Maa Bharti P.G. College

Rangbari Road, Sector-8, Mahaveer Nagar-III, Kota (Raj.) Tel.: 7231839999

Affiliated to **University of Kota**, Kota (Rajasthan)

• Email : mbpgcollege@yahoo.com • Website : maabhartipgcollegekota.com

Ref. No. : MBPGC/2021-22/D-2647 Date : 23/02/2022

To

The Training Suptt.,

Nuclear Training Center

Rawatbhata,

Rajasthan site

Sub: An Educational trip to Nuclear Power Plant of M.Sc. (Physics) Students of Maa Bharti P.G. College, kota.

Dear Sir,

Kindly give the consent for the educational trip to nuclear power plant for our students on 04/03/2022.

Approx 35 students of class M.Sc. (Physics) and 7 faculty members will participate in it.

List of the participants and responsible teachers will be sent after the permission.

Thanking You,

Shweta Saxena

Principal

Maa Bharti P.G. College

Mahaveer Nagar-III, Kota

Dr. Shweta Saxena

M.No.: 9413651151

Dr. Kanhaiya Lal Galav

HOD Physics

M.No.: 9929969464

SHWETA SAXENA

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Objective:

The objective of tour is to give knowledge about nuclear energy and nuclear reactors. Through this visit students gained the knowledge about future career option and opportunities in nuclear filed.

Outcomes-

i. This educational tour helps the students to visualize various processes they have studied.

ii. Students identify the opportunities for their future career in power plant how clean energy generate in power plant.

iii. This educational tour improves the perception of safe use of energy and radiation among the students.

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Maa Bharti P.G. College, Kota

DEPARTMENT OF CHEMISTRY AND PHYSICS

EDUCATIONAL TOUR

Session-2021-22

9th March 2022- Organized educational tour at RAPP Plant, Rawatbhata

One day educational trip was organized by Department of Chemistry and Physics. The tour comprised student of M.SC. I and III semester accompanied by faculty members of the departments. If built, it would be the largest nuclear power generating station in the India by net power generation station capacity of 7386GWH. MR. MAZHAR ALI Assistant chief engineer was the resource person for the entire event. He guided students about the working of the nuclear reactor and its safe operation. The student also gained knowledge about nuclear energy and its use as clean energy. An information leaflet was also to all the students to create awareness among the people about nuclear energy and its use as clean energy.

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Ref. No. : MBPGC/2021-22/D-2649

Date : 03/03/2022

Responsible Faculty & Students Name List With Aadhar No. For Educational trip.

Faculty List

S.No.	Name of Faculty	Aadhar Card No.
1.	Dr. Bharti Sharma	284963328618
2.	Dr. Sapna Sharma	2734 0635 3851
3.	Dr. Kanhaiya Lal Galav	4917 0029 5225
4.	Mr. Lokesh Rathore	5188 0032 5170
5.	Mr. Javed Khan	6709 5327 5491
6.	Mr. Gautam Mishra	3255 4822 8407

Student List

	Name of Student	Aadhar Card No.
1.	Ankur Nagar	2448 2214 2320
2.	Anjali Meena	7324 2866 8797
3.	Anil Meena	8631 1074 4332
4.	Jaswant Rathore	3255 6966 2223
5.	Kusum Meena	6854 2219 3233
6.	Mayank Nama	7117 1387 8518
7.	Rohit Gautam	7682 9332 5935
8.	Sonu Suman	8911 6938 8727
9.	Thakur Sharma	8402 1403 5545
10.	Aakash Verma	5627 8667 1212
11.	Ankit Malav	5525 2749 5632
12.	Keshav Batra	7427 5233 8010
13.	Pragesh Yaduvanshi	4526 1150 9269
14.	Pooja Yaduvanshi	7285 3451 7190
15.	Narendra Nagar	6560 7845 9306
16.	Vishnu Kumar	2552 1909 5823
17.	Kusumanjali Rajawat	6610 9997 9024
18.	Jayesh Bhardawaj	9781 3367 9137
19.	Bhanu Pratap Singh Jodhana	3854 1809 4406
20.	Ram Meena	7834 6974 9471
21.	Diksha Nagar	6869 8088 4656
22.	Manoj Mehta	4981 8905 9989
23.	Bhawana Singhal	7501 8582 4756
24.	Ankit Sharma	2992 6390 4189
25.	Mahee Vijay	8496 8070 4186
26.	Narendra Prajapat	3200 8745 8663
27.	Poojs Kushwaha	6460 9536 5081
28.	Srishti Gaur	5136 7787 7310
29.	Pallavi Sharma	7175 6562 5623
30.	Chetan Sharma	8989 1583 6579

Shweta Saxena

प्राचार्य

माँ भारती स्नातकोत्तर महाविद्यालय

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MAA BHARTI P.G. COLLEGE , M.N. III KOTA

MSC ~~SEMESTER~~ CHEMISTRY 2021-22 I + III Sem

NAME OF FACULTY: Chemistry

SUBJECT: Rawatbhata Power Plant Tour

S.N.	STUDENTS NAME	FATHER'S NAME	SIGNATURE
1	CHETAN SHARMA	RAKESH CHANDRA SHARMA	
2	DEEPIKA MALAV	YUGAL KISHOR	
3	DEEPSHIKHA BHARGAVA	OMPRAKASH BHARGAVA	
4	DIVYA MALAV	CHETAN MALAV	
5	DURGESH NANDAN SUMAN	BADRI LAL SUMAN	
6	GAURAV SHARMA	RAMMANOHAR SHARMA	
7	GOVIND NAGAR	BHERU LAL NAGAR	
8	GOVIND VERMA	RAM LAL VERMA	
9	GULABSHA KHAN	MOHAMMAD JAVED KHAN	
10	HARSHIT KUMAR MALAV	RAMESH CHAND MALAV	
11	HEMANT NAGAR	BALMUKUND NAGAR	
12	HEMLATA MEENA	JAISHANKAR MEENA	
13	HEMLATA NAGAR	KANHAIYA LAL NAGAR	
14	HIMANI NAGAR	PREM CHAND NAGAR	
15	HIMANSHU SHARMA	LAXMINARAYAN SHARMA	
16	ISHITA JAIN	SANDEEP KUMAR JAIN	
17	JAGDISH PRASAD MEENA	BHARAT LAL MEENA	
18	JITENDRA GOCHER	BABU LAL GOCHER	
19	JITENDRA LODHA	MANGILAL LODHA	
20	JYOTI NAGAR	DWARKA LAL NAGAR	
21	MAHEE VIJAY	DINESH VIJAY	
22	MOHIT CHOUHAN	BALRAM CHOUHAN	
23	NARENDRA PRAJAPAT	HUKUM PRAJAPAT	
24	NIKITA SINDHAW	SANJAY SINDHAW	Nikita Sindhaw
25	PALLAVI SHARMA	YOGENDRA KUMAR SHARMA	P. Sharma
26	POOJA KUSHWAHA	VIRENDRA SINGH	
27	PRIYANKA NANIWAL	ASHOKA ANNIWAL	
28	ROHIT MEENA	JAGDISH MEENA	
29	SANDEEP TYAGI	LAXMI NARAYAN	
30	SRISHTI GAUR	ANIL GAUR	

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Maa Bharti P.G. College, Kota

Field Report on 'Atomic Power Plant, Rawatbhata'

Session 2021-22

Submitted by:

1. Pallavi Sharma

2. Mahee Vijay

3. Srishti Gaur

Class: M.Sc. Chemistry II Sem

Submitted to: Department of Chemistry

Acknowledgement

We would like to convey my heartfelt thanks to my teachers Dr. Neeru Choudhary, Dr.Shanu Mathur, Dr. Bharti Sharma who always gave valuable suggestions and guidance in completing the project. The completion of this project was possible under their guidance.

We feel great pleasure in expressing our gratitude towards my principal Dr. Shweta Saxena for giving us this wonderful opportunity.

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DATE OF VISIT: 9TH MARCH 2022-

OBJECT: Study of generation of energy by the reactions of Nuclear Reactors.

INTRODUCTION:

1. **Location and Area:** Nuclear Power Corporation of India Ltd., Rawatbhata, District- Chittorgarh (Rajasthan)

COMPANY PROFILE:

The Educational visit for students of Maa Bharti P.G. College, Kota was organized as a part of Student – Industry Interaction program. This visit was of one day. Students visited the Nuclear Power Corporation of India Limited, Rawatbhata.

Nuclear Power Corporation of India Limited (NPCIL) is a Public Sector Enterprise under the administrative control of the Department of Atomic Energy (DAE), Government of India. The Company was registered as a Public Limited Company under the Companies Act, 1956 in September 1987 with the objectives of operating atomic power plants and implementing atomic power projects for generation of electricity in pursuance of the schemes and programmes of the Government of India under the Atomic Energy Act, 1962. NPCIL also has equity participation in BHAVINI, another PSU of Department of Atomic Energy (DAE) which implements Fast Breeder Reactors programme in the country.

Visit started with a presentation on NPCIL, in which they elaborated that, NPCIL is responsible for design, construction, commissioning and operation of nuclear power reactors.

NUCLEAR POWER PRODUCTION:

NPCIL is presently operating 21 nuclear power reactors with an installed capacity of 5780 MW. The reactor fleet comprises two Boiling Water Reactors (BWRs) and 18 Pressurized Heavy Water Reactors (PHWRs) including one 100 MW PHWR at Rajasthan which is owned by DAE, Government of India.

Currently NPCIL has five reactors under various stages of construction/commissioning totaling 3800 MW capacity. NPCIL, Rawatbhata consist of 6 units (100 MW, 200 MW and 4*220 MW PHWRs), 2 units are under construction (2*700MW). Student visited 5th unit over there, where they got to know the working process of Nuclear Power Plant.

- Rajasthan Atomic Power Station (RAPS 1) (100 MWe) PHWR completely defueled and maintained under dry preservation
- Rajasthan Atomic Power Station (RAPS 2) (200 MWe) under operation
- Rajasthan Atomic Power Station (RAPS 3 & 4) (2 x 220 MWe PHWR)
- Rajasthan Atomic Power Station (RAPS 5 & 6) (2 x 220 MWe PHWR)
- Rajasthan Atomic Power Project (RAPP 7 & 8) (2 x 700 MWe PHWR)

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The first reactor was commissioned in December 1973 with an installed capacity of 100MW. The second reactor of 200MW capacity was synchronized to the grid in April 1981. The third and fourth reactors, each of 220MW capacity, began commercial operations in June 2000 and December 2000 respectively.

The fifth reactor achieved first criticality in November 2009 and commenced commercial operations in February 2010. It also has an installed capacity of 220MW.

The sixth unit of 220MW capacity attained the first criticality in January 2010 and began commercial operations a month later in March 2010.

Units

Phase	Unit No.	Reactor		Status	Capacity in MWe		Construction start	First criticality	Grid Connection
		Type	Model		Net	Gross			
I	1	PHWR	CANDU	Shut Down	90	100	1 August 1965	11 August 1972	30 November 1972
	2	PHWR	CANDU	Operational	187	200	1 April 1968	8 October 1980	1 November 1980
II	3	PHWR	IPHWR-220	Operational	202	220	1 February 1990	24 December 1999	10 March 2000
	4	PHWR	IPHWR-220	Operational	202	220	1 October 1990	3 November 2000	17 November 2000

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Phase	Unit No.	Reactor		Status	Capacity in MWe		Construction start	First criticality	Grid Connection
		Type	Model		Net	Gross			
III	5	PHWR	IPHWR-220	Operational	202	220	18 September 2002	24 November 2009	22 December 2009
	6	PHWR	IPHWR-220	Operational	202	220	20 January 2003	23 January 2010	28 March 2010
IV	7	PHWR	IPHWR-700	Under Construction	630	700	18 July 2011	—	—
	8	PHWR	IPHWR-700	Under Construction	630	700	30 September 2011	—	—

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DEVELOPMENT OF UNITS 7 AND 8

RAPP Units 7 and 8 were approved by the Government of India in October 2009. Excavation works for both units began in August 2010.

The engineering, procurement and construction (EPC) contract of the units was awarded to Hindustan Construction Company (HCC) in May 2010. The total value of the contract is INR88.79m (approximately $1.85m). The company was also involved in the construction of the previous units of RAPP.

“The two PHWR reactors will increase”

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MAIN PARTS OF NUCLEAR POW3ER PLANT

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S.No.	Activity	Unit No.	Completion Month	Unit No.	Completion Month
01	First pour of concrete	7	July-2011	8	Sep-2011
02	Release calandria vault for end shield erection	7	Sep-2013	8	Mar-2015
03	Completed alignment & welding of end shield calandria and grout	7	Dec-2015	8	Feb-2017
04	Installed calandria tubes	7	July-2016	8	Jan-2020
05	Completed coolant channel installation	7	Mar-2017	8	Feb-2021
06	Erection of feeders	7	Jun-2019	8	in progress
07	PHT Hydro Test	7	Nov-2021	8	-

WASTE MANAGEMENT FACILITY

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Handling of radioactive waste from the Rajasthan Atomic Power Station, India, over the last 4.5 years is explained. The experiences encountered are rather unique and serious since RAPP is an inland station, where the criteria for environmental discharges are more stringent.

The wastes are handled either as primary systems waste or as waste from secondary service facilities. The present waste management practices followed in either case is described in detail.

The volume of waste handled and the gross activity level are reported. Problems likely to be encountered in future especially in the spent resin/filter cakes generated from the SFSB, moderator or the PHT system are also discussed, along with the remedial actions planned.

Primary Subject
MANAGEMENT OF RADIOACTIVE WASTES, AND NON-RADIOACTIVE WASTES FROM NUCLEAR FACILITIES (E5100)
Secondary Subject

MANAGEMENT OF RADIOACTIVE WASTES, AND NON-RADIOACTIVE WASTES FROM NUCLEAR FACILITIES (E5200)

Source

Department of Atomic Energy, Bombay (India). Engineering Sciences Advisory Committee; p. 358-362; 1977; p. 358-362; Department of Atomic Energy; Bombay; Symposium on operating experience of nuclear reactors and power plants; Bombay, India; 7 - 9 Feb 1977

Record Type

Book

Literature Type

Conference

Country of publication

India

Descriptors (DEI)

LIQUID WASTES, RADIOACTIVE WASTE DISPOSAL, RADIOACTIVE WASTE PROCESSING, RADIOACTIVE WASTE STORAGE, RADIOACTIVE WASTES, RAJASTHAN-1 REACTOR, RAJASTHAN-2 REACTOR

Descriptors (DEC)

CANDU TYPE REACTORS, HEAVY WATER COOLED REACTORS, HEAVY WATER MODERATED REACTORS, MANAGEMENT, NATURAL URANIUM REACTORS, PHWR TYPE REACTORS, POWER REACTORS, PRESSURE TUBE REACTORS, RADIOACTIVE MATERIALS, REACTORS, STORAGE, THERMAL REACTORS, WASTE DISPOSAL, WASTE MANAGEMENT, WASTE PROCESSING, WASTE STORAGE, WASTES

Reference Number

10471039

INIS Volume

10

INIS Issue

16

SAFETY

In November 2012, the International Atomic Energy Agency (IAEA) intensively audited over several weeks two reactors at the Rajasthan Atomic Power Station for safety. It has been concluded that the

reactors are among the best in the world, the indigenously made 220 MW atomic plants can withstand a Fukushima type of accident, even suggesting that the "safety culture is strong in India" and that India emerged a winner with a high global safety rank.[4]

ENVIRONMENT SURVEY

• Ambient air quality was observed to be good with respect to SO2 and NOx. However, Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM) were found to be slightly higher than the national standards set up by CPCB.

• Among radionuclides, the only significant radionuclides that are likely to be released are tritium, fission product noble gases (FPNG), radio iodine, and activated particulates. The Geometric Mean (GM) values for gross alpha and beta are 0.08 and 1.18 mBq/m3 and were below detection limits in quarterly cumulative samples analyzed by gamma spectrometry. The levels of activity for radio cesium and radio strontium in annual cumulative rainwater samples were below detection limit.

• The noise levels were within the stipulated limits in residential areas and commercial areas except slightly higher in commercial area in 5-10 km distance around RAPP. The noise levels in infrastructural buildings were slightly higher than the standards.

• The physico-chemical characteristics of surface water sources are within the permissible limits for drinking water. The nutrients were observed to be within the permissible limits. Heavy metals like iron, lead and chromium were found to be higher than standards at some places in ground water.

• The ground water samples collected from study area showed high mineral content and pH ranging from 6.5-8.5. The inorganic constituents in groundwater (hardness, chlorides, sulphates) were observed to be lower than the Indian standards for drinking water in most of the samples collected. Few water samples also showed higher levels of heavy metals in them.

CONCLUSION

Nuclear power plants are also capable of producing huge quantities of electricity, further reducing the need for additional coal or gas power plants. Since nuclear plants can produce so much energy, far fewer are needed in order to meet demands than are coal or gas plants.

• The fire doors inspection and maintenance program should be enhanced to identify and correct more effectively deficiencies which could affect fire doors function.

• The station should enhance actions to maintain cables conditions at high standard.

• The station's surveillance testing program by functional checks should be enhanced.

• The station should improve analyses of root causes in order to systematically identify all learning opportunities.

• Site emergency control Centre should be upgraded for post-accident habitability and continuous environmental monitoring.

Rajasthan Atomic Power Station management expressed a determination to address the areas identified for improvement and indicated a willingness to accept a follow up visit in about fifteen months.

Reference

1. Management of radioactive waste from Rajasthan Atomic Power Station

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Balu, K. (Bhabha Atomic Research Centre, Bombay (India)); Bhatia, S.C. (Bhabha Atomic Research Centre, Bombay (India)); Ali, S.S. (Bhabha Atomic Research Centre, Bombay (India))
Symposium on operating experience of nuclear reactors and power plants [held during] February 7-9, 1977 [at] Bombay [Invited talks and contributed papers]

2. **https://en.wikipedia.org/wiki/Rajasthan_Atomic_Power_Station#Units**

3. *"Monthly Generation Reports Actual for Apr-2021 : Central Sector Nuclear" (PDF). National Power Portal. Central Electricity Authority. Retrieved 10 October 2021.*

4. *"Construction starts on new Rajasthan units". World Nuclear News. World Nuclear Association (WNA). 18 July 2011. Retrieved 18 July 2011.*

5. **https://www.iaea.org/sites/default/files/documents/review-missions/osart**

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