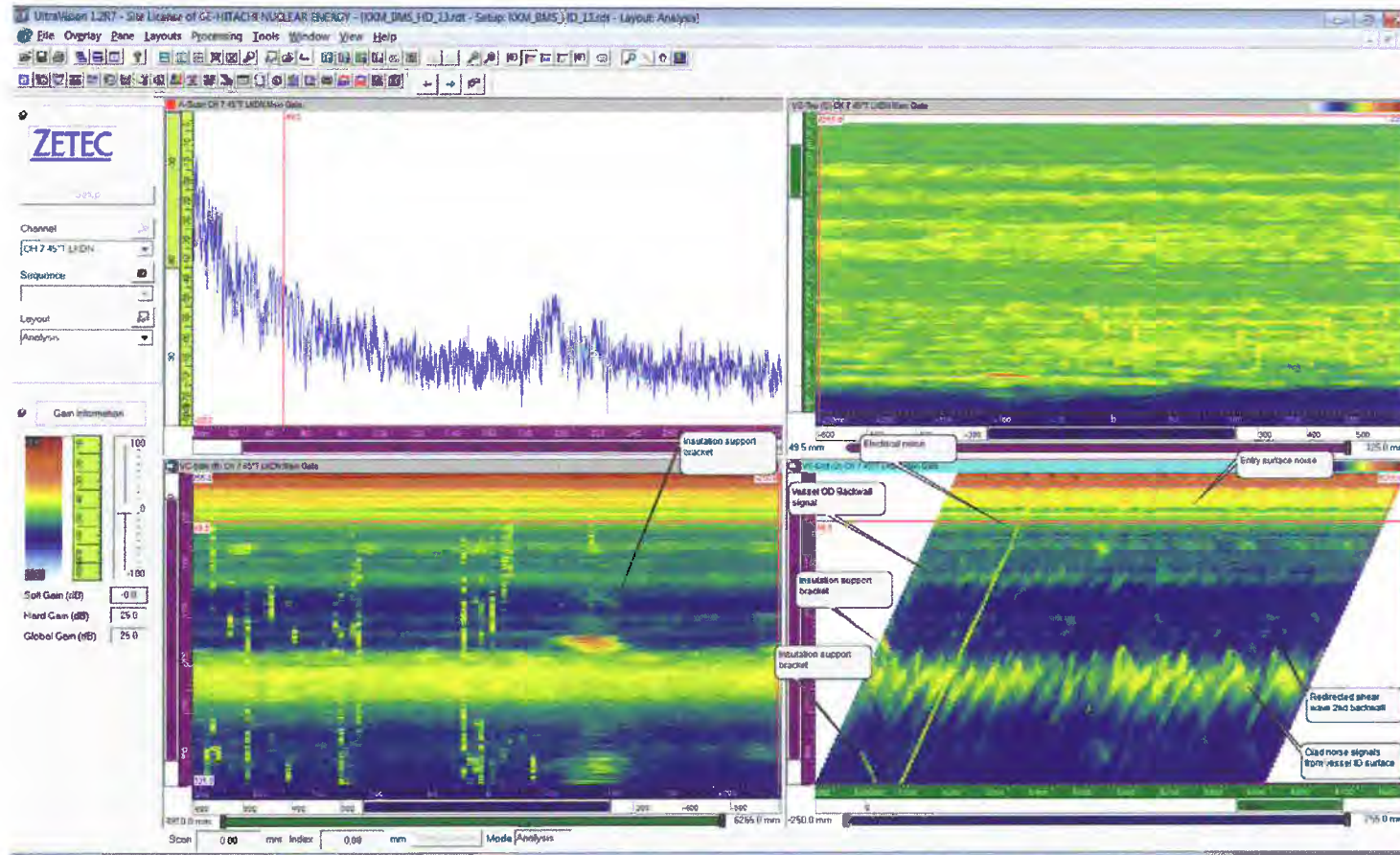




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 7 - 45° angle beam scan search unit looking down

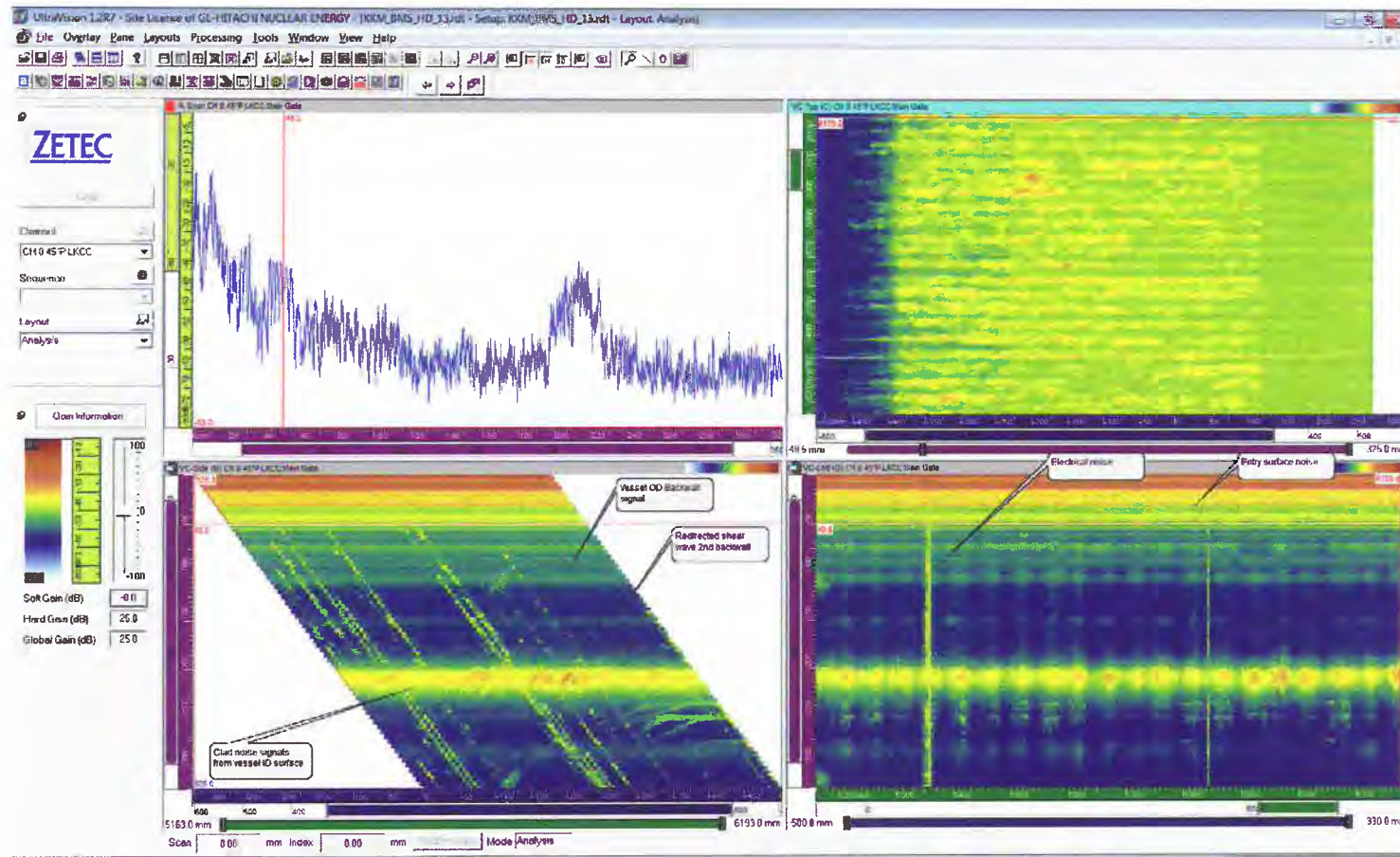




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_13



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

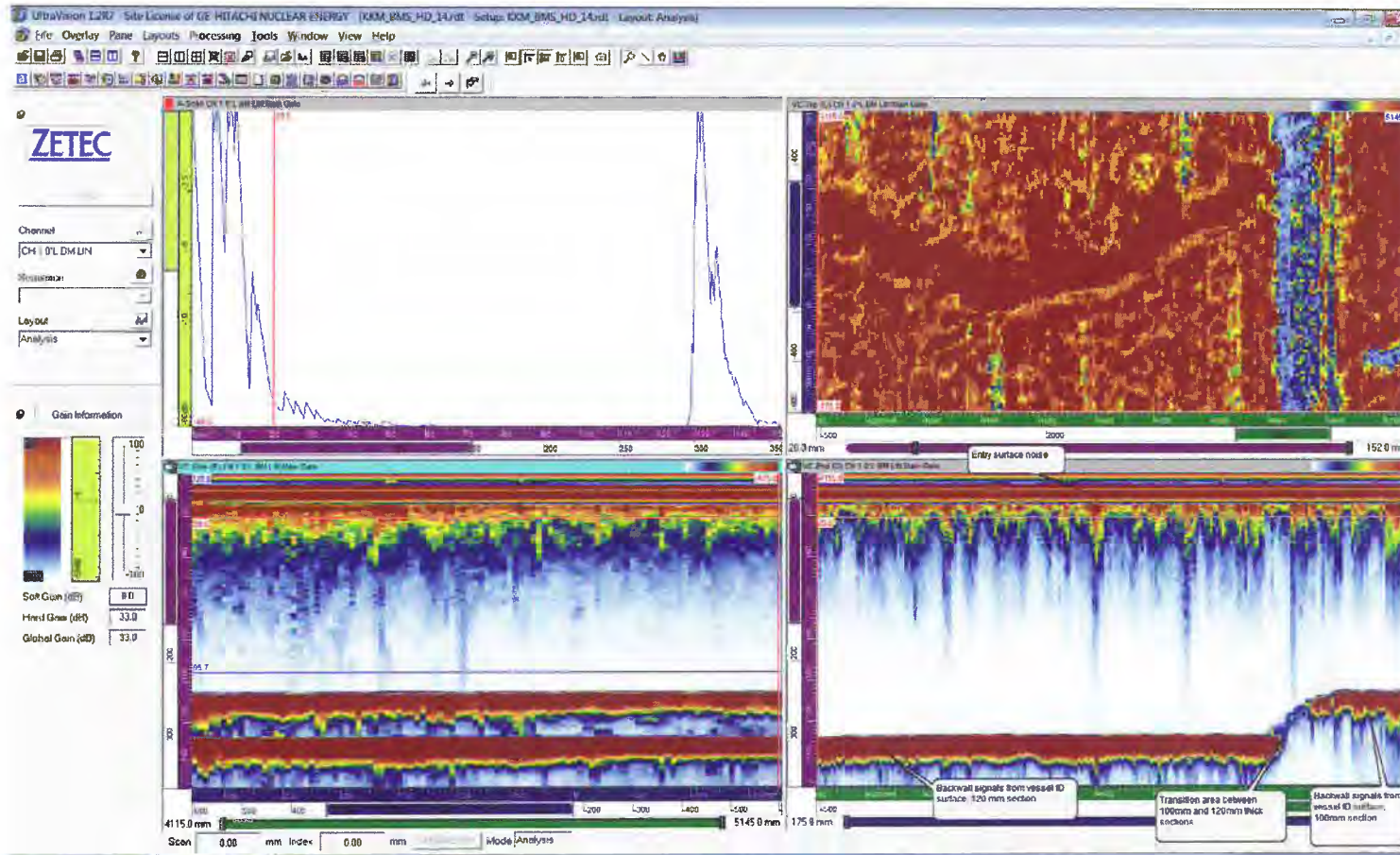




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 1 - 0° straight beam scan

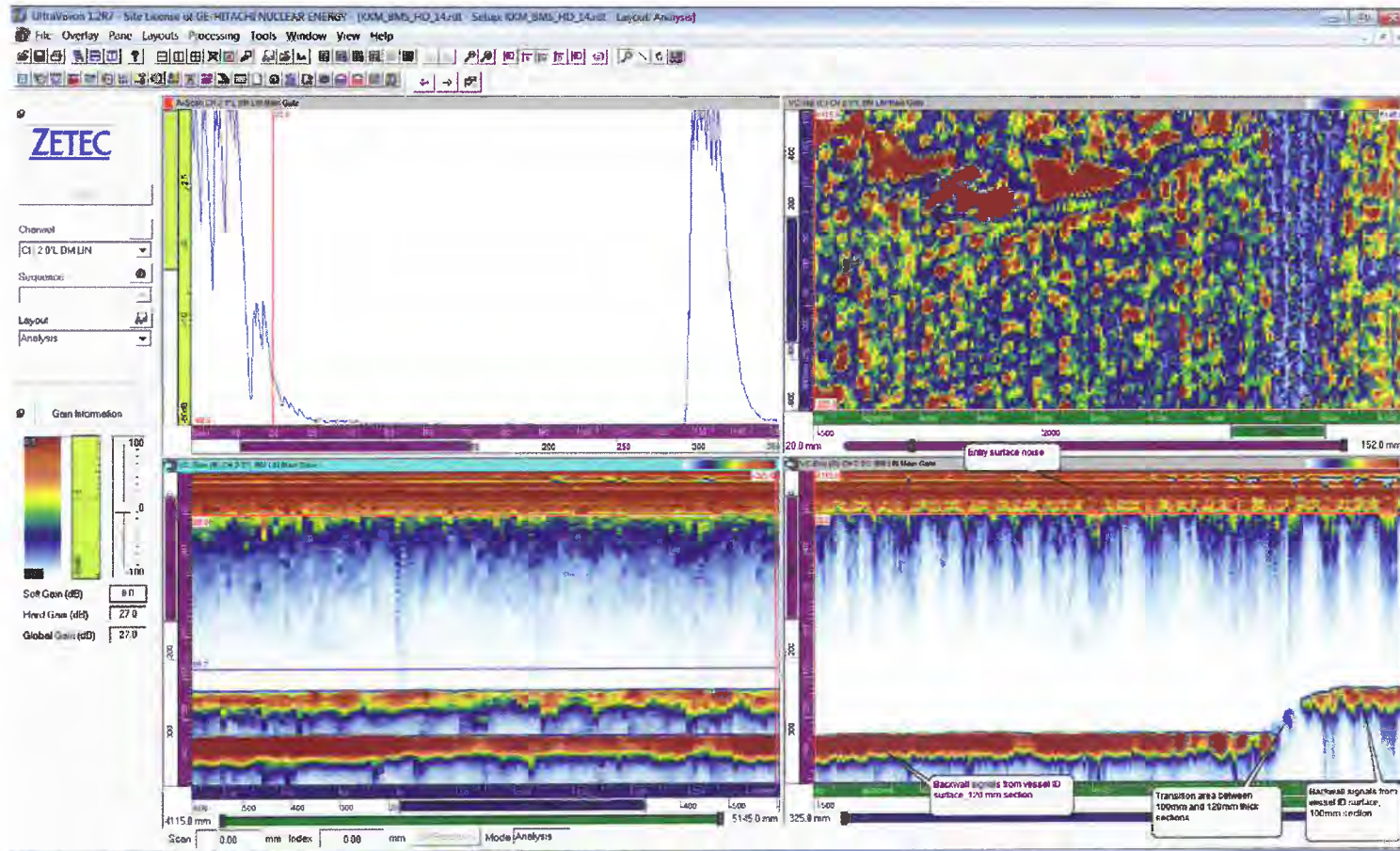




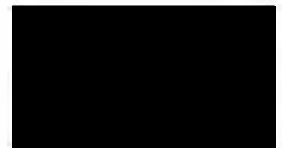
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 2 - 0° straight beam scan

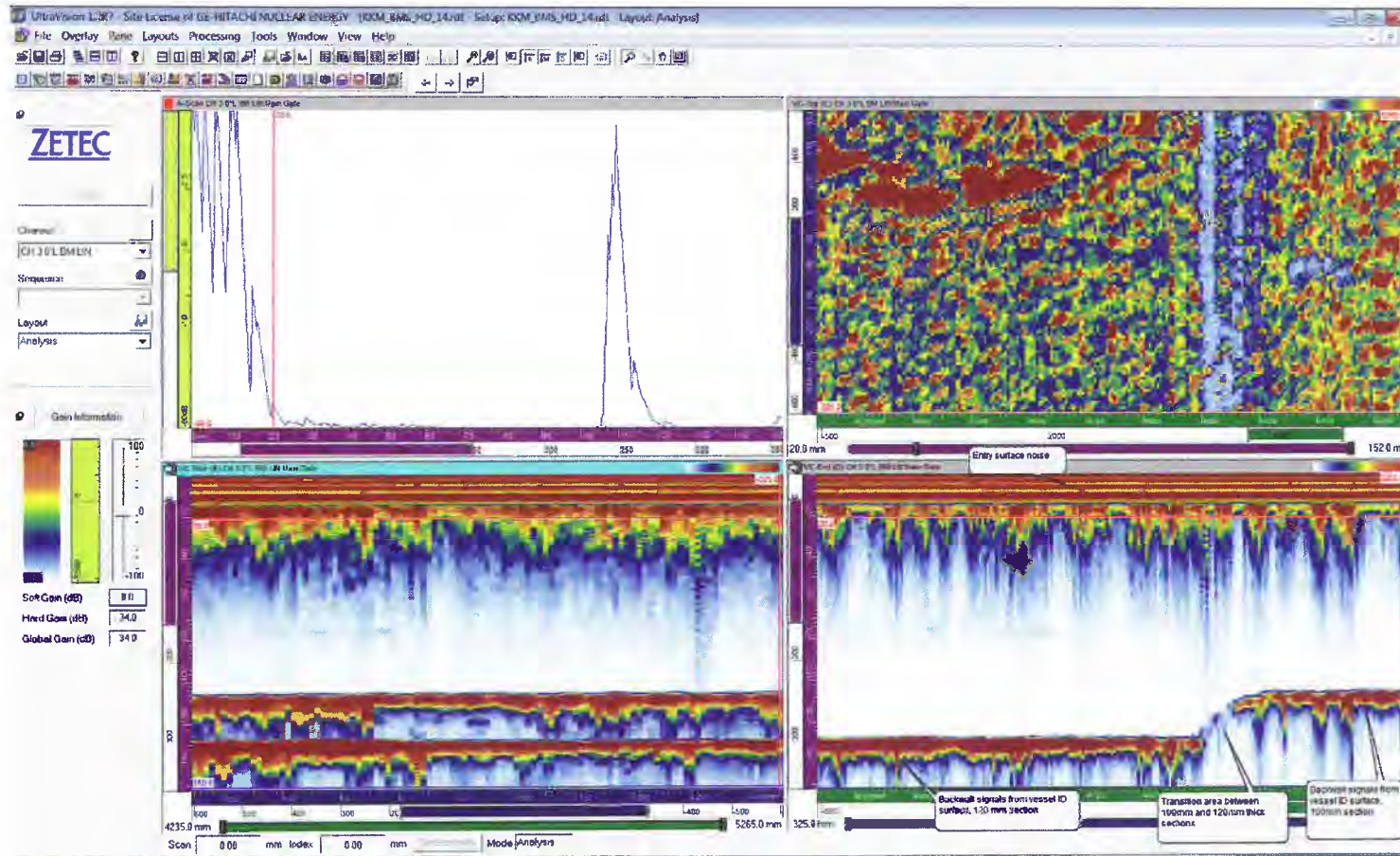




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 3 - 0° straight beam scan







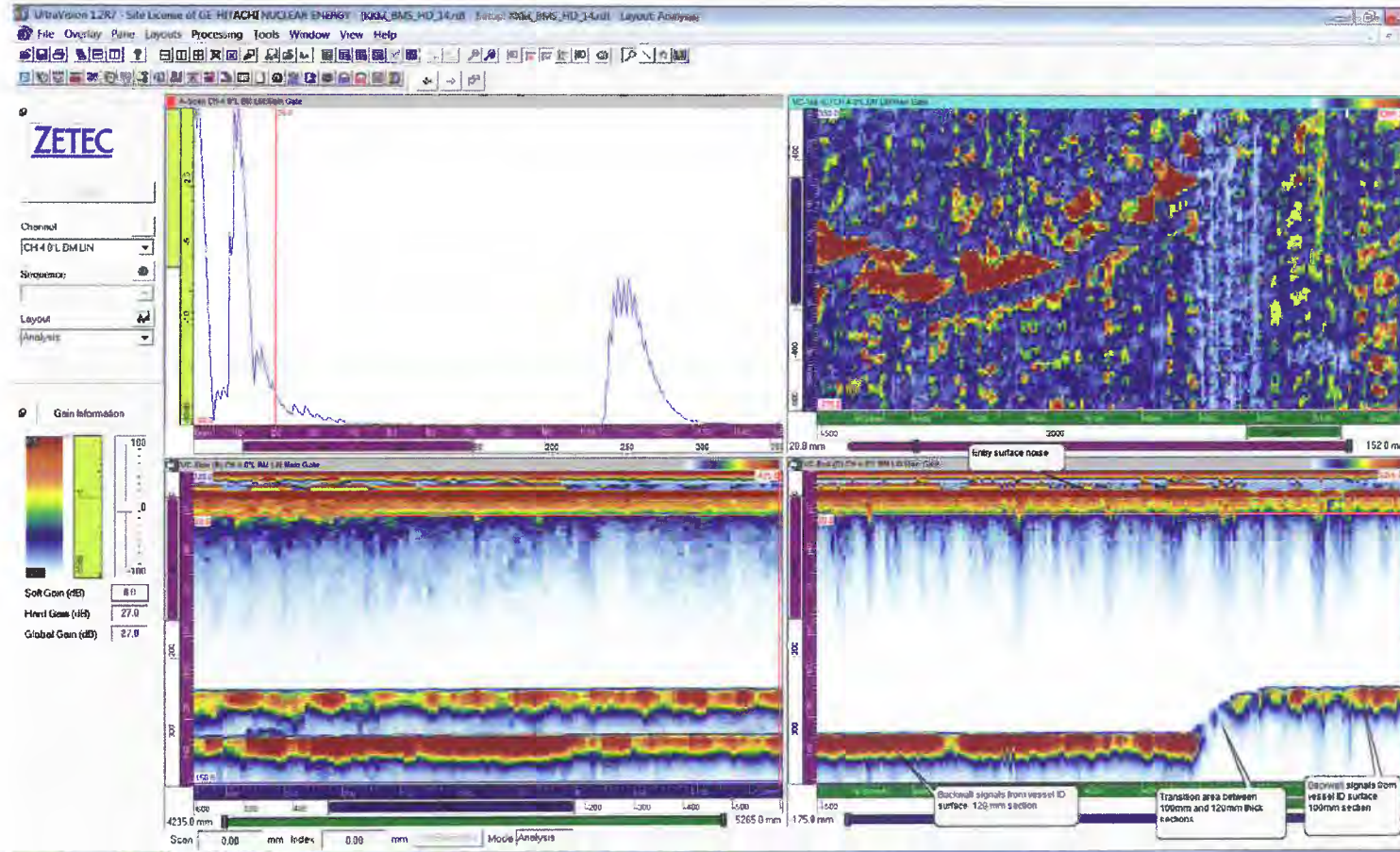
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14

KKM Base Material Survey Results

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Channel 4 - 0° straight beam scan

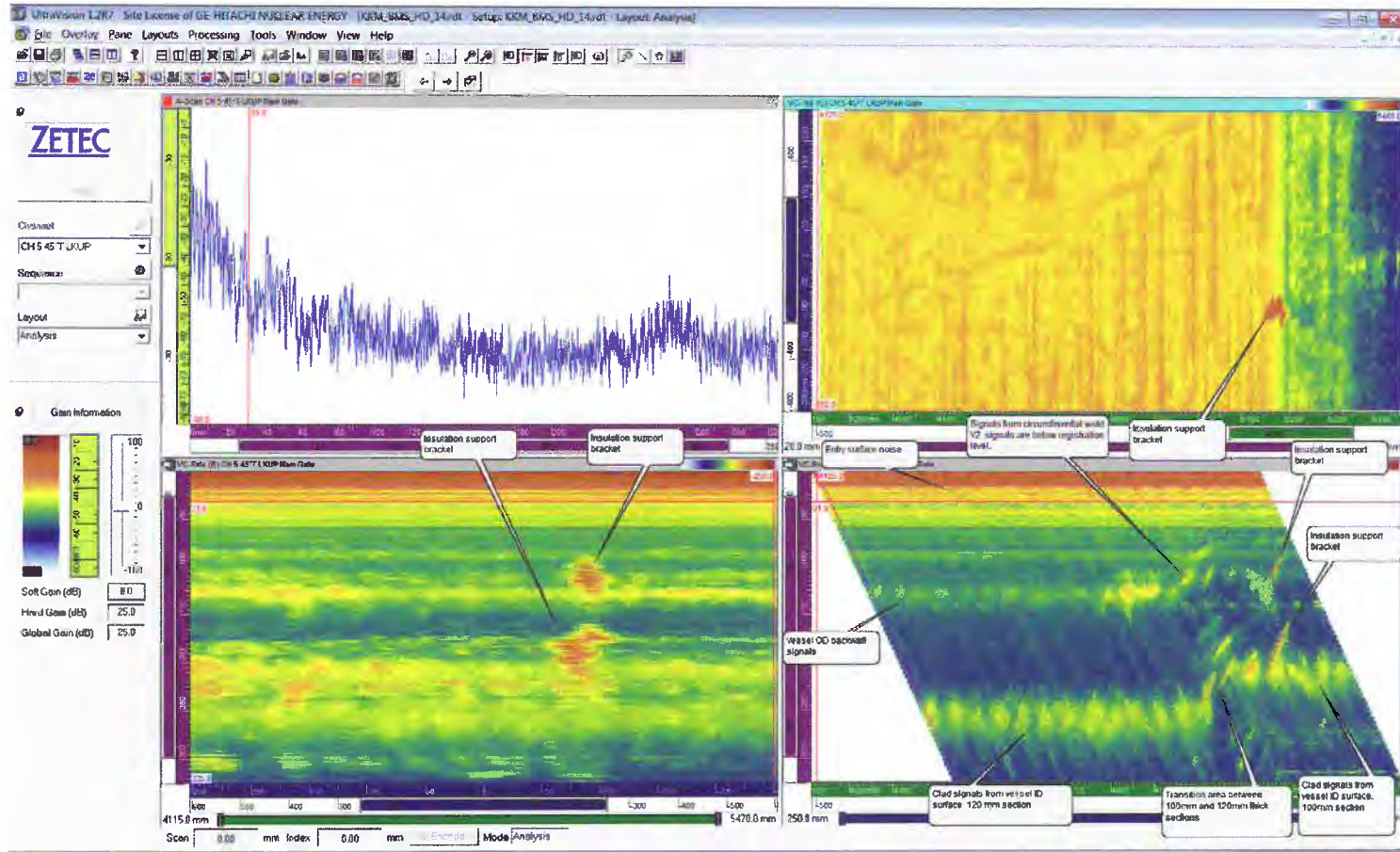




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 5 - 45° angle beam scan search unit looking up

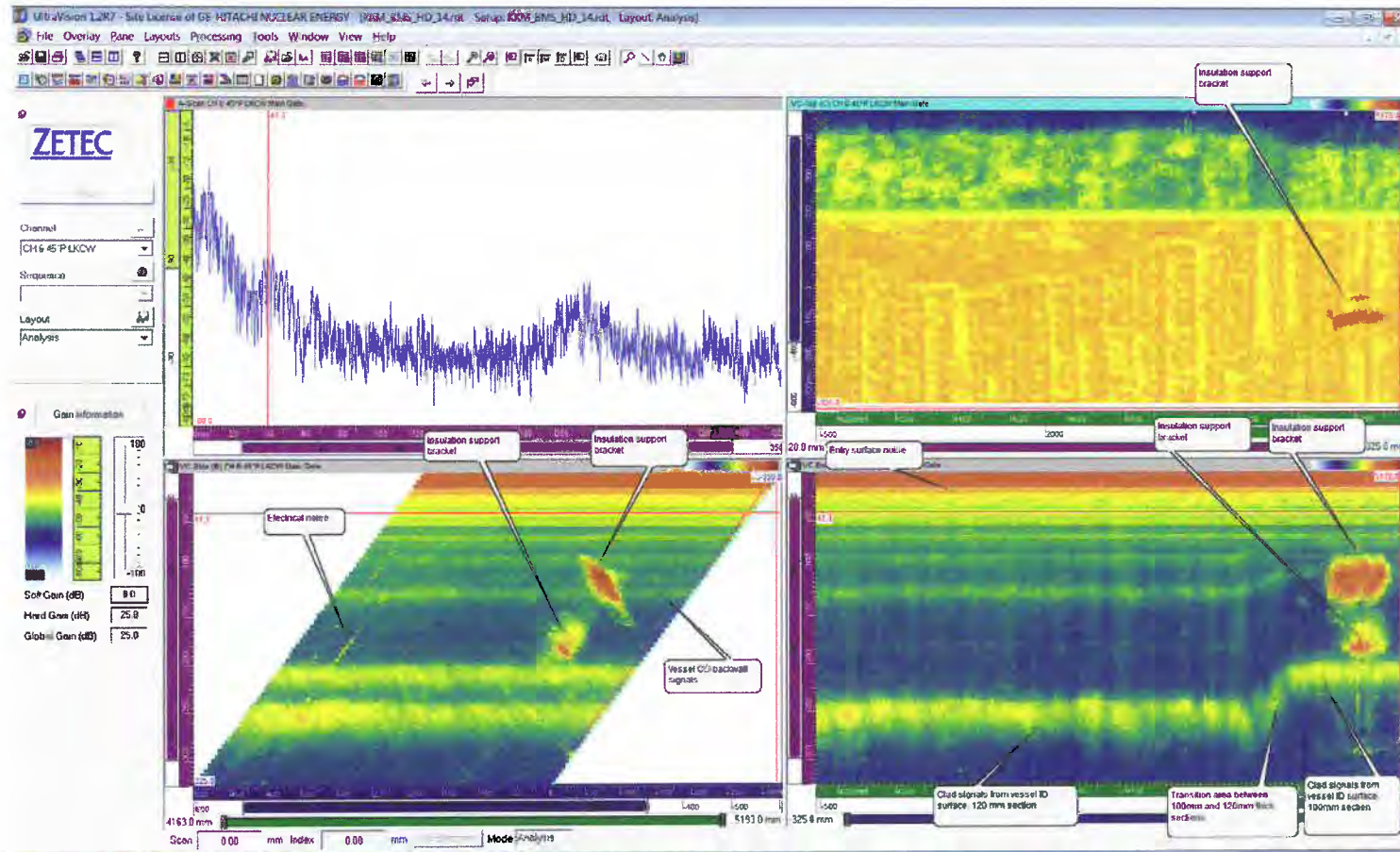




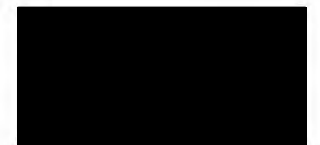
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 6 - 45° angle beam scan search unit looking clockwise

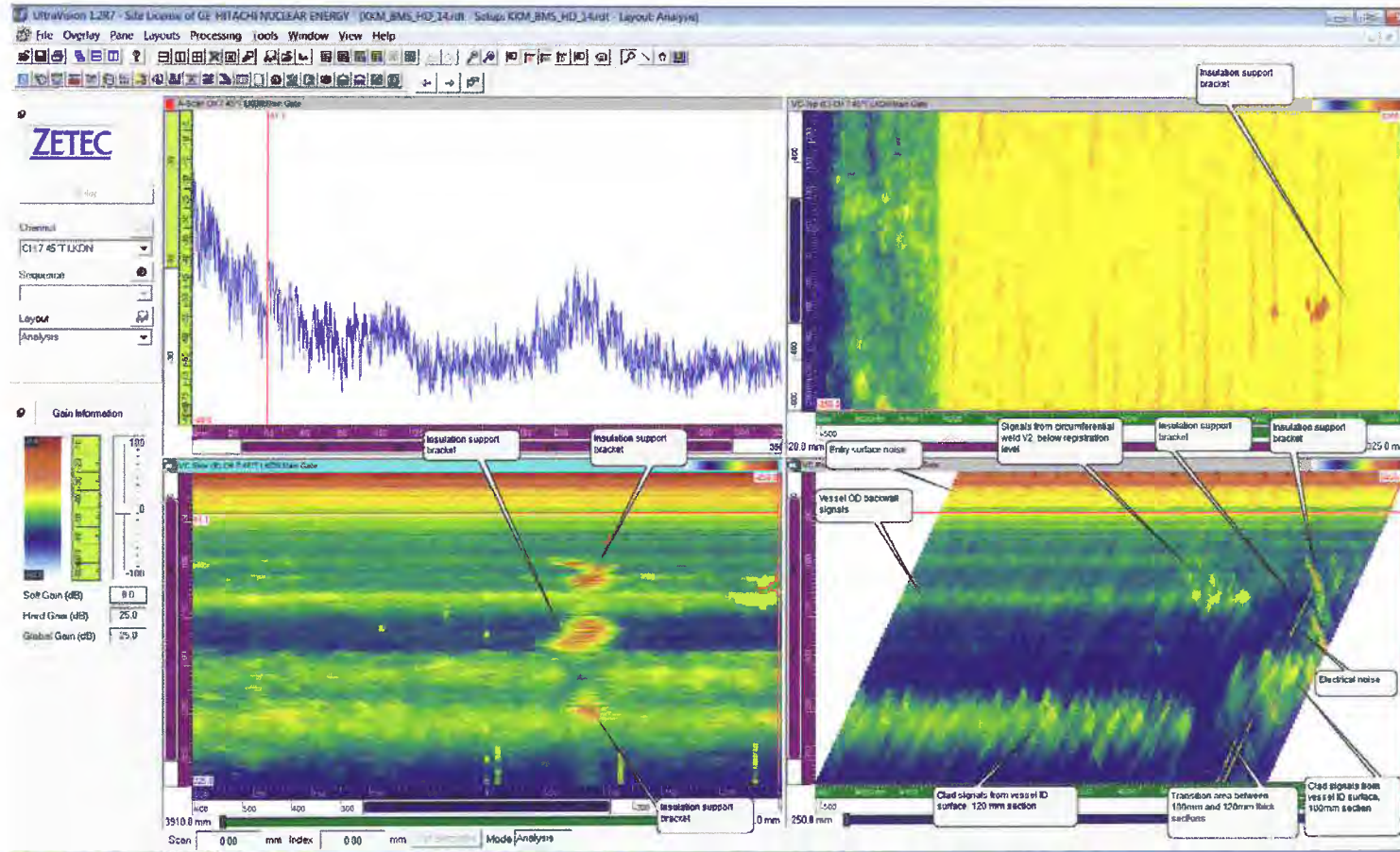




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



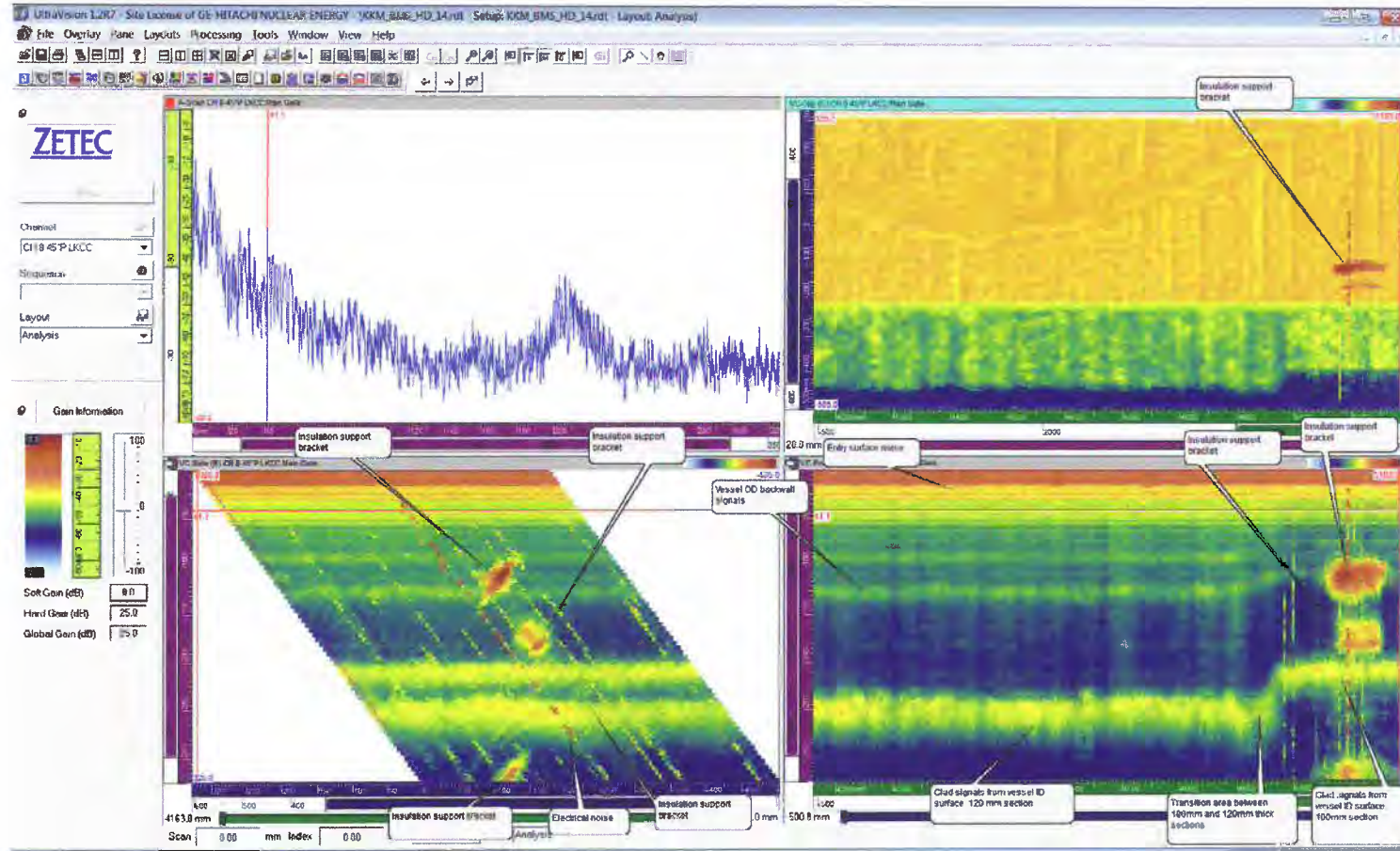
Channel 7 - 45° angle beam scan search unit looking down



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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_14



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

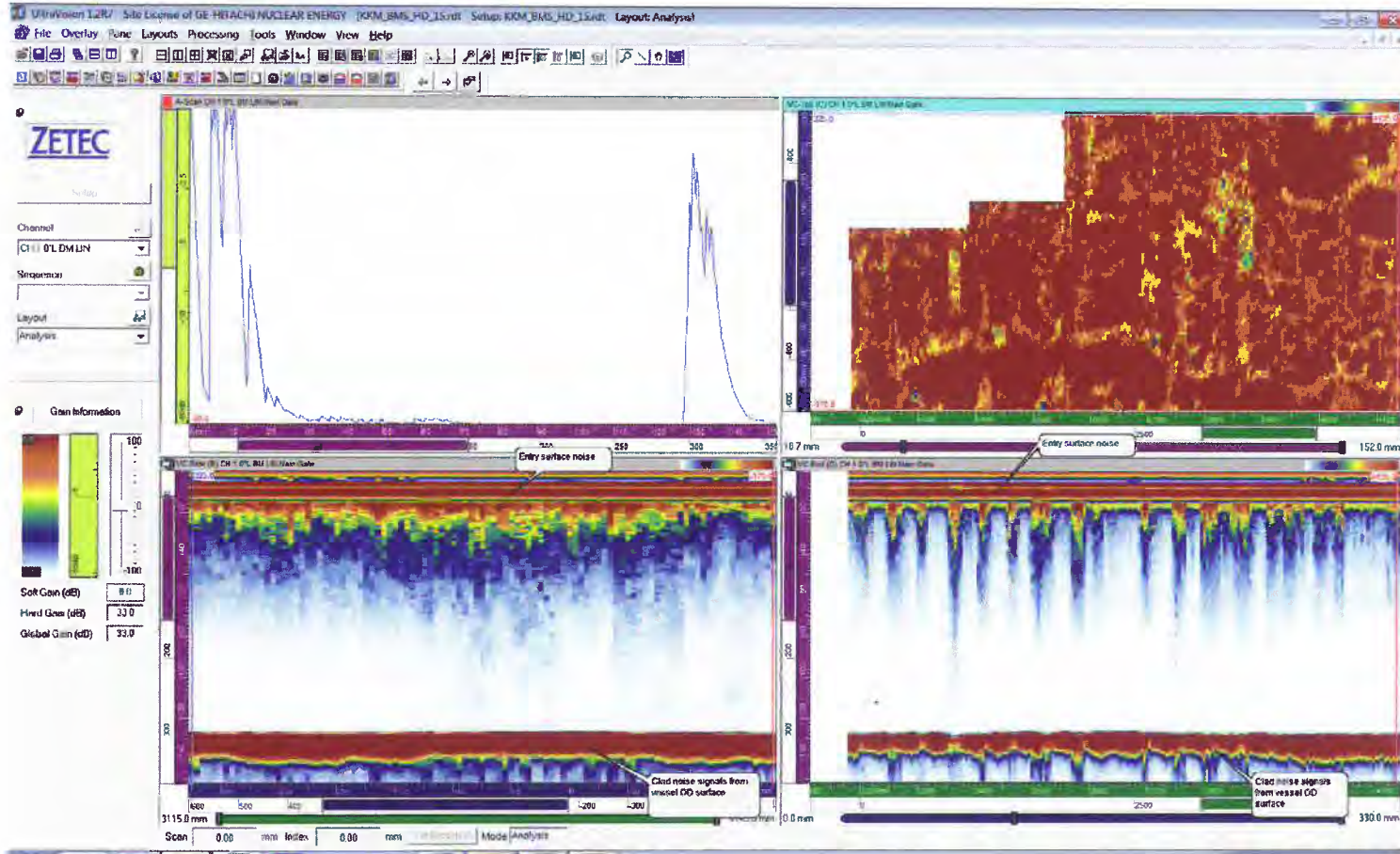




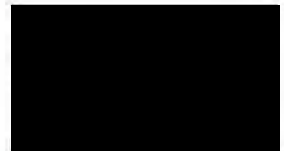
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 1 - 0° straight beam scan

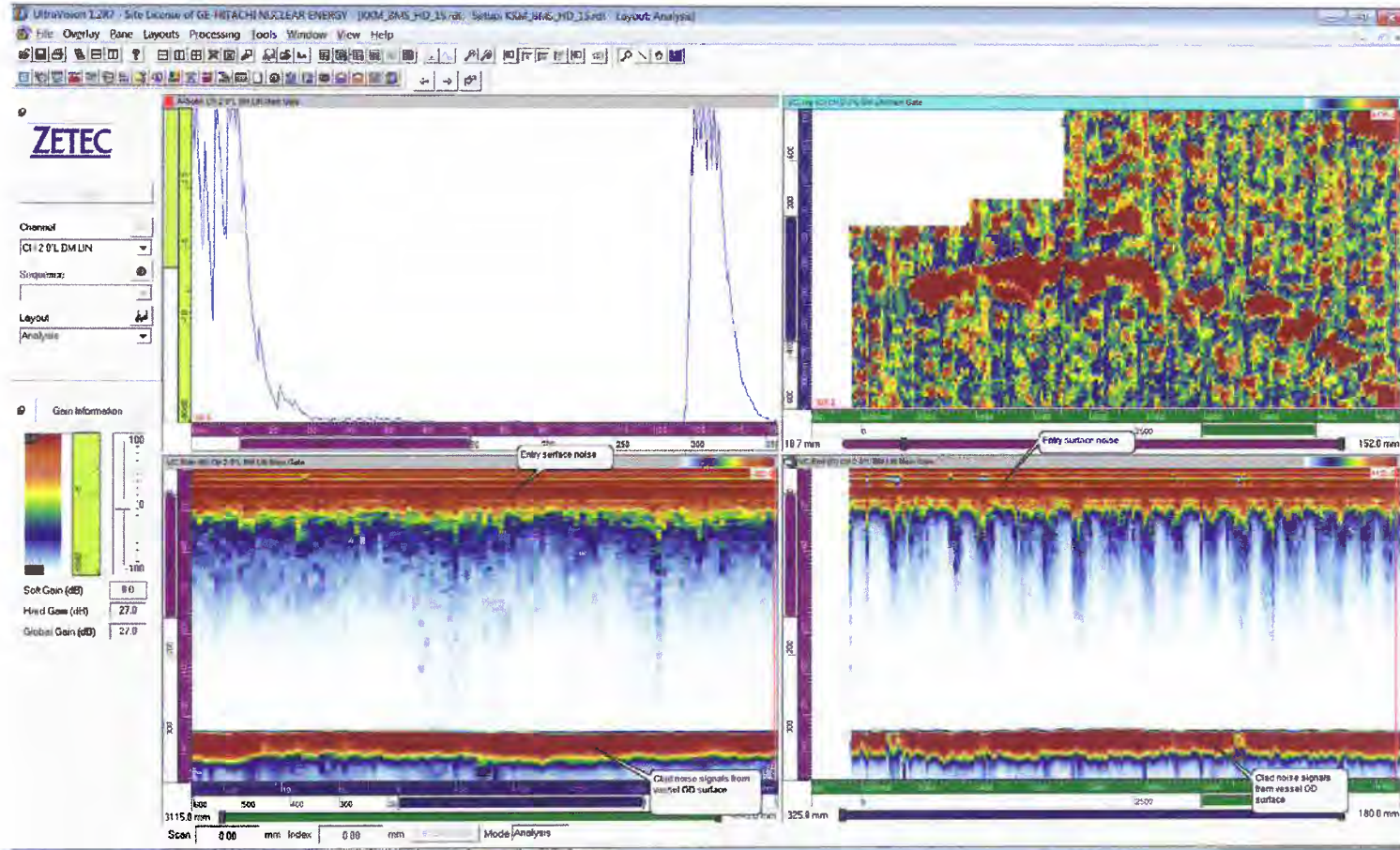




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 2 - 0° straight beam scan

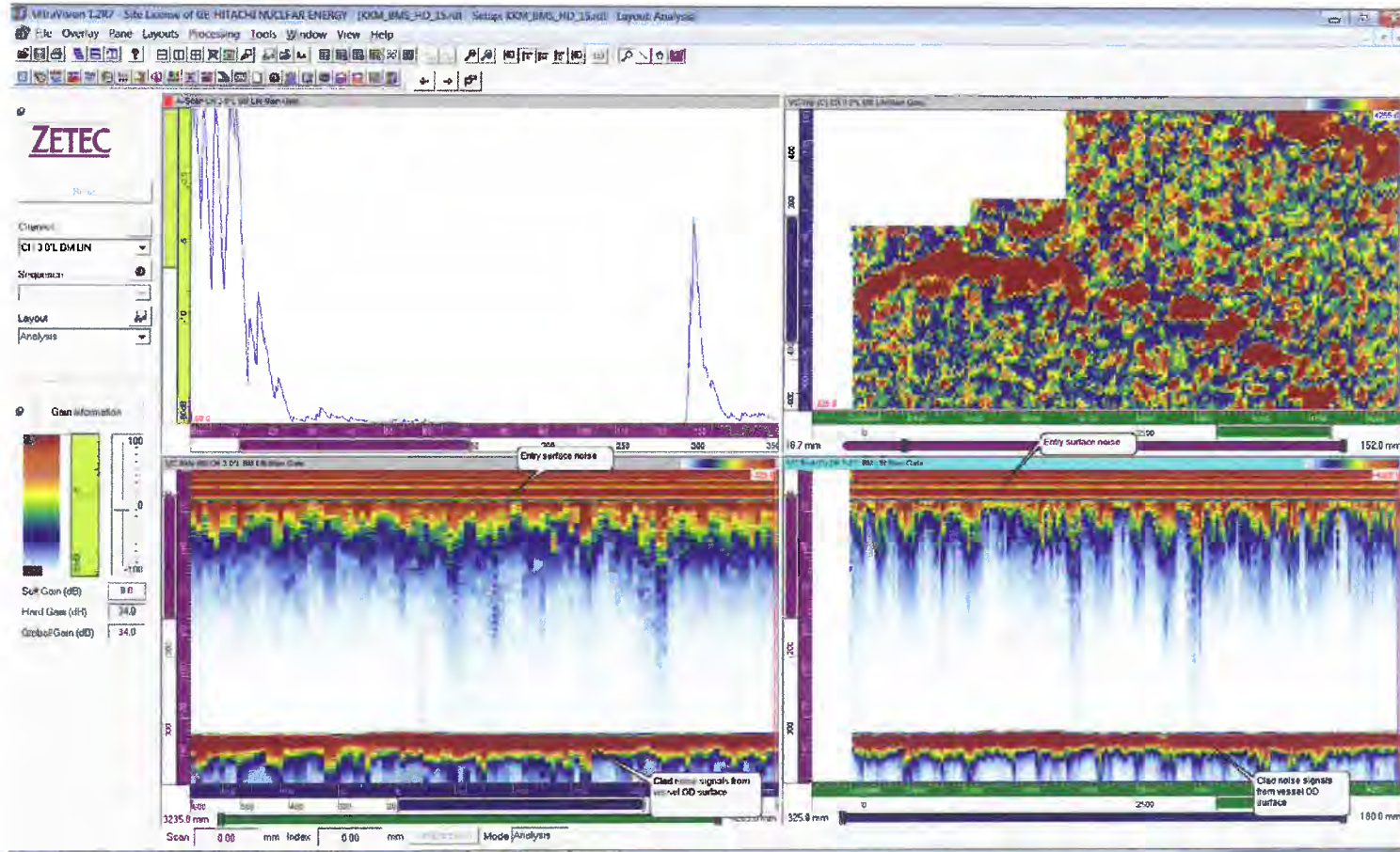




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# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 3 - 0° straight beam scan



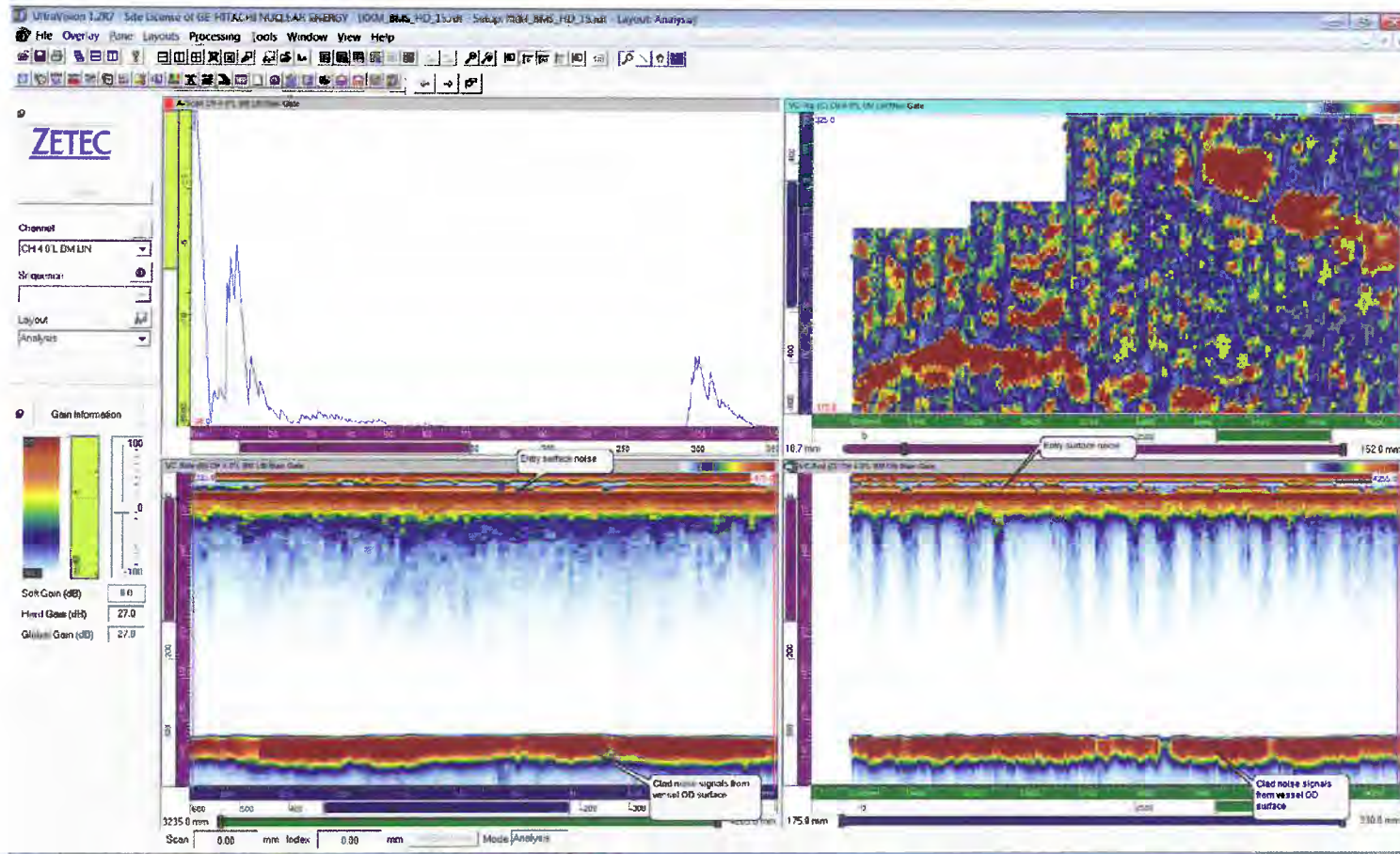




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 4 - 0° straight beam scan

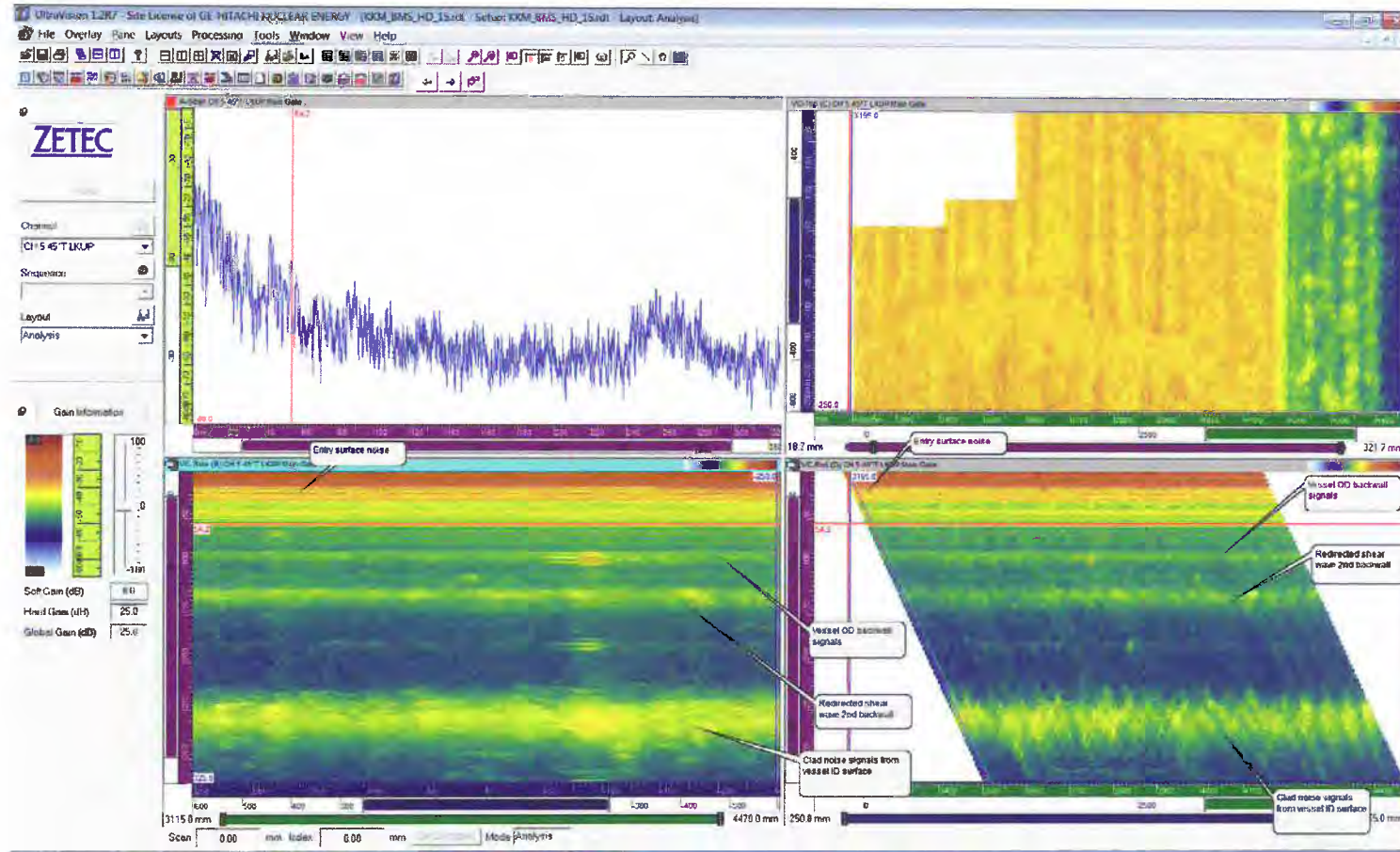




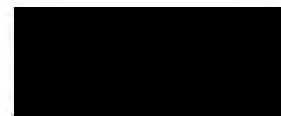
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 5 - 45° angle beam scan search unit looking up

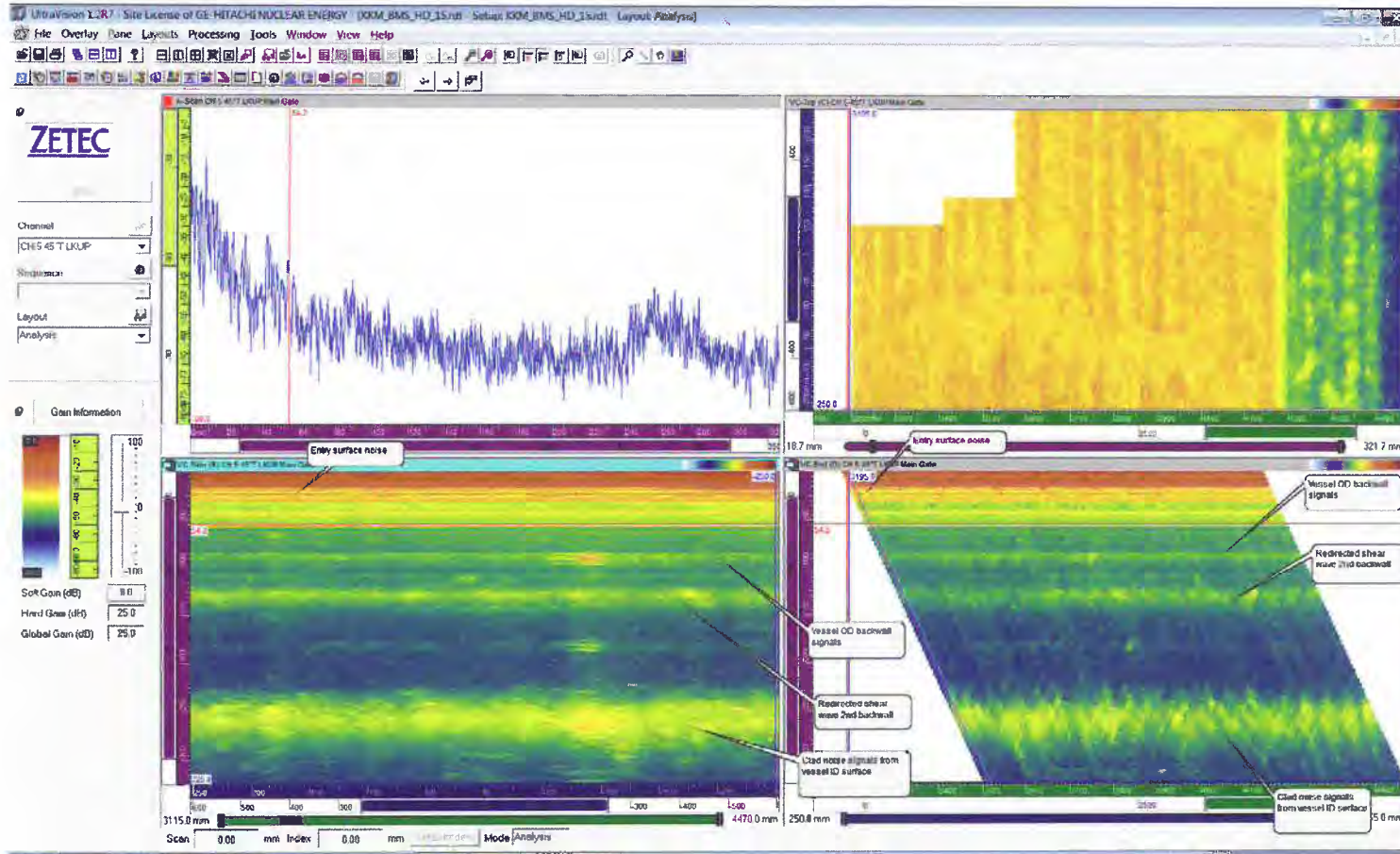




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 6 - 45° angle beam scan search unit looking clockwise

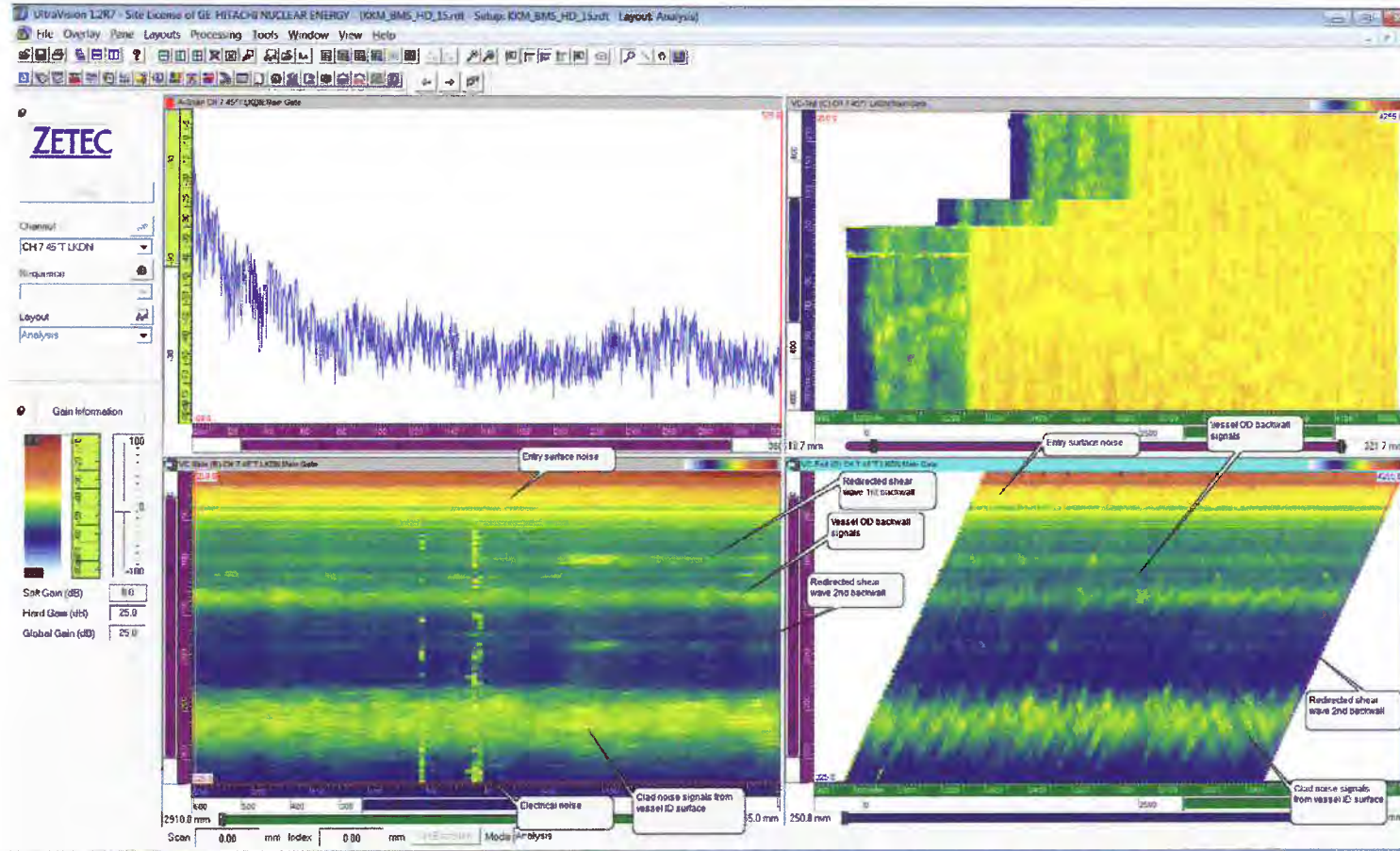




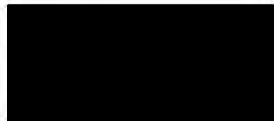
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 7 - 45° angle beam scan search unit looking down

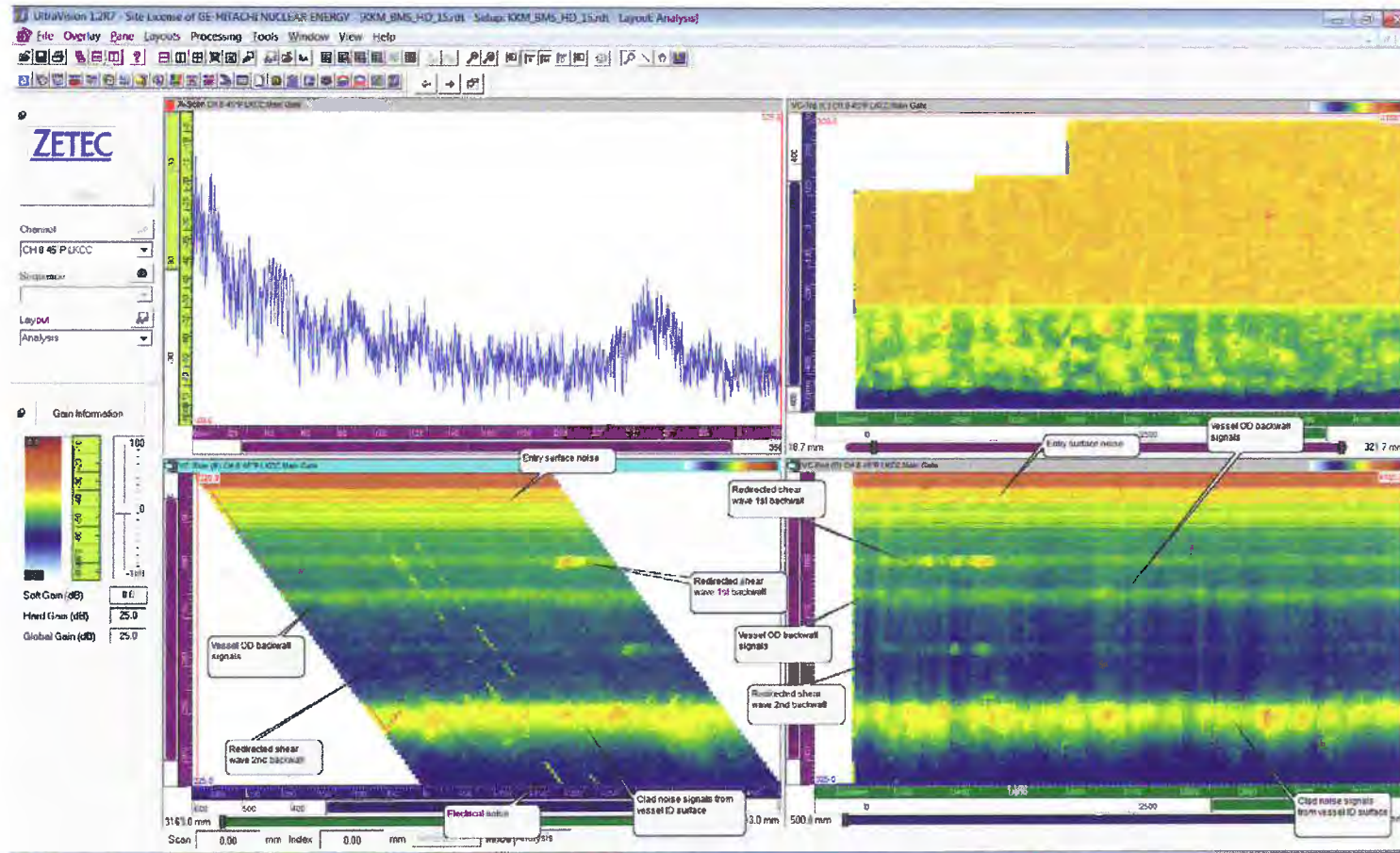




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_15



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

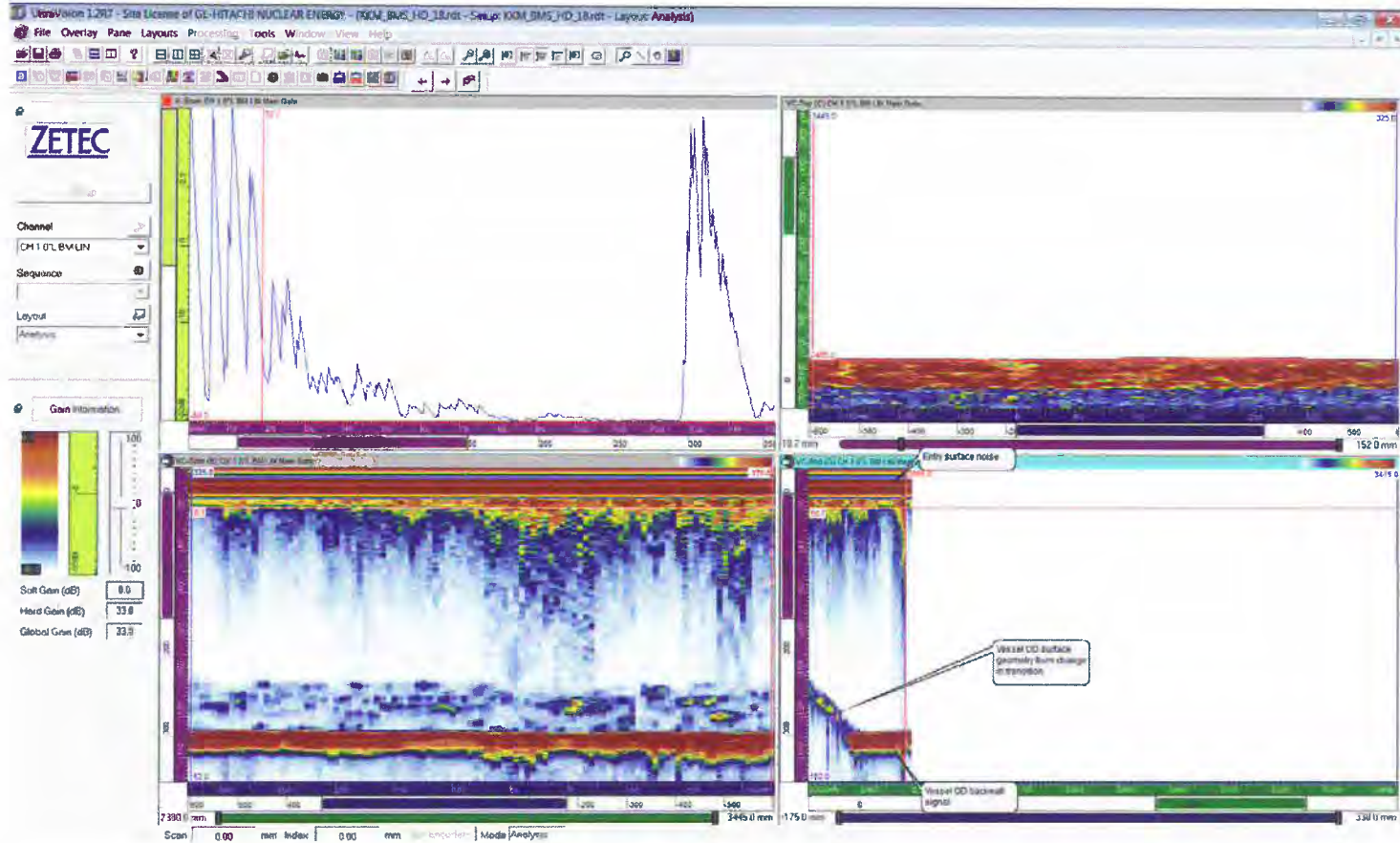




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 1 - 0° straight beam scan

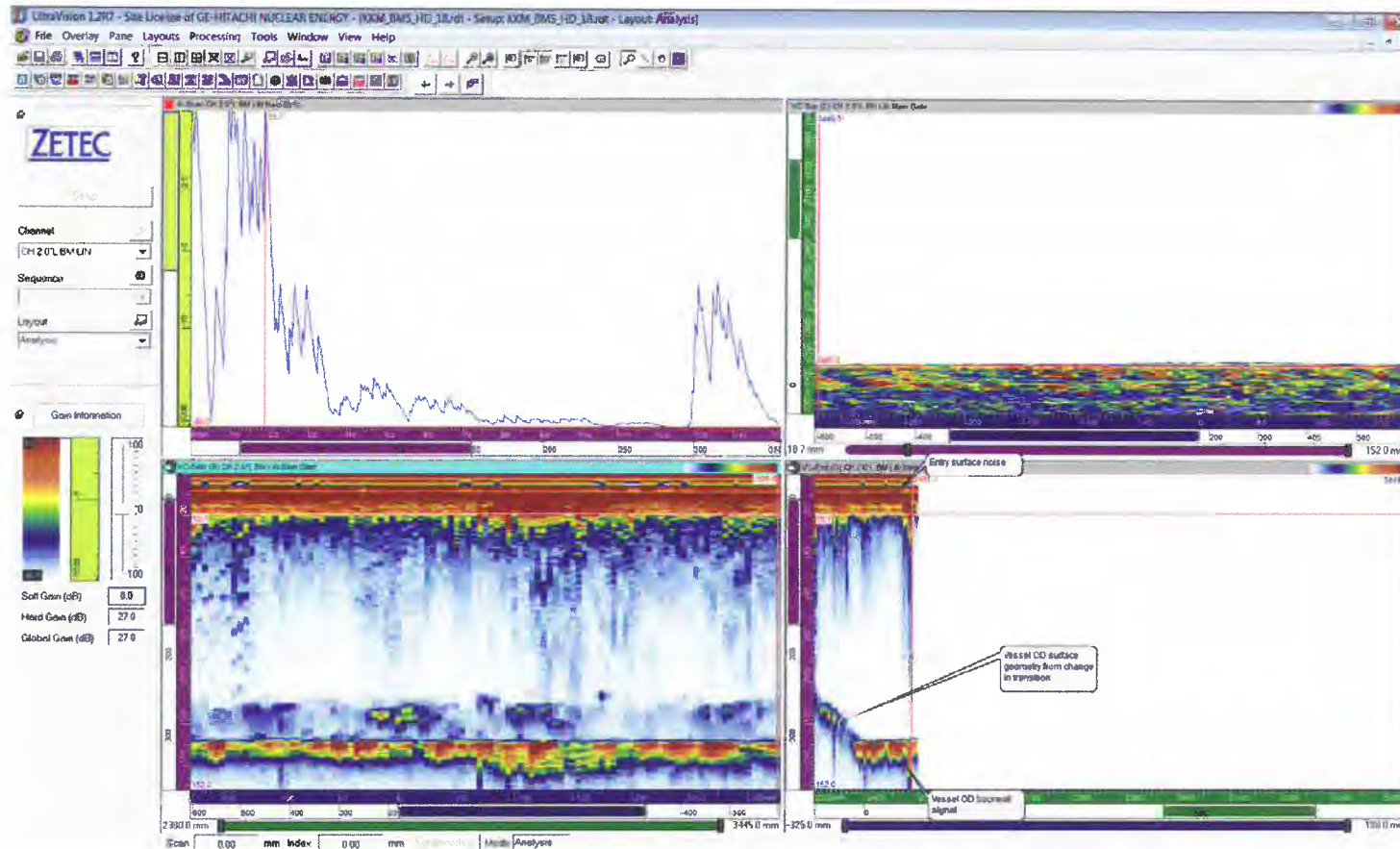




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18

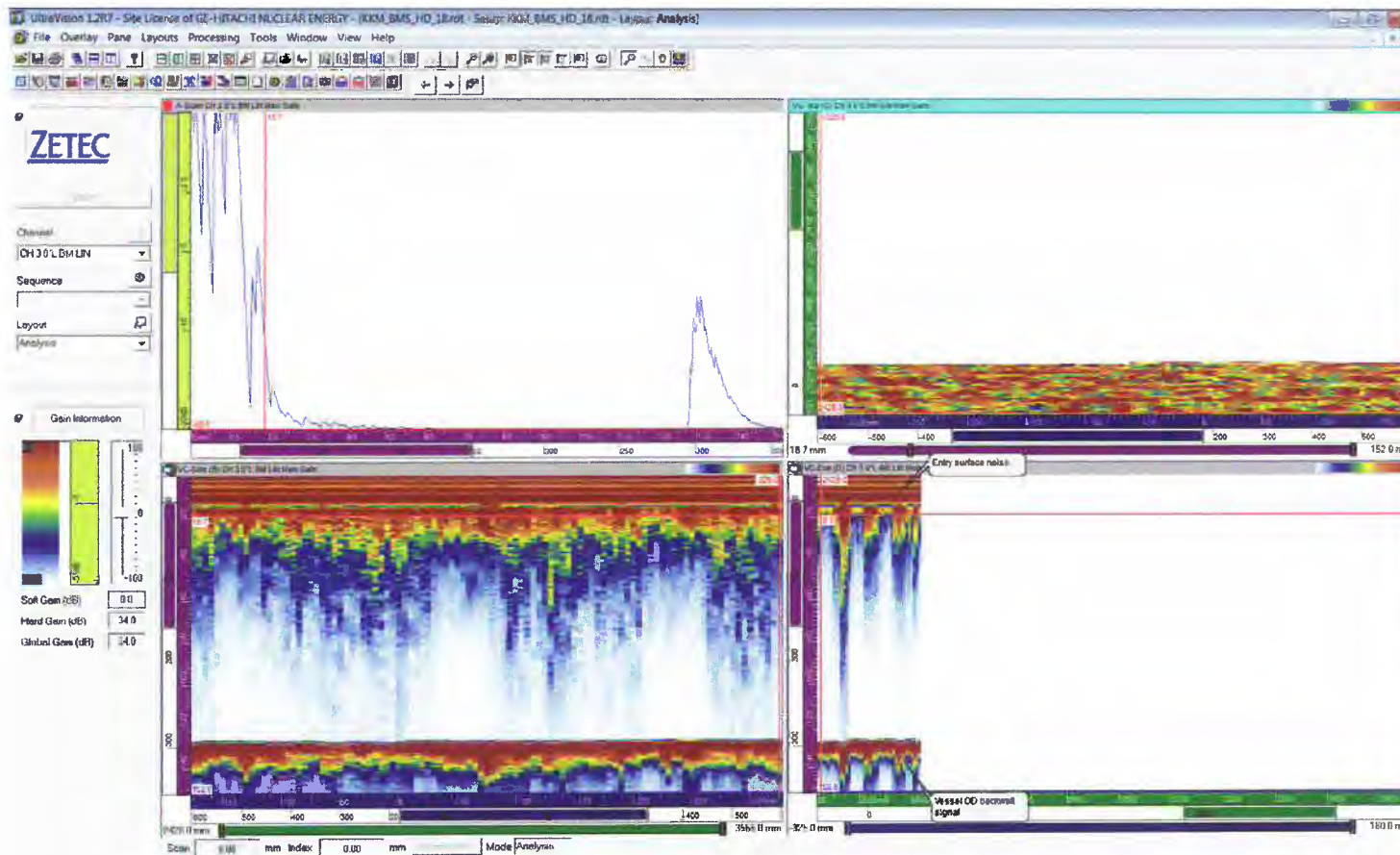




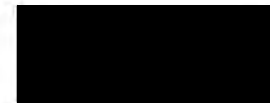
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 3 - 0° straight beam scan



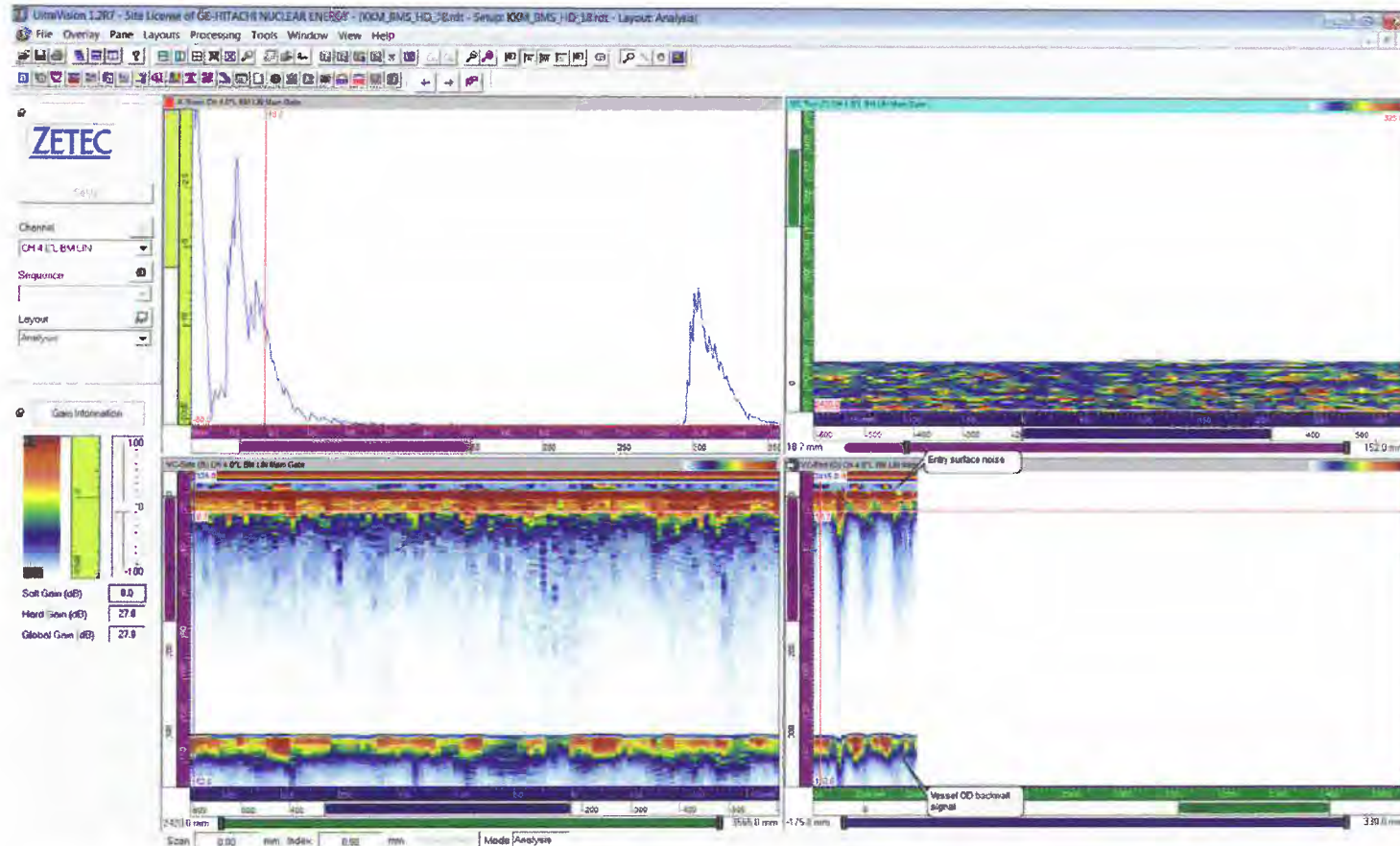




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 4 - 0° straight beam scan

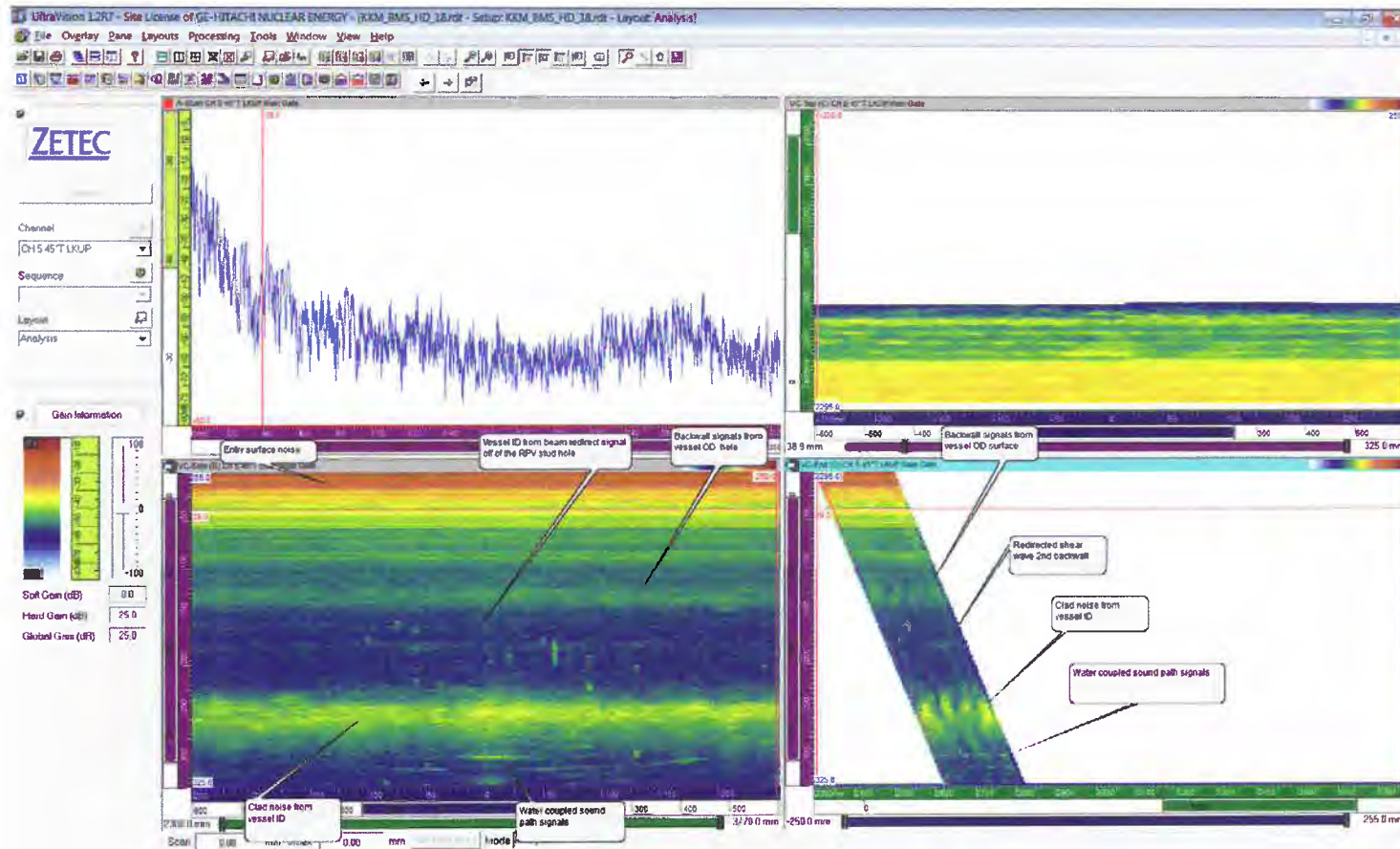




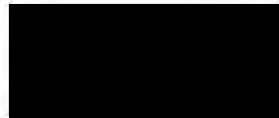
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 5 - 45° angle beam scan search unit looking up

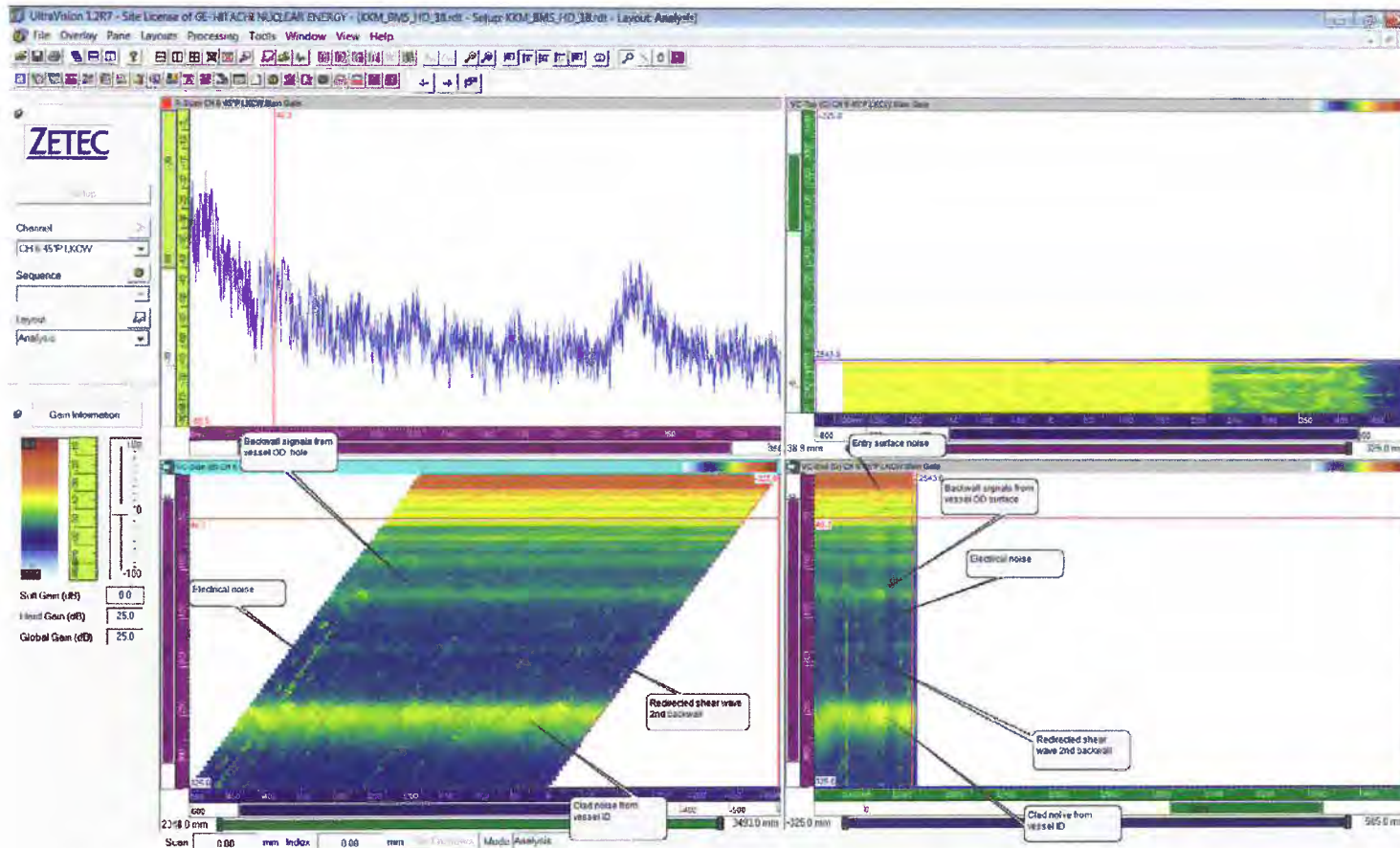




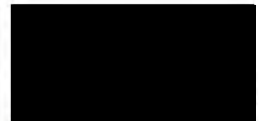
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 6 - 45° angle beam scan search unit looking clockwise

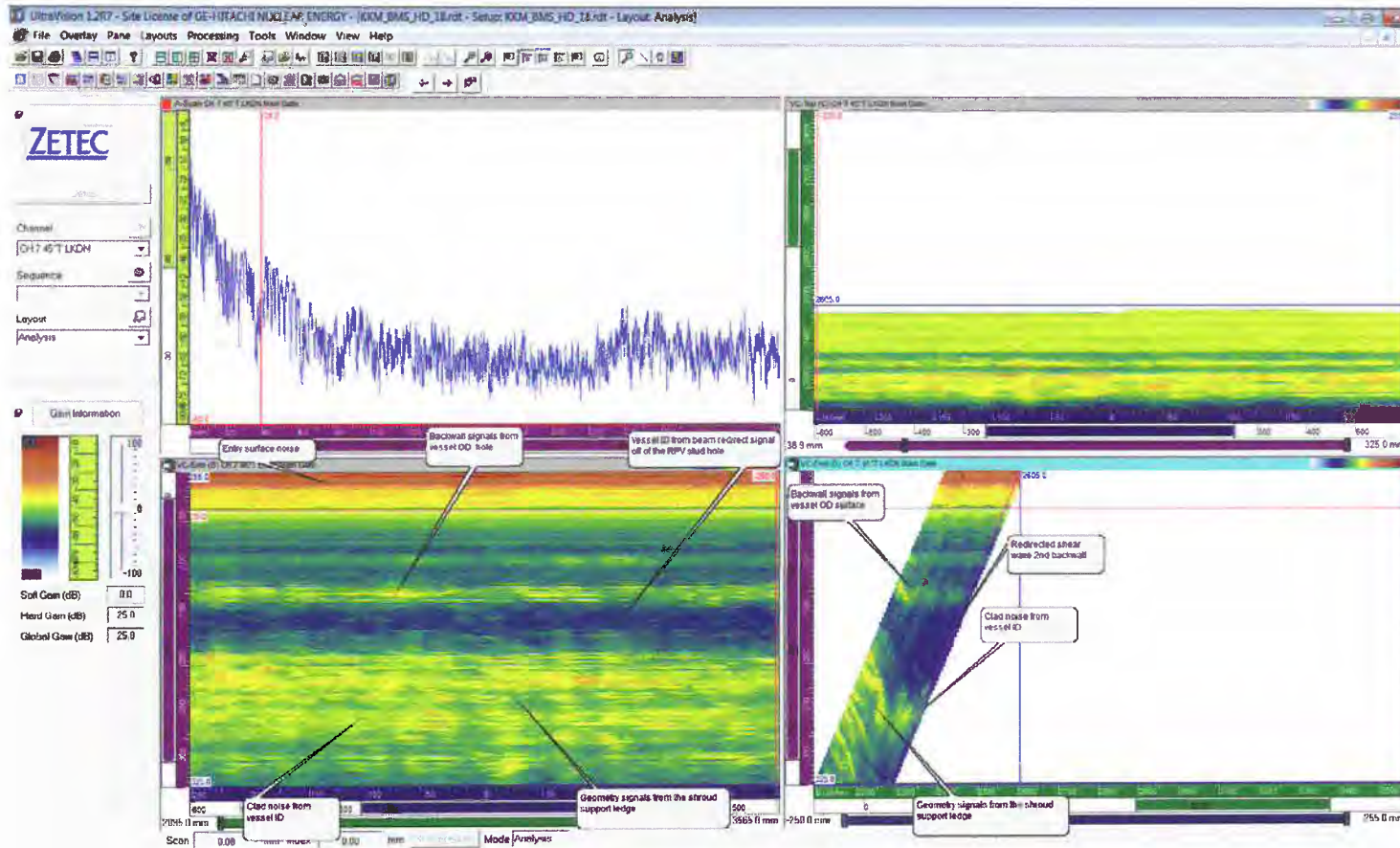




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 7 - 45° angle beam scan search unit looking down

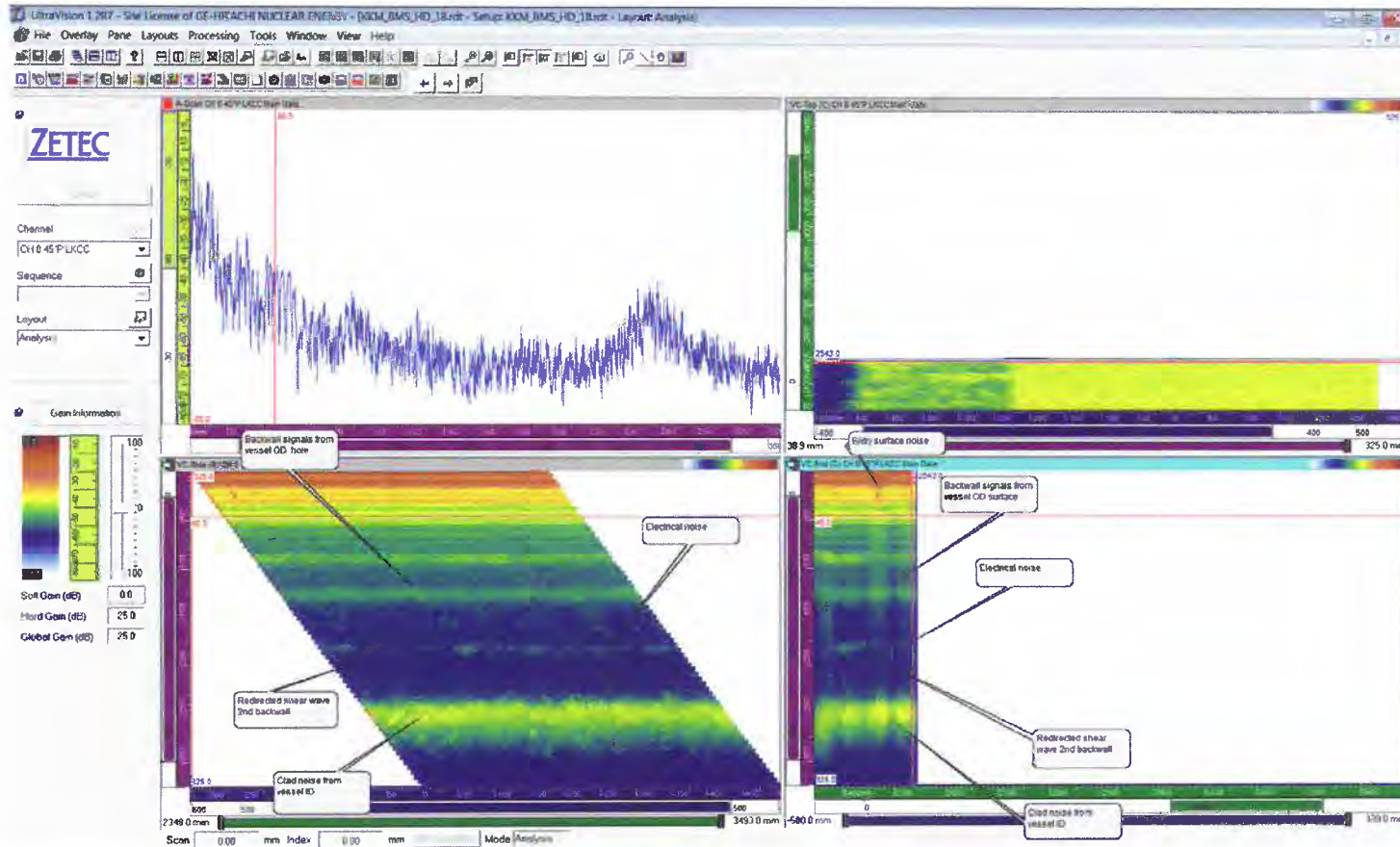




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_18



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

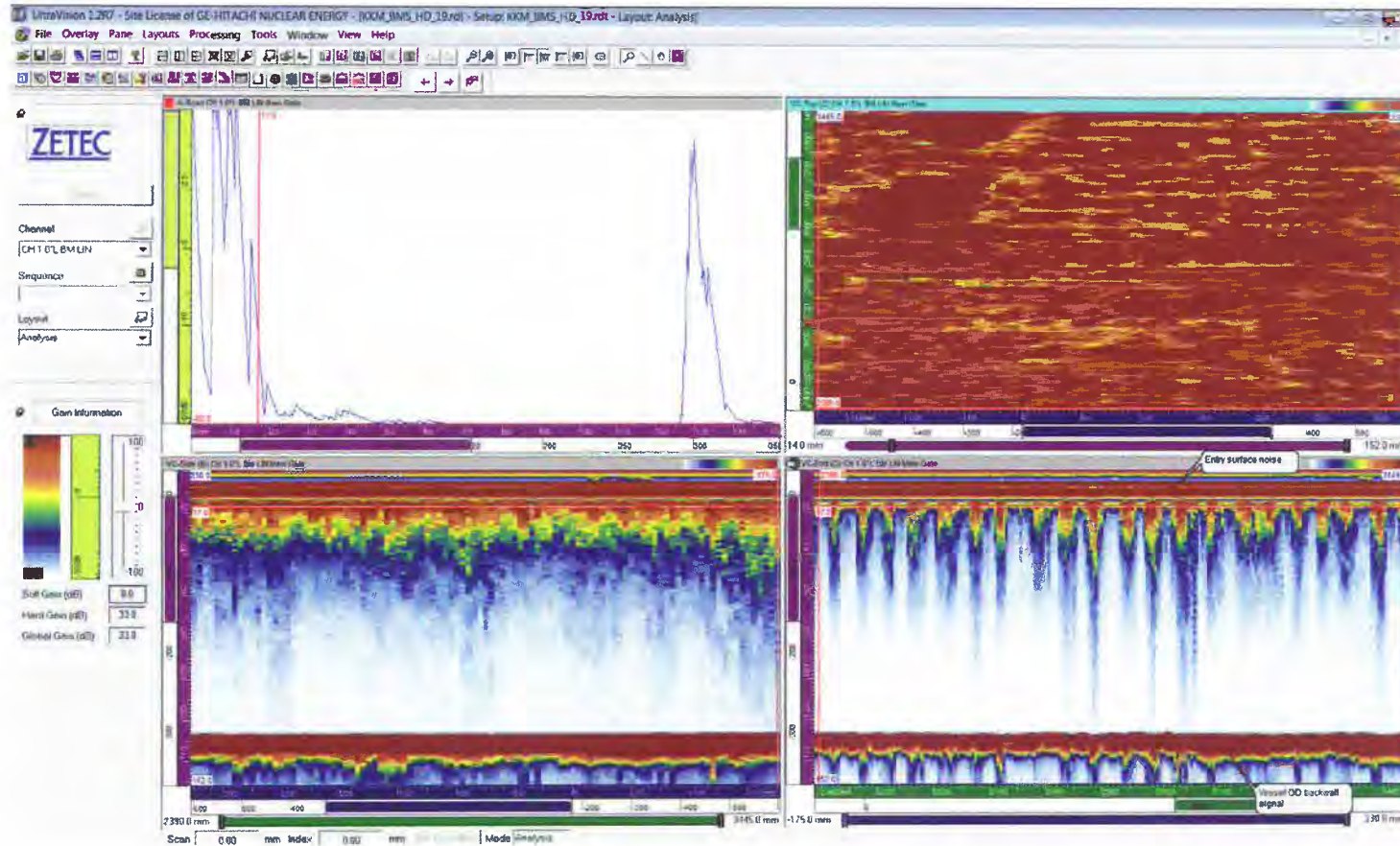




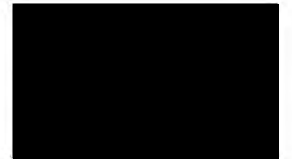
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 1 - 0° straight beam scan

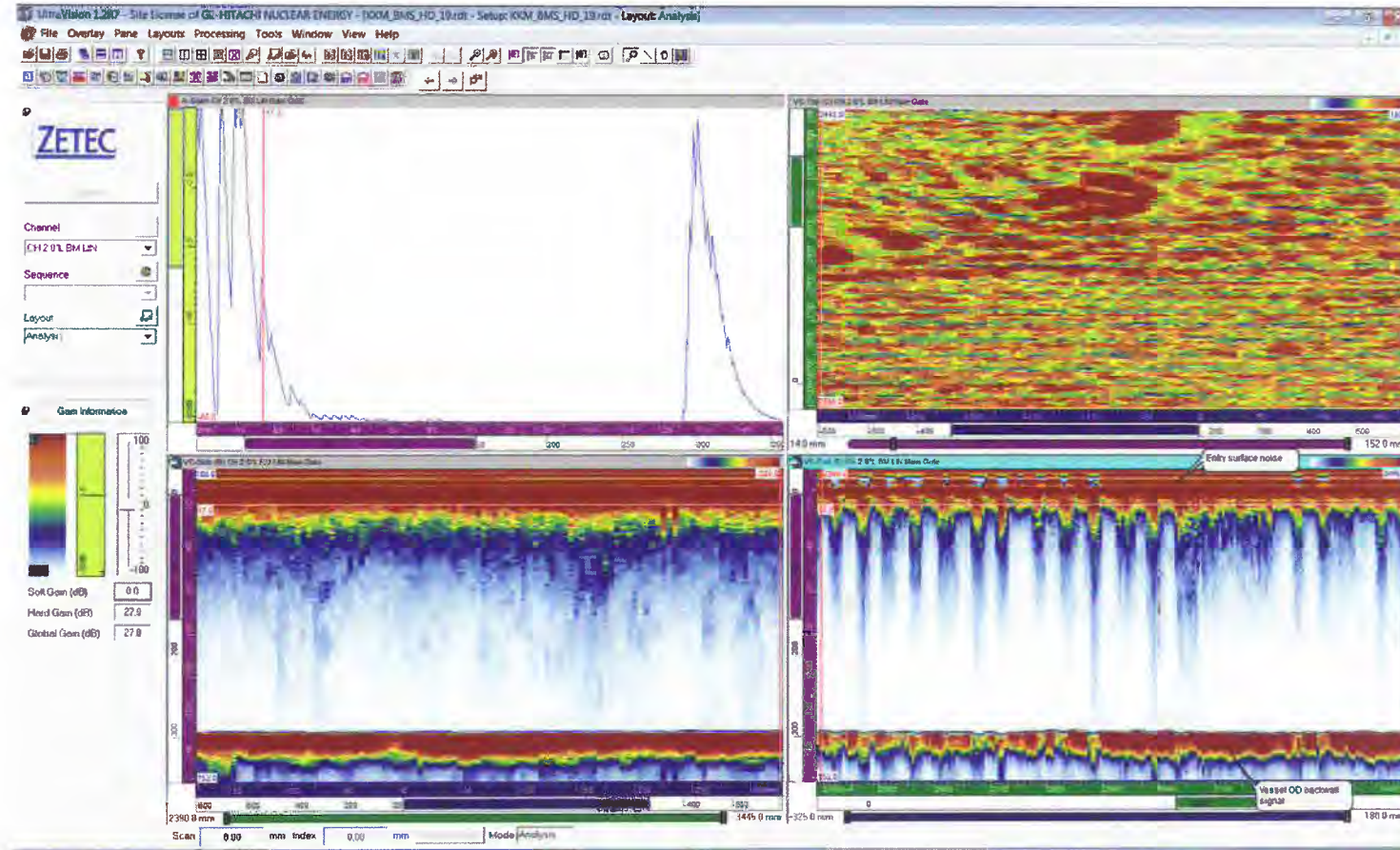




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 2 - 0° straight beam scan

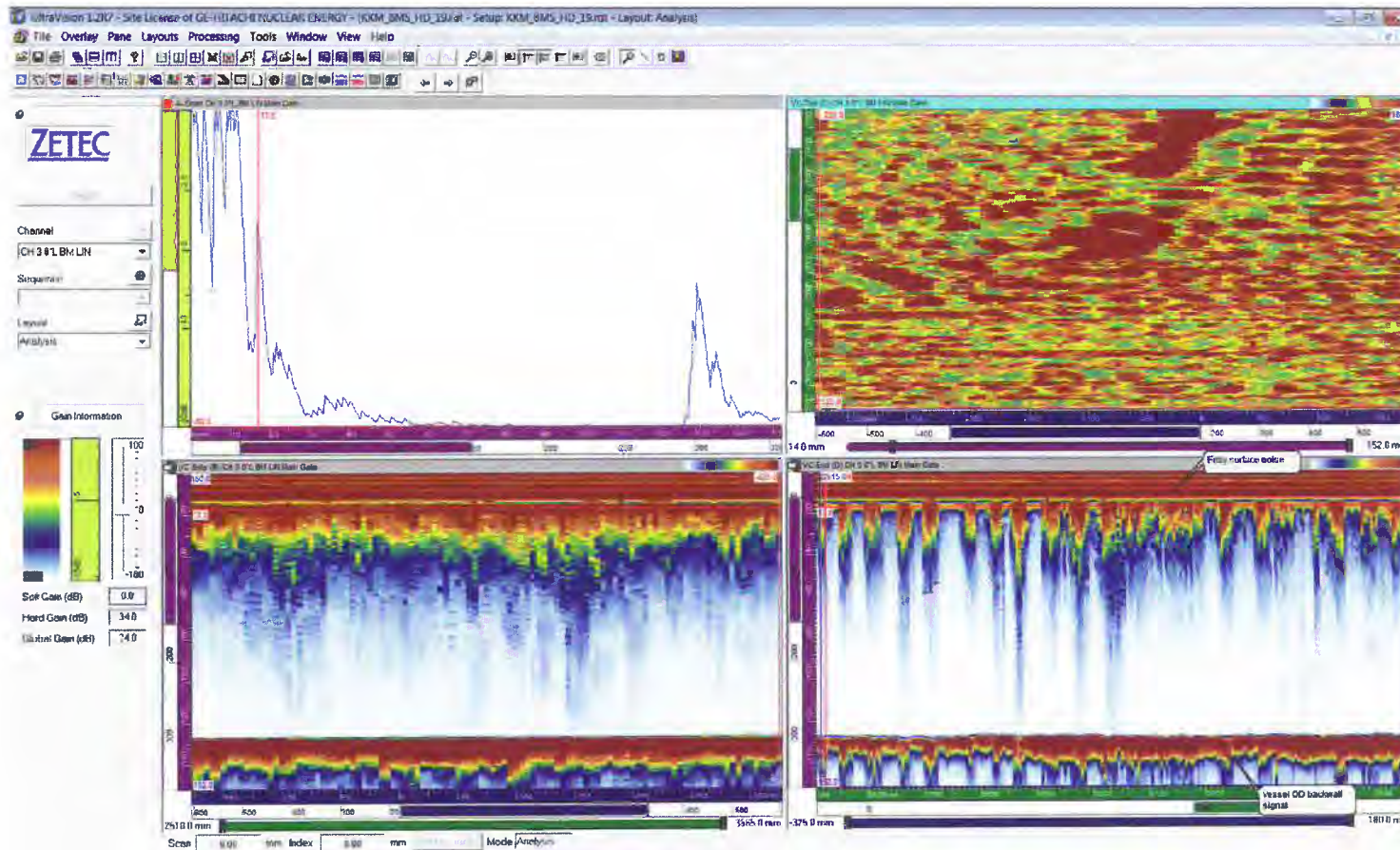




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 3 - 0° straight beam scan



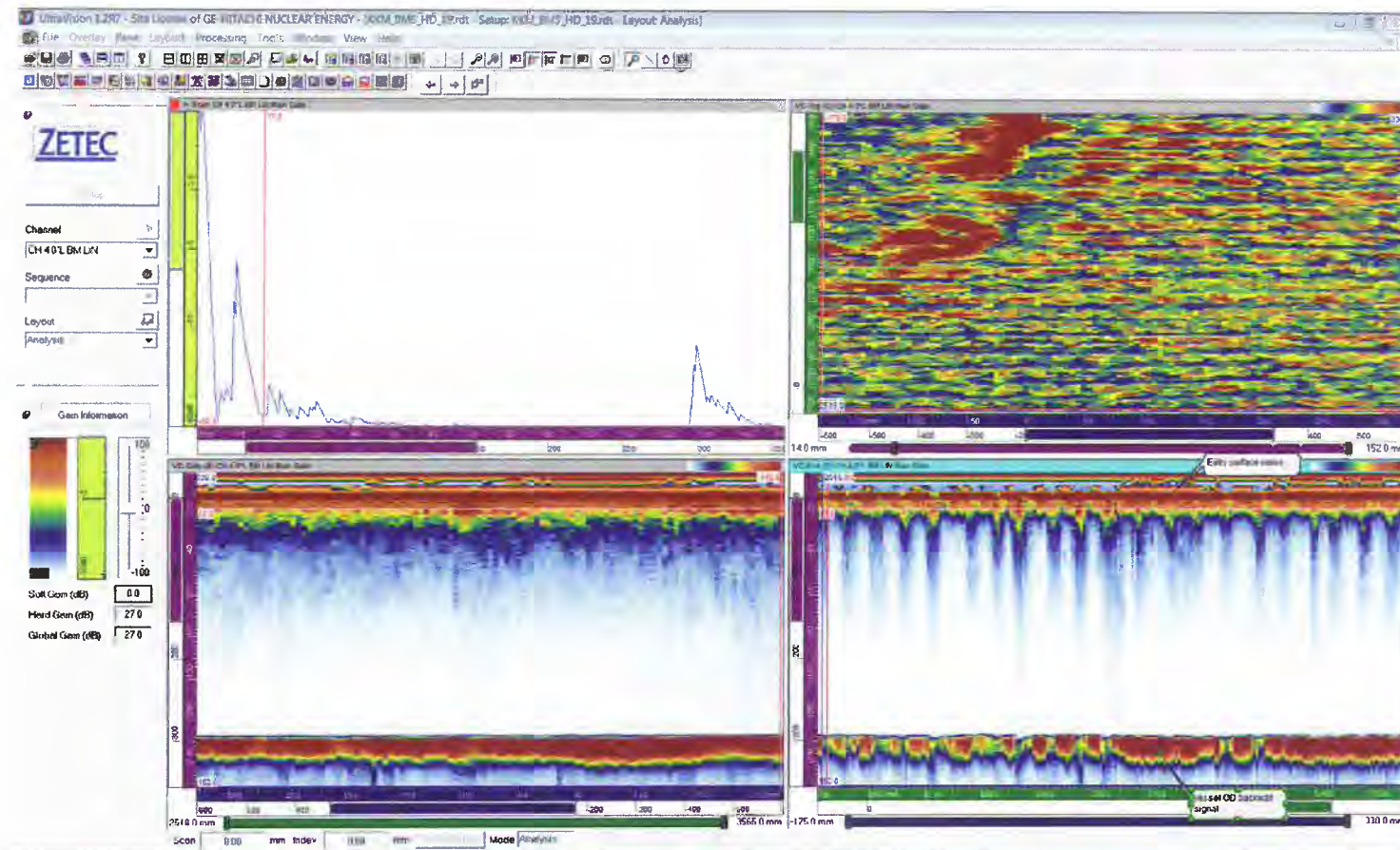




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 4 - 0° straight beam scan

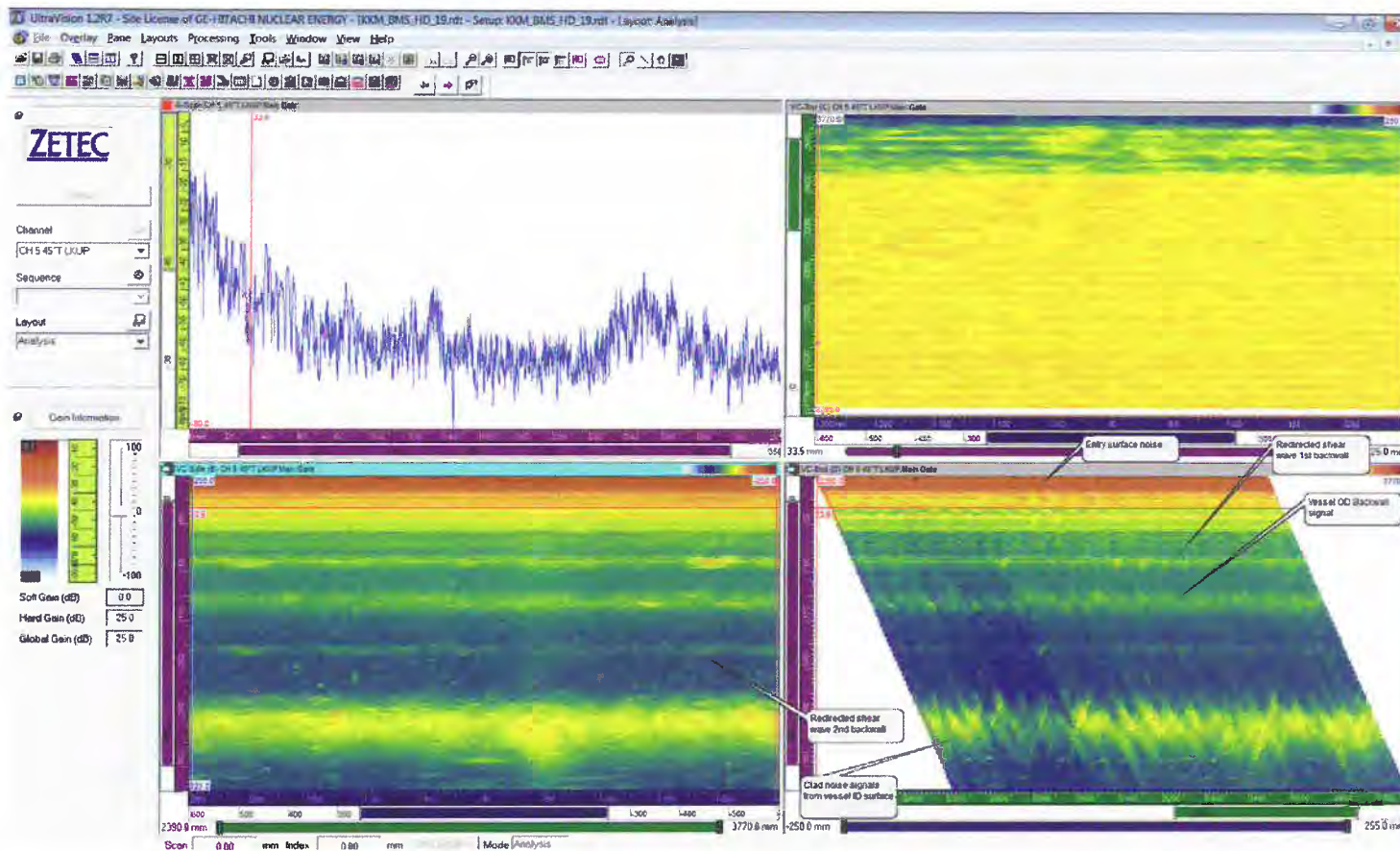




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 5 - 45° angle beam scan search unit looking up

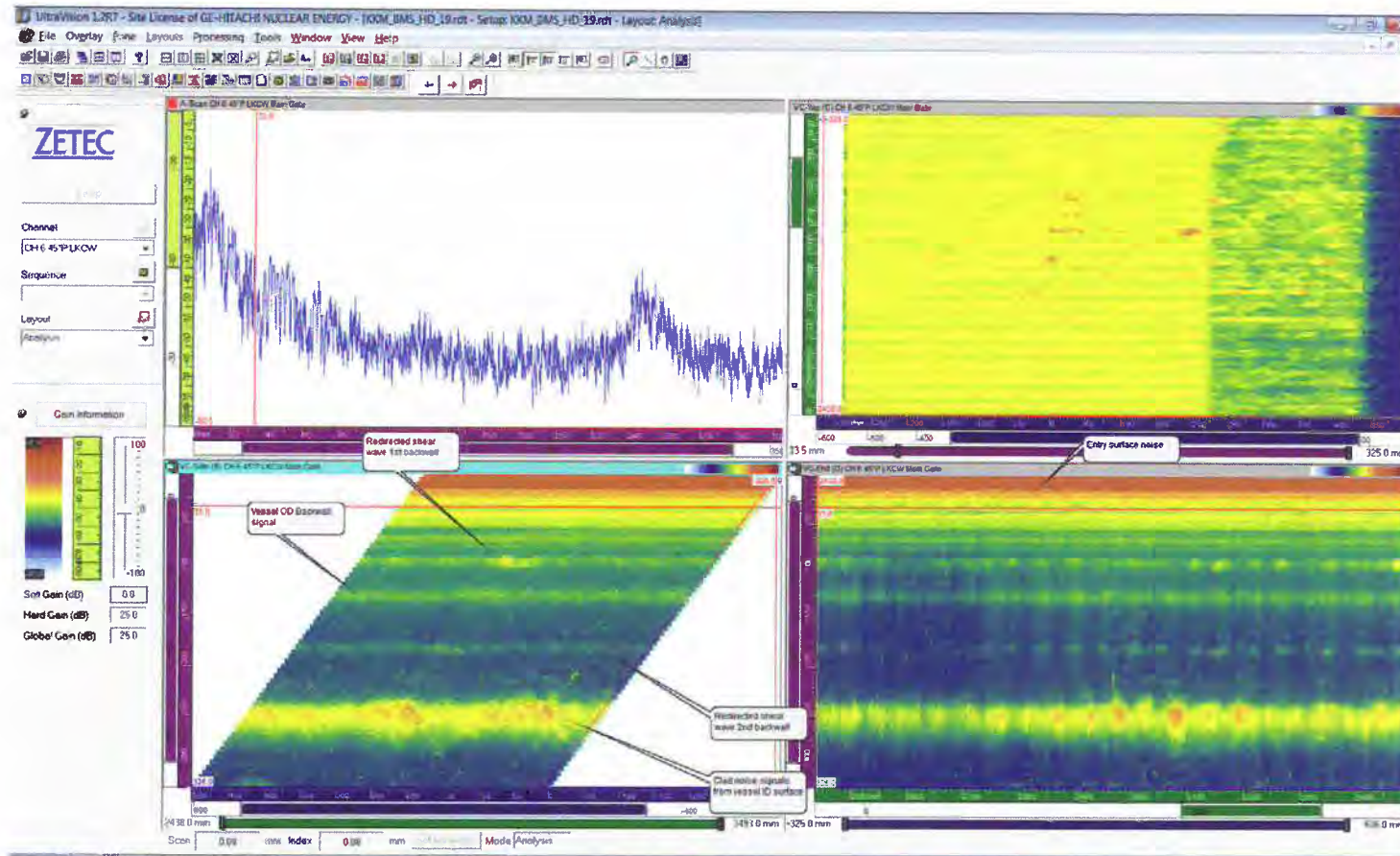




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 6 - 45° angle beam scan search unit looking clockwise

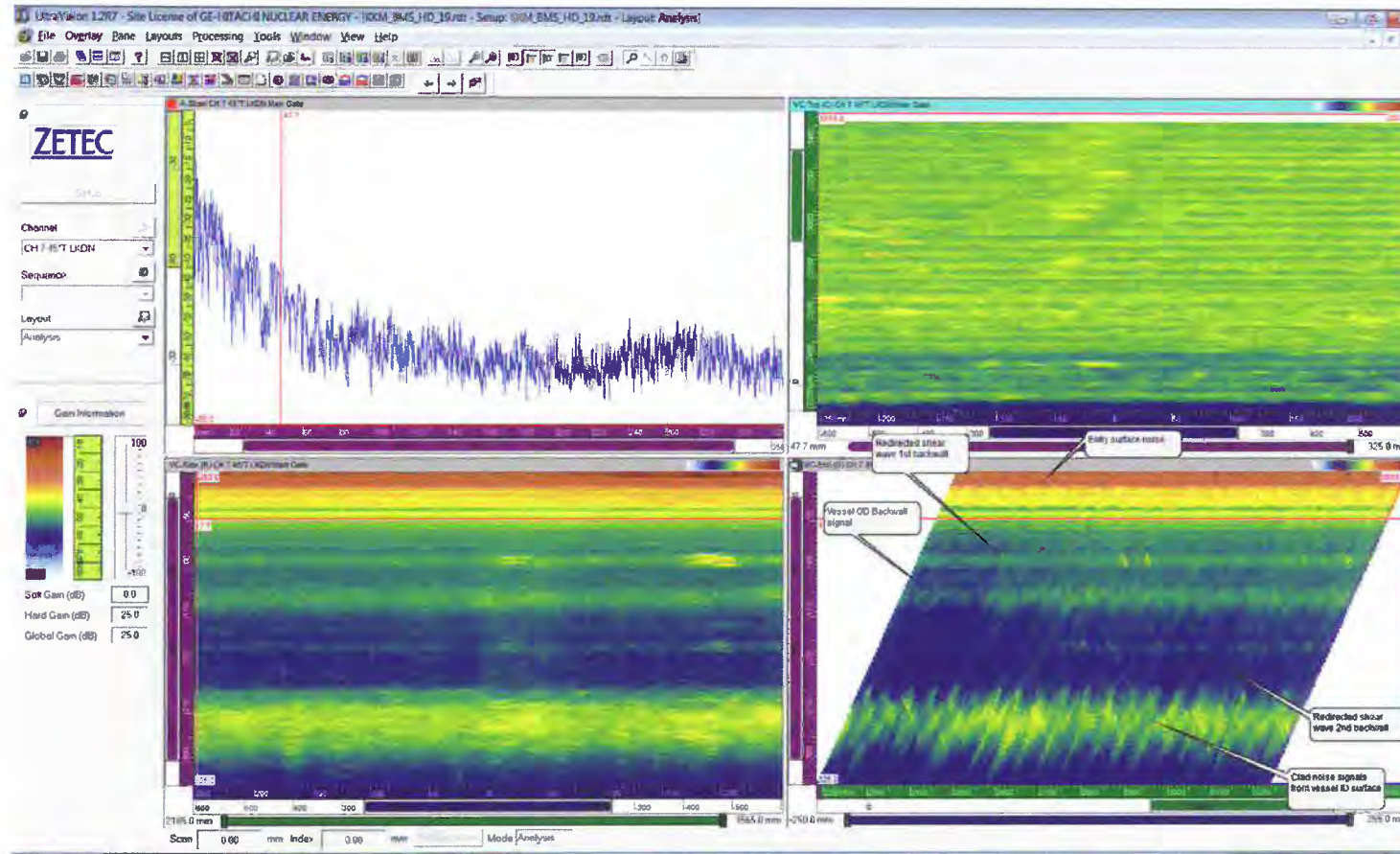




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 7 - 45° angle beam scan search unit looking down

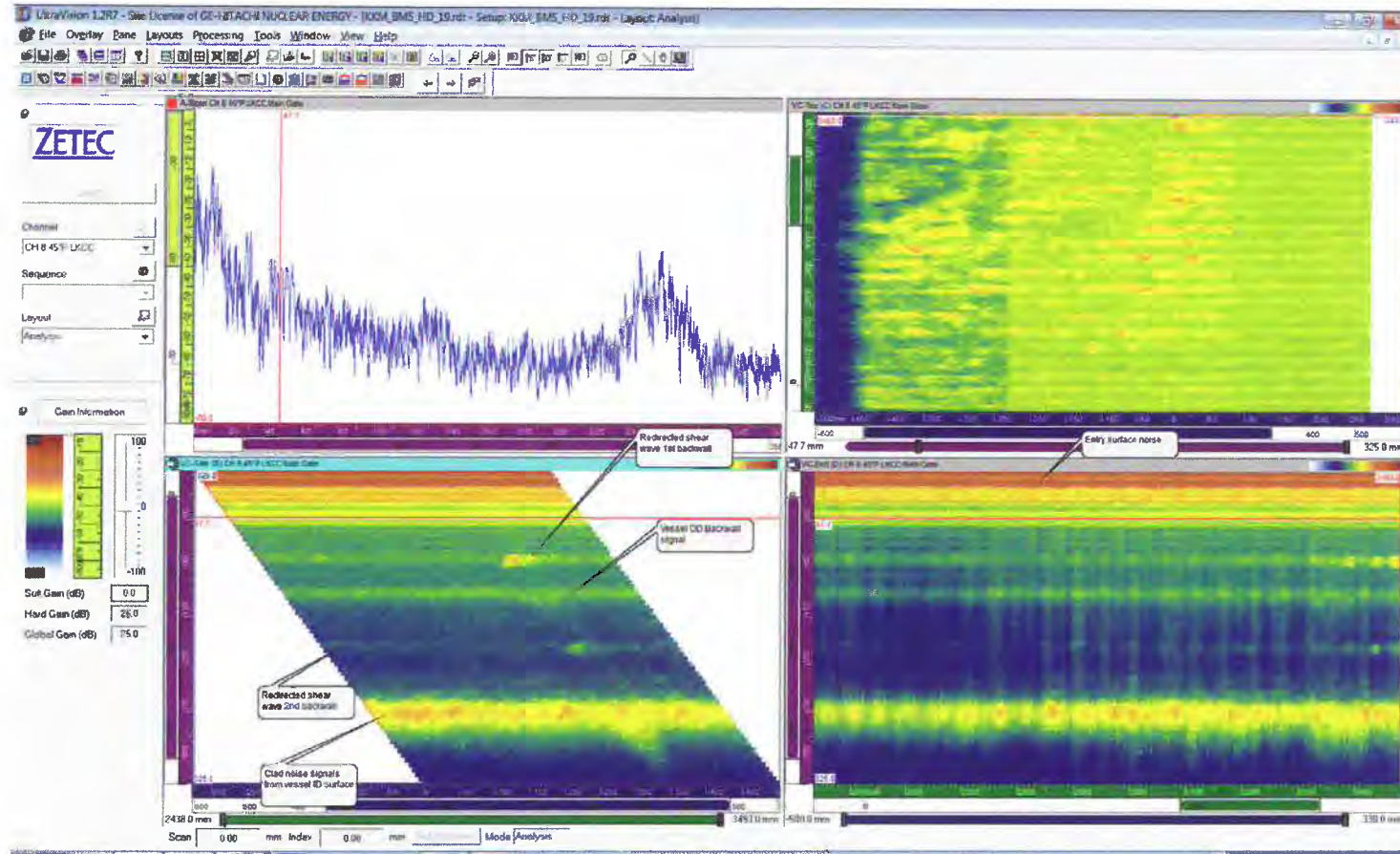




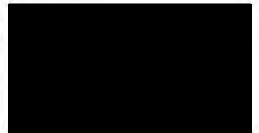
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HD\_19



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

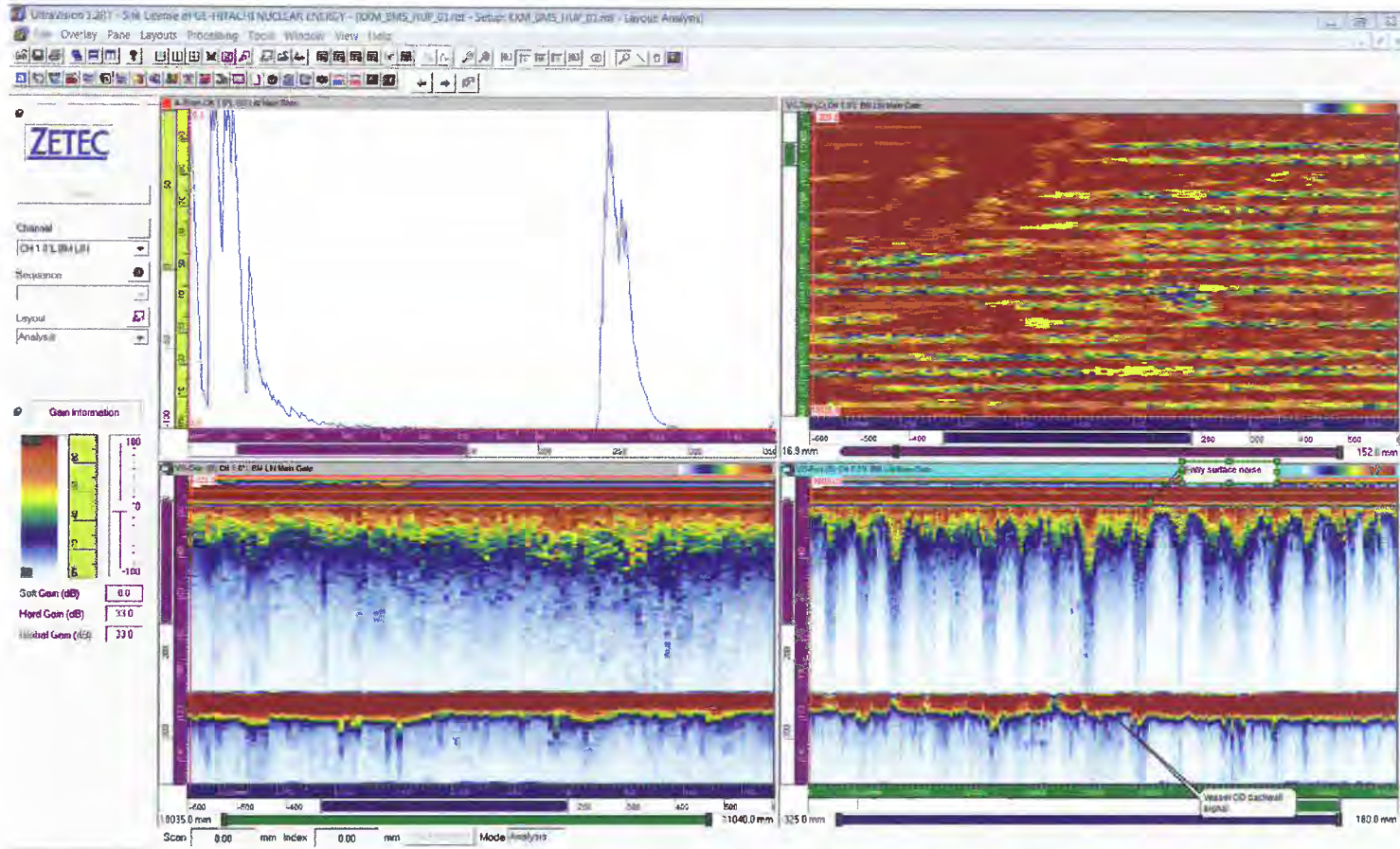




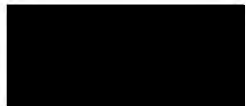
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 1 - 0° straight beam scan

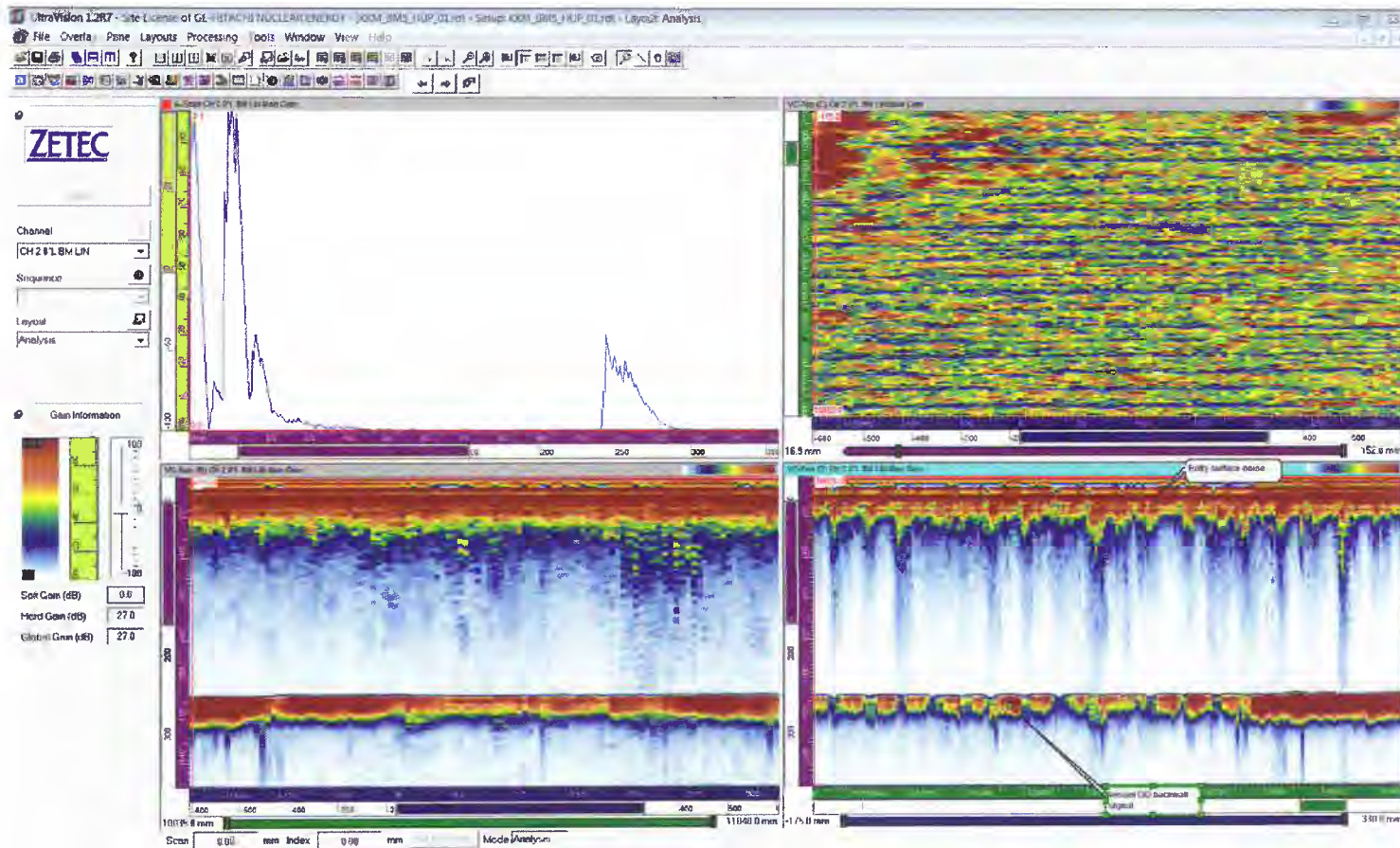




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01

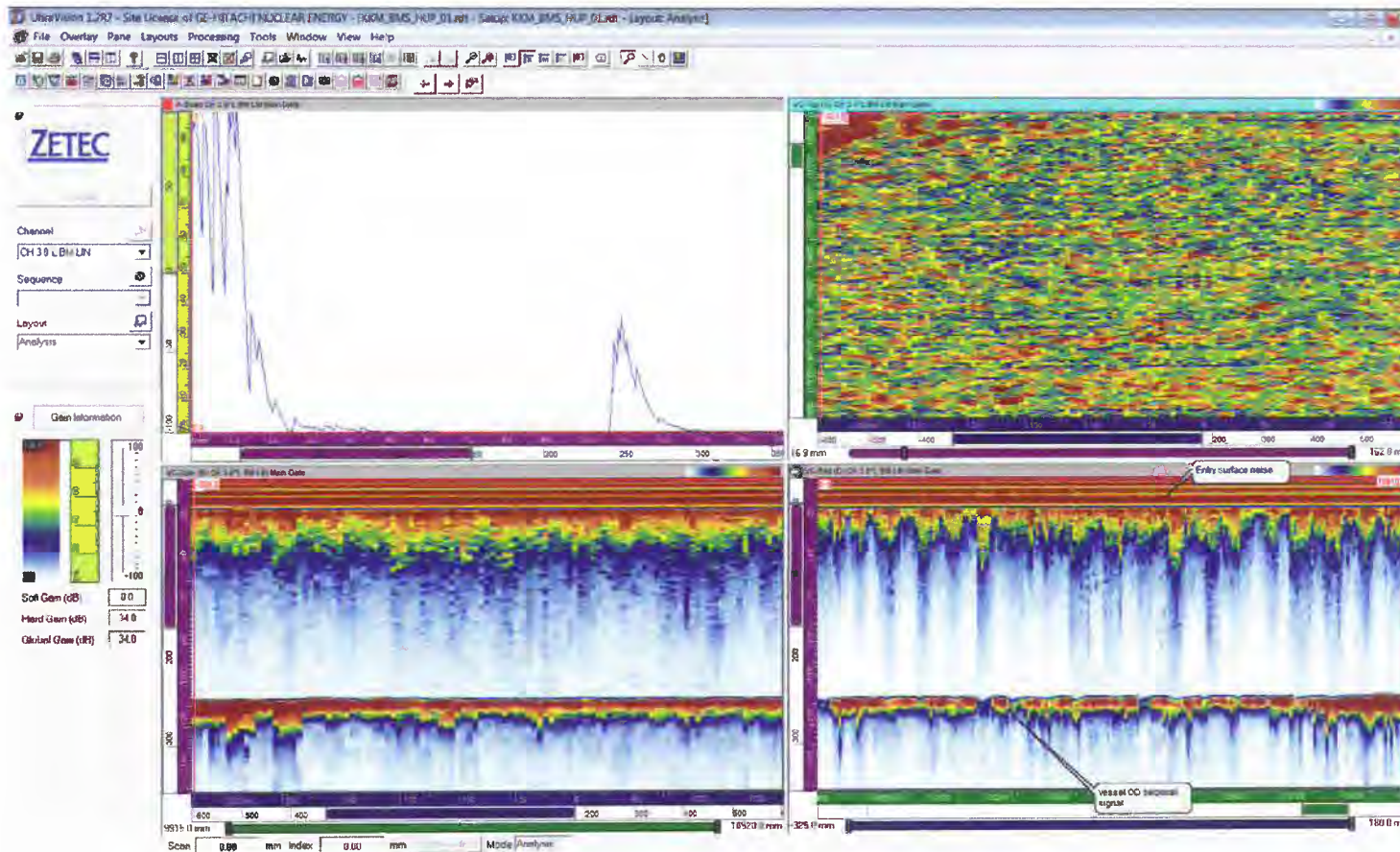




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 3 - 0° straight beam scan



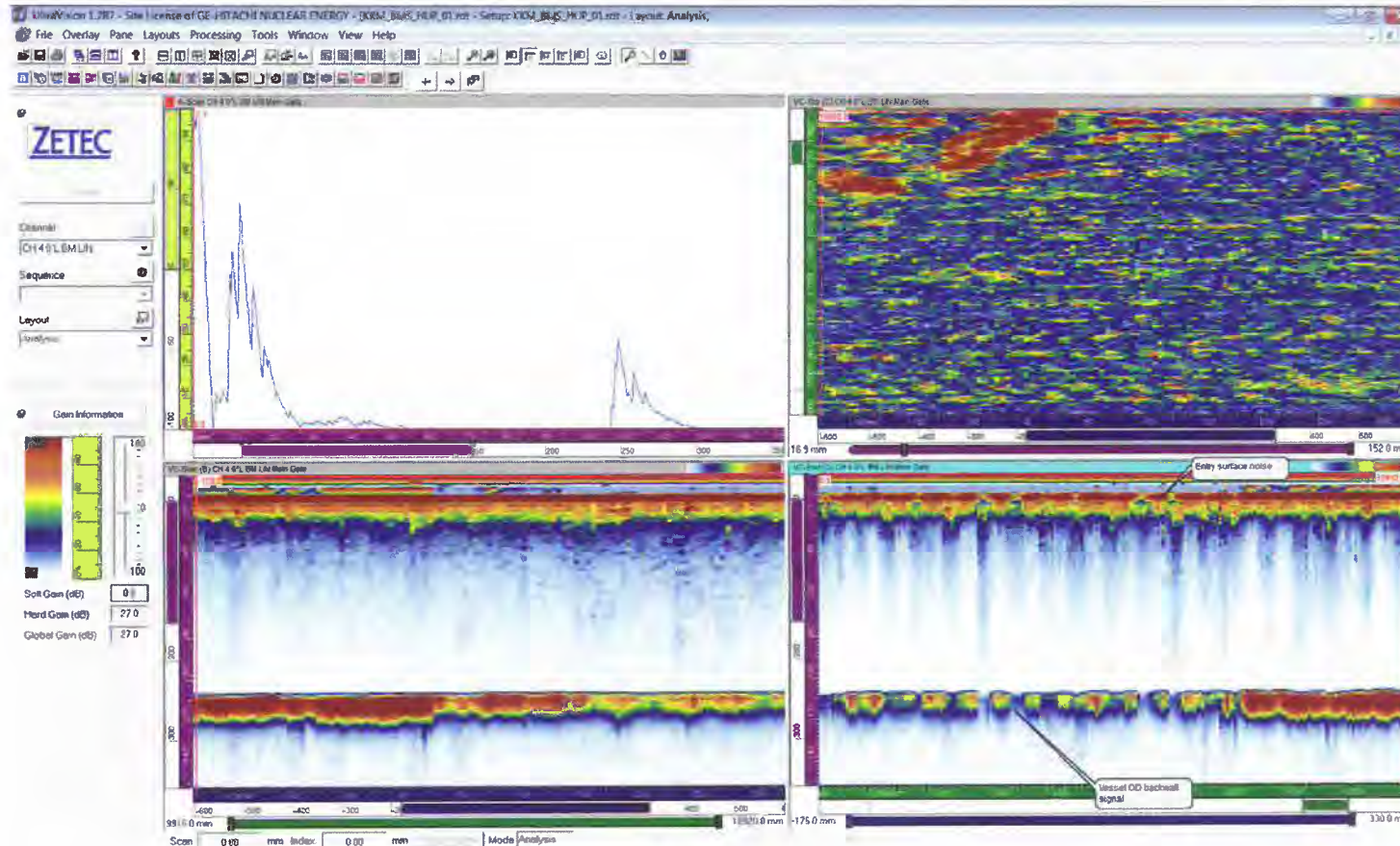




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 4 - 0° straight beam scan

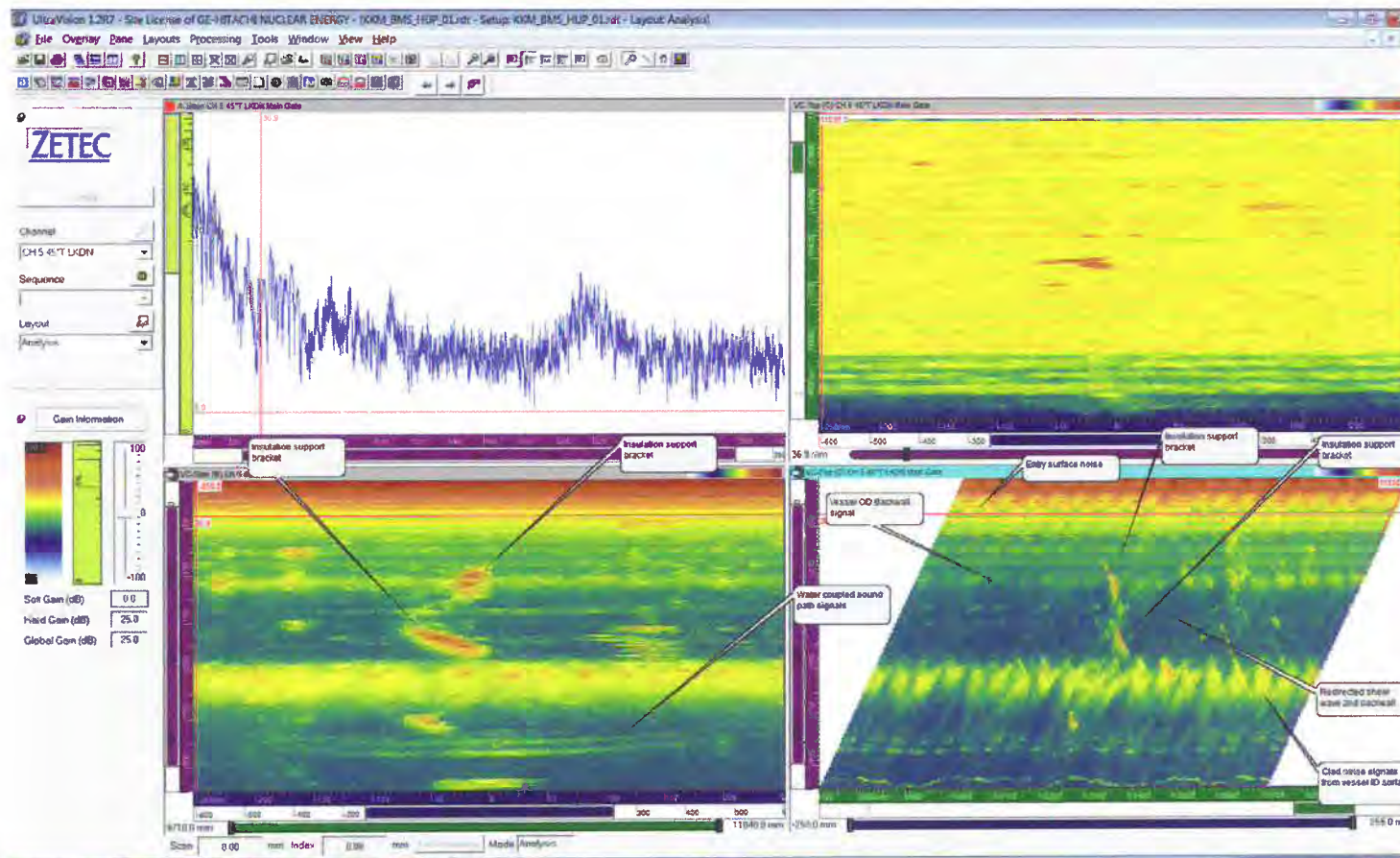




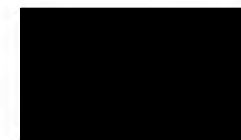
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 5 - 45° angle beam scan search unit looking up

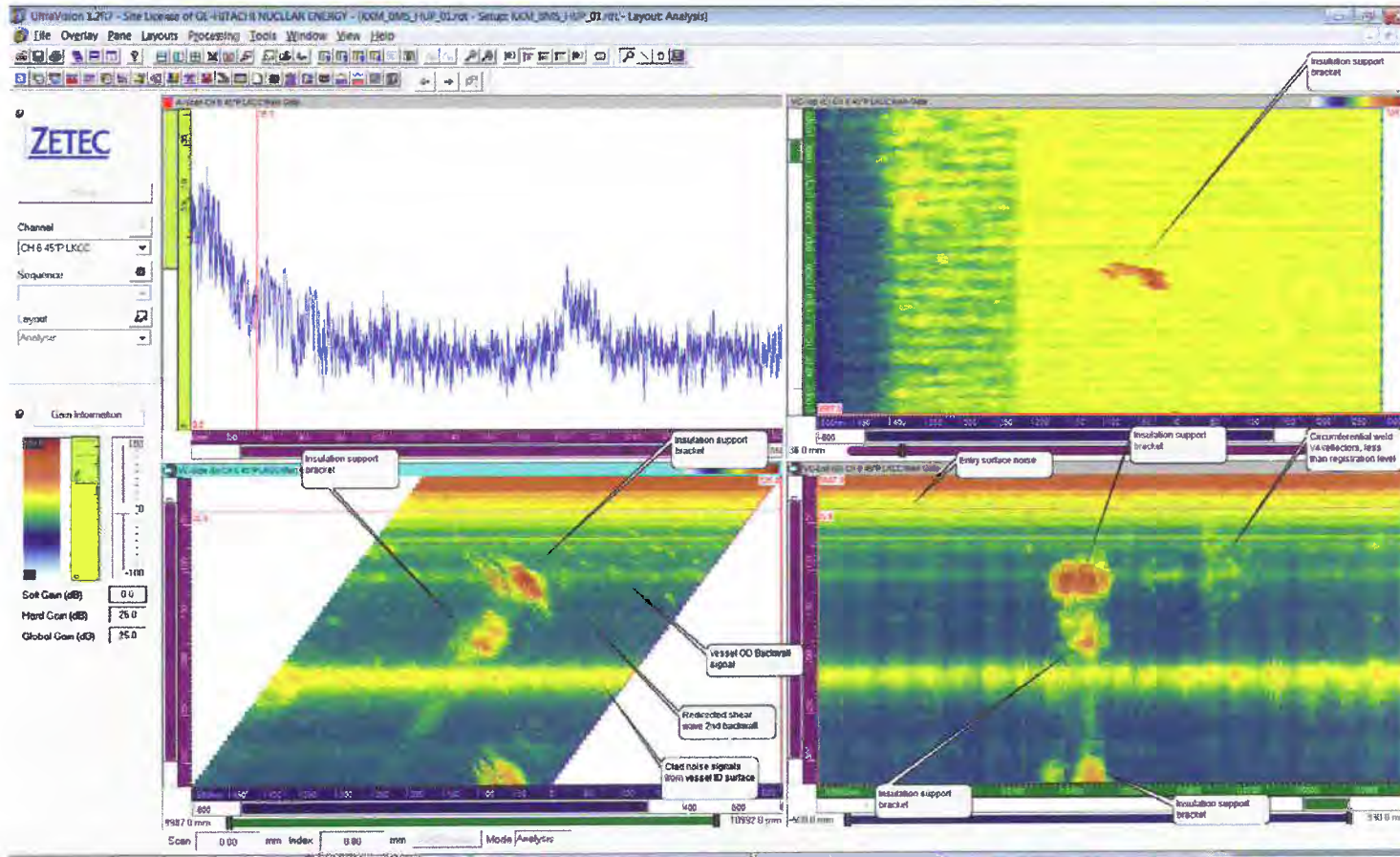




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 6 - 45° angle beam scan search unit looking clockwise

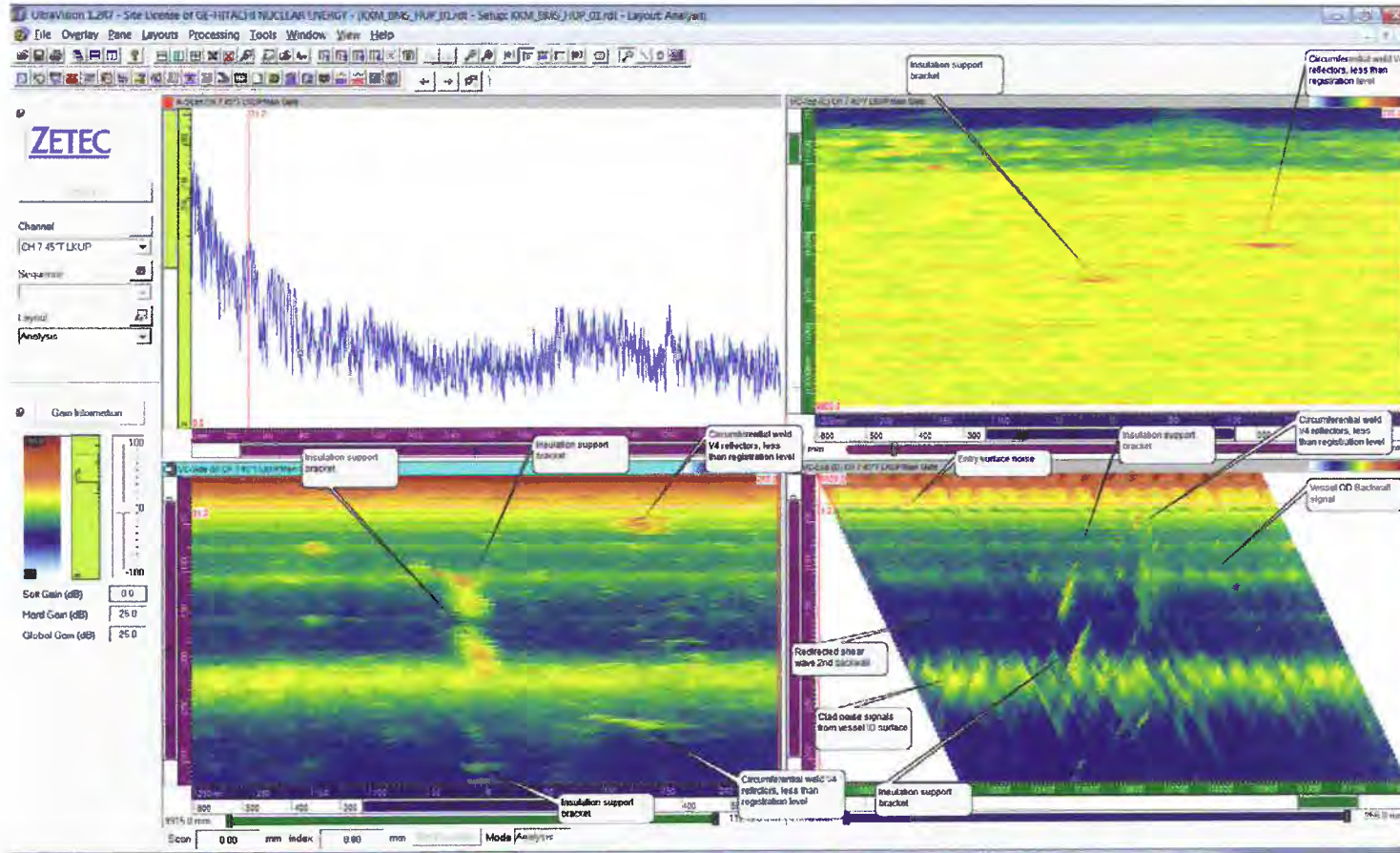




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 7 - 45° angle beam scan search unit looking down

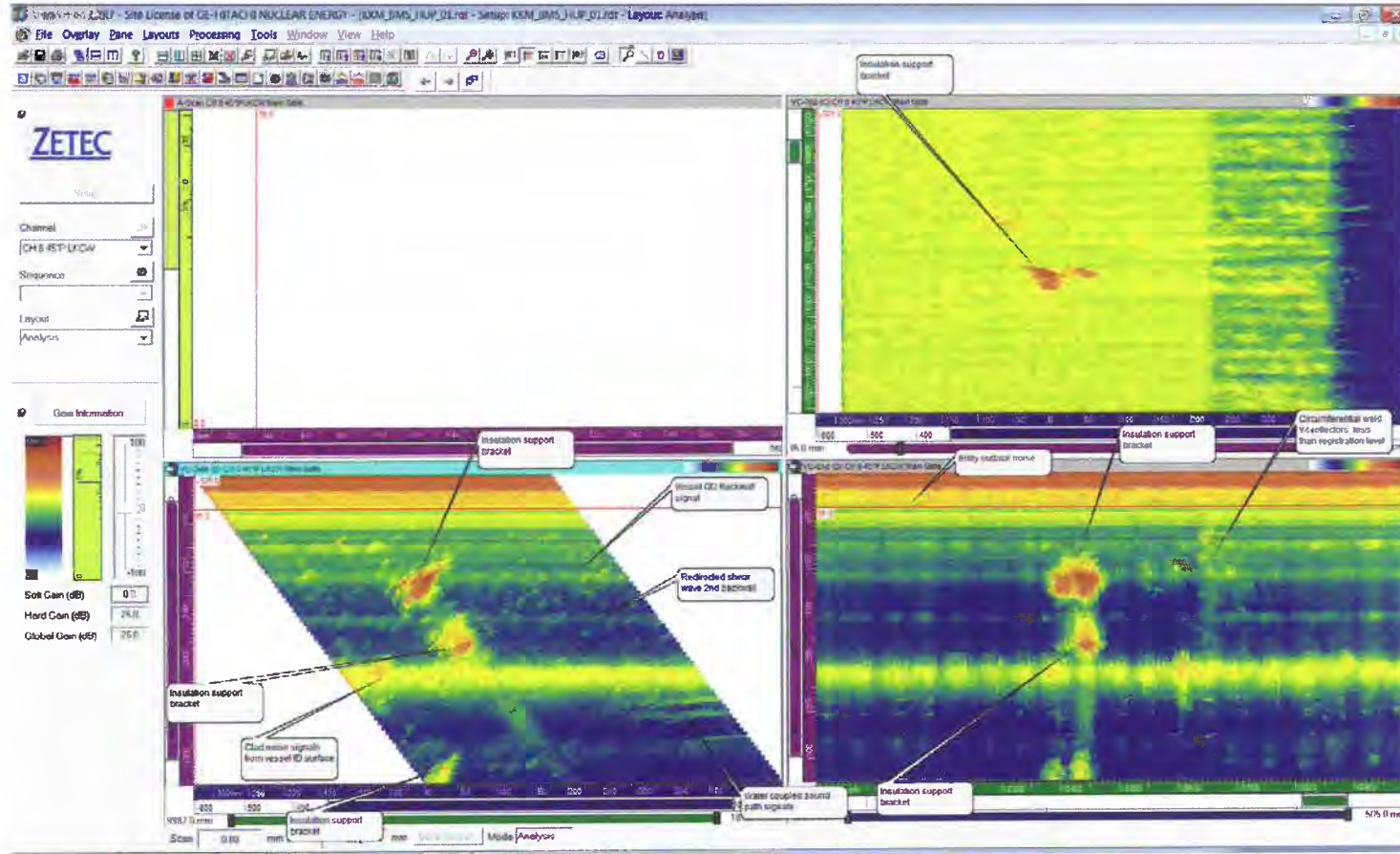




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_01



Channel 8 - 45° angle beam scan search unit looking counter-clockwise

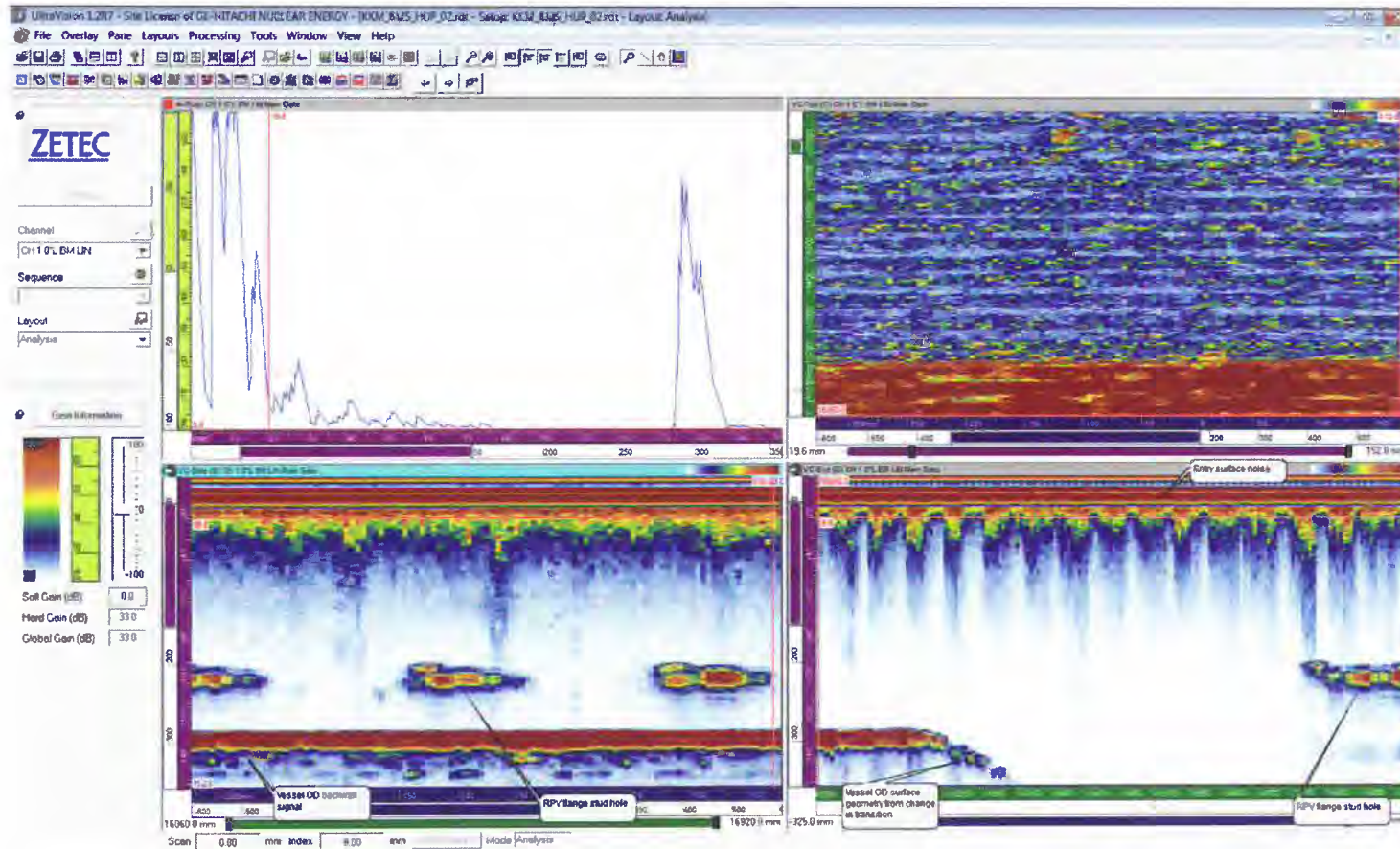




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 1 - 0° straight beam scan

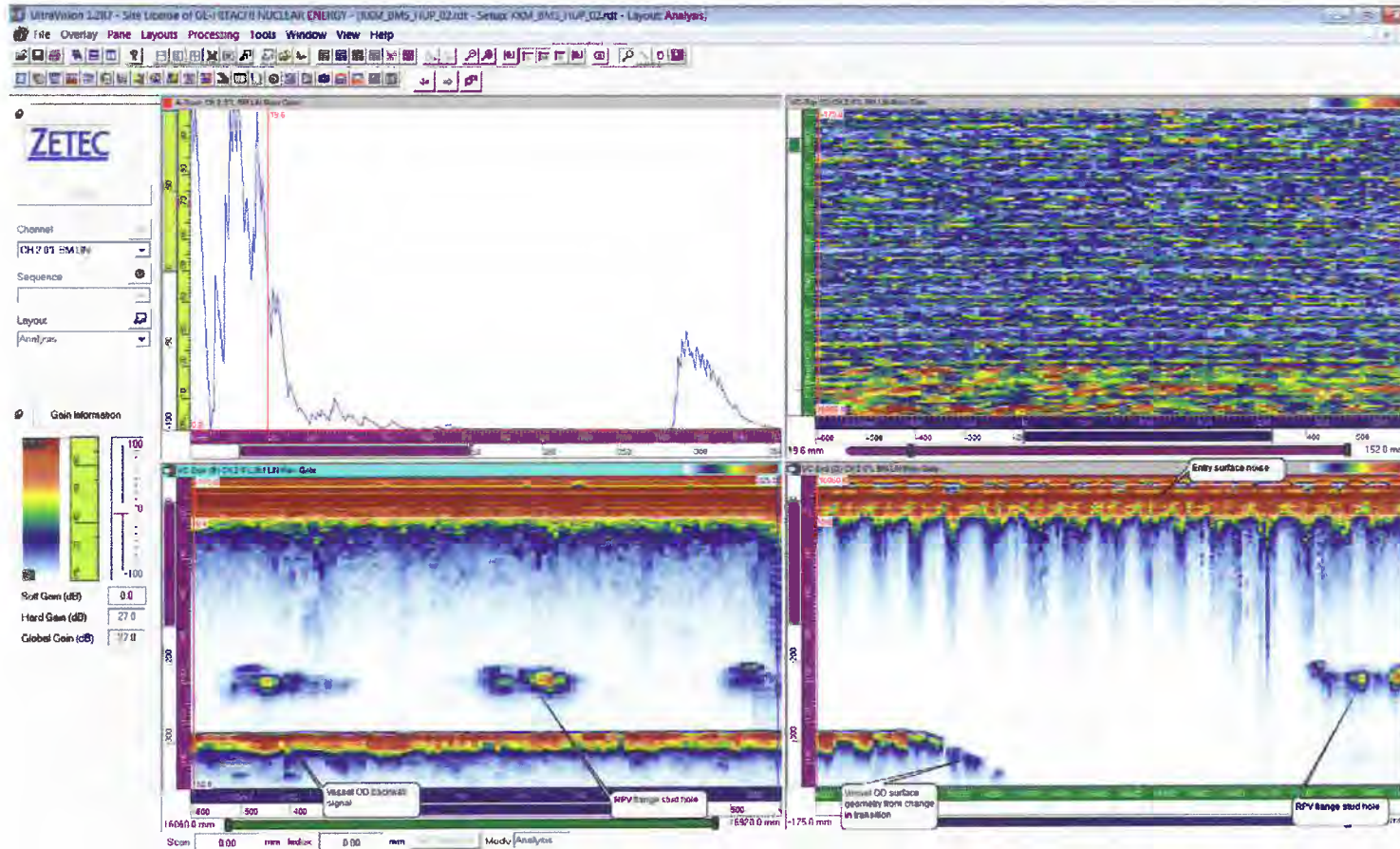




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 2 - 0° straight beam scan

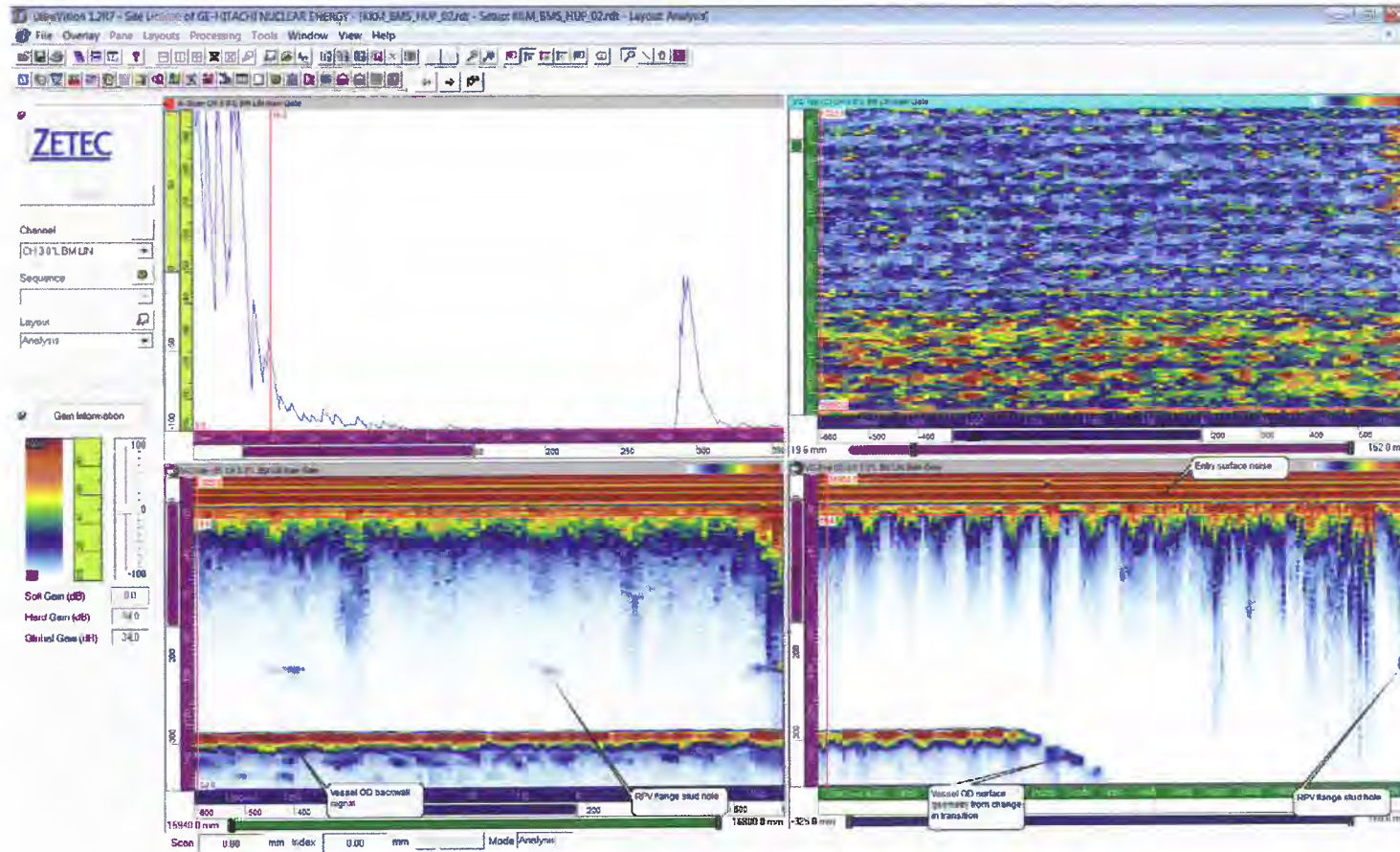




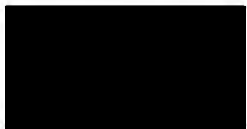
HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 3 - 0° straight beam scan



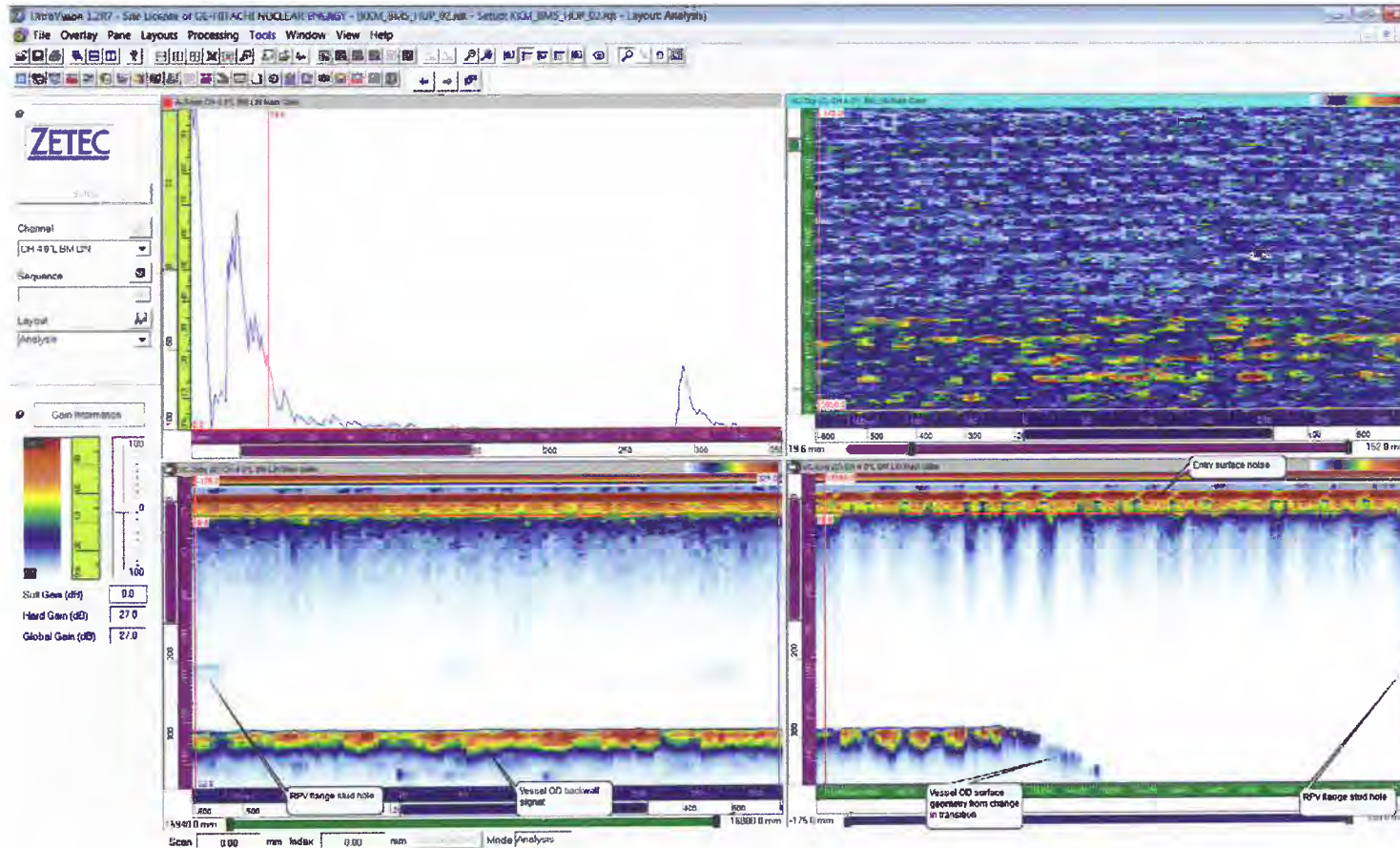




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 4 - 0° straight beam scan

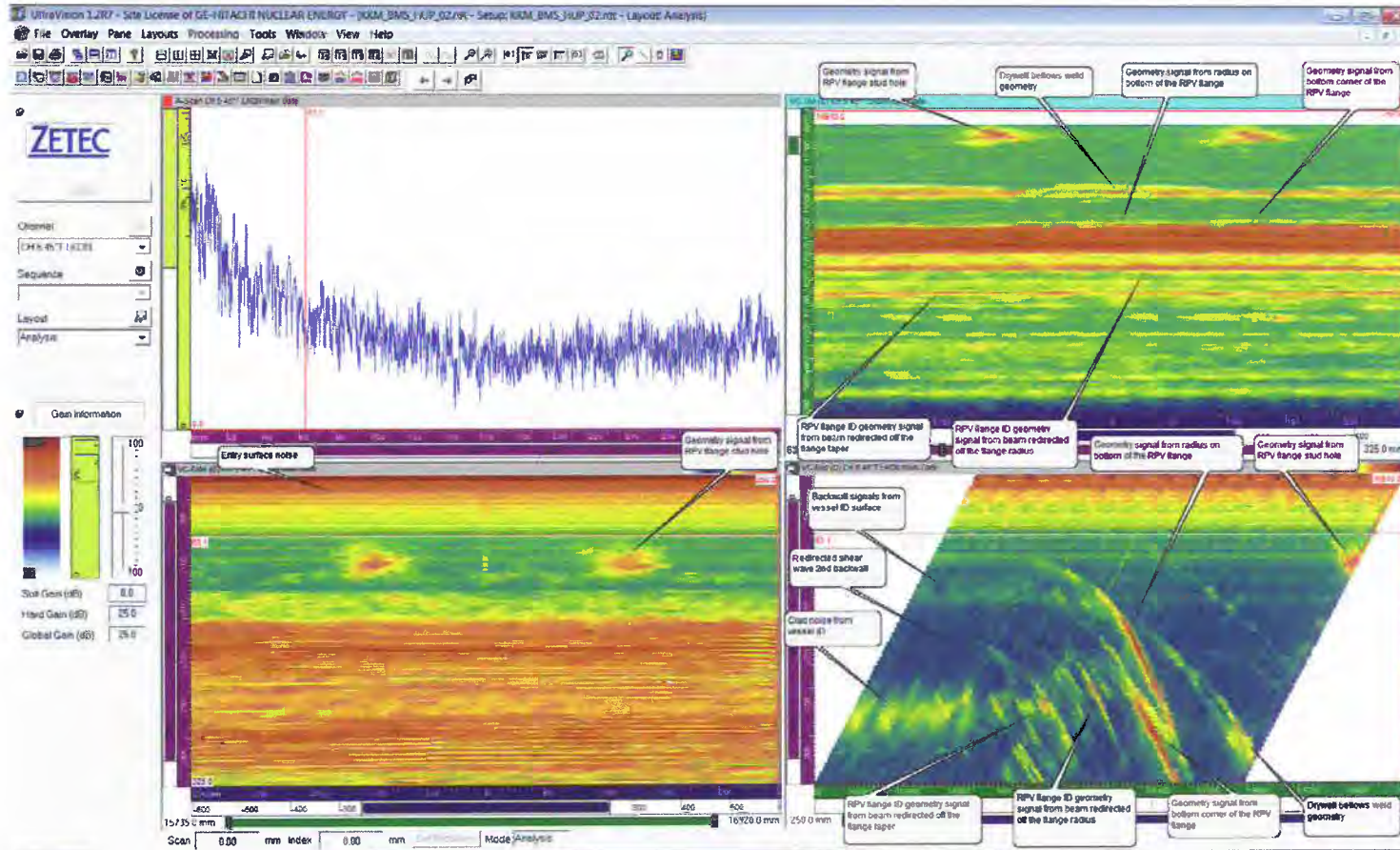




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 5 - 45° angle beam scan search unit looking up

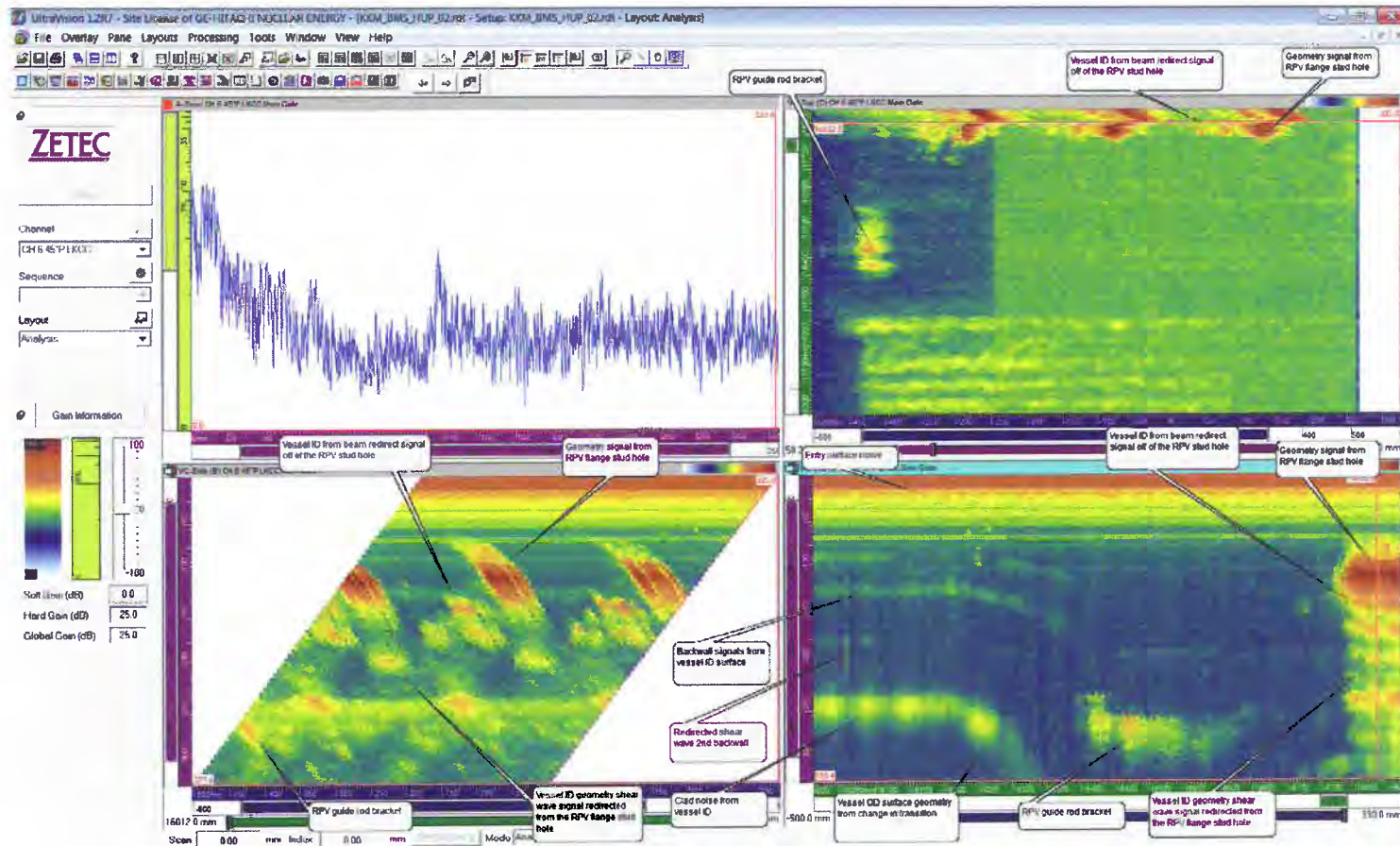




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 6 - 45° angle beam scan search unit looking clockwise

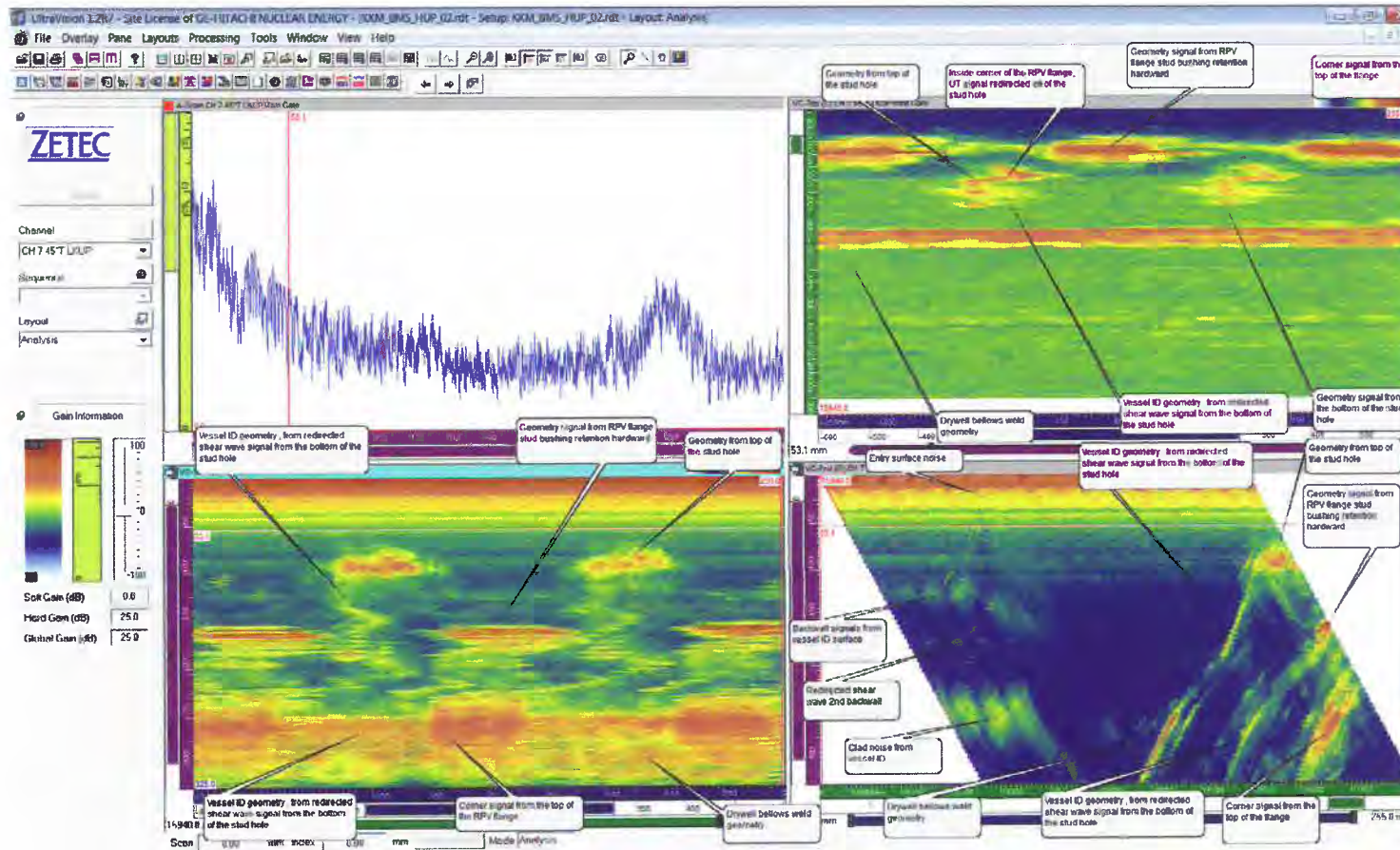




HITACHI

# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



Channel 7 - 45° angle beam scan search unit looking down

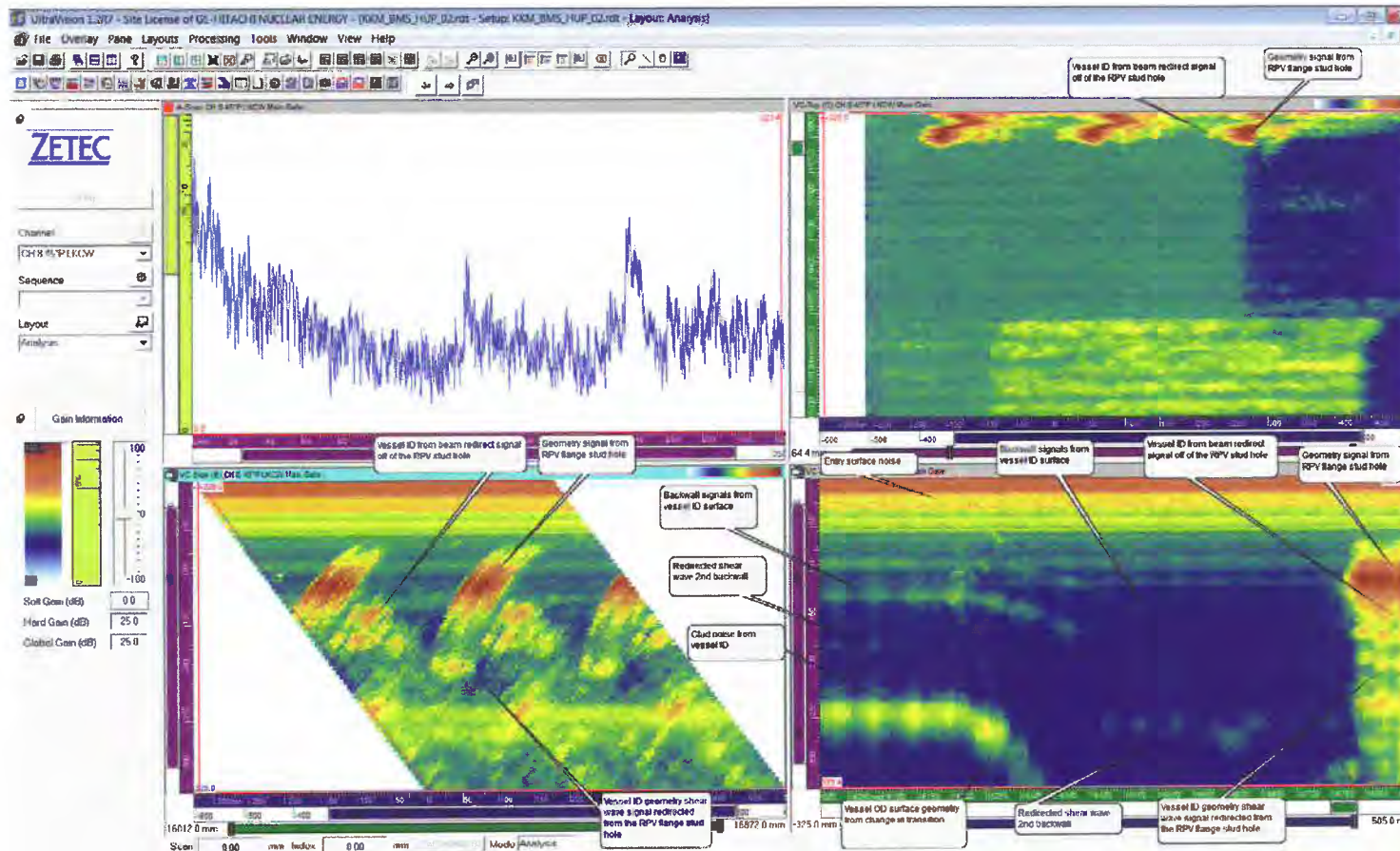




HITACHI

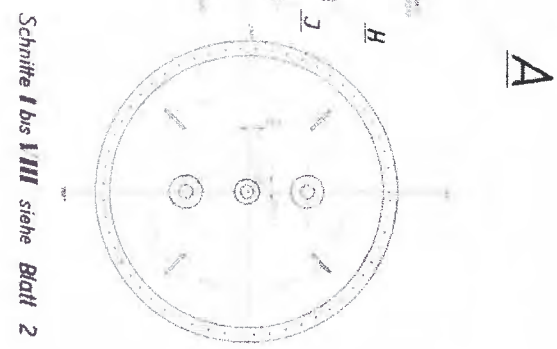
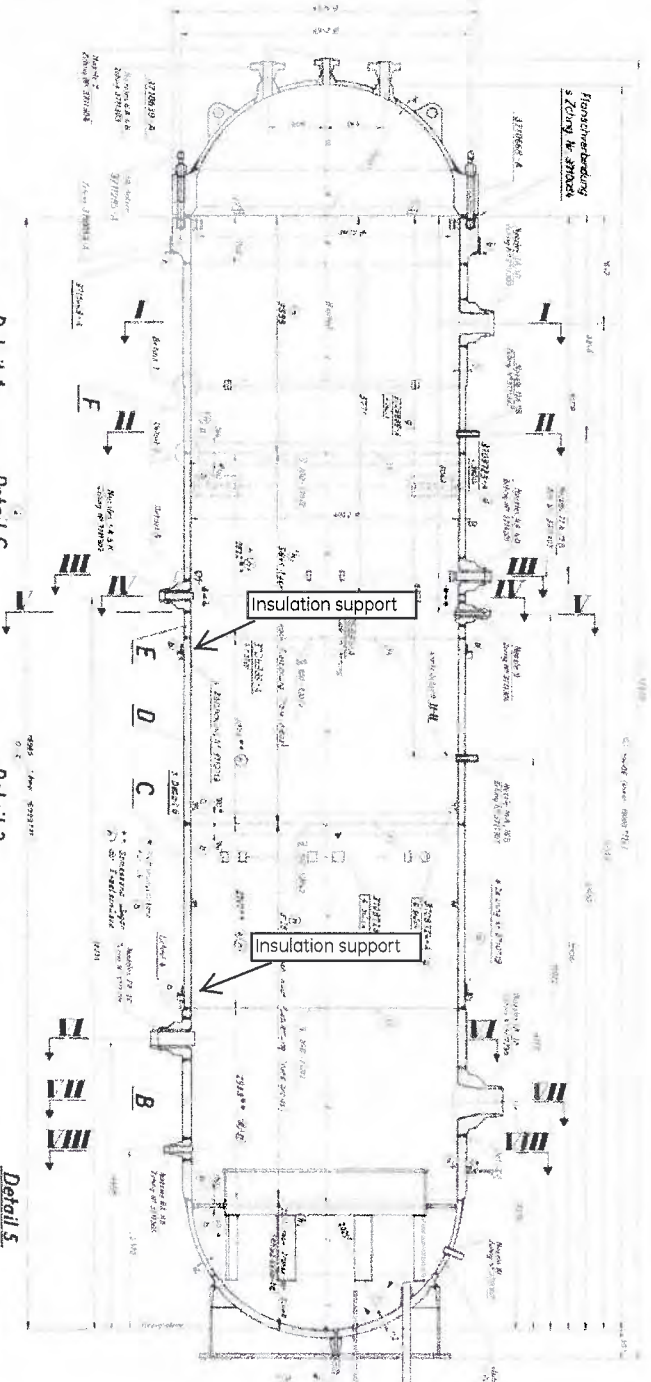
# KKM Screen Prints

Scan Patch KKM-BMS\_HUP\_02



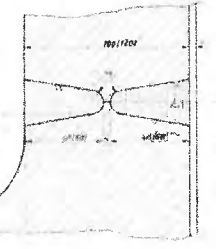
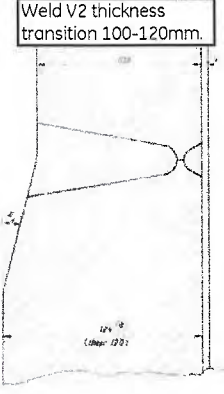
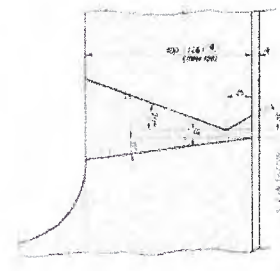
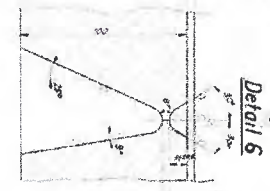
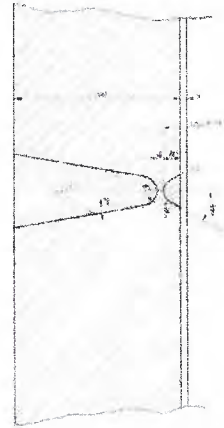
Channel 8 - 45° angle beam scan search unit looking counter-clockwise





Shell course 5 thickness transition 100-120mm

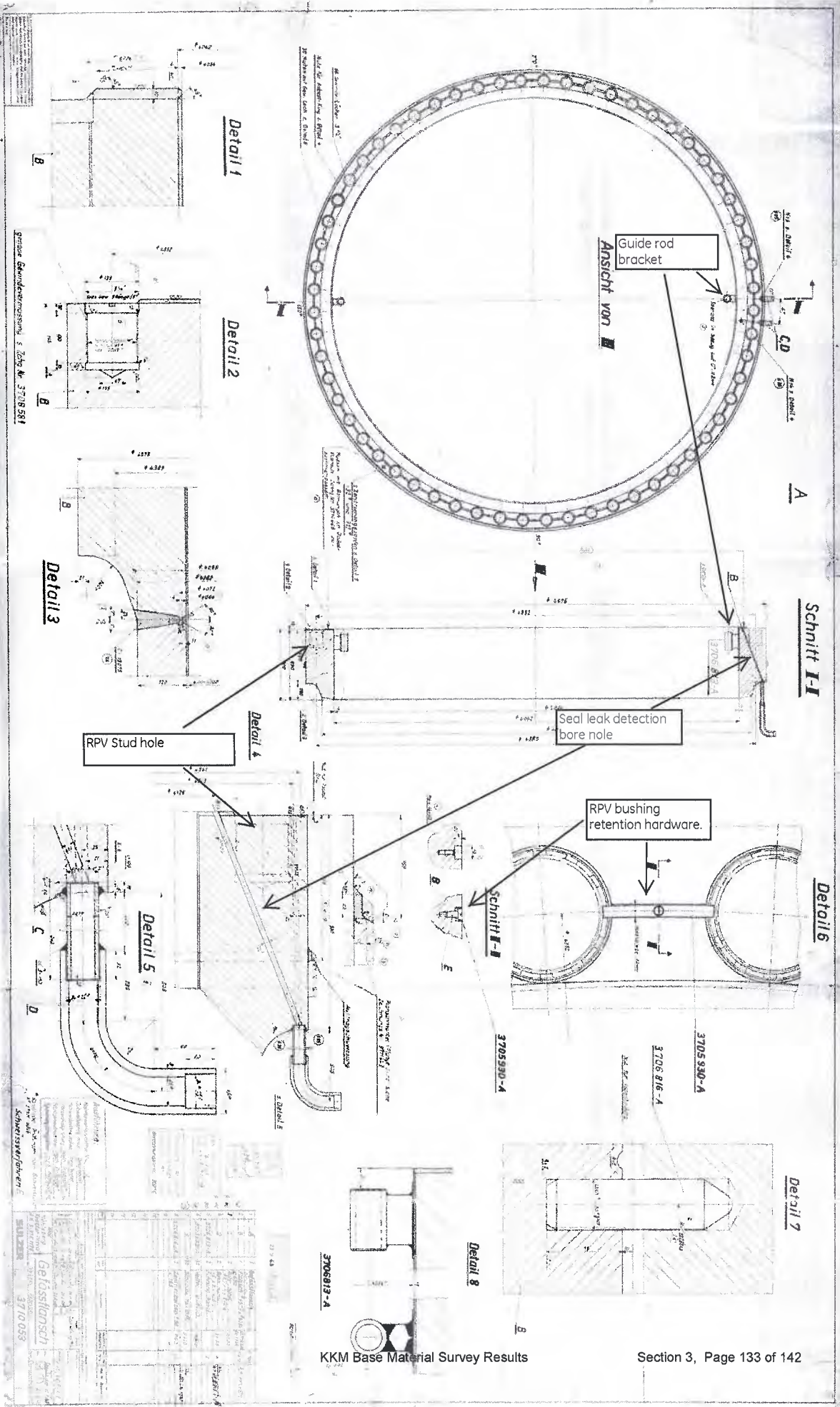
Weld V2 thickness transition 100-120mm.



Item No.	Part Name	Material	Quantity	Unit	Notes
1	...	...	...	...	...
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SUZER 3710663

BKW\_005652.02



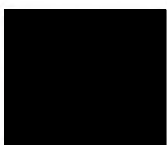


**HITACHI**

# KKM Screen Prints



Vertical Clad Patch Seen in Patches 10 and 11







**HITACHI**

# SP2000 RPV Examination Scan Files Data Sheet

**Project :** KKM  
**Component :** RPV Base Material Survey  
**Report No. :** RPV-2012-001

**Procedure No. :** GEH-UT-728  
**Revision :** 0  
**DRR No. :** N/A

Scan File	Date	Drive Start (mm)	Drive Stop (mm)	Drive Direction	Drive Distance (mm)	Start Time	Stop Time
KKM_BMS_HD_01	26-08-12	16300	16025	Down	-275	1623	1631
KKM_BMS_HD_02	26-08-12	16045	15130	Down	-915	1649	1715
KKM_BMS_HD_03	26-08-12	15155	14155	Down	-1000	1730	1809
KKM_BMS_HD_04	26-08-12	15155	15025	Down	-130	1827	1833
KKM_BMS_HD_05	26-08-12	15155	14155	Down	-1000	1840	1912
KKM_BMS_HD_06	26-08-12	14180	13180	Down	-1000	1915	1946
KKM_BMS_HD_07	26-08-12	13205	12205	Down	-1000	1950	2027
KKM_BMS_HD_08	26-08-12	12230	11730	Down	-500	2036	2058
KKM_BMS_HD_09	26-08-12	10200	9175	Down	-1025	2255	2322
KKM_BMS_HD_10	26-08-12	9200	8175	Down	-1025	2327	2355
KKM_BMS_HD_11	27-08-12	8200	7175	Down	-1025	0001	0029
KKM_BMS_HD_12	27-08-12	7200	6175	Down	-1025	0036	0105
KKM_BMS_HD_13	27-08-12	6200	5175	Down	-1025	0107	0137
KKM_BMS_HD_14	27-08-12	5200	4175	Down	-1025	0145	0251

**Comments :** Rotation angles specified are for the head down scan configuration. Scanning was restricted due to the feedwater spargers, core spray piping, jet pump diffuser and shroud support plate.

SEARCH UNIT DATA;							
No.	Mfg.	S/N	Angle Mode	Size	Freq.	Rotation	
1	GEIT	01V7V7	0° / L	1 (25.4) mm	2.25	0°	
2	GEIT	025WY4	0° / L	1 (25.4) mm	2.25	0°	
3	GEIT	025WY5	0° / L	1 (25.4) mm	2.25	0°	
4	GEIT	025WY6	0° / L	1 (25.4) mm	2.25	0°	
5	GEIT	01V5NC	45° / S	1 (23 x 25)mm	2.25	90°	
6	GEIT	01V5ND	45° / S	1 (23 x 25)mm	2.25	0°	
7	GEIT	01V5NH	45° / S	1 (23 x 25)mm	2.25	270°	
8	GEIT	01V5NJ	45° / S	1 (23 x 25)mm	2.25	180°	

**Thermometer S/N :** KKM Equipment    **Software Rev. :** V1.2R7  
**Vessel Temp. (°F) :** 85°F / 87°F    **Couplant :** Water

**Operators :** XXXXXXXXXX

KKM Base Material Survey Results

Section 3, Page 135 of 142





**HITACHI**

# SP2000 RPV Examination Scan Files Data Sheet

**Project :** KKM  
**Component :** RPV Base Material Survey  
**Report No. :** RPV-2012-001

**Procedure No. :** GEH-UT-728  
**Revision :** 0  
**DRR No. :** N/A

Scan File	Date	Drive Start (mm)	Drive Stop (mm)	Drive Direction	Drive Distance (mm)	Start Time	Stop Time
KKM_BMS_HD_15	27-08-12	4200	3245	Down	-955	0300	0336
KKM_BMS_HD_16	27-08-12	8200	7310	Down	-890	0840	0928
KKM_BMS_HD_17	27-08-12	7175	7310	Up	135	0937	0941
KKM_BMS_HD_18	27-08-12	2360	2550	Up	190	1100	1115
KKM_BMS_HD_19	27-08-12	2450	3500	Up	1050	1120	1200
~	~	~	~	~	~	~	~
KKM_BMS_HUP_01	27-08-12	10975	9975	Down	-1000	0536	0605
KKM_BMS_HUP_02	27-08-12	16855	16000	Down	-855	0700	0725
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~

**Comments :** Rotation angles specified are for the head down scan configuration. Scanning was restricted due to the feedwater spargers, core spray piping, jet pump diffuser and shroud support plate.

**Thermometer S/N :** KKM Equipment    **Software Rev. :** V1.2R7  
**Vessel Temp. (°F) :** 87°F / 87°F    **Couplant :** Water

**Operators :** [Redacted]

SEARCH UNIT DATA;							
No.	Mfg.	S/N	Angle Mode	Size	Freq.	Rotation	
1	GEIT	01V7V7	0° / L	1 (25.4) mm	2.25	0°	
2	GEIT	025WY4	0° / L	1 (25.4) mm	2.25	0°	
3	GEIT	025WY5	0° / L	1 (25.4) mm	2.25	0°	
4	GEIT	025WY6	0° / L	1 (25.4) mm	2.25	0°	
5	GEIT	01V5NC	45° / S	1 (23 x 25)mm	2.25	90°	
6	GEIT	01V5ND	45° / S	1 (23 x 25)mm	2.25	0°	
7	GEIT	01V5NH	45° / S	1 (23 x 25)mm	2.25	270°	
8	GEIT	01V5NJ	45° / S	1 (23 x 25)mm	2.25	180°	
~	~	~	~	~	~	~	
~	~	~	~	~	~	~	
~	~	~	~	~	~	~	
~	~	~	~	~	~	~	

KKM Base Material Survey Results

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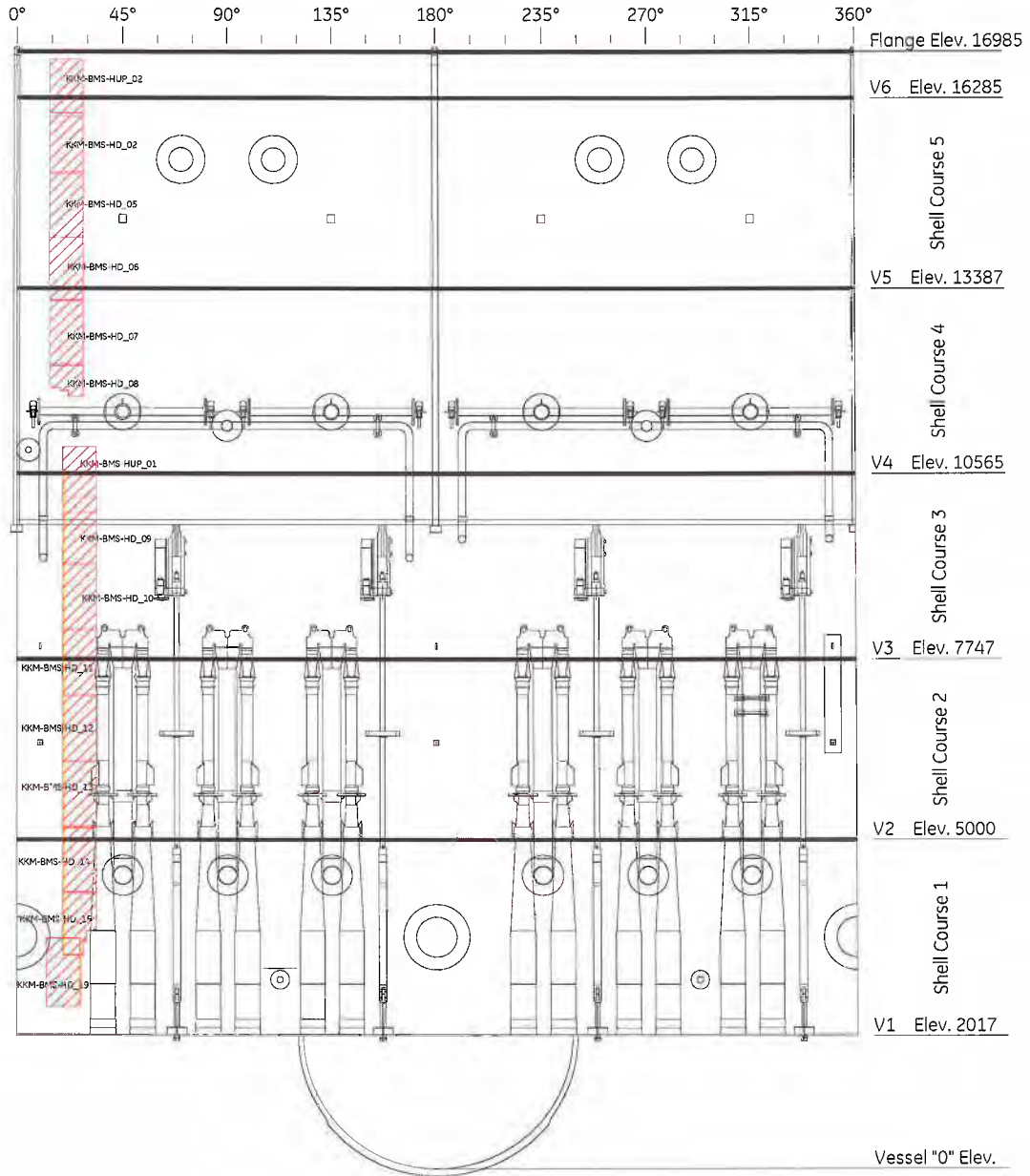




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# KKM Coverage Drawings

## KKM Reactor Pressure Vessel

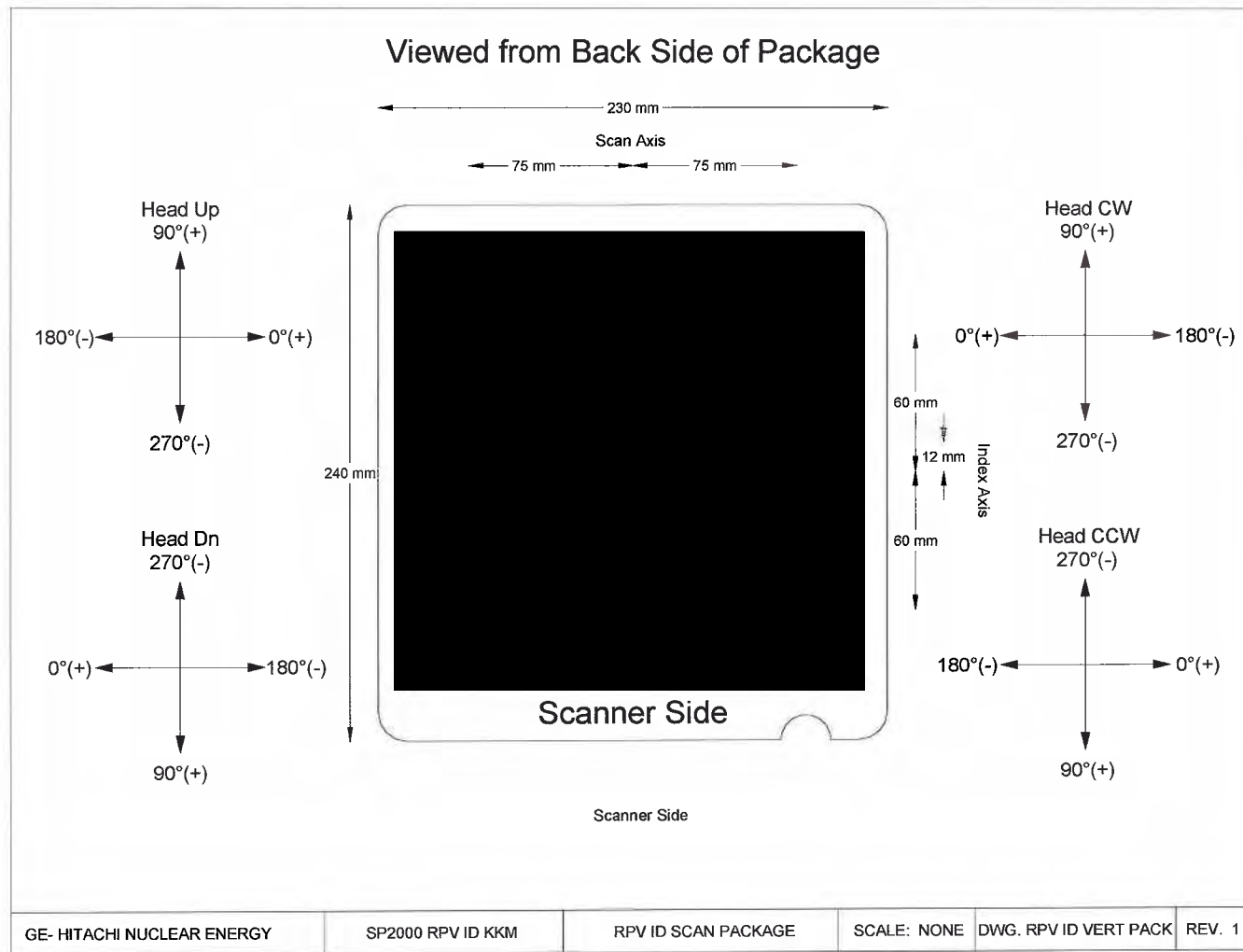


Coverage Figure 1 - As Scanned Coverage Map



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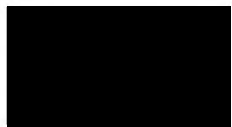
# KKM Coverage Drawings



KKM Base Material Survey Results

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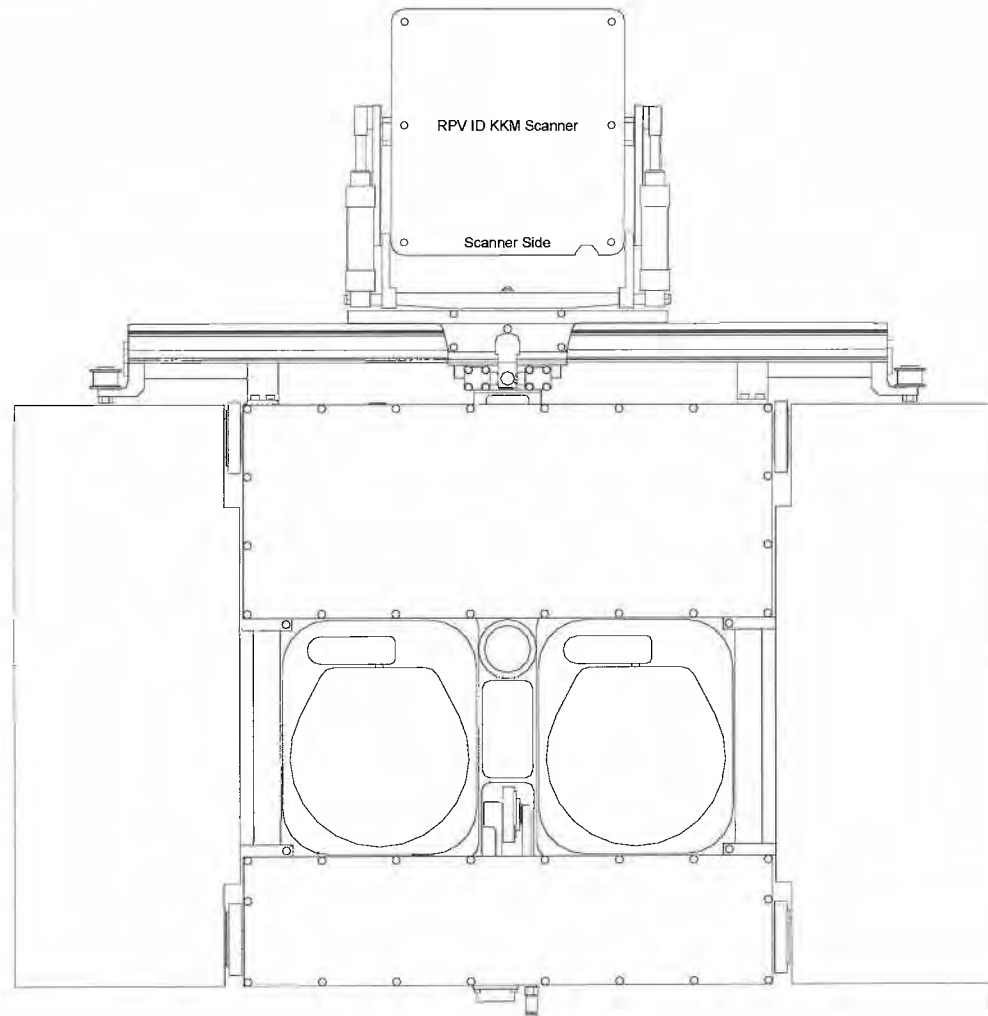
Coverage Figure 2 – RPVID Search Unit Package for KKM





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# KKM Coverage Drawings



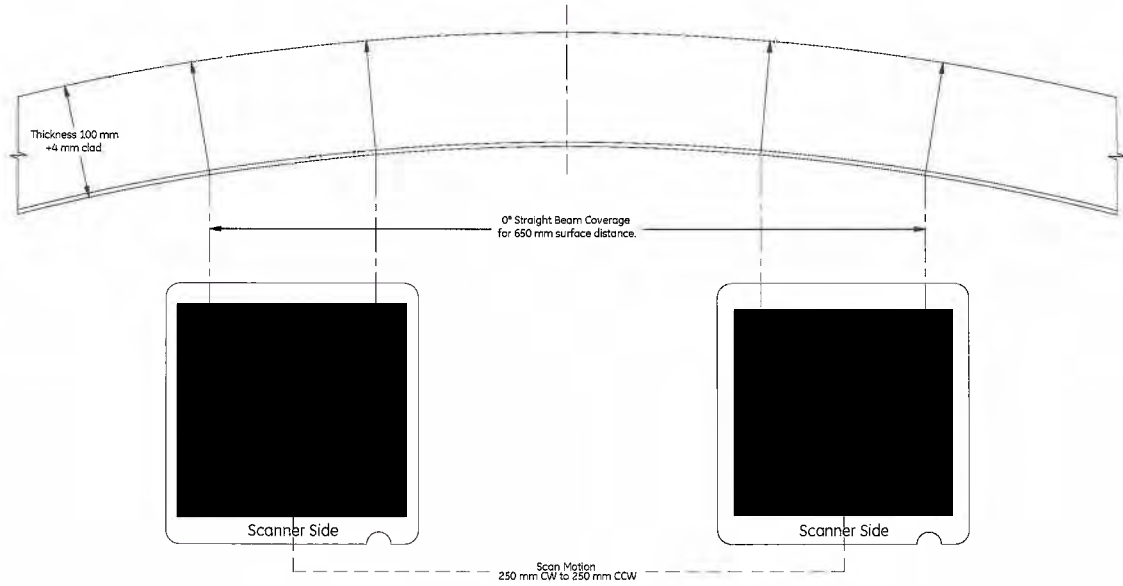
Coverage Figure 3 - RPVID Scanner in Heads Up Configuration for KKM



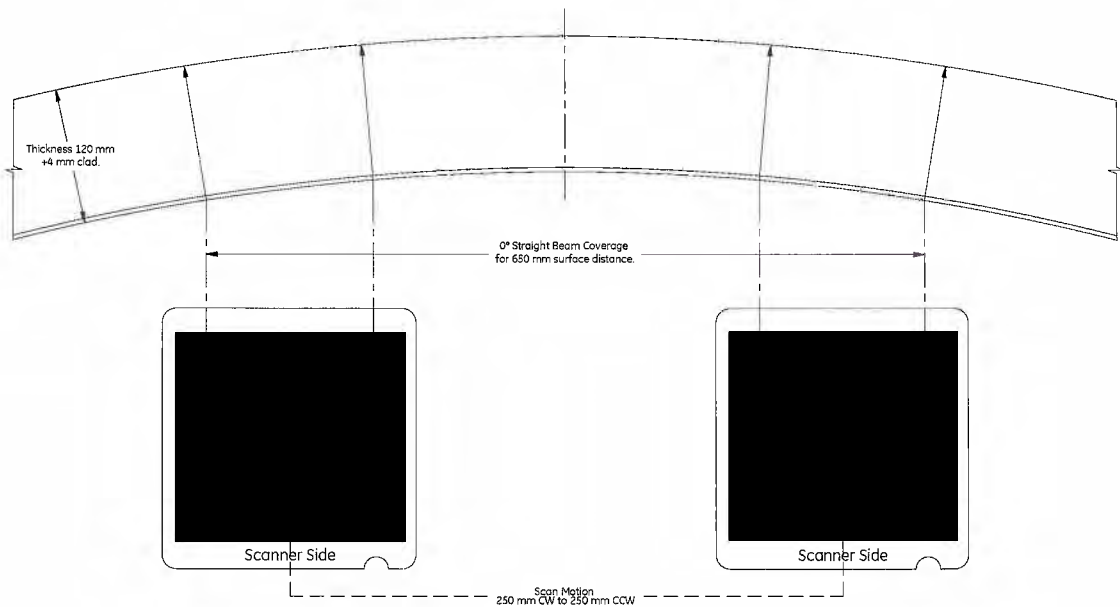


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# KKM Coverage Drawings



Coverage Figure 4 – 0° Straight Beam Coverage for 100mm T Areas



Coverage Figure 5 – 0° Straight Beam Coverage for 100mm T Areas



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# KKM Coverage Drawings

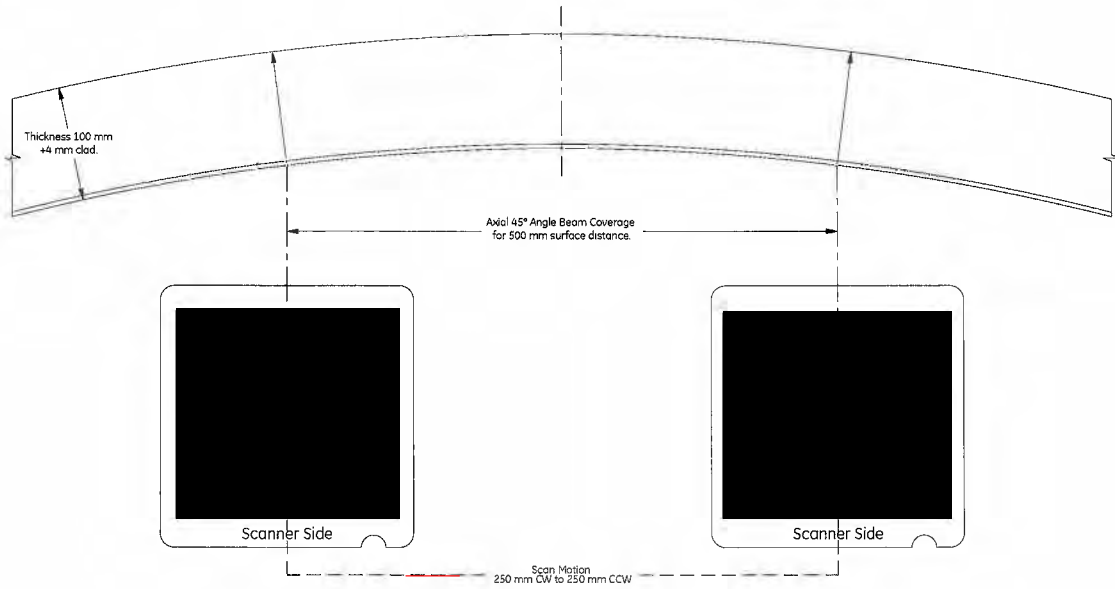


Figure 6 – Axial 45° Angle Beam Coverage for 100mm T Areas

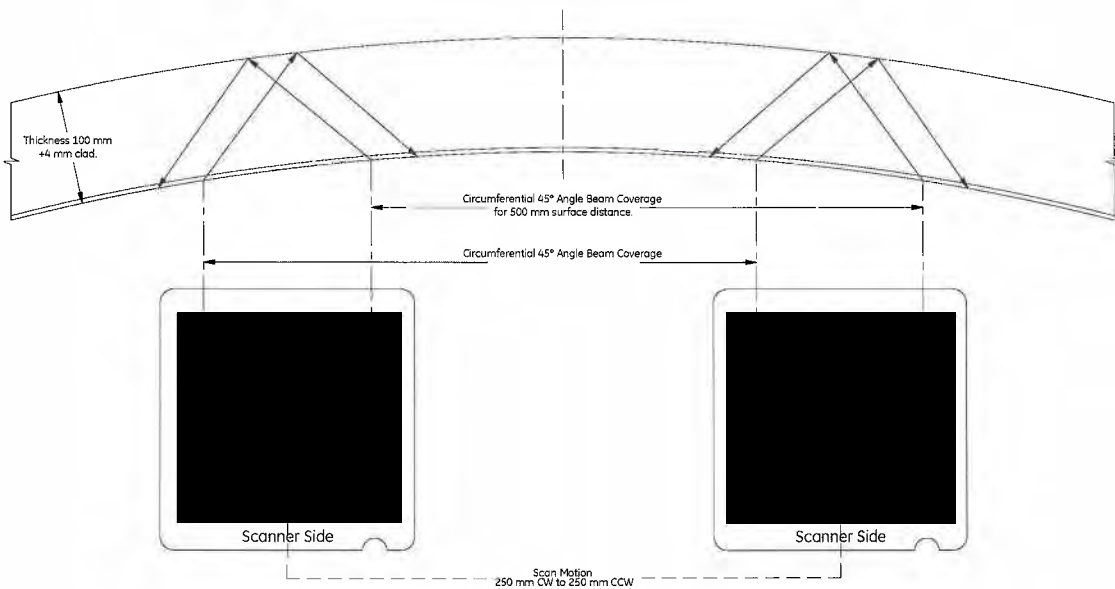


Figure 7 – Circumferential 45° Angle Beam Coverage for 100mm T Areas





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# KKM Coverage Drawings

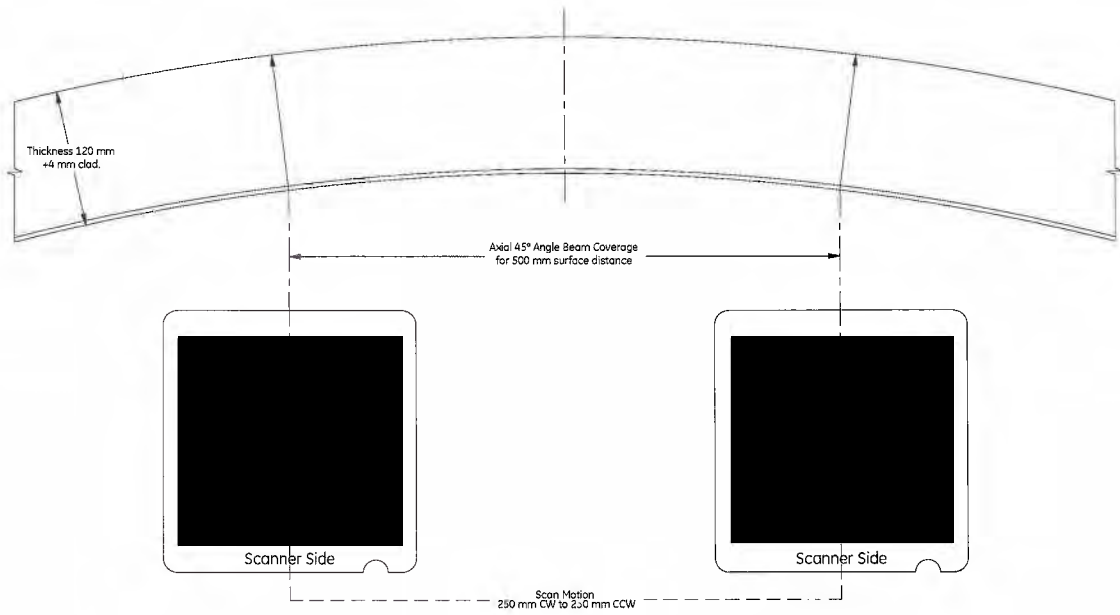


Figure 8 – Axial 45° Angle Beam Coverage for 120mm T Areas

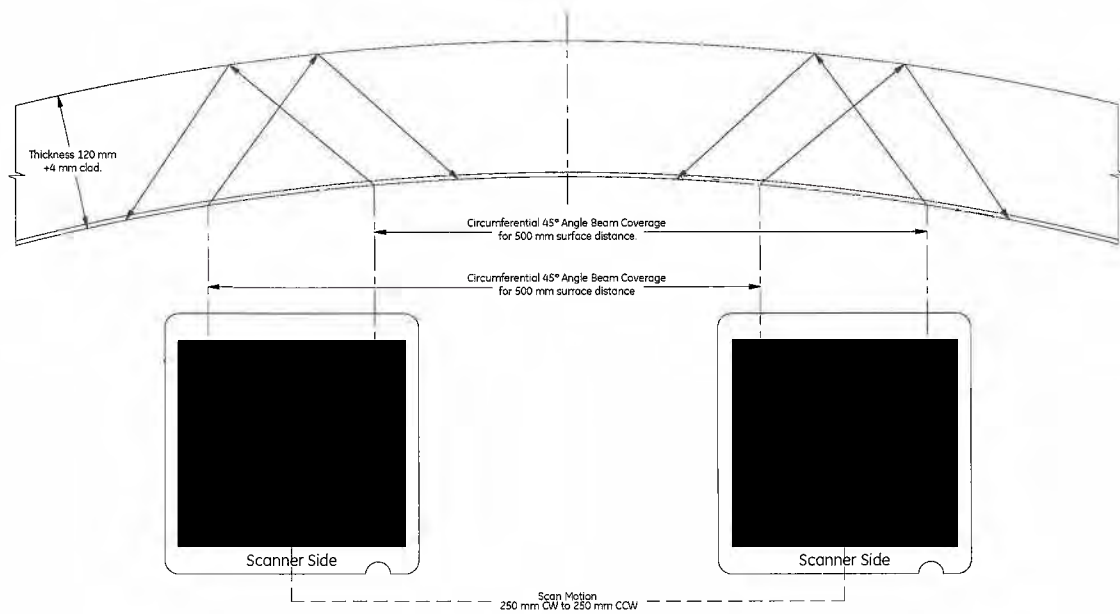


Figure 9 – Circumferential 45° Angle Beam Coverage for 120mm T Areas







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## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-001

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: <u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board: <u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board: <u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board: <u>Zetec / EQTXE159B-003</u> Manufacturer / Model	
Search Unit: <u>GEIT</u> Manufacturer	<u>01V7V7</u> Serial No.	<u>389-061-101</u> Model	<u>2.25 MHz.</u> Frequency
<u>0° / Longitudinal</u> Nominal Angle / Mode	<u>N/A</u> Measured Angle	<u>1(25.4) mm / Round</u> Element Size / Shape	<u>N/A</u> Focus
Cables: <u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>79.4%</u>	<u>19.2%</u>	<u>9.0%</u>	<u>~</u>
Sweep:	<u>35.4</u>	<u>72.1</u>	<u>109.1</u>	<u>~</u>
Gain (dB):	<u>33</u>	<u>33</u>	<u>33</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u> Calibration Block S/N	<u>CSCL</u> Block Material	<u>148 mm / Flat</u> Nominal "T" Diameter		
<u>272782</u> Thermometer S/N	<u>RX Grade Water</u> Couplant Type	<u>N/A</u> Couplant Batch No.		

<u>Channel ID</u>	<u>CH 1 0°L BM LIN</u>
<u>General</u>	
Time Base Start:	<u>-0.180</u> Range: <u>152.198</u>
Units: <u>True Depth (mm)</u>	

<u>Digitizer</u>			
Synchro:	<u>Pulse</u>	A-Scan:	<u>Checked</u>
Averaging:	<u>1</u>	Sample Size:	<u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition:	<u>105</u>
Compression:	<u>1</u>	Max Recurrence:	<u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>1600</u>	<u>25-08-12</u>	<u>76</u>	<u>SG/NS</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1630</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>			
Configuration:	<u>Conventional Pulse-Echo</u>		
Pulser:	<u>P1</u>	Receiver:	<u>R1</u>
Voltage (V):	<u>300</u>	Scale Type:	<u>LIN</u>
Width (ns):	<u>222</u>	Rectification:	<u>Bipolar</u>
High Pass:	<u>1.0 MHz.</u>	Smoothing:	<u>Digital</u>
Low Pass:	<u>5.0 MHz.</u>		

Comments

Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>			
Wave Type:	<u>Longitudinal</u>	Scan Offset:	<u>+75 mm</u>
Velocity:	<u>5890 m./sec.</u>	Index Offset:	<u>-60 mm</u>
Wedge Delay:	<u>1.901</u>	Nom. Angle:	<u>0°</u>
		Skew Angle:	<u>0°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date	<u>[REDACTED]</u> KKM Review	<u>31.08.12</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>[REDACTED]</u> Level	<u>29-08-12</u> Date	<u>[REDACTED]</u> SVII Review	<u>30.08.12</u> Date
				<u>1</u> Page



# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-002

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: <u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board: <u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board: <u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board: <u>Zetec / EQTXE159B-003</u> Manufacturer / Model	
Search Unit: <u>GEIT</u> Manufacturer	<u>025WY4</u> Serial No.	<u>389-061-101</u> Model	<u>2.25 MHz.</u> Frequency
<u>0° / Longitudinal</u> Nominal Angle / Mode	<u>N/A</u> Measured Angle	<u>1(25.4) mm / Round</u> Element Size / Shape	<u>N/A</u> Focus
Cables: <u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>77.6%</u>	<u>28.6%</u>	<u>13.9%</u>	<u>~</u>
Sweep:	<u>35.9</u>	<u>72.1</u>	<u>109.1</u>	<u>~</u>
Gain (dB):	<u>27</u>	<u>27</u>	<u>27</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u> Calibration Block S/N	<u>CSCL</u> Block Material	<u>148 mm / Flat</u> Nominal "T" / Diameter		
<u>272782</u> Thermometer S/N	<u>RX Grade Water</u> Couplant Type	<u>N/A</u> Couplant Batch No.		

<u>Channel ID</u>	<u>CH 2 0°L 8M LIN</u>	
<u>General</u>		
Time Base Start:	<u>-0.180</u>	Range: <u>152.198</u>
Units: <u>True Depth (mm)</u>		
<u>Digitizer</u>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>1900</u>	<u>25-08-12</u>	<u>76</u>	<u>SG/NS</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1438</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>			
Configuration:	<u>Conventional Pulse-Echo</u>		
Pulser:	<u>P2</u>	Receiver:	<u>R2</u>
Voltage (V):	<u>300</u>	Scale Type:	<u>LIN</u>
Width (ns):	<u>222</u>	Rectification:	<u>Bipolar</u>
High Pass:	<u>1.0 MHz.</u>	Smoothing:	<u>Digital</u>
Low Pass:	<u>5.0 MHz.</u>		

Comments

Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>			
Wave Type:	<u>Longitudinal</u>	Scan Offset:	<u>-75 mm</u>
Velocity:	<u>5890 m./sec.</u>	Index Offset:	<u>-60 mm</u>
Wedge Delay:	<u>1.901</u>	Nom. Angle:	<u>0°</u>
		Skew Angle:	<u>0°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date	<u>[REDACTED]</u> KKM Review	<u>31/08/12</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>III</u> Level	<u>29-08-12</u> Date	<u>[REDACTED]</u> SVII Review	<u>30.8.12</u> Date
				<u>2</u> Page



# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-003

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: Zetec / Z-Scan UT 518100 UltraVision V1.2R7 UltraVision V1.2R7  
 Manufacturer / Model System Serial No. Acquisition Software Analysis Software  
 Pulser/Receiver Main Board: Zetec / EQEX100D-004 Zetec / EQEX101F Digitizer Board: Zetec / EQTXE159B-003  
 Manufacturer / Model Piggy Board: Manufacturer / Model Manufacturer / Model  
 Search Unit: GEIT 025WY5 389-061-101 2.25 MHz.  
 Manufacturer Serial No. Model Frequency  
0° / Longitudinal N/A 1(25.4) mm / Round N/A  
 Nominal Angle / Mode Measured Angle Element Size / Shape Focus  
 Cables: RG-174 / RG-174 240 ft. / 9 ft. / 1 ft. 2  
 Cable Type(s) Nominal Cable Length(s) No. of Intermediate Connectors

<u>Calibration</u>				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>83.1%</u>	<u>34.0%</u>	<u>11.0%</u>	<u>~</u>
Sweep:	<u>36.8</u>	<u>73.1</u>	<u>109.1</u>	<u>~</u>
Gain (dB):	<u>34</u>	<u>34</u>	<u>34</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u>	<u>CSCS</u>	<u>148 mm / Flat</u>		
<u>Calibration Block S/N</u>	<u>Block Material</u>	<u>Nominal "T" / Diameter</u>		
<u>272782</u>	<u>RX Grade Water</u>	<u>N/A</u>		
<u>Thermometer S/N</u>	<u>Couplant Type</u>	<u>Couplant Batch No.</u>		

<u>Channel ID</u>	<u>CH 3 0°L BM LIN</u>	
<u>General</u>		
Time Base Start:	<u>-0.180</u>	Range: <u>152.198</u>
Units: <u>True Depth (mm)</u>		
<u>Digitizer</u>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>0010</u>	<u>26-08-12</u>	<u>76</u>	<u>SG/NS</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1657</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>			
Configuration:	<u>Conventional Pulse-Echo</u>		
Pulser:	<u>P3</u>	Receiver:	<u>R3</u>
Voltage (V):	<u>300</u>	Scale Type:	<u>LIN</u>
Width (ns):	<u>222</u>	Rectification:	<u>Bipolar</u>
High Pass:	<u>1.0 MHz.</u>	Smoothing:	<u>Digital</u>
Low Pass:	<u>5.0 MHz.</u>		

Comments  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>		
Wave Type:	<u>Longitudinal</u>	Scan Offset: <u>-75 mm</u>
Velocity:	<u>5890 m./sec.</u>	Index Offset: <u>+60 mm</u>
Wedge Delay:	<u>1.901</u>	Nom. Angle: <u>0°</u>
		Skew Angle: <u>0°</u>

[REDACTED] II 27-08-2012  
 Operator Level Date  
[REDACTED] 74 29-08-12  
 GE Reviewer Level Date

[REDACTED] 31/08/12  
 KKM Review Date  
[REDACTED] 30.8.12 3  
 SVTI Review Date Page



# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-004

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument:	<u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board:	<u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board:	<u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board:
			<u>Zetec / EQTXE159B-003</u> Manufacturer / Model	
Search Unit:	<u>GEIT</u> Manufacturer	<u>025WY6</u> Serial No.	<u>389-061-101</u> Model	<u>2.25 MHz.</u> Frequency
	<u>0° / Longitudinal</u> Nominal Angle / Mode	<u>N/A</u> Measured Angle	<u>1(25.4) mm / Round</u> Element Size / Shape	<u>N/A</u> Focus
Cables:	<u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

<u>Calibration</u>				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>76.5%</u>	<u>20.0%</u>	<u>13.7%</u>	<u>~</u>
Sweep:	<u>35.9</u>	<u>72.4</u>	<u>109.1</u>	<u>~</u>
Gain (dB):	<u>27</u>	<u>27</u>	<u>27</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u> Calibration Block S/N	<u>CSCL</u> Block Material	<u>148 mm / Flat</u> Nominal "T" Diameter		
<u>272782</u> Thermometer S/N	<u>RX Grade Water</u> Couplant Type	<u>N/A</u> Couplant Batch No.		

<u>Channel ID</u>	<u>CH 4 0°L BM LIN</u>
<u>General</u>	
Time Base Start:	<u>-0.180</u> Range: <u>152.198</u>
Units: <u>True Depth (mm)</u>	

<u>Digitizer</u>	
Synchro:	<u>Pulse</u> A-Scan: <u>Checked</u>
Averaging:	<u>1</u> Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u> Acquisition: <u>105</u>
Compression:	<u>1</u> Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>1730</u>	<u>25-08-12</u>	<u>76</u>	<u>SG/NS</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1705</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>	
Configuration:	<u>Conventional Pulse-Echo</u>
Pulser:	<u>P4</u> Receiver: <u>R4</u>
Voltage (V):	<u>300</u> Scale Type: <u>LIN</u>
Width (ns):	<u>222</u> Rectification: <u>Bipolar</u>
High Pass:	<u>1.0 MHz.</u> Smoothing: <u>Digital</u>
Low Pass:	<u>5.0 MHz.</u>

Comments

Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>	
Wave Type:	<u>Longitudinal</u> Scan Offset: <u>+75 mm</u>
Velocity:	<u>5890 m./sec.</u> Index Offset: <u>+60 mm</u>
Wedge Delay:	<u>1.901</u> Nom. Angle: <u>0°</u>
	Skew Angle: <u>0°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>[REDACTED]</u> Level	<u>29-08-12</u> Date

<u>[REDACTED]</u> KKM Review	<u>[REDACTED]</u> Date
<u>[REDACTED]</u> SVTI Review	<u>30.8.12</u> Date
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# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-005

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument:	<u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board:	<u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board:	<u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board:
				<u>Zetec / EQTXE159B-003</u> Manufacturer / Model
Search Unit:	<u>GEIT</u> Manufacturer	<u>01V7V7</u> Serial No.	<u>389-061-101</u> Model	<u>2.25 MHz.</u> Frequency
	<u>0° / Longitudinal</u> Nominal Angle / Mode	<u>N/A</u> Measured Angle	<u>1(25.4) mm / Round</u> Element Size / Shape	<u>N/A</u> Focus
Cables:	<u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>34.5/11.0</u>	<u>47.7/21.3</u>	<u>51.1/27.6</u>	<u>~</u>
Sweep:	<u>34.7</u>	<u>71.4</u>	<u>108.4</u>	<u>~</u>
Gain (dB):	<u>0/+25</u>	<u>0/+25</u>	<u>0/+25</u>	<u>~</u>
Examined from the	<u>ID Surface</u>		<u>+25dB Boost:</u>	<u>Selected</u>
<u>KKM ASME BCB</u> Calibration Block S/N	<u>CSCL</u> Block Material	<u>148 mm / Flat</u> Nominal "T" Diameter		
<u>272782</u> Thermometer S/N	<u>RX Grade Water</u> Couplant Type	<u>N/A</u> Couplant Batch No.		

<u>Channel ID</u>	<u>CH 1 0°L BM LOG</u>	
	<u>General</u>	
Time Base Start:	<u>-0.180</u>	Range: <u>152.198</u>
	Units: <u>True Depth (mm)</u>	
	<u>Digitizer</u>	
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

	<u>Calibration Verification</u>			
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>0017</u>	<u>26-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1633</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>	
Configuration:	<u>Conventional Pulse-Echo</u>
Pulser:	<u>P1</u> Receiver: <u>R1</u>
Voltage (V):	<u>300</u> Scale Type: <u>LOG</u>
Width (ns):	<u>222</u> Rectification: <u>Unsigned</u>
High Pass:	<u>No Filter</u> Smoothing: <u>Digital</u>
Low Pass:	<u>No Filter</u>

**Comments**  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>	
Wave Type:	<u>Longitudinal</u> Scan Offset: <u>+75 mm</u>
Velocity:	<u>5890 m./sec.</u> Index Offset: <u>-60 mm</u>
Wedge Delay:	<u>1.901</u> Nom. Angle: <u>0°</u>
	Skew Angle: <u>0°</u>

[REDACTED] II 27-08-2012  
 Operator Level Date  
[REDACTED] TR 29-08-12  
 GE Reviewer Level Date

[REDACTED] 31108172  
 KKM Review Date  
[REDACTED] 30.8.12 5  
 SVIT Review Date Page



# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-006

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: Zetec / Z-Scan UT 518100 UltraVision V1.2R7 UltraVision V1.2R7  
 Manufacturer / Model System Serial No. Acquisition Software Analysis Software  
 Pulser/Receiver Main Board: Zetec / EQEX100D-004 Zetec / EQEX101F Digitizer Board: Zetec / EQTXE159B-003  
 Manufacturer / Model Piggy Board: Manufacturer / Model Manufacturer / Model  
 Search Unit: GEIT 025WY4 389-061-101 2.25 MHz.  
 Manufacturer Serial No. Model Frequency  
0° / Longitudinal N/A 1(25.4) mm / Round N/A  
 Nominal Angle / Mode Measured Angle Element Size / Shape Focus  
 Cables: RG-174 / RG-174 240 ft. / 9 ft. / 1 ft. 2  
 Cable Type(s) Nominal Cable Length(s) No. of Intermediate Connectors

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>27.9/2.8</u>	<u>36.1/10.0</u>	<u>43.0/18.2</u>	<u>~</u>
Sweep:	<u>35.2</u>	<u>71.4</u>	<u>108.4</u>	<u>~</u>
Gain (dB):	<u>0/+25</u>	<u>0/+25</u>	<u>0/+25</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u>	<u>CSCL</u>	<u>148 mm / Flat</u>		
<u>Calibration Block S/N</u>	<u>Block Material</u>	<u>Nominal "T" / Diameter</u>		
<u>272782</u>	<u>RX Grade Water</u>	<u>N/A</u>		
<u>Thermometer S/N</u>	<u>Couplant Type</u>	<u>Couplant Batch No.</u>		

<u>Channel ID</u>	<u>CH 2 0°L BM LOG</u>
<u>General</u>	
Time Base Start:	<u>-0.180</u> Range: <u>152.198</u>
Units: <u>True Depth (mm)</u>	

<u>Digitizer</u>	
Synchro:	<u>Pulse</u> A-Scan: <u>Checked</u>
Averaging:	<u>1</u> Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u> Acquisition: <u>105</u>
Compression:	<u>1</u> Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>0020</u>	<u>26-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1453</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>	
Configuration:	<u>Conventional Pulse-Echo</u>
Pulser:	<u>P2</u> Receiver: <u>R2</u>
Voltage (V):	<u>300</u> Scale Type: <u>LOG</u>
Width (ns):	<u>222</u> Rectification: <u>Unsigned</u>
High Pass:	<u>No Filter</u> Smoothing: <u>Digital</u>
Low Pass:	<u>No Filter</u>

Comments  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>	
Wave Type:	<u>Longitudinal</u> Scan Offset: <u>-75 mm</u>
Velocity:	<u>5890 m./sec.</u> Index Offset: <u>-60 mm</u>
Wedge Delay:	<u>1.901</u> Nom. Angle: <u>0°</u>
	Skew Angle: <u>0°</u>

[REDACTED] II 27-08-2012  
 Operator Level Date  
[REDACTED] III 29-08-12  
 GE Reviewer Level Date

[REDACTED] 31/08/12  
 KKM Review Date  
[REDACTED] 30.08.12 6  
 SVTI Review Date Page



# Hitachi

# SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-007

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument:	<u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulsar/Receiver Main Board:	<u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulsar/Receiver Piggy Board:	<u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board:
				<u>Zetec / EQTXE159B-003</u> Manufacturer / Model
Search Unit:	<u>GEIT</u> Manufacturer	<u>025WY5</u> Serial No.	<u>389-061-101</u> Model	<u>2.25 MHz.</u> Frequency
	<u>0° / Longitudinal</u> Nominal Angle / Mode	<u>N/A</u> Measured Angle	<u>1(25.4) mm / Round</u> Element Size / Shape	<u>N/A</u> Focus
Cables:	<u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>32.6/6.0</u>	<u>42.0/17.6</u>	<u>49.6/25.1</u>	<u>~</u>
Sweep:	<u>35.2</u>	<u>72.4</u>	<u>108.2</u>	<u>~</u>
Gain (dB):	<u>0/+25</u>	<u>0/+25</u>	<u>0/+25</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
KKM ASME BCB Calibration Block S/N	<u>272782</u>	CSCL Block Material	<u>RX Grade Water</u>	148 mm / Flat Nominal "T" Diameter
Thermometer S/N	<u>272782</u>	Couplant Type	<u>N/A</u>	Couplant Batch No.

<u>Channel ID</u>	<u>CH 3 0°L BM LOG</u>	
	<u>General</u>	
Time Base Start:	<u>-0.180</u>	Range: <u>152.198</u>
	Units: <u>True Depth (mm)</u>	
	<u>Digitizer</u>	
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

	<u>Calibration Verification</u>			
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>0025</u>	<u>26-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1700</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

	<u>Pulsar / Receiver</u>	
Configuration:	<u>Conventional Pulse-Echo</u>	
Pulsar:	<u>P3</u>	Receiver: <u>R3</u>
Voltage (V):	<u>300</u>	Scale Type: <u>LOG</u>
Width (ns):	<u>222</u>	Rectification: <u>Unsigned</u>
High Pass:	<u>No Filter</u>	Smoothing: <u>Digital</u>
Low Pass:	<u>No Filter</u>	

**Comments**  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

	<u>Probe</u>	
Wave Type:	<u>Longitudinal</u>	Scan Offset: <u>-75 mm</u>
Velocity:	<u>5890 m./sec.</u>	Index Offset: <u>+60 mm</u>
Wedge Delay:	<u>1.901</u>	Nom. Angle: <u>0°</u>
		Skew Angle: <u>0°</u>

[REDACTED] II Level 27-08-2012 Date  
[REDACTED] GE Reviewer  
[REDACTED] III Level 29-08-12 Date

[REDACTED] KKM Review 31/08/12 Date  
[REDACTED] SVII Review 30.8.12 Date 7 Page  
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# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-008

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: Zetec / Z-Scan UT 518100 UltraVision V1.2R7 UltraVision V1.2R7  
 Manufacturer / Model System Serial No. Acquisition Software Analysis Software  
 Pulser/Receiver Main Board: Zetec / EQEX100D-004 Pulser/Receiver Piggy Board: Zetec / EQEX101F Digitizer Board: Zetec / EQTXE159B-003  
 Manufacturer / Model Manufacturer / Model Manufacturer / Model  
 Search Unit: GEIT 025WY6 389-061-101 2.25 MHz.  
 Manufacturer Serial No. Model Frequency  
0° / Longitudinal N/A 1(25.4) mm / Round N/A  
 Nominal Angle / Mode Measured Angle Element Size / Shape Focus  
 Cables: RG-174 / RG-174 240 ft. / 9 ft. / 1 ft. 2  
 Cable Type(s) Nominal Cable Length(s) No. of Intermediate Connectors

	<u>Calibration</u>			
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>~</u>
Type:	<u>1/4 T</u>	<u>1/2 T</u>	<u>3/4 T</u>	<u>~</u>
Depth:	<u>37</u>	<u>74</u>	<u>111</u>	<u>~</u>
Amp. (-dB):	<u>27.9/1.9</u>	<u>37.6/11.9</u>	<u>42.7/17.3</u>	<u>~</u>
Sweep:	<u>35.4</u>	<u>71.7</u>	<u>108.7</u>	<u>~</u>
Gain (dB):	<u>0/+25</u>	<u>0/+25</u>	<u>0/+25</u>	<u>~</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u>	<u>CSSL</u>	<u>148 mm / Flat</u>		
<u>Calibration Block S/N</u>	<u>Block Material</u>	<u>Nominal "T" Diameter</u>		
<u>272782</u>	<u>RX Grade Water</u>	<u>N/A</u>		
<u>Thermometer S/N</u>	<u>Couplant Type</u>	<u>Couplant Batch No.</u>		

Channel ID CH 4 0°L BM LOG  
General  
 Time Base Start: -0.180 Range: 152.198  
 Units: True Depth (mm)

Digitizer  
 Synchro: Pulse A-Scan: Checked  
 Averaging: 1 Sample Size: 12 bits  
 Digitizing Freq.: 12.5 MHz. Acquisition: 105  
 Compression: 1 Max Recurrence: 2000

	<u>Calibration Verification</u>			
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>0034</u>	<u>26-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1710</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

Pulser / Receiver  
 Configuration: Conventional Pulse-Echo  
 Pulser: P4 Receiver: R4  
 Voltage (V): 300 Scale Type: LOG  
 Width (ns): 222 Rectification: Unsigned  
 High Pass: No Filter Smoothing: Digital  
 Low Pass: No Filter

Comments  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

Probe  
 Wave Type: Longitudinal Scan Offset: +75 mm  
 Velocity: 5890 m./sec. Index Offset: +60 mm  
 Wedge Delay: 1.901 Nom. Angle: 0°  
 Skew Angle: 0°

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date	<u>[REDACTED]</u> KKM Review	<u>31108/12</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>[Signature]</u> Level	<u>29-08-12</u> Date	<u>[REDACTED]</u> SVII Review	<u>8</u> Page





# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-009

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: Zetec / Z-Scan UT 518100 UltraVision V1.2R7 UltraVision V1.2R7  
 Manufacturer / Model System Serial No. Acquisition Software Analysis Software  
 Pulser/Receiver Main Board: Zetec / EQEX100D-004 Pulser/Receiver Piggy Board: Zetec / EQEX101F Digitizer Board: Zetec / EQTXE159B-003  
 Manufacturer / Model Manufacturer / Model Manufacturer / Model  
 Search Unit: GEIT 01V5NC 388-000-334 2.25 MHz.  
 Manufacturer Serial No. Model Frequency  
45° / Transverse 45° 1(23 x 25) mm / Rect. N/A  
 Nominal Angle / Mode Measured Angle Element Size / Shape Focus  
 Cables: RG-174 / RG-174 240 ft. / 9 ft. / 1 ft. 2  
 Cable Type(s) Nominal Cable Length(s) No. of Intermediate Connectors

<u>Calibration</u>				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Type:	<u>OD Notch</u>	<u>OD Notch</u>	<u>ID Notch</u>	<u>ID Notch</u>
Depth:	<u>148</u>	<u>148</u>	<u>296</u>	<u>296</u>
Amp. (-dB):	<u>34.8</u>	<u>9.7</u>	<u>50.2</u>	<u>25.7</u>
Sweep:	<u>148.3</u>	<u>148.3</u>	<u>292.6</u>	<u>292.5</u>
Gain (dB):	<u>0</u>	<u>+25</u>	<u>0</u>	<u>+25</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u>	<u>CSCCL</u>	<u>148 mm / Flat</u>		
<u>Calibration Block S/N</u>	<u>Block Material</u>	<u>Nominal "T" Diameter</u>		
<u>272782</u>	<u>RX Grade Water</u>	<u>N/A</u>		
<u>Thermometer S/N</u>	<u>Couplant Type</u>	<u>Couplant Batch No.</u>		

<u>Channel ID</u>	<u>CH 5 45° T LKUP</u>	
<u>General</u>		
Time Base Start:	<u>-0.057</u>	Range: <u>325.052</u>
Units: <u>True Depth (mm)</u>		
<u>Digitizer</u>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>2305</u>	<u>25-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1730</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>			
Configuration:	<u>Conventional Pulse-Echo</u>		
Pulser:	<u>P5</u>	Receiver:	<u>R5</u>
Voltage (V):	<u>300</u>	Scale Type:	<u>LOG</u>
Width (ns):	<u>222</u>	Rectification:	<u>Unsigned</u>
High Pass:	<u>No Filter</u>	Smoothing:	<u>Digital</u>
Low Pass:	<u>No Filter</u>		

Comments  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>			
Wave Type:	<u>Transverse</u>	Scan Offset:	<u>0 mm</u>
Velocity:	<u>3230 m./sec.</u>	Index Offset:	<u>-60 mm</u>
Wedge Delay:	<u>12.130</u>	Nom. Angle:	<u>45°</u>
		Skew Angle:	<u>90°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date	<u>[REDACTED]</u> KKM Review	<u>31/08/12</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>IV</u> Level	<u>29-08-12</u> Date	<u>[REDACTED]</u> SVTI Review	<u>30.8.12</u> Date
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# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-010

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument:	<u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board:	<u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board:	<u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board:
				<u>Zetec / EQTXE159B-003</u> Manufacturer / Model
Search Unit:	<u>GEIT</u> Manufacturer	<u>01V5ND</u> Serial No.	<u>388-000-334</u> Model	<u>2.25 MHz.</u> Frequency
	<u>45° / Transverse</u> Nominal Angle / Mode	<u>45°</u> Measured Angle	<u>1(23 x 25) mm / Rect.</u> Element Size / Shape	<u>N/A</u> Focus
Cables:	<u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

<u>Calibration</u>				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Type:	<u>OD Notch</u>	<u>OD Notch</u>	<u>ID Notch</u>	<u>ID Notch</u>
Depth:	<u>148</u>	<u>148</u>	<u>296</u>	<u>296</u>
Amp. (-dB):	<u>34.8</u>	<u>10.4</u>	<u>50.5</u>	<u>26.0</u>
Sweep:	<u>149.0</u>	<u>149.0</u>	<u>291.2</u>	<u>291.3</u>
Gain (dB):	<u>0</u>	<u>+25</u>	<u>0</u>	<u>+25</u>
Examined from the	<u>ID Surface</u>		+25dB Boost:	<u>Selected</u>
KKM ASME BCB Calibration Block S/N	<u>CSCL</u> Block Material	<u>148 mm / Flat</u> Nominal "T" / Diameter		
<u>272782</u> Thermometer S/N	<u>RX Grade Water</u> Couplant Type	<u>N/A</u> Couplant Batch No.		

<u>Channel ID</u>	<u>CH 6 45° P LKCW</u>	
<u>General</u>		
Time Base Start:	<u>-0.057</u>	Range: <u>325.052</u>
Units: <u>True Depth (mm)</u>		
<u>Digitizer</u>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>2324</u>	<u>25-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1740</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulser / Receiver</u>	
Configuration:	<u>Conventional Pulse-Echo</u>
Pulser:	<u>P6</u> Receiver: <u>R6</u>
Voltage (V):	<u>300</u> Scale Type: <u>LOG</u>
Width (ns):	<u>222</u> Rectification: <u>Unsigned</u>
High Pass:	<u>No Filter</u> Smoothing: <u>Digital</u>
Low Pass:	<u>No Filter</u>

Comments  
Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>	
Wave Type:	<u>Transverse</u> Scan Offset: <u>-75 mm</u>
Velocity:	<u>3230 m./sec.</u> Index Offset: <u>-12 mm</u>
Wedge Delay:	<u>11.970</u> Nom. Angle: <u>45°</u>
	Skew Angle: <u>0°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>TU</u> Level	<u>29-08-12</u> Date

<u>[REDACTED]</u> KKM Review	<u>37108112</u> Date
<u>[REDACTED]</u> SVTI Review	<u>30.8.12</u> Date
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# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-011

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument:	<u>Zetec / Z-Scan UT</u> Manufacturer / Model	<u>518100</u> System Serial No.	<u>UltraVision V1.2R7</u> Acquisition Software	<u>UltraVision V1.2R7</u> Analysis Software
Pulser/Receiver Main Board:	<u>Zetec / EQEX100D-004</u> Manufacturer / Model	Pulser/Receiver Piggy Board:	<u>Zetec / EQEX101F</u> Manufacturer / Model	Digitizer Board:
				<u>Zetec / EQTXE159B-003</u> Manufacturer / Model
Search Unit:	<u>GEIT</u> Manufacturer	<u>01V5NH</u> Serial No.	<u>388-000-334</u> Model	<u>2.25 MHz.</u> Frequency
	<u>45° / Transverse</u> Nominal Angle / Mode	<u>45°</u> Measured Angle	<u>1(23 x 25) mm / Rect.</u> Element Size / Shape	<u>N/A</u> Focus
Cables:	<u>RG-174 / RG-174</u> Cable Type(s)	<u>240 ft. / 9 ft. / 1 ft.</u> Nominal Cable Length(s)	<u>2</u> No. of Intermediate Connectors	

Calibration				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Type:	<u>OD Notch</u>	<u>OD Notch</u>	<u>ID Notch</u>	<u>ID Notch</u>
Depth:	<u>148</u>	<u>148</u>	<u>296</u>	<u>296</u>
Amp. (-dB):	<u>36.4</u>	<u>12.5</u>	<u>50.5</u>	<u>26.4</u>
Sweep:	<u>148.0</u>	<u>148.0</u>	<u>291.5</u>	<u>291.5</u>
Gain (dB):	<u>0</u>	<u>+25</u>	<u>0</u>	<u>+25</u>
Examined from the	<u>ID Surface</u>	+25dB Boost:	<u>Selected</u>	
KKM ASME BCB Calibration Block S/N	<u>272782</u>	CSCL Block Material	<u>RX Grade Water</u>	Couplant Type
		148 mm / Flat Nominal "T" Diameter	<u>N/A</u>	Couplant Batch No.

Channel ID	<u>CH 7 45° T LKDN</u>	
<b>General</b>		
Time Base Start:	<u>-0.057</u>	Range: <u>325.052</u>
Units: <u>True Depth (mm)</u>		
<b>Digitizer</b>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

Calibration Verification				
	Time	Date	Temp. (°F)	Operator
Initial:	<u>2343</u>	<u>25-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1719</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

Pulser / Receiver	
Configuration:	<u>Conventional Pulse-Echo</u>
Pulser:	<u>P7</u>
Receiver:	<u>R7</u>
Voltage (V):	<u>300</u>
Scale Type:	<u>LOG</u>
Width (ns):	<u>222</u>
Rectification:	<u>Unsigned</u>
High Pass:	<u>No Filter</u>
Smoothing:	<u>Digital</u>
Low Pass:	<u>No Filter</u>

**Comments**  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

Probe	
Wave Type:	<u>Transverse</u>
Scan Offset:	<u>0 mm</u>
Velocity:	<u>3230 m./sec.</u>
Index Offset:	<u>+60 mm</u>
Wedge Delay:	<u>12.130</u>
Nom. Angle:	<u>45°</u>
Skew Angle:	<u>270°</u>

[REDACTED] II 27-08-2012  
 Operator Level Date  
[REDACTED] III 29-08-12  
 GE Reviewer Level Date

[REDACTED] 31/08/12  
 KKM Review Date  
[REDACTED] 30.8.12 11  
 SVII Review Date Page



# Hitachi

## SP2000 Automated RPV Ultrasonic Calibration Sheet

Site: KKM Unit: 1 Project: 6538-177011-BN1 Report Number: RPV-2012-001  
 Components: RPV Base Material Survey Calibration Record: RPV-CAL-012

Procedure: [REDACTED] Version: 0 DRR's: N/A

Instrument: Zetec / Z-Scan UT 518100 UltraVision V1.2R7 UltraVision V1.2R7  
 Manufacturer / Model System Serial No. Acquisition Software Analysis Software  
 Pulsar/Receiver Main Board: Zetec / EQEX100D-004 Zetec / EQEX101F Zetec / EQTXE159B-003  
 Manufacturer / Model Piggy Board: Manufacturer / Model Digitizer Board: Manufacturer / Model  
 Search Unit: GEIT 01V5NJ 388-000-334 2.25 MHz.  
 Manufacturer Serial No. Model Frequency  
45° / Transverse 45° 1(23 x 25) mm / Rect. N/A  
 Nominal Angle / Mode Measured Angle Element Size / Shape Focus  
 Cables: RG-174 / RG-174 240 ft. / 9 ft. / 1 ft. 2  
 Cable Type(s) Nominal Cable Length(s) No. of Intermediate Connectors

<u>Calibration</u>				
Orientation:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Type:	<u>OD Notch</u>	<u>OD Notch</u>	<u>ID Notch</u>	<u>ID Notch</u>
Depth:	<u>148</u>	<u>148</u>	<u>296</u>	<u>296</u>
Amp. (-dB):	<u>35.5</u>	<u>10.4</u>	<u>50.2</u>	<u>25.7</u>
Sweep:	<u>148.8</u>	<u>148.8</u>	<u>292.4</u>	<u>292.4</u>
Gain (dB):	<u>0</u>	<u>+25</u>	<u>0</u>	<u>+25</u>
Examined from the	<u>ID Surface</u>	<u>+25dB Boost:</u>	<u>Selected</u>	
<u>KKM ASME BCB</u>	<u>CSCL</u>	<u>148 mm / Flat</u>		
<u>Calibration Block S/N</u>	<u>Block Material</u>	<u>Nominal "I" Diameter</u>		
<u>272782</u>	<u>RX Grade Water</u>	<u>N/A</u>		
<u>Thermometer S/N</u>	<u>Couplant Type</u>	<u>Couplant Batch No.</u>		

<u>Channel ID</u>	<u>CH 8 45° P LKCC</u>	
<u>General</u>		
Time Base Start:	<u>-0.057</u>	Range: <u>325.052</u>
Units: <u>True Depth (mm)</u>		
<u>Digitizer</u>		
Synchro:	<u>Pulse</u>	A-Scan: <u>Checked</u>
Averaging:	<u>1</u>	Sample Size: <u>12 bits</u>
Digitizing Freq.:	<u>12.5 MHz.</u>	Acquisition: <u>105</u>
Compression:	<u>1</u>	Max Recurrence: <u>2000</u>

<u>Calibration Verification</u>				
	<u>Time</u>	<u>Date</u>	<u>Temp. (°F)</u>	<u>Operator</u>
Initial:	<u>2358</u>	<u>25-08-12</u>	<u>76</u>	<u>CG/KM</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Intermediate:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Final:	<u>1735</u>	<u>27-08-12</u>	<u>75</u>	<u>SG/NS</u>

<u>Pulsar / Receiver</u>			
Configuration:	<u>Conventional Pulse-Echo</u>		
Pulsar:	<u>P8</u>	Receiver:	<u>R8</u>
Voltage (V):	<u>300</u>	Scale Type:	<u>LOG</u>
Width (ns):	<u>222</u>	Rectification:	<u>Unsigned</u>
High Pass:	<u>No Filter</u>	Smoothing:	<u>Digital</u>
Low Pass:	<u>No Filter</u>		

Comments  
 Channel name, probe scan offset, index offset and skew angle for Head Down scanning configuration.

<u>Probe</u>			
Wave Type:	<u>Transverse</u>	Scan Offset:	<u>+75 mm</u>
Velocity:	<u>3230 m./sec.</u>	Index Offset:	<u>-12 mm</u>
Wedge Delay:	<u>11.650</u>	Nom. Angle:	<u>45°</u>
		Skew Angle:	<u>180°</u>

<u>[REDACTED]</u> Operator	<u>II</u> Level	<u>27-08-2012</u> Date	<u>[REDACTED]</u> KKM Review	<u>31/08/12</u> Date
<u>[REDACTED]</u> GE Reviewer	<u>III</u> Level	<u>29-08-12</u> Date	<u>[REDACTED]</u> SVTI Review	<u>30.8.12</u> Date
				<u>12</u> Page



# HITACHI

BKW FMB Energy AG  
KKM Unit 1 RPV ID Project 181513  
Linearity Data Sheet L-001

### Horizontal Timebase Linearity Verification

Z-Scan UT S/N: 518100

Channel: 1

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.9	0.1
10.0	9.8	0.2

Channel: 2

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.9	0.1
10.0	9.8	0.2

Channel: 3

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.8	0.2
10.0	9.8	0.2

Channel: 4

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.9	0.1
10.0	9.8	0.2

Channel: 5

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.8	0.2
10.0	9.8	0.2

Channel: 6

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.9	0.1
10.0	9.8	0.2

Channel: 7

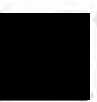
Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.8	0.2
10.0	9.8	0.2

Channel: 8

Back Reflection	Sweep Reading	Deviation
in.	in.	
1.0	1.0	0.0
2.0	2.0	0.0
3.0	3.0	0.0
4.0	4.0	0.0
5.0	4.9	0.1
6.0	5.9	0.1
7.0	6.9	0.1
8.0	7.9	0.1
9.0	8.8	0.2
10.0	9.8	0.2

Operator: [REDACTED] Date: 24.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-002

Z-Scan UT S/N: 518100  
 Channel: 1

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.4	-9.0	-0.4
32	6	-11.3	-11.0	-0.3
34	8	-13.5	-13.0	-0.5
36	10	-15.7	-15.0	-0.7
38	12	-17.6	-17.0	-0.6
40	14	-19.5	-19.0	-0.5
42	16	-21.6	-21.0	-0.6
44	18	-23.8	-23.0	-0.8
46	20	-25.7	-25.0	-0.7
48	22	-27.6	-27.0	-0.6
50	24	-29.5	-29.0	-0.5
52	26	-31.4	-31.0	-0.4
54	28	-33.6	-33.0	-0.6
56	30	-35.5	-35.0	-0.5
58	32	-37.6	-37.0	-0.6
60	34	-39.2	-39.0	-0.2
62	36	-41.1	-41.0	-0.1
64	38	-43.3	-43.0	-0.3
66	40	-45.2	-45.0	-0.2
68	42	-46.7	-47.0	0.3
70	44	-48.3	-49.0	0.7
72	46	-49.9	-51.0	1.1
74	48	-51.1	-53.0	1.9
76	50	-53.0	-55.0	2.0
Max Deviation ± dB				2.0

25 dB Boost Active

51	25	-5.0	-5.0	0.0
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Operator: [REDACTED] Date: 24.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-003

Z-Scan UT S/N: 518100  
 Channel: 2

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.3	-5.3	0.0
28	2	-7.5	-7.3	-0.2
30	4	-9.4	-9.3	-0.1
32	6	-11.3	-11.3	0.0
34	8	-13.5	-13.3	-0.2
36	10	-15.7	-15.3	-0.4
38	12	-17.6	-17.3	-0.3
40	14	-19.5	-19.3	-0.2
42	16	-21.3	-21.3	0.0
44	18	-23.5	-23.3	-0.2
46	20	-25.7	-25.3	-0.4
48	22	-27.6	-27.3	-0.3
50	24	-29.2	-29.3	0.1
52	26	-31.1	-31.3	0.2
54	28	-33.3	-33.3	0.0
56	30	-35.5	-35.3	-0.2
58	32	-37.0	-37.3	0.3
60	34	-38.9	-39.3	0.4
62	36	-40.8	-41.3	0.5
64	38	-42.7	-43.3	0.6
66	40	-44.9	-45.3	0.4
68	42	-46.7	-47.3	0.6
70	44	-48.6	-49.3	0.7
72	46	-50.2	-51.3	1.1
74	48	-52.1	-53.3	1.2
76	50	-54.0	-55.3	1.3
Max Deviation ± dB				1.3

25 dB Boost Active

51	25	-5.9	-5.3	0.6
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Operator: ██████████ Date: 25.Aug.2012

Reviewed By: ██████████ Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-004

Z-Scan UT S/N: 518100  
 Channel: 3

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.3	-5.3	0.0
28	2	-7.5	-7.3	-0.2
30	4	-9.4	-9.3	-0.1
32	6	-11.3	-11.3	0.0
34	8	-13.5	-13.3	-0.2
36	10	-15.7	-15.3	-0.4
38	12	-17.6	-17.3	-0.3
40	14	-19.5	-19.3	-0.2
42	16	-21.3	-21.3	0.0
44	18	-23.5	-23.3	-0.2
46	20	-25.7	-25.3	-0.4
48	22	-27.3	-27.3	0.0
50	24	-29.2	-29.3	0.1
52	26	-31.1	-31.3	0.2
54	28	-33.3	-33.3	0.0
56	30	-35.5	-35.3	-0.2
58	32	-37.0	-37.3	0.3
60	34	-38.9	-39.3	0.4
62	36	-40.8	-41.3	0.5
64	38	-42.7	-43.3	0.6
66	40	-44.5	-45.3	0.8
68	42	-46.4	-47.3	0.9
70	44	-48.7	-49.3	0.6
72	46	-50.8	-51.3	0.5
74	48	-52.8	-53.3	0.5
76	50	-54.7	-55.3	0.6
Max Deviation ± dB				0.9

25 dB Boost Active

51	25	-5.1	-5.3	-0.2
----	----	------	------	------

Operator: [REDACTED] Date: 25.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012







# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-005

Z-Scan UT S/N: 518100  
 Channel: 4

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

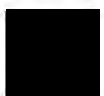
Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.1	-9.0	-0.1
32	6	-11.0	-11.0	0.0
34	8	-13.2	-13.0	-0.2
36	10	-15.4	-15.0	-0.4
38	12	-17.3	-17.0	-0.3
40	14	-19.1	-19.0	-0.1
42	16	-21.0	-21.0	0.0
44	18	-23.2	-23.0	-0.2
46	20	-25.1	-25.0	-0.1
48	22	-27.0	-27.0	0.0
50	24	-28.9	-29.0	0.1
52	26	-30.7	-31.0	0.3
54	28	-32.9	-33.0	0.1
56	30	-35.1	-35.0	-0.1
58	32	-37.0	-37.0	0.0
60	34	-38.9	-39.0	0.1
62	36	-40.8	-41.0	0.2
64	38	-42.7	-43.0	0.3
66	40	-44.9	-45.0	0.1
68	42	-46.4	-47.0	0.6
70	44	-48.0	-49.0	1.0
72	46	-50.2	-51.0	0.8
74	48	-52.1	-53.0	0.9
76	50	-54.0	-55.0	1.0
Max Deviation ± dB				1.0

25 dB Boost Active

51	25	-5.3	-5.0	0.3
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Operator: [REDACTED] Date: 25.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-006

Z-Scan UT S/N: 518100  
 Channel: 5

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.1	-9.0	-0.1
32	6	-11.0	-11.0	0.0
34	8	-13.2	-13.0	-0.2
36	10	-15.4	-15.0	-0.4
38	12	-17.3	-17.0	-0.3
40	14	-19.1	-19.0	-0.1
42	16	-21.0	-21.0	0.0
44	18	-23.2	-23.0	-0.2
46	20	-25.1	-25.0	-0.1
48	22	-27.0	-27.0	0.0
50	24	-28.9	-29.0	0.1
52	26	-30.7	-31.0	0.3
54	28	-32.9	-33.0	0.1
56	30	-34.8	-35.0	0.2
58	32	-37.0	-37.0	0.0
60	34	-38.6	-39.0	0.4
62	36	-40.5	-41.0	0.5
64	38	-42.4	-43.0	0.6
66	40	-44.5	-45.0	0.5
68	42	-46.1	-47.0	0.9
70	44	-47.7	-49.0	1.3
72	46	-49.3	-51.0	1.7
74	48	-51.1	-53.0	1.9
76	50	-53.3	-55.0	1.7
Max Deviation ± dB				1.9

25 dB Boost Active

51	25	-6.5	-5.0	1.5
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Operator: [REDACTED] Date: 25.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-007

Z-Scan UT S/N: 518100  
 Channel: 6

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.1	-9.0	-0.1
32	6	-11.0	-11.0	0.0
34	8	-13.2	-13.0	-0.2
36	10	-15.4	-15.0	-0.4
38	12	-17.3	-17.0	-0.3
40	14	-19.1	-19.0	-0.1
42	16	-21.0	-21.0	0.0
44	18	-23.2	-23.0	-0.2
46	20	-25.1	-25.0	-0.1
48	22	-27.0	-27.0	0.0
50	24	-28.9	-29.0	0.1
52	26	-30.7	-31.0	0.3
54	28	-32.9	-33.0	0.1
56	30	-35.1	-35.0	-0.1
58	32	-37.0	-37.0	0.0
60	34	-38.9	-39.0	0.1
62	36	-40.5	-41.0	0.5
64	38	-42.7	-43.0	0.3
66	40	-44.5	-45.0	0.5
68	42	-47.1	-47.0	-0.1
70	44	-48.0	-49.0	1.0
72	46	-50.2	-51.0	0.8
74	48	-52.4	-53.0	0.6
76	50	-54.6	-55.0	0.4
Max Deviation ± dB				1.0

25 dB Boost Active

51	25	-6.2	-5.0	1.2
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Operator: XXXXXXXXXX Date: 25.Aug.2012

Reviewed By: XXXXXXXXXX Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-008

Z-Scan UT S/N: 518100  
 Channel: 7

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.1	-9.0	-0.1
32	6	-11.0	-11.0	0.0
34	8	-13.2	-13.0	-0.2
36	10	-15.4	-15.0	-0.4
38	12	-17.3	-17.0	-0.3
40	14	-19.1	-19.0	-0.1
42	16	-21.0	-21.0	0.0
44	18	-23.2	-23.0	-0.2
46	20	-25.4	-25.0	-0.4
48	22	-27.3	-27.0	-0.3
50	24	-28.9	-29.0	0.1
52	26	-30.7	-31.0	0.3
54	28	-32.9	-33.0	0.1
56	30	-35.1	-35.0	-0.1
58	32	-37.0	-37.0	0.0
60	34	-38.6	-39.0	0.4
62	36	-40.5	-41.0	0.5
64	38	-42.7	-43.0	0.3
66	40	-44.5	-45.0	0.5
68	42	-46.1	-47.0	0.9
70	44	-47.7	-49.0	1.3
72	46	-49.6	-51.0	1.4
74	48	-51.1	-53.0	1.9
76	50	-53.0	-55.0	2.0
Max Deviation ± dB				2.0

25 dB Boost Active

51	25	-6.7	-5.0	1.7
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Operator: [REDACTED] Date: 25.Aug.2012

Reviewed By: [REDACTED] Date: 26.Aug.2012





# HITACHI

BKW FMB Energy AG  
 KKM Unit 1 RPV ID Project 181513  
 Linearity Data Sheet L-009

Z-Scan UT S/N: 518100  
 Channel: 8

Attenuator S/N: 25971  
 Calibration Due Date 13.April.2013

Attenuation Total (dB)	Attenuation Added (dB)	Signal Amplitude (dB)	Expected Amplitude (dB)	Deviation (dB)
26	0	-5.0	-5.0	0.0
28	2	-7.2	-7.0	-0.2
30	4	-9.1	-9.0	-0.1
32	6	-11.0	-11.0	0.0
34	8	-13.2	-13.0	-0.2
36	10	-15.4	-15.0	-0.4
38	12	-17.3	-17.0	-0.3
40	14	-19.1	-19.0	-0.1
42	16	-21.0	-21.0	0.0
44	18	-23.2	-23.0	-0.2
46	20	-25.1	-25.0	-0.1
48	22	-27.3	-27.0	-0.3
50	24	-28.9	-29.0	0.1
52	26	-30.7	-31.0	0.3
54	28	-32.9	-33.0	0.1
56	30	-35.1	-35.0	-0.1
58	32	-37.0	-37.0	0.0
60	34	-38.6	-39.0	0.4
62	36	-40.5	-41.0	0.5
64	38	-42.7	-43.0	0.3
66	40	-44.5	-45.0	0.5
68	42	-46.7	-47.0	0.3
70	44	-48.3	-49.0	0.7
72	46	-49.9	-51.0	1.1
74	48	-52.1	-53.0	0.9
76	50	-53.6	-55.0	1.4
Max Deviation ± dB				1.4

25 dB Boost Active

51	25	-6.5	-5.0	1.5
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Operator: XXXXXXXXXX Date: 25.Aug.2012

Reviewed By: XXXXXXXXXX Date: 26.Aug.2012





**HITACHI**

## RPV ID Scan Plan for KKM Base Material Exams

**Scope:** This examination is limited to a selected area of the KKM Reactor Pressure Vessel.

Examine the accessible areas of the area inline with vessel 22° Azimuth extending from the vessel flange elevation down to the shroud support plate elevation.

Expected limitations are the feedwater spargers, core spray piping, jet pump diffusers and shroud support plate.

**Procedure:** GEH-UT-728 Version 0.

**Scanner:** GE Hitachi RPV ID Scanner

**Package:** Standard RPVID Package configured as shown in Figure 9.

**Material:** Carbon steel clad with stainless steel.

**Nominal Thickness of Base Material:** 100 mm and 120 mm.

**Nominal Thickness of Clad:** 4 mm

**Scan speed:** Less than 150 mm/sec.

**Scan Axis Resolution:** 5 mm

**Scan Axis Range:** -250 mm to +250 mm.

**Index Axis Resolution:** 5 mm





**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams

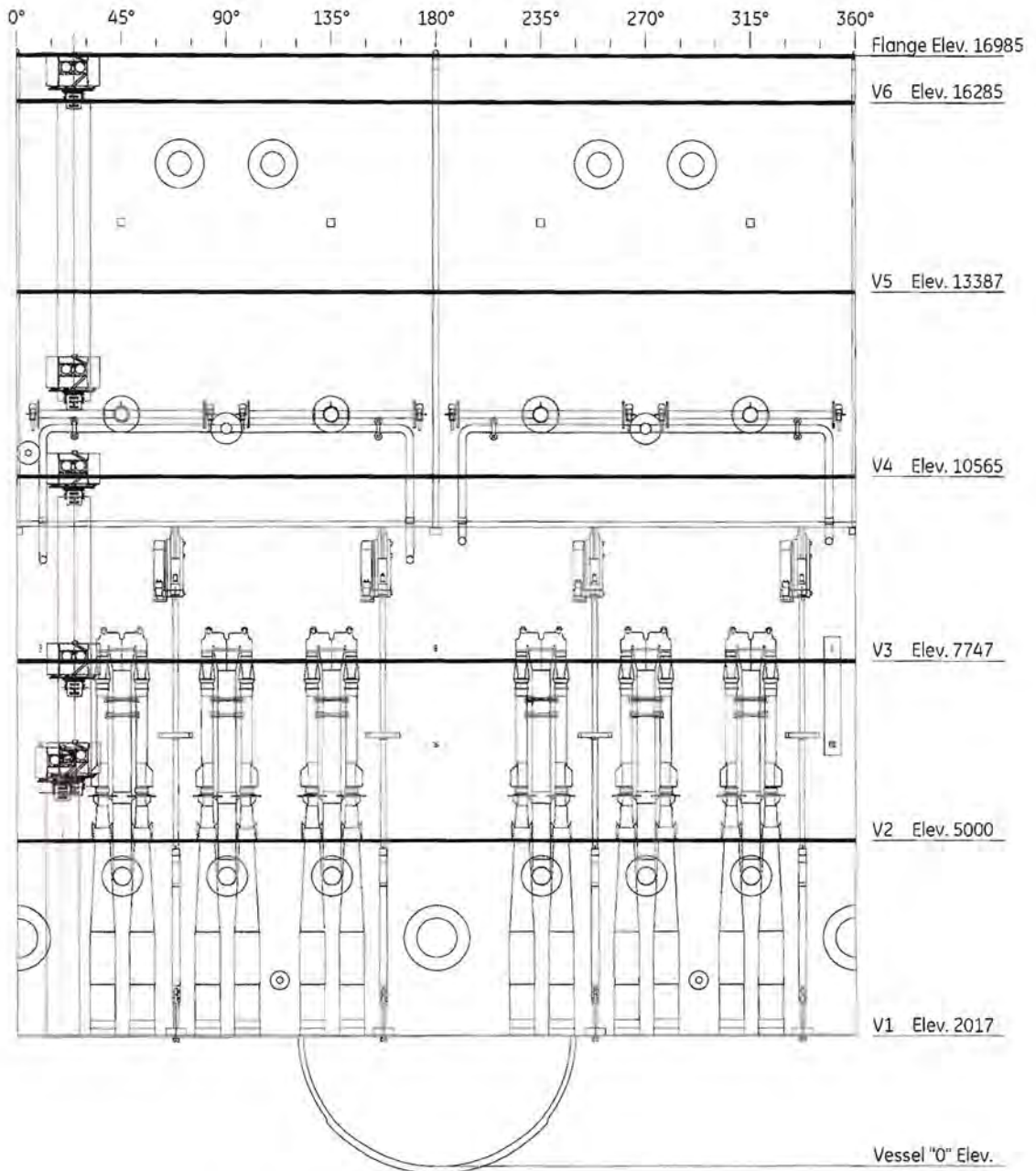


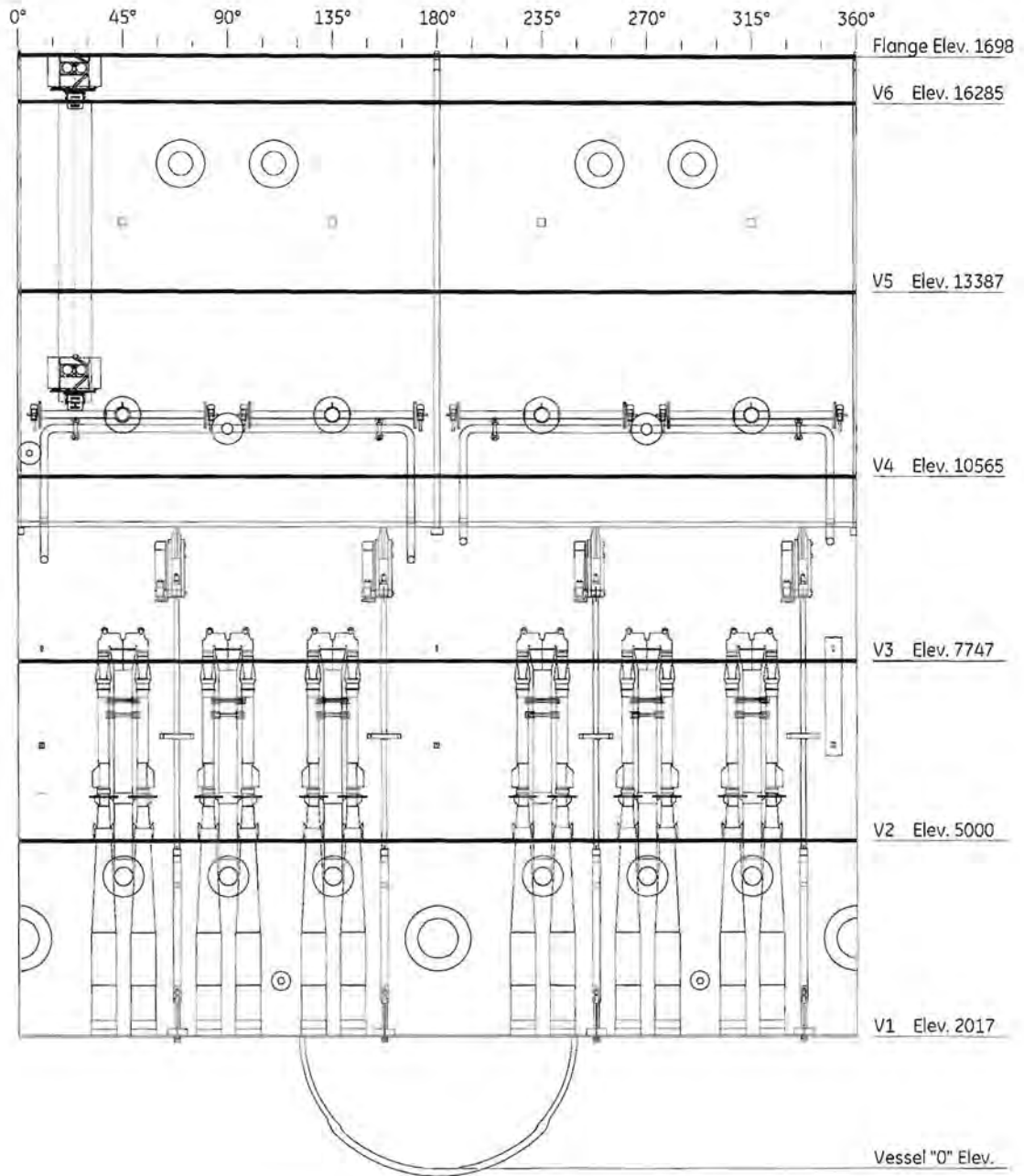
Figure 1 - Overview Head Down Configuration





**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams



**Figure 2 - Scan Area 1 Head Down Configuration**  
Reference back of scanner to Flange (Package ~16300 mm)

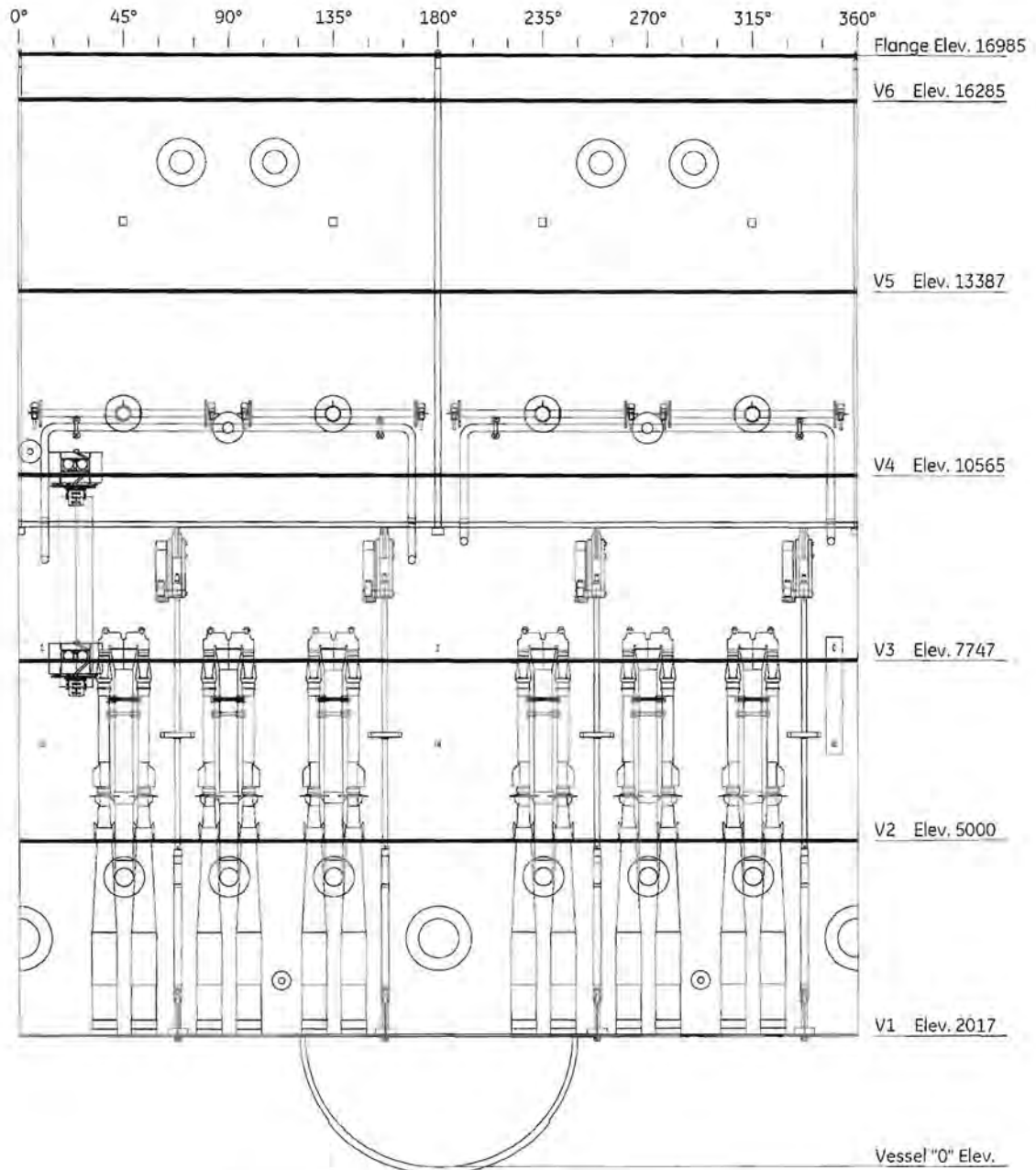






**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams



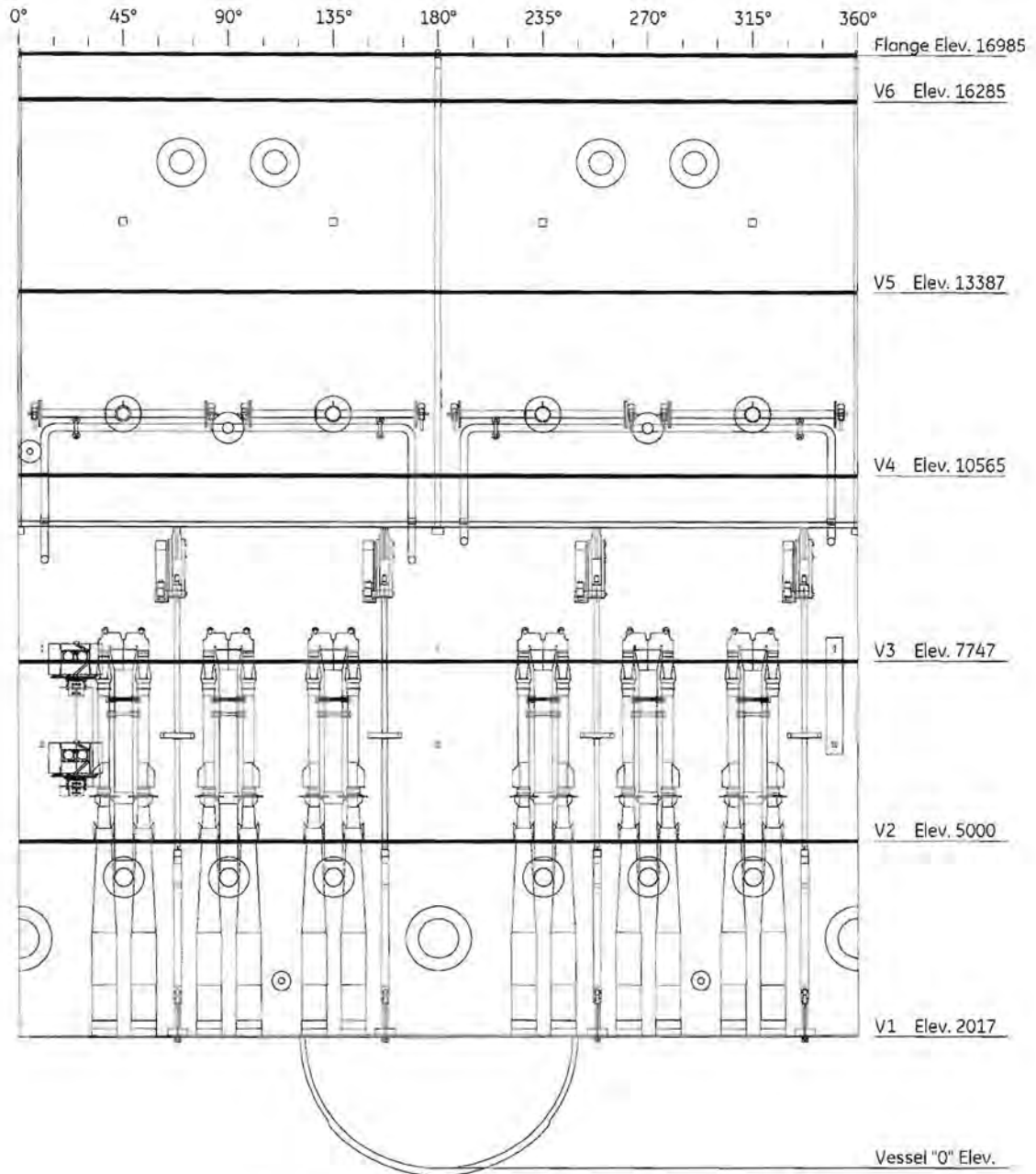
**Figure 3 - Scan Area 2 Head Down Configuration**

Position scanner to clear Core Spray Downcomer.  
Reference back of scanner to CL CRDR Nozzle (Package ~10240 mm)  
Scan down to JP Riser braces. If the floats clear continue scanning down.



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# RPV ID Scan Plan for KKM Base Material Exams



**Figure 4 - Scan Area 3 Head Down Configuration**

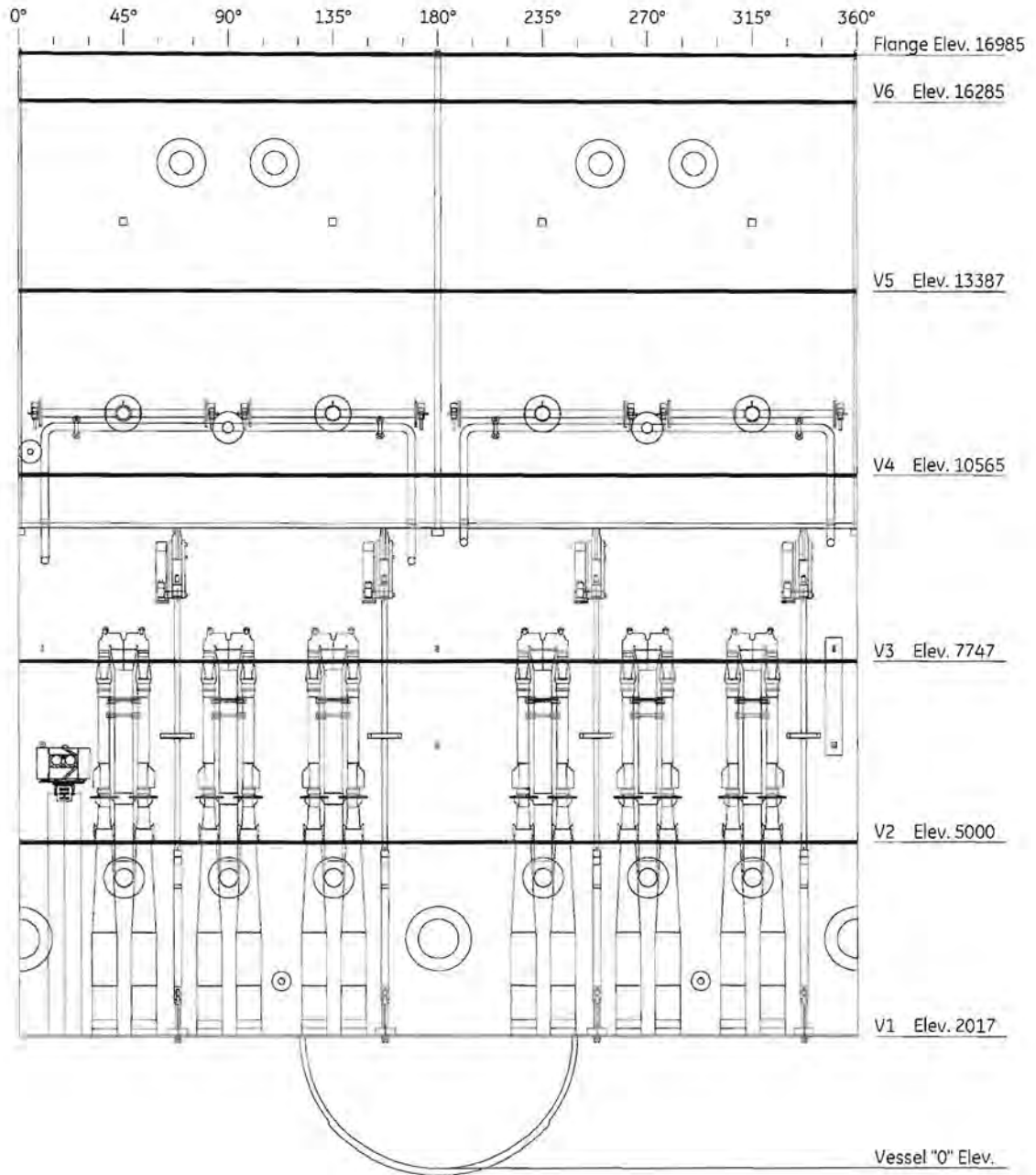
Shift scanner CCW to clear Riser Braces (if required)  
Reference back of scanner to top of upper spec. bracket (Package ~7300 mm)  
Scan down to JP Restrainer braces. If the floats clear continue scanning down.





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# RPV ID Scan Plan for KKM Base Material Exams



**Figure 5 - Scan Area 4 Head Down Configuration**

Shift scanner CCW to clear JP Restrainer Braces (if required)  
Reference back of scanner to bottom of lower spec. bracket (Package ~5730 mm)  
Scan down to baffle plate.





**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams

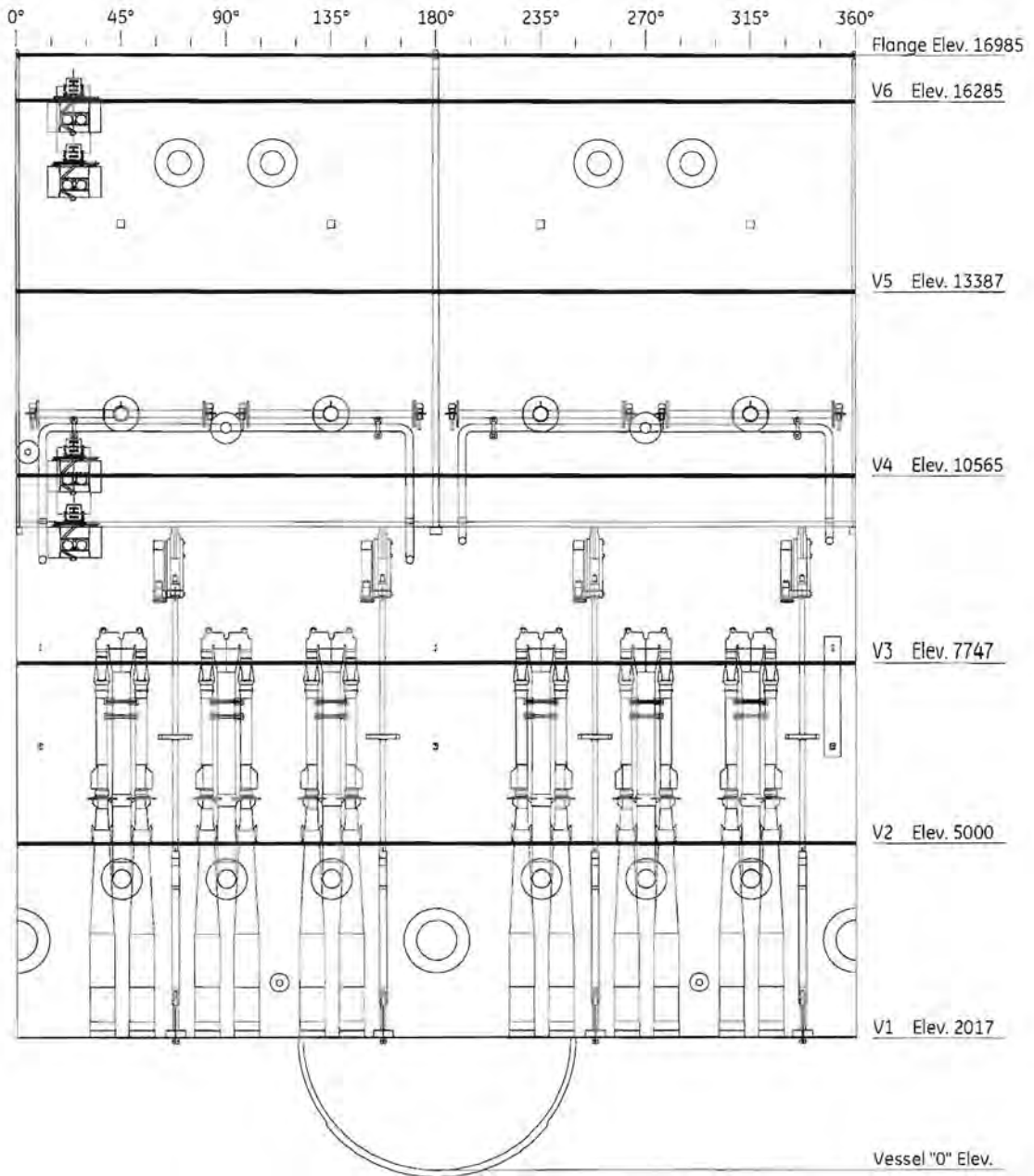
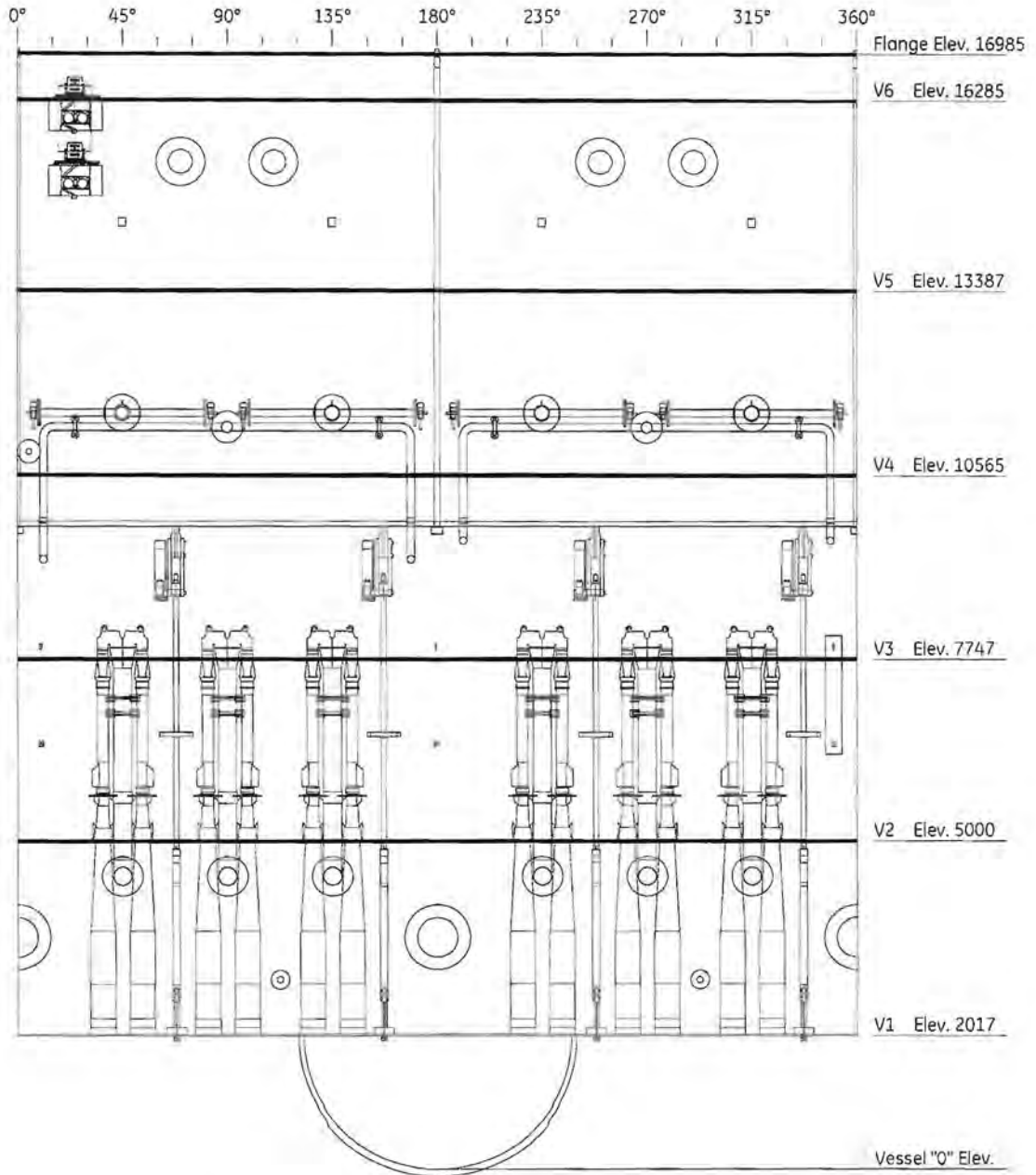


Figure 6 - Overview Head Up Configuration



**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams



**Figure 7 - Scan Area 5 Head Up Configuration**

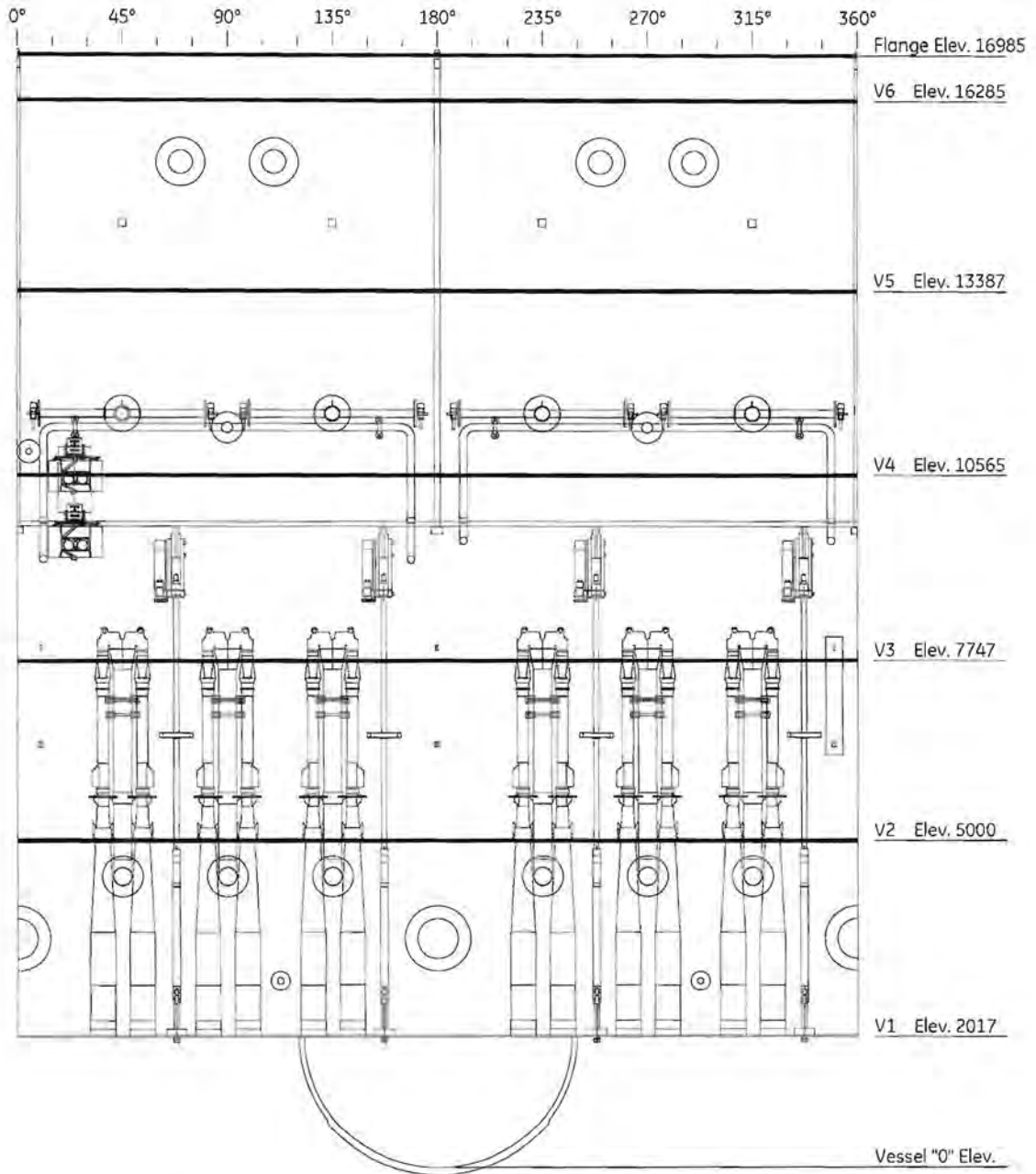
Reference front of package to Flange (Package ~16850 mm).  
Scan down to 16500 to 15500 mm.





**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams



**Figure 8 - Scan Area 6 Head Up Configuration**

Reference front of package to CL of CRDR Nozzle (Package ~10720 mm)  
Drive up to Core Spray Limitation. Scan down 1000 mm.





**HITACHI**

# RPV ID Scan Plan for KKM Base Material Exams

## ID Vessel Transducer Offsets and Skews

### Head Down Configuration

			Index
1 0°L BM	+75	-60	0°
2 0°L BM	-75	-60	0°
3 0°L BM	-75	+60	0°
4 0°L BM	+75	+60	0°
5 45°T LKUP	0.0	-60	90°
6 45°P LKCW	-75	-12	0°
7 45°T LKDN	0.0	+60	270°
8 45°P LKCC	+75	-12	180°
9 Not Used	N/A	N/A	N/A

### Head Up Configuration

			Index
1 0°L BM	-75	+60	0°
2 0°L BM	+75	+60	0°
3 0°L BM	-75	-60	0°
4 0°L BM	+75	-60	0°
5 45°T LKDN	0.0	+60	270°
6 45°T LKCC	+75	+12	180°
7 45°T LKUP	0.0	-60	90°
8 45°T LKCW	-75	+12	0°
Not Used	N/A	N/A	N/A





HITACHI

# RPV ID Scan Plan for KKM Base Material Exams

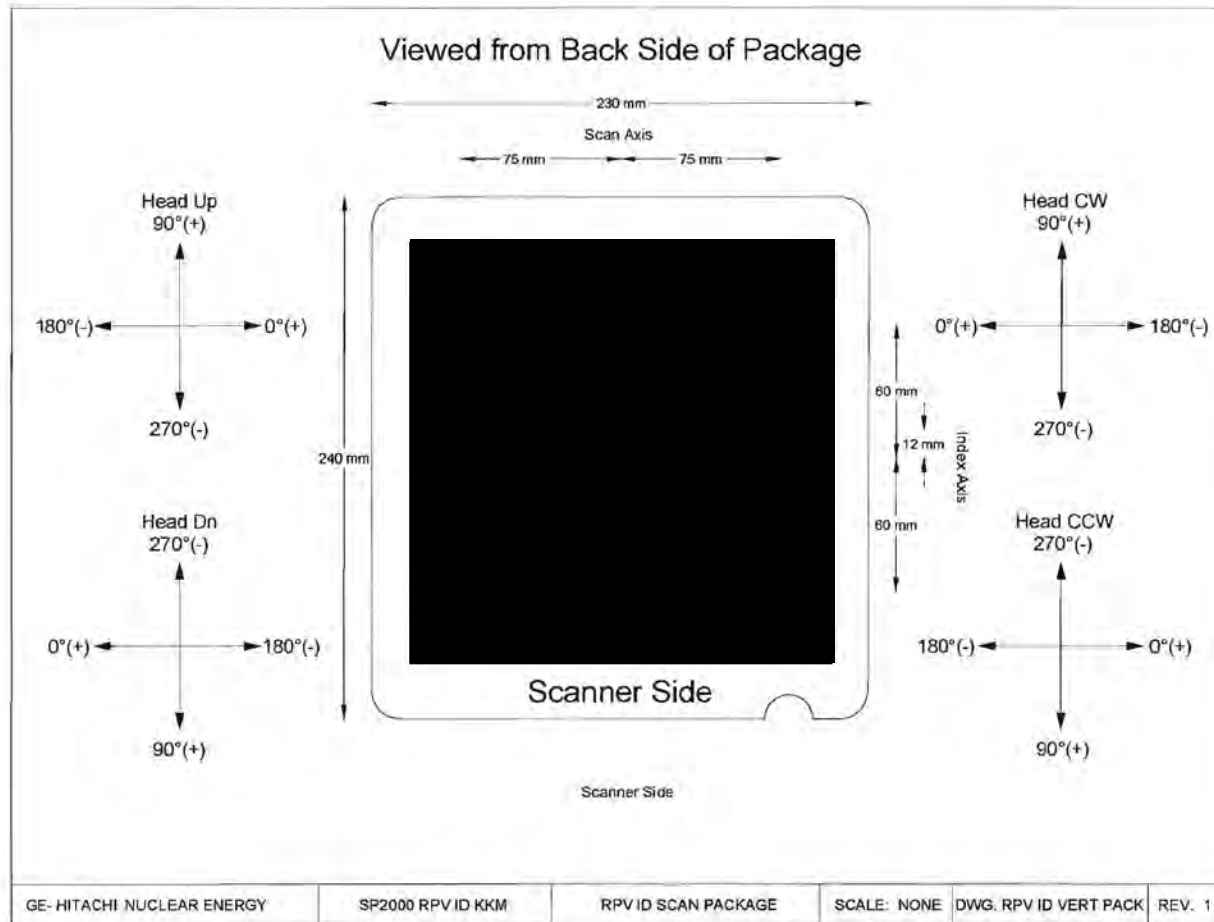


Figure 9 – Scan Package Configuration







**HITACHI**

GE Hitachi Nuclear Energy  
International, LLC

Project: 2012 RPV Shell Coarse Examination

WCP No.: GE UT 728 V0 WCP Rev.: 0

Work Description: Automated UT Utilizing Z-Scan

Page: 1 of 7

DOCUMENT  
RELEASED FOR PRODUCTION  
QUALITY ASSURANCE  
DATE

Project Mgr Approval/Date [Redacted] 25. Aug. 12

QA/QC Approval/Date [Redacted] 25. Aug. 12

Seq No.	Operation, Examination or Test	Reference Document or Procedure and Rev.	Check, Hold/Witness				Completed by/Date				Remarks
			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
		GEH-UT-728 V0									
1.0	Verify Personnel Certifications	Section 3.0									
1.1	Verify Personnel Certifications	Par. 3.1 – Par. 3.4	H	H	C	C	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2.0	Verify Equipment	Section 4.0									
2.1	Verify Ultrasonic Equipment	Par. 4.1 – Par. 4.8.1	H	C	C	C	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
3.0	System Set Up	Section 5.0									
3.1	General Information	Par. 5.1 – 5.10	H	C	C	C	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
4.0	Calibration	Section 6.0									

H = Hold C = Check



**Project:** 2012 RPV Shell Coarse Examination

**WCP No.:** GE UT 728 V0

**WCP Rev.:** 0

**Work Description:** Automated UT Utilizing Z-Scan

Page: 2 of 7

Seq No.	Operation, Examination or Test	Reference Document or Procedure and Rev.	Check, Hold/Witness				Completed by/Date				Remarks
			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
4.1	General Calibration	Par. 6.1 – 6.4	H	C	C	H	[Redacted]	[Redacted]	[Redacted]	[Redacted]	Notify KKM X SVTI [Redacted]
4.2	Straight Beam Time Base Calibration	Par. 6.5.1 – 6.5.4.e	H	C	C	C	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
4.3	Instrument Sensitivity Calibration (Figure 2)	Par.- 6.6	H	C	C	C	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted]	[Redacted]	
4.4	Verify all information from List 2 in Settings Parameter Tab	Par. 6.7	H	C	C	C	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted]	[Redacted]	
4.5	Straight Beam Calibration Logarithmic Channels	Par. 6.8.1 – 6.8.5	H	C	C	H	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted] 25 Oct. 12	[Redacted]	
4.6	Straight Beam Calibration Linear Channels	Par. 6.9.1 – 6.9.5	H	C	C	H	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted] 25 Oct. 12	[Redacted]	
4.7	Angle Beam Time Base Calibrations	Par. 6.10.1- 6.10.4	H	C	C	H	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted]	[Redacted]	
4.8	Calibration Block	6.11	H	C	C	C	[Redacted] 25 Aug. 12	[Redacted] 25 Aug. 12	[Redacted]	[Redacted]	

H = Hold C = Check



Project: 2012 RPV Shell Coarse Examination

WCP No.: GE UT 728 V0 WCP Rev.: 0

Work Description: Automated UT Utilizing Z-Scan

Page: 3 of 7

Seq. No.	Operation, Examination or Test	Reference Document or Procedure and Rev.	Check, Hold/Witness				Completed by/Date				Remarks
			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
4.9	Verify List 2 is entered in UT Settings Parameter Tabs	Par. 6.12	H	C	C	C	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12			
4.10	Angle Beam Calibration Logarithmic Channels	Par. 6.13.1 – 6.13.6	H	C	C	H	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12		[Redacted] 26.8.12	
4.11	Initial Calibrations and Calibration Verifications	Par. 6.14.1 – 6.14.2	H	C	C	H	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12			Notify KKM X SVTI [Redacted]
5.0	<b>Examination</b>	<b>Section 7</b>									
5.1	Calibration Verification (Cal Check)	Par. 6.14	H	C	C	C	N/A	N/A	N/A	N/A	Initial calibration in step 4.11 was used.
5.2	Examine Shell Coarse 5	Par. 7.1 – 7.12.4	H	C	C	C	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12	[Redacted]	
5.3	Examine Shell Coarse 4	Par. 7.1 – 7.12.4	H	C	C	C	[Redacted] 26 Aug 12	[Redacted] 26 Aug 12			
5.4	Examine Shell Coarse 3	Par. 7.1 – 7.12.4	H	C	C	C	[Redacted] 27 Aug 12	[Redacted] 27 Aug 12			

H = Hold C = Check



**Project:** 2012 RPV Shell Coarse Examination

**WCP No.:** GE UT 728 V0

**WCP Rev.:** 0

**Work Description:** Automated UT Utilizing Z-Scan

**Page:** 4 of 7

Seq No.	Operation, Examination or Test	Reference Document or Procedure and Rev.	Check, Hold/Witness				Completed by/Date				Remarks
			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
5.5	Examine Shell Coarse 2	Par. 7.1 – 7.12.4	H	C	C	C	██████████ 27-Aug-12	██████████ 27-Aug-12			
5.6	Examine Shell Coarse 1	Par. 7.1 – 7.12.4	H	C	C	C	██████████ 27-Aug-12	██████████ 27-Aug-12			
5.7	Calibration Verification (Cal Check)	Par. 6.14	H	C	C	C	██████████ 27-Aug-12	██████████ 27-Aug-12	██████████ 27-Aug-12	██████████	Notify KKM X SVTI
6.0	<b>Recording</b>	<b>Section 8</b>									
6.1	Record Shell Coarse 5	Par. 8.1 – Par. 8.5	H	C	C	C	██████████ 26-Aug-12	██████████ 26-Aug-12			
6.2	Record Shell Coarse 4	Par. 8.1 – Par. 8.5	H	C	C	C	██████████ 26-Aug-12	██████████ 26-Aug-12			
6.3	Record Shell Coarse 3	Par. 8.1 – Par. 8.5	H	C	C	C	██████████ 27-Aug-12	██████████ 27-Aug-12			
6.4	Record Shell Coarse 2	Par. 8.1 – Par. 8.5	H	C	C	C	██████████ 27-Aug-12	██████████ 27-Aug-12			

H = Hold C = Check



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			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
6.5	Record Shell Coarse 1	Par. 8.1 – Par. 8.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			
	<b>Evaluation</b>	<b>Section 9</b>									
7.1	Evaluate Shell Coarse 5	Par. 9.1 – Par. 9.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			
7.2	Evaluate Shell Coarse 4	Par. 9.1 – Par. 9.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			
7.3	Evaluate Shell Coarse 3	Par. 9.1 – Par. 9.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			
7.4	Evaluate Shell Coarse 2	Par. 8.1 – Par. 8.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			
7.5	Evaluate Shell Coarse 1	Par. 8.1 – Par. 8.5	H	C	C	C	[Redacted] 27-Aug-12	[Redacted] 27-Aug-12			

H = Hold C = Check



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			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
	<b>Reports</b>	<b>Section 10</b>									
8.1	Report Shell Coarse 5	Par. 10.1 – Par. 10.3	H	C	C	C	[Redacted] 29 Aug 12		[Redacted] 03/09/12	[Redacted]	
8.2	Report Shell Coarse 4	Par. 10.1 – Par. 10.3	H	C	C	C	[Redacted] 29 Aug 12		[Redacted] 03/09/12	[Redacted]	
8.3	Report Shell Coarse 3	Par. 10.1 – Par. 10.3	H	C	C	C	[Redacted] 29 Aug 12		[Redacted] 03/09/12	[Redacted]	
8.4	Report Shell Coarse 2	Par. 10.1 – Par. 10.3	H	C	C	C	[Redacted] 29 Aug 12		[Redacted] 05/09/12	[Redacted]	
8.5	Report Shell Coarse 1	Par. 10.1 – Par. 10.3	H	C	C	C	[Redacted] 29 Aug 12		[Redacted] 03/09/12	[Redacted]	
8.6	GE Prüfprotokoll Generation and Verification	N/A	H	H			[Redacted] 29 Aug 12				QA to Review

**H = Hold    C = Check**



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			P	QC	KKM	SVTI	Prod	QC	KKM	SVTI	
8.7	Prüfprotokoll Signatures	N/A	H	H	H	H	[Redacted] 24 Nov 12	[Redacted]	[Redacted] 29 Oct 12	[Redacted]	
8.8	Final Review	NEDC32286 Rev. 10		H					[Redacted] 04/09/12	[Redacted]	

**H = Hold    C = Check**