Chapter-2

Shortcomings in Sewage Treatment Infrastructure

Chapter-2

Shortcomings in Sewage Treatment Infrastructure

State Ganga Committee and State Mission for Clean Ganga (SMCG) did not plan and implement sewage treatment infrastructure in collaboration with local communities. State Government did not contribute in improving the sewerage facilities in Ganga Front Towns from its own resources. As a result, many Sewage Treatment Plants (STPs) either remain unconnected to household sewer network or are only partially connected. Moreover, the existing STPs lack sufficient treatment capacity, resulting in significant discharge of untreated sewage into the Ganga. Uttarakhand Jal Sansthan (UJS) declined to take over 18 STPs due to deficiencies in their construction and operation. Proper management of sewage sludge was also neglected. Furthermore, the State Ganga Committee did not conduct timely safety audits of STPs, resulting in avoidable loss of human lives and Namami Gange assets.

2.1 Augmentation of sewerage infrastructure

Prevention, control and abatement of environmental pollution in River Ganga and its tributaries is the prime objective of Namami Gange programme. The programme aims to rejuvenate the river Ganga to its natural and pristine condition. Untreated municipal sewage is considered to be the major source of pollution of rivers. Out of the total measurable pollution in the rivers from various point sources, around 75 *per cent* is accounted for by municipal sewage from towns located along the banks of rivers. To tackle this menace of pollution from municipal sewage, State Ganga Committees have been entrusted by the Government of India (GoI), through River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016, with the duty of augmenting sewerage infrastructure. In Uttarakhand, 78 *per cent*[1] of the Namami Gange expenditure during 2018-23 was on augmentation of sewerage infrastructure.

2.2 Network of STPs in Ganga front towns

Number and capacity of STPs, constructed under Namami Gange/erstwhile Ganga Action Plan projects, as of May 2024 in 16 Ganga Front Towns is provided in **Table-2.1** below:

Table-2.1: Details of STPs

Sl. No.	Name of Town	Total number of STPs	Total Treating Capacity in million liters per day (MLD)
1	Badrinath	03	1.270
2	Chamoli- Gopeshwar	05	4.370
3	Devprayag	03	1.625
4	Gangotri	01	1.000
5	Haridwar	05	145.000
6	Joshimath	02	3.780
7	Karnaprayag	05	0.350
8	Kirtinagar	02	0.060
9	Nandprayag	02	0.150
10	Rishikesh	03	34.000

[1] (Expenditure on sewage infrastructure: ₹ 680·79 crore) *100/(total expenditure: ₹ 873.17 crore).

Sl. No.	Name of Town	Total number of STPs	Total Treating Capacity in million liters per day (MLD)
11	Tapovan	01	3.5
12	Muni ki Reti	01	7.5
13	Rudraprayag	06	0.525
14	Srinagar	02	4.500
15	Srikot	02	0.125
16	Uttarkashi	01	2.000
	Total	***44***	***209.755***

Source: Information collected from SMCG and implementing agencies.

2.3 Planning for augmentation of sewerage infrastructure

Audit noticed following shortcomings in planning for augmentation of sewerage infrastructure in the State:

2.3.1 Lack of State/District level river basin management plan

In 2011, erstwhile State River Conservation Authority (predecessor of State Ganga Committee) had set a target that no untreated urban wastewater and industrial effluent would be allowed to flow into River Ganga by year 2020. SMCG had to prepare a State River Basin Management Plan to achieve this target. Besides, District Ganga Plans were to be prepared for rejuvenation and protection of River Ganga and its tributaries in each village and town of specified District abutting River Ganga and its tributaries.

Audit noticed that SMCG had not prepared state level river basin management plan even after 13 years of its establishment. Despite clear provisions in National Mission for Clean Ganga (NMCG) Authority Order (2016), District Ganga Committees (DGCs) also did not prepare district level river basin management plans in any of the districts through which Ganga and its tributaries flow (Uttarkashi, Tehri, Chamoli, Rudraprayag, Pauri, Dehradun and Haridwar).

The impact of lack of well-defined plans can be seen in fragmented addressing of sewerage problems in Ganga Front Towns, as infrastructure to treat sewage could not develop parallelly and STPs were built but not connected to households, as highlighted in succeeding ***Paragraph 2.3.4*** and ***2.3.5***. Besides, the target of preventing all untreated wastewater from falling into River Ganga by the year 2020 could also not be achieved in absence of concrete planning (***Paragraph 2.4.1***).

The State Government replied (May 2024) that comprehensive district Ganga plan had been prepared for district Udham Singh Nagar only.

The reply is not acceptable in view of the fact that Udham Singh Nagar district does not have any Ganga Front Town in it. Hence, preparing District Ganga Plan in Udham Singh Nagar will have no direct impact on Ganga water quality.

2.3.2 Local public not involved in planning

One of the major themes of Namami Gange Programme is implementation of the concept of Jan Ganga which strives to engage community through various activities. Hence, it was pertinent to engage local population in planning of Namami Gange infrastructure for its sustainability and maintenance.

Audit noticed that State Ganga Committee, SMCG and implementing agencies did not involve the local public in planning Namami Gange infrastructure. Their needs for

sewerage facilities were not heeded by local implementing agencies (***Paragraph 2.3.6*** and Social Audit). There were instances when local concerns were met only after public raised the issue of their need through various state authorities, central level ministers and NMCG. For example, an eight MLD STP in Muni Ki Reti (Rishikesh) was sanctioned after Chairman of Nagar Palika Rishikesh raised the issue of low capacity of existing STP with a Central Minister. Similarly, a 1.50 MLD STP at Neelkanth Mahadev Temple was sanctioned after local trade unions, temple management and local MLA pursued the issue of lack of STP facility with Central Minister, State Ganga Committee, Executing Agency *etc*. Findings of social audit commissioned by SMCG revealed that people were dissatisfied with sewerage facilities created under Namami Gange because SMCG had not involved local public in planning and implementation and created improper infrastructure.

Audit noticed that planning of sewerage and other Namami Gange infrastructure without involving local public and without assessing local needs resulted in construction of symbolic sewerage infrastructure (***Paragraph 2.3.4***) and/non-utilization of created infrastructure (***Paragraph 3.2.1***).

Audit noticed that planning of Namami Gange infrastructure was based on top-down approach. For example, 21 STPs[2], for treating sewage drains, were constructed in compliance of National Green Tribunal (NGT) order dated 10 December 2015. Co-treatment sewerage treatment plants were also planned on the basis of same judgement. Hence, the major planning was based on NGT orders and did not keep the need of the local public (sewerage facilities *i.e.* connecting household sewage with STPs) in perspective.

The State Government replied (May 2024) that local residents were consulted during ground survey for identification of drains, but the consultations were not documented. It added that 8.00 MLD STP in Rishikesh and 1.50 MLD STP in Neelkanth were proposed as per demand of local residents.

The reply is not acceptable because social audit[3] commissioned by SMCG itself found that local people were neither consulted nor their needs assessed as mentioned in paragraph. Besides, 8.00 MLD STP in Rishikesh and 1.50 MLD STP in Neelkanth were proposed only after NMCG/GoI intervention.

2.3.3 No financial contribution by State Government in augmentation of sewage *facilities for Ganga Rejuvenation*

Sanitation is a subject of State List of seventh schedule of the Constitution of India. Hence, providing adequate sanitation and sewerage facilities in all towns of Uttarakhand (be it Ganga Front Towns or others) is the responsibility of State Government, even if there are no centrally sponsored programme, like Namami Gange, in existence.

[2] Nandprayag- two STPs (Sanctioned in March 2017), Karnaprayag- five STPs (Sanctioned in March 2017), Rudraprayag- six STPs (Sanctioned in March 2017), Kirtinagar- two STPs (Sanctioned in March 2017), Chamoli- one STP (Sanctioned in March 2017), Srinagar- one STPs (Sanctioned in March 2017), Srikot- two STPs (Sanctioned in March 2019) and Joshimath- two STPs (Sanctioned in March 2017).

[3] Conducted by Garhwal University, Srinagar, Pauri in year 2022-23.

During audit, it was noticed that the State Government did not allocate funds for enhancing supplemental sewerage facilities in Ganga Front Towns. During 2018-23, State Government spent an amount of ₹ 55.08 crore on creating sanitation infrastructure under State Sector Scheme for Sewage Development. However, no amount was spent in Ganga Front Towns.

Audit noticed that state Government did not construct a single STP or other sanitation infrastructure in any of the 16 Ganga Front Towns using its own resources. It did not provide funds for connecting houses with STPs which were constructed from Namami Gange funds ***(Case study of Paragraph 2.3.4***).

During exit conference (May 2024), Secretary stated that State Government had limited financial resources to fulfil its mandate of providing sewage facilities to people irrespective of Namami Gange. With these resources, State Government has prioritized/ sanctioned household sewer network in some cities. Currently externally aided KfW[4] (a German Development Bank) project in Haridwar and Rishikesh are underway that aims at 100 *per cent* coverage of households in these two main Ganga Front Towns. Hence, State Government is moving forward to provide universal sewage facilities in the State.

The fact remains that KfW funded project has only recently commenced and is limited to Rishikesh and Haridwar. Other Ganga Front Towns still lack adequate sewerage facilities.

2.3.4 Construction of 'Symbolic' STPs not connected with households

As per mandate of NMCG, only 'Interception & Diversion (I&D) and STP' works are planned and funded under Namami Gange Programme. I&D works are designed for intercepting drains and diverting them to STP through sewer lines. An I&D network does not include 'house sewer connections and sewer network' which link household to sewer connecting chambers of I&D network. State Government was required to undertake 'house sewer connections and sewer network' through its own resources to fully utilize the STP network.

Audit noticed that sewage treatment projects under Namami Gange were not planned in a comprehensive manner. State Ganga Committee did not ensure that all three components of sewage treatment-STPs, I&D facilities and house sewer connections and sewer network, were planned and implemented simultaneously. Instead, the focus of planning was limited to providing I&D and STP facilities in Ganga Front Towns.

In the above circumstances, the audit noticed that 21 STPs[5] built in seven towns were not connected to any households, rendering them symbolic in nature. Joint inspection of STPs and scrutiny of records showed that these STPs were treating only grey water (typically generated in kitchens and flowing through roadside drains), rather than actual sewage. The details are in ***Appendix-2.1***.

[4] Kreditanstalt für Wiederaufbau.

[5] Nandprayag- two STPs, Karnaprayag- five STPs, Rudraprayag- six STPs, Kirtinagar- two STPs, Chamoli- one STP, Srinagar and Srikot- three STPs and Joshimath- two STPs.

Further, most of these 21 STPs cannot handle additional sewage volumes due to their small size (6.04 MLD in total). New STPs will need to be constructed when sewer networks are laid for household connections in future. This approach is evident in Joshimath, where three additional STPs are proposed alongside the sewer network and house sewer connections.

Case Study: Sewage Facilities in Joshimath

In 2010, the GoI sanctioned an I&D scheme to lay 27.67 km of sewer lines at a cost of ₹ 9.61 crore in Joshimath. The scheme included *nalla* tapping but did not provide for STP construction. After facing significant delays, the scheme was closed in March 2017 after exhausting ₹ 9.57 crore, with only 14.64 km of sewer lines laid. Local residents requested house sewer connections to these lines, but this was not possible as the scheme did not include provisions for house connections and STPs.

Again, in March 2017, SMCG got sanctioned from GoI an 'I&D scheme with STP' at a cost of ₹ 48.43 crore for Joshimath. This time, the scheme included two STPs: a 1.08 MLD STP at Pokhari and a 2.70 MLD STP at Marwari. However, it still did not include house sewer connections. The construction of these two STPs was completed in November 2019 and March 2023, respectively, after spending ₹ 33.16 crore. Now, two STPs are functional, nallas are intercepted and diverted to STPs but no house was connected to these STPs due to lack of house sewer connections. NMCG did not provide funds for it because it was not within their mandate. State Government also refused to sanction funds for house sewer connections.

Thus, the infrastructure developed in schemes of 2010 and 2017 with expenditure of ₹ 42.73 crore[6] did not include sewage connection to any household. After incidents of sinking of land in Joshimath gained limelight and such sinking was attributed to lack of proper sewage system in the town, SMCG submitted (January 2023) a fresh preliminary proposal to NMCG for laying of sewer network and providing house connections at a cost of ₹ 202 crore as per instructions given by NMCG team during their visit (January 2023) to Joshimath.

During exit conference (May 2024), Secretary accepted that lack of sewerage facilities might be one of the reasons for Joshimath incidence. He also informed that a separate Detailed Project Report (DPR) for providing full coverage of sewer connections in Joshimath was under process and funds would be provided by GoI under disaster relief package.

During exit conference (May 2024), Secretary informed that Namami Gange was essentially a drain catching project wherein drains were intercepted and diverted to STPs (I&D with STPs) so that no untreated sewage was discharged to Ganga/tributaries. Provision of simultaneous household connections was not there and Namami Gange has been executed as originally conceived.

[6] Expenditure against sanction of year 2010: ₹ 9.57 crore + Expenditure against sanction of year 2017: ₹ 33.16 crore.

The reply is not acceptable because the Director General (NMCG), during the fifth meeting of the Executive Council of NMCG in August 2017, underscored the urgent need to resolve the house connection issue. He emphasized that without household connectivity, the STPs could not deliver desired results, rendering the investment of public funds wasteful.

2.3.5 Partial household sewage connectivity

In five big Ganga Front Towns, sewer connectivity was limited to only a fraction of households, except in Haridwar where a bigger population was connected to the STPs. The details of these five towns are given in **Table-2.2** below:

Table-2.2: Details of partial household sewage connectivity in five Ganga Front Towns

Sl. No.	Name of Town	Number of STPs	Total Treating Capacity in MLD	Total no. of Households	Total No. of Sewer connections *(Per cent)*	Reason of partial connectivity
1	Chamoli-Gopeshwar	04*	4.32	5,510	354 *(06.42)*	Lack of sewer lines
2	Haridwar	05	145	68,802	47,728 *(69.37)*	Lack of sewer lines and deficient treatment capacity in STPs
3	Rishikesh including Tapovan and Muni Ki Reti	05	45	34,756	9,966 *(28.67)*	Lack of sewer lines and deficient treatment capacity in STPs
4	Srinagar	01	3.50	6,523	797 *(12.22)*	Lack of sewer lines
5	Uttarkashi (Gyansu)	01	2.00	6,089	572 *(9.39)*	Lack of sewer lines
Total		***16***	***199.82***	***1,21,680***	***59,417***	

****One STP of 0.05 MLD capacity (near old suspension bridge, Chamoli) has been excluded because it treated only grey water.***

Source: Information provided by Directorate of Urban Development, Uttarakhand. Data of Haridwar households has been adopted from the reply of the State Government.

Partial household connectivity with STPs was a major hindrance in Ganga cleanliness.

The State Government replied (May 2024) that sewer network and house connections work was under construction in Haridwar and Rishikesh town under KfW loan. Besides, DPR for sewer network in Srinagar and Uttarkashi town was also under preparation.

In comparison to instances of nil/poor connectivity of Namami Gange STPs (as elaborated in ***Paragraph 2.3.4 and 2.3.5***), Audit noticed that five MLD STP constructed by Tehri Hydroelectric Development Corporation (THDC) in New Tehri had very impressive household connectivity. This STP of five MLD was commissioned in 2006. It has a sewer network length of 32 km and currently connects 83 *per cent of* households (3,754 out of 4,543 households) in Tehri. It presents a better model where networking was provided during construction of STP and it makes the STP effective and relevant even after 17 years of its construction.

2.3.6 Unsuccessful planning for co-treatment

State Ganga Committee repeatedly stresses that unconnected households use soak pits and septic tanks as sanitation facility. These on-site sanitation systems require regular

emptying into STPs for appropriate treatment and consequential release. Uttarakhand Government issued (22 May 2017) 'Protocol for Septage Management' in pursuance of NGT directions on the matter.

Paragraph 5.4.1 of the Protocol provides that de-sludging/emptying of septic tanks will be done once every two or three years, or when the tank becomes two third full. Further, paragraph 5.4.3 requires that septage shall be treated in any existing STP within 25 km distance.

Since normal sewer lines and STPs are not designed to treat septage from soak pits and malfunction if septage is included in STPs, SMCG decided (11 November 2019) to set up special co-treatment facilities for treatment of septage combined with the existing STPs of Ganga Front Towns. It instructed Uttarakhand Peyjal Nigam (UJN) to prepare and submit DPRs for co-treatment facility. NMCG provided administrative approval and expenditure sanction (16 June 2022) for ₹ 8.60 crore for a project 'Co-treatment of septage at existing STPs of Haridwar, Rishikesh, Srinagar and Devprayag'. The period of completion of the project was fixed at 12 months.

Audit noticed that the UJN could not succeed in setting up any co-treatment plant in the State and the whole exercise was limited to level of bidding only. Thus, on one hand there was no co-treatment facility available in the state, and on the other maintenance agencies did not allow treatment of septage into existing STPs.

Hence, in absence of proper co-treatment facilities and lack of other options for safe treatment and disposal of septage, the large quantity of septage generated in unconnected households poses a substantial risk of hazardous disposal and of polluting the river system.

During exit conference (May 2024), Secretary, Drinking Water stated that it was not contested that people get their soak pits emptied in open due to lack of sewage coverage of households in STPs. He also informed that bidders were now responding to tendering process of co-treatment facilities. Furthermore, co-treatment facilities had now been made an integral part of all future STPs to be established under AMRUT scheme.

2.3.7 Insufficient projection of treatment capacity

Paragraph 2.2 of Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Sewerage and Sewage Treatment Systems highlights need for capacity to treat sewage in short, medium and long term. This requires projection of treatment capacity of STPs keeping in view population forecast using most appropriate method and the density and distribution of such population in several areas, zones or districts. Floating population should also be considered which includes number of persons visiting the project area for tourism, pilgrimage or for working. The numbers should be decided in consultation with the tourism departments and specified for water supply and sewerage (Paragraph 2.6.2 of the Manual).

Audit noticed that implementing agency (UJN) did not possess basic database containing the details of each household and commercial establishment, availability of sewer lines in the area, status of connectivity of households and establishments with available sewer lines. Due to this, sufficient capacity of STPs to be built was not

correctly projected by the implementing agency. Due to this reason, constructed STPs achieved their full capacity in two-three years of their construction as observed in following cases:

Case No. 1: Low Capacity of 68 MLD STP Haridwar

In 2014, implementing agency[7] proposed a new STP in Jagjeetpur with a capacity of 40 MLD. This proposal was based on the fact that 85 MLD of sewage was reaching to Jagjeetpur against the existing total treatment capacity of 45 MLD[8] of available two STPs. In 2016, the proposed capacity was enhanced randomly by 10 MLD. Subsequently, an additional 18 MLD was also added to the proposed capacity, as the existing 18 MLD STP, which was commissioned in 1989 was planned to be scrapped. As a result, the total proposed capacity of the new STP was revised to 68 MLD (40 MLD + 10 MLD + 18 MLD). This revised capacity was projected to be sufficient for the sewage load expected by the year 2028.

However, Audit found that the 68 MLD STP was currently having sewage load more than its capacity. In March 2023, the STP was treating daily inlet of 71 MLD sewage at an average. The maximum inlet received in a day was 84 MLD. Hence, the established capacity was exhausted in 2023 itself *i.e.* five years before the schedule of 2028. Though, 18 MLD STP which was planned to be scrapped was still getting sewage of 19-20 MLD per day.

During exit conference (May 2024), General Manager, Construction Circle (Ganga) stated that it was essentially an I&D project which was planned for treating drain discharge only. Secretary, Drinking Water assured that project funded by KfW in Haridwar was based on actual household survey and it would be able to serve all households and floating and camping population.

The reply is not acceptable as the reply highlights a flaw in fundamental planning of assessing the sewage load. Although the STP was approved under I&D project with a planned capacity of 68 MLD to meet projected sewage load by 2028, it was already overloaded by 2023, treating up to 84 MLD in a day. The KfW project is future-oriented and does not address the issue of existing overload.

Case No. 2: Low Capacity of 7.50 MLD STP Dhalwala, Rishikesh

In 2013, NMCG approved the construction of a 7.50 MLD STP in Dhalwala, Rishikesh. However, the project was cancelled in 2016. Subsequently, during 2016-17, another STP of the same capacity was proposed in the DPR projecting that 7.50 MLD of sewage would be generated by 2018. NMCG sanctioned this proposal in March 2017, with a scheduled completion date of August 2019 as per the agreement. However, the projected sewage generation (7.50 MLD in 2018) exceeded the STP's capacity of 7.50 MLD by the time STP was completed (2019), leading to immediate overflow issues. Therefore, the STP was facing problem of overflowing since the beginning.

[7] Project Manager (PM), Construction & Maintenance Unit (Civil), UJN Ganga Haridwar.
[8] 18 MLD STP + 27 MLD STP.

The State Government replied (May 2024) that, during rainy season, the quantum of Dhalwala *nalla* exceeds capacity of STP, and excess flow over the capacity of STP is directly discharged into the river.

The reply is not acceptable as the audit noticed that discharge of untreated sewage was not limited to rainy season only and the issue was observed multiple times (January 2023, February 2023 and March 2023, *etc.*) and covered in local print media.

Case No. 3: Low Capacity of five MLD STP Chorpani, Rishikesh

In 2016-17, a STP with a capacity of five MLD was proposed for the Chorpani area in Rishikesh, based on an estimate that five MLD of sewage would be generated by 2028. The same was sanctioned by NMCG in March 2017. The STP was commissioned in November 2020. However, the capacity of STP proved insufficient after it began receiving sewage in excess of its full capacity. Due to rising demand from public and efforts of elected representatives up to NMCG level, a new STP of eight MLD capacity was sanctioned by the NMCG (06 September 2022). Meanwhile, the operator continued discharging excess sewage into river without treatment.

The Central Pollution Control Board (CPCB) team also found 17 MLD sewage coming to the 5.0 MLD STP on their visit to site on 20 June 2023. In response, the contractor responsible for operation and maintenance (O&M) of STP stated (letter dated 28 June 2023) that he was treating sewage as per the capacity of the plant and claimed that he was bypassing the excess sewage as per instructions of UJN *i.e.* the implementing agency.

In addition to the specific instances mentioned, the audit also observed instances of untreated sewage being discharged into the Ganga and its tributaries. Many of these cases stemmed from the inadequate treatment capacity of STPs, as detailed in ***Paragraph 2.4.1***.

As the SMCG reviews all DPRs before forwarding them to the NMCG for approval, it bears responsibility for these shortcomings. The responsibility should be fixed against the officials of SMCG, who are responsible for preparation/submission of DPRs to NMCG.

The State Government accepted (May 2024) that flow received at STP was much more than its treatment design capacity and another eight MLD STP was being constructed in the area.

2.3.8 Excess capacity and low intake of sewage

(i) Excess projection of treatment capacity

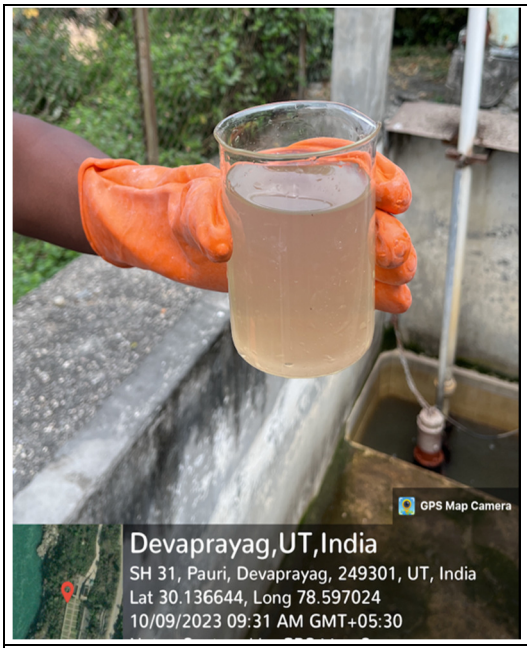
Availability of surplus capacity to treat sewage may be considered as a sign of STPs being future ready. However, in the case of 1.40 MLD STP Devprayag, Audit noticed that proposed STP operates at only three-four *per cent* of its capacity due to insufficient sewage input.

The 1.40 MLD STP in Devprayag was originally constructed (March 2016) at a cost of ₹ 3.66 crore to serve the entire town, which is divided into three zones. However, the implementing agency, UJN, built two separate STPs[9] to cater to two of these zones,

[9] 75 KLD for Shanti Bazar and 150 KLD for Sangam Bazar.

leaving the mentioned STP to handle sewage treatment for only one zone. Currently, this STP receives sewage from 70 households and nine commercial establishments within its designated zone. However, this amount is inadequate to provide the minimum quantity of sewage or greywater required for effective treatment. The STP currently operates at only three - four *per cent* of its capacity due to insufficient sewage input.

Under these circumstances, the Audit observed that there is room for improvement in the quality of sewage treatment. During joint physical inspections, Audit noted visibly dirty and foul-smelling water at the outlets of STPs, as in pictures below:



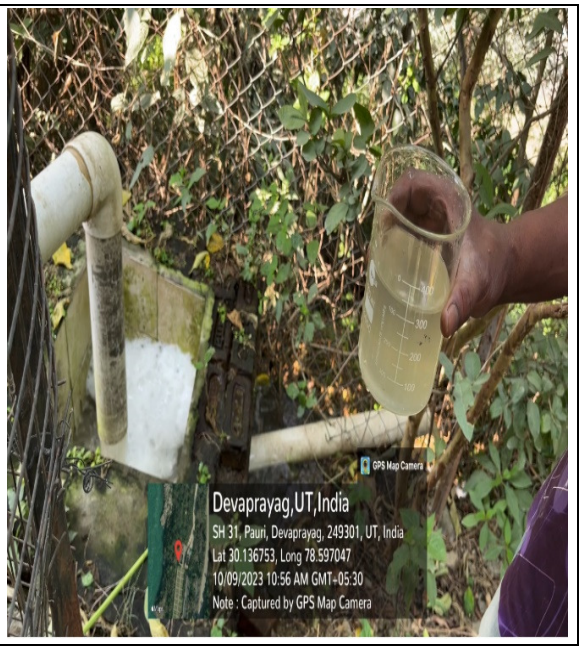


Photo 2.1 and 2.2: Visibly dirty and smelly water discharged from the outlet of the STP in Ganga

This observation was further substantiated by testing reports from the CPCB on treated effluent, which revealed non-compliance with norms for parameters such as Biochemical Oxygen Demand (BOD), Total Suspended Solid (TSS) and Faecal Coliform (FC) during quarterly tests[10].

The State Government replied (May 2024) that capacity of the STP was proposed to serve the needs of the local residents as well as an extra 7,000 National Hydro-electric Power Corporation personnel who were likely to be employed by THDC. Those personnel were to live in Devprayag. Subsequently, the dam was not constructed and personnel were not shifted to Devprayag.

The reply is not acceptable because THDC manages its own sewage disposal, as evident from construction of five MLD STP in Tehri by THDC (As mentioned in box of ***Paragraph 2.3.5***). Furthermore, THDC related claim of Department was not supported by any documentary evidence.

(ii) Vanishing of Incoming Sewage

In Joshimath, a STP with daily treatment capacity of 1.08 MLD sewage was commissioned in September 2019. However, during physical inspection, audit noticed that discharge of the *nalla* (for which the STP was constructed) had diverted somewhere

[10] conducted between August to November 2023 and April to July 2023.

else (perhaps gone underground) resulting in nominal receipt of sewage. STP operator told that the STP received approximately 0.2-million-liter sewage/grey water per month. Audit confirmed that during whole month of October 2023, the STP had received total sewage of less than one million liters. Such little intake of sewage in the STP adversely affected various instruments of the STP. The operator had to decant the STP at least two times a month to keep the STP machinery running. Hence, the whole objective of constructing the STP could not be achieved.

Although flow of drain could be retrieved by repairing the broken sewer line, Audit noticed that no such effort was made by either construction agency or maintenance agency to detect where the discharge had disappeared and there was no possibility to tap household sewer connections without construction of any new networking scheme. Hence, the working of STP was ineffective and it could become useless for future purpose.

The State Government replied (May 2024) that a comprehensive project for sewerage network in Joshimath town was proposed based on Post Disaster Need Assessment Report and the DPR of the project was under preparation.

The Government reply implies that there was no chance of recovering lapsed sewage flow until new works in proposed DPR, which was under preparation, were implemented.

2.3.9 Lack of STP in Ganga front town

Gauchar is a Ganga Front Town with 3,930 households. However, there was no STP in Gauchar and people used soak pits for managing sewage. During physical inspections, Audit was informed that there was high need of STP in Gauchar in view of very high population growth and migration into Gauchar. It was also informed that provisions of septage management[11] required cleaning of every soak pit in three years and disposal of that septage into proper STP. However, Audit noticed that no STP was planned and constructed in Gauchar.

When this issue was pointed out by audit, the Implementing Agency stated that as per NMCG norms, only *nalla* tapping (I&D with STP) is done under Namami Gange project. Since there was no *nalla* falling into the river, the proposal for an STP was not made.

This situation highlights the complete dependence of sewage treatment systems in Ganga Front Towns on funding from the Namami Gange initiative.

The State Government replied (May 2024) that a faecal sludge treatment plant had been proposed in December 2023 under Swachchh Bharat Mission programme 2.0.

2.4 Operation and Maintenance of STPs

Proper O&M of STPs is the most significant aspect of efforts for treating municipal sewage and cleaning Ganga. Audit noticed various shortcomings in this function as detailed below:

[11] Paragraph 5.4.1 of Septage Management Protocol.

2.4.1 Discharge of untreated sewage into Ganga

Audit carried out joint physical inspections of 37 Namami Gange STPs. During these inspections, Audit noticed that 12 STPs (32 *per cent*) were discharging untreated sewage into Ganga and its tributaries because of insufficient treating capacity and ineffective tapping of drains/ nallas. The details of such STPs, as noticed during physical inspection, are given in **Table-2.3** below:

Table-2.3: Details of discharge of untreated sewage into Ganga in 12 STPs

Name of STP	Year of Installation	Capacity	Reason of Discharging Untreated Sewage into Ganga
STP Chandreshwar Nagar/ Dhalwala Rishikesh	September 2020	7.50 MLD	Insufficient treating capacity of STP
STP Kirti Nagar	January 2019	10 KLD	Insufficient treating capacity of STP
STP Belni Road, Rudraprayag	November 2020	50 KLD	Destruction of *nalla* Tapping in Rains
STP Near SBI, Rudraprayag	May 2019	100 KLD	Breaking of *nalla* Tapping
STP Near bus stand, Rudraprayag	May 2019	75 KLD	Insufficient treating capacity of STP/ Receipt of extra grey water
STP Near Steel Bridge Rudraprayag	September 2019	125 KLD	Insufficient treating capacity of STP
STP, Srikot	February 2021	75 KLD	Insufficient treating capacity of STP
STP, Pokhari Bend, Gopeshwar	August 2020	1.25 MLD	Complete destruction of *nalla* tapping of Papadiyana *nalla* during rains which was not repaired by O&M agency
STP (Near old bridge), Karnaprayag	May 2019	100 KLD	Non- tapping of grey water from nearby households
STP (Ward No. 1 and 3), Karnaprayag	April 2019	100 KLD	Leakage from *nalla* Tapping
STP (Near BRO/New Bridge), Karnaprayag	November 2020	50 KLD	Leakage from *nalla* Tapping
STP (near police chowki), Karnaprayag	April 2019	50 KLD	Choking of *nalla* tapping

Source: Physical inspection notes.

In Exit conference (May 2024), the Secretary, Drinking Water assured that sufficiency of treatment capacity of STPs, particularly in hill areas, would be ascertained.

The Government should fulfill its assurance of ascertaining sufficiency of treatment capacity without any delay and fix responsibility of implementing agencies for proposing STPs with low capacity leading to discharge of untreated sewage into Ganga and tributaries.

2.4.2 Willfully discharging of untreated sewage into Ganga by O&M contractor

Section 24 of 'The Water (Prevention and Control of Pollution) Act, 1974' prohibits use of stream or well for disposal of polluting matter like sewer *etc*. Further, as per Section 43, whoever contravenes the provisions of section 24 shall be punishable with imprisonment for a term which shall not be less than one year and six months, but which may extend to six years and with fine.

Operation & Maintenance of two projects at Rishikesh *viz* 3.0 MLD STP, Swargashram and 3.5 MLD STP, Tapovan is being carried out by Executive Engineer, UJS, Ganga, Haridwar. The contractor responsible for maintenance of STPs was found to be

emptying sewage from collection tank of both the STPs directly into Ganga without any treatment which was noticed by Junior Engineer during a surprise inspection of both the STPs on 9 February 2023. Junior Engineer and Assistant Engineer both recommended legal action against the contractor.

The contractor accepted (10 April 2023) his fault and in his defiance stated that the equipment installed in both the STPs were old and defective since the time he had assumed the charge. These challenges were communicated earlier to the maintenance agency many times. He also requested to replace the defective and old equipment installed in STPs, but the maintenance agency never replaced defective equipment for smooth working of STPs. Hence, the Department equally bears responsibility for not taking timely corrective action for replacement/maintenance.

Further, Audit noticed that the department did not pursue any legal action against either the contractor or the responsible officer. Instead, the Superintending Engineer ordered only withholding a part of its payment from O&M bills which could be released later.

During exit conference (May 2024), the Secretary, Drinking Water assured that the Government would fix responsibility for such crime.

2.4.3 Drains discharging into Ganga not tapped

Implementing agency[12], constructed six STPs for tapping of eight drains sanctioned in Rudraprayag. NMCG sanction for the same was provided in March 2017. However, these STPs did not cover all drains and five other drains discharging into Ganga were left. Executive Officer, Nagar Palika Parishad, Rudraprayag requested (11 Dec 2020 and 30 Dec 2020) to District Magistrate, Rudraprayag and District Ganga Committee, Rudraprayag, with copy to implementing agency, to tap the leftover drains which were flowing directly into the river. These drains serve as the carrier of both sewage and solid waste generated from the town, which finally discharged into Alaknanda/Mandakini and ultimately polluted River Ganga.

The State Government replied (May 2024) that implementing agency forwarded (February 2021) the case for tapping of above drains to District Ganga Committee, Rudraprayag for onward submission to SMCG for allotment of funds but the funds were not released yet.

Government reply is not acceptable because implementing agency could not incorporate tapping proposals of all drains when NMCG was approving.

2.4.4 Operation of STPs without renewing authorization and consent from the Uttarakhand Pollution Control Board

Provisions of various Acts and Rules[13] require STPs to obtain Consolidated Consent and Authorization (CCA) from State Pollution Control Board for operation. The same is renewed from time to time.

---

[12] PM, Construction and Maintenance Division, Ganga, UJN, Srinagar.

[13] Section-25 of the Water (Prevention and Control of Pollution) Act, 1974, Section-21 of the Air (Prevention and Control of Pollution) Act, 1981 and Rule 3(c) & 5(5) of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 framed under the Environment Protection Act, 1986.

Audit noticed that eight of 44 Namami Gange STPs were running their operations without renewing CCA from the Uttarakhand Pollution Control Board (UKPCB) for more than four years as of May 2024 (as detailed in ***Appendix-2.2***). It was in violation of above provisions and involved the risk of polluting environment due to the absence of any checks in their operations.

The State Government replied (May 2024) that the process of renewal of authorization was in progress by coordinating with UKPCB.

2.4.5 Eighteen STPs not taken over by maintenance agency due to operational and safety related issues

In Uttarakhand, UJN constructs sewerage projects and hands over these systems to UJS, which is the maintenance agency for such assets. A Government order issued in March 2016 reaffirms this directive, specifying that all completed sewerage and water supply schemes must be transferred to UJS within the same financial year of their completion. This ensures smooth operations and effective management of these crucial services.

Audit noticed that 18 out of 44 STPs have not been taken over by the maintenance agency UJS citing construction, operational and safety related deficiencies like overflow of sewage, non-compliance with effluent parameters, unsafe construction *etc.* (as detailed in ***Appendix-2.3***). Handover was pending for up to five years.

In absence of handover, a single office[14] was carrying out O&M of these STPs which are spread up to distance of 320 km from Haridwar. This office has time and again expressed its inability to manage the O&M of these STPs. Although the matter pertained to the Namami Gange STPs, SMCG played no role in sorting out the issue. Not transferring of such a large number of STPs points to large scale deficiencies in O&M and construction of facilities.

The State Government replied (May 2024) that steps were being taken to address the defects identified in the 18 STPs mentioned above. They assured that the process of transferring these STPs to the maintenance agency was already underway.

2.5 Management and reuse of sludge

Sewage sludge is a semi-solid or solid waste material that is removed from the sewage during the treatment process at STPs. It contains a variety of contaminants, including heavy metals, pathogens, organic compounds, and micro plastics. Therefore, it must be treated and disposed of safely to prevent any negative impacts on human health and the environment.

2.5.1 Utilization of sludge as organic fertilizers

Sewage sludge in Uttarakhand is freely distributed to farmers for use in agriculture purposes. However, in 13th meeting of Supervisory Committee (28 January 2022), General Manager, Construction Circle (Ganga) highlighted that the sludge generated from the STPs cannot be regarded as ready to use as manure. It was scientifically suggested to undergo further processing of the sludge through composting to enhance its organic properties for application as manure. The same fact was also highlighted in

[14] PM, Mechanical, Construction and Maintenance Unit, Ganga, UJN, Haridwar.

a research paper (Waste to Wealth: Value Addition & Scientific Validation- A Comprehensive Report for Sludge Management in India). The research paper noted that use of untreated sludge as fertilizer on agricultural soil had been shown to increase heavy metal concentrations for areas around Jagjeetpur STP (Haridwar) where sludge from the STP had been used for soil fertilization (Kumar *et al*., 2022; Pathak *et al*., 2011; Kumar *et al*., 2018).

Audit compared parameters of heavy metals available in raw sludge (as noted in the research paper) with standards of city compost (as mentioned in Schedule-IV of Fertilizers Control Order (FCO), 1985) and found that raw sludge was not usable for agriculture purposes. Details are given in **Table-2.4** below:

Table-2.4: Details of heavy metals available in raw sludge

Heavy Metal	Maximum limit as in FCO, 1985 (mg/ Kg)	Quantity available in raw sludge of Jagjeetpur (mg/ Kg)
Arsenic	10	8.11
Cadmium	05	18.51
Chromium	50	77
Copper	300	433
Mercury	0.15	0.69
Nickel	50	76
Lead	100	97
Zinc	1,000	2,730.12

Above data shows that untreated sludge from STPs in Haridwar was not usable in agriculture in light of high quantity of heavy metals.

However, Audit noticed that 64,292 *cubic meters* sludge was produced[15] in three STPs of Haridwar (27 & 18 MLD Jagjeetpur and 18 MLD Sarai) of which 51,071 *cubic meters* was distributed to farmers. This practice, which may harm soil characteristics, was practised in Uttarakhand STPs despite the relevant authorities acknowledging inherent risks.

State Government submitted (May 2024) testing reports of sludge issued by a private laboratory which found parameters of sludge sample to be fit for use as manure for agricultural purposes. Furthermore, in exit conference (May 2024), the General Manager, Construction Circle (Ganga) accepted that the sludge had not undergone treatment and mentioned that a pilot project for its treatment was currently in the planning stages.

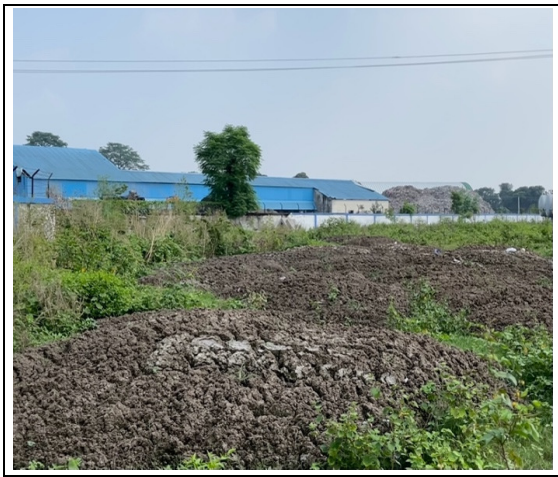
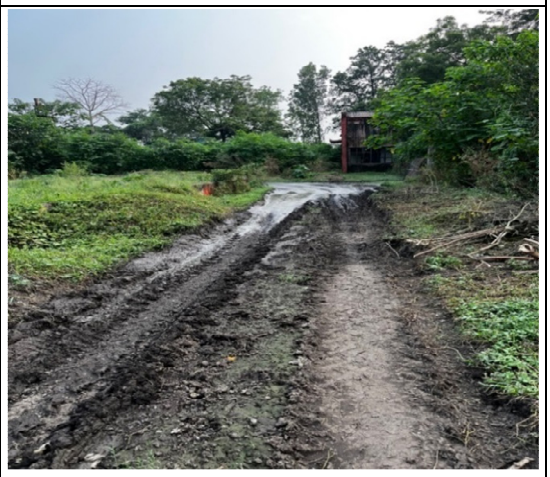
The reply is not acceptable as the Department has already acknowledged unsuitability of untreated sludge as manure and findings of above mentioned independent research papers. Besides, planning of a project for treating sludge is another evidence of the fact that raw sludge should not be used as manure.

2.5.2 Improper storage of sludge

Paragraph 6.11.2.2 of Manual on Sewerage and Sewage Treatment Systems (issued by CPHEEO) provides for use of concrete slabs or other impervious slabs for long term storage of dried sludge. Besides, it is also needed to determine whether the storage facility should be open or covered.

[15] 20 March 2018 to 30 June 2023.

Audit noticed that large amount of sludge was stored in open *kachcha* ground in Haridwar (Sarai ground and Jagjeetpur). However, sludge stored in open ground was prone to get wet and flow to the Ganga during rainy season. Besides, old sludge turned into heaps of soil and its ingredients were prone to seep into ground water and river water.

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Photo 2.3: Heaps of sludge thrown in 14 MLD Sarai STP
(Date: 27 September 2023)</td><td>Photo 2.4: Old sludge turned into soil along with fresh sludge (Sarai)</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Photo 2.5: Dried sludge heaped in open for farmers (Jagjeetpur)
(Date: 15 September 2023)</td><td>Photo 2.6: Wet sludge spread on open road (Jagjeetpur)
(Date: 15 September 2023)</td></tr>
</table>

Thus, storage of sludge was not as per norms and could pollute ground and surface water.

During exit conference (May 2024), Secretary, Drinking Water instructed General Manager, Construction Circle (Ganga) to ensure that sludge was not washed out to Ganga/tributaries due to lack of boundary wall *etc*.

2.5.3 Non-operation of sludge management plant

Sludge is also seen as a resource, in terms of generation of energy and production of bio-manures out of it. In view of this, NMCG is currently focusing on reuse of sludge and related bio-products under Namami Gange-II programme.

In line of this, GoI accorded (October 2020) administrative approval and expenditure sanction of ₹ 8.67 crore for construction of a sludge management plant (SMP) in

Rishikesh. Audit noticed that General Manager, Construction Circle (Ganga) selected Thermal Stabilization and Volume Reduction of Sludge technique for the sludge management plant. In this technique, calorific value of sludge is utilized to reduce the volume of sludge by 90 *per cent* and ash is produced which can be used for making paver tiles.

Sludge with calorific value of 4,000 calorie per gram (*cal/g)* produced sufficient heat for drying sludge and reducing volume. If calorific value of sludge was less, additional fuel in the form of Liquefied Petroleum Gas (LPG) was required for running the plant. However, neither General Manager, Construction Circle (Ganga) nor his subordinate *i.e.* Project Manager (PM), E&M, UJN Ganga, Haridwar or contractor assessed the calorific value of sludge produced in STPs and accepted the technology for adoption. Even IIT, Roorkee, that vetted technology, did not highlight the need of testing calorific value of sludge.

The calorific value of sludge was later found as 2,469 *cal/g* which required additional fuel in the form of LPG which was unviable for economic reasons. Due to this reason, the contractor did not run the plant even after commissioning (October 2022) and receiving full payment of ₹ 4.93 crore for construction (construction cost ₹ 4.40 crore plus 12 *per cent* GST). Hence, the objective of constructing SMP remains unfulfilled despite an expenditure of ₹ 4.93 crore.

The State Government accepted (May 2024) the above facts and stated that the plant was not being operated due to contractual dispute regarding who would bear the cost of additional fuel in the form of LPG and the matter was being sorted out in consultation with NMCG. During the exit conference (May 2024), Secretary, Drinking Water assured the audit that he would look into the matter.

2.5.4 Reuse of treated water

NGT has issued instructions from time to time for reuse of treated water. Chief Secretary of Uttarakhand filed a compliance affidavit (31 Dec 2020). He affirmed, with regard to compliance in relation to para 28 (ii) (b) of NGT directions dated 18 Dec 2019, that proposal for reuse of treated water of Sarai STP (Haridwar) and Lakkarghat STP (Rishikesh) was submitted to SMCG (*vide* letter dated 07 July 2020 from Chief Engineer, Planning Section of Irrigation Department) and further to NMCG for sanctioning (estimated costs were ₹ 9.91 crore and ₹ 6.53 crore respectively). However, NMCG, *vide* its letter 12 Oct 2020, rejected the proposals stating that construction of irrigation canal did not come under purview of NMCG. Accordingly, during the Supervisory Committee meeting dated 25 Nov 2020, the Irrigation Department was directed to make its own plan for reuse of wastewater through Scheme of National Bank for Agriculture and Rural Development. However, Audit noticed that there was no progress in this direction and facility to reuse treated water was limited to only three STPs of Jagjeetpur out of total 44 Namami Gange STPs. Besides, there was no progress on reuse of treated water of Sarai STPs (two STPs with cumulative capacity of 32 MLD in Sarai, Haridwar) and 26 MLD STP at Lakkarghat in Rishikesh, as contained in Chief Secretary's affidavit. It led to fall of treated water of the three STPs directly into Ganga.

The State Government accepted (May 2024) that treated water was being used for purpose of irrigation from three STPs in Jagjeetpur only. It also stated that reuse of treated effluent was not feasible in hill areas.

Reply is not acceptable in view of the fact that all these three STPs were fully in plains and there was no progress on reuse of treated water at these two places despite Chief Secretary's commitment before NGT.

2.6 Safety Audit

A safety audit is a systematic review to analyze the risks and hazards in the workplace and evaluate the effectiveness and reliability of the safety procedures set up in the organization. Point no. 9 and 27 of 'River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016' clearly provide that State Ganga Committee and DGCs are responsible for Ganga Safety Audit. In the meeting (May 2022) of Supervisory Committee (constituted under orders of NGT), Executive Director-Technical (NMCG) opined that a safety audit of all the STPs created under Namami Gange was needed to be carried out as a preventive measure for their smooth operation, protection works and other arrangements. Chairman of the supervisory committee issued instructions for the same and it was conveyed (July 2022) to all the concerned by Program Director, SMCG that the report of Safety Audit was to be submitted within 45 days.

Audit noticed that Ganga Safety Audit or safety audit of the STP projects constructed under program was never conducted. DGCs and State Ganga Committee did not take any action in this regard. In the absence of such audit, Audit noticed that two accidents happened which caused loss of property in one case and loss of lives in other case, as detailed below:

Case 1: Loss of property/STP due to landslide

A 75 KLD STP (near Anoop Negi School in Rudraprayag) was constructed (April 2019) on slope of Alaknanda River. It was on a very steep slope and the STP was damaged due to land slide during rains in September 2021. Hence, the STP built at a cost of ₹ 0.88 crore was damaged beyond repair. Its machinery (DG set and other equipment of STP) had to be dismantled and shifted to a safe place. Now, the Department has proposed to shift STP to another location. If safety audit was conducted, loss of this asset could have been avoided.

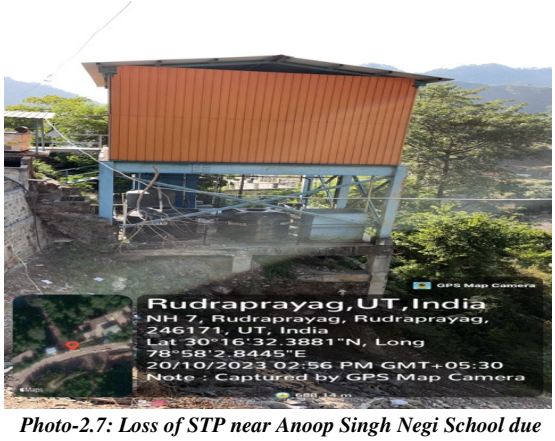


Photo-2.7: Loss of STP near Anoop Singh Negi School due to landslide

During joint inspections, Audit noticed that 17[16] of total 44 STPs were at risk of physical damage due to being on steep slope/riverbed.

[16] All six STPs in Rudraprayag, all five STPs in Karnaprayag, two STPs in Kirtinagar, two STPs in Devprayag and two STPs in Nandprayag.

The State Government replied (May 2024) that slope stability safety audit of the sites of 26 STPs was being carried out by IIT, Roorkee. The inspection by IIT, Roorkee was expected to be completed by the end of May 2024.

The reply is not acceptable because actions were initiated by the State Ganga Committee and DGCs nearly two years after the Chairman of Supervisory Committee issued orders for safety audits. Regular safety audit could prevent any loss to these assets and resulting loss of human lives.

Case 2: Loss of Human Lives (Electrocution of 28 people in Chamoli STP)

In a grave mishap in 50 KLD STP Chamoli (constructed in September 2019), 28 people were electrocuted on 18 July (one dead) and 19 July 2023 (15 dead and 12 injured). The STP was constructed by PM, Construction & Maintenance Unit, Ganga, UJN, Gopeshwar[17] and handed over to UJS, Gopeshwar in June 2021. This STP was one amongst the 22-steel structure STPs[18] built by implementing agency UJN. These STPs are highly unsafe to electrical hazards due to having steel body structure. After the mishap of electrocution at Chamoli, Office of the Director Electrical safety, Haldwani investigated the incident and departmental action was initiated against the contractor responsible for O&M of the STP. The investigation revealed that there were many defects in the electrical installation of the plant such as non-functionality of safety devices installed in various circuits as per safety and power supply measures, earthing not as per electrical provisions, unsafe joints in incoming cables, temporary wiring *etc*., which could have been revealed, if safety audit had been conducted.

After this accident, Department conducted an 'electrical safety inspection' of STPs. However, the report of this inspection was not provided to the test checked maintenance agencies or Audit. Hence, issues/checklist examined in this electrical safety audit could not be ascertained in audit. Besides, comprehensive safety audit of STPs covering all aspects was still pending.

The State Government replied (May 2024) that electrical safety inspection of all STPs with electro-coagulation technology was conducted after the above accident. During exit conference (May 2024), the Secretary, Drinking Water also assured that report of electrical safety audit would be shared with audit, which however has not been received till date (August 2024).

2.7 Recommendations

1. ***The State Government may undertake a comprehensive safety audit of Sewage Treatment Plants to identify and address any potential risks, ensuring that deficiencies are corrected before transferring them to maintenance agencies.***
2. ***The State Government may explore the possible avenues of financing sewer networking works and ensure laying of adequate house sewerage networks connecting Sewage Treatment Plants with unconnected households.***

[17] PM (Construction & Maintenance Unit) Ganga, UJN, Gopeshwar.
[18] Six STPs in Rudraprayag, five STPs in Karnaprayag, two STPs in Kirtinagar, two STPs in Devprayag, two STPs in Nandprayag and five STPs in Chamoli.

3. ***Sufficient co-treatment facilities may be planned and provided to ensure safe disposal of septage in Ganga Front Towns without sewerage network.***
4. ***The details of each household and commercial establishment, availability of sewer lines in the area, and status of connectivity of households with available sewer lines may also be considered by implementing agencies while projecting treatment of proposed sewage treatment plants.***
5. ***Responsibility may be fixed for: (i) projection of low capacity of Sewage Treatment Plants leading to discharge of untreated sewage into river; and (ii) not ascertaining calorific value of sludge before executing project of Sludge Management Plant.***