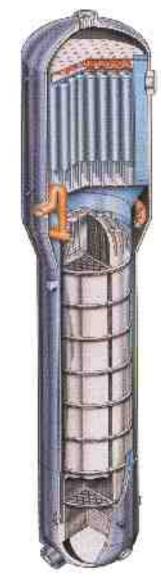


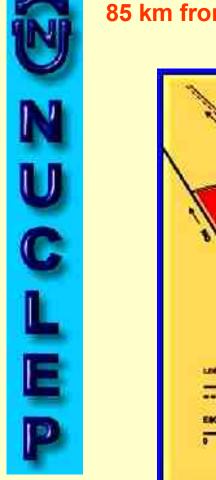
NUCLEBRAS EQUIPAMENTOS PESADOS S. A.



LAS / ANS Symposium 2008

LOCATION

Itaguaí – south coast of Rio de Janeiro state 85 km from Rio downtown and 120 km to the Angra nuclear plants





QUALITY CERTIFICATES

69.30

mineral Late want

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PRIVATE MARITIME TERMINAL

Located at the Sepetiba bay, 3 km from NUCLEP's workshop.

Connection between the terminal and the workshop through a private road.





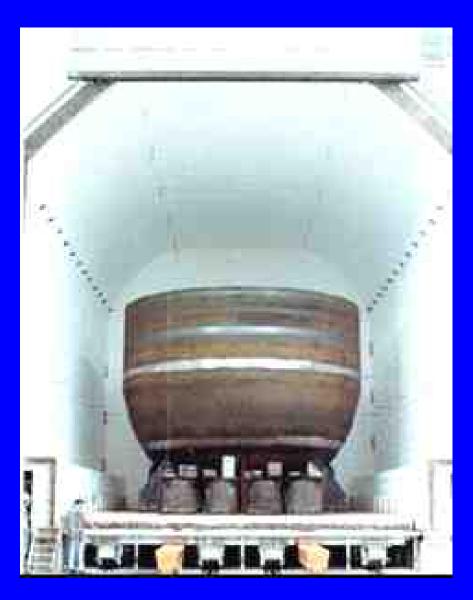






NUCLEAR ACTIVITIES

LOWER PART OF THE REACTOR VESSEL TO ATUCHA II NUCLEAR PLANT - ARGENTINA



Stress Relieving Heat treatment

PRESSURIZER TO ANGRA 3



CONDENSERS TO ANGRA 2

MANUFACTURING and ASSEMBLY ON SITE BY NUCLEP





SPENT FUEL STORAGE RACKS TO ANGRA 2



MANUFACTURING and ASSEMBLY ON SITE BY NUCLEP



ACCUMULATORS TO ANGRA 2



PROTOTYPE OF A REACTOR VESSEL TO NUCLEAR SUBMARINES







ANGRA 1 REPLACEMENT STEAM GENERATORS

Design: AREVA NP SAS

Manufacturer: NUCLEP

Fabrication time: 32 months (2 GV)

Individual weight: 345 tons

CLEAN ROOM





Temperature: 24°C

Relative humidity: 50%

Pressure: 1.5 mm ca

Class: 100.000 (Tests indicated a class of 10.000)

Air changes: 10 / h

WELDING FEATURES

- 50 procedures were qualified.
- Processes employed: SAW, SMAW, FCAW, GTAW.
- Stainless steel Cladding
- Nickel alloy cladding
- Tube to tubesheet welds (TIG Orbital): 21.712 welds on both SG



INCONEL CLADDING OF THE TUBESHEET



POLISHING OF TUBESHEET SECONDARY SURFACE



SUB-ASSEMBLY 11









DEEP DRILLING OF TUBESHEET



Each tubesheet: 10.856 holes Tubesheet thickness: 600 mm Diameter: 19.27 mm (0/+0.12) Perpendicularity between the tubesheet faces: 0.5 mm max.

Total drilling time: 35 days per SG 24 hours a day

More than 1.800 BTA heads were used (max. per head: 12 holes)

Result: 100% approved.



SA10 - CHANNEL HEAD









SUB-ASSEMBLY 12







Welding of nozzles & accessories

SUB-ASSEMBLY 30 (SA11 + SA12)





Local stress relieving heat treatment (electromagnetic induction)

Transfer to the clean area

SUB-ASSEMBLY 13







SUB-ASSEMBLIES 23, 24, 25 & 26

SA 24 SA 25





SA 23 SA 26





SUB-ASSEMBLY 31 INTRODUCTION OF THE BUNDLE WRAPPER









SA 32 - TRANSFER TO THE CLEAN ROOM







SA 32 (INTERMEDIATE PART)

Sequence of activities







Tube to tubesheet welds





Hydraulic expansion

Helium leak test





Profilometry

SA 25 (WRAPPER ROOF)









SA 34 – (UPPER PART – ASSEMBLY OF INTERNALS)









ASSEMBLY OF THE UPPER PART







LAST CIRCUMFERENTIAL WELD







HYDROSTATIC TEST

Test pressure:

Secondary side → **105 bar** Primary side → 214 bar





EDDY CURRENT TEST



Result: 100% approved

ASSEMBLY OF THE CYCLONES











TRANSPORT TO THE MARITIME TERMINAL







TRANSPORT TO ANGRA SITE





THANKS FOR YOUR ATTENTION!

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