

Year: 2022-2023

# COURSE DIRECTOR REPORT

Advanced Co-treatment of Faecal Sludge  
and Septage in STPs

(06th – 08th April, 2022)

Course Director  
MANOJ PANDE

*Supported by:*  
National Institute of Urban Affairs (NIUA)

**Organized by**  
Urban Development Cell (CGG)  
Dr. R. S. T. Uttarakhand Academy of Administration,  
Nainital, – 263 001



# **COURSE TEAM**

**Sh. B. P. Pandey, IAS**

Director General – Dr. R.S.T. UAoA & CEO–CGG

**Sh. Prakash Chandra, PCS**

*Joint Director* Dr. R.S.T. UAoA & CGG

**Sh. Manoj Pande**

Incharge, UD Cell , Dr. R.S.T. UAoA – (Course Director)

**Smt. Sweta Pandey**

Training & Account Manager, UD Cell , Dr. R.S.T. UAoA

**Smt. Asha Joshi**

Training Manager, UD Cell–CGG , Dr. R.S.T. UAoA

**Contact Address:**

Urban Development Cell (CGG)

Dr. R. S. Tolia Uttarakhand Academy of Administration

Nainital, 263 001

Phone – 05942- 237633, 236068, 236149, 235011,

Fax : 05942-237642m 237633

E-mail : [urbandevp.uaoa@gmail.com](mailto:urbandevp.uaoa@gmail.com),

Website : [www.uaoa.gov.in](http://www.uaoa.gov.in)

# NIUA COURSE TEAM

**Sh. Hitesh Vaidya**

Director, NIUA, New Delhi

**Dr. Mahreen Matto**

Programme Manager

National Institute of Urban Affairs

**Sh. Doab Singh**

Programme Officer, National  
Institute of Urban Affairs

**Contact Address:**

National Institute of Urban Affairs

Phone No: 9818019491

1<sup>st</sup> and 2<sup>nd</sup> floor Core-4-B, India Habitat Centre,

Lodhi Road, New Delhi - 110 003 Phone:011-24649610-23

Website: <http://www.niua.org>

# Advanced Co-treatment of Faecal Sludge and Septage in STPs

Date: 06th to 08th April, 2022

## TRAINING PROGRAMME REPORT



## **TITLE**

Advanced Co-treatment of Faecal Sludge and Septage in STPs  
(Face to Face Training Programme Report)

## **PUBLISHER**

Urban Development Cell (CGG) Dr. R.S. Tolia UAoA, Nainital

## **RESEARCH PROJECT**

Sanitation Capacity Building Platform

## **GRAPHIC DESIGN**

Asha Joshi

## **ACKNOWLEDGEMENT**

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## **CONTACT**

Urban Development Cell

Centre for Good Governance (CGG)

Dr. R. S. Tolia Uttarakhand Academy of Administration, Nainital

Phone – 05942-237633

E-mail – [urbandevp.uaoa@gmail.com](mailto:urbandevp.uaoa@gmail.com)

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## Abbreviations

<b>AMRUT</b>	Atal Mission for Rejuvenation and Urban Transformation
<b>BIS</b>	Bureau of Indian Standards
<b>CEPT</b>	Center for Environmental Planning & Technology
<b>CSP</b>	City Sanitation Plan
<b>CW</b>	Constructed Wetlands
<b>DPR</b>	Detailed Project Report
<b>DTS</b>	Decentralised Treatment System
<b>ESF</b>	Ecosan Services Foundation
<b>FS</b>	Faecal Sludge
<b>FSSM</b>	Faecal Sludge and Serptage Management
<b>FSTP</b>	Faecal Sludge Treatment Plant
<b>GOI</b>	Government of India
<b>GOM</b>	Government of Maharashtra
<b>IHHL</b>	Individual Household Latrine
<b>IHS</b>	Indian Institute of Human Settlement
<b>NIUA</b>	National Institute of Urban Affairs
<b>O&amp;M</b>	Operation & Maintenance
<b>OWSSB</b>	Odisha Water Supply & Sewerage Board
<b>PBMC</b>	Port Blair Municipal Croporation
<b>PBC</b>	Pollution Control Board
<b>PMC</b>	Pune Municipal Corporation
<b>RAS</b>	Rapid Assessment Survey
<b>SCBP</b>	Sanitation Capacity Building Program
<b>STP</b>	Septage Treatment Plant
<b>SHG</b>	Self-help Group
<b>SOP</b>	Standard Operating Procedure
<b>STP</b>	Sewage Treatment Plant
<b>SWM</b>	Solid Waste Management
<b>ULB</b>	Urban Local Body

# INTRODUCTION



## Introduction

The state of Uttarakhand is the source of two major rivers, the holy Ganges and Yamuna which supply water not only to the natives of the state but also the rest of India living in the Indo- Gangetic plains. There are huge gaps in the sanitation situation in the state which demand immediate action, a failure in which would result in contamination of lakes, springs and river system in the state. In order to address the problem GoI has launched many flagship programmes like AMRUT, Namami Gange and Swachh Bharat which focuses on all parts of the sanitation service chain. The state has also come with various advisories and protocols for the ULBs for better implementation of treatment of human excreta produced.

Under these schemes various STPs are being planned in the state. The underutilized STPs and the new STPs which are under planning stage have a good potential to co-treat the Faecal Sludge and Septage (FSS) with the incoming domestic wastewater. However, for this to be done, one needs to understand the designing and functioning of wastewater treatment processes and also the impact of co treatment of FSS with the domestic wastewater.

The three-days advanced training programme on “Co-Treatment of Faecal Sludge in Sewage Treatment Plant” will provide insights to the engineers of Department of Pwajal and Jal Sansthan of Uttarakhand. It will cover the different approaches of FSS treatment, characterisation of sludge and feasibility assessment of co-treatment. It will also cover the co-treatment approach/ application of FSS at different stages of domestic wastewater treatment systems like at septage receiving station or in a liquid or solid stream.

The training programme is based on training module developed by NIUA, New Delhi in partnership with ESF, Pune. The training module has is based on Case Methodology where in sessions will be combined with exercises based on real-life cases. This would help the trainees to apply the knowledge grasped during the session and reinforce it further.

The module is divided into three parts:

Part A: This contains the slides used during the session in the presentation format.

[https://niua.org/scbp/sites/default/files/Final\\_Co-Treatment\\_3A\\_-\\_PPT\\_Book\\_0.pdf](https://niua.org/scbp/sites/default/files/Final_Co-Treatment_3A_-_PPT_Book_0.pdf)

Part B: This is a comprehensive compilation of the all the session briefs and further reading material which helps to strengthen the learning.

[https://niua.org/scbp/sites/default/files/Final\\_Co-treatment\\_Module\\_Part\\_B.pdf](https://niua.org/scbp/sites/default/files/Final_Co-treatment_Module_Part_B.pdf)

Part C: This contains the exercise developed for training based on the real-life cases

[https://niua.org/scbp/sites/default/files/Final\\_Co-treatment\\_Module\\_Part\\_3C\\_-\\_Workbook\\_0.pdf](https://niua.org/scbp/sites/default/files/Final_Co-treatment_Module_Part_3C_-_Workbook_0.pdf)

## AGENDA

Following is the day wise agenda of the training. A detailed session wise agenda is available in the annexure.

**Table 1: Agenda of the Training of Trainers**

<b>DAY-1 (06<sup>th</sup> April, 2022)</b>		
<b>Time</b>	<b>Topic/Content</b>	<b>Resource Person</b>
<b>10:00 to 1030 Hrs</b>	Registration/ Inauguration	<b>Director General, DRSTUAOA Course Team</b>
<b>1030 to 1130 Hrs</b>	Co-Treatment Opportunities in Uttarakhand	<b>NIUA Team</b>
<b>1130 to 1145 Hrs</b>	<b>TEA /COFFEE BREAK</b>	
<b>1145 to 1230 Hrs</b>	Approaches for Faecal Sludge and Septage Treatment	<b>Saurabh Kale</b>
<b>1230 to 1330 Hrs</b>	Characterization of Sewage, Faecal Sludge and Septage	<b>Dhawal Patil</b>
<b>1330 to 1430 Hrs</b>	<b>LUNCH BREAK</b>	
<b>1430 to 1530 Hrs</b>	Sewage Treatment Plant and Co Treatment	<b>Dhawal Patil</b>
<b>1530 to 1545 Hrs</b>	<b>TEA /COFFEE BREAK</b>	
<b>1545 to 1630 Hrs</b>	Planning for Operationalizing Co Treatment	<b>Saurabh Kale</b>
<b>Closing of day 1</b>		
<b>DAY-2 (07<sup>th</sup> April, 2022)</b>		
<b>10:00 to 1015 Hrs</b>	Recap of Day 1	
<b>1015 to 1130 Hrs</b>	Faecal sludge and Septage Receiving Station	<b>Saurabh Kale</b>
<b>1130 to 1145 Hrs</b>	<b>TEA /COFFEE BREAK</b>	
<b>1145 to 1230 Hrs</b>	Co Treatment in Liquid Stream at STP	<b>Dhawal Patil</b>
<b>1230 to 1315 Hrs</b>	Exercise: Detailed Assessment (Part I)	<b>Dhawal Patil</b>
<b>1315 to 1415 Hrs</b>	<b>LUNCH BREAK</b>	
<b>1415 to 1530 Hrs</b>	Co Treatment in Sludge Stream at STP	<b>Dhawal Patil</b>
<b>1530 to 1545 Hrs</b>	<b>TEA /COFFEE BREAK</b>	
<b>1545 to 1630 Hrs</b>	Exercise: Detailed Assessment (Part II)	<b>Dhawal Patil/ Saurabh Kale/Shivkumar Mulay</b>
<b>Closing of day 2</b>		
<b>DAY-3 (08<sup>th</sup> April, 2022)</b>		
<b>1000 to 1015 Hrs</b>	Recap of Day 2	
<b>1015 to 1130 Hrs</b>	Exercise: Detailed Assessment (Part III)	<b>Dhawal Patil/ Saurabh Kale/Shivkumar Mulay</b>
<b>1130 to 1145 Hrs</b>	<b>TEA /COFFEE BREAK</b>	
<b>1145 to 1300 Hrs</b>	Disinfection of Sludge	<b>Saurabh Kale</b>
<b>1300 to 1330 Hrs</b>	Closing Ceremony and Vote of Thanks	<b>ATI and NIUA Team</b>
<b>1330 to 1400 Hrs</b>	<b>LUNCH BREAK</b>	

# SESSIONS

A Face to Face “Advanced Training Programme on Co-treatment of Faecal Sludge and Septage in STPs of Uttarakhand” was organized by Urban Development Cell, CGG, Dr. R. S. Tolia Uttarakhand Academy of Administration between 06<sup>th</sup> to 08<sup>th</sup> April, 2022. The programme was sponsored by National Institute of Urban Affairs with Technical Inputs from the team of NIUA and ESF. The participants of the programme were engineers from Pey Jal Nigam and Jal Sansthan from of Uttarakhand.



**Day: 1<sup>st</sup> (06.04.2022)**

### **Inaugural Session**

The day started with inauguration session wherein Mr. Manoj Pande, Course Director, welcomed Sh. Prakash Chandra, Joint Director (Admin.), Sh Doab Singh, Program Manager SCBP, the Ecosan Team, the team from NIUA and the participants. He gave a brief of the Academy, CGG and its Urban Development Cell and the activities undertaken by it. He also introduced the course to the participants along with its purpose, learning objectives and structure.



In his inaugural speech, Sh. Prakash Chandra Joint Director highlighted the sensitive nature of the Himalayan ecosystem and the need to develop necessary strategies for liquid and solid waste management in the state. He stressed that in order to prevent the contamination of water bodies in the

region it is important that all effluent is properly treated before it is discharged in the environment. In order to utilize the capacities of these STPs, methodologies to co-treat STPs with septage must also be devised. He stated that such programmes shall help his organization in developing strategies to co-treat such septage in STPs. He asked the participants to learn as much as possible from the programme so that it can be implemented in the field. The session ended with Mr. Doab Singh, Programme Manager NIUA providing details of the engagement of NIUA in Uttarakhand and the assistance that can be provided by the institute in augmenting the capacities of the state for implementation of FSSM.

The training programme aimed to convey the following learnings:

1. There is a scope and significant potential for co-treatment of faecal sludge and septage (FSS) in the existing and proposed sewage treatment plants.
2. The requirement of frame-work and policy and its enforcement for successful statewide implementation of co treatment of faecal sludge and septage (FSS) with domestic wastewater.
3. Technical requirements for practicing co-treatment of faecal sludge and septage (FSS) and domestic wastewater and estimating its feasibility.

region it is important that all effluent is properly treated before it is discharged in the environment. In order to utilize the capacities of these STPs, methodologies to co-treat STPs with septage must also be devised. He stated that such programmes shall help his organization in developing strategies to co-treat such septage in STPs. He asked the participants to learn as much as possible from the programme so that it can be implemented in the field. The session ended with Mr. Doab Singh, Programme Manager NIUA providing details of the engagement of NIUA in Uttarakhand and the assistance that can be provided by the institute in augmenting the capacities of the state for implementation of FSSM.



### **Technical sessions**

The first technical session of the day was taken by Sh. Saurabh, Sr Project Manager, ESF on the approaches to Faecal Sludge and Septage Management, He described the various stages of planning and approaches for FSSM and stressed that there are three main stages while planning for FSSM at the city scale. These are

1. Quantification and Characterization of the Sludge
2. Selecting various approaches for treatment
3. Creating an enabling environment

While discussing the need of the need on quantification and characterization Sh. Kale focused on the design of the septic tanks, the quantification methodology, the modes of desludging and the types of sludge that is being discharged. In the session he also discussed the



various approaches for FSSM viz. Deep row entrenchment, FSTP and Co treatment with Septage. The standards for treatment, treatment objectives, its mechanism and stages were also discussed. The crucial role of the enabling environment was highlighted by him which included formation of bye-laws, training of the employees and creating clear contracts and agreements. The second session of the day was presented by Sh Dhawal Patil, General Manager, Ecosan Services Foundation on Characterization of sewage, faecal Sludge and septage. He described how faecal sludge and septage differs from sewage and sewage sludge; he also explained the characterization ratios which are required to select the appropriate treatment process and the operational factors which might change the nature of faecal sludge and septage.



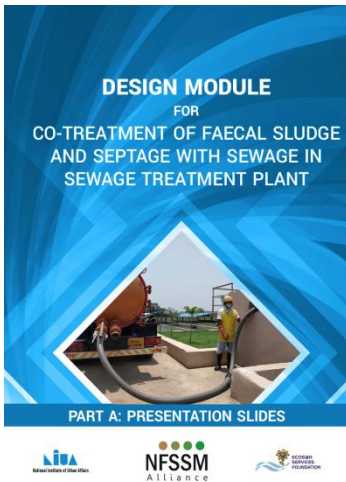
The characteristics of the faecal sludge and septage may differ based on the sources of generation, the availability and use of water, the culture, lifestyle and habits of the residents and the devices used for flushing etc. The sludge so produced can be judged based on the parameters like Solid Concentration (TSS, TDS, TFS, TVS), COD, BOD, Nutrients, Pathogens and Metals. He drew a comparison between the Sewage, Septage and Faecal Sludge based on the above parameters. Finally he discussed the operational factors which may impact the characteristics of the sludge produced. This may include the usage of the toilets, the climate, the water table and also the frequency and equipment's used for decanting of the tanks.

In the session after lunch Sh. Dhawal Patil spoke on Sewage Treatment Plant and Co-Treatment. In the session he described the objectives, processes and different stages of sewage treatment. He stressed that proper treatment of waste water not only helps to protect the environment and the water bodies but also acts as an alternate source of water for irrigation and industrial purposes. The treatment process mainly comprises of physical, biological, chemical process while the treatment stages can be categorized as primary treatment stage where solids are removed, the secondary treatment stage where the organic content is taken out and finally the tertiary treatment stage which comprises of removal of pathogens. He also explained the approach of Co- Treatment of sludge in sewage treatment system and its impact if added unscientifically in treatment system. While elucidating the treatment system, Sh. Patil explained the various treatment options available and highlighted the benefits with each treatment options. For the addition of sludge for co treatment with sewerage he specified the points wherein the sludge can be added and stressed that the point of addition is decided on the pretreatment that septage is provided and its efficiency before it is added either into the liquid or solid stream. He added that septage addition should be



done after carefully monitoring as addition of sludge impacts STPs in different ways like the hydraulic loading, organic load, the microbial balance, odour and foaming issues, generation of sludge, sludge loading rates and chances of untreated effluents in the liquid stream. The last session of the day was presented by Sh. Saurabh on Planning and operationalizing Co Treatment of Sludge and Septage. In the session Sh. Kale dwelled on the steps in planning and scaling of co-treatment of faecal sludge and septage in STPs. The impact of unscientific addition of faecal sludge and septage was also discussed.

Sh Kale in the session also highlighted the administrative controls required for smoother implementation of co-treatment in STPs. In his discussion he stressed the need of mapping the sewage appurtenances and the need for administrative controls. In the end of the session the participants were provided with a workbook and were asked to do the exercise on Sewage Treatment Plant and its pre- feasibility assessment.



The workbook consists of exercises based on real life cases so that the participants can have a better understanding of the subject. It consists of four sections

1. Foundation: Introduction to various definitions, terminologies and the Problem Statement.
2. Sewage treatment Plant: Introduction to design criteria, design parameters, the details of treatment units and their efficiency and sludge characteristics of the Sewage Treatment Plant.
3. Prefeasibility Assessment: To judge the current utilization of the STP with respect to Volumetric Capacity, BOD, COD and TSS and the septage handling capacity
4. Detailed Assessment: To carry out the detail assessment and to provide recommendation for co treatment of septage at STPs

### Day:2<sup>nd</sup> (07<sup>th</sup> April, 2022)

The Day 2 started with the recap of Day 1. Sh. Saurabh then explained the design of the septage receiving stations which are necessary for safe transfer of the septage from the vehicles to the treatment facility. The design of mechanized receiving station was also discussed. In his discussion he highlighted the objectives of receiving station which primarily consisted of safe and easy transfer of septage to the plant, prevent its clogging and wear and tear, provide intermediate storage and equalization points and prevent the fouling of the process. Various options of the receiving stations based on the treatment facility and septage load introduced to the plant were also explained by him. The discussion introduced to the participants various pretreatment facilities like the mechanical screens, parabolic grit channels etc. Besides discussion on the mechanized dewatering systems like the Screw and the belt press, Sh. Kale also highlighted the need of preparation of SOPs for the receiving stations.



Sh Dhawal Patil in his session on Co-Treatment in liquid stream at the STPs detailed the treatment units involved in the liquid treatment stream of STPs. He also explained the impact of co-treatment and measures to mitigate the impact of co-treatment. While discussing the treatment units at the primary, secondary and tertiary treatment stages, the design criteria and feasibility checks were also explained by him. The manner in which the impact of co-treatment at the STPs could be mitigated was also discussed. The participants were then asked to refer to the workbook provided and were asked to carefully go through the data provided with respect to the STP and its sludge characteristics. They were then asked to carry out the pre-feasibility assessment for carrying out co treatment at the STPs.



After the lunch break, Sh. Patil explained how the co treatment in solid stream should be carried out the STPs; He detailed the treatment units involved in the sludge treatment stream and the impact of co-treatment with measures to mitigate its effects. The treatment units were discussed along with their design criteria and feasibility checks. He highlighted the criteria for the design of different equipment and their process control. The precautions and feasibility checks for co- treatment depends on the impact of addition of faecal sludge and septage at STPs which can either be in liquid stream or in sludge stream. The feasibility checks also require to check the solid loading rate which should be less than the design loading rates. The manner in which the impact of the co treatment in the solid stream could be mitigated was also discussed. The participants were again asked to refer to the workbook and carry out detailed assessment in order to recommend the co treatment of septage at STPs. The feasibility checks in the exercise allowed the participants to decide process parameters at different process stages.

## Day: 3<sup>rd</sup> (06<sup>th</sup> April, 2022)

Day 3 started with a recap of Day 2. The issues faced by the participants in solving the section of the

exercise were also discussed. The solutions of the previous day were also provided. The participants were then asked to solve the remaining portion of the exercise which allowed the participants to have a clear idea of the impacts of the addition of sludge at different stages. The participants were then provided with a detailed solution of the exercise for a better understanding of the subject. The final session of the day was taken by Sh. Saurav Kale on disinfection of sludge wherein he explained the different treatment technologies for the disinfection of sludge and reuse of bio solids. Approaches of Co-composting, thermal drying and thermal treatment of bio-solids were also discussed.



### Valediction.

The valedictory session was chaired by the Director General, DRSTUAoA, Sh. B. P Pandey. The course director Sh. Manoj Pande gave a brief of the overall programme and introduced the resource persons and the faculty from the NIUA to the chair. The course director requested the participants to provide their views and feedback on the programme. All the participants who evinced their views were satisfied with the structure and contents of the programme. In his address the DG Academy highlighted the importance of sanitation and its subsequent impact on the water bodies. He emphasized that Sewerage Treatment plants being capital



intensive cannot cater to the sanitation needs of the state and therefore we must think of alternate solutions for treating this liquid waste. Use of septic tanks and the subsequent treatment of the septage provides a viable solution to this problem. He asked the participants to utilize the learnings of the session to create better sanitation facilities in the state. The programme ended with a vote of thanks by the Joint Director Academy.

# FEEDBACK



## Participants Profile

### Gender

Gender	Male	Female
Number	24	03
Percentage (%)	88.9	11.1

### Age

Age	20-30	31-40	41-50	51-60
Number	06	05	12	04
Percentage (%)	22.22	18.52	44.44	14.82

### Job Related Information

Job Related Experience	Below 5	5-10	10-20	20-30	30 & above
Number	14	04	09	..	..
Percentage (%)	51.85	14.82	33.33	..	..

### Organisation

Department	PeyJal Nigam	Jal Sansthan
Number	10	17
Percentage (%)	37.04	62.96

### Post/Level

Post	CE	SE	EE	AE	AAE	JE
Number	0	0	01	10	05	11
Percentage (%)	0.0	0.0	3.70	37.04	18.52	40.74

### Districts

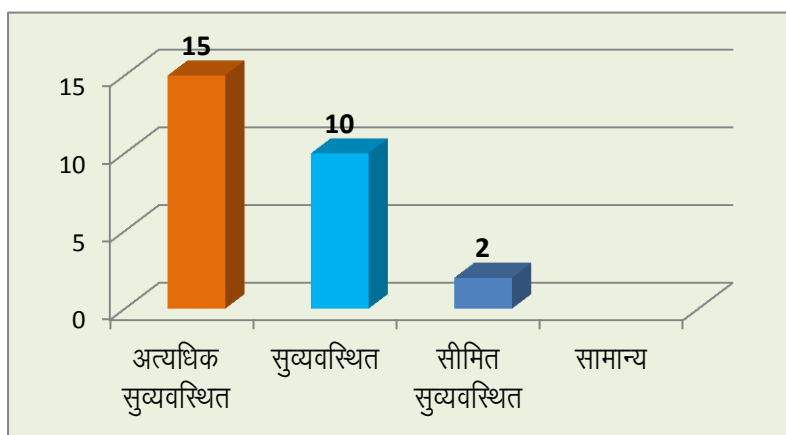
District	Nainital	Tehri Garhwal	Pauri Garhwal	Dehradun	Haridwar	Uttarkashi	Rudraprayag	Chamoli
Number	09	02	02	02	05	02	01	04
Percentage (%)	33.33	7.41	7.41	7.41	18.52	7.41	3.70	14.81

## Feedback

At the end of the training programme the participants were requested to provide their feedback both verbally as well in pre- designed forms. While providing their opinion regarding the programme during the valedictory session most of the participants were satisfied with the course content, the structure of the programme, the facilities provide at the academy and the sessions taken by the resource persons. While speaking on the occasion **Sh. Rajeev Kumar Jain, Executive Engineer, Payjal**, said that the programme would benefit us in designing, implementing and operating the co- treatment facilities in the state. **Sh. Sachin Kumar, Project Manager (M) Payjal**, also voiced similar opinion and said that she would continue to be in touch with the NIUA experts for effective implementation of Co-treatment in her town. The feedback forms submitted by the participants were also compiled and analysed, the findings of which are as under.

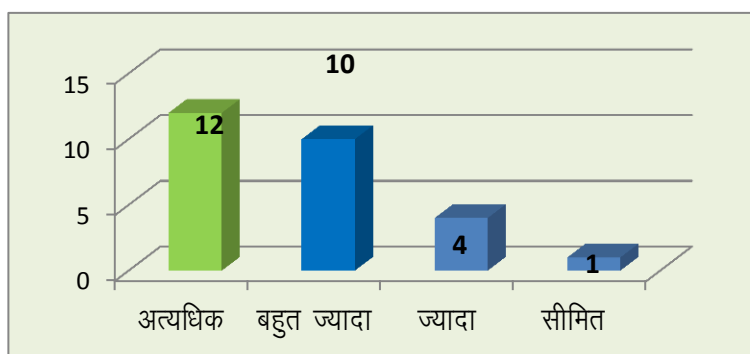
## Training Management

1. Level of organisation of training programme with respect to the objectives laid down:



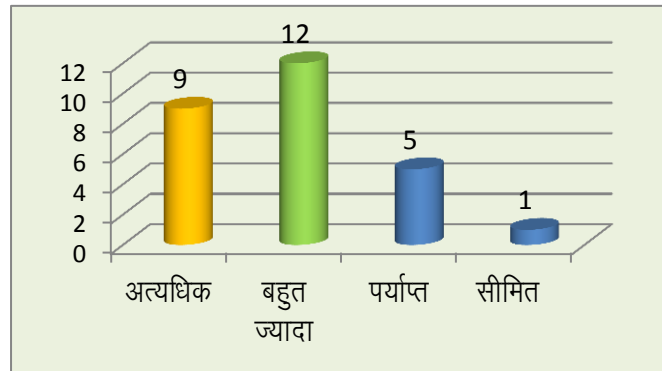
More than 55.56% (15 out of 27) of the participants found the programme to be excellently organised while 37.04% (10 out of 27) found it to be well organised. 7.4% (2 out of 27) found it to be Limited well organised.

2. The help the training programme provided in improving their knowledge in the subject:



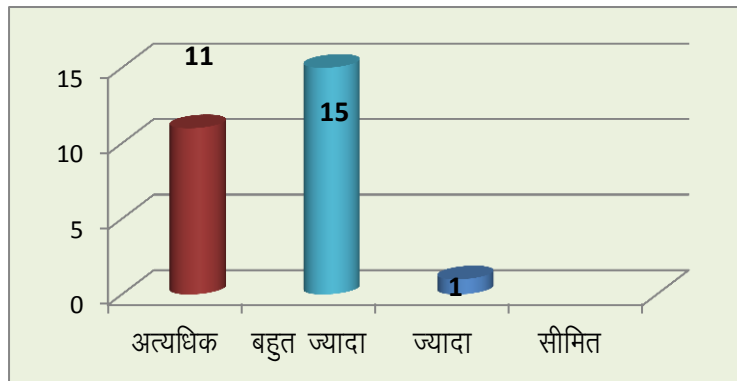
44.44% (12 out of 27) found that the programme would help them excessively while 37.04% (10 out of 27). 14.81% (4 out of 27) found it to be well Limited organised. 3.71% (1 out of 27) found it to be well More.

3. The benefits obtained by interaction with the fellow participants during the programme:



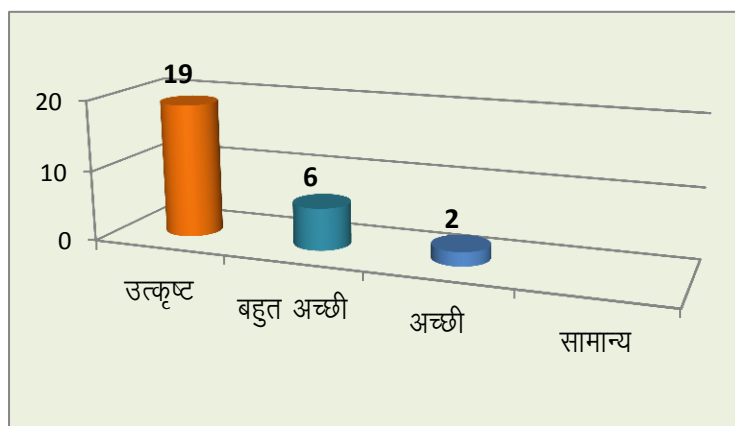
33.33% (09 out of 27) found participants were of the view that they were excessively benefited by the interaction, 44.44% (12 out of 27) found the interaction of great benefit and 18.52% (5 out of 27) found the interaction to be enough. 3.71% (1 out of 27) found it to be of limited benefit.

4. The benefit the training would provide in making qualitative improvement in the functions performed by the participants:



40.74% (11 out of 27) believed that the training programme would help them immensely in making qualitative improvements in their job while 55.56% (15 out of 27) felt that it would be of great help. 3.7% (1 out of 27) found it to be of more benefit.

5. The level of the boarding and lodging facilities, training room and other related facilities:

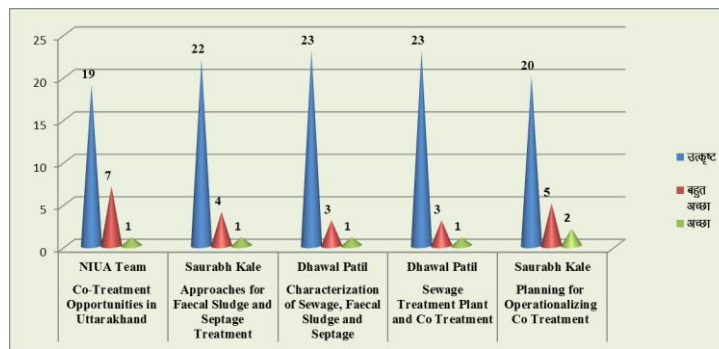


70.37% (19 out of 27) found the facilities to be excellent, while 22.22% (6 out of 27) felt that they were very good. 7.41% (2 out of 27) found it to be good.

## Sessions taken by the resource persons

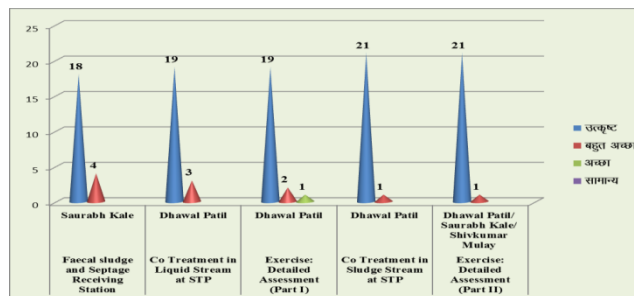
6. The overall analysis of the sessions shows that the sessions were very well appreciated:

Day-1<sup>st</sup>: 06.04.2022



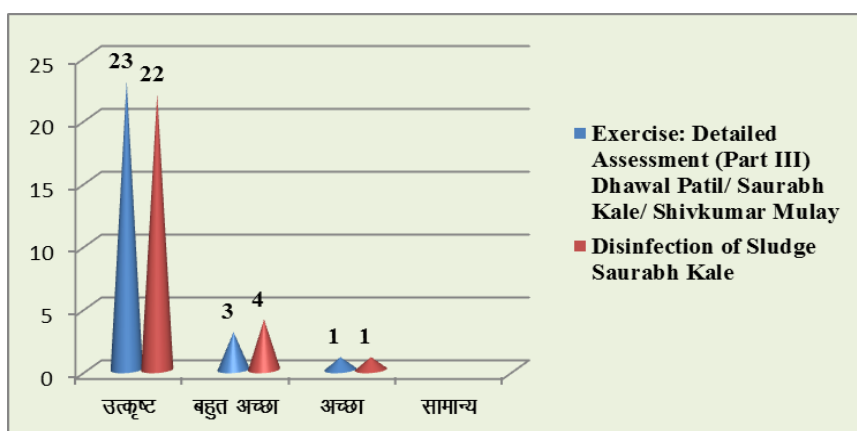
The excellent scores for the 05 sessions were around 79.00 % (107 out of 135×100). The Very Good scores for the 05 sessions were around 16.9 % (22 out of 135 ×100). & The Good scores for the 05 sessions were around 4.00% (6 out of 135 ×100).

Day-2<sup>nd</sup>: 07.04.2022



The excellent scores for the 05 sessions were around 89.00 % (98 out of 110×100). The Very Good scores for the 05 sessions were around 10.00 % (11 out of 110 ×100). & The Good scores for the 05 sessions were around 1.00 % (1 out of 110 ×100).

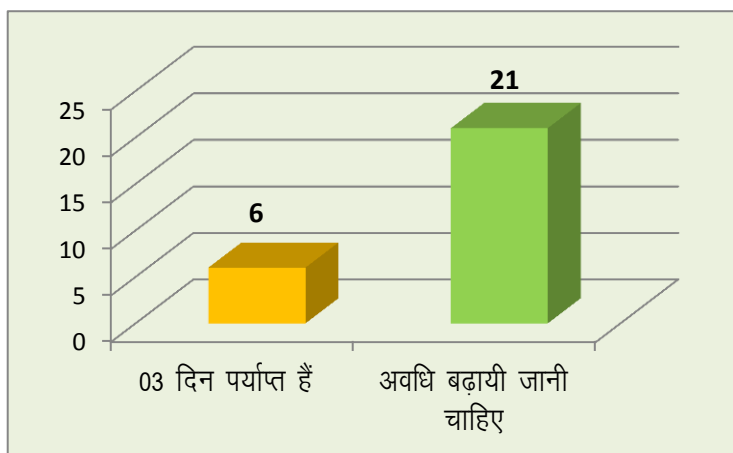
Day-3<sup>rd</sup>: 08.04.2022



The excellent scores for the 02 sessions were around 83.00 % (45 out of 54×100). The Very Good scores for the 02 sessions were around 12.00 % (7 out of 54 ×100). & The Good scores for the 2 sessions were around 3.07 % (2 out of 54 ×100).

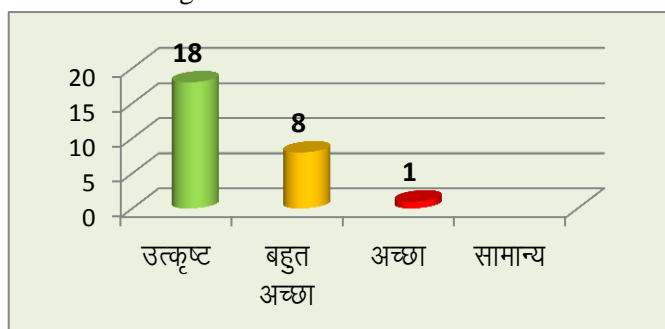
## View regarding overall training

### 7. Regarding the duration of the programme:



77.78% (21 out of 27) believed that the duration of the training programme should be increased while only 22.22% (6 out of 27) believed that the duration is satisfactory.

### 8. Overall assessment of the training:



66.67% (18 out of 27) found the training to be excellent, 29.63% (8 out of 27) felt that it was very good and 3.7% (1 out of 27) found it to be good.

## Testimonials by the participants

The table below presents some of the valuable comments that have been shared from the participants in their feedback forms.

S.N.	Name of the Participants	Organization	Testimonial
1.	Mr. Jagdish Singh Panwar	Jal sansthan	<ul style="list-style-type: none"> <li>सीवर ट्रीटमेंट प्लांट की डिजाइन सही उचित होनी चाहिए।</li> <li>ग्रामीण क्षेत्र एवं नगरीय क्षेत्र में सीवरेज का ढंग से संचालन होना चाहिये।</li> </ul>
2.	Ms. Puja Dhanai	Jal sansthan	<ul style="list-style-type: none"> <li>जिन बड़े Industries या Hospital या बड़े House को खुद के STPs बनवाने का सुझाव दूँगी जब तक हमारा खुद का को-ट्रीटमेंट नहीं बन जाता।</li> <li>Sludge को Directly सीवरेज चैम्बर में नहीं डालना चाहिये जिस वजह से STP breakdown होने की संभावना रहती है।</li> </ul>
3.	Mr. Vipul Chaudhary	Peyjal Nigam	<ul style="list-style-type: none"> <li>नई तकनीकी को जानने का मौका मिला।</li> <li>प्रशिक्षण कार्यक्रम की अवधि बढ़ानी चाहिए जिससे प्रतिभागी को समझने और प्रशिक्षण संबंधित वार्ता में अधिक समय मिले।</li> </ul>
4.	Ms. Nidhi Sethi	Jal sansthan	<ul style="list-style-type: none"> <li>Septage, Sewage &amp; Faecal Sludge में major difference कैसे इन सबका Treatment STPs में किस प्रकार किया जाना चाहिए। Co-Treatment की वहाँ आवश्यकता है और कैसे इसे सही प्रकार किया जाना चाहिए।</li> </ul>
5.		Jal Sansthan	<ul style="list-style-type: none"> <li>Co-Treatment design as per based on exercise which are planned by you in such a beautiful manner.</li> </ul>
6.	Mr. Manoj Kumar	Jal Sansthan	<ul style="list-style-type: none"> <li>इस कार्यक्रम में ऑपरेटरों/नगर निगम आदि को भी सम्मिलित किया जाना चाहिये।</li> <li>सीवेज में प्राप्त होने वाले सभी पैरामीटरों को स्पेशल लेब से ट्रेसिस्टम कराके प्रेक्टिकल कराया जाना आवश्यक है।</li> </ul>
7.	Mr. Gaurav Arya	Jal Sansthan	<ul style="list-style-type: none"> <li>मैंने अपने जॉब में कभी STP नहीं देखा है और न ही मुझे इसके बारे में कोई जानकारी रही है मेरे जैसे अन्य प्रतिभागी भी है, अतः प्रशिक्षण आधार पर ही अधिक से अधिक जानकारी सर्वप्रथम दी जानी चाहिये जिससे प्रशिक्षण के आगे के चरण की पूर्व समझ आ सके।</li> </ul>
8.	Mr. Ravindra Kumar	Jal Sansthan	<ul style="list-style-type: none"> <li>भविष्य में Sewage Treatment Plant का Visit कराये जिससे STPs के बारे में अच्छी तरह से जानकारी मिल सके।</li> </ul>
9.	Mr. Dheeraj Singh	Jal Sansthan	<ul style="list-style-type: none"> <li>मेरा सुझाव यह है कि प्रत्येक दिन लगभग 30 मिनट के लिये NIUA टीम के समस्त प्रतिभागियों को 6-7 के ग्रुप के साथ एक NIUA सदस्य बैठें तथा उनकी समस्याओं का समाधान करें।</li> </ul>

10.	<b>Mr. Omprakash</b>	Jal Sansthan	<ul style="list-style-type: none"> <li>● प्रशिक्षण कार्यक्रम की अवधि बढ़ाकर STP के Basic से शुरू करना चाहिए।</li> </ul>
11.	<b>Mr. Rewat Singh Rawat</b>	Jal Sansthan	<ul style="list-style-type: none"> <li>● भविष्य में प्रशिक्षण के साथ-साथ प्रयोगात्मक रूप से CO-Treatment Plant का निरीक्षण करवाया जाय।</li> <li>● STP से होने वाली समस्याओं के बारे में विस्तृत जानकारी एवं निराकरण कैसे किया जायें।</li> </ul>
12.	<b>Mr. Dharmendra Prasad</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● संबंधित विषय पर दिया गया ज्ञान कार्यक्षेत्र की आवश्यकतानुसार अत्यन्त उपयोगी है जो सीवर ट्रीटमेंट तथा संचालन हेतु महत्वपूर्ण है।</li> </ul>
13.	<b>Mr. Rajeev Kumar Jain</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● भविष्य में विभिन्न तकनीक पर आधारित सीवरेज शोधन सयंत्र एवं पेयजल शोधन सयंत्र के विस्तृत डिजाईन पर न्यूनतम एक सप्ताह का प्रशिक्षण दिया जाना उपयोगी रहेगा।</li> </ul>
14.	<b>Mr. Lalit Mohan Aithani</b>	Jal Sansthan	<ul style="list-style-type: none"> <li>● सीवर लाईन, (STP डाईग से शुरू किया जाय)</li> </ul>
15.	<b>Mr. Deepak Vatsa</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● प्रत्येक बैंच पर पैरामीटर की व्यवस्था कराना।</li> <li>● अपने शहर में भी DPR को चैक कर सभी आकलन करेंगे।</li> </ul>
16.	<b>Mr. Shubham Bisht</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● Training period should be increased there should be more exercise and if possible please conduct site visit also.</li> </ul>
17.	<b>Ms. Meenakshi Vashistha</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● 1 and half days are not sufficient days should be more co than learning many more elaborative.</li> <li>● Currently I am working as PHE Engineer in Haridwar town I would like to implement these aspects in my town and District</li> </ul>
18.	<b>Mr. Sachin Kumar</b>	Peyjal Nigam	<ul style="list-style-type: none"> <li>● डिजाइन आदि से संबंधित विषय को भी शामिल किया जाना उचित होगा।</li> </ul>
19.	<b>Mr. Suman Singh Bhandari</b>	Jal Sansthan	<ul style="list-style-type: none"> <li>● Faecal and septage treatment के लिये मात्रा अवधि एवं पृथक से Unit बनाने के लिये अपने शहर STP सीवरेज में प्रावधान करवाने हेतु प्रयास करेंगे।</li> </ul>

## **Learnings and Way Forward**

In order to conduct the programme during the times of Covid19 epidemic detailed SOPs have been prepared in the academy. As the programme was residential in nature all the participants were asked to carry a Covid19 negative report. There was a lukewarm response initially because of the stringent procedures at the academy but after repeated requests made to the HODs of the departments 23 participants joined the programme. The participants underwent a medical examination before the start of the training programme and only after that they were allowed to sit in the programme. Few participants whose Covid19 negative report were not available during the time were isolated from others in the Academy quarantine facility.

## **Agenda and Schedule**

The programme was conducted in face to face mode therefore interaction between the experts and the participants was high. In the first half of the first day some participants report was pending. The academy had foreseen this eventuality therefore a separate facility to isolate these participants was planned. These participants were connected with the class online through Zoom call through which they were able to interact with the experts. Once the participant's reports were available they were shifted to the class immediately.

The detailed training modules with the schedule has been tailor made for the target audience. The purpose of the programme, the learning objectives and the structure of the module is well defined and PPTs, learning notes and exercise have been well documented.

It was felt that many participants had limited knowledge of the definitions, terminologies and working of STPs and therefore requested for tour to STPs to have a better understanding. The exercises required more time and attention from the resource persons and a longer period course can also be considered. The participants were also of the view that the length of the training programme be increased to include a visit to STP site.

## **Content**

The content comprises of PPTs, case studies and exercise for a better understanding of the subject. The purpose of the course is to allow the engineers to understand the design of a co-treatment facility and the processes involved and also the impact of co treatment in functioning of STPs. As the participants were from Hindi speaking state of Uttarakhand the delivery by the experts was kept mixed with both Hindi and English spoken in the class. The feedback forms were also made in Hindi for better understanding. It is felt that the overall module can also be translated in Hindi.

## **Exercises**

The exercise forms a very important part of the training programme as it allows the engineers of pre-feasibility assessment and detailed assessment of co-treatment at STPs. It is felt that more time be given to this so that the participants are confident of calculations. Detailed assessment part requires continuous recap of the theoretical concepts, hence sometimes the participants required individual attention of the resource person.





## **Resources**

It was felt that while conducting exercises participants require individual attention and clearing of their doubts and concepts. The exercises could initially be done in form of group work with an expert assigned to each group followed by individual calculations. The facility for the participants who were quarantined because the reports were not available can be upgraded to have larger screens and better audio and microphone facility.



# ANNEXURE

**Annexure 1:**  
**List of Resource Persons**

<b>S.N.</b>	<b>Name of Resource Person</b>	<b>Organization</b>	<b>Role</b>	<b>Profile Photo</b>
1.	<b>Mr. Manoj Pande</b>	DRST, UAoA Nainital	Course Coordination & Moderator	
2.	<b>Mr. Dhawal Patil</b>	Ecosan Services Foundation	Lead Trainer	
3.	<b>Mr Saurabh Kale</b>	Ecosan Services Foundation	Lead Trainer	
4.	<b>Sh. Shivkumar Mulay</b>	Ecosan Services Foundation	Lead Trainer	

## Annexure 2:

### List of Participants

The following table presents the details of the officials, staff with whom we have discussed about the design of Faecal Sludge and Septage Management (FSSM).

S.N.	Organization Name	Nominations	Email ID
1.	Uttarakhand Jal Sansthan	Mr. Ravindra Kumar	E mail:kumar2781@gmail.com
2.	Uttarakhand Jal Sansthan	Mr. Anand Singh Negi	E mail: anandnegi923@gmail.com
3.	Uttarakhand Jal Sansthan	Mr. Lalit Mohan Aithani	E mail. lalitaithani79@gmail.com
4.	Uttarakhand Jal Sansthan	Mr. Suman Singh Bhandari	..
5.	Uttarakhand Jal Sansthan	Mr. Rewat Singh Rawat	E mail: rewatrawat7@gmail.com
6.	Uttarakhand Jal Sansthan	Mr. Manoj Kumar	E mail:manoj8204@gmail.com
7.	Uttarakhand Jal Sansthan	Mr. Jagdish Singh Panwar	E mail: jagdishpanwar442@gmail.com
8.	Uttarakhand Jal Sansthan	Ms. Gaurav Arya	E mail: gauravarya1891@gmail.com
9.	Uttarakhand Jal Sansthan	Mr. Omprakash	E mail: rastogiom424@gmail.com
10.	Uttarakhand Jal Sansthan	Ms. Puja Dhanai	E mail: <a href="mailto:pujadhanai2014@gmail.com">pujadhanai2014@gmail.com</a>
11.	Uttarakhand Jal Sansthan	Mr. Himanshu Padaliya	E mail: <a href="mailto:hpadaliya8@gmail.com">hpadaliya8@gmail.com</a>
12.	Uttarakhand Jal Sansthan	Ms. Nidhi Sethi	mail: <a href="mailto:nidhisethi2000@gmail.com">nidhisethi2000@gmail.com</a>
13.	Uttarakhand Jal Sansthan	Mr. Amit Raturi	E mail: <a href="mailto:amitraturi@gmail.com">amitraturi@gmail.com</a>
14.	Uttarakhand Jal Sansthan	Mr. Bikram Singh	E mail: <a href="mailto:bikramsingh054@gmail.com">bikramsingh054@gmail.com</a>
15.	Uttarakhand Jal Sansthan	Mr. Navin Chandra Joshi	E mail: <a href="mailto:ncjoshijejal@gmail.com">ncjoshijejal@gmail.com</a>
16.	Uttarakhand Jal Sansthan	Mr. Dheeraj Singh	E mail: dhirjmehta99@gmail.com
17.	Uttarakhand Pey Jal Nigam	Mr. Rajeev Kumar Jain	pmcivilgangahrd@gmail.com
18.	Uttarakhand Pey Jal Nigam	Mr. Ritesh Sharma	E mail:ritesh311079@gmail.com
19.	Uttarakhand Pey Jal Nigam	Mr. Narendra Bharti	Email:narendrabharti1984@gmail.com
20.	Uttarakhand Pey Jal Nigam	Mr. Sunil Kumar	E mail:skkumarsunil50@gmail.com
21.	Uttarakhand Pey Jal Nigam	Mr. Jagdish Kanderi	E mail:jagdishkanderi@gmail.com
22.	Uttarakhand Pey Jal Nigam	Mr. Deepak Vatsa	E mail:deepakvatsa.ujn@gmail.com
23.	Uttarakhand Pey Jal Nigam	Mr. Dharmendra Prasad	E mail:dpkukjn@gmail.com

<b>24.</b>	Uttarakhand Pey Jal Nigam	Ms. Meenakshi Vashistha	<b>E mail:</b> <a href="mailto:meenakshimittal16@gmail.com">meenakshimittal16@gmail.com</a>
<b>25.</b>	Uttarakhand Pey Jal Nigam	Mr. Sachin Kumar	<b>E mail:</b> <a href="mailto:sachin231514@gmail.com">sachin231514@gmail.com</a>
<b>26.</b>	Uttarakhand Pey Jal Nigam	Mr. Vipul Chaudhary	<b>E mail:</b> <a href="mailto:vipulpjn@gmail.com">vipulpjn@gmail.com</a>
<b>27.</b>	Uttarakhand Pey Jal Nigam	Mr. Shubham Bisht	<b>E mail:</b> <a href="mailto:erhubhamukpn@gmail.com">erhubhamukpn@gmail.com</a>

**Annexure 3:  
Detailed Session Wise Agenda**

<b>Date</b>	<b>Session</b>	<b>Topic/ Content</b>	<b>Resource Person</b>	<b>Duration (Min)</b>
<b>06<sup>th</sup> April, 2022</b>	1.	Co-Treatment Opportunities in Uttarakhand	NIUA Support in Uttarakhand	15
	2.	Approaches for Faecal Sludge and Septage Treatment	Saurabh Kale	45
	3.	Characterization of Sewage, Faecal Sludge and Septage	Dhawal Patil	45
	4.	Sewage Treatment Plant and Co Treatment	Dhawal Patil	1 Hrs
	5.	Planning for Operationalizing Co Treatment	Saurabh Kale	1 Hrs
<b>07<sup>th</sup> April, 2022</b>	6.	Faecal sludge and Septage Receiving Station	Saurabh Kale	15
	7.	Co Treatment in Liquid Stream at STP	Dhawal Patil	15
	8.	Exercise: Detailed Assessment (Part I)	Dhawal Patil	
	9.	Co Treatment in Sludge Stream at STP	Dhawal Patil	45
	10.	Exercise: Detailed Assessment (Part II)	Dhawal Patil/ Saurabh Kale/Shivkumar Mulay	45
<b>08<sup>th</sup> April, 2022</b>	11	Exercise: Detailed Assessment (Part III)	Dhawal Patil/ Saurabh Kale/Shivkumar Mulay	1 Hrs
	12	Disinfection of Sludge	Saurabh Kale	45

## Annexure 4:

### Feedback format

#### प्रशिक्षण मूल्यांकन-प्रपत्र

नोट : कृपया प्रश्न क्र० 01 से 06, 11 तथा 12 के सन्दर्भ में (✓) अंकित कर एवम् शेष बिन्दुओं पर लिखित में अपने सुझाव दें। आपके सुझाव हमारे भविष्य के प्रशिक्षण कार्यक्रमों को और अधिक लाभप्रद बनाने हेतु सहायक सिद्ध होंगे।

संस्थान का नाम : डॉ. आर, एस, टोलिया उत्तराखण्ड प्रशासन अकादमी, नैनीताल  
(शहरी विकास प्रकोष्ठ, सी.जी.जी.)

प्रशिक्षण का शीर्षक : **Advanced Co-treatment of Faecal Sludge and Septage in STPs**

प्रशिक्षण अवधि : 06 से 08 अप्रैल, 2022 (तीन दिवसीय)

प्रतिभागी का नाम व पद: .....

1. कार्यक्रमों के उद्देश्यों के अनुरूप प्रशिक्षण कार्यक्रम का आयोजन किस स्तर का था?

अत्यधिक सुव्यवस्थित	सुव्यवस्थित	सीमित सुव्यवस्थित	सामान्य
---------------------	-------------	-------------------	---------

2. यह प्रशिक्षण कार्यक्रम आपके स्वयं के ज्ञानार्जन में कितना सहायक होगा ?

अत्यधिक	बहुत ज्यादा	ज्यादा	सीमित
---------	-------------	--------	-------

3. प्रशिक्षण के दौरान सहयोगी प्रतिभागियों आपसी वार्ता आपके लिए कितनी लाभदायक रही?

अत्यधिक	बहुत ज्यादा	पर्याप्त	सीमित
---------	-------------	----------	-------

4. यह प्रशिक्षण कार्यक्रम आपके द्वारा संपादित किये जाने वाले कार्यों में गुणात्मक सुधार की दृष्टि से

कितना लाभदायक होगा ?

अत्यधिक	बहुत ज्यादा	ज्यादा	सीमित
---------	-------------	--------	-------

5. कार्यक्रम के दौरान प्रशिक्षण कक्ष, आवास, भोजन, एवं अन्य सम्बन्धित व्यवस्थाओं का स्तर कैसा

था?

उत्कृष्ट	बहुत अच्छी	अच्छी	सामान्य
----------	------------	-------	---------

6. निम्नांकित प्रमुख सत्रों का उपयुक्त कॉलम में(✓) अंकित कर मूल्यांकन करें :

विषय	वार्ताकार	उपयुक्त कॉलम में(✓) अंकित करें				कुल प्रतिभागी
		उत्कृष्ट	बहुत अच्छा	अच्छा	सामान्य	
<b>प्रथम दिवस– दिनांक: 06.04.2022</b>						
Co-Treatment Opportunities in Uttarakhand	NIUA Team					
Approaches for Faecal Sludge and Septage Treatment	Saurabh Kale					
Characterization of Sewage, Faecal Sludge and Septage	Dhawal Patil					
Sewage Treatment Plant and Co Treatment	Dhawal Patil					
Planning for Operationalizing Co Treatment	Saurabh Kale					
<b>द्वितीय दिवस– दिनांक: 07.04.2022</b>						
Faecal sludge and Septage Receiving Station	Saurabh Kale					
Co Treatment in Liquid Stream at STP	Dhawal Patil					
Exercise: Detailed Assessment (Part I)	Dhawal Patil					
Co Treatment in Sludge Stream at STP	Dhawal Patil					
Exercise: Detailed Assessment (Part II)	Dhawal Patil/ Saurabh Kale/Shivkumar Mulay					
<b>तृतीय दिवस– दिनांक: 08.04.2022</b>						
Exercise: Detailed Assessment (Part III)	Dhawal Patil/ Saurabh Kale/Shivkumar Mulay					
Disinfection of Sludge	Saurabh Kale					

7. आपकी राय में कार्यक्रम के सबसे उपयोगी विषय कौन-कौन से थे? (क्रमवार लिखें)

8. क्या कोई सत्र कम महत्व का लगा ? कृपया कारण सहित इंगित करें।

9. आपकी राय में इस प्रशिक्षण कार्यक्रम में सम्मिलित सत्रों के अलावा किन अतिरिक्त विषयों पर भविष्य में जानकारी दिया जाना उपयोगी होगा ?

10. भविष्य में इस विषय पर आयोजित किये जाने वाले प्रशिक्षण को और अधिक प्रभावशाली व ज्ञानवर्धक बनाने हेतु आपके सुझाव ?

11. प्रशिक्षण कार्यक्रम की अवधि के बारे में आपकी क्या राय है ?

03 दिन पर्याप्त हैं

अवधि बढ़ायी जानी चाहिए

12. सम्पूर्ण प्रशिक्षण के बारे में आपका आंकलन:

उत्कृष्ट

बहुत अच्छा

अच्छा

सामान्य

13. आप इस प्रशिक्षण कार्यक्रम से जानकारी को किस प्रकार से अपने शहर में उपयोग करेंगे?

हस्ताक्षर : .....

दिनांक : 08 अप्रैल, 2022

## **Annexure 5: Attendance Sheet**



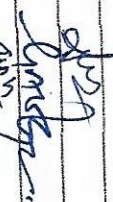

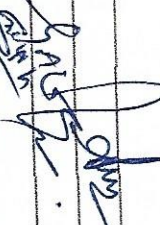







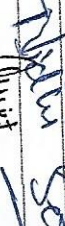



















Urban Development Cell (CGG)

Dr. R. S. Tolia Utarakhand Academy of Administration Nainital

Date: 06 to 08 April, 2022

(Attendance Sheet)

S.N.	Name	Designation	06.04.2022 (Wednesday)	07.04.2022 (Thursday)	08.04.2022 (Friday)
1.	Mr. Rajeev Kumar Jain	Executive Engineer			
2.	Mr. Ravindra Kumar	Additional Assistant Engineer			
3.	Mr. Anand Singh Negi	Assistant Engineer			
4.	Mr. Lalit Mohan Aithani	Additional Assistant Engineer			
5.	Mr. Ritesh Sharma	Additional Assistant Engineer			
6.	Mr. Narendra Bharti	Additional Assistant Engineer			
7.	Mr. Sunil Kumar	Additional Assistant Engineer			
8.	Mr. Suman Singh Bhandari	Assistant Engineer			
9.	Mr. Rewat Singh Rawat	Assistant Engineer			
10.	Mr. Mahoj Kumar	Assistant Engineer			
11.	Mr. Jagdish Kanderi	Assistant Engineer			
12.	Mr. Jagdish Singh Panwar	Assistant Engineer			
13.	Mr. Deepak Vatsa	Project Engineer			
14.	Mr. Dharmendra Prasad	Project Engineer			
15.	Ms. Meenakshi Vashistha	Project Engineer			

16.	Mr. Sachin Kumar	Project Manager (M)			
17.	Ms. Gaurav Arya	Junior Engineer			
18.	Mr. Omprakash	Junior Engineer			
19.	Ms. Puja Dhanai	Junior Engineer			
20.	Mr. Himanshu Padaliya	Junior Engineer			
21.	Mr. Vipul Chaudhary	Junior Engineer			
22.	Mr. Shubham Bisht	Junior Engineer			
23.	Ms. Nidhi Sethi	Junior Engineer			
24.	Mr. Amit Raturi	Junior Engineer			
25.	Mr. Bikram Singh	Junior Engineer			
26.	Mr. Navin Chandra Joshi	Junior Engineer			
27.	Mr. Dheeraj Singh	Junior Engineer		