स्पीड पोस्ट द्वारा

मिसिल सख्या पृविमं/29/25/2016-आरटीआई

भारत सरकार

पृथ्वी विज्ञान मंत्रालय

पृथ्वी भवन, आई एम डी परिसर,
लोधी रोड़, नई दिल्ली,
दिनांक 11/05/2016

सेवा में,

श्री मदन मोहन प्रिया,
चम्बर नंबर-251,
वेस्टर्न विंग, तीस हजारी कौर्ट्स,
दिल्ली-110054

विषय:- सूचना का अधिकार अधिनियम धारा 6(3) 2005 के तहत श्री मदन मोहन प्रिया, चम्बर नंबर-251, वेस्टर्न विंग, तीस हजारी कौर्ट्स, दिल्ली-110054 (ऑन लिने रजिस्ट्रेशन नंबर 80019 dated 21/4/2016) को सूचना उपलब्ध करवाने हेतु।

महोदय,

कृपया सूचना का अधिकार अधिनियम 2005 के तहत प्राप्त ऑनलाइन आवेदन दिनांक 21/04/2016 के संदर्भ में अवलोकन करें।

2. मंत्रालय के संबंधित अधिकारी द्वारा पत्रांक दिनांक 11/05/2016 के ज़रिये उपलब्ध कराया गया है, जो आपको सूचनार्थ संलग्न है।

3 यदि आप इस जवाब के विरुद्ध अपील करना चाहते हैं, तो आप इस पत्र के प्राप्त होने से 30 दिनों के अन्दर मंत्रालय के निदेशक (आईसीसी) तथा प्रथम अपीलीय प्राधिकारी को निम्न पते पर अपील कर सकते हैं :-

श्री विवेक मिश्रा,
निदेशक एवं प्रथम अपीलीय प्राधिकारी,
पृथ्वी भवन, पृथ्वी विज्ञान मंत्रालय,
भारतीय मौसम विभाग परिसर,
लोधी रोड, नई दिल्ली -3

भवदीय,

इ. हक

(इ0 हक)
केन्द्रीय जन सूचना अधिकारी एवं वैज्ञानिक सी'
दूरभाषन: 24669521

सूचनार्थ प्रतिलिपि:-

1 निदे॰ (ICC) & प्रथम अपीलीय प्राधिकारी, पृथ्वी विज्ञान मंत्रालय, नई दिल्ली।
2 श्री बी के ठाकुर, वैज्ञानिक 'सी' पृथ्वी विज्ञान मंत्रालय, नई दिल्ली।
3 डॉ एन खरे, वैज्ञानिक 'एफ' पारदर्शिता अधिकारी, पृथ्वी विज्ञान मंत्रालय, नई दिल्ली।
4 पीएस, संयुक्त सचिव, पृथ्वी विज्ञान मंत्रालय, नई दिल्ली।
5 प्रभारी, सूचना प्रौघौगिकी (श्री कृष्णन) इस जवाब को वेब पर अपलोड करें।

अनुस्मारक-II

मिसिल संख्या पृविमं/29/25/2015-आरटीआई

भारत सरकार

पृथ्वी विज्ञान मंत्रालय

पृथ्वी भवन, आई एम डी परिसर,
लोधी रोड़, नई दिल्ली,
09/05/2016

कार्यालय ज्ञापन

विषय:- सूचना का अधिकार अधिनियम 2005 के तहत श्री मदन मोहन प्रिया, दिल्ली को सूचना उपलब्ध करवाने हेतु !

कृपया सूचना का अधिकार अधिनियम 2005 के तहत इस अनुभाग के कार्यालय ज्ञापन दिनांक 22/04/2016 अनुस्मारक दिनांक 28/4/2016 के संदर्भ में अवलोकन करें । अधिनियम के तहत प्रार्थी को निर्धारित समयावधि में सूचना भेजना है, जो प्राप्त नहीं हुई है ।

2 आपसे अनुरोध है कि अपेक्षित सूचनाएँ इस अनुभाग को शीघ्र मुहैया कराई जाये, ताकि आवेदक को सूचना उपलब्ध कराई जा सके ।

इ हक
(इ हक)

वैज्ञानिक 'सी' एवं केन्द्रीय जन सूचना अधिकारी
दूरभाषन: 24669521

सेवा में,

Programme Head (Dr. Wakdikar) पृथ्वी विज्ञान मंत्रालय, नई दिल्ली ।

सूचनार्थ प्रतिलिपि:-

1 निदेशक (ICC), पृथ्वी विज्ञान मंत्रालय, नई दिल्ली ।

2 डॉ एन खरे, वैज्ञानिक 'एफ' पारदर्शिता अधिकारी, पृथ्वी विज्ञान मंत्रालय, नई दिल्ली ।

3 पीपीएस, सचिव/संयुक्त सचिव, पृथ्वी विज्ञान मंत्रालय, नई दिल्ली ।

We may provide the attached information.

वै.ई (डा.विजयकुमार)
11/5/16

आवश्यक जानकारी

RTI REQUEST DETAILS

Registration No. :	MOOCD/R/2016/80019	**Date of Receipt :**	21/04/2016
Transferred From :	Prime Minister's Office on 21/04/2016 With Reference Number PMOIN/R/2016/51012		
Remarks :	**Transferred for an appropriate action.**		
Type of Receipt :	Electronically Transferred from Other Public Authority	**Language of Request :**	English
Name :	madan mohan priya	**Gender :**	Male
Address :	chamber no.251, western wing, tis hazari courts delhi-110054. Pin:110054		
State :	Delhi	**Country :**	India
Phone No. :	+91-8527679634	**Mobile No. :**	+91-8527679634
Email :	lawmakermohanbhai@gmail.com		
Status(Rural/Urban) :	Urban	**Education Status :**	Above Graduate
Letter No. :	Details not provided	**Letter Date :**	Details not provided
Is Requester Below Poverty Line ? :	No	**Citizenship Status**	Indian
Amount Paid :	10)	**Mode of Payment**	Payment Gateway
Does it concern the life or Liberty of a Person ? :	No(Normal)	**Request Pertains to :**	
Information Sought :	Kindly provide information about programmes and schemes in respect of making sea water potable for general public		
Original RTI Text :	Kindly provide information about programmes and schemes in respect of making sea water potable for general public		

Print Save Close

Pls forward to PH (Dr. Wakdikar)

Sh. R.L Meena

22/4/16

Technology for Desalination of Water

1. Introduction

The desalination refers to any of several processes that remove excess salt and other minerals from water. Water is desalinated in order to be converted to freshwater suitable for human consumption or irrigation. It is used on many seagoing ships and submarines. Most of the modern interest in desalination is focused on developing cost-effective ways of providing freshwater for human use in regions where the availability of freshwater is limited. Large-scale desalination typically uses extremely large amounts of energy as well as specialised, expensive infrastructure, making it very costly compared to the use of freshwater from rivers or groundwater.

Sea water desalination is attaining increasing attention of present day policy makers, especially with the growing demands that urbanization, population explosion, irregular rainfall and ground water contamination place on the fragile natural resources.

2. Conventional Desalination Processes

Some of the commonly used desalination processes are as follows:

Reverse Osmosis is the most commonly used membrane process in the industry. Water at high pressure is made to pass through a porous membrane. As the water passes from the high pressure area to the low pressure area through pore of the size of 0.5-1.5 nm, the dissolved solids are left behind. Over the past 20 years the process has been fine tuned. However, high power consumption and the disposal of the concentrated brine are two of the major drawbacks of the process.

Multi Stage Flash Desalination (MSF) is a flash distillation process that is similar to LTTD process, but works on a higher temperature difference. The flashing is done in multiple stages. Most MSF plants use inlet feed water in the temperature range of 60°-80°C.

In Multi Effect Desalination (MED) the energy available from the steam in the power plants is used to distill the seawater in multiple stages in this method. The use of steam as the primary source makes the process expensive in the Indian context.

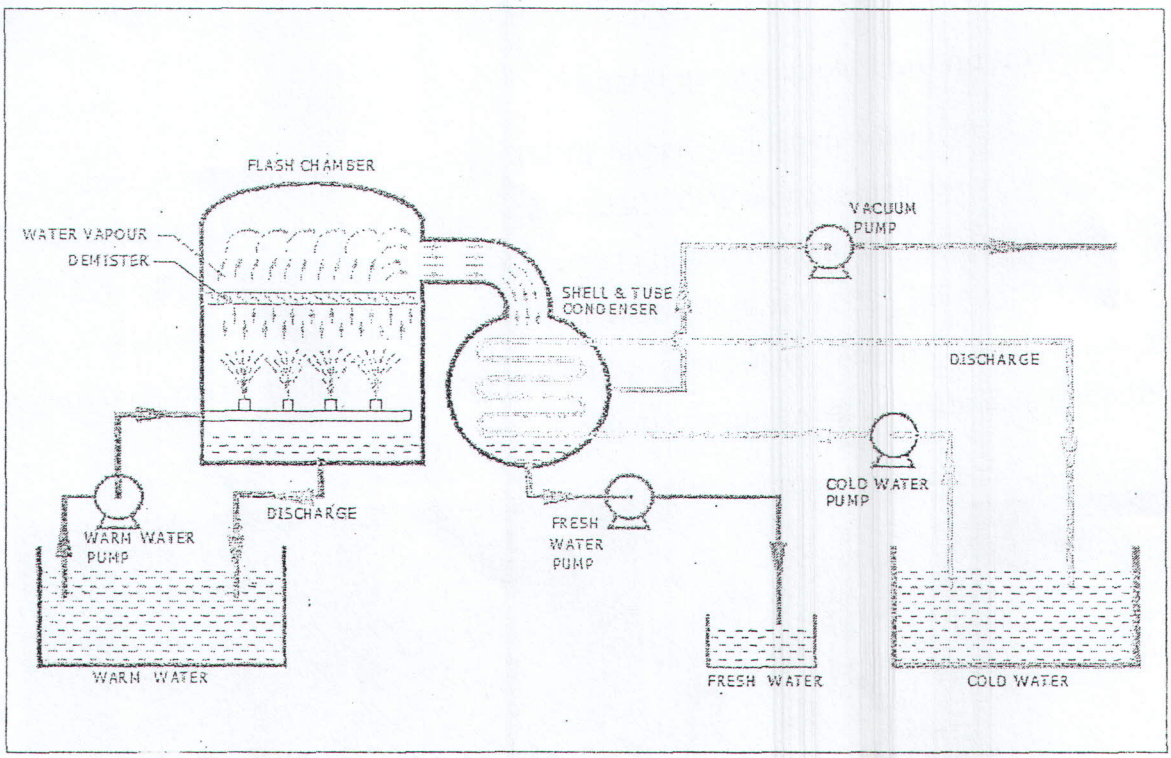

Fig. 1 Schematic of LTTD Process

The main components that are required for LTTD plant are the evaporation chamber, the condenser, pumps and pipelines to draw warm and cold water, and a vacuum pump to maintain the plant at sub-atmospheric pressures. One of the advantages of the process is that it can be implemented even with a low temperature gradient of about 8°-10°C between the two water bodies. Even though flash distillation is a commonly used desalination process worldwide and especially in Middle East, none of the established plants work with the temperature gradient as low as 8°C that exists in the NCTPS.

NIOT started working with the LTTD applications in 2004 and established various plants, for islands and mainland applications, using indigenous materials. This technology has been successfully demonstrated in the islands of Lakshadweep, at a coastal power plant in Tamil Nadu and with a barge mounted desalination plant off Chennai for mainland requirements

3.1 LTTD Plant on the Lakshadweep Islands

The sea bed bathymetry near the islands of UT Lakshadweep was such that 350m water depth was available within 600-1000 m from the shore, to draw cold water at 12°C. MoES-NIOT has setup land based plants in Kavaratti (May, 2005), Minicoy (April, 2011) and Agatti (July, 2011) with capacity of 1 lakh litre per day of freshwater. The plants are constructed with indigenous components and installed using the limited infrastructure available in these remote islands.

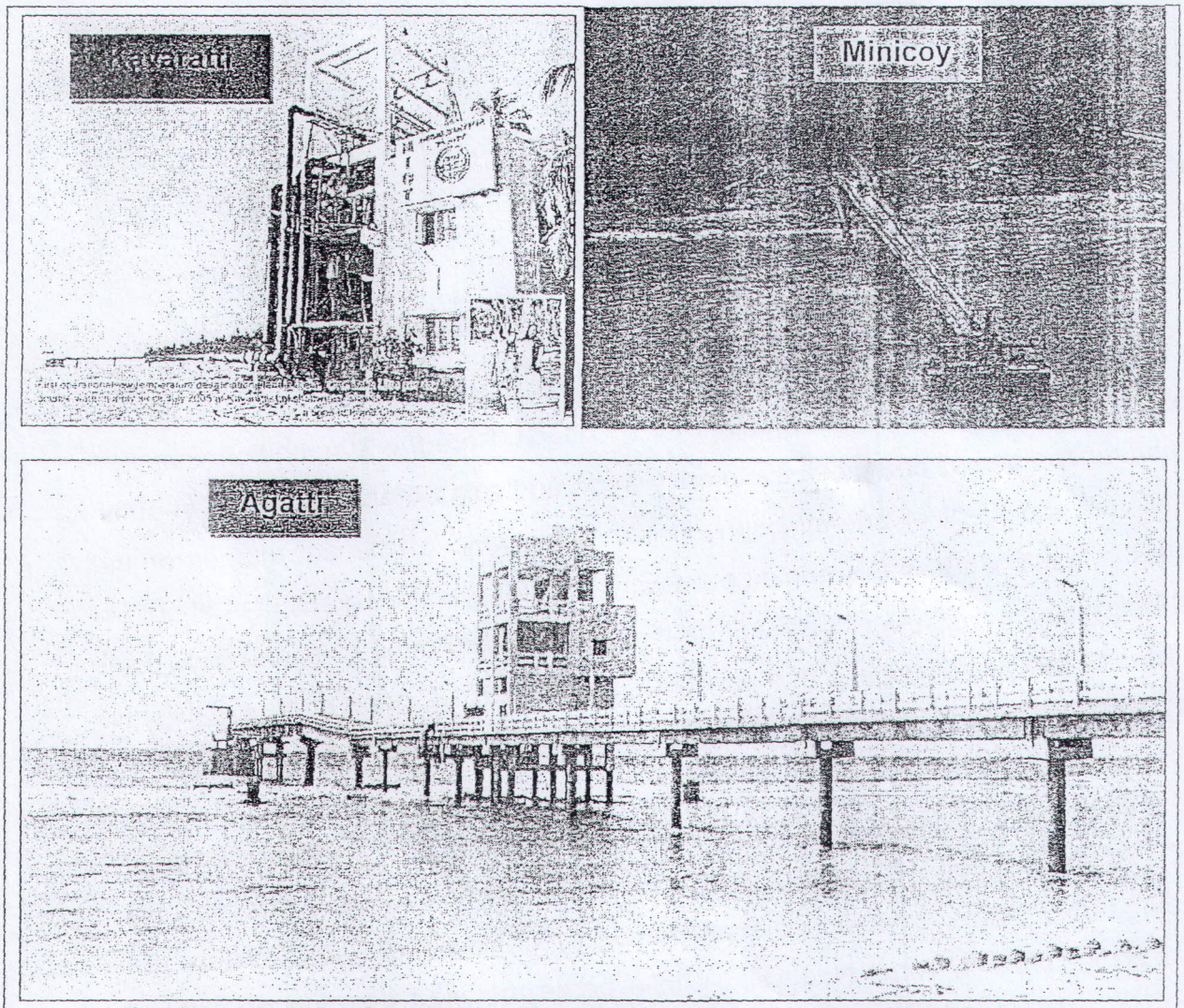

Fig. 2 A view of the Desalination Plants at Kavaratti, Minicoy and Agatti islands

High Density Polyethylene (HDPE) pipes of 12m length and 630mm diameter were welded at the island shore to the required 600 -1000 m length,towed about 10 km to the site and deployed to draw cold water from a depth of about 350m. The sea water pumps

inside the partitioned sump supply warm and cold water to the plant on the land. The sump, with a deployed weight of around 500 tonnes was partially cast initially on the island shore, and then built while in floating condition, towed 10 km to the site and then installed at the required location to complete the final stage of construction in situ. Fig. 2 shows a view of the Agatti Desalination Plant. The plants are being maintained by the PWD with the local man power, to fulfill the needs of the 10000 strong local communityin each of these islands. The salinity of the freshwater produced at the plantswas reduced from 35000 ppm for the seawater to about 180 ppm whereas the permissible limit for drinking water is 2000 ppm. Subsequent to the commencement of the plant water supply for drinking water needs, there have been significant drop in the incidence of water borne diseases among the consumers as may be seen from Table 1. NIOT is currently assisting UT-LPWD in the persual of the proposals for the set-up of similar plants in six more islands of the region.

Table 1. Water Borne Diseases – before and after the installation of LTTD Plant at Kavaratti

Name of disease	Period 06/2004 to 12/2004(7 months before installation)							Total Cases	Period 06/2005 to 12/2005(7 months after installation)							Total Cases
	6/04	7/04	8/04	9/04	10/04	11/04	12/04		6/05	7/05	8/05	9/05	10/05	11/05	12/05	
Viral Hepatitis	87	68	57	64	70	49	60	455	72	50	43	52	45	37	43	342
Diarrhea with vomiting under 5 year	119	92	118	142	110	107	124	812	102	83	101	103	124	95	93	701
Diarrhea with vomiting above 5 year	88	69	54	67	55	52	54	439	71	49	44	43	53	47	40	347
Dysentery	132	--	9	12	11	20	14	198	10	-	-	-	-	-	-	10
Cholera	-	-	-	-	-	-	-	Nil	-	-	-	-	-	-	-	Nil

3.2 Barge - Mounted LTTD Plant

For an LTTD plant meant for the mainland needs, NIOT has demonstrated an experimental 1000^{3}m /day (1 million litres per day) barge mounted desalination plant 40 km off Chennai coast meant for mainland usage. Temperature gradient of about 18°C was utilized with surface water at 28°C and the water at 550m depth at 10°C. The plant was commissioned in April 2007 and the sea trials were successfully conducted for a few weeks and the fresh water generated was of very good quality. The barge with the plant and the mooring buoy are shown in Fig. 3.

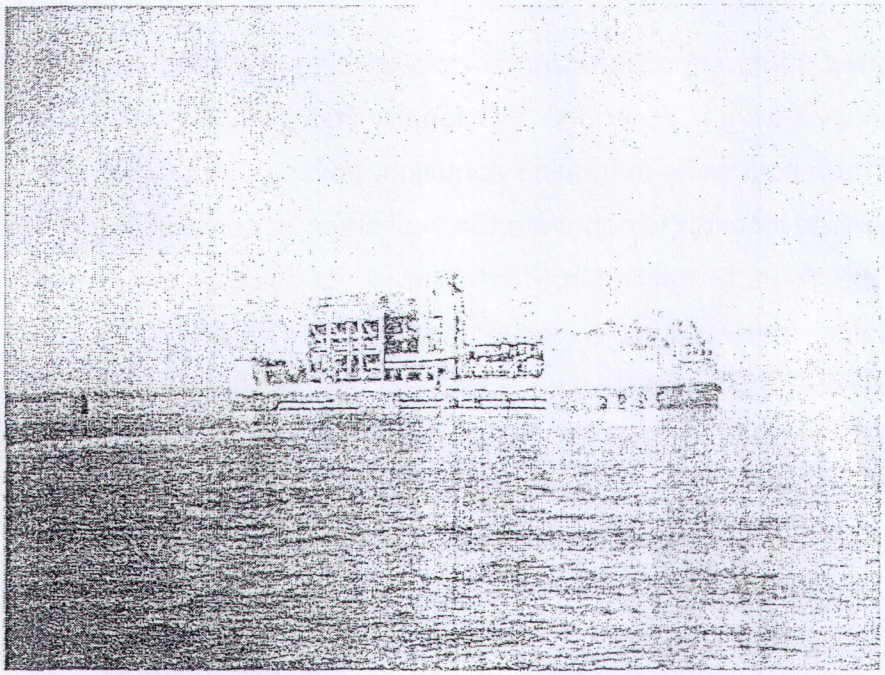

Fig. 3 A View of the Barge Mounted Desalination Plant

4. Application of LTTD in Power Plants

Coastal thermal power plants discharge warm water from their condensers, involving transfer of tremendous levels of energy using heat recovery systems like cooling towers or heat dissipating open channels before the condenser reject water at acceptable temperatures is discharged back into the surrounding environment. Consequently, the resultant thermal pollution by the power plants is a serious issue today. An efficient way to utilize the heat available in the condenser reject water would reduce the load on the cooling towers and in turn the resultant thermal pollution. One of the aspects of LTTD is that it transfers the available heat from warmer water to the colder water while generating fresh water from the warm water. This aspect could therefore be aptly used in thermal power plants resulting in the double benefits of cooling the condenser reject water and generating the fresh water. A small temperature gradient of about 8°-10°C, as is the case with most power plants, would be sufficient to utilize the concept.

A power plant condenser reject water based desalination plant wasset-up in North Chennai Thermal Power Station in 2009. The 600 MW NCTPS plant discharges about 100,000 m^3/hr of condenser reject water at about 37°C. In order to reduce the thermal pollution issues arising out of mixing this water with the nearby seawater at 29°C,

NCTPS lets the water run through a long open channel where the water is brought to about 33°C. The power plant consists of three units each with a capacity of 200 MW. The manholes in the lines were modified to accommodate the inlet and discharge piping required for the LTTD plants. A structure was designed to accommodate the plant components of flash chamber, condenser and the vacuum system. Existing components from the decommissioned barge mounted desalination plant were used in the set-up the plant. The schematic is shown in Fig. 4 and the actual plant is shown in Fig. 5.

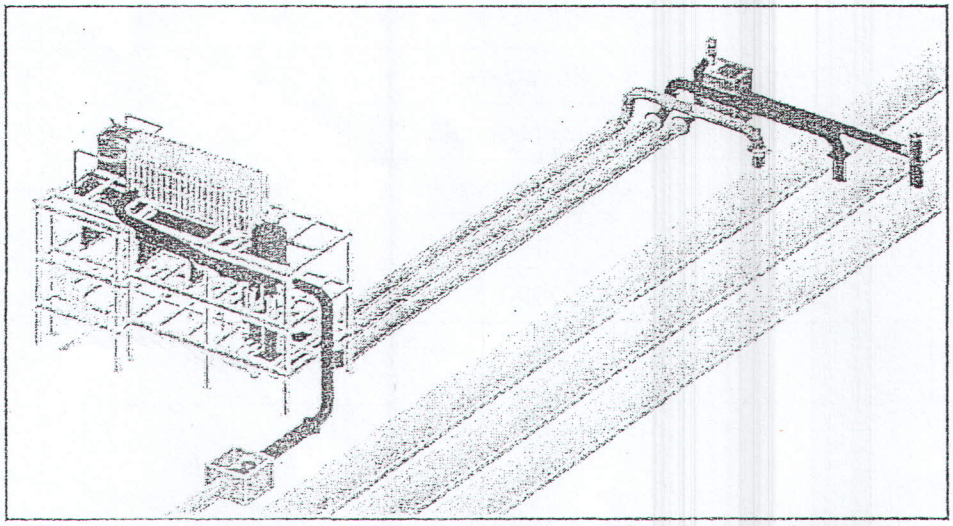

Fig. 4 A schematic view of the LTTD plant installed in NCTPS

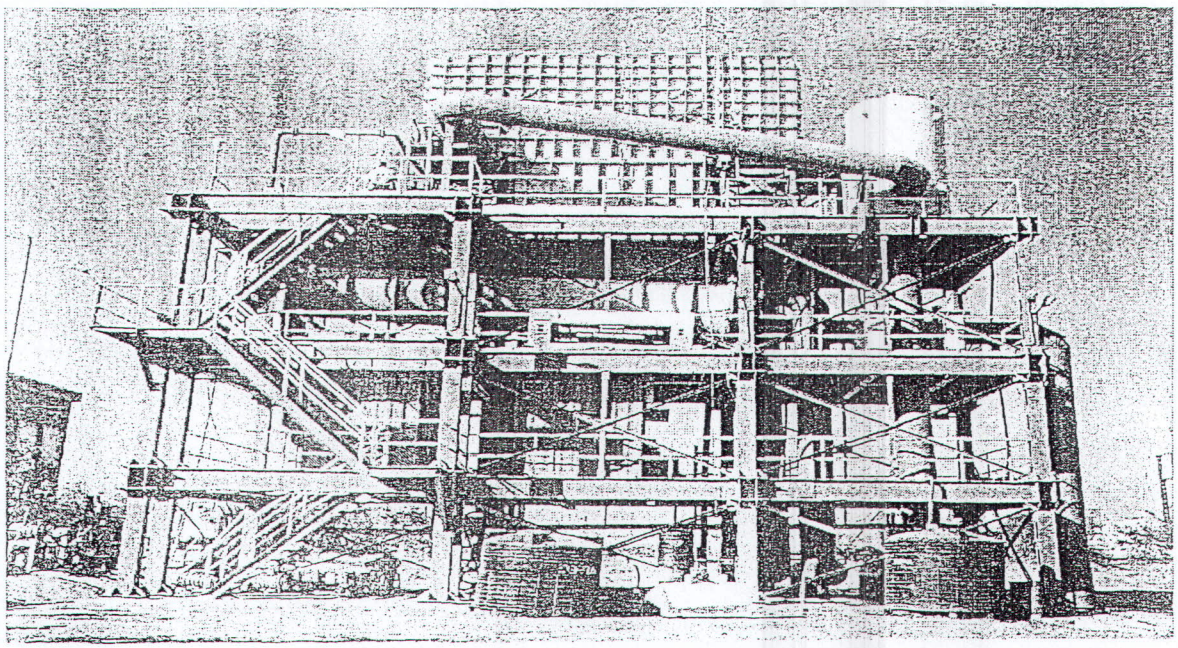

Fig. 5 A view of the LTTD plant installed in NCTPS

The salinity of the freshwater was reduced from 35000 ppm of the seawater to about 24 ppm, the quality is well suited for drinking water. Water suitable for use in the boilers can also be generated by this method.Water Quality Analysis for LTTD Plant at Kavaratti and NCTPS, Chennai is presented in Table 2.

Table 2. Water Quality Analysis: LTTD Plant at Kavaratti and NCTPS, Chennai

Parameter	Desirable limit for drinking water	Permissible limit for drinking water	Desalinated Water at Agatti	Desalinated Water at NCTPS, Chennai
Color	5 hazen	25 hazen	OK	OK
Odour	Unobjectionable	Unobjectionable	OK	OK
Taste	Unobjectionable	Unobjectionable	OK	OK
pH	6.5	8.5	7-8	6.54
TDS (PPM)	500	2000	180	24
Total Coli form (MPN)	-	10	Not Detected	<2

5. Current Efforts

ESSO-NIOT is currently undertaking the following works:

For the establishment of the 6 LTTD plants, one each in the islands of Androth, Amini, Chetlat, Kadamat, Kiltan and Kalpeni, UT Lakshadweep, assistance is being provided to UT Administration for the perusal of the approvals.

A plant with similar technology with a capacity of 2 million liters per day (MLD) at Tuticorin Thermal Power Station has been initiated and the activities of site identification and survey and obtaining of necessary approvals are completed and the detailed design is nearing completion. The plant is being designed to generate 1 MLD of high quality water with the TDS less than 2 ppm and 1MLD of potable water. Such plants not only provide fresh water but also reduce the temperature of condenser reject water before entering into the sea.

The mainland requirements for fresh water are proposed to be addressed through large scale offshore floating desalination plants. An industrial partner is involved in

preparation of a Detailed Project Report (DPR) for a 10 MLD floating Desalination Plant which involves the investigation of the complexities, techno-commercial viability and scaling up towards large floating plants for possible first time implementation.

6. Summary

Since the Low Temperature Thermal Desalination plants work with the available heat between various streams of water, they are environmentally friendly. The successful demonstration of LTTD plants in various configurations has provided NIOT with the critical design experience. The continuous operation of these LTTD plants has proved the simplicity of the process. While the island based plants provide the means for potable water in remote islands where applicable, offshore platform mounted plants provide an alternate option for the mainland needs.

Establishment of the LTTD plant for an existing temperature gradient of mere 8°C at the NCTPS has provided another new area for its application. Since most power plants discharge the condenser reject water at 8°-10°C above the ambient sea water temperature, any increase in the available temperature difference or the provision of additional process steam from power plant will increase the efficiency of the LTTD process, resulting in the generation of huge quantity of fresh water. If implemented in the design stages further optimization of the power consumption and capital cost is also possible. Newer power plant projects are also coming up all over the country, mostly along the coast. Thus, the LTTD technology, if applied to power plants, would be useful in providing high quality freshwater for boilers and drinking purposes, while reducing the thermal pollution.

Thus a technology which is environmentally friendly, completely indigenous, with low operation and maintenance issues and with long term sustainability has been demonstrated and now needs to be scaled up with industry participation. Apart from coastal power plants, however, the application of the LTTD technology for onshore requirements is limited owing to the requirement of thermal gradient of about 15 degree C which is possible where water depth of 350-400 m is found near the coast. This requirement is satisfied in islands in the Indian context and can be attempted offshore in deeper waters since India has a large EEZ.