Contents

- Editorial
- Tube Plugging Criteria for Heat Exchangers, Boilers and Condensers, etc.
- Application of Mechanized Ultrasonic Testing in lieu of Radiographic Testing during the Construction of Pipeline for Petroleum Products
- Seminars on NDT
  - Experience of WAPDA using NDT as a Tool for Turbine Maintenance
  - The Role of NDT Technology in the Industrial Development of Pakistan
- Investiture of PASNT
  - PASNT Website
  - Training Courses Conducted
  - Training Courses Planned for 2003
  - Happy News
  - Global Harmonization of NDT Certification under ISO- 9712
  - Industrial NDT Services
  - In-service Inspection of CHASNUPP Conventional Island (CI) by NCNDT
  - International NDT News
  - Foreign Assignment
  - Visitors Gallery
  - Visit of NCNDT & CHASNUPP Officers
  - Private Advertisement

EDITORIAL
Last issue of this Newsletter was brought out in a new getup. Snaps of members of the Editorial Board were added. Table of contents was included (Previously we faced difficulty in referring to a news item that appeared in a certain issue and had to browse through the pages of many issues in order to locate a desired news). Similarly, titles like International NDT News, Visitors gallery and account of Visits of National Centre for Non-destructive Testing (NCNDT) Personnel were included. This gave new dimensions to the scope of our Newsletter. All this was possible by the contribution of ideas given by the members of newly constituted Editorial Board. It is felt that the readers would have appreciated it.

For the sake of further improvements the Editorial Board would welcome suggestions from the readers and is keen to incorporate changes/additions as proposed by the well wishers.

NCNDT is constantly striving to safeguard the interests of its over 1300 certified participants in various training courses. News about recognition of its RT Level-2 Certificate by the Canadian NDT Certifying Body (NR Can) appears later in this Issue.

As pointed out many times in the past we would like to receive technical articles/news items related to the field of Non-destructive Testing (NDT) from the National NDT Community so that the text be conveyed to most of the persons engaged in NDT activity in the country. All this service is offered in good faith and free of charge.

There is no short cut to experience but instead of tackling the problem from abinitio oneself and learning by mistakes it is judicious to take advantage of research and development done by forerunners. This is how knowledge advances. So we hope that the Newsletter will be favoured by summaries of rich experiences of people senior in the field of NDT.

Editor

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**TUBE PLUGGING CRITERIA FOR HEAT EXCHANGERS, BOILERS, AND CONDENSERS. ETC.**

**Introduction**

Heat exchangers, boilers and condensers, etc. are the integral parts of all nuclear and non-nuclear plants. The tubes installed in such equipment degrade due to hostile environment with the passage of time. The faulty tubes are to be plugged.

Eddy current technique provides information about the integrity of the heat exchangers. This information is based on the tube plugging criteria that has been adopted by different power plants. The tube plugging criteria for the heat exchangers, steam generators, boilers & condensers, etc. is dependant on the tube material, surface conditions, flaw mechanisms and plant requirements. The criteria should preferably be established by the plant itself.

Different alloys corrode and crack at different rates. For example: soft alloys, such as Aluminum Brass has one of the highest erosion rates among the materials in common use in power plants but they rarely crack. Hard alloys such as Titanium rarely erode, with the exception of steam impingement, but cracking is the major failure mechanism of such alloys. Stainless steels with minute impurities may be highly prone to corrosion in sea water environment. Aluminum Brass alloy has been known to develop internal erosion dents where shellfish have become logged in the tube. These pits grow through the tube wall in less than 1 year.

Alloys subject to cracking have growth rates that are very fast. Under favourable conditions, Titanium tubes have been known to develop circumferential cracks midspan between support plate that grow to 100% in a few hours.

As far as corrosion is concerned Titanium tubes are rarely susceptible to corrosion while Aluminum Brass tubes, in an environment in which ammonia is used for oxygen, control, have been known to develop ammonia induced condensate corrosion adjacent to support plates. This damage mechanism can be traced accurately over several years by inspecting the wall of the tube.
Plant requirements may have an impact on plugging criteria. For example, if a single isolated defect is identified in an inspection and the plant is relatively new, this tube may well be plugged as a precautionary measure to prevent the possibility of an unexpected leak in near future. On the other hand, in an older plant it has often been desirable to increase the percent wall loss criteria used for tube plugging in order to keep the maximum number of tubes in service until the next shut down. This procedure is normally adopted near the end of the heat exchanger life when the power plant is trying to operate at full capacity for an additional year until a replacement heat exchanger or replacement tube material is obtained.

**Tube Plugging Criteria**

Plugging of the tubes reduces the efficiency of the heat exchangers. But the heat exchangers, etc. are normally over designed. Therefore tube plugging upto 10% (in some situations) may not affect the efficiency to a great deal.

The tube plugging criteria is best established by a team of engineers comprising of a corrosion engineer, metallurgical engineer, plant operation engineer and eddy current specialist. The corrosion engineer and metallurgical engineer together should understand the failure mechanisms of tubes. The plant operation engineer should understand the requirements of the plant. The eddy current specialist should understand the capabilities and limitations of the eddy current test method.

**For Cracks**

As cracks often grow rapidly, most power plants decide to plug the tubes which may have detectable cracks regardless of the depth of the crack.

**For Erosion Pits**

In the heat exchangers normally the source of erosion can be identified and stopped. For example, blockage in the tubes from shellfish or wood chips can be removed. High internal velocities which result in the end erosion can be resolved by adjusting the flow rate of cooling water in order to stop the erosion process. Erosion caused by an obstruction at the inlet of the tube such as from epoxy coatings on the support plates can be removed. Once the source of erosion has been removed it can be assumed that the erosion process will stop and the tube need not be plugged with almost no regard to the defect depth.

**For Corrosion**

The cause of corrosion is more difficult to stop than the cause of erosion. Corrosion pit depth can be monitored year after year. Tubes should be plugged as pits approach the maximum allowable depth.

**CONCLUSION**

Power plants have used the tube plugging criteria that vary between 40% to 80% through-the-wall thickness of the tube. Forty percent through-the-wall thickness is too conservative in most situations with the exception of cracks. Plugging criteria of 50% to 60% of the tube wall thickness appears to be more common. A plugging criteria of 80% of the tube wall thickness is only acceptable in a situation such as the pit being caused by erosion and the source of erosion having been removed. Another situation in which 80% plugging criteria may be acceptable is when the damage mechanism is known to grow relatively, slow and the plant is attempting to keep as many tubes in service as possible until the heat exchanger can be repaired or replaced. Under these circumstances the plant anticipates occasional tube failures that will require the unit to be brought offline for tube plugging.

Contributed by: Dr. M. Sabir Ch., Chief Scientific Officer NCNDT; SES Dte. Sultan Sikander; Pr. Technician-I NCNDT; SES Dte.
APPLICATION OF MECHANISED ULTRASONIC TESTING IN LIEU OF RADIographic TESTING DURING THE CONSTRUCTION OF PIPELINE FOR PETROLEUM PRODUCTS

Pipelines are used for compression, pumping and transmission of crude petroleum, petroleum products and fuel gases in the petroleum industry. Testing and inspection is an important phase in all construction stages of pipeline for petroleum products.

So far, radiographic testing is being successfully used for the inspection of welds of pipeline during construction stage. Due to the harmful effects of radiographic testing, research has been in progress worldwide to replace this technique during construction stage.

In January 2001, The China National Petroleum Company (CNPC) announced the construction of the West-East Pipeline Project (WEPP). The 4,167 Km pipeline (Longest in China) will start from the "Tarim Barin" in northwest Xinjiang and end in Shanghai running through nine provinces. This pipeline is designed to carry 12 billion cubic meter of natural gas to Shanghai annually by the year 2005. The maximum design capacity of the pipeline will be reached in 2010 when throughput will amount to 20 billion cubic meter annually. This project is also a significant event for NDT in that CNPC announced its intention to use mechanised ultrasonic testing in lieu of radiographic testing on this project.

Early in 2001 the members of Chinese Pipeline Bureau and NDT Committee along with potential inspection companies and the pipeline owners met to develop specifications for mechanised ultrasonic testing to ensure high quality welding. To this end they adapted a specification based on ASTM-1961 which was specifically designed for girth weld inspection using mechanised ultrasonic testing. After different experiments, in June 2001, CNPC decided to use the RD Tech. phased array system of RD Tech. Company throughout the project."

As a final preparation, CNPC decided to carry out a comparison of mechanised ultrasonic testing and radiographic testing on the initial welded joints to assure that the previous experience gained outside China would be applicable to their welding configuration and processes. As a result of the favourable comparison of the two NDT methods CNPC was in a position to carry out its first major pipeline project using mechanised ultrasonic testing.

(For more information on the WEPP readers may visit their website www.chinaoilweb.com)

Contributed by: Mr. Tahir Nazir; Senior Engineer; (NCNDT.)

HOLDING OF SEMINARS ON NDT AT NCNDT

As a part of its regular programme to arrange seminars on NDT related topics NCNDT reports the following two seminars:

1. "Experience of WAPDA using NDT as a Tool for Turbine Maintenance" - Mr. Munir Bhatti, Engineer, WAPDA (27 June, 2002).


EXPERIENCE OF WAPDA USING NDT AS A TOOL FOR TURBINE MAINTENANCE
The topic "Experience of WAPDA using NDT as a Tool for Turbine Maintenance" was presented by him on Multimedia on, total ninety slides. First fifteen slides were about introduction to WAPDA, Thermal Power Generation System and NDT facilities available at this Workshop and in the remaining seventy-five slides he discussed about main parts of a Gas Turbine and Steam Turbine, their functions and various method of NDT which are applied to perform reliable NDT of these parts and types of defects which are commonly found in them. He explained different aspects of the topic in detail with the help of pictures of the turbine parts in non-assembled form.

WAPDA has established a Central Maintenance Workshop at Faisalabad to provide inspection & repair facilities to all Thermal Power Stations of WAPDA Power Generation System. NDT Shop is comprehensive part of this Workshop which is fully equipped with latest NDT facilities. The NDT crew inspects every job which is received in this Workshop many times during repair process. Same crew visits various Thermal Power Stations of WAPDA to provide on-site NDT facilities during their major overhauling.

The best suitable method of NDT for a typical turbine part is selected keeping in view the recommendations of manufacturer of that turbine. Different parts of Gas and Steam Turbines, types of defects commonly found in these parts and different NDT methods applied for inspection of each part have been summed up in a tabular form for the ease of the readers as follows:

**NDT of Gas Turbine**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Main Section</th>
<th>Part</th>
<th>Nature of Defect</th>
<th>NDT Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inlet Guide Vanes</td>
<td>Inlet Guide Vanes</td>
<td>Cracks, Wear</td>
<td>VT, PT</td>
</tr>
<tr>
<td>2.</td>
<td>Compressor</td>
<td>a. Compressor Blades</td>
<td>Cracks, Loss of Thickness, Bends</td>
<td>VT, MT, PT, UT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Compressor Tie Rods</td>
<td>Cracks</td>
<td>VT, UT, PT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Compressor Casings</td>
<td>Cracks</td>
<td>VT, PT, MT</td>
</tr>
<tr>
<td>3.</td>
<td>Combustion Chamber</td>
<td>a. Fuel Nozzle</td>
<td>Burning, Metal Missing</td>
<td>VT, PT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Crossfire Tubes</td>
<td>Wear, Burning, Metal Missing</td>
<td>VT, PT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Transition Piece</td>
<td>Cracks, Bulging, Wear, Bends</td>
<td>VT, PT</td>
</tr>
<tr>
<td>Item No.</td>
<td>Main Section</td>
<td>Part</td>
<td>Nature of Defect</td>
<td>NDT Methods</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>b. Steam Header</td>
<td>Pinholes, Pitting, Loss of Thickness, Welding Defects</td>
<td>VT, UT, RT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Welding Joints of HP Steam Rout</td>
<td>Pinholes, Loss of Thickness, Welding Defects</td>
<td>VT, PT, UT, RT</td>
</tr>
<tr>
<td>2.</td>
<td>Steam Admission Chest</td>
<td>a. Steam Chest Body</td>
<td>Cracks, Pitting, Loss of Thickness</td>
<td>VT, MT, UT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Welding Joints</td>
<td>Cracks, Lack of Fusion, Lack of Penetration, Porosity, Slag Inclusions, Lack of Side Wall fusion etc.</td>
<td>VT, MT, PT, UT, RT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Bends</td>
<td>Pitting, Loss of Thickness</td>
<td>VT, UT</td>
</tr>
<tr>
<td>3.</td>
<td>HP, IP, &amp; LP Turbine Rotors</td>
<td>a. Moving Blades</td>
<td>Bend, Erosion, Cracks, Metal Missing, Wear</td>
<td>VT, MT, PT, ET</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Blade Grooves</td>
<td>Cracks</td>
<td>VT, MT, PT, UT</td>
</tr>
</tbody>
</table>

**NDT of Steam Turbine**
c. Rotor disks & Shaft | Cracks, Wear, Scratches | VT, MT, PT, UT

d. Thrust Collar | Cracks, Wear, Scratches | VT, MT, UT

4. HP, IP, & LP Turbine Casings

a. Diaphragms | Bends, Cracks, Erosion, Metal Missing, Wear, Pitting | VT, MT, PT

b. Turbine Casings | Cracks, Erosion | VT, MT, UT

c. Turbine Casings Studs | Cracks | VT, PT, UT

5. Condenser

Condenser Tubes | Pinholes, Loss of Thickness | HP, ET, PT

6. Generator

Retaining Rings | Corrosion, Pitting, Scratches, Stress Corrosion Cracks | VT, PT, UT

ABBREVIATIONS

VT: VISUAL TESTING
PT: DYE PENETRANT TESTING
UT: ULTRASONIC TESTING
MT: MAGNETIC PARTICLE TESTING
ET: EDDY CURRENT TESTING
RT: RADIOGRAPHIC TESTING
HP: HIGH PRESSURE TESTING

THE ROLE OF NDT TECHNOLOGY IN THE INDUSTRIAL DEVELOPMENT OF PAKISTAN

(About the speaker: Mr. Asghar Ali Khan, Director; National Centre for Non-destructive Testing joined Pakistan Atomic Energy Commission (PAEC) in 1967 after having obtained Masters Degree in the subject of Physics from University of the Punjab in 1966. He worked as a Group Leader in the field of industrial applications of NDT and Radiation Technology upto 1979. During this course of time he had an opportunity of completing his MTech. in 1976 from Brunei University, Uxbridge, Middlesex, U.K. with Non-Destructive Testing (NDT) of Materials as main subject. He has received an extensive training in the field of NDT from many foreign International Institutes of repute.

Mr. Asghar Ali Khan has played a key and pivotal role lasting over a span of 35 years in promoting the applications of NDT in Pakistan. He is the author of over 45 publications which include: research papers, technical reports, reviews and text books for NDT training courses. He has been on foreign assignments as an International Expert on NDT in many countries under International Atomic Energy Agency (MEA) Technical Assistance Programmes and has also served IAEA Headquarters at Vienna, Austria for three years.)

The present seminar is the one delivered by the speaker at Pakistan Institute of Nuclear Science & Technology (PINSTECH) on 10th July, 2002. It was attended by an audience of about 200 highly qualified Scientists & Engineers and its text was published by Pakistan Nuclear Society in their June-August 2002 Issue of "The News". Since the topic has great usefulness for the NDT Community so we are repeating a summary of the subject matter for wider publicity.

The main contents and general lecture plan as delivered was:

1. Introduction to NDT technology.
3. Development & Present Status of NDT Technology in
Pakistan.

4. NCNDT’s Programme & Activities.

1. Introduction to NDT Technology

The speaker discussed in the first instant the merits and demerits of destructive testing and non-destructive testing. He discussed in detail the various NDT methods, typical defects in materials and failure of structures. There was a detailed description on the topic ‘Failure of Structures’ which included: common mode of failure viz. fracture, causes of fracture and stages of failure due to a crack. Typical examples of catastrophic failures in industries such as Railways, Automobiles, Aircraft, Power Houses, Refineries, Ships, Pipelines and Petrochemical plants, etc. were discussed. The need of detecting defect at an early stage in any product being fabricated before their reaching critical levels was highlighted.

In the last phase of discussion on the above mentioned topic, importance and uses of NDT were discussed. The benefits discussed include: ensuring better reliability of machines, improvement in the quality of the products, helping in design and development of new products and nuclear power plant life extension through NDT carried out during pre-service & in-service inspection i.e. PSI & ISI and others.

2. Current Trends in NDT Development

An elaborate discussion on the topic was made during which the salient trends highlighted for the developed & developing countries were as under:

a) Developed Countries

i) There is a strong need of investing in NDT technology to gain quality for competing in the international market.

ii) Defect detection sensitivity of the NDT equipment shall be increased.

iii) The equipment for NDT shall be made less operator dependant through the use of computers and robotics.

iv) Use of newer NDT technologies such as computer tomography, laser interferometry, holography and acoustic emission shall become more popular.

v) In the fields of radiography and ultrasonic testing, areas such as microfocus radiography and high, frequency ultrasonic will be further developed.

vi) Training and Certification of NDT personnel shall be harmonized at regional and international levels.

b) Developing Countries

i. Development of the core group of personnel & trainers in all the basic NDT methods in order to initiate training activity.

ii. Establishment of National Certifying Bodies/Boards responsible for Training and Certification of NDT personnel.

iii. Issuance of one’s own National Standards fulfilling the minimum requirements of International Standard, ISO 9712 on Qualification & Certification of NDT personnel.

iv. Training of the persons in the field of NDT by organizing National Training Courses for other countries.

V. Creation of NDT commercial companies & establishment of professional NDT Societies.

vi. Introduction of those NDT techniques required as part of applications of NDT such as; NDT inspection of
concrete, ceramic materials and other advanced techniques, etc.

3. Development and Present Status of NDT Technology in Pakistan

The speaker highlighted the development phase of NDT within PAEC and in Pakistan. The NDT activities have been carried out in PAEC since 1965. Initially the NDT programme comprised of holding of training courses in radiographic testing and inspection storage tanks and pipelines for the National industry.

NDT during seventies within PAEC was that carried out by the working NDT group at Radiation & Isotope Application Division (RIAD) at Pakistan Institute of Nuclear Science & Technology (PINSTECH) and at Directorate of Industrial Liaison (DIL). NDT activities further flourished during bilateral programmes such as: PAEC-KFK, PAEC- BAM and IAEA-RCA regional project on NDT. At this moment, NDT activities were also initiated in various industries of Pakistan and some private NDT companies also had come into existence. In eighties, with the establishment of Scientific & Engineering Services Directorate (SES), the following activities were completed: Issuance of PAEC Document on Training & Certification, Establishment of PAEC Board for Training & Certification, Organization of Training Courses & Certification Examinations by SES & Issuance of Certificates of Competence.

4. NCNDT’s Programme & Activities

The National Centre for Non-destructive Testing (NCNDT) was established by Pakistan Atomic Energy Commission (PAEC) formally in 1995. During nineties and the years onward, there was a tremendous increase in the activities related to promotion of NDT within PAEC & Pakistan. Pakistan Society for Non-destructive Testing (PASNT) was established and it became member of International Committee for Non-destructive Testing (ICNDT). Publication of a quarterly NDT Newsletter was started. NCNDT received advanced NDT equipment from International Atomic Energy Agency (IAEA) under its technical assistance programme to develop a laboratory for inspection of concrete.

NCNDT is the main centre of NDT related activities in Pakistan. It is helping industry in Pakistan by providing NDT inspection services and solving their typical problems. The NDT activities related to in-service inspection (ISI) of nuclear power plants in Pakistan are being planned to be carried out in near future. NCNDT has successfully organised the First National Conference on NDT in the year 2001 which shall be its regular feature in future. It is planned to introduce NDT as a field of specialization for the students completing their degree courses in engineering and sciences. The seminar in broad sense can be described as an eye-opener for those unaware of the potentials of NDT and was greatly appreciated by the audience.

INVESTITURE OF PASNT

As announced in our Issue No.27, Pakistan Society for Non-destructive Testing (PASNT) held its 3 rd Elections on 14th March, 2002 to elect the office bearers for its eleven vacant posts of the Administrative Council for the next two year term of 2002-2004. The oath taking ceremony of the 3 rd elected Administrative Council of PASNT, which all got elected unopposed, was held on 5th August, 2002 at the National Centre for Non-destructive Testing (NCNDT) and the oath was administered by Mr. Parvez Butt, Chairman, Pakistan Atomic Energy Commission (PAEC).

Speaking on the occasion, the Chairman PAEC announced the initiation of "Gold Medal" award for innovation to encourage creativity among employees. The Chairman said the award would be given on comprehensive evaluation and usefulness of the proposal the country's benefit and promote competitiveness. He further said that the award would aid in providing local solutions to industrial problems of the country.

PASNT WEB SITE

It is announced with pleasure that the website of Pakistan Society for Non-destructive Testing, (PASNT) has been introduced on August 19, 2002. The website address is www.pasnt.freeservers.com. This website includes useful information about NDT, NCNDT, PASNT, Certification of NDT personnel in Pakistan, Details & fee schedule of NDT
training courses and links to other useful NDT websites. Readers may also download the application forms for training and certification programmes at NCNDT and PASNT membership forms, etc.

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**TRAINING COURSES CONDUCTED**

During the reported period following training courses conducted by NCNDT:

1. **Course on Interpretation of Radiographs (NDT-134) 08 -12 July. 2002**

The course was a non-certification type and a total of 14 participants attended the said course. These included 8 candidates from various PAEC organizations and 6 from outside industries.

The concluding ceremony of the course was held on 12th July wherein Mr. Shahid Hussain Shahid, Director General, Directorate of Reactor Engineering, PAEC was the chief guest.

2. **Level-2 and Level-1 Course on Surface Methods Testing for PIA Personnel (NDT-132). 08 July -02 August. 2002**

The course was organized & conducted in-house for the NDT personnel of Pakistan International Airlines (PIA), at Karachi. In this Level-2 NDT Course on Surface Methods, 11 candidates participated and 5 were certified. For Level-1 NDT Course on Surface Methods, 9 candidates participated out of which 4 were declared qualified. One candidate did not appear in the certification examination.

3. **Level-I Course on Visual Testing (NDT-135), 12 th August to 29th August, 2002**

This course was the first to be organized and conducted by NCNDT on visual testing. A total of 14 candidates participated in the said course out of which 9 were from various organizations within PAEC and 5 were from outside industries.

The closing ceremony of the course was held on 29th August. Mr. Saeed Ahmed, General Manager, Directorate of Scientific & Engineering Services(SES) was the chief guest.

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**TRAINING COURSES PLANNED FOR 2003**

Proposed Training and Certification schedule of NCNDT for 2003 is announced below (requests of the industries for holding any course at their premises can be accommodated).

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>COURSE TITLE</th>
<th>DURATION</th>
<th>NOMINATION CLOSING DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Level-3 Radiographic Testing Course</td>
<td>08 Jan -06 Feb</td>
<td>09 Dec,2002</td>
</tr>
</tbody>
</table>
2. NDT Appreciation Course for Managers  
   07 - 11 April  
   07 March, 2003

3. Level-2 Ultrasonic Testing course  
   14 April - 15 May  
   17 March

4. Re-certification/Re-examination  
   19-30 May  
   21 April

5. Level-1 Leak Testing Course  
   04 - 20 June  
   05 May

6. Level-1 Surface Methods Testing Course  
   09 - 31 July  
   09 June

7. Course on Introduction to Fracture Mechanics  
   20 Aug. - 04 Sep.  
   18 July

8. Re-certification/Re-examination  
   08 - 19 Sep.  
   08 Aug.

9. Second National conference on NDT  
   15 - 17 Oct  
   -

HAPPY NEWS

By becoming Life / Corporate member of the Pakistan Society for NDT (PASNT), you/your organization will now be entitled to:

i) 7% discount on fee for course / re-examination / re-certification conducted/ administered by NCNDT

ii) Preference in selection for the courses

For obtaining Life/Corporate membership of PASNT, kindly contact:

Mr. Asghar Ali Khan (President PASNT)  
or  
Mr. M. Afzal (Secretary PASNT)  
C/o NCNDT P.O.Box 1781, Islamabad

Tel: 051-9258528  
Fax: 051-9258524  
e-mail: ncndt@isb.comsats.net.pk

GLOBAL HARMONIZATION OF NDT CERTIFICATION UNDER ISO 9712

Commenting on the recognizable benefit of global harmonization of NDT certification under ISO 9712, Dr. Richard V; Murphy, Manager, Canadian NDT Certificating Body (NR Can) disclosed in a technical letter exchanged with Director NCNDT the equivalence and acceptance of a Level-2 Certificate in Radiography issued by NCNDT and the one by the Canadian NDT Certifying Body (NR Can) i.e. CGSB/NR Can Level-2 Radiographic Testing. A candidate thus qualified and certified at NCNDT as Level-2 in RT will be acceptable to the Canadian Certifying Board as the certification programmes in both systems are based on ISO9712. However, NR Can requires for any individual seeking their certification two additional examinations.

INDUSTRIAL NDT SERVICES
During the reported period NCNDT has provided the following main services to the national industry in addition to carrying out its other assignments:

1. Calibration of survey meter, UT and eddy current testing equipment for PIA.
2. Tension, face & root bend tests on mild steel welded plate for MIS Inter-globe Commerce Pakistan (Pvt.) Ltd.
3. Calibration of UT thickness meter and ultraviolet light for PTIS.
4. NDT of pipelines & vessels at Qadirpur Gas Processing Plant.
5. NDT of Ammonia Flush Tank and pipelines at Uch gas field.
6. Tension test on base metal plate sample for Imam Trading & Contracting, Islamabad.
7. RT services for DESCON Engineering Ltd.
8. Hardness testing of heater tubes for Attock Refinery.

**INSERVICE INSPECTION OF CHASNUPP CONVENTIONAL ISLAND BY NCNDT**

The proposed shut down of Chashma Nuclear Power Plant (CNPP) commenced for its First Re-fuelling Outage (RFO-I) on 30th September, 2002 and In-service Inspection (ISI) activities for Conventional Island (CI) commenced from 5th October, 2002. NCNDT will be carrying out the said inspection by employing NDT techniques such as: Ultrasonic Testing (UT), Radiographic Testing (RT), Eddy Current Testing (ET), Penetrant Testing (PT) and Visual Testing.

**INTERNATIONAL NDT NEWS**

7TH WORLD CONFERENCE ON NEUTRON RADIOGRAPHY

FROM 15-21 SEPTEMBER, 2002. ROME. ITALY

Researchers and scientists across the world presented their research and development work in the conference and the main topics addressed in addition to Neutron Radiography facilities were, the applications of real-time imaging systems and computed tomography in various disciplines. Mirza M. Ashraf, Chief Scientific Officer from Radioisotope Application Division (RIAD), PINSTECH represented Pakistan in the Conference. He presented a paper entitled "Current Status of Neutron Radiography in Pakistan".

Following international events in the shape of Conference/Symposium/Exhibition, etc. related to NDT are falling in near future:

<table>
<thead>
<tr>
<th>Date</th>
<th>Conference on</th>
<th>Location</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>31st</td>
<td>National Non-destructive Testing</td>
<td>Szczvrk 2002</td>
<td>Testing</td>
</tr>
</tbody>
</table>
Dates: 22-24 October, 2003
Location: Szczyrk, Poland
Contact: Conference Office 31 KKBN, S.C., Box No. 53,41-506 Chorzow, POLAND.
Tel/Fax: + 48322461249, + 48 322467666
E-mail: ekopjr1@ekopo1.cc.pl
Website: www.ekopo1.cc.pl

ASNT Fall Conference and Quality Testing Show

Dates: 04-08 November, 2002
Location: San Diego, California
Contact: American Society for Nondestructive Testing, Box No. 28518, 1711 Arlington Lane, Columbus, Ohio, U.S.A.
E-mail: kwise@asnt.org
Website: www.asnt.org

NDE 2002

Dates: 05-07 December, 2002
Location: Chennai, India
Contact: Dr. Baldev Raj, Hon. Member, ICNDT, Director, Materials, Chemical & Reprocessing Groups, KALPARKAM 603102, T.N., INDIA.
E-mail: dmg@igcar.ernet.in
Website: www.nde2002.org

3rd Pan-American Conference for Non-destructive Testing PANNDT

Dates: 02-06 June, 2003
Location: Riode Janeiro; Brazil
Contact: Maria Izabel Gebrael, 3rd Pan American Conference President, "ABENDE", The Brazilian Society for Non-destructive Testing, Rua Guapiaco 5, Sao Paulo, BRAZIL.
E-mail: "Abende" abende@abende.Org.br

FOREIGN ASSIGNMENT
Dr. M. Asif Khan, Sr. Principal Engineer (Mechanical) and Mr. Tahir Nazir, Senior Engineer paid an official two-week visit to China from 14-26 July under the 15th Protocol on S&T Cooperation between Pakistan and China. The topic of studies was "The use of Digital Image Processing in the Detection of Corrosion by using Radiography".

VISITORS GALLERY

During the period July to September, 2002 following personnel visited NCNDT:

- Four members of CHASNUPP Audit Team on 20th August, 2002.


VISIT OF NCNDT & CHASNUPP OFFICERS

- A four-member team of NCNDT lead by Mr. Asghar Ali Khan, Director NCNDT; Dr. M. Sabir Ch., Head ETD; Mr. A Rahim Khan, PSO; and Mr. Tahir Nazir, SE; visited CHASNUPP Site in July 2002. The objective of this visit was to finalize the scope of NDT inspection during ISI of Conventional Island (CI).
- Another six-member team of NCNDT comprising Mr. Abdur Rahim Khan, PSO; Mr. M. Arif Iftikhar, SE; Mr. Tahir Jamil, PT-I; Mr. Sultan Sikander, PT-I; Mr. Bashir Ahmed, PT-I and Mr. Fazal Din, Sr. Tech. visited CHASNUPP Site in mid July 2002 to make list of requirements to be completed by CNPP before inspection.
- M/s Abdur Rahim Khan, PSO, NCNDT & M. Asif Mehmood, PE, Pakistan Welding Institute (PWI), SES scope of work for repair & carrying out of NDT of Butterfly Valve in one of the tunnels.
- Mr. M. Gulab, S.E. visited GIKI to provide technical assistance to X-ray radiography lab." at their Faculty of Metallurgy and Materials Engineering.
- Mr. Jamaluddin, CSO and Dr. M. Asif Khan, SPE visited Pakistan Tobacco Company Limited, Akora Khattak, Nowshera on 5-7-2002 to assess scope of work on non-destructive inspection and life assessment of compressed air receiver tanks connected to the compressors in compressed air supply networks installed in the cigarette factory.

PRIVATE ADVERTISEMENT RATES

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Edited and published by Mohammad Javaid Iqbal, Principal Engineer, National Centre for NDT, SES Directorate, Pakistan Atomic Energy Commission, Islamabad. Layout design and composing done by SES Computer Section. Phone:(051)9257347-51, Fax: (051)4446126, e-mail: ncndt@isb.comsats.net.pk