	Environmental Policy	Revision – 2.0
	Document no – EMS/PRO/001	Date: 03-July-2007



ENVIRONMENTAL POLICY
AES Barka Power & Desalination Plant

It is the policy of the Management on behalf of the board of directors of AES Barka SAOG to be fully committed to the achievement of high standards of Environmental performance, which reflect its commitment to the environment as part of the Company's shared values. AES Barka business leaders are encouraged to develop a balanced approach to meeting these guidelines; one that considers all environmental standards and requirements, as well as the needs of all stakeholders (including social and other needs of the local community).


The aim of this policy is to protect the natural environment and to avoid unnecessary liabilities. We believe that environmental objectives are extremely important and implementation of the arrangement is a key line management responsibility. People are the key to our success and the co-operation and participation of all members of the workforce and of our contact service providers is crucial to the successful implementation of this policy.

We aim to achieve this policy by:

- Adopting an environmental management system
- Adopting clear accountability to support its implementation
- Establishing a balanced business approach regarding our environmental management

In particular our arrangements will ensure that we:

- a) Meet or where practical, exceed the requirements of all relevant environmental legislation and industry standards and codes of practice imposed by local, regional, and national government of Sultanate of Oman.
- b) Meet or where practical, exceed the requirements imposed by participating financial institutions
- c) Meet or where practical, exceed the requirements imposed by The AES Corporate Global Environmental Standards.
- d) Strive to continually improve environmental performance at AES Barka Power & Desalination Plant by routinely assess the effects of current and future activities
- e) Implement methods & measures to identify hazards, prevent pollution and minimize possible detrimental environmental impacts
- f) Reduce and where feasible eliminate discharge emissions and waste that may have an adverse effect on the environment.

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- g) Communicate this Policy to all people working at AES Barka, Contractors, suppliers, visitors and other interested parties.
- h) Make short and long range planning decisions on additional expenditures based on an evaluation of the local, regional, and global environment where the term “environment” is broadly defined as, “the external surroundings or conditions within which people live, including ecological, economic, and social and all other factors that determine quality of life and standard of living.”

Nadeem Rizvi
Plant Manager & CEO

Date:- 3rd July 2007

Certificate CH06/1141

The management system of

AES Barka SAOG

P.O. Box 572, Barka, PC 320, Oman



has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Power Generation & Water Desalination.

This certificate is valid from 28 December 2006 until 27 December 2009
Issue 1. Certified since December 2006

Authorised by

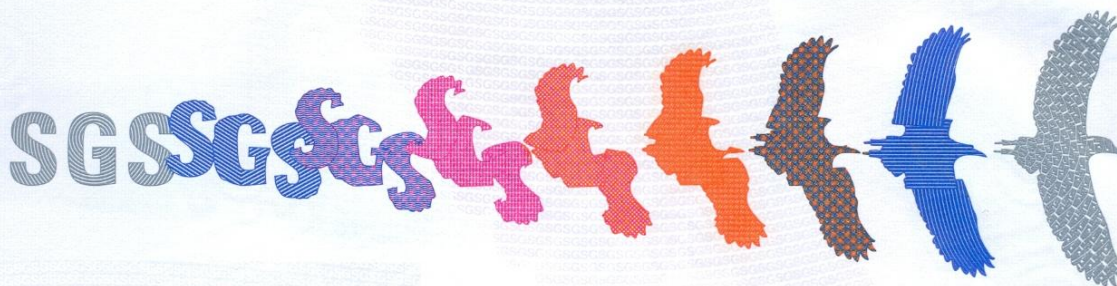
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»» 1st APEX AME Award Event

Team: AES Barka

Business /Country: AES Barka /Oman



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» AES Barka

Project Leader

- » Fahad Al Kindi

Knowledge Manager

- » Hamoud Al Amri

Project Sponsor

- » Nadeem Rizvi

Project Team Members

- » Gopi M.R.
- » Haji Aslam



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» Team Charter

- » To improve the performance of the demineralized water production as output was less than the expected value.
- » Leading to more frequent operation & regeneration cycles, resulting in higher chemical consumption and extra man hours.
- » Higher frequency of effluent discharge.
- » Higher frequency of personnel exposure to hazardous chemicals.

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» Our Approach

- › APEX group was formed to come up with various solutions to increase the DM plant production
- › DM plant is fed through our desalination plant. It was noticed that the reduction of the mixed bed output was due to the low pH of the distilled water
- › Most suitable solution was to improve the inlet distillate water quality
- › Performed SWOT analysis
- › Strengths: Savings in chemical cost, environment friendly project, reduction in the risk of handling hazardous chemicals, increase in equipment life time due to less usage.
- › Weakness: Limitation of resources, cost constraints
- › Opportunities: APEX implementation, positive NPV, people development
- › Threat: Budget approval, scaffolding work for pipe line routing in a running plant was a safety challenge, cost overrun

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PDCA

› Plan

- › Group was formed
- › Problem analysis
- › Collection of all inputs
- › Brain storming
- › Set an action plan
- › Solution identified
- › Formal sketch of the drawings
- › Decided requirements
- › Allocate responsibilities
- › Search for the vendor
- › Negotiations & vendor finalization
- › OEM approval

› DO

- › Work completion
- › Routed water to the DM plant thru new line up
- › Line checked for leakages
- › Unit put into operation.

› Act

- › Review the project and results were better than anticipated, therefore the PDCA cycle was completed.

› Check

- › Performance observations
- › Project report completion

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» Goals and Objectives

» Goal:

To improve the performance of mixed bed DM plant to produce 10,000m³ per cycle

» Objectives:

To increase the production of DM water

Reduce the number of regeneration cycles

Reduce chemical consumption & electrical usage

Reduce maintenance cost

Reduce hazardous chemical handling

Reduce effluent discharge

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» Our Findings (root causes)

» Root cause of the problem

Distillate water produced at our facility through the desalination plant is the feed to DM plant.

CO2 compressors are used to compress the non condensable gases to higher pressure for the absorption process in Remineralization area.

The CO2 compressors are fixed with the sealing water line. The outlet of this sealing water was getting mixed with the distillate water as a result the pH value of the distillate water reduces from pH 6 to pH 4.8

Due to this low pH, feed water mixed bed resins are getting exhausted more frequently and output of the DM plant reduces.

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>> Trainings

To enhance team knowledge on APEX, in-house training was conducted for the entire Barka team.

Considering the issue, the appropriate members were selected for the project.



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» Solution Implementation

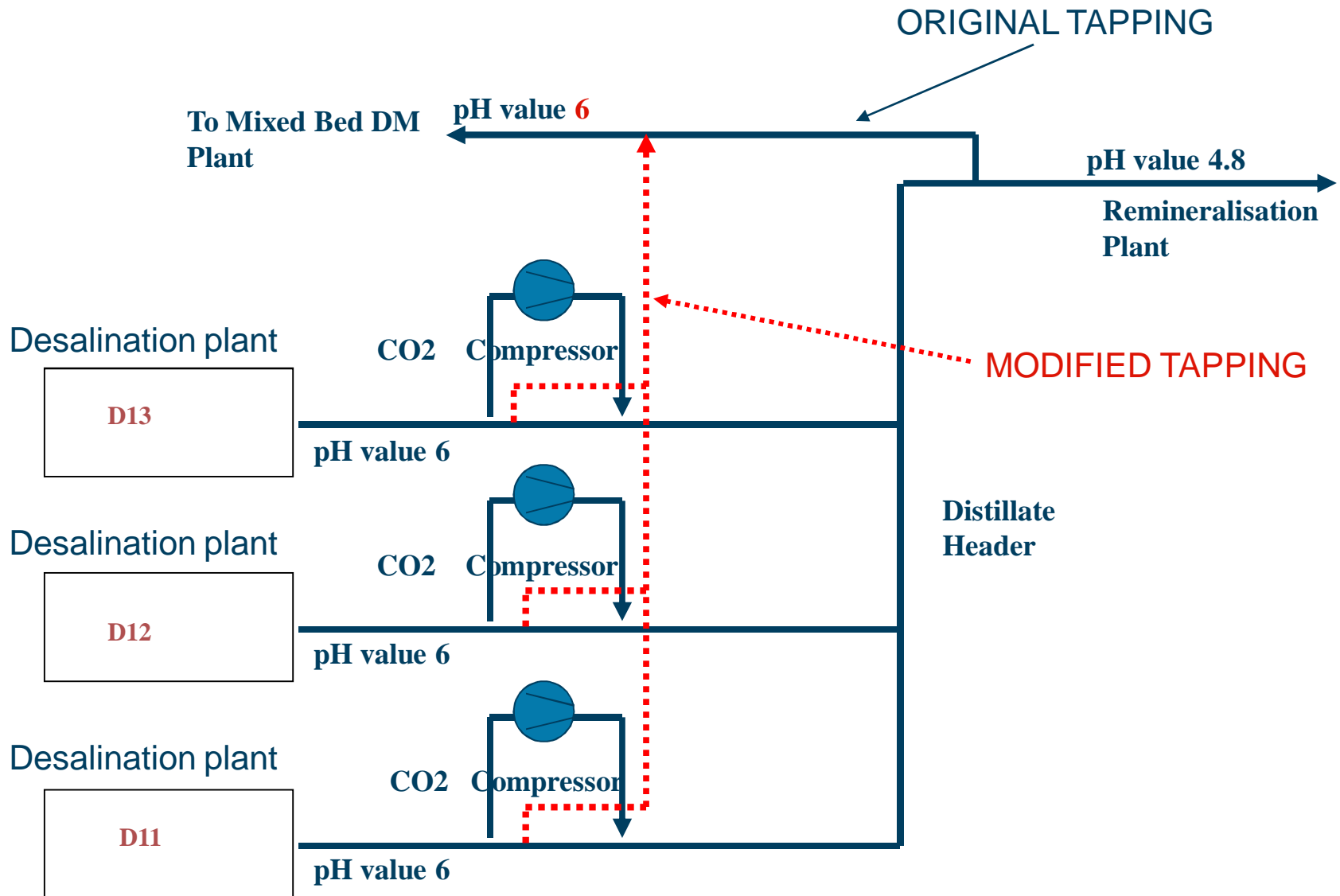
- › The modification consisted of installing 100 mm diameter GRP from the three desalination units before the CO2 compressor sealing return line.
- › The tapping was taken from the existing isolation valve. The three 100 mm GRP tapping were connected in one header with 150 mm diameter. The header was again connected with the existing DM line.
- › A Non Return Valve was provided to protect the reverse flow in each desalination unit.
- › The objective was that during the normal operation one line should be able to run the DM plant and consequently the line with the lowest conductivity would be tapped.
- › The idea of this modification was to enhance the DM plant's production by twice of the existing output.

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» Modification



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>> Project Site photographs

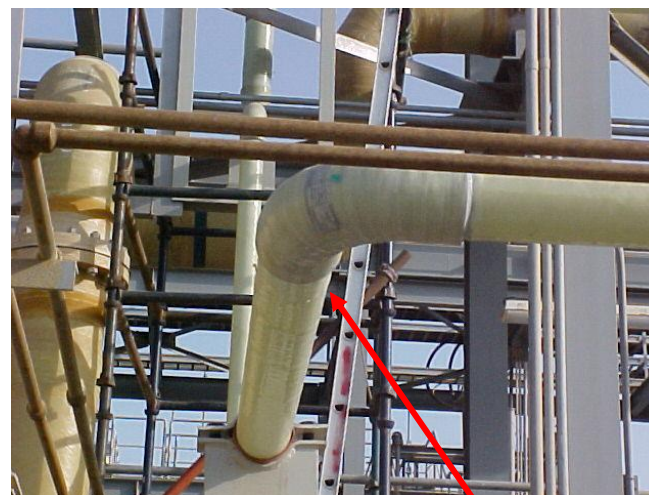
Scaffolding



Pipe line Route



New pipe line



New Pipe line

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›› Results: Business impact and financial benefits

Safety & environment

- › Discharge effluent to environment reduced
- › Frequency of personnel exposure to hazardous chemicals reduced

Operation

- › The production increased from 6,000m³ to 18,000m³ which is significantly higher than the desired result of 10,000m³.
- › The cost savings in chemical, electrical and maintenance cost per year is US \$ 20,000
- › Post-modification annual regenerations 7- 8 cycles compared to pre-modification 33 – 36 cycles
- › Improvement in the plant operation flexibility

Financial

- › Project cost US \$65,000
- › NPV US \$ 119,000
- › Payback in 2 years

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» Knowledge Learned

- » Optimum utilization of APEX
- » Self Improvement in knowledge level & thinking ability
 - Project design, review and implementation was done internally without outside consultancy
 - NPV calculations
- » The successful implementation of this project by using the APEX methodology has turned out to be a confidence boost for the entire team

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» In Conclusion

- › The design capacity of our DM plant was 4,250m³ but by improving the inlet water quality, we have achieved 18,000m³ production through this project
- › There are opportunities around us for improvement
- › Respect each other, discuss various ideas & come up with solutions
- › APEX is the best tool to obtain extraordinary results & PDCA cycle was used by our team to complete this project
- › Apart from the commercial benefit gained, it also added value to our safety & environment and boosted our esteem
- › Think differently is the message from our team

THANKS!!!

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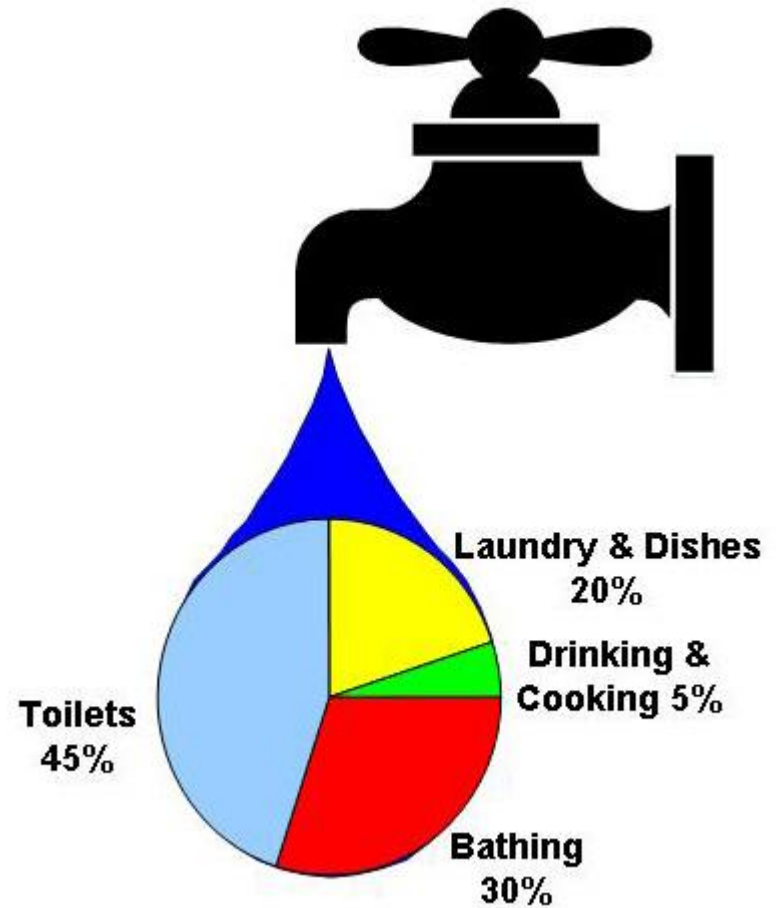
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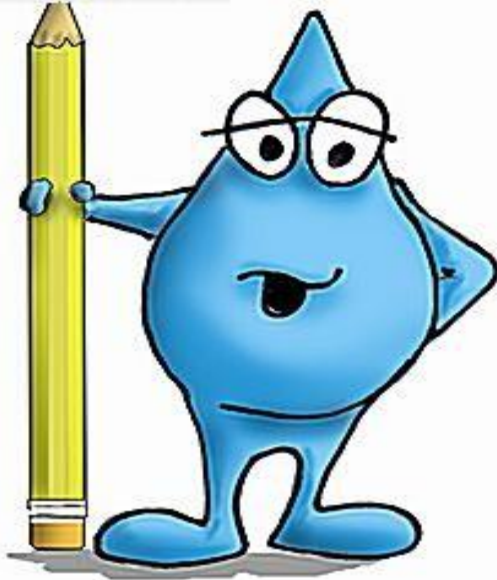
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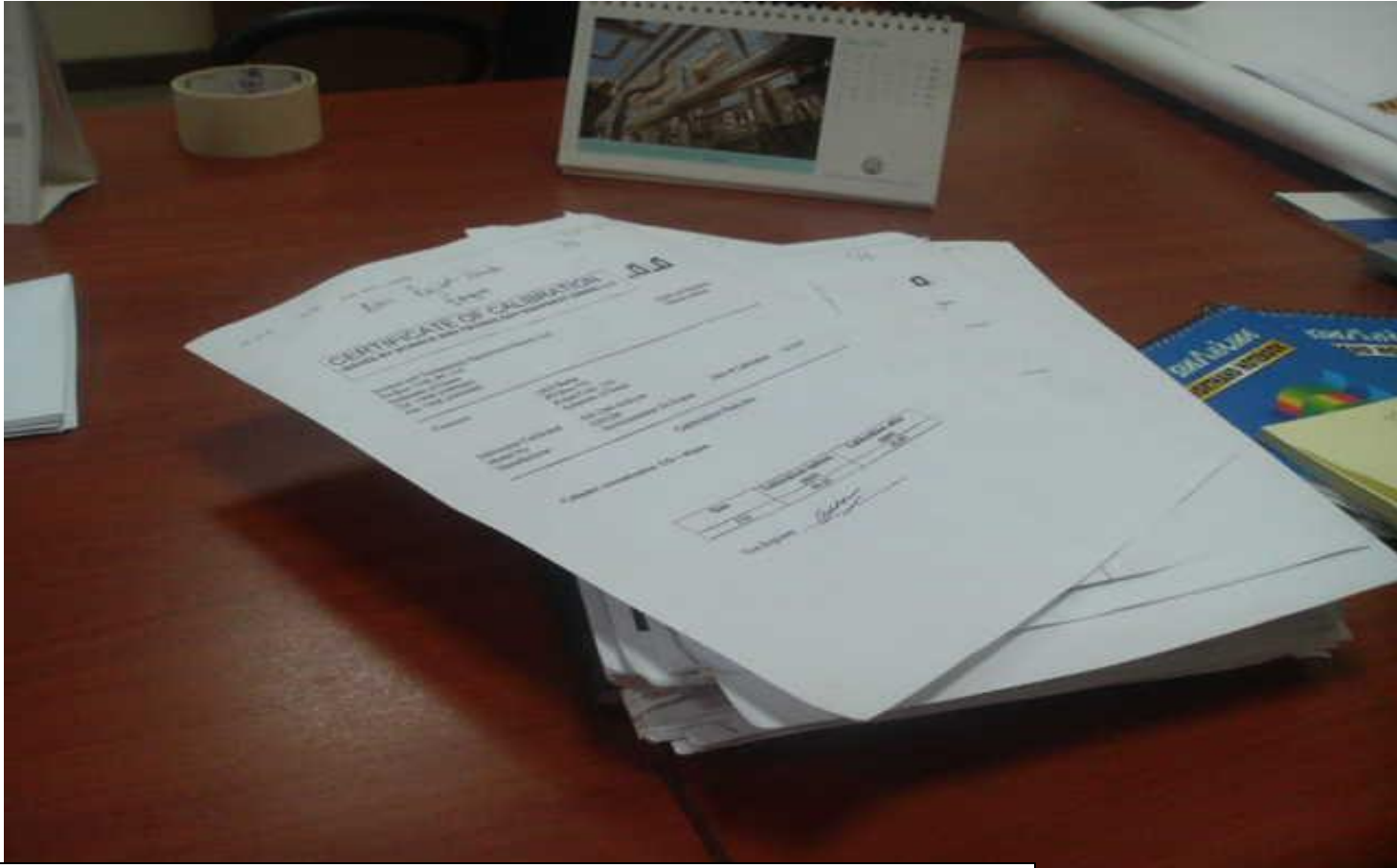
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LIFESTYLE

OMAN DAILY Observer

SATURDAY, JUNE 14, 2008

AES Barka marks World Environment Day

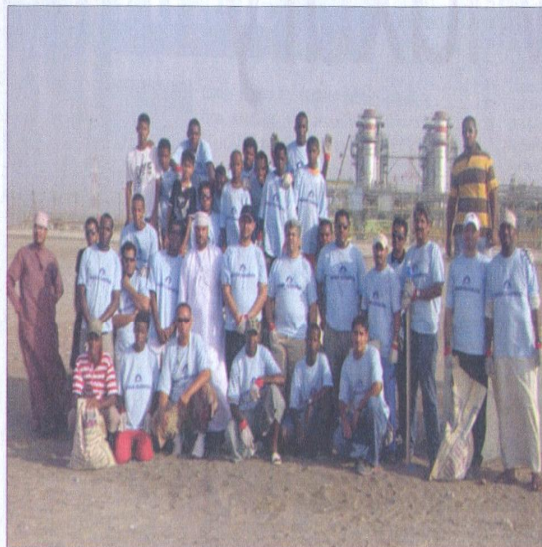
AES Barka, which owns and operates a major independent power and water desalination plant at Barka, celebrated World Environment Day recently with a series of activities intended to inculcate in the local community and children the importance of a clean and safe environment.

The day began with a collective commitment by staff towards safeguarding the environment through actions reflecting individual and collective responsibility. Thus, employees pledged to use environment-friendly shopping bags in place of plastic, find ways to reduce waste generation, and support environment conservation practices. On the collective level, employees vowed to conserve water, plant emissions, and other harmful industrial emissions. The management also stressed the importance of achieving business environmental goals.

As part of the day's activities, EHS committee members displayed a selection of environment videos highlighting the effects of global warming on people and the earth. The panel also brainstormed several environmental scenarios on ways to protect the environment, particularly through water and energy conservation, waste minimisation and reduced air pollution.

Other highlights included a quiz competition on the environment, beach cleaning drive, distribution of canvas shopping bags, and a painting and drawing competition for children.

AES Barka's EHS committee also conducted a one-day



children's environmental training awareness programme at a Barka elementary school, aimed at enhancing their understanding of environmental concerns, chiefly in the area of

water conservation and waste minimisation.

AES Barka owns Oman's third independent utility project and first Independent Water and Power Project (IWPP). The



\$415 million natural gas-fired, combined cycle facility and a water-desalination plant can produce 427 MW of electricity and 20 MIGD (million gallons per day) of water.

شركة آيه إي أس بركاء تحفل باليوم العالمي للبيئة

كتب : سعيد بن خلفان النعماني

احتفلت شركة آيه إي أس بركاء باليوم العالمي للبيئة وذلك بتنظيم عدد من الأنشطة والفعاليات التي تسهم في رفع مستوى الوعي بأهمية المحافظة على البيئة ليس بين موظفيها فقط ولكن بين شرائح المجتمع أيضا. وتضافنا مع ما يشهده العالم من متغيرات مناخية تجتث الوقوف جنبا إلى جنب من أجل المساهمة في المحافظة على البيئة من خلال ترشيد الاستهلاك وتقليل المخلفات.

وتضمنت اجتهالية الشركة حلقة عمل شملت عدة نقاشات حول أسباب وتأثير التغيرات المناخية وإيجاد بعض البدائل للمساهمة في الحد من أسباب هذه التغيرات ، وخرجت الحلقة بعدد من المبادرات أهمها ضرورة ترشيد استهلاك المياه والكهرباء واستخدام بدائل صديقة للبيئة وتقليل المخلفات والمساهمة في إعادة تصنيع المواد البلاستيكية والورقية. ومن أهم الفعاليات التي نظمتها موظفو الشركة بالتعاون مع أهالي ولاية بركاء حملة تنظيف شاطئية تهدف إلى نشر الوعي بين شرائح المجتمع وإبراز مسؤولية كل فرد في المحافظة على نظافة البيئة.



Desalination Units Condensate Conductivity Cooling Water Recovery

Mohammed Al-Weshahi

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Why this project is important?

- This water is used to cool down the condensate for conductivity measurement purpose, after that the water drained to discharge culvert through a pit.
- The quantity of this water is : $500 \text{ ml} / 5 \text{ second} = 6 \text{ L/min} = 360 \text{ L/hr}$
and for 3 units / day = $25 \text{ m}^3/\text{day} = 777 \text{ m}^3/\text{month} = 9331 \text{ m}^3/\text{year}$
- The price of this water if it will be send for the off taker around = 4000 RO/year.
- The quality of this water is matching with our drinking water and temperature is around = 35 C.

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Modification Alternatives:

- Collecting the drains from the three desalination units in a tank and sent it to drinking water tank.
- Collecting the drain in a pit and use it for the irrigation purposes.
- use the water as a cooling water for condensate recovery system.



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Current modification:

- To get use of the water till choose the best alternative:
- We took a tapping from the drain line to irrigate the palm tree near admin. Building as pictures are showing :



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