BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Application Nos. 305, 309 of 2013 and 149 of 2015 (SZ)

Application No.305 of 2013 (SZ)

IN THE MATTER OF:

Thressiamma Mathew,
W/o Mathew,
Thelekkat House,
Thaikottam Desom,
Kadukutty, P.O.,
Thrissur District.

..Applicant

AND

1. State of Kerala represented by Secretary,
   Department of Environment,
   Secretariat,
   Thiruvanaanthapuram – 695 001.

2. District Collector
   Collectorate, Ayyanthole,
   Thrissur – 680 003.

3. Superintendent of Police (Rural),
   Thrissur – 680 003.

4. Kerala State Pollution Control Board
   Represented by Environmental Engineer,
   Regional Office,
   Thrissur 680 002.

5. Kadukutty Gramapanchayat,
   Kadukutty, P.O.,
   Thrissur District – 680 315
   Represented by its Secretary.

6. Kerala Water Authority,
   P.H. Circle, Thrissur – 680 001,
   Represented by Superintending Engineer.

7. Centre for Water Resources
Development and Management,
Kunnamangalam,
Kizhikkode – 673 571.
Rep. by its Director.

8. Nitta Gelatin India Limited,
Kathikudam P.O., Koratti,
Thrissur District – 680 308. ...Respondents

Application No. 309 of 2013

K.N. Lohithakshan,
S/o. Narayanan,
Kaipuzha Veedu,
Kathikoodam P.O.,
Koratty,
Thrissur District
....Applicant

And

1. State of Kerala
Represented by its Secretary,
Department of Environment,
Secretariat,
Thiruvananthapuram – 695 001.

2. District Collector,
Collectorate,
Ayyanthole, Thrissur – 680 002.
3. Kerala Pollution Control Board
Represented by Environmental Engineer,
Regional Office,
Thrissur – 680 002.

4. Kadukutty Gramapanchayat,
Represented by its Secretary,
Kadukutty P.O.,
Thrissur District – 680 002.

5. Kerala Water Authority,
Represented by its Superintending Engineer,
P.H. Circle, Thrissur – 680 001.

6. Nitta Gelatin India Limited,
Kathikudam P.O.,
Koratti,
Thrissur District -680 308. ... Respondents

Application No. 149 of 2015

V.R. Babu,
S/o. Raghavan,
Vallathuparambil House Kakkad,
Kathikudam P.O.,
Koratty 680 308. ....Applicant

And

1. The Union of India
Represented by its Secretary to the Government,
Ministry of Environment and Forests & Climate Change,
Paryavaran Bhavan,
New Delhi.

2. The State of Kerala,
Directorate of Environment and Climate Change,
Pallimukku – Kannammoola Rd,
Velakudi, Thiruvananthapuram,
Kerala 695 024.

3. The Kerala Pollution Control Board
Pattom,
Thiruvananthapuram,
Kerala 695 004.

4. Kadukutty Gramapanchayat,
Kallur Vadakkumury Village,
Mukundapuram Taluk, Thrissur,

5. Nitta Gelatin India Limited,
Kathikudam,
Thrissur , Kerala. ... Respondents

Counsel appearing for the Applicant:

Mr. T. Mohan and A. Yogeeswaran for G. Stanley in Application Nos. 305 and 309 of 2013

Mr. T. Mohan and A. Yogeeswaran for M/s. Neha Miriam Kurian in Application No. 149 of 2015

Counsel appearing for the Respondents:

Smt. Suvitha A.S for R1 to R3 and R6 in Application No. 305 of 2013
Smt. Suvitha A.S for R1 to R3 and R5 in Application No. 309 of 2013
Smt. Suvitha A.S for R2 in Application No. 149 of 2015

T. Naveen for R4 in Application No. 305 of 2013 and for R3 in Application Nos. 309 of 2013 and 149 of 2015

Mr. Sheejo Chacho for R5 in Application No. 305 of 2013 and for R4 in Application Nos. 309 of 2013 and 149 of 2015

Mr. George Zachaiah for R7 in Application No. 305 of 2013

Mr. K. Anand Senior Counsel for M/s. B.S. Krishna Associates, Koushik N. Sharma and Vishnu for R8 in Application No. 305 of 2013 and for R6 in Application No. 309 of 2013 and for R6 in Application No. 149 of 2015

J U D G E M E NT

PRESENT:

HON'BLE SHRI JUSTICE M.S.NAMBIAR, JUDICIAL MEMBER

HON'BLE SHRI P.S. RAO, EXPERT MEMBER

Delivered by Hon'ble Justice M.S.NAMBIAR, Judicial Member

Dated: 27th February, 2017

Whether the Judgement is allowed to be published on the Internet – Yes/No

Whether the Judgement is to be published in the All India NGT Reporter – Yes/No

Application No.305 of 2013 was filed under Article 226 of the Constitution of India before the Hon'ble High Court of Kerala as Writ Petition No.15010 of 2012. The prayer was to issue a writ of mandamus commanding the respondent Nos. 1 to 7 to ensure that there is 'zero liquid discharge' to the Chalakudy river by the 8th respondent, Nitta Gelatin India Limited and to command respondent No.4, Kerala State Pollution Control Board not to renew the Consent granted to respondent No.8 without complying with the circular dated 09.08.2004 issued earlier regarding the siting parameters and also for a direction to respondent No.7, Centre for Water

Resources Development and Management, Kozhikkode to conduct a detailed study regarding the discharge of effluents by respondent No.8 to the Chalakudy river and to ensure that the functioning of respondent No.8 does not cause any environment hazards to the residents of the locality. That Writ Petition was filed by the applicant as Public Interest Litigation claiming to be an affected person residing in the neighbourhood of the industry of respondent No.8.

The Pleadings:

2. Application No.309 of 2013 was also filed under Article 226 of the Constitution of India before the Hon'ble High Court of Kerala as Writ Petition No.26653 of 2012. That Writ Petition was filed by the applicant as Public Interest Litigation with the prayers to issue a writ of mandamus directing Nitta Gelatin India Limited, respondent No.6 herein, the same respondent No.8 in Application No.305 of 2013, to complete the pollution control measures as per the Government Order dated 03.11.2011, at any rate by 01.01.2013 and also for a direction to the 3rd extend the time allowed beyond 01.01.2013 and also to direct respondent No.3 to depute an expert committee to

supervise the movement of ETP Sludge from the company to distant places and to report whether it is nutrisoil and further direction to respondent No.6 not to commission the biogas plant without necessary sanction from the Panchayat and also to direct respondent No.6 to recycle the water taken from the Chalakkudy river within the company itself and to remove the huge pipes laid by the company to drain water back to the river and also to direct the respondent No.3 not allow the respondent No.6 company to make any fresh construction of the effluent pipeline under the guise of repair and maintenance. The applicant also claims to be an affected resident of the locality.

3. While these writ petitions were pending before the Hon'ble High Court of Kerala, by the order dated 27.08.2013, following the decision of the Hon'ble Supreme Court of India in Bhopal Gas Peedith Mahila Udyog Sangathan & Others Vs. Union of India & Others [(2012)8 SCC 326], the writ petitions were directed to be transferred to National Green Tribunal, Southern Bench, Chennai. On receipt of the records the writ

petitions were numbered as Application Nos. 305 and 309 of 2013 respectively.

4. Application No. 149 of 2015 was filed by a resident of neighbourhood of the company under Section 14 of the National Green Tribunal Act, 2010 with the prayers to direct respondent No. 5, Nitta Gelatin India Limited to stop operating at the present site since it is a Red Category industry and is situated in the midst of ecologically sensitive area, in close proximity to residential areas and banks of the Chalakkudy River and for a direction to respondent Nos. 1 to 4, Ministry Environment and Forests & Climate Change (MoEF & CC), State of Kerala, Kerala State Pollution Control Board and Kadukutty Grama Panchayat to make proper and adequate studies and take necessary action to remediate the damage caused by the pollution and to restore the area.

5. M/s. Nitta Gelatin India Limited (Ossein Division) was established in 1979, at Kathikudam Village, Kadikutty Panchayat in Chalakuddy of Thrissur District. The industry was established in a plot of about 32 acres. The unit is manufacturing Ossein, Limed Ossein, Di-Calcium Phosphate

(DCP), Meat meal and Sterilized bone meal. The raw materials used are crushed bones, Hydrochloric acid (HCl) and Hydrated Lime. The crushed bones are purchased from local slaughter houses and also from different parts of the country including Aligarh etc., The HCl is mainly purchased from M/s. Travancore Cochin Chemicals Limited, Kochi and M/s. Chemplast Sanmar, Mettur, Tamil Nadu. The manufacturing process is divided into three major parts namely Pre-treatment of Crushed Bone, Acidulation and Di Calcium Phosphate Plant.

6. In the Pre-treatment, Crushed Bone which is the raw material, is fed into a hopper through of screw and belt conveyors. The sinews and bone meal are separated using blower and rotary screen. From there, crushed bone is transferred to rotary wash for washing. Grease and bone meal are separated during washing. After, Pre-treatment, Crushed Bone is transferred to the acid bath for further processing. The wash water from Pre-treatment process is sent to Effluent Treatment Plant (ETP) through open drain as organic waste water.

7. In the Acidulation process, crushed bone after pre-treatment is transferred to acid path and treated with 4% concentrated HCL for about 5-7 days to convert bone into a product called Ossein. After complete reaction, from crushed bone to Ossein, the Ossein is taken into paddle washer for washing and to remove free acid and impurities. Neutralization of Ossein is also done at paddle washer by adding hydrated lime. After the neutralization the Ossein is dried and packed in PP bags and exported to Nitta Gelatin India Limited Company. For gelatin production, wet Ossein is pumped to liming plant, where it is subjected to lime treatment for 35-45 days and treated lime as a whole in wet condition is transported to M/s. Nitta Gelatin Unit located in Kakkanad, Kochi for gelatine manufacturing. The Mono-calcium phosphate solution generated during acidulation is pumped to Di-calcium Phosphate (DCP) plant for manufacturing of Di-calcium phosphate. The waste water from paddle washer is sent to ETP in open drain as organic wastewater. The hot air for Ossein drier is met through the fire wood boiler attached to stack of 30m height.

8. Di-calcium Phosphate (DCP) plant is where the mono calcium phosphate generated from acidulation process is pumped and treated with hydrated lime solution for conversion of Mono calcium phosphate to Di Calcium Phosphate. The solution is allowed for settling to obtain the DCP slurry. DCP slurry is filtered using Rotary Drum Vacuum filter, dried in vacuum drier and packed and stored in closed storage yard. The filtrate and supernatant generated during the process is sent to ETP through open drain as inorganic waste water.

9. The separated sinews and bone meal during crushed bone pre-treatment is converted into a product named meat meal in two processes i.e., dry process and wet process. The sinews and bone meal separated from crushed bone which is in dry form are packed and sold to local farmers as meat meal. The bone meal separated during crushed bone washing is cooked in a cooker with a steam and dried and finally sold to farmers as sterilized bone meal as poultry feed.

10. The main source of water to the unit is Chalakudy river. The waste water generated in the unit is categorized as process waste water and domestic wastewater. The wash

water from pre-treatment of Crushed Bone, Wash water from Ossein washing, Effluent from liming plant, Supernatant from DCP precipitation and Filtrate from DCP filtration are the sources of process waste water. The process waste water generated in the unit is segregated into two streams namely organic stream and inorganic stream. Organic stream includes wash water from pre-treatment of Crushed Bone, Wash water from Ossein washing, Effluent from liming plant, boiler blow down, floor washing and storm water. Inorganic stream consists of Supernatant from DCP precipitation and Filtrate from DCP filtration. The organic waste water generated from Ossein plant is transferred into ETP and after removal of grease, the overflow of effluent is collected in effluent collection tank and pumped to flash mixer where lime dosing is done to neutralize the effluent followed by buffer tank. From the flash mixer the effluent is pumped to anaerobic digester for degradation of organic compounds in anaerobic condition. The biogas generated during the oxidation process is collected in biogas holder and used as a fuel for boiler. The overflow from anaerobic digester is collected in Lamella Clarifier for settlement of solid particles. The overflow of lamella clarifier is

pumped to flash mixer flowed by Flocculator, primary clarifier, Diffused Air Flocculator (DAF). The effluent from DAF is mixed along with inorganic effluent and the mixture is sent to aeration tank for further treatment. The sludge from primary clarifier is taken into thickener followed by Rotary Vacuum Drier, filter press and sludge drier. The final sludge is collected and packed in polythene bags and sent to Treatment, Storage and Disposal Facility (TSDF) at Kochi. The supernatant from DCP precipitation and filtrate from DCP filtration is taken into DCP effluent collection in separate channel and collected in DCP effluent collection tank. The water from effluent collection tank is pumped to flash mixer followed by Flocculator, primary clarifier and Diffused Air Flocculator(DAF). The treated effluent from DAF-1 is pumped to aeration tank along with the treated effluent from DAF-2 for further treatment. The sludge from primary clarifier is taken into thickener followed by Rotary Vacuum Drier, filter press and sludge drier. The final sludge is collected and packed in polythene bag and sent to Treatment Storage and Disposal Facility at Kochi. In the secondary and tertiary treatment, the effluent from Diffused Air Flocculators are pumped to aeration tank for further oxidation. The effluent

after aeration is pumped to secondary clarifier followed by flash mixer, flocculator, tertiary clarifier, sand filter and delay Pond. The effluent from delay pond is diluted with the back wash water of sand filter and finally disposed into the Chalakudy river.

11. The case of all the applicants is that because of the negligence of the respondent company, the pipes and the manholes are broken and leaking and the toxic materials are allowed to the neighbourhood resulting in environmental degradation of the entire area apart from contamination of drinking water in the wells. It is alleged that the company takes in about 2 crore litres of fresh water from Chalakudy river every day and effluents, approximately 80 tonnes are discharged to the Chalakudy river through huge tunnel like pipes installed by the company to the middle portion of the river and the effluent contains decomposed particles animal bones, marrow and flsh, hydraulic acid and other hazardous wastes.

12. The applicant in Application No.305 of 2013 would allege that when these facts are brought to the notice, all the

statutory authorities and expert agencies who had conducted study of the effluent discharge system of the company have unanimously found that the functioning of the company is causing environmental disaster in the locality. The District Collector, Pollution Control Board as well as Panchayat had time and again prohibited the functioning of the industry. But because of external pressures respondent No.1, State of Kerala is taking a lethargic attitude and as a result the ecological problem continued. The residents of the locality including the applicant formed an action council by name Nitta Gelatin India Limited Action Council which has been spearheading for campaigning for the stoppage of environmental hazards caused by the company.

13. As per the report of the Kerala State Pollution Control Board dated 21.02.2012, the effluent discharged by the company shows astronomical increase in the level of pollutants. Based on the report of the Pollution Control Board, Environmental Engineer has issued a show cause notice on 23.2.2012 to the company. It is alleged that still without any positive action by the company, the Pollution Control Board is

taking steps to renew the Consent under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act 1981.

14. The report prepared by the Kerala State Pollution Control Board (KSPCB) shows that though the tolerance limit of Biological Oxygen Demand (BOD) is 30 mg/L, it is 133333 times more than the tolerance limit. Though maximum tolerance limit of Chemical Oxygen Demand (COD) is 250, it is 83,80,000 i.e. 33, 555 times more than the tolerance limit. The tolerance limit of suspended solids is 100 whereas it is more than 10,000 times the tolerance limit. The Ammonical nitrogen in 50 mg/L is more than three times the tolerance limit. The dissolved phosphate tolerance limit is 5/mg/1 but it is at a quantity of 12,000 i.e. 2400 times more than the tolerance limit.

15. A circular dated 09.08.2004 was issued by the KSPCB regarding the siting parameters for the industries. The minimum distance from the residential houses as regards red category large industries is 100 metres. The Consent shows that the company is a large red category industry. Therefore,

it should be placed outside 100 metres from the nearest residential house. There are at least 46 residential houses situated within a distance of 100 metres radius from the industrial unit. The report submitted by the Environmental Engineer also reveals that foul smell is being transmitted from the company to the nearby houses and that there is foul odour in the treated effluent discharged from the company to the Chalakudy river. Inspite of repeated directions, the company is not taking any positive action to stop the pollution being caused. Direction was issued by the KSPCB on the illegal discharge of effluent to the Chalakudy river, construction of biogas plant in the industrial unit causing environmental problem. At the intervention of the State Government, the KSPCB had granted permission for functioning of the unit by order dated 13.12.2011. On the basis of the public protest the District Collector sent a letter to the State Government on 06.12.2012. The report shows that the waste waster is being discharged into the river causing serious water pollution. There are residues of sludge leaked from the pipe carrying waste to the river emitting foul smell is also found in the report.

16. The Kadukutty Gramapanchayat has also, responding to the public protest, submitted a detailed letter to the Environmental Engineer, Pollution Control Board on 13.06.2012 disclosing that the application for renewal of consent should not be allowed. The Panchayat also reported that the facts mentioned in the application for licence submitted by the 8th respondent was rejected by the Panchayat due to the serious environmental hazards.

17. The Kerala Water Authority issued a letter dated 28.11.2011 to the District Collector stating that the treatment of waste water by respondent No.8 is not adequate and the effluent discharged has high foul smell. It was also reported that excessive acidity was found because of the effluent discharged into the river near pump house of the Kerala Water Authority. It is the Kerala Water Authority which is providing drinking water from the Chalakudy river to the residents of the Mukundapuram Taluk which is one of the largest Taluks in Kerala. The Environmental Engineer of the KSPCB also filed a report before the Local Self Government Institutions that there is no proper treatment made to the waste water, which is

directly pumped to the Chalakudy river which is causing pollution and it directly affects the right to life of the residents in the locality.

18. Contending that the Hon'ble Supreme Court in Tirupur Dying Factory Owners Association case directed that 'Zero Liquid Discharge' (ZLD) of trade effluents has to be achieved, the applicant contended that the industry is to be directed to achieve ZLD and not to discharge any trade effluent into the Chalakudy river. On these allegations the applicant in Application No.305 of 2013 has sought the reliefs.

19. The applicant in Application No.309 of 2013 had contended that all the statutory authorities and expert agencies who had conducted study of the effluent discharge system of the company unanimously found that the manner of operating of the company is causing an environmental disaster in the locality. The residents of the locality have formed an action council, NGIL Action council which is striving for the stoppage of environmental hazards caused by the company. The Panchayat did not renew the licence since 2009, the company is functioning only on the strength of the orders of the Hon'ble

High Court. On the complaints from the local public, the Government ordered an enquiry by an expert committee headed by the Head of the Department of Chemical Engineering, Government Engineering College, Thrissur. Based on the report of the expert committee, the Government issued orders on 03.11.2011 directing immediate action by the company and the concerned departments. The company was directed to implement the pollution control measures by the Panchayat. By order dated 03.11.2011 the Panchayat directed the shutting down of the entire industry due to pollution. At the instance of the State Government, the Pollution Control Board had to permit the functioning of the company.

20. On the basis of the public sentiment, the District Collector issued a letter to the State Government and pointed out that the untreated effluent is being discharged into the river causing water pollution. Instead of fulfilling the suggestions given in the Government order dated 03.11.2011, the company is misguiding the authorities by sending a periodical status report based on the action plan which was designed by the company and submitted in the meeting held

by the Chief Minister on 07.12.2011. The Pollution Control Board relying on the misleading reports by order dated 30.06.2012 renewed the Consent to Operate. Consent was also given for setting up bio gas plants for processing the sludge formed in the company as a waste product. The waste product sludge is an industrial waste and not a bio waste. As far as the company is concerned, the bio gas plant is only a stocking place for the enormous quantity of sludge produced by the company every day. The sludge so accumulated day by day will make horrible odour nuisance and suffocation to people and the same spreads to far away places even kilometres distance. Thus the company is to be restrained from commissioning the so called bio gas plant and storing the sludge therein.

21. As sludge has been increased from 750 tonnes in a year to 18000 tonnes in a year, it is clear that the company has increased its production and the waste sludge called sludge contains heavy metals like Lead, Nickel, Cadmium and Chromium which are highly harmful to human beings and may cause dreadful diseases like cancer, cardiac and kidney

problems. As they find it difficult to dispose of the sludge in faraway places, the company is conveniently discharging the same into Chalakudy river during night time. The polluted water is reaching lakhs of people through drinking water projects. Though, the Pollution Control Board directed that the sludge in the semi solid form shall not be transported outside the company, it is being violated. The permission granted for the production of sludge is only 750 tonnes in a year. As per the Consent, even if it is transported outside in the form of Nutrisoil, the quantity cannot exceed 750 tonnes in a year. The prohibition of sludge being taken outside the company premises should be strictly made applicable also to the discharge of sludge into Chalakudy river. The huge pipes having a diameter of 2 ½ ft. laid by the company to drain waste water into the river is blocking the natural drainage channels thereby causing water stagnation in the area which in turn has adversely affected the yield expected by the agriculturists including the applicant. The company could recycle the water inside the company itself without pumping it back into the river through pipes. As there is also direction to the company to stop the sale of sludge to outside parties, the

biogas plant is also to be stopped. The applicant in Application No. 309 of 2019 has sought the reliefs on these allegations.

22. The applicant in Application No.149 of 2015 has also reiterated the same allegations raised by the other applicants and also contended that the company is producing about 100 tonnes of toxic sludge which is being generated every day and the company has no proper method of disposal of the sludge generated. The company has dug pits on their premises, dumped the sludge without any lining whatsoever and have sealed it using cement/ concrete and the sludge has been entering the ground water and making the land unsuitable for agriculture and the water in the wells not potable. The untreated effluents from the company are being discharged into the Chalakudy river daily. On enquiry under Right to Information Act, 2005, it was found that the company is operating based on the letter received from the Pollution Control Board. The consent period expired on 30.06.2015 and such operation from 30.06.2015 is illegal and without valid consent. The company is also not having a valid NOC from the Grama Panchayat. The company also laid a discharge pipe

through the land of an adjacent plot. It was laid without permission. The company is also setting up a biogas plant to treat the chemical sludge that is being generated by the company. On 09.11.2011, a biogas plant installed by them earlier get burst causing injury to persons. Only chemical sludge was being put into the plant. This resulted in build-up of poisonous gases and ultimately explosion. The company had shown scant regard to the safety and security of the local population. On these allegations, the applicant in Application No.149 of 2015 has also sought the reliefs.

23. The Kerala State Pollution Control Board herein referred to as KSPCB, is the respondent No.4 in Application No.305 of 2013 and respondent No.3 in Application No.309 of 2013 and respondent No.3 in Application No.149 of 2015, resisted the applications by contending that respondent No.8 Nitta Gelatin India Limited company has been functioning at Kathikudam since 1979 and 8th respondent company is promoted by Kerala State Industrial Development Corporation in collaboration with Nitta Gelatin Inc, Japan for functioning of the company. The company pumps water from the Chalakudy

river and discharges after effluent treatment to the river itself through the discharge pipe from the company to the river. An action council NGIL (formally KCPL) was formed with Jayan Pattah as Chairman and Appu Kuttippat as General Convenor in March 2008. They demanded to put an end to the polluting activities of NGIL with a view to protecting the health of the public as the industry polluting the water and water resources. The Council alleged that the company is discharging the sludge without treating the same and that would contaminate the water and water resources which would directly affect the health of the people as well as destruct the rare species and fishes in the river. In some occasions, the agitators turned to violence which developed into serious law and order issue in that area. The Koratty Police Station has taken action and 45 cases were registered from 2008 to 2015 and some were convicted, some were acquitted, some are pending and some are undetected.

24. The Action Council also declared that they would forcefully remove the discharge pipe erected from the effluent treatment plant to the Chalakudy river and started various

campaigns for the propaganda and strengthening of agitation. As part of that a mass campaign through social media was organised. The District Collector convened an all party meeting including the officials on 29.06.2013 in which an expert committee to study the pollution was constituted and directed to submit the report before 21.07.2013. The action counsel announced that they will remove the discharge pipes on 21.07.2013 and proceeded with their agitation. The Government constituted 8 member technical committee by order G.O (RT) No. 129/2011/Industries dated 27.01.2011 and G.O. (RT) No. 249/2011/Industries dated 21.02.2011 with Dr. Lakshmikutty, Head of the Department of Chemical Engineering, Government Engineering College, Thrissur as chairperson for studying and reporting on the pollution caused by Nitta Gelatin Company and to suggest remedial measures. The expert committee after detailed study submitted report before the Government. The Government vide order No. 1376/2011/Industries dated 03.11.2011 accepted the report and directed the company to implement the recommendations of the committee. The Chief Minister of Kerala convened a meeting on 07.12.2011 with Ministers, MLAs and officials from

various Government departments also attended the meeting along with the action council members, Panchayat members and the Company Officials. The company submitted the time based action plan which was accepted by the Government. In addition to 13 points already suggested by the expert committee, 3 more points were added by the Government for compliance in the meeting. Further, 13 member monitoring committee was also constituted to monitor the implementation of the 16 point programme.

25. By Judgement dated 03.12.2013 in W.P.(C) No.15795 of 2013, the Hon'ble High Court of Kerala directed NEERI (National Environmental Engineering Research Institute, Nagpur) to conduct a detailed study into the pollution staus with respect to the Air, Water and Solid Waste generated from NGIL and the adequacy and efficacy of the pollution control measures installed by the company. The NEERI was also directed to submit report to the company, Pollution Control Board and to the District Collector with its recommendations and also specifying the time required for the implementation of the recommendations. The NGIL moved Writ Petition before

the Hon'ble High Court in W.P.No.15795 of 2013 for direction to the District Police Chief, Thrissur Rural, Deputy Superintendent of Police, Chalakudy, Circle Inspector of Police, Chalakudy, and Sub Inspector of Police, Koratty to take necessary steps to avert any law and order situation which may arise as declared by the Action Council and to prevent the Action Council, their men, associates and sympathizers from causing destruction of the pipelines or any other properties and afford adequate, effective and timely protection to preserve and maintain law and order situation. On 21.06.2013 the Hon'ble High Court directed the respondents to ensure that none of the installations of the petitioner's company is put to any harm and adequate action will be taken to ensure such protection. Based on the action and adequate steps were taken. The agitators started their agitation on 21.07.2013, and they were blocked when they proceeded to remove the discharge pipeline and they returned to the front gate of the company and started the siege. The agitation was moving peacefully and when the women and children demonstrators were removed from the scene, one group strongly opposed the move and pelted stones and worsened the situation, following

which the Executive Magistrate who was present there ordered to remove the agitators using force which resulted in lathi charge. About 26 Police personnel got injured and some of the agitators were also injured. A crime case as Cr.1104 of 2013 under Sections 143, 147, 148, 188, 283, 341, 332 r/w 149 IPC was registered and the Police has taken up investigation.

26. As directed by the District Collector, the company was closed for some days. Meeting was convened in the Chambers of the Hon'ble Chief Minister and thereafter the company started its functioning. The agitators then started blocking the vehicles carrying the raw materials and sludge from the company. The company already obtained an order in the year 2010 for transportation of the sludge. The company filed I.A.No.10984 of 2012 in W.P.(C) No.15795 of 2013 to afford timely and effective police protection to bring the raw materials and to have free ingress and egress of the employees of the company. On 16.8.2013 the Hon'ble High Court passed an order clarifying that the order dated 21.06.2013 shall be used only for the protection of the installations of the petitioner

and not for suppressing any peaceful agitation by the local people. Police is proving necessary Police Protection to the company, its employees, its installations and transporting of raw materials etc. On 03.12.2013, W.P.No.15795 of 2013 was disposed by the Hon'ble High Court directing the respondents to afford adequate and effective Police protection to the company and to maintain law and order and for smooth functioning of the company and also directed to ensure that the NGIL Action Council and its sympathisers shall not cause any obstruction to the functioning of the company or damage to its installations, pipes and other properties.

27. On 09.11.2011 the Bio as tank of the company bursted and due to the high foul smell the complainant and the inmates of the residences and the surroundings of the company were hospitalised. Crime No.1260 of 2011 was registered and charge sheet has been submitted for the offences under Sections 278, 336, 285 IPC against the NGIL company before the Judicial First Class Magistrate Court, Chalakudy. So also Crime No.1435 of 2013 under Section 3(2) of PDPP Act 1984, Crime No.1588 of 2014 under Sections 269, 270, 336 IPC and

49 of Water (Prevention and Control of Pollution) Act, 1974 were registered against the company and later after completing investigation the charge sheets were laid before the Judicial First Class Magistrate. As far as the Pollution Control Board is concerned, it is doing all that is required to do under law. Further, it is duty bound to comply with the directions of the Hon'ble High Court.

28. Kadukutty Grama Panchayat who is respondent No.5 in Application No.305 of 2013 and respondent No.4 in Application No.309 of 2013 and Application No.149 of 2015 filed the reply contending that the company is functioning without Panchayat license since 2011. The applications for renewal of licenses for the year 2011 to 2016 were rejected by the Panchayat Committee as there has been wilful default by the company in carrying out the directions of the Panchayat to abate the nuisance and pollution. The abatement of nuisance is found impracticable in view of repeated incidents of leakage of discharge of pipeline, explosion of biogas plant and pollution caused to Chalakudy river. The residue of sludge leaked from the pipeline carrying waste water into the river is emitting

strong stench and foul water is spread atleast within radius of 1 km of the industrial premises. The Local Self Government Department has issued a Circular bearing No. 66562/RC3/12/LSGD directing the local bodies to insist for sanitation certificate issued by Health Inspectors after conducting site inspection for renewal of license or for fresh grant. The application filed by the company for issuance of sanitation certificate was rejected by the Health Inspector. Thereafter, the Panchayat Committee considered the application for license for renewal for the period 2015-2016 which was unanimously rejected by the Panchayat Committee on 31.03.2015. The company is listed under large Red Category Industries and its operations are hazardous. The breaking of discharge pipe, biogas plant explosion and spreading of sludge and slurry in the paddy fields and thereby hazardous materials being moved to the water sources. Due to discharge of effluent on 29.10.2010 causing pollution in the whole locality, a law and order problem was created. On getting the information about it, the Tahsildar reached at the spot and communicated to the Additional District Magistrate who directed to stop the functioning of the company. That

order was challenged before the Hon'ble High Court in W.P.(C) No.1307 of 2011. The raw materials used by the company are crushed bone of slaughtered animals, hydrochloric acid, hydrated lime etc., The effluent discharged by the company is causing foul smell in the ambient air around atleast 1 km of the industrial premises. The company is shirking its responsibility and the accumulated sludge is creating horrible odour nuisance and suffocation to the people of the locality. The company has multiplied its production and machines were installed and buildings were constructed without obtaining permissions from the Panchayat. Local residents have filed W.P.(C) No.6092 of 2013 alleging that company is functioning in a manner causing acute nuisance and pollution to the residents of the locality. Alleging unauthorized installations and building constructions, representations were filed before the Panchayat by local residents and also before the Hon'ble High Court. The Hon'ble High Court directed the Panchayat to consider the grievance of the petitioners therein by considering and disposing the representation and pass appropriate orders thereon. The Secretary on inspection found that buildings having an area of about 33000 square feet are found

constructed without building permit and machines were installed to the extent of 4593 HP as against the sanction granted for 120 HP machinery installation. The Panchayat, after hearing all concerned, directed the company to remove machinery installed without permission and to demolish the unauthorised buildings constructed by the company. That order was challenged before the Tribunal for Local Self Government Institutions in Appeal No.810 of 2013 and order passed by the Panchayat is found to be one in the nature of a final order and Panchayat was directed to initiate fresh proceedings in compliance with Section 235W of the Kerala Panchayat Raj Act. Thereafter, fresh proceedings were initiated and a provisional and a final order was passed in accordance with law. The company filed O.S.No.511 of 2014 before the Munsif Court, Chalakudy praying for a decree of permanent injunction against the respondents and their men from doing acts illegally to demolish the buildings and machinery. The Munsif Court passed an order restraining the respondents and their men from demolishing the buildings. The sludge and slurry are seen on the surface of river water near the manhole of the discharge pipe. The dark red colour of

the water is a sufficient indicator of pollution of river water. As a result the polluted water is being pumped to the drinking water tanks existing near to the effluent outlet causing threat and danger to the public. The company is not having a proper waste management system for the disposal of hazardous waste and dangerous chemical waste. There are 32 residential houses situated within a radius of 100 meters from the company and certain houses are even situated within 80 metres from the location of the company. Therefore, considering the larger public interest, license was not renewed. No effective steps appear to have been taken to stop the grave public nuisance caused by the company. The closure order was issued by the Pollution Control Board, later the closure order was withdrawn at the instance of the Government. It is also stated that the company shall ensure that the river water is not polluted.

29. Respondent No.6, Kerala Water Authority filed the reply contending that Kerala Water Authority was one of the Expert Committee Members out of 8 appointed by the State Government to study the pollution created by the Nitta Gelatin.

Water Authority was entrusted to test the water quality of nearby wells and rivers at various localities of water samples during the month of April 2011. The quality control wing, Thrissur of the Water Authority collected 11 water samples and tested physical, chemical and pesticides and heavy metal constituents in their Regional Laboratory at Ernakulam. Out of the 11 samples, 6 samples are well water samples collected nearby the company and the rest are river water samples collected from nearby locations upstream and downstream. pH value found is less than 6.5 which is slightly acidic. The remedy is adding lime to increase the pH value to make it within the acceptable limit. As per the order of Industries Department dated 03.11.2011, direction was issued to carry out 13 numbers of things by the company and other departmental agencies for proper functioning of the company. In the meeting conducted by Hon'ble Chief Minister with Industry Minister and all the stake holders on 07.12.2011, to resolve the issue arising out of the bursting of the Biogas plant of the company, the company agreed to carry out the rectification works and all the other concerned departments especially the Pollution Control Board were directed to have close monitoring of the effluent

discharge and also to form a Monitoring Committee including local body representative, Trade union representative, Management, Health Department etc., There should be a close monitoring of the effluent discharge and working of the company by the respondent No.4. Respondent No.4 is frequently monitoring the physical, chemical and bacteriological parameters of water supply scheme maintained by the Water Authority through Quality Control Wing.

30. Reply affidavit was filed by Respondent No. 7, the Centre for Water Resources Development and Management (CWRDM) Kozhikode contending that it has nothing to do with the company and respondent No. 7, CWRDM is not an authority constituted by the Government to ensure quality of drinking water for the public. Respondent No.7 being a 100% grant-in-aid autonomous institution, has no statutory duty to conduct any study, other than required as per the objectives fixed for the institution. Therefore, the application as against the respondent is to be dismissed.

31. Respondent No.4, Kerala State Pollution Control Board (KSPCB) who is the respondent No.3 in Application Nos.

309 of 2013 and 149 of 2015 filed the reply contending that m/s. Nitta Gelatin India Limited was formerly known as Kerala Chemicals and Proteins Ltd has been functioning at Kathikudam in the Kadukutty Grama Panchayat since 1979. The company is engaged in the production of 13.3 t/d of ossein, 8.3 t/d of limed ossein, 40.5 t/d of Di calcium phosphate, 3 t/d of meat meal, 2 t/d of sterilized bone meal and 6.87 t/d of compost using 74 t/d of crushed bone, 81.40 t/d of 4% hydrochloric acid and 15 t/d hydrated lime as raw materials. Ossein is produced by leaching of crushed bone with 4% Hydrochloric acid. After leaching it is washed with water to remove the free acid present. A part of this is dried and packed. The remaining portion is leached with lime solution to produce limed ossein. Mono calcium phosphate dissolved in acid during processing of bone is then neutralised with lime to precipitate Di-calcium phosphate. This Di-calcium phosphate slurry is filtered, dried and packed. The effluent from the unit is a combination of effluents from ossein plant, liming plant and Di-calcium phosphate plant. From June 1997 onwards the Pollution Control Board had received several complaints from local residences against the company for causing water pollution and foul smell.

An Action Council was formed by the local people who submitted complaints against water pollution as well as odour nuisance due to functioning of the company from 2012 onwards. Based on the complaints filed by the Action Council, the Government appointed an Expert Committee to study and report the alleged pollution from the company. As per the order issued in G.O. (RT) No. 129/2011/Industries dated 27.01.2011 Government appointed 8 member Expert Committee headed by Dr.Lakshmikutty, Head of the Department of Chemical Engineering, Government Engineering College, Thrissur. The Expert Committee submitted a report dated 03.11.2011 which was accepted by the government and the Government directed the company to implement the 13 recommendations by order dated 03.11.2011 in G.O. (RT) No. 1376/2011/1D. The recommendations were:

> "1. Reduce water consumption by using appropriate technology and water recycling method.
>
> 2. Construction of new biogas plant.
>
> 3. Improve the efficiency of DCP bag filters by installing additional bag filters.
>
> 4. Stoppage of semi-dried solid waste transportation to outside.

5. Execution of the directives from the PCB and complete adherence to pollution control norms.

6. Prevention of order from the company using modern technology.

7. Take sincere steps for the benefit and upbringing of local people and there by achieve their goodwill.

8. Formation of green belt along the company boundary.

9. Prevention of odour related pollution in the area.

10. Consider continuous monitoring system for assessing the smell in the surrounding.

11. Formation of monitoring committee comprising local body members, trade union members, management and health department.

12. Take steps to remove the apprehensions regarding outlet water discharge system.

13. Cleaning of Chalakudy river to remove the sediments from the river bed."

32. On 01.11.2011, new biogas plant which was under trial run, collapsed and the sludge partially spilled over the surroundings. Then the company was directed to be closed on 03.11.2011. The Chief Minister of Kerala convened a meeting on 7.12.2011 to discuss the issues of the company in the presence of local MLA, Local body Authorities, Company Authorities, NGIL Action Council members and other

Government Departments. It was decided to strictly implement the 13 recommendations given by the Expert Committee and as approved by the Government. In addition to the above 13 recommendations, 3 more items were included in this meeting as follows:

> "1. Provide delay pond for treated effluent.
>
> 2. Provide bag filters to reduce suspended matter.
>
> 3. Enclose the crushed bone unloading area for reducing the smell."

33. Pursuant to the decision, the closure order was revoked with effect from 13.12.2011. Action Plan was submitted by the company to implement the aforesaid 16 recommendations which was approved by the Pollution Control Board. The District Office of the Kerala State Pollution Control Board, Thrissur closely monitored the progress in implementing the Action Plan and submitted monthly report to Head office of the Board. The company implemented all the recommendations within the stipulated time as per the Action Plan except the cleaning of Chalakudy River. The Chairman of the Board also reviewed the progress in implementing the

Action Plan on a quarterly basis and submitted report to the Government. The Effluent Treatment Plant (ETP) consisting of equalisation tank, coagulation tank, flocculation tank, primary clarifier, aeration tank, secondary clarifier, tertiary clarifier, pressures and filter, delay pond, rotary vacuum filter and filter presses were found to be working continuously and no water is let into the river without treatment. The company installed 4 bag filters for the DCP plant and chimney of hot air generators having a height of 30 m from ground level to control particulate matter emission. The company also provided a bio filter for the meat meal plant and crushed bone charging area for reducing odour problem. The stack monitoring and ambient air quality monitoring were conducted in the company premises on 27.11.2012 and the concentration of particulate matter and suspended particulate matter were within the parameters. The Consent to Operate granted to the company on 30.06.2012 was valid upto 30.06.2013. It was later renewed upto 30.06.2015 on 20.06.2013 Consent to Operate was granted only after conducting the statutory enquiry and after assessing the pollution control measures already provided and additional measures proposed by the company.

As per condition no.3.11, the Board permitted the company to discharge the treated effluent into Chalakudy river after complying with the effluent standards specified in condition no.3.1 of Consent to Operate. It is upto the company to make arrangements and the safety measures to be adopted while discharging the treated effluent through pipeline from the company to Chalakudy river. The Board is particular in ensuring the quantity and quality of the treated effluent discharged into the river.

34. The Circular dated 09.08.2004 stipulated siting criteria for industries other than stone crusher. The siting criteria stipulated minimum distance to be kept between the industry to nearest residence and to nearest educational institutions / court / public offices / hospital / place of worship / community hall and similar establishments. Also the siting criteria do not specify any minimum distance from the industry to any stream, wells and other water bodies. The siting criteria came into force with effect from 09.08.2004, whereas company was established earlier i.e. in 1979. Therefore, the

siting parameters cannot be applied to the company in question.

35. By order dated 03.12.2013, the Hon'ble High Court of Kerala in WP(c) No. 15795 of 2013 directed the CSIR – National Environmental Engineering Research Institute (NEERI), Nagpur to conduct a detailed study into the environmental pollution status with respect to air, water and solid waste from the ossein division of NGIL including the adequacy and efficacy assessment of the pollution control facilities installed. NEERI submitted a detailed report in May 2014, to the Board. The Board considered the report in detail and directed the company to implement the recommendations of NEERI. On 04.01.2015 and 15.01.2015 the Board along with officials of NEERI and District Collectorate inspected the company for assessing the status of implementation of the recommendations of NEERI. During the joint inspection it was found that the company has started implementing the recommendations in a time bond manner to the satisfaction of the Board. Samples of effluents from the company and water from Chalakudy river were collected for analysis. On

implementing all the recommendations of NEERI, the Board expected that the pollution problems and nuisance to the public will be reduced.

36. Additional reply was filed by respondent No.4 on 11.03.2016 stating that the company was inspected by officials of NEERI, KSPCB and District Collectorate, Thrissur on 14.01.2015, 15.01.2015, 12.08.2015 and 13.08.2015. NEERI submitted the inspection reports on 23.11.2015 and 08.02.2016. KSPCB inspected the company and during the last inspection it was noticed that company has complied with all the recommendations of NEERI, except recommendations No.14 and 21 regarding clearing of weeds along the banks, of Chalakudy River and dredging of bed of Chalakudy River, respectively. These recommendations can be fulfilled only with the association of Kadukutty Grama Panchayat and Irrigation Department. The company had already taken necessary follow up action in this regard. The Analysis Report of effluent samples collected from the outlet of the company on 08.02.2016 show that as against the permissible limit of 5.5-9.0 mg/l the value is found as 8.3 mg/l, as against permissible

limit of 30 mg/l the value is found as 10.4 mg/l, the suspended solids was found to have the value as 24 mg/l as against the permissible limit of 100 mg/l and the Dissolved phosphates is 0.26 mg/l as against the permissible limit of 5 mg/l and Oil and Grease were found Below Detectable Level and the Ammonical Nitrogen was found 8.12 mg/l as against the permissible limit of 50 mg/l.

37. Considering the progress made in the implementation of the NEERI recommendations, Consent to Operate was renewed to the unit on 30.12.2015 with validity upto 30.06.2018. The Board assured that they would monitor the unit regularly. Another additional affidavit was filed on 21.04.2016 by Respondent No.4, KSPCB stating that as directed by the Tribunal in the order dated 11.03.2016 the damaged pipeline was inspected by the KSPCB on 21.03.2016. On inspection it was found that the pipeline carrying the treated effluent from the company to Chalakudy river was found in partially broken stage at a particular point. Certain portion of this pipeline was laid along and under the bed of a Natural thodu (Canal) through which there is flow of water.

The broken part of the pipeline is at this point. The thodu is reported to be a "Poramboke land" under the custody of Kadukutty Grama Panchayat. The broken portion of pipeline is already under the water and certain quantity of effluent is found discharged through the hole of the broken pipe into the thodu and mixture of effluent and water is seen flowing in the thodu. It is roughly estimated that about 1/3rd effluent leaked into the thodu through the broken portion of the pipeline. Black coloured sludge like materials could be found to be deposited beside damaged part of the pipeline. But at the time of inspection no sludge like materials could be found to be discharged into the thodu along with the effluent. The hole of the broken pipeline is not visible. It was learnt that the hole is having about 30 cm. diameter. The flow in the thodu was also found to be partially obstructed with some wooden materials by some unknown persons and the flow rate in the thodu is very slow.

38. The Board got knowledge about the damage of the pipeline when a complaint was received alleging break-down of pipeline of the company carrying effluent to Chalakudy in the

month of April 2015. The complaint was enquired and Board issued a notice to the company to stop the discharge of effluent through the broken pipeline into the thodu and into the fields. In reply, the company reported that they noticed a leakage in the pipeline on 08.03.2015 and repaired the same on 11.03.2015. Though the company contended that leakage was arrested, it was still continuing. It was represented by the company that some outside people have blocked the pipeline partially by putting concrete blocks into the broken portion.

39. During the month of January 2016, public agitated against the discharge of effluent into the thodu through the hole of the broken pipe. Based on the compliant received from the Board direction was issued to the company on 04.01.2016 to redress the complaint. In response to the direction given by the Board, the company reported that they were not able to carry out the repairing works due to obstruction by the agitators. The Board collected effluent samples from the authorised outlet of the company inside the company premises and also from the damaged part of the pipe line carrying effluent from the company to Chalakudy river. The samples

taken from the damaged portion are found to be a mixture of effluent and water flowing through the thodu. The water flowing in the thodu was slightly in agitated condition during the sampling time due to gushing up of effluent through the broken hole. The effluent carrying pipeline of the company ends almost at the middle of the Chalakudy river. It is about 2.5 mtrs below the water level of the river. Hence it was not possible to collect effluent sample from that final discharge point in the Chalakudy River.

40. The Consent to Operate given by the Board to the company, provides 7 effluent parameters. Therefore, analysis of samples was done for the consented parameters. In addition to the consented parameters, TDS and Chlorides were also analysed. The analysis of the effluent samples taken from the breakage point of the pipeline shows that pH 7.1, BOD - 9.0, COD – 48.0, Suspended Solids – 55.0, Dissloved Phosphates – BDL, Oil & Grease – 10, Ammonical Nitrogen – 130.2, Total Dissolved Solids – 4914 and Chlorides – 2729.7. So also the effluent taken from the authorised outlet of the company shows that pH – 7.5, BOD – 34.4, COD – 72,

Suspended Solids – 28, Dissloved Phosphates – BDL, Oil & Grease – 9.1, Ammonical Nitrogen – 10.1, Total Dissolved Solids – 3141 and Chlorides – 1637.8. The parameters such as TDS and Chlorides were omitted from the Schedule VI of General Standards for discharging Environmental Pollutants Part A- Effluent as per Rule 2(d) (i) of the Environment (Protection) Third Amendment Rules 1993 vide Notification dated 31.12.1993. Therefore the Board has omitted the TDS and Chlorides from the consented parameters.

41. The analysis report shows that BOD slightly exceeded the standards in the effluent collected from the authorised outlet of the unit. All other parameters are within the prescribed standards. The analysis report of effluent collected from the broken portion of pipeline showed that the Ammonical Nitrogen exceeded the standards prescribed in the Consent to Operate. Though both samples were taken on the same day, the sampling time was different. The company does the process of backwashing of its sand filters of their fresh water treatment plant 3 times a day. The backwash water is taken to the polishing pond and after settling, the clear water

is discharged along with the treated effluent. Hence, there is dilution of effluent at the time of discharging of the sand filter water from polishing pond to the treated effluent outlet. The dilution is not a continuous process. The decrease of TDS between the sand filter of the effluent treatment plant and the final effluent outlet might have occurred due to the dilution of the effluent as described above. During the joint inspection conducted along with NEERI and the officials of the District Collectorate, Thirssur on 12.08.2015 and 13.08.2015, the Board has collected water samples from the Chalakudy river. The analysis report of water samples collected from different points of Chalakudy river shows the values of Chlorides at Upstream of water intake 14 mg/l, effluent discharging point 16 mg/l, 500 Meters downstream of effluent discharging point 12 mg/l, 2kms., downstream of discharging point 14 mg/l, and 3 kms downstream of discharging point 16 mg/l. The guidelines appended to the schedule to the notification state that while permitting the discharge of effluent and emissions into the environment, State Boards have to take into account the assimilative capacity of the receiving bodies especially water bodies so that the quality of the intended use of

receiving water is not affected. Where such quality is likely to be affected discharges should not be allowed into water bodies. The above analysis report indicates that the water quality of Chalakudy river for the intended use of drinking water is not at all affected due to discharge of effluent from the company. Hence, the guideline for permitting the discharge of effluent to the water bodies as per Environment (Protection) Rules are followed with regard to the parameters of TDS and Chlorides.

42. Additional reply has been filed by respondent No.4, KSPCB dated 22.12.2016 submitting that the quantity of sludge that can be handled by the company NGIL is 18000 tonne / year (1500 tonne / month) as per Consent to Operate issued to them. The quantity was specified under condition No. 6.9 of the Consent to Operate and it is also specified in the condition that sale of semi-solid sludge to outside parties shall be stopped on commissioning of Bio-gas plant and sludge shall be processed in the Bio-gas Plants.

43. Accordingly the company commissioned two Anaerobic Bio Digesters. The first Anaerobic Digester was

commissioned in March 2014 and the second Anaerobic Digester was commissioned in October 2015. After the commissioning of Anaerobic Digester, the generation of sludge is reported to have been reduced to 900 tonnes / month (10800 tonnes / year).

44. A letter dated 17.11.2016 was received from the company by the Board stating that the sludge generated by the company is not a Hazardous waste as per the Hazardous wastes (Management and Transboundary Movement) Rules, 2016. Hence, authorization for handling the sludge waste is not mandatory. However, the company shall ensure that the solid wastes are handled and disposed without causing any environmental pollution.

45. The industry Nitta Gelatin India Ltd., respondent No.8 in application 305/13, respondent No.6 in application No.309 of 2013 and respondent No.5 in application 149 of 2015 filed counter affidavits in all the three applications contending that the company registered under the Companies Act is having 46.43 of the shareholding by Nitta Gelatin incorporated Japan and 34.07 % by Kerala State Industrial Development

Corporation. The Chairman of the company is the Additional Chief Secretary, Industries Department, Government of Kerala. The company has a factory at Kathikoodam in Kadukutti Grama Panchayat which is engaged in the manufacture of Ossein by adopting the modern technology developed by Nitta Gelatin Inc., Japan, which is one of the world leaders in the manufacture of Gelatin. The factory started commercial production in 1979 and has been functioning under the name of Kerala Chemicals and Proteins (I) Ltd. which was subsequently changed as Nitta Gelatin (I) Ltd. The company is engaging approximately 500 employees and the factory at Kathikoodam is having more than 150 employees, apart from giving indirect employment to others. A group of employees, who belong to 3 or 4 families in and around the factory premises with the assistance and connivance of some employees of the locality, started agitation against the company with ulterior motives. The Writ Petitions are part of the said concerted action. Earlier, a complaint was filed before the Human Rights Commission as HRMP.No.416 of 2005. After filing objection and hearing all the parties, the Commission dismissed the complaint on 18.07.2016. It is

presumed that the applicant in O.A.305 of 2014 is the son of Mr.Franco Mathew, a dismissed employee of the company for proven misconduct. The Industrial Dispute raised by him was later settled by payment of amounts agreed to between the parties. A cousin of that employee had filed a complaint before the Sub Divisional Magistrate, Thrissur as complaint No.B2/7356/2008. Another cousin by name, Benny Thelakkat filed a suit in O.S.85 of 2012 before the Munsiff Court, Challakkudi alleging that the company is causing pollution. Earlier also, one, Mr.Poulose Thelakkat filed O.S.178 of 1995 before the Munsiff Court, Chalakkudi, which was dismissed and Appeal A.S 292/2004 filed before the District Court, Thrissur challenging the judgment of the District Munsiff, was also dismissed. All these litigations were started by different family members of the applicant. A Public Interest Litigation was also filed before the Hon'ble High Court of Kerala in W.P.10294 of 2002 which was dismissed by the Hon'ble High Court. O.S.595 of 2005 filed before the Munsiff Court, Chalakkudy was also rejected for non payment of balance Court Fee. Another petition filed before the Revenue Divisional Officer, Tiruchur A.2/12484/2004 was also dismissed.

46. The company has been functioning for the past 33 years. The end product of the company is Gelatin, which is widely used for pharmaceutical applications. Large quantity of Gelatin is being exported to various other countries. Local Grama Panchayat also started action against the company for the reasons best known to it. During 2011-2012, the Panchayat did not renew the licence. The company was constrained to approach the Hon'ble High Court by filing W.P.(C) No.8793 of 2011. In the light of the Consent granted by the Pollution Control Board, the Hon'ble High Court granted an interim order permitting the company to function. During 2012-2013 also the licence was not renewed. It was challenged by the company before the Hon'ble High Court in W.P.(C) 7322 of 2012. Both the Writ Petitions are pending before the Hon'ble High Court. In W.P(C) No.7322 of 2012, to ascertain the actual facts, the Hon'ble High Court directed the Pollution Control Board authorities to conduct a thorough investigation and submit a report. The Board conducted an inspection and submit a report before the Hon'ble High Court. An advocate Commissioner was also appointed, who after inspection, submitted a report. Based on these reports, the Hon'ble High Court granted an interim

order in favour of the company. For 2012-2013 also when Panchayat did not renew the licence, the company filed W.P No. 7322 of 2012 wherein also, an interim order to function was granted by the Hon'ble High Court. Earlier, during 2009-2010, the Panchayat had refused to renew the licence. When it was challenged in W.P.20891 of 2009, the Hon'ble High Court granted an interim order and directed to decide the question on the pollution by the Pollution Control Board. The Board has conducted a strict and periodical examination and submitted a report. Based on that report, Consent was granted, which was valid upto 30.06.2013. The Consent was later renewed from time to time.

47. Complaints were filed before the Chief Minister and the Pollution Control Board. Hence, the Pollution Control Board was very much diligent in the functioning of ETP of the company. The question of pollution allegedly caused by the company was the subject matter of the litigations before the various forums. It was thoroughly examined by such forums and the directions issued by the Pollution Control Board were being implemented and complied with. Very high standards of

pollution control measures are adopted by the company and more than three crores of rupees were invested by the company for ETP plant alone. In addition, approximately Rs.5 crores have been spent to implement the recommendations of the Expert Committee appointed by the Government of Kerala. A meeting was convened by the respondent No.1, Industries Department and an Expert Committee was formed with Dr.Lakshmikutty as Chairperson. The Expert Committee, which consists of 8 members, convened a meeting of all political parties, the Panchayat authorities, persons complaining against the functioning of the company and after hearing and based on the study of the Expert Committee, they submitted a report containing 13 suggestions to the industries department. Based on the said report, the industries department passed an order on 03.11.2011 directing the company to execute the suggestions of the Expert Committee. Based on the suggestions, the company submitted an Action Plan before the meeting held on 07.12.2011 under the Chairmanship of the Hon'ble Chief Minister of Kerala. The meeting accepted the Action Plan submitted by the respondent No.8, company.

Under the Action Plan, the company was granted time till December 2012 for carrying out the suggested works.

48. The Committee also formed a monitoring Committee under the Chairmanship of MLA Shri B.D.Devasi. The Company implemented the suggestions as per the Action Plan on war footing. The monitoring Committee is supervising the actions of the company. The Company is submitting a monthly report to the monitoring committee, Kerala State Pollution Control Board and the Government of Kerala. In addition, the Kerala State Pollution Control Board used to conduct meetings for reviewing the progress.

49. The allegation that the company is taking two crore litres of fresh water from Chalakkudi river every day is not correct. The fresh water consumption per day is 3400 **m3**. The Kerala State Pollution Control Board granted Consent in its renewal dated 30.06.2012 for consuming the said quantity. The allegation that 80 tonnes of effluents were discharged into the Chalakudi river is false. No effluents are discharged into the Chalakudi river. After treatment, the treated water alone is discharged into the Chalakudy river. The pH of the water

discharged into the Chalakudy river is displayed at the main gate of the company, which is visible to the general public. No decomposed particles, animal bone marrow and flesh, hydraulic acid and other hazardous chemicals etc. are discharged into the river. The parameters of the water discharged are taken on day to day basis by the company and on a monthly basis by the KSPCB. After the treatment of the effluents, no wastage is generated by the company. The solid effluent is used as manure. There are purchasers to purchase the said manure from the company. The said manure is sold by the company. The Kerala Agricultural University and Tamil Nadu Agricultural University have conducted a study on the sludge generated by the company and certified that the ETP sludge is the co-source organic manure. The Pollution Control Board has given a certificate to the effect that ETP sludge is non hazardous in nature. The allegation that 1,20,000 ltrs of HCl is used in the production process is incorrect. So also, the allegation that due to the negligence of the company, the pipes and manholes are broken and are leaking and the toxic materials are allowed to spread to the neighbourhood causing environmental degradation of the entire area, is not correct. The Advocate

Commissioner appointed in W.P.(C) No.8793 of 2011 by the Hon'ble High Court filed a report showing that the allegations are false. The allegation that the company is causing pollution is not correct. In fact, the company is functioning based on the Consent given by the KSPCB. There is no prohibition by the Pollution Control Board as alleged. The bio-gas plant inside the factory premises accidentally collapsed on 01.11.2011. At that time, the Pollution Control Board had prohibited the functioning of the company and in compliance of the directions, the factory was closed. Thereafter, various recommendations were put-forward by the Committee and such recommendations and suggestions were substantially carried out and in respect of the remaining recommendations, time was given upto 31.12.2012. The report of the KSPCB showing that the samples were collected on 14.02.2012 by the Board, produced along with the application is not true. It is understood that the samples taken which had led to the report dated 21.02.2012, was not under genuine circumstances. The sample was made polluted as the parameters are above normal. The report of the analysis was perused and reliance cannot be placed on it to come to a conclusion regarding the pollution. As already alleged, a

complaint before the Koratty Police Station was filed by the company in this regard. The Pollution Control Board issued the Consent only after careful analysis of the whole issue. The company has installed machinery for treating effluents. Most modern technology is being employed in the ETP. The company is having a full fledged Pollution Control Board approved laboratory for testing the effluent and treated water. Samples are taken on every day basis and tested in the laboratory of the respondent. The results are kept in the office of the company for further reference. So, no reliance can be placed on the report and the circular dated 09.08.2004 referred to in the application is not applicable. The commercial production of the company was started in the year 1979.The circular issued on 09.08.2004, says about the siting criteria for industries and therefore, not applicable to the industries which were already existing prior to the date of circular. The circular dated 05.07.2012 issued by the KSPCB proves that the circular dated 09.08.2004 is applicable only to the new industries, which are to be commenced after 09.08.2004 and is not applicable to the existing industries, which are being operated prior to 09.08.2004. The pipeline which carries the treated effluent

from the factory to the Chalakkudy river was purposely broken by some unknown people of the locality. A Complaint was filed before the police to investigate into the sabotage committed by a few people of the locality and many illegal and unethical means are employed to tarnish the image of the company. The allegation that the directions of the Pollution Control Board with regard to pollution control measures are not implemented is not correct. When there was an accident in the biogas plant, the Pollution Control Board directed the closure of the industry and accordingly, the industry was closed. After clearing the entire premises and after implementing all the directions of the Board, the Board granted Consent to re-start the company and accordingly, the factory is functioning. It was because of the exerting pressure on the Panchayat, the Panchayat refused to issue licence inspite of the valid consent issued by the Board.

50. In the meeting chaired by the Chief Minister on 11.02.2011, a time bound action plan was submitted by the company. It was approved with the recommendations of the Expert Committee. One of the recommendations was reduction

in the water consumption to 3000 mq per day by December 2012. The water consumption was accordingly reduced and now the consumption is 3,928.400 mq per day, which was cross checked by the Board officials. The Writ Petitions filed before the Hon'ble High Court is not a public interest litigation but a litigation to wreck vendetta of the applicant against the company.

The Arguments:

51. Mr.Mohan, learned senior counsel appearing for applicants in all applications argued that the company has been classified as Red category Largescale Industry by the Pollution Control Board, as per the siting criteria prescribed in Board's Circular dated 09.08.2004, there cannot be any dwellings in existence within a distance of 100 meters from the company. But a number of houses are located within the prohibited distance. The report of the Environmental Engineer of the Pollution Control Board discloses that 46 houses are located within 100 meters from the boundary of the company. Though the verification report of the industry shows that the residences are 250 meters away from the company, when the report of

the Engineer of the Board establishes that within 100 meters of the compound wall, there are 46 residential houses, the Pollution Control Board should have taken action and still no action has been taken. The argument of the learned counsel is that the Board did not conduct proper audit and the company was dumping the sludge into the river along with fluid. It is argued that, this fact is clear from the various reports prepared by the Board. Reliance was placed on the report of the Environmental Engineer dated 12.06.2012, where it is recorded that the company is still transporting semi solid sludge and foul odour was felt near the surroundings of the houses, adjacent to the compound wall of the company. When inspected, the effluent is being discharged into the Chalakkudi river. Foul odour and change in colour was felt. Semi solid effluents were in existence in the same condition as it was before. Reliance was also placed on the communication dated 09.07.2010 issued by the Board to the industry, where it is revealed that during inspection, effluent was seen discharged from the manhole. Some dead fish and frogs were also found at this point. The Complaint was found genuine. The same incident was reported on 01.07.2010. On inspection on 02.07.2010

also, waste water and sludge were seen discharged through the broken manhole. The company was directed to ensure that sludge is not discharged through the pipeline. Reliance was also placed on the direction of the Board dated 03.11.2011 where it is disclosed that during inspection of the industry and its premises by the Board officials on 07.07.2011, the ETP sludge was seen dumped on the side of NH047 near flyover at Kuttanellur and during enquiry on the complaint by Board officials on 22.08.2011, blackish sludge was seen deposited in the bed of Karikkathodu where the treated effluent carrying pipeline is laid and whitish oily slurry was seen suspended and stagnated at Kundukadavu near the final effluent discharge point. It is also revealed that the analysis report of the effluent collected from the discharge point at Kundukadavu on 23.08.2011 showed that the concentration of parameters is in excess of the limits specified. The sludge from the collapsed biogas plant overflowed near the compound wall and leaked through the bottom of the compound wall to the backside road causing environmental problems.

52. Learned counsel also relied on the communication of the District Collector addressed to the Secretary to the Government, Industries Department dated 06.02.2011 where it is stated that when the team inspected the factory, it was found that waste water is being discharged into the river causing serious water pollution. It was also stated that there are residue of sludge leaked from the pipe carrying waste water into the river emitting strong odour. Large deposit of silt mixed with sludges has been formed on the banks of the river, which is the result of earlier discharge of sludge. Letter dated 06.01.2016 by the Secretary of the Kadukutty Grama Panchayat to the Company was relied on by the learned counsel to argue that on 04.01.2016 a team of Kakkad PHC visited the spot and filed a report stating that dissoluble and un-dissoluble biochemical substance which was black in colour with a stringent odour, was found at the spot where the pipeline was broken. It is also argued that the decision of the Panchayat dated 07.01.2016 also establishes that untreated effluent is being discharged into the river causing ecological and health problems. Learned counsel argued that even the reply filed by the Board 16.04.2016 records the presence of

sludge at the point where the pipeline was broken and the Board ought to have directed the industry to cease the pumping of effluent through the pipeline, having found the sludge at the leakage point. Learned counsel argued that when the effluent is being discharged into the river and it is clear that the discharge constitutes an unauthorised discharge in violation of the Water (Prevention and Control of Pollution) Act, 1974, the Board should not have renewed the Consent. Learned counsel argued that realising this fact, the Board directed to stop the operations in the industry. Though the company by letter dated 30.04.2015 to the Board, claimed that the leak was arrested, leak was never arrested. Learned counsel argued that the ETP sludge is not compost and it is toxic. The argument is that the Consent letter mandates the ETP sludge (18,000 t/yr) shall be dried, processed to manure (nutrisoil), stored securely and disposed. Sale of semi solid sludge to outside parties shall be stopped on commissioning biogas plants and the sludge then processed in the biogas plants. It is argued that the company claimed that the ETP sludge is being sold as compost and it is declared as safe by the authorities. The ETP sludge is being let out through the

effluent pipeline and that is why the presence of sludge is noticed at the point where the pipeline had broken. It is argued that the sludge is toxic and in fact, it is not useful as compost and it contains very high concentration of heavy metals. It is argued that the analysis report dated 14.05.2010 of the Kerala Agricultural University shows that the Carbon : Nitrogen ratio does not meet the required norms and the presence of heavy metals, Led and Nickel is very high. Learned counsel also pointed out that the communication of the Assistant Director of Agriculture, Palakkad to the Principal Agricultural Officer, Palakkad dated 15.02.2016 shows that based on the reports of the visual and print media and on the instruction of the District Collector, he conducted a field inspection of the plantation which belongs to one, Sri Vinod, Pathipara, Kaliyapuram, Muthalmada, Palakkad on 21.01.2016 along with the Principal Agricultural Officer, Palakkad and Board officials and on enquiry, industrial waste material from the company was seen deposited in bulk quantities at different place in the plantation. During inspection it was seen that the material is not used as an organic manure for crop production, but only deposited at different parts of the plantation and therefore, the claim of the

company that the sludge is being used as organic manure is not believable. It is stated therein that the analytical report of sample submitted to the Department of Soil Science and Agricultural Chemistry reveals that Nitrogen and Potash, the major required plant nutrients are not present at the required level as per standards and all other parameters like moisture, colour, organic carbon etc. do not satisfy the minimum standards required for an organic manure and Mercury is present beyond the permissible level, which is harmful to human beings, animals, crops and the environment.

53. Learned counsel argued that the clandestine dumping of the sludge by the industry is clear from the reply received under RTI Act from the Pollution Control Board dated 01.10.2014 where it is stated that the waste dumped at Pollachi was directed to be removed within 24 hours and even the marketing engineer of the industry participated in the meeting held at the Police Station. Learned counsel argued that the report of the Central Pollution Control Board (CPCB) filed as directed by the Tribunal in Application No.412 of 2016,(PB)

shows that unutilized sludge accumulated over a period of time is found in Kaliyapuram area, is severely affected by rains and the analysis of such sludge confirms that it is highly dangerous to the surrounding environment. Further, the analysis of the mercury level was also made. It is therefore argued that the company has not treated the effluent properly. so also, the sludge, which is toxic in nature, is not being disposed properly and the company is causing pollution to the environment.

54. Learned counsel argued that the sludge is being disposed without any accounting. The reports of the Pollution Control Board and NEERI did not address this issue. There is no material balance in so far as the material consumed by the industry, the products produced and the waste generated and disposed. It is pointed out that the raw materials consumed by the industry is 115.048 TPD and the permitted quantum of products is 62.1 TPD. Therefore, the waste generated by the industry per annum should be 19326.02 tonnes. It is pointed out that as per the form submitted by the industry for getting

approval for organic fertiliser sold by it, the total annual production capacity is 2600 MT. As per the verification form of Board dated 23.06.2012, the industry is permitted to generate a total of 18,000 MT of ETP waste, of which 2/3rd is converted as nutrisoil after drying in a drier. 1/3rd is now sold to outside parties as semi solid sludge, which is proposed to be used in two biogas plants to be constructed. Therefore, 6,000 MT is cleared to be sold as nutrisoil and 12,000 MT is to be used in the biogas plants.

55. Learned counsel argued that therefore, the total consumption including crushed bone, HCl and hydrated lime should be 41992.52 TPA and the total production including Ossein, Limed Ossein, Dicalcium Phosphate should be 22,666.5 MT and the total waste generated is 19326.02 MT, while the total ETP waste as per Consent order is 18,000 TPA and spent oil is 2000 TPA .It is pointed out that if so, the sludge that can be converted into fertilizer should be 12000 TPA. However, in the form submitted for approval for fertilizer, it is only 2600 MT per month. Learned counsel argued that even according to the

report of CPCB, there is a gap of 1326.02 TPA between the waste generated by the industry and the waste permitted to be generated from the ETP. If it is assumed that the sludge generated from the industry is sold as compost, and 120000 TPA of sludge is converted into solid fertilizer, there is no accounting for 7326.02 TPA of solid waste. Learned counsel argued that these figures represent mis-match in the permission granted to the industry by the Board. Learned counsel argued that the quantity of raw materials consumed and production details as admitted by the industry for the years from 2008 to 2014, are provided in the table 5.1 of NEERI report dated May, 2014 and from the figures it is clear that the industry consumed the raw materials more than the quantum permitted by the Board and it has also produced finished products in excess. The waste generated from the process is also not accounted for. Learned counsel argued that it is not known how many tonnes of so called fertilizer was even sold during these years and the fact that sludge has been noticed by the authorities shows that the industry has released the effluent mixed with the sludge into the River. Learned counsel argued that the reply received from the Board under

RTI Act reveals that the total sludge generated is 750 TPA. But as per the report of the CPCB, the sludge generated from the ETP is only 15 to 18 T per day, which translates to 5475 to 6570 TPA. If this is the quantum of sludge generated from the ETP, there is great variance in the material balance. Learned counsel argued that the industry has not offered any explanation to this fact.

56. Learned counsel also argued that the industry is not treating its effluent and releasing the effluents not conforming to the parameters mandated by the KSPCB. Though the Effluent Treatment System of the industry consists of Equalization tank, coagulation tank, flocculation tank, primary clarifier, aeration tank, secondary clarifier, tertiary clarifier, pressure sand filter, delay pond, rotary vacuum filter, filter press, the ETP does not have any system in place to remove dissolved solids and chlorides and in the absence of a Reverse Osmosis system, the industry cannot claim that it is removing salts from the effluent.

57. Learned counsel argued that the figures provided in the NEERI report shows that the industry is not treating the effluent to remove calcium chloride salt and other components as the level of TSS, TDS, COD and BOD are not satisfying the prescribed parameters. It is argued that the industry is merely diluting the effluent with fresh water and after passing through the clarifier, the effluent is released into the river water, unloading the entire quantum of chemicals present in the effluent including calcium chloride. As the ETP does not have an RO system or similar ion process to remove salts present in the effluent, the industry' s claim that it is treating the effluent to remove elements from the effluent, can never be said correct. It is therefore argued that there is no proper effluent treatment system in the industry and it cannot be permitted to continue its operations without proper ETP.

58. Learned counsel appearing for the applicants further argued that the report submitted by CPCB after inspection as directed by the Tribunal in the Original Application NO.412 of 2016 pending before the Tribunal against the company, also shows that the industry is diluting its effluent without properly

treating it. The report of CPCB also shows that the back water from the sand filters is treated in polishing pond and mixed with treated effluent from delay pond and thereafter discharged into the river. The report also shows that they have not accounted for the quantum of water required for the dilution. The report of CPCB after tabulating effluent parameters at various points of the ETP has stated that the treated effluent from delay pond is diluted with the back wash water (Fresh water) through sand filters before discharging into the river and this has resulted in dilution of TDS, COD and chloride concentrations at the final disposal point. Learned counsel argued that comparison of the said figures to the corresponding values would clearly show how the industry has been diluting the effluent and adding pollutants into the river all these years. Learned counsel argued that the crucial issue that needs to be addressed is that there is no accounting for spent backwash which will contain high levels of particulate matter, but the industry is silent on this issue. It is argued that the water pollution caused by the industry is evident from the finding of the CPCB that Ammonia in the water discharged is 1 : 1 times the permitted quantum and the excess emission

from stacks and the fact that PM levels were high in one location is the indication that the bag filters used by the industry are not adequate. Learned counsel vehemently argued that unless 'Zero Liquid Discharge' is mandated, pollution of water cannot be controlled. It is also argued that since the industry has not installed any flow meters in the ETP, details of water consumption cannot be calculated. It is also pointed out that the effluent discharged from the industry is not metered and there is no system in place to check or detect any leakage in the effluent pipeline and since the discharge outlet pipeline is under the water, no monitoring of the discharge is possible. Learned counsel argued that the directions issued by CPCB establish that the industry has been operating in violation of the law and therefore, necessary directions are to be issued including mandating Zero Liquid Discharge.

59. Learned counsel argued that though the industry subsequently provided data on the anaerobic digesters, the quantity of Carbondioxide, quantum of biogas generated etc. are not furnished and it is clear that the industry does not have

the capacity to breakdown the claimed quantum of solids and generate biogas. Though it is also argued that the industry listed the places where AAQ stations are located, these stations are not connected online to the regulator and there is no real time monitoring of the industry. Learned counsel also argued that the reports submitted by the NEERI by taking the data from stations imperfectly located has compromised its scientific reliability. Though the industry claims that the outflow of the ETP is metered, NEERI does not record the outflow details and does not mention the presence of electromagnetic flow meters in the ETP outlet. None of the reports of Pollution Control Board or the replies submitted by the industry mentions the existence of electromagnetic flow meters in the ETP outlet. The report of CPCB clearly discloses that no flow meters are installed at the ETP outlet. Without a clear audit of water balance, it is not possible to ascertain that the industry is not consuming water more than the permitted quantity, which will result in an increase in the quantum effluent generated. As there was a huge variance between input and output, there was no material balance. Though there was variance between input and output, the industry has stated that 21 tonnes

equivalent of solid is converted in the anaerobic bioreactor . It is also to be taken into account the claim of the industry that the total quantum of effluent generated in the (organic and inorganic) industry is approximately 2900 cu.m. per day and out of this, the sludge of 1860 cu.m per day is processed from the organic stream and 21 TPD equivalent of solid is converted into biogas. As the said quantity is included in the total effluent generated, a total of 21 tonnes per day equivalent of solid is converted into biogas at the rate of approximately 2900 cu m per day. But the maximum capacity of 2 digesters at the rate of 930 cu.m.per day would be only 1860 and not 3000 as claimed by the industry. It is also argued that the effluent from DCP stream is not treated in the anaerobic bio digesters and the solids present in the DCP stream is around 23.63358 tonnes. The effluent from the industry is not treated in the bio-digester, and the industry has no other treatment system in place to remove the dissolved solids, suspended solids present in the effluent stream, and the industry has also not explained as to how the reduction of solids present in the stream is dealt with. According to the learned counsel, in addition to this, 3.5 tonnes of waste is also generated from

bone processing and even according to the industry, the first anaerobic digester was commissioned only on 22.03.2014 and the second digester in October, 2015. The industry is therefore bound to explain how the huge volume of sludge and waste was managed before and after the installation of digesters. The learned counsel argued that each digester can hold 352 M^3 of effluent and can digest a maximum volume of 704 M^3 in 45 hours and therefore, the claim of the industry that they are breaking down 1800 M^3 of effluent stream from Ossein plant with 21 MT of solids into biogas on daily basis is unbelievable and cannot be relied on. It was argued that when the capacity of both the digesters is put together is only 704 M^3 and with HRT of 46 hours, they can process only a maximum volume of 11.099 M^3 effluent in 30 days, out of the total volume of 54 000 M^3 of fresh effluent generated every month at the rate of 1800 M^3 per day and therefore, there is a net shortfall in treatment capacity for 42,981 M^3 effluent . As the digester capacity is only to treat 20.405% of daily effluent from Ossein plant and the remaining 79.594% of daily generated effluent is discharged into Chalakkudy river without treatment. It is thus clear that the industry is causing water pollution, which

cannot be allowed to continue and necessary directions are to be issued.

60. Learned Senior Counsel appearing for the industry, M/s.Nitta Gelatin India Company, argued that the M/s.Nitta Gelatin India Limited is one of the world leaders in the manufacture of gelatin and the industry is at Kathikoodam in Kadukutty Grama Panchayat and it has adopted the most modern technology of M/S.Nitta Gelatin Inc., Japan. Learned senior counsel argued that the industry has been functioning since 1979 and is having Consent granted by the Kerala State Pollution Control Board (KSPCB) and without challenging the Consent under Section 31 of the Air (Prevention and Control of Pollution) Act, 1981 and under Section 28 of the Water (Prevention and Control of Pollution) Act, 1974, the applications are not maintainable. It was argued that the pollution level in and around the industry has been constantly monitored and it was consistently found to be within the permissible limit by various agencies, like, NEERI, CPCB and KSPCB. The quality of water in the Chalakkudy river and the Wells nearby have been found to be well within the acceptable

limits of Indian Standard Drinking Water Specifications and inspite of these facts, the present frivolous applications have been filed without any bonafides.

61. Learned senior counsel pointed out that the Circular No.PCB/TAC/18/2004 is not applicable to the industries, which had already established before the date of Circular and the KSPCB in its report dated 12.07.2012 categorically declared that the Circular is not applicable to the industries which started functioning prior to the date of the said Circular and therefore, the siting parameters relied on by the applicants is not at all applicable and on that ground, the applicants cannot contend that the industry of the respondent cannot function as well. It is also argued that the industry is not dumping sludge into the river as alleged and pointed out the report of the NEERI dated May 2014 which specifically states that ”as monitored the bottom sediments were not found at most of the sampling locations in Chalakkudy river and the sediments as observed were mostly sand and pebble or gravel. Rare presence of benthic organisms belonging to pelecypoda and Gastropods genera and Chironomouslearva belonging to

Chironomidae were observed and their presence indicates no organic pollution in the river". Argument of the learned senior counsel is that it is very clear that there is no discharge of sludge along with the effluent into the Chalakkudy river as canvassed by the applicants. It was also pointed out that NEERI report of May 2014, also indicates that concentration of suspended solids in the effluent has been consistently below the stipulated norms, which is also clear from the NEERI report dated 27.02.2015. As the concentration of suspended solids has consistently been well within the norms prescribed by the Board, the allegation of discharge of solids along with the effluent into the river is only to be rejected. The argument is that if sludge is discharged along with the effluent, the suspended solids should be very high and as it is not the case, it is to be found that there has not been any discharge of sludge into the river or causing pollution thereby. It was argued that the report filed by the Central Pollution Control Board in the Original Application No.142 of 2016, also shows that all the parameters are within the prescribed limits and CPCB did not find presence of sludge either in the effluent

discharge pipe or in the Chalakkudy river, which completely dis-proves the allegations raised by the applicants.

62. Learned senior counsel further argued that the report of CPCB dated 07.11.2016 shows that the result of the analysis of sludge collected from the sludge dumping site and the sludge storage yard, establish that the concentration of various parameters from the sludge comply with the standards fixed for organic fertilizer as per the Fertilizer (Control) Order, 1985. It is also pointed out that the additional report filed by CPCB dated 30.11.2016 on the mercury parameter also establishes that the mercury level is also within the standards prescribed by the Board. It is therefore, argued that the sludge can be used as organic fertilizer and is not a toxic substance as canvassed by the applicants. Learned counsel pointed out that the report of NEERI of May 2014 proves that the ETP sludge does not contain any hazardous constituents and it is classified as non-hazardous and after a detailed analysis of the solid waste generated at the industry, which includes matured compost and materials from the yard, where it was stocked by a buyer, it was concluded that the sludge is

non-hazardous. Learned senior counsel therefore argued that the sludge generated by the industry is neither hazardous nor toxic. Learned counsel argued that in the light of the findings in the report, the submission of the applicants that the sludge is highly dangerous to the environment is erroneous and unfounded and there is no basis to arrive at such a conclusion. The findings of the CPCB establish that bio-compost conforms to the standard stipulated as per the Fertilizer (Control) Order,1985 and it is suitable to be used as organic fertilizer. It was pointed out that it was under the directions of the Agriculture Office, the production of bio-compost was stopped though it does not pose any threat to the surrounding environment. It is pointed out that as per letter dated 09.02.2010, the KSPCB approved the usage of compost for all types of food and plantation crops and that approval was based on the analysis report of R & D wing of the Fertilizers and Chemicals Travancore Limited (FACT). The learned counsel argued that nutrisoil was sold to one, Mr.Vinod as raw material for manufacturing of compost manure and as seen from the report of CPCB dated 07.11.2016, the nutrisoil is also conforms to the standards stipulated under the Fertilizer (Control)

Order,1985 for use as organic fertilizer. It is, therefore, argued that the toxic element found to be dumped in the property of Mr.Vinod , as per the report of CPCB, cannot be attributed to the respondent industry. It is also pointed out that in the letter addressed to the Advocate General of Kerala by the District Collector, Palakkad on this issue, it was observed that hospital waste, chicken waste etc are being dumped in the property of Mr.Vinod and therefore, the toxicity of the samples collected from the premises of Mr.Vinod, cannot be attributed to the respondent industry., especially, in the light of the findings of CPCB that the sludge is non-hazardous. The learned counsel argued that the industry is not responsible for fish-kill and pointed out that in the letter dated 07.06.2013 addressed by the Environmental Engineer to the District Collector, it is stated that the nitrates which caused the fish kill, cannot be attributed to the respondent industry, as the nitrate is a chemical used in the manufacture of fire works.

63. Learned Senior counsel also argued that there is no merit in the arguments of the learned counsel for the applicants regarding the material balance. It is argued that

the industry is maintaining strict material balance in compliance with the Consent issued by KSPCB. Learned counsel also pointed out that the gross raw materials consumed is 170.5 TPD which consists of 74 TPD of crushed bone, 1.5 TPD of lime and 81.4 TPD of HCl and the concentration of HCl is 30% and 70% is water and therefore, the net quantity of HCl consumed is only 24.4 TPD. Hence, the total net quantity of material consumed is only 113.4 TPD. It is argued that during the process, the raw materials undergo a lot of physico-chemical changes and the pre treated and washed crushed bone is transferred to the acid bath and treated with 4% concentrated HCL for about 5-7 days to produce Ossein. This process is called acidulation. The Ossein thus produced is taken to the paddle washer for washing and for removing free acid and impurities and also neutralized at the paddle washer by adding hydrated lime. After such neutralization, Ossein is dried and packed and exported or used by the industry for conversion to gelatin, a product used widely in the pharmaceutical and food industry. The dried Ossein production is 13.3 TPD. Wet Ossein required for gelatin production is pumped into the liming plant where it is treated with lime for

35-45 days and treated like as a whole transported to gelatin unit for gelatin manufacture and limed Ossien production is 8.3 TPD. The Mono Calcium Phosphate (MCP) generated during acidulation is pumped to the Di Calcium Phosphate (DCP) plant and treated with hydrated lime solution for converting MCP to DCP and the settled DCP slurry is filtered, dried and packed and stored in closed storage and DCP production is 40.5 TPD. Thus, the sinews and bone meal separated during crushed bone pre-treatment is converted to meat meal in two processes, namely, dry process and wet process. In dry process it is packed and sold to local farmers as meat meal. It is pointed out that the production is 1 TPD. The bone meal separated after crushed bone washing is cooked with steam and dried and sold to the farmers as sterilized bone meal. According to the learned counsel, the total production is 63.1 TPD. The waste generated during the above processes is treated in the ETP . The process waste generated is in two streams, organic and inorganic. In the organic stream after removal of grease, the water is neutralized and the next process is degradation of organic compounds in the anaerobic digesters 1 and 2. It is contended that approximately 21 TPD

equivalent of solid substance is converted into biogas at the rate of 3000 cu m. per day. In the inorganic stream, the effluent is treated in the flash mixer, followed by flocculator, primary clarifier and Diffused Air Flocculatorfollowed and thereafter, by aeration, the sludge from primary clarifier is taken into thickener followed by Rotary Vaccum Drier, filter press and sludge drier. The final sludge generated both in organic and inorganic stream is 25 TPD. The effluent from DAF 1 and 2 further undergoes secondary and tertiary treatment and finally being discharged into the river and during pre-treatment of crushed bone, 3.5 TPD of bone meal and sinews is generated. Therefore, the argument is that the total waste generated would be 28.5 TPD and from the anaerobic reactor approximately 21 TPD equivalent mass of biogas is generated and if this is added to 63.1, the total output would be 112.6 TPD (63.1 +28.5 +21) as against the permitted output of 113.4 TPD and therefore, there is no material balance unaccounted as canvassed by the applicants. Learned counsel pointed out that the argument raised by the applicants that there is no material balance is without taking into account the loss of mass during the manufacturing process in liquid and

gases state and the mass equivalent of the biogas being generated in the anaerobic reactors. Hence, there cannot be any mis-match in the consent granted to the industry as alleged by the applicants. Learned counsel argued that as per the Consent order, the industry is authorized to generate 18000 TPY of solid waste amounting to 49.31 TPD and the waste generated has always been within the said parameter. The observation in the report of CPCB that the sludge generated from the ETP is only 15 to 18 TPD is not based on any scientific method. Learned counsel argued that the efficiency of the ETP is clear from the observations of the NEERI in its report as well as CPCB as the results show that all the relevant parameters are below the stipulated levels. It is pointed out that the report of NEERI dated May 2014 states that the performance assessment of ETP indicates that the characteristics of the final treated effluent meet the regulatory standards fixed by KSPCB. The Consent order and compendium of documents submitted by the industry prove that all parameters of the effluent are below the stipulated norms. It is also pointed out that the report of NEERI dated 27.02.2015 indicates that the performance of ETP is satisfactory and the

physic0 chemical characteristics of the effluent conform to the standards fixed by KSPCB and therefore, the contention of the applicants that the performance of ETP is not satisfactory, is erroneous .

64. Learned counsel argued that it is clear from various reports that the treated effluent discharged from the ETP has no impact on the river water. It is pointed out that NEERI's report dated May 2014 categorically states about the impact of effluent discharge on Chalakkudy river as the river water quality downstream of the discharge location of treated effluent from the industry, indicates that no major impact is observed in the characteristics of the river water with respect to major physico-chemical parameters including heavy metals and are well within acceptable limits of the Drinking Water Standards Specification. It is pointed out that the Shannon-Weiner Diversity Index and the Palmer Pollution Index also indicate absence of organic pollutants. It is also pointed out that the similar conclusion is drawn in the subsequent reports of NEERI dated 27.02.2015, 10.10.2015 and 02.06.2016. It is also pointed out that the analysis report of CPCB on the river

water samples indicates that all parameters are within the Drinking Water Standards and the CPCB had taken the samples of river water and bottom sediments. It was argued that though CPCB found that iron concentration is high, it is the same case on the iron concentration when the water was collected even from upstream of the discharge point. It is clear from the report that the discharge from the effluent treatment plant is not making any adverse impact on the quality of the water. Learned counsel therefore, argued that the contention of the applicants that the industry is polluting the Chalakkudy river is dis-proved.

65. Learned senior counsel also pointed out that the standards originally fixed for TDS and Chlorides were excluded from Schedule VI of the Environment (Protection) Rules, 1986 vide GSR 801 (E) dated 31.12.1993 and therefore, the TDS and Chlorides are not relevant to find out the quality of the effluent being discharged by the industry. It is also argued that as the parameters of TDS and Chlorides are excluded with

effect from 31.12.1993, the industry cannot be compelled to comply with those parameters.

66. Learned senior counsel also argued that the inference made by CPCB in the report submitted in the Original Application No.412 of 2016 (PB) to the effect that the sludge is highly dangerous to the surrounding environment is unfounded. It is pointed out that the very same report shows that the analysis result of the sludge collected from sludge dump site and sludge storage yard establish that the concentration of various parameters from the sludge comply with the standards for Organic Fertilizer and even the Mercury parameter is within the standard prescribed and therefore, there is no basis to conclude that the sludge is highly dangerous, especially, when it can be used as organic fertilizer. Hence, the observation that the sludge is highly dangerous, is in-consistent to the report of NEERI and KSPCB and even the findings of KSPCB .

67. Learned counsel also argued that the back wash water from the sand filter is a process effluent , which contains substantial quantity of suspended solids and thereafter, the

said water is treated at the polishing pond and then discharged from the ETP along with other effluents. Learned counsel argued that to the report of the CPCB filed in Original Application No.412 of 2016,(PB) the respondent has filed a detailed objection.

68. Learned counsel also argued that the attack made by the applicants against the NEERI report based on AAQ Monitoring station is without any scientific basis. It was argued that NEERI conducted a comprehensive study of the AAQ based on an Ambient Air Quality Monitoring Network consisting of 7 sampling locations covering 4 locations within the industry premises ,namely (1) crushed bone godown area, (2) raw effluent collection tank ,(3) tertiary clarifier in ETP area, and (4) compost area and four locations in the residential area namely, M/s.NGIl staff quarters road in Kathikudam, Kathikudam and Thykottam and the observations made by NEERI are based on the data collected from the said AAQ monitoring stations. Learned counsel also argued that the submission made by the learned counsel for the applicants regarding the flow meter is also not sustainable. It was argued

that flow meters are installed for measuring the intake of fresh water from the Chalakkudy river and the quantity of water drawn is consistently found within the stipulated limit of 3000 cu m per day. It is argued that therefore, the discharge quantity has always been less than the intake. It was also argued that the flow meters are used for measuring the processed effluents from the Ossein and Di-calcium phosphate process and the effluents from the said process are collected separately in an equalisation tank and thereafter pumped to the respective primary flash mixers for further treatment It has been taken note of by the NEERI in the report dated May 2014. It is also pointed out that V-notches are installed at the outlet of the ETP to measure the flow of discharge and therefore, the quantity of the effluent being processed in the ETP can be consistently monitored. The CPCB has unfortunately failed to take note of this aspect. It was also argued that the methodology adopted by the applicant with respect to material balance , based on TSS and TDS is not correct as it fails to take into account the various critical aspects. The total input amounts to 113.4 TPD and the products amount to 63.1 TPD. The total output is 112.6 which

is almost equal to the input. It is also argued that the possibility of mercury contamination in HCl is possible only if HCl is synthesized in a mercury cell process. It is argued that none of the agencies that supply HCl to the industry use the mercury cell process, which is an outdated process. Learned counsel pointed out that the suppliers are TCC and M/S.Chemplast and the former uses membrane process and the later makes HCl from Ethylene Dichloride by Pyrolysis route. In both these processes, there is no possibility of any mercury contamination. It is argued that the industry analyses every load of HCl that enters the premises and satisfies that it is within the stipulation. It is also pointed out that the report of NEERI shows that the sludge analysis for heavy metls reveals that all heavy metals are within the parameters. It is pointed out that the mercury level was found to be below detectable level as seen from the report submitted by NEERI dated 02.06.2016 . It is also argued that as far as the concentration of HCl used in the industry is concerned, the concentration is only 30% and not 32% as presumed by the applicants and it varies from 28.5 % to 32%. Moreover, the quantity of HCL consumed depends on the quantity of crushed

bone and vice versa. Even the 30% HCl is reduced to 4% for acidulation and it does not make any difference even if the percentage of HCl is 30% or 32%. It is therefore, argued that the anaerobic digesters convert approximately 21 TPD of solid substance into biogas and the inlets to the bio-digesters are fitted with flow meters and the flow of effluents into the digesters can be measured. The total quantum of effluent generated by the industry is approximately 2900 cu.m. per day. Out of this, the sludge in1860 cu.m. per day of effluent from the organic stream is processed and 21 TPD equivalent of solid is converted into biogas, since that quantity is included in the total effluent generated. Learned counsel would contend that a total of 21 TPD of solid waste is converted into biogas at the rate of approximately 2900 cu.m. per day. It is also argued that there is a total of 4 biogas plants (bio-digesters) in the ETP system. One pair of digesters converts the raw effluent from the equalization basin or effluent collection tank which is directly fed into the anaerobic digesters. Another pair of digesters plays the same role. It is therefore argued that the total mass of solid substance converted to gas is 18.91 TPD and the sludge processed in the

biogas plant feed from the primary clarifier and the secondary clarifier and the total quantity converted is 2.8 TPD and the grand total from all the plants amounts to 21.71 TPD and thus it is clear that 21 TPD equivalent amount of solid substance is converted into biogas and therefore, there is no material imbalance.

69. The learned counsel appearing for KSPCB argued that the Pollution Control Board is monitoring the industry regularly and only on satisfying that the effluent discharge satisfies all the prescribed parameters, Consent has been renewed from time to time. It was also argued that the quantity of sludge that can be dried, processed to manure, stored and disposed by the industry as per the Consent Order is 18000 TPD which is 1500 per month. It was also specified in the condition that sale of semi solid sludge to outside parties can be stopped on commissioning of biogas plants, sludge shall then be processed in the biogas plants. Accordingly, the Company commissioned two Anaerobic Bio Digesters. The first Anaerobic Digester was commissioned in March 2014 and the second Anaerobic Digester was commissioned in October

2015. Learned counsel submitted that after the commissioning of Anaerobic Digester, the sludge generation has been reported to be reduced to 900 tonnes / month namely, 10800 tonnes per year. It is also submitted the sludge generated by the company is not a hazardous waste as per the Hazardous Waste (Management and Transboundary Movement) Rules, 2016 and therefore, authorisation for handling the sludge waste is not mandatory. However, the Board shall ensure that the solid wastes are handled and disposed without causing any environmental pollution.

DISCUSSION AND CONCLUSION:

70. The following points arise for consideration:

1. Whether the functioning of ossein unit of the respondent Nitta Gelatin India Ltd., at Kathikudam in the Kadukutty Grama Panchayat is in violation of the siting criteria fixed by the Pollution Control Board as canvassed by the applicants.

2. Whether the ETP of the unit is functioning efficiently and sufficient enough to prevent the pollution.

3. whether the effluent discharged into the chalakkudy river satisfies the prescribed parameters

4. Whether the sludge generated by the industry is discharged into chalakkudy river along with the trade effluents discharged as alleged by the applicants.

5. Whether the sludge generated by the unit is hazardous.

6. Whether the discharge of the effluent from the industry has an adverse impact on the quality of water in the chalakkudy river or ground water.

7.What are the steps, if any, to be taken by the industry to make it pollution free.

71**. Point No.1**: The disputed Oessin unit of the respondent M/S.Nitta Gelatin (I) Ltd., admittedly started its commercial production in 1979 at Kathikudam in Kadukutty Grama Panchayat. The industry is admittedly classified as large scale red category industry by the Pollution Control Board.

72. The argument of the learned senior counsel, Mr.Mohan appearing for the applicants is that as per siting criteria prescribed by the Board by Circular dated 09.08.2004

such an industry cannot be established within a minimum distance of 100 meters from the residences. The argument is that enormous number of residential houses are located within the prohibited distance. Learned counsel is relying on the report of the Environmental Engineer of the Board dated 12.06.2012 which shows that the Environmental Engineer along with officials visited the company on 31.05.2012 and at that time they measured the distance from the nearest house and compound wall of the industry. As per the report "approximately 46 houses are existing within 100 meters from the boundary of the company" Learned counsel also argued that even the report dated 12.06.2012, submitted before the Ombudsman by the Engineer of the KSPCB, shows that there are several houses close to the industry and as per the Circular dated 09.08.2004 a large-scale red category industry has to maintain a minimum distance of 100 meters from the residences, the KSPCB should not have granted Consent or renewed later and therefore, the functioning of the industry at the site is clearly in violation of the siting criteria fixed by the KSPCB.

73. The argument of the learned senior counsel Mr. Anand, appearing for the industry is that the siting criteria has no application for the unit/industry established prior to 09.08.2004 and therefore, based on the siting criteria fixed on 09.08.2004 , the functioning of the respondent company which commenced its operation from 1979 onwards, cannot be found to be in violation of the siting criteria. Learned senior counsel also pointed out that even the Pollution Control Board admitted this position in the report dated 12.07.2012.

74. Circular PCB/TAC/18/2004 dated 09.08.2004 issued by the KSPCB shows that pursuant to the recommendations submitted by the Committee, constituted to study and record norms for siting criteria of the industries other than stone crushers, were considered in the meeting of the Board held on 17.05.2004 and finalised the criteria. Thereafter, in the Board meeting held on 23.07. 2004, it was decided to implement the siting criteria: As per the circular, in the case of industry having air pollution (including noise pollution) potential, distance shall be measured from the main building or the

building housing the equipment operation or process of most pollution potential and in case of industry having water pollution potential, distance shall be measured from the major waste water outlet. But in the case of industry having air and water pollution potential, the shorter of the above said two distances shall be taken. The minimum distance from the nearest residence, in respect of a large-scale red category industry is 100 meters. The Circular also shows that the said criteria will be implemented with immediate effect and will be reviewed after six months. Therefore, it cannot be disputed that the siting criteria fixed under the said Circular came into effect only with effect from 09.08.2004. The question is whether the said siting criteria could be made applicable to the industry which was already established and commenced its operation before 09.08.2004.

75. The siting criteria which came into existence for the first time on 09.08.2004, cannot be made applicable to an industry which came into existence in the year 1979, is the case of the 6th respondent industry. The Pollution Control Board

in their reply filed in Application No.305 of 2013 directly addressed this issue as follows:

> "The siting criteria stipulated minimum distance to be kept between the industry to nearest residence and to nearest educational institutions / court / public offices / hospital / place of worship / community hall / similar establishment (excluding other industry). Also the siting criteria does not specify any minimum distance from the industry to any stream, wells and other water bodies. **The respondent company started functioning since 1979 and the siting criteria came into force with effect from 09.08.2004 onwards only. Hence the siting criteria circular dated 09.08.2014 cannot be made applicable to the respondent company."(Bold letters supplied)**

76. In the light of the discussions, it can only be found that the siting criteria relied upon by the applicants to contend that the industry of the respondent is functioning in violation of the siting criteria fixed by the KSPCB in its circular dated 09.08.2004, is not applicable to the respondent industry and therefore, it is held that the functioning of the industry is not

in violation of the siting criteria as contended by the applicants. The point is answered accordingly.

77. **Points 2 to 6**: Before considering the disputed points, it is necessary to appreciate the manufacturing process of the respondent industry. The industry is engaged in manufacturing of ossein, limed ossein, dicalcium phospate and meat meal, and sterilized bone meal. As per the order of Consent, capacity of each of the components is 13.3, 8.31, 40.5, 3.0 and 2 tonnes per day respectively. The raw materials used are Crushed bone, HCl and hydrated lime. The unit is purchasing crushed bones from different parts of India including Aligarh in U.P. Though the report submitted by the Central Pollution Control Board (CPCB) in application No.412 of 2016 (PB) shows that the unit is also purchasing crushed bones from slaughter houses, the industry is disputing it and there is no material before the Tribunal to hold that it is purchasing the crushed bones from the local slaughter houses. Anyway, that is not a relevant aspect to be considered here. HCl is mainly purchased from M/S.Travancore Cochin Chemicals Ltd., and

M/s. Chemplast Sanmar, Mettur, Tamil Nadu. The manufacturing process comprises of three major parts. (1). Pre-treatment of crushed bone (CB) (2). Acidulation and (3) Di Calcium Phosphate Plant.

78. The raw crushed bone is fed into a hopper through screw and belt conveyors. In that process sinews and bone meal are separated using blower and rotary screen. Thereafter, crushed bone is transferred to rotary washers for washing and grease and bone meal are separated. After pre-treatment, crushed bone is transferred to the acid bath for further processing. The wash water from pre-treatment process is sent to the ETP through open drain as organic waste water. Crushed bone, thus transferred to acid bath is treated with 4% concentrated HCl for about 5-7 days to convert bone into a product called Ossein. After complete reaction, from crushed bone to Ossein, the Ossein is taken into paddle washer for washing and to remove free acid and other impurities are removed. At the paddle wash by adding hydrated lime, neutralisation washing is also done. After the neutralisation,

the Ossein is dried and then packed in PP bags and thereafter, the packed bags are exported. For the production of Gelatin, wet Ossein is pumped to liming plant where it is subjected to lime treatment (0.5-1.0% lime solution) for 35-45 days and treated lime as a whole in wet condition is transported to the unit of the respondent located in Kakkanad, Kochi for manufacturing Gelatin. The mono-calcium phosphate solution generated during acidulation is pumped to DCP plant for manufacture of Di-calcium Phosphate. The waste water from paddle washer is sent to ETP as organic waste water in open drain. The hot air required for Ossein drier is met through the firewood boiler attached to stack of 30 m height. The mono-calcium phosphate generated from acidulation process is pumped to DCP plant and treated with hydrated lime solution for conversion of mono calcium phosphate to Di-calcium phosphate solution and the same is allowed to settle down to obtain DCP slurry. The DCP slurry is filtered using Rotary Drum Vacuum filter (RDV), dried, packed and stored in closed storage yard. The filtrate and supernatant generated during the process is sent to ETP through open drain as inorganic waste water. The separated sinews and bone meal during the

pre-treatment process is converted into a product called meat meal in two processes, i.e dry process and wet process. The sinews and bone meal separated from crushed bone , which is in dry form are packed and sold to local farmers for using as meat meal. The bone meal separated during crushed bone washing is cooked in a cooker with a steam and then dried and finally sold to farmers as sterilised bone meal as poultry feed. Therefore, the source of water is from Chalakudi river. As per the Consent order, the industry is permitted to draw 3000 m^3/ per day water from river Chalakudi. Admittedly, the industry has installed flow meter to measure the water consumption at the intake point in the industry premises and a log book also was maintained therein by the industry to note the reading of water consumption.

79. Waste water generated in the unit is categorised as process waste water and domestic waste water. The major sources of process waste water are wash water from pre-treatment of crushed bone, wash water from Ossein washing , effluent from liming plant, supernatant from DCP precipitation

and filtrate from DCP filtration. In addition, cooling tower blow down, boiler blow down, storm water collected in storm water drain and water collected as leach from bio filters are also sent to ETP and the existing ETP is of the capacity of 5000 m^3/day. It is designed to treat the effluent generated during the manufacturing process. The waste water, as stated earlier, generated in the unit, is segregated into organic stream and in-organic stream. The organic stream includes waste water from pre treatment of crushed bone, wash water from Ossein washing, effluent from liming plant, boiler blow down, floor washing and storm water. In-organic stream includes Supernatant from DCP precipitation and filtrate from DCP filtration. The organic waste water generated from Ossein plant is transferred into ETP in a separate channel with gravity flow and collected in grease trap tank for removal of grease generated during washing. The overflow of effluent is collected in effluent collection tank after the removal of grease and then pumped to flash mixer where lime and alum are present to neutralize the effluent followed by buffer tank. The online pH meter is installed in buffer tank. The working of pH meter is cross verified and found that the meter is working

satisfactorily. From the flash mixer, the effluent is pumped to anaerobic digester 1 and 2 for degradation of organic compounds in anaerobic condition. The biogas generated during the oxidation is collected in biogas holder and used as fuel for boiler. The overflow from anaerobic digester is collected in Lamella Clarifier 1 & 2 for settlement of solid particles. The overflow of lamella clarifier is pumped to flash mixer followed by Flocculator(2), primary clarifier, Diffused Air Flocculator(DAF – 2) and from there, it is mixed along with inorganic effluent and then sent to aeration tank for further treatment. The sludge from primary clarifier is taken into thickener followed by Rotary Vaccum Drier, filter press and sludge drier. The final sludge is collected and packed in polythene bags and sent to Treatment, Storage and Disposal Facility (TSDF) at Kochi.

80. The waste water generated from DCP plant is being termed as inorganic stream and the supernatant from DCP precipitation and filtrate from DCP filtration is taken into DCP effluent collection tank in separate channel and collected in

DCP effluent collection tank. The water from effluent collection tank is pumped to flash mixer 1 & 2 followed by flocculator, primary clarifier and Diffused Air Flocculator(DAF-1). The treated effluent from DAF-1 is pumped to aeration tank along with the treated effluent from DAF-2 for further treatment. The sludge from primary clarifier is taken into thickener followed by Rotary Vacuum Drier, filter press, and sludge drier. The final sludge is collected and packed in polythene bags and sent to the TSDF at Kochi. The effluent from DAF-1 and 2 are pumped to aeration tank 1 & 2 for further oxidation. The online D O meter and temperature meter are, admittedly, installed at aeration tank. The effluent after aeration is pumped to secondary clarifier followed by flash mixer, flocculator, tertiary clarifier, sand filter and delay pond. The effluent from delay pond is diluted with the back wash water of sand filter (fresh water sand filter) and finally discharged into Chalakkudy river. The industry has installed online pH meters at different treatment points of ETP and five cameras are also installed at ETP having direct access to the KSPCB for surveillance purpose. The online pH meter is also installed at the final outlet point in the premises of the industry before it is

discharged into the river. It is displayed at the main gate of the industry for public access. The final treated effluent is being carried to Chalakkudy river through closed concrete conduit of 900 m length having outer diameter of 18". The conduit is buried 5 meter below the earth surface and submerged about 5 meter deep in the river. It is at that discharge point, the final treated effluent is discharged into the river. As the outlet point is at 5 meter depth in the river, it is not visible from outside.

81. While the question of pollution allegedly caused by the 6th respondent industry was brought to the notice of the Hon'ble High Court of Kerala in WP (C) No.15795 of 2013, by order dated 03.12.2013, the Hon'ble High Court directed CSIR NEERI, Nagpur to conduct a detailed study on the pollution status with respect to the Air, Water and Solid waste generated from the Ossein Division of M/s.Nitta Gelatin India Ltd. including the adequacy and efficacy assessment of the pollution control measures installed and to submit a report to the KSPCB and the District Collector, Trichur with its

recommendations and specifying the time bound action plan for implementation of the recommendations.

82. As directed, the CSIR-National Environmental Engineering Research Institute (NEERI) conducted prima facie assessment of the site and surrounding areas during 23rd – 24th January, 2014. After assessing the industry site, surrounding areas, habitat, existing stacks in the industry, Existing Effluent Treatment Plant (ETP) and wind blow pattern, a detailed programme for sampling of emissions, odour, surface and ground water, solid waste/sludge and soil and strategy for monitoring of air quality, assessment of ETP and green belt assessment within the industry premises, were designed and sampling locations were identified. 17 Members comprising 10 Scientists and 7 Project Assistants conducted the study and submitted a report on May, 2014. The report shows that the quantity and characteristics of the process effluents from Ossein and DCP plants were evaluated for a period of three days, namely, February 13th, - 14th , 14th-15th and 15th - 16th 2014. The Ossein and DCP Process effluents were also sampled for characterisation. Hourly samples were collected at

inlet of flash mixture and composited for 12 hours, and 24 hours for three days. The concentration of various physico-chemical parameters in process effluents including heavy metals were monitored and presented under Table 10.1 appended to the report. The high strength (in terms of organic load) Ossein process effluent is acidic to neutral in nature with high organic and inorganic contents including oil and greases and total kjeldhal nitrogen (TKN), Dicalcium phosphate process effluent was also acidic to near neutral in nature with low concentration of organic matter and TKN but with high concentration of inorganic materials. Low organic strength di-calcium phosphate process effluent was found suitable for diluting the high organic strength for biological treatment. The combined effluent of Ossein and DCP process units were also assessed by them for characterization. The hourly samples of Ossein and DCP process effluents were mixed in the ratio of 1.0 : 35 to 1.0 : 45 based on flow monitored at inlet of flash mixer. The concentration of various parameters in the combined effluent were also furnished along with report under Table 10.1. NEERI considered the adequacy assessment of effluent treatment plant under Clause 10.2 of page 35 of the

report. It shows that performance assessment of the ETP was carried out through flow monitoring of Ossein and DCP effluent streams and analysis of composite samples collected at various stages of the treatment. It is shown in Plan 10.1 of the report. Samples were collected from the various stages of the treatment. Samples were collected hourly and composited for 12 hours and 24 hours during the said period of February 13th to 15th, 2014. Samples collected were placed directed into acid-rinsed polyethylene bottles with no filtration. Samples collected were analysed for physico-chemical parameters including heavy metals as per the methodology prescribed for the examination of water and waste water.

83. Measurement of pH was conducted online and analysis of suspended solids (SS) total dissolved solids (TDS), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Ammonical Nitrogen dissolved oxygen (DO) mixed liquid suspended solids (MLSS) and mixed liquid volatile suspended solids (MLVSS) were performed in the onsite laboratory. Preservation samples were taken to the Laboratory at NEERI, Nagpur and analysed for the rest of the parameters

including heavy metals. The physico-chemical characteristics of the composite samples at various stages of the treatment are shown in Table 10.2 of the report. The major physico-chemical characteristic parameters including heavy metals, sand filter treatment, final treated effluent of ETP conformed to the stipulated limits for discharge into inland surface waters as per Consent prescribed by KSPCB as shown in table 10.5 of the report. To assess the impact of discharge of treated effluent from ETP on the aquatic life of the receiving water body, treated effluent samples from ETP being discharged into Chalakkudy river, were collected and subjected to static fish bioassay test. That test was conducted in the laboratory at room temperature using Zebra fish as test fish species, as prescribed by the CPCB, New Delhi in the guidelines (Method of Determination of Waste Water Toxicity for fish) That method was also adopted by the Bureau of Indian Standard as Bioassay Method of Evaluating acute toxicity of industrial effluents and waste water. During the test, no mortality was observed for control. The test result of the 'as received' treated effluent samples from the ETP without any dilution, also shows no mortality after exposure for 96 hours and the fishes

survived throughout the exposure time indicating that 'as received' samples were non-toxic to fish life. Based on these results of NEERI, the following were observed:

- The ETP was operational at an average flow rate (combined effluent) in the range 2764-2844 m^3/d during monitoring vis-à-vis the maximum flow of 3000 m^3/d as per the KSPCB Consent. Thus, the ETP was operational at 92.1-94.8% of the Consent flow.
- Physico-chemical characteristics in terms of the major parameters of the final treated effluent being discharged into Chalakudy river as observed during the monitoring vis-à-vis the KSPCB stipulated norms, are as follows:

Parameters	**Magnitude**	**KSPCB norms as per Consent for discharge into ISW**
	Final treated effluent	
pH	6.4-7.1	5.5-9.0
SS	60-72	100
COD	102-108	250
BOD (3d-27°C)	22-26	30
Ammonia-N	37.6-42.8	50
TKN	54-66	100
Phosphates ($x10^{-1}$) as P	0.29-0.42	5
Oil & grease	6.0-10.0	10

- The concentration of the physicochemical parameters in the final treated effluent from ETP conformed to the stipulated limits of the KSPCB for discharge into Inland Surface Waters as per Consent with respect to all the parameters.

- The heavy metals concentration in the final treated effluent from ETP was in very low concentration of below detectable limits.
- The result of the static fish bioassay test of the 'as received' treated effluent samples from ETP without any dilution, had no mortality after 96 h of exposure time indicating that the treated effluent samples were non-toxic to fish.
- As observed during monitoring the dosing of coagulant and coagulant aid was random and not based on treatability optimization for chemical precipitation at primary stage of treatment. The quantity of lime, alum and polyelectrolyte usage in primary treatment are as follows:

Particular	Dosage, mg/l	Quantity, kg/d
- Lime	~500	~1500
- Alum	~150	~450
- Polyelectrolyte	~1.5	~4.5

- The quantity of chemical sludge generated from primary treatment was in the range 200-230 ml/l.
- Online pH meters are not installed at primary and tertiary level of treatment where alum is used as coagulant. Alum works as an effective coagulant agent in a narrow pH range 6.5-7.8. Hence, it is imperative to install an online pH meter in chemical treatment unit.
- The weirs provided in clarifiers are not uniform which may lead to short circuiting of flow and formation of dead pockets, resulting in poor clarification of treated effluent.
- The operational hydraulic retention time (HRT), overflow rate (OFR), weir loading (WL) and performance of the primary clarifier with respect to SS, COD, BOD and phosphate removal were as follows:

Parameter	Existin	CPHEEO	Removal efficiency+, %

s	g	*				
HRT, h	6.6-6.7	2.5-3.5	SS	COD	BOD	Phosphate
OFR, $m^3/m^2/d$	11.40-11.62	25-50	89.1-90.6	78.5-81.8	76.5-78.3	90.2-93.6
WL, $m^3/d.m$	35.6-36.7	125				

***CPHEEO, 2012; +Bases on 12 and 24 hours monitoring.**

- HRT in primary clarifier was high (6.6-6.7 h) vis-à-vis the design criteria. High HRT may lead to development of septic condition due to high organic fraction and thereby may affect the performance of the downstream biological process.
- The pH of feed to aeration tank was observed to be alkaline (range: 7.2-8.7) rather than the desirable range (6.8-7.2) necessary for effective bio-oxidation.
- The BOD: Nitrogen: Phosphate (B:N:P) ratio in aeration tanks was in the range 100:14.5:0.20 to 100:15.3:0.30 as against a standard requirement of 100:5:1 for effective aerobic bio-oxidation. Thus, effluent routed to aeration tank was deficient in phosphates which may affect metabolism of bacteria and lead to non-optimal growth rate.
- The aeration tanks are provided with seven surface aerators in addition to diffused aeration. The tanks are completely covered from the top to control odour emission **(Plate 10.03).**
- The oxygen requirement for oxidation of organics based on BOD concentration as monitored was in the range 2048-2746 **KgO2/d.** The power requirement to meet the oxygen demands through surface aerators alone would be in the range, 115-155 HP and through blower would be in the range, 100-135 HP, respectively.

- The total HP of 7 aerators provided is 115 HP and that of the compressor is 100 HP. However, the power efficiency (PE) and actual torque at shaft of the seven aerators in operation as estimated at site were lower than the rated capacity **(Table 10.6).**
- The PE of the seven operational aerators was in the range of 48.1-66.8% as against the rated capacities and the actual torque at shaft was in the range 59.2-83.3 Nm as against the rated torque of 63.0-89.1Nm. Similarly, the PE of the compressor was also lower (51.1%).
- Thus, the low DO concentration in the aeration tanks could also be attributed to the low power efficiencies of the existing aerators and compressor.
- The low power efficiencies of the surface aerators are due to the excessive wear and tear of conveyor V-belts causing reduction in torque at shaft of the surface aerators. On the other hand, the low PE of the compressor is mainly due to non-optimal control of air flow and pressure.
- It was observed that alum was dosed at the outlet of aeration tank and polyelectrolyte was added in the secondary clarifier to improve settling of biomass in secondary clarifier. The quantity of alum and polyelectrolyte addition was ~150 and ~6 kg/d, respectively. Due to chemical dosing the sludge from the secondary clarifier was rather heterogenous in nature than being completely biological. Recycle of such heterogenous sludge (chemical and biological) in aeration tank severely affects biological activity. This was evident from the visual appearance of biomass that appeared discuss and thick as floccculant polymer solution. The whitish colour probably also indicated the presence of excess polyelectrolyte in the aeration tanks, which was dense rather than flocculant and whitish in colour due to presence of unreacted coagulant/ coagulant aid.

- The MLSS and MLVSS concentrations in the aeration tank I under the existing operation were in the range 7969-9320 and 2330-2568 mg/l, respectively, whereas the concentrations in aeration tank II were in the range 8450-10600 and 3250-3300 mg/l, respectively.
- The ratio of MLVSS and MLSS was in the range 0.29-0.34 as against the design ratio of 0.8-0.85. This is indicative of the presence of inorganic fraction in the biomass from aeration tanks due to chemical dosing in aeration tank and secondary clarifier thereby resulting in ineffective bio-oxidation.
- The dissolved oxygen concentration as mentioned in both the aeration tanks was nil. This may be attributed to two main reasons. Firstly, as the aeration tanks are completely covered (Plate 1) hence the atmospheric oxygen transfer was negligible, and secondly, oxygen transfer efficiency of the surface aerator was low.
- The design parameters, namely food of micro-organisms ratio (F/M) and volumetric loading rate (VLR) considering both aeration tanks under existing operating conditions vis-à-vis design criteria were as follows:

Parameters	Aeration tank	
	Existing+	Design Criteria
F/M, d^{-1}	0.33-0.45	0.2-0.6
VLR, kgBOD/m^3.d	0.69-1.26	0.3-1.6

- Microscopic analysis of biomass from aeration tanks reveals presence of filamentous bacteria. Details of species identified and their characteristics are given in **Table 10.7.** The identified species typically were not responsible for foam formation in aeration tanks. The foaming in aeration tanks may be due to the presence of high concentration of oil & grease (140-180 mg/l) in primary treated effluent being routed for bio-oxidation.
- To determine the sludge volume index (SVI) and sludge setting rate of the sludge from aeration tanks sludge

setting studies were carried out in one litre. The SVI and sludge setting rate as monitored were as follows:

Particulars	Aeration tank	
	I	II
Sludge Volume Index (ml/g)	31.5-36.8	31.4-36.8
Sludge settling rate (m/h)	0.21-0.24	0.23-0.26

- Bio-logical sludge with SVI value in the range 80-100 ml/g has good settle ability. The low SVI value and high settling rate indicate presence of chemical sludge and/or mineralized sludge in aeration tanks.
- HRT, OFR and WL of secondary clarifier including performance of the biological treatment with respect to SS, COD and BOD removals as monitored were as follows:

Parameters	Existing	CPHEEO*	Removal efficiency+, %		
HRT, h	7.0-7.2	1.5-2.0	SS	COD	BOD
OFR, $m^3/m^2/d$	8.4-8.6	8-15	22.6-25.4	39.1-40.6	70.3-73.1
WL, $m^3/d.m$	35.6-36.7	125			

***CPHEEO, 2012; +Bases on 12 and 24 hours monitoring.**

- High HRT in secondary clarifier is attributed to over design of the unit operation. High HRT may lead to septic condition and deteriorating the quality of clarified effluent. The solid settling rate in secondary clarifier is maximum during the first 2.0-2.5 h of settling and thereafter decreases considerably. Hence, longer retention period do not provide much advantage, and instead may lead to sludge000 bulking.

- The dosage of alum and polyelectrolyte for chemical precipitation at tertiary stage of treatment was ~300 kg/d and ~3 kg/d, respectively.
- HRT, OFR, WL and performance of the tertiary treatment with respect to SS, COD and BOD removals as monitored were as follows:

Paramete00rs	Existing	CPHEEO*	Removal efficiency+, %		
HRT, hr	17.0-17.4	1.5-2.0	SS	COD	BOD
OFR, $m^3/m^2/d$	3.4-3.5	8-15	68.7-70.8	74.9-76.3	68.1-70.6
WL, $m^3/d.m$	27.5-28.3	125			

***CPHEEO, 2012; +Bases on 12 and 24 hours monitoring.**

- HRT in tertiary clarifier was high (17.0-17.4 h) compared to the design criteria. High HRT may lead to septic condition and may result in biofouling of the downstream sand filter.
- Performance of the pressure sand filter with respect to SS, COD & BOD removal efficiencies based on 12 and 24 h monitoring were in the range 5.1-6.8, 9.1-11.1 and 4.9-5.8% respectively. Performance of pressure of the media to be followed as per instruction laid down in the operational manual.
- No separate energy meter is provided for effluent treatment plant. A separate energy meter exclusively for ETP would facilitate monitoring of power consumption by the regulatory authorities to ensure continuous operation of the ETP."

84. NEERI also suggested mitigation measures for improved and sustained performance of the ETP at peak flow, which include mixing facility of adequate capacity must be provided in collection tank of DCP process effluent for proper equalisation of the effluent as the manufacturing process are batch operated, which will ensure flow of equalised effluent into downstream units facilitating ease of coagulant dosing and avoiding shock loading, online pH meter must be installed at the primary, secondary and tertiary stages of treatment to ensure maintenance of optimum pH for effective chemical precipitation and bio-oxidation, the dosage of coagulant and coagulant aid at primary and tertiary stages of treatment should be optimized based on the concentration of major pollutants in the feed through regular jar test (treatability studies) facilitating optimal chemical consumption for effective chemical precipitation and consequent minimal chemical sludge generation, the coagulant and coagulant aid must be properly closed in the flash mixer with rapid mixing at 100-120 rpm for 1-2 minutes followed by slow mixing at 30 rpm for 15-120 minutes in Flocculator to achieve effective coagulation/flocculation, regular de-sludging from the primary

clarifier must be practised to prevent escape/carry-over of suspended solids in the clarified effluent, dosing of coagulant and coagulant aid in feed to secondary clarifier must be discontinued, as recycle of sludge from clarifier to aeration tank will result in building of chemical sludge in aeration tanks, efforts to be made for development of active biomass in aeration tanks for effective bio-oxidation and achieving optimum removal of soluble organics, the pH of primary treated effluent routed to aeration tank must be maintained in the range 6.8-7.4 and dissolved oxygen must be regularly monitored and maintained in the range 2.0 – 2.5 mg/l to ensure optimum environmental conditions for proper growth of microorganisms for effective bio-oxidation, the bio-degradable organics to nutrient ratio of 100 : 5.1 must be maintained in aeration tanks for effective bio-oxidation through supplement of nutrients, if required, the torque at shaft of the aerators must be improved through regular replacement of conveyor V-belts and predictive maintenance of the assembly to enhance the efficiency of the existing surface aerators, in case of the compressor, the air discharge rate must be regulated to achieve improved efficiency, the

covered roof in the aeration tank may be partly removed to allow transfer of atmospheric oxygen into the liquid during aeration to improve the desired dissolved oxygen concentration or both the aeration tanks must be provided with diffused aeration instead of surface aeration, bio-sludge recycle and wastage from secondary clarifier must be optimally practised based on design to ensure desired MLSS concentration in aeration tanks and improve the sludge growth rate, the combined effluent has high concentration of TKN which eventually converts to Ammonia-N and the development of active biomass in aeration tanks will facilitate removal of ammonia through bio-oxidation, weirs must be refurbished in primary, secondary and tertiary clarifiers to maintain design weir loading rate for facilitating uniform outflow velocity to prevent short circuiting and avoid formation of dead pockets , thereby ensuring effective clarification in the industry, sand media filters must be backwashed at regular intervals as per the operational manual guidelines to ensure optimum efficiency of the filtration units. And further, the management must consider the feasibility for further reducing the effluent generation through the plant process improvement thereby

decreasing the quantity of effluent discharge into the river as at that time around 45.8% of waste water alone was generated from process units is recycled/reused within the plant in various processes, as at that time pH, SS, BOD, COD, Ammonia Nitrogen, Phosphate and oil and grease are analysed for the final treated effluent alone , which is finally discharged into the Chalakkudy river, regular analysis of the major parameters at various stages of treatment was recommended to ensure performance check of the various unit processes in the ETP. Equipping laboratory with proper instrumentation facilities namely, Jar test apparatus, double beam spectrophotometer and double distillation unit, TKN digester with ammonia distillation assembly were suggested. Maintenance of proper records in the form of printed log books of quantity of waste water generated, chemical and energy consumption, laboratory analysis for the ETP performance, quantity of sludge generated and schedule followed for recycle of biological sludge were suggested as this will facilitate proper operation and maintenance of the ETP and to facilitate monitoring of power consumption by the regulatory authorities

providing of separate energy meter was recommended to ensure that ETP is continuously operated.

85. To assess the impact of the effluent discharged on the water quality of Chalakkudy river, a sampling programme was prepared and considered the river flow pattern. River water was sampled at 10 locations spread over the river stretch starting from Vynthala pump house – 2.51 km upstream of water intake Well of the industry to - 17.18 km downstream of treated effluent discharge location of the industry at Kanakkankadve barrage. The total river stretch of 20.3 km was covered to assess the quality of water in the river. Sampling was carried out at the centre of the river using a motor boat and also at both the banks at few locations downstream of the treated effluent discharge location. The results are given in Table 10.8 and 10.9 of the report. Study was also conducted on aquatic biodiversity.

86. So also, to assess the impact of the industrial activity on ground water in the vicinity of the industry, sampling locations were identified and samples were collected

and ground water samples were collected from open dug wells that are used in residential blocks in the nearby villages around the industry. Detailed physico-chemical characteristics including heavy metals of ground water samples collected from the villages are quantitatively analysed along with the acceptable limit and permissible limit of Indian Standard Drinking Water Specification and shown in table 10.16 appended to the report. Water samples were also collected from the paddy field adjacent to the industrial site at Perunthode channel, pond opposite to M/s.Kirupa bone industries and the ponds in low lying area and dumping site within the industry premises. The detailed physico-chemical characteristics including heavy metals of the water samples collected from various locations are furnished in tale 10.18 appended to the report. Based on the study, it was observed that the characteristics of surface water collected from Chalakkudy river from 2 km upstream of water intake Well of the industry to 17.18 km downstream of treated effluent discharge location do not indicate high concentration of any major pollutants. The river water quality of the downstream treated effluent from the industry indicates that no major

impact is observed in the characteristics of river water with respect to major physico-chemical parameters as per Drinking Water Standards Specification.

87. Shannon-Wiener Diversity Index (SWI) values of the river water samples based on composition of phytoplankton found varied from 3.11 to 3.55, which indicate the level of plankton biodiversity with minimum impact of organic pollution or adverse factors for plankton growth. The Palmer Pollution Index (PPI) of 20 or more in a sample which is an indicator of organic pollution was ruled out as the PPI values as estimated and as per the samples collected from various locations varied in the range 4-10 indicating absence of organic pollution (table 10.10 of the report) SWI values for zooplankton ranging between 1 and 3 are believed to indicate semi productivity of a water body while the values above 3 are considered the minimum impact of pollution or adverse factors as SWI values varied from 3.01 to 3.65 which indicate good level of plankton biodiversity with minimum impact of organic pollution or adverse factors for plankton grown. The characteristics of

ground water sampled from dug Wells located in the villages around the industry do not indicate the presence of any major pollutants in concentrations exceeding the permissible limit of Drinking Water Standards. The characteristics of the water samples collected from various locations identified by the members associated with the ongoing agitation against the industry do not indicate the presence of any major pollutant in concentrations that can attribute to any discharge/disposal of waste from the industrial activity. The waste generated were inventorized to find out (Hazardous Waste Management Handling and Transboundary Movement) Rules. The sinews, a fibrous tissue binding muscle and bone are generated as waste during the pre-treatment of crushed bones and are collected in gunny bags and either converted into a value added poultry feed product, namely, meat meal or sold as manure to manufacturers as it is a good source of nutrient supplement. The fine dust of bones present in crushed bones separated during pre-treatment of crushed bones, is collected in gunny bags and either sold as manure or processed into a value added product called as meat meal, which is a good nutrient supplement and it is also sold to the poultry feed

manufacturers. The effluent generated during the manufacture of various products is collected in an equalization tank and treated in a three stage ETP. It was found that the primary ETP sludge is sun dried and collected in polypropylene bags. The primary ETP sludge is termed as nutrisoil and sold as soil nutrient, supplement to the compost/manure manufacturers. The secondary ETP sludge is subjected to biological treatment which comprises of aeration tank followed by secondary clarifier. A part of bio sludge settled in the secondary clarifier is recycled to the aeration tank to maintain the MLSS concentration and the excess sludge is subject to de-watering using filter process. The de-watered sludge is discarded as secondary ETP sludge. It is collected and stored in polypropylene bags and used for compost manufacturing and the remaining product is sold as manure to the manufacturers. The wood ash used as fuel in the furnace to meet the requirement of heat energy for drying of Ossein and DCP, is collected in polypropylene bags and used for composting within the industry. Spent/used oil generated from various mechanical equipments is collected in impermeable containers and stored in a covered shed. E-wastes of various categories generated

from electrical/electronic equipments, is periodically sold to KSPCB authorized agency. On an average four number of filter cloths are discarded as waste in every two months from the drum filter and filter press. It is stored and disposed of periodically.

88. Based on analysis of various solid waste/sludge generated by the industry, it was observed that the sinews, bone meal waste, are non hazardous as provided under the Hazardous Waste (Handling, Management and Tran-boundary Movement) Rules, 2008. So also, on the primary ETP sludge, it was observed that "on the process details of generation and the overall analysis, it may be concluded that the Primary ETP sludge does not contain any hazardous constituent and therefore, classified as non hazardous waste as per the Hazardous Waste (Handling, Management and Tran-boundary Movement) Rules, 2008". The waste however, has a very high pH and needs to be managed in an environmentally sound manner to prevent contamination of land and water resources. Based on the analysis of the secondary ETP sludge, it was observed that " on the overall analysis it may be concluded

that the secondary ETP sludge does not contain any hazardous waste as per the Hazardous Waste (Handling, Management and Tran-boundary Movement) Rules, 2008". The sludge, however, has high pH value and needs to be managed in an environmentally sound manner to prevent contamination of land and water resources. The waste generated by using the wood as fuel, it was observed that the wood ash generated by using the wood as fuel, is also non hazardous waste. On the analysis of the samples collected at dump site adjacent to ETP , it was observed that "Based on the visual inspection and the overall analysis it may be concluded that the dump material does not contain any hazardous constituent and is therefore, classified as 'non-hazardous waste' as the Hazardous Waste (Handling, Management and Tran-boundary Movement) Rules, 2008. The dumped material has a very high pH value and needs to be managed in an environmentally sound manner to prevent contamination of land and water resources. Based on the analysis of the representative samples collected to check the presence of hazardous constituent, it was observed that based on the overall analysis, it may be concluded that the compost does not

contain any hazardous constituent. The impact of waste dumped on open land was also considered by NEERI. It was reported that the analysis of soil samples collected from dump site conform various physico-chemical parameters and its comparison with control soil sample indicates that there is no significant and adverse change in the characteristics of soil at the dump. In addition, the characteristics of the soil samples from the paddy field adjacent to the industry and also from the excavated land on northern side of the industry , adjacent to abandoned roof tile industry, do not indicate any major change in characteristics compared to control sample. Still, as a mitigating measure, NEERI suggested after observing that the industry does not generate any hazardous waste from the process and only hazardous waste generated by the industry is used/spent oil which is generated from various mechanical equipments. Considering the high pH value of the some of the wastes such as primary and secondary ETP sludge as well as low pH value of wood ash, it was recommended not to dump or store these wastes directly on land to avoid any possibility of ground water contamination.

89. On the aspect of air environment, it was reported that the dust and gaseous pollutants from the industrial unit are collected, treated wherever required and emitted through stacks attached to various processes. The concentration of particulate matter emission from Ossein (162.3 – 175.2 mg/Nm^3) furnace hot air generator, as monitored, marginally exceeded the regulatory limit (150 mg/ Nm^3). It was also observed that as the data was based on short term monitoring, the high concentration observed may be only due to blowing operation being carried out in the hot air generator during the stack monitoring. But the particulate matter control at source needs attention. The Particulate matter emission from stack attached to DCP manufacturing unit conformed to the prescribed limit fixed by KSPCB. It was, however, noted that emission limits for Sulphur di-oxide and Hydrogen sulphide from stack have not been stipulated in the Consent Order. The average concentration of particulate matter (PM_{10} & $PM_{2.5}$) monitored on 24 hourly basis in the ambient air within the industry premises and in the surrounding areas, were found to be within the prescribed National Ambient Air Quality Standards. The Ambient Air Quality in reference to the

parameters namely, $SO_{2,}$ $NO_{2,}$ H_2S and NH_3 are within the industry premises and surrounding areas were also found within the norms prescribed by the National Ambient Air Quality Standards. The concentration of the parameters, namely, $SO_{2,}$ $NO_{2,}$ NO, NH_3 and H_2S installed by the management within the industry continuously displayed through an electronic display board. An online Ambient Air Quality monitoring station has been installed by the management within the industry premises. The odour concentration as monitored at various locations was reported as very low. Lower concentrations were observed at location in the surrounding areas of the industry premises. But it was also observed that the odour as monitored was found higher during early morning and evening hours compared to day time and this can be due to different meteorological conditions that prevail during those periods of the day. High odour concentrations were detected at the manufacturing points, namely, cooking and separation of dry sinews, wet bone meal, pre-treatment of crushed bone, acidulation of crushed bone and DCP precipitation and filtration.

90. Based on the findings, NEERI suggested the following recommendations:

1. To control odour emission from crushed bone (CB) charging area, it is recommended to provide an enclosure for the charging process of CB. The existing godown admeasuring 45 m x 11 m with 6.2 m height along the length and 8.2 m along the width (Figure 14.1). The existing CB charging equipment may be relocated within the enclosure with necessary modifications and provided with blower and discharge duct connected to a new scrubber system or a biofilter. The enclosed space would be around 4428 m3 with the existing blower of 12000 m3/h capacity. However, it is recommended to enhance the blower capacity by providing an additional blower of 30000 m3/h capacity to achieve improved air circulation. The blower discharge should be scrubbed through installation of a new scrubber system having capacity of 12000 m3/h, or treated in a biofilter designed for an adequate capacity.

2. In addition, the bay on the Eastern side of the godown must be isolated/ separated by providing a partition wall. This will reduce the storage space of the godown, and restrict storing of CB on the Eastern side of the godown and thereby control dust and odour emissions on the Eastern side of the industry which is adjacent to the boundary wall of M/s NGIL. The schematic of the proposed modification of the godown is presented in Figure 14.1.

3. Similarly to control odour emission in acidulation of CB and DCP precipitation & filtration process areas, the ambient air from these process areas may be treated using the existing biofilter. Ambient air from these areas may be routed to the existing biofilter by providing ducts and blowers to mitigate odour emission in these areas.

In addition, the following recommendations must be judiciously implemented in a time bound manner (Table 14.1) for sustainable environmental management:

4. Use of low ash and low sulphur contents fuel in furnaces and boilers must be practiced for control of PM and SO_2 concentration at sources.

5. The ossein furnace hot air generator emissions marginally exceeded the regulatory limits for particulate matter. Though the monitoring data is based on short term assessment, feasible corrective measures are needed to ensure emission within the norms on a sustainable basis.

6. The present practice of spraying deodorant in the process unit areas where odour emissions are higher must be continued to control the odour problem in and around the industry premises.

7. The chemical treatment unit process of ETP comprising coagulation-flocculation needs to be operated effectively to optimize the treatment efficiency. Since the chemical treatment is pH dependent. It is recommended to provide online pH meter in reaction tanks ensuring maintenance of optimum pH for effective precipitation of the

pollutants and thereby reducing the consumption of chemicals and subsequent sludge generation.

8. Similarly, the performance of the biological treatment needs to be improved. The efficiency of the surface aerators must be enhanced through regular maintenance and in case of the compressor the air discharge rate must be maintained as per the recommendation of the manufacturer. This will ensure optimum oxygen supply thereby facilitating proper biomass growth leading to improvement in bio-oxidation of the organics. In addition, the present practice of adding coagulant/ coagulant aid in biological process for improving sludge settleability must be discontinued. This will facilitate development of active biomass in the system for effective bio-oxidation on a sustainable basis.

9. Regular backwashing of sand filters must be ensured for optimum performance of the sand filtration unit, and if necessary the media must be replaced with proper media size depending on the size of the suspended fraction.

10. The final treated effluent characteristics from ETP conform to the limits of all the seven stipulated parameters of the KSPCB Consent. However, the concentration of the chloride in the final treated effluent being discharged is higher than that in the receiving water body. The KSPCB has given Consent to M/s. NGIL vide letter dated 20.09.2009 excluding the chloride parameter as long as the river water quality meets the Indian Standard Drinking Water Specifications (IS

10500:2012) at the point of discharge. Considering the concentration of chloride in the treated effluent being directly discharged into the river, it is recommended that M/s NGIL must judiciously monitor fortnightly the chloride and TDS parameters in the river water especially during lean flow periods. If any time the concentration of the referred parameters in the river water exceeds the acceptable limits of the Indian Standard Drinking Water Specifications, M/s NGIL must immediately ensure necessary measure to bring down the concentration of the referred parameters in the treated effluent being discharged by increasing the flow ratio of polishing pond effluent to delay pond effluent.

11. M/s NGIL must submit the analyses report on river water quality to the KSPCB every fortnight.

12. As being practiced flexible pipe must not be used for conveyance of treated/untreated wastewater from one unit of the ETP to another, and instead should be replaced by rigid pipes.

13. The industry management must also consider the feasibility for further reducing the effluent generation through in plant process improvement there by decreasing the quantity of effluent discharge into the river.

14. During river water sapling along the 20.03 km stretch of river Chalakudy, weed growth was observed along the banks of the river restricting the free flow in the river and thereby resulting in water stagnation and scum formation on the water

surface. M/s NGIL must undertake regular cleaning of weeds specially near the treated effluent discharge pipeline in the river to ensure free flow of water at the banks, and thereby mitigating the possibility of anaerobicity at the banks of the river.

15. The present study of greenbelt developed within the industry premises covers 22.72% of the total area of the industry premises. Besides this, an additional 2.42% of the area is also being developed as green belt. The industrial area also possesses natural vegetation with wild climbers and sparse trees of coconut on 8.82% of the total area. An additional area of 0.37 ha is recommended for further development as green belt at locations as presented in Figure 12.1.

16. Efforts must be made to develop greenbelt of adequate width and density along the boundary wall and within the industry premises depending on the availability of space at the recommended locations to mitigate the effect of odour emission.

17. New trees belonging to species Casuarina equisetifolia have been planted 3-4 months earlier on the Eastern side of the crushed bone godown and have attained height of 1-2 meter. These trees can be replaced by tree species with broad leaves as listed in Table 12.2.

18. New green belt of 10 meter width is recommended on the North East of industry premises (low lying area) and near Smruti Vanam as per the development plan presented in section

12.3. The green belt plan is designed considering the climate conditions and soil type.

19. Aegal marmelos, Terminalia catappa, Tectona grandis, Azadirachta indica, Artocarpus heterophyllus and Mangifera indica are the species growing well in the local environment and also possesses the large biomass with broader leaf area. Therefore, these species are recommended for developing new green belt areas.

20. Utmost care must be ensured to achieve optimum growth of the trees for an effective greenbelt development within the industry premises.

21. The industry should also improve the green belt cover through plantation of high foliage trees around the periphery of CB godown and other point sources of odour emission to act as barrier for controlling the secondary fugitive emissions in the areas within the industry.

22. M/s NGIL must ensure judicious implementation of the recommendation made by the Technical Expert Committee which is still not complied within the targeted time frame.

23. An Environmental Management Cell must be created with either a chemical engineer or an environmental engineer as In-charge of the cell

who will directly report to the Unit Head. This will facilitate independent responsibility of the cell for effective / efficient and sustainable pollution control leading to better environmental management of the industrial activities.

24. M/s NGIL must also be committed to go beyond compliance through continuous improvement in management practices, and delineating a road map for progressive renovation in environment management system.

91. Pursuant to the report, the Kerala State Pollution Control Board (KSPCB) accepted the recommendations and issued the following directions to be complied with by the industry as per letter dated 24.09.2014.

1. "Cameras are to be provided in the "Effluent Treatment Plant area for viewing the effluent treatment plant operations from District Office at Thrissur, Regional Office at Ernakulam & from the Head Office of Pollution Control Board.

2. The odour of treated effluent is to be assessed.

3. Oil and grease trap is to be provided as oil and grease in effluent treatment plant is high.

4. Anaerobic disaster is to be installed before aeration tank so as to reduce the generation of sludge, to reduce the dosing rate of chemicals and to produce energy.

5. Treated effluent is to be reused to the maximum extent.

6. The storage area of godown is to be partitioned for controlling smell problem.

7. Acidity in fumes is to be ascertained as there is chance of microbes in biofilter being affected.

8. Arrangement shall be made to provide a minimum required dissolved oxygen content in the aeration tank & for the proper functioning of aeration tank.

9. TCLP analysis is to be done for soil and sediment samples.

10. Facility shall be provided to maintain / adjust pH in Effluent Treatment Plant units.

11. Periodical maintenance of sand filter is to be ensured.

12. Environment Management Cell shall be strengthened by posting an Engineer exclusively for the purpose.

13. There shall not be any flexible pipes in the factory. The Environmental Engineer, District Office, Thrissur shall ensure this."

92. Even earlier, based on the complaint received against the industry, the Government appointed an eight member Expert Committee headed by Smt.Dr.B.Lakshmikutty,

Head of Department (Chemical Engineering), Government Engineering College, Thrissur as per G.O.(Rt) No.29/2011/10 dated 27.01.2011. The Expert Committee after inspection and verification suggested 13 recommendations to be implemented by the industry. As per the G.O.(Rt) No.1376/2011/10 dated 03.11.2011, the Government accepted the study report and directed the company to implement the following 13 directions:

> "1. Reduce water consumption by using appropriate technology and water recycling method.
>
> 2. Construction of new biogas plant.
>
> 3. Improve the efficiency of DCP bag filters by installing additional bag filters.
>
> 4. Stoppage of semi-dried solid waste transportation to outside.
>
> 5. Execution of the directives from the PCB and complete adherence to pollution control norms.
>
> 6. Prevention of order from the company using modern technology.
>
> 7. Take sincere steps for the benefit and upbringing of local people and there by achieve their goodwill.
>
> 8. Formation of green belt along the company boundary.
>
> 9. Prevention of odour related pollution in the area.

10. Consider continuous monitoring system for assessing the smell in the surrounding.

11. Formation of monitoring committee comprising local body members, trade union members, management and health department.

12. Take steps to remove the apprehensions regarding outlet water discharge system.

13. Cleaning of Chalakudy river to remove the sediments from the river bed."

93. Thereafter, a meeting was convened by the Chief Minister of the State on 07.12.2011 wherein the NGIL Action Council members, officers of the Government Department, Industry officials, Local body authorities and the local MLA were present. In that meeting, it was resolved to strictly implement the said 13 directions of the Expert Committee as approved by the Government. In addition, the following 3 recommendations were also included and directed to be complied by the industry. They are:

1. Provide delay pond for treated effluent.

2. provide bag filters to reduce suspended matter emission.

3. Enclose the crushed bone unloading area for reducing the smell.

94. Pursuant to the directions, the company submitted an Action Plan before the KSPCB and by order dated 13.10.2011, it was approved by the Board. KSPCB, District Office, Thrissur had closely monitored the progress in implementing the Action Plan. According to the Board, the industry implemented all the recommendations within the stipulated period as per the Action Plan except the cleaning of Chalakkudy river, the recommendation no.13. It was subsequently, the matter came before the Hon'ble High Court of Kerala in WP(C) No.15795 of 2013 and the Hon'ble High Court directed the CSIR NEERI to conduct a detailed study with respect to the environmental pollution status. As per the order dated 26.11.2014, the Chairman of the KSPCB directed for a joint Monitoring by NEERI and KSPCB along with the representatives of Thrissur District Collector, to assess the implementation status of the recommendations of NEERI report dated May 2014 and compliance of the directions of KSPCB dated 24.09.2014. Accordingly, Joint Monitoring Committee conducted inspection at the industry during the period January 14-15 , 2015 and based on the findings of the

Joint Monitoring Committee, report was prepared by CSIR NEERI dated 27th February, 2015.

95. The report reveals that performance assessment of effluent treatment plant (ETP) was carried out through grab sampling of inflow to ETP and treated effluent after tertiary treatment (sand filter) including final treated effluent being discharged into Chalukkudy river. Sample of mature compost was also collected and analysed for various hazardous constituents. Surface water quality assessment of Chalakkudy river was conducted through sampling from 5 locations starting from 2 km upstream of intake Well of the industry (Vynthala pump house) to 3 km downstream of treated effluent discharge point. Treated effluent and Chalakkudy river water samples were also collected for estimation of volatile organic compounds (VOCs). Ambient Air sample from acidulation process unit area was also collected to estimate the acidity level in ambient air. Performance assessment of the pilot scale scrubber unit installed was conducted for VOCs estimation through collection of air samples at the inlet and

outlet of the scrubber unit. On the performance assessment of effluent treatment plant, the report shows the concentration of major parameter in the final treated effluent being discharged into Chalakkudy river conform to the discharge Standards stipulated by the KSPCB . On the surface water quality assessment of Chalakkudy river, the report shows the concentration of all the monitored parameters in Chalakkudy river water samples at various locations conform to the Acceptable Limits of the Drinking Water Specifications (IS-10500 2012 Second revision) On the assessment of volatile organic compounds (VOCs) in water and air samples, it is reported that the river water samples collected near Iyathykadavu irrigation pumping house was found to have a few number of target VOC species in detectable level. The fuel (diesel) contamination from the pumps installed in the pump houses located along the banks of the river and motor boats plying in the river may be contributing to the target species. The results of the two air samples comprising inlet and outlet of scrubber were analysed and it is reported that the performance efficiency based on the single trial run, indicates more than 99% efficiency in scrubbing of Benzene and

complete scrubbing of detected target species. Further, trial runs are necessary to ascertain effective performance of scrubber system. On the assessment of acidity in Ambient Air at acidulation process unit area, it is recorded that the acidity of the aliquot was estimated to be 4.3 mg/l as $CACO_3$ indicating only insignificant amount /quantities of acidic gases on the ambient air of the process unit area. The report shows that the team assessed the status of implementation of the recommendations and directions during inspection. In addition, the performance evaluation of the operation of ETP and assessment of surface water quality , according to them, based on the performance evaluation of ETP , it is concluded that the physico-chemical characteristics including heavy metals concentration in the final treated effluent being discharged into Chalakkudy river conform to the discharge Standards stipulated by the KSPCB. Hence, there is no impact of the discharge from the industry on river water quality. The overall analysis of mature compost samples indicates that the compost does not contain any hazardous constituent. The concentration of the analysed parameters in Chalakkudy river water samples monitored at various locations conform to the

Acceptable limits of the Drinking Water Specifications. The target species of VOCs were not detectable in ETP effluent sample being discharged into Chalakkudy river. As the target VOCs species are below detectable limit in treated effluent discharged into Chalakkudy river . Hence, there is no impact of the discharge from the industry on river water quality. The performance efficiency of the pilot scale scrubber based on the single trial run indicated more than 99% efficiency in scrubbing of Benzene and complete scrubbing of the other detected target species. The estimated acidity in the ambient air at acidulation process unit area indicate insignificant amount/quantity of acidic gases in the ambient air around the process unit area. On the compliance of the recommendations, it is reported as follows:

> "As observed by the joint monitoring team, M/s. Nitta Gelatin India Limited (industry) has complied with the implementation of 13 recommendations out of 23 as suggested by NEERI and 10 out of 13 directions issued by KSPCB. The remaining recommendations /directions are under various stages of implementation and are being taken up in a time bound manner by the industry, Management

making efforts to comply within the stipulated time schedule."

96. As directed by the Chairman, KSPCB, to assess the implementation status of the recommendations given by NEERI and the compliance of directions of the KSPCB, a joint monitoring Committee once again inspected the industry on 12th and 13th August, 2015 and the monitoring committee comprised of two officials from KSPCB, 5 members from NEERI, Tahsildar, Thrissur and the representatives of the industry. Based on the findings, the CSIR NEERI prepared a report of the Joint Monitoring Committee on 10th October, 2015.

97. The report shows that based on the physico chemical analysis of various samples of ETP, performance of ETP was found to be satisfactory and the final treated effluent being discharged into Chalakkudy river conform to the discharge Standards stipulated by KSPCB. The overall analysis of mature compost sample indicates that the compost does not contain any hazardous constituents. The concentration of

analysed parameters in Chalakkudy river water samples monitored at various locations conform to the Acceptable Limits of the Drinking Water Specifications. The target species of VOCs were almost not detectable in ETP effluent being discharged into Chalakkudy river. As the target VOCs species are below detectable limit in treated effluent discharged into Chalakkudy river, there is no impact of the discharge from the industry on river water quality. The VOCs in the ambient air outside the industry premises indicate insignificant concentration in the ambient air. On the compliance of the recommendations and directions, it was reported that the industry has complied with the implementation of 20 recommendations out of 23 as suggested by NEERI and all the 13 directions issued by KSPCB. The remaining two recommendations of the NEERI to be complied, are the implementation of bio-filter for odour control and 2nd anaerobic reactor for biogas recovery. It is reported that they are under various stages of implementation. Regarding odour control, pilot scale trials for wet and dry scrubbing were conducted and the performance was observed to be ineffective. Hence, bio-filter option was considered based on the study

conducted by CSIR NEERI, Trivandrum. They are entrusted with the design of bio-filter system and it is in progress. The second anaerobic reactor being constructed similar to the first unit, which is performing effectively. It is reported that the construction is completed and balance work is in progress for commissioning. Both the works are being taken up in a time bound manner by the industry to comply within the stipulated time, i.e December 2015. The remaining direction to be complied with is regarding the cleaning of weeds along the banks of the river, for which, the industry waits for an approval from Kadukutty Panchayat for implementing the same.

98. Another Joint Monitoring Committee consisting of the same officials again inspected the industry on August 12 and 13, 2015 to assess the implementation status of the recommendations of the NEERI and the balance directions of the KSPCB. Based on the findings, the CSIR NEERI prepared a report dated October 10, 2015.

99. When the applications were listed before the Tribunal on 11.3.2016, it was reported by the industry that due to some sabotage outlet pipeline which carries the treated effluents from the industry to the Chalakkudy river, was damaged, which are to be rectified, the Tribunal directed the KSPCB to submit a status report as to when the damage occurred to the pipeline and the extent of damage and the extent of rectification done by the industry and the quantum of discharge of effluent on the land and river. The Board was also directed to file an analysis report of the effluent including all the parameters. When the matter was listed on 22.03.2016, it was reported by the Board that the report of analysis is awaited. At that time, it was clarified by the Tribunal that the samples shall be collected from the place of discharge, place of breakage and the place where the discharge is let out into the river at the final outlet of the ETP.

100. The KSPCB thereafter, submitted a report dated 16th April 2016. The report shows that during inspection, it was noticed that the pipeline carrying the treated effluent was in

partially broken stage at a particular point. Certain length of this pipeline is laid along and under the bed of Natural thodu (canal), through which there is flow of water. The broken part of the pipeline is at this point. The thodu is in the poramboke land under the custody of Kadukutty Grama Panchayat. The broken portion of the pipeline is already under the water and certain quantity of effluent was discharged through the broken part into the Thodu and the mixture of effluent and water was seen flowing into the thodu. It is roughly estimated that 1/3rd effluent leaked into the thodu through the broken portion of the pipeline. It is reported that black coloured sludge like materials could be found to be deposited beside damaged part of the pipe line. But, during the time of inspection, no sludge like materials could be found to be discharged into the thodu along with the effluent. The broken hole of the pipeline is not visible. It was learnt that the hole is having about 30 cm diameter. As per the report, the Board got information about the damage of the pipeline in April 2015. When a complaint was received alleging the breaking of the pipeline, the Board issued a notice to the industry to stop the discharge of effluent through the broken pipeline on 18.04.2016. The industry

replied that they had noticed the leak on 08.03.2015 and it was repaired on 11.03.2015. Though the industry claims that the leakage had been completely arrested, it was found at the time of inspection that the leakage still continues. According to the industry, the local people have blocked the pipeline partially by putting concrete blocks in the broken portion. The report also shows that during January, 2016, public had agitated against the discharge of effluent through the hole of the broken pipeline into thodu and based on a complaint from the public, the Board issued direction to the industry on 04.01.2016 to take necessary action for redressal of the complaint regarding the discharge of effluent into the thodu due to the leakage of the pipeline. At the time of inspection, the Board collected effluent samples from the outlet of the company inside the factory premises and also from the damaged part of the pipeline carrying effluent from the industry to the Chalakkudy river. It is reported that the sample taken from the damaged portion is a mixture of effluent and water flowing through the thodu. As the pipeline carrying effluent of the factory is about 2.5 meters below the water level of the river, the officials

could not take sample of effluent from that final discharge point.

101. The report shows that the result of the analysis of effluent taken from the pipe breakage point is as follows:

Table- A

Parameter	Value (mg./l) except pH	Permissible limit (mg./l) except pH
pH	**7.1**	**5.5-9.0**
BOD	**9.0**	**30**
COD	**48.0**	**250**
Suspended Solids	**55.0**	**100**
Dissolved Phosphates	**BDL**	**5**
Oil & Grease	**10**	**10**
Ammonical Nitrogen	**130.2**	**50**
Total Dissolved Solids	**4914**	**No standard is prescribed under the EP Rule**
Chlorides	**2729.7**	**No standard is prescribed under the EP Rule**

Analysis of the effluents taken from the outlet of the industry is as follows:

Table- B

Parameter	Value (mg./l) except pH	Permissible limit (mg./l) except pH
pH	**7.5**	**5.5-9.0**
BOD	**34.4**	**30**
COD	**72**	**250**
Suspended Solids	**28**	**100**
Dissolved Phosphates	**BDL**	**5**
Oil & Grease	**9.1**	**10**
Ammonical Nitrogen	**10.1**	**50**
Total Dissolved Solids	**3141**	**No standard is prescribed under the EP Rule**
Chlorides	**1637.8**	**No standard is prescribed under the EP Rule**

102. The parameters of TDS and Chlorides were omitted from the Schedule IV of General Standards for discharging environmental Pollutants as per Rule 2(d)(i) of the Environment (Protection) Rules, 1986 vide Notification No.GSR 801 (E) dated 31.12.1993. It is therefore reported that there are no standards for parameters of TDS and Cholorides. The report shows that BOD found on analysis is slightly exceeded the Standards in the effluent collected from the authorised outlet of the industry and all other parameters are within the prescribed standards. The analysis report of the effluent collected from the broken portion of pipeline showed that the parameters of Ammonical Nitrogen being 130.2 mg/l, exceeds the prescribed Standard of 50 mg/l. It is observed that the industry has to take necessary action to bring all the effluent parameters in accordance with the prescribed standard as per the Consent Order. The Board, therefore, issued direction dated 13.4.2016 to the industry to take urgent action to ensure that the effluent is discharged only after fully complying with the effluent standards prescribed in the consent to Operate.

103. While these applications were pending, Original Application No.412 of 2016 (PB) was filed by the NGIL Action Council on 03.08.2016 to direct the respondent No.5, Central Pollution Control Board (CPCB) to study the pollution caused by the industry to the air, water and land in terms of the parameters fixed for effluents and to restrain the industry from discharging effluents and sludge into the Chalakkudy river. This Tribunal, by order dated 29th September 2016 restrained the industry from discharging untreated effluents and sludge not meeting to the standards of the Pollution Control Board into Chalakkudy river till the next date of hearing i.e. 06.10.2016. Further, the Central Pollution Control Board, Delhi is directed to file a report including sludge and AAQ in the industry.

104. Pursuant to the directions, the officials of Central Pollution Control Board (CPCB) inspected the industry during October 3rd – 5th, 2016 and submitted a report dated 07.11.2016 in Application No.412 of 2016. (PB) As the said report deals with the same industry causing pollution by

discharging effluents into Chalakkudy river as in the other applications, a copy of the report has also been filed in these applications.

105. As the Hon'ble High Court of Kerala by order dated 07.04.2016 in W.P.(C) No.28913 of 2015 (L) issued instructions to the NEERI to conduct an inspection on the premises of the company of the respondent (M/s.NGIL) and the 1st petitioner in the Writ Petition as well as the Secretary to the Panchayat shall be permitted to be part of inspection to be conducted by NEERI and the report is to be filed within six weeks. Accordingly, NEERI conducted yet another inspection on May 11th and 12th, 2016. The team consists of Acting Director, Dr.Tapas Nandy, Principal Scientist, Mr.M.Karthik, Senior Scientist Mr.P.Manekar, and Dr.R.Biswas, senior scientist and A.Kuila, Project Assistant for NEERI, for the pollution Board, the very same earlier officials, i.e. Environmental Engineer, P.K.Baburajan, Assistant Environment Engineer, P.B.Sreelakshmy for the company, Executive Director Corporate Mr.S.Mohan and Unit head, Mr.A.N.Kannan and for

the Panchayat, its Secretary, Junior Superintendent, and their counsel and for the writ petitioner, apart from their counsel writ petitioners 1 and 2 were present.

106. The inspection was mainly to assess the implementation of series of recommendations of the NEERI. As is clear from the report, NEERI team inspected the site pointed out by the counsel appearing for the writ petitioners, i.e the land adjacent to the industry site, which was earlier objected alleging that the industry had disposed sludge and effluent into its land and collected samples from the said land also. As it was represented that at the appropriate point of the pipeline effluent was discharged into the natural drain, the NEERI team inspected the place and also collected samples from there also. When the Writ Petitioners' counsel insisted that the same procedure that was followed by taking samples for testing under the Prevention of Food Adulteration Act, should be followed, NEERI agreed to take independent sample and also directed the Pollution Control Board to collect their samples and also permitted the Writ Petitioners to collect the

samples. The performance assessment of ETP was carried out by NEERI team through flow monitoring at inlet to flash mixer, grab samples of process effluents in flow to ETP and treated effluent after tertiary treatment (sand filter) including final treated effluent being discharged. ETP sludge sample was collected from various places. On site analysis for physico-chemical parameters was also conducted. In addition, water and soil/sediment samples were also collected from two locations identified by the petitioners, as stated earlier, namely, the paddy field adjacent to the company site and the drain where the effluent carrying pipeline had earlier broken and caused leakage. The water quality assessment at Chalakkudy river was conducted at 5 locations, i.e. 2.00 km upstream of intake well of the industry, at the point of discharge of treated effluent of the industry and 500 m, 2.00km and 3.00 km downstream of treated effluent discharge point of the industry. Samples of treated effluent and Chalakkudy river were also collected for assessment of VOCs. The report shows that on the second day when the samples were collected, attempts were made by some unidentified persons to block the collection of samples. Still, the NEERI

team could successfully collect the samples and send them for analysis. On the implementation status of NEERI recommendations, the following are reported.:

Implementation status of NEERI's recommendation at M/s NGIL

Sr. No	NEERI's Recommendations	Implementation Status
Odour Control		
1.	Provide an enclosure for the charging process of CB. The existing CB charging equipment may be relocated within the enclosure with necessary modifications, and provided with blower and discharge duct connected to a new scrubber system of 12000 m^3/h capacity, or treated in a biofilter designed for an adequate capacity. Enhance the blower capacity by providing an additional blower of 30000 m^3/h capacity to achieve improved air circulation.	-The CB charging area has been enclosed by constructing a L shaped partition wall of 37x5m (ht) and 11x7m (ht). -Equipment have been relocated and the enclosure has been provided with a blower and a discharge duct connected to a new bio-filter. -The bio-filter has been designed by CSIR-NIIST. Design completed by 30-08-2015 and the bio-filter was commissioned on December 30, 2015. As observed the bio-filter was in operation during the inspection period.
2.	The bay on the Eastern side of the CB godown must be isolated / separated by providing a partition wall to reduce the storage space of the godown, and restrict storing of CB on the Eastern side of the godown.	A partition wall of 37x5m (ht) has been constructed and work was completed on 18.10.2014 thereby isolating the bay on the eastern side of CB godown and reducing the CB storage by 357.2 m^2.
3.	Ambient air from acidulation of CB and DCP precipitation & filtration process areas, may be routed to the existing biofilter by providing ducts and blowers	-Ducting from acid bath and DCP areas to the existing bio-filter has been provided and blower installed on 20.06.2015. Thus the ambient air is being routed to the existing bio-filter for control of odour in these process areas. -Odour has reduced significantly in the process areas as compared to first monitoring conducted in early 2014.
4.	The present practice of spraying deodorant in the process unit areas where odour emissions are higher must be continued to control the odour problem in and around the industry premises.	SOP has been prepared and being practiced accordingly in process unit areas. However, with control measures in place, the frequently of spraying the deodorant in the process unit areas has reduced

		to a great extent.
Air emissions control		
5.	Use of low ash and low sulphur contents fuel in furnaces and boilers must be practiced for control of PM and SO_2 concentration at sources.	-Low sulphur furnace oil is being purchased from Bharat Petroleum Corporation Ltd. and in use from April 2015 for control of air emissions. -Energy (biogas) recovered from the 2nd anaerobic reactor installed is routed to boiler thereby reducing furnace oil consumption by ~60%
6.	The ossein furnaces hot air generator emissions marginally exceeded the regulatory limits for participate matter. Though the monitoring data is based on short term assessment, feasible corrective measures are needed to ensure emission within the norms on a sustainable basis.	-To control particulate matter emission from ossein hot air generation furnace, mechanical dust collector has been installed on 16.01.2015. This unit was in operation as observed during the inspection.
Optimization of ETP performance		
7.	The chemical treatment unit process of ETP comprising coagulation-flocculation must be provided with an online pH meter in reaction tanks for ensuring maintenance of optimum pH for effective precipitation of the pollutants.	Installation of online pH meters (6 Nos.) was completed on 05.11.2014 in the following units: -Buffer tank -Flocculator1 -Flocculator2 -Inlet to aeration tank -Secondary clarifier outlet -Lamella overflow weir. As observed one of the online pH display was under maintenance during the inspection on 11th May 2016 however the same was rectified on 12th May 2016.
8.	Regular maintenance of the surface aerators must be ensured and in case of the compressor the air discharge rate must be maintained as per the recommendation of the manufacturer.	-The worn out belts of surface aerators have been replaced with new belts, and work was completed by 10.08.2014. -The maintenance schedule has been revised as per the manufacture's manual, and is being practiced.
9.	The present practice of adding coagulant / coagulant aid in biological process for sludge settleability must be discontinued to improve biomass growth in aeration tanks.	As observed, the practice of coagulant / coagulant aid dosing at outlet of aeration tank was stopped to improve the growth of biomass in aeration tank. This has improved the treated effluent quality of the ETP.
10.	Regular backwashing of sand filters must be practiced, and if necessary the media must be	-SOP has been prepared for backwashing of sand filter and is being practiced since

	replaced with proper media size depending on the size of the suspended fraction.	02.08.2014. -Presently the suspended solids concentration in treated effluent from sand filter is within the stipulated standards. The management must ensure that, if necessary the media must be replaced with proper media size depending on the size of the suspended fraction.
Reduction in sludge generation		
11.	Scientifically based treatability of process effluents must be adopted for chemical treatment for optimization of chemicals dosage to reduce chemical consumption and subsequent chemical sludge generation in ETP.	-SOP for optimization of chemical dosage has been prepared and the same is being practiced as observed. -Chemical dosing tanks with dosing pumps have been installed and commissioned on 02.03.2015 for effective coagulant dosing and were observed to be in operation during inspection.
Water quality of river water		
12.	M/s NGIL must judiciously monitor fortnightly the chloride and TDS parameters in the river water especially during lean flow periods. If any time the concentration of the referred parameters in the river water exceeds the acceptable limits of the Indian Standard Drinking Water Specifications (IS10500: 2012), M/s NGIL must immediately ensure necessary measure to bring down the concentration of the referred parameters in the treated effluent being discharged by increasing the flow ratio of polishing pond effluent to delay pond effluent.	-Monitoring of chloride and TDS parameters in Chalakudy river water being monitored every fortnight. -The results of the latest sample collected in May 2016 and analysed indicate that the concentration of chloride and TDS parameters does not exceed the acceptable limits of the Indian Standard Drinking Water Specifications (IS 10500: 2012).
13.	M/s NGIL must submit the analyses report on river water quality to the KSPCB every fortnight.	The latest analysis report of the river water quality was submitted by M/s NGIL to KSPCB on 04.05.2016, and same was confirmed by Shri. P.K. Baburajan, Environmental Engineer.
14.	M/s NGIL must undertake regular cleaning of weeds along the banks of the river specially near the treated effluent discharge pipeline to ensure free flow of water at the banks, and thereby	-As per management of M/s NGIL request letter has been submitted to Irrigation Department on 30.08.2014 for granting permission to undertake cleaning of weeds along the

	mitigating the possibility of anaerobicity at the banks of the river.	banks of the river. -Irrigation Department has directed M/s NGIL to initiate action through Kadukutty Panchayath. -Letter from M/s NGIL was submitted to Gram Panchayath on 06.08.15 requesting to grant permission for cleaning of weeds. - However, formal grant of permission is to be issued by Kadukutty Gram Panchayath to M/s NGIL.
15.	The flexible pipe is use for conveyance of treated / Untreated wastewater from one unit of the ETP to another, must be replaced by rigid pipes.	All existing flexible pipes in the ETP area have been replaced with rigid pipes.
In plant control measure		
16.	M/s NGIL must consider the feasibility of further reducing the effluent generation through in plant process improvements there by decreasing the quantity of effluent discharge into the river.	In plant control measure through reuse of seal water in paddle washer implemented as observed during the inspection thereby reducing the effluent generation and reusing ~50 m^3 water per day within the plant.
Green belt development		
17.	An additional area of 0.37 ha is further recommended for development as green belt at various locations.	Development of additional green belt has been initiated through plantation of tree species recommended by NEERI under the guidance of State Social Forestry.
18.	New green belt of 10 meter width is recommended on the North East of industry premises (low lying area) and near Smruti Vanam.	M/s NGIL had requested for an amendment in the development of green belt in the low lying area (3000 m^2), because of the terrain of the industrial site. The slope of the industrial site is towards the low lying area and is used for collecting the storm water runoff during monsoon through natural gradient. Development of green belt will obstruct the natural flow of storm water runoff. As observed during inspection, green belt was developed in equivalent area within the industrial site.
19.	The industry should also improve the green belt cover through plantation of high foliage trees	Plantation of high foliage trees has been initiated around the periphery of CB godown and

	around the periphery of CB godown and other point sources of odour emission to act as barrier for controlling the secondary fugitive emissions in the areas within the industry.	other point sources of odour emission. The plants have attained a height of about 10m on the inspection day.
20.	*Aegel marmelos, Terminalia catappa, Tectona grandis, Azadirachta indica, Artocarpus heterophyllus* and *Mangifera indica* are the species growing well in the local environment and also possesses the large biomass with broader leaf area. Therefore, these species are recommended for developing new green belt areas.	The tree species as recommended have been planted near Smrithivan as per availability. As observed during inspection the plants are growing well, and have gained a height of ~7m.
Implementation of TEC Recommnedation		
21.	M/s NGIL must ensure judicious implementation of the recommendation made by the Technical Expert Committee which is still not complied within the targeted time frame.	M/s NGIL is adhering to the recommendations.
Human resource development		
22.	An Environmental Management Cell must be created with either a chemical engineer or an environmental engineer as in-charge of the cell who will directly report to the Unit Head. This will facilitate independent responsibility of the cell for efficient and sustainable pollution control leading to better environmental management of the industrial activities.	Chemical engineer (Mr. A. R. Nithin) has been designated In-charge of Environmental Management Cell from 30.06.2014 and is reporting to the Unit head.
Corporate responsibility		
23.	M/s NGIL must also be committed to go beyond compliance through continuous improvement in management practices, and delineating a road map for progressive renovation in environment management system.	-As observed an additional anaerobic reactor for recovery of biogas has been implemented. Commissioning was done on 15.10.2015 and the system after stabilization is in operation since 12.11.2015. -This has facilitated usage of biogas in the boiler thereby further reducing fuel oil

		consumption to the tune of 1450 litres per day. This has also reduced the load on the aerobic unit process resulting in saving of operational cost through energy conservation. -Presently the reactor is operational at the flow rate of ~950 m^3/d with inlet BOD concentration of 9500 mg/l and biogas generation in the range 2780-3200 m^3/d.

107. On the implementation of the recommendations of KSPCB, the report is as follows:

Table 2 : Implementation status of KSPCB directions at M/s. NGIL

Sr. No	**KSPCB directions**	**Compliance Status**
1.	Cameras are to be provided in the effluent treatment plant area for viewing the effluent treatment plant operators from District office at Thrissur, Regional office at Ernakulum & from Head office of PCB	- CCTV surveillance camera installed. The system is in operation from March 30,2015. - Five cameras have been installed two each at chemical treatment units and aeration tanks, and one at sludge filtration unit. - Internet connection established.
2.	The odour of treated effluent is to be assessed.	-M/s NGIL has analysed effluent samples for volatile organic compounds (VOCs) through an NABL accredited laboratory and analysis report submitted to KSPCB vide letter (NO. PCB/OD/87) dated 30.10.2014. - However NEERI also collected effluent and river water samples for assessment of VOCs during the joint monitoring. - The details are reported under section 5.0 of this report.
3.	Oil and Grease trap is to be provided as oil and grease in effluent treatment plant is high	-Oil & Grease trap installed on 25.04.2015 and is in operation.
4.	Anaerobic digester is to be installed before aeration tank so as to reduce the generation of sludge, to reduce the dosing rate	-A second anaerobic reactor for recovery of biogas is under implementation. This will facilitate use of biogas reducing the fuel oil

	of chemicals and to produce energy.	consumption and also reduce the load on aerobic process resulting in energy conservation. - The unit is schedules to be commissioned by December 2015.
5.	Treated effluent is to be reduced to the maximum extent.	Seal water recovery and reuse implemented resulting in reusing 50 m^3 of water per day.
6.	The storage area of godown is to be partitioned for controlling smell problem.	A partition wall of 37x5m (ht) has been constructed and work completed on 18.10.2014 thereby isolating the bay on the eastern side of CB godown and reducing the CB storage by 357.2 m^2.
7.	Acidity in fumes is to be ascertained as there is chance of microbes in biofilter being affected.	Estimation of acidity in ambient air at acidulation process unit area was carried out by NEERI on 15.01.15. The acidity in ambient air sample was estimated at 4.3 mg/L as $CaCO_3$ (Section 6.0) of the NEERI report dated February 27, 2015.
8.	Arrangement shall be made to provide minimum required dissolved oxygen content in the aeration tank & the proper functioning of aeration tank	-The worn out belts of surface aerators have been replaced with new belts. -The maintenance schedule has been revised as per the manufacture's manual and being practiced.
9.	TCPL analysis to be done for soil and sediments.	M/s NGIL has conducted TCPL analysis for soil and sediment samples through a NABL accredited laboratory and report submitted to KSPCB.
10.	Facility shall be provided to maintain/ adjust pH in effluent treatment plant units.	On line pH meters (6 Nos.) have been installed by 05.11.2014 in the following units: -Buffer tank -Flocculator 1 -Flocculator 2 -Inlet to aeration tank -Secondary clarifier outlet -Lamella overflow weir.
11.	Periodic maintenance of sand filters is to be ensured	-SOP prepared for backwashing of sand filter and being practiced since 02.08.2014. As per management of M/s NGIL assessment study for media replacement to ensure proper media size will be taken up as and when required since presently the suspended solids concentration in treated effluent from sand filter is the

		within the stipulated standards.
12.	Environment management cell shall be strengthened by posting an engineer exclusively for the purpose.	Chemical engineer (Mr. A. R. Nithin) has been designated In-charge of Environmental Management Cell from 30.06.2014 and is reporting to Unit Head.
13.	There shall not be any flexible pipes in the factory. The environmental engineer, District office, Thrissur shall ensure this.	All existing flexible pipes in the ETP area have been replaced by rigid pipes.

108. On the Performance Assessment of ETP the following is reported:

5.0 Performance Assessment of Effluent Treatment Plant

"The assessment of existing effluent treatment plant (ETP) was carried out through flow monitoring at inlet to flash mixer and through collection of grab samples at inlet (process effluent from ossein and dicalcium phosphates plants) to flash mixer, treated effluent from sand filter and final treated effluent being discharged. The samples were analysed for major parameters as per Standard Method (APHA, 2005. Standards Methods for the Examination of Water and Wasterwater, 21st Ed. American Public Health Association, Washington, DC, USA). The physic-chemical characteristics in terms of major relevant parameters along with the heavy metals of the various samples collected including the discharge Standards stipulated by the KSPCB are presented in **Table 5**. The concentrations of the major parameters in the final treated effluent from ETP conform to the discharge standards stipulated by the KSPCB for M/s NGIL.

The analysis data for the constituents estimated in ETP sludge is presented in **Table 6**. Based on the process details of generation and the overall analysis it may be concluded that the ETP sludge does not contain any hazardous constituted and is therefore classified as

"non-hazardous waste" as per the Hazardous Waste (Handling, Management and Tran boundary Movement) Rules, 2005. The sludge, however, has high pH value and needs to be managed in an environmentally sound manner to prevent contamination of land and water resources."

109. On the water quality Assessment of Chalakkudy river, the report reads:

"6.0 Chalakudy River – Water Quality Assessment

To assess the water quality of Chalakudy river, grab samples were collected at five locations from 2.0 km upstream of intake well of M/s NGIL (Vynthala pump house), at treated effluent discharge location of M/s NGIL, 500 m downstream of treated effluent discharge location of M/s NGIL (Iyathukadavu irrigation pump house), 2.0 km downstream of treated effluent discharge location of M/s NGIL (Pulik Kadavu bridge) and 3.0 km downstream of treated effluent discharge location of M/s NGIL (Mambra irrigation pump house). Plate IV presence the photographs of sampling being conducted in river Chalakudy. The physic-chemical characteristics of the river water samples collected are presented in **Table 7**. The concentration of all the monitored parameters in Chalakudy river water samples at various locations conform to the Acceptable Limits of the Drinking Water Specification (IS 10500:2012 Second revision)."

Table 5: Physicochemical characteristics of effluents from ETP[#] (Monitoring: May 12, 2016)

Sr. No	Parameters	Method Detection limit	Process effluent from		Sand Filter effluent	Final treated effluent being discharged	KSPCB Stipulated discharge Standards for M/s NGIL
			Ossein plant	DCP plant			
1	pH	0.02	7.4	6.9	7.1	7.1	5.5-9.0

2	Temperature, °C	0.1	32.0	31.4	31.4	31.2	-
3	SS	5	1368	576	36	<5	100
4	TDS	5	3530	15120	4500	1380	-
5	COD	2	2429	1214	81	35	250
6	BOD (3d;27°C)	2	1750	680	42	15	30
7	Dissolved Oxygen	0.1	NM	NM	4.2	5.2	-
8	Sulfate as S	0.05	215	108	95	32	-
9	Chlorides as Cl	5	1242	8875	2379	547	-
10	Ammonia as N	0.5	188	54	29	19	50
11	Free Ammonia as NH_3	0.5	2.5	1.5	0.5	BDL	-
12	TKN as N	0.5	86	75	56	32	-
13	Dissolved phosphate as P	0.01	20	24	3.6	2.5	5
14	Cyanide as CN	0.01	0.1	BDL	BDL	BDL	-
15	Oil & Grease	2	140	96	15	<2	-
16	Total Residual Chloride	0.1	BDL	BDL	BDL	BDL	-
17	Fluoride	0.01	0.02	BDL	0.01	BDL	-
18	Sulfide as S	0.5	2.0	BDL	0.6	BDL	-
19	Phenolic Compounds	0.05	1.4	1.0	0.12	0.01	-
20	Nitrate as N	0.05	BDL	BDL	5	1	-
Heavy metals							
21	Arsenic	0.007	BDL	BDL	BDL	BDL	-
22	Aluminum	0.009	BDL	BDL	BDL	BDL	-
23	Copper	0.0004	0.04	0.03	0.01	BDL	-
24	Cadmium	0.0006	BDL	BDL	BDL	BDL	-
25	Total Chromium	0.01	BDL	0.20	BDL	BDL	-
26	Iron	0.001	0.45	0.22	0.18	0.10	-
27	Lead	0.009	0.02	0.01	BDL	BDL	-
28	Manganese	0.002	0.39	0.26	0.10	0.05	-
29	Mercury	0.09	BDL	BDL	BDL	BDL	-
30	Nickel	0.005	BDL	0.05	BDL	BDL	-
31	Zinc	0.001	BDL	0.20	BDL	BDL	-

Grab Sample:
All parameters are expressed in mg/l except pH and temperature.
DCP-DI-Calcium phosphate; BDL – Below detectable limit; NM- Not Monitored.
Total inflow to flash mixer 2563 m^3/d

Table 6 : Constituents in ETP Sludge#

Sr. No	Parameters	ETP Sludge
Proximate analysis of samples		
1	pH	9.9
2	Moisture content (%)	15
3	Volatile matter (% dry weight)	45.3
4	Fixed Carbon (% dry weight)	27.8
5	Ash Content (% dry weight)	56.7
6	Calorific value Kcal/kg	795
CHNS analysis (% magnitude)		
7	Carbon (C)	20.5

8	Hydrogen (H)	1.6		
9	Nitrogen (N)	2.3		
10	Sulfur (S)	25.6		
Heavy metal (mg/kg)		**Sludge**	**TCLP Extract**	**Water Extract**
11	Arsenic	0.06	BDL	BDL
12	Copper	1.2	0.01	0.06
13	Cadmium	0.1	BDL	BDL
14	Total Chromium	1.6	BDL	0.1
15	Iron	1652.7	15.6	5.6
16	Lead	0.5	0.01	0.05
17	Manganese	122.5	1.6	0.8
18	Mercury	BDL	BDL	BDL
19	Nickel	25.1	BDL	0.2
20	Zinc	52.6	0.6	0.1
Anion, Alkaline & Earth Metal Concentration (mg/Kg)			**TCLP Extract**	**Water Extract**
21	Chloride		36	166
22	Sulfate as SO_4		1003.6	1523
23	Nitrate as N		0.2	0.36
24	Phosphate as P		966	109
25	Fluoride as F		100	76
26	Sodium as Na		65	18
27	Potassium as K		5	39
28	Calcium as Ca		12	45
29	Magnesium as Mg		13	19

Grab Sample: BDL-Below Detection Limit
Method detection limit (mg/kg): Arsenic – 0.007; Calcium – 0.0006; Total Chromium – 0.01; Mercury – 0.09; Nickel – 0.005.

Table 7: Physico-chemical characteristics of water samples from river Chalakkudy * (Monitoring: May 12,2016.)

Sr. No	Parameters	Method detection Limit	2.0 k/mu/s of intake well of M/s NGIL (Vynthala pump house)	At treated effluent discharge location of M/s NGIL	500 m d/s of treated effluent discharge location of M/s NGIL (Iyathuka davu irrigation pump house)	2.0 km d/s of treated effluent discharge location of M/s NGIL (Pullkkadavu bridge)	3.0 km d/s of treated effluent discharge location of M/s NGIL (Mambra irrigation pump house)	Drinking water Standards[$]	
								Acceptable Limit	Permissible limit [@]
1	pH	0.02	7.8	7.7	7.5	7.3	7.5	6.5-8.5	NR
2	Alkalinity	0.2	9.0	10.2	10.5	9.7	11.0	200	600
3	SS	5	6	6	8	6	4	-	-
4	TDS	5	44	45	57	110	105	500	2000
5	COD	2	22	14	16	16	20	-	-
6	BOD (3d;27˚C)	2	<5	<5	<5	<5	7	-	-
7	DO	0.1	7.0	6.9	7.0	6.5	6.4	-	-
8	Sulfate as SO_4	0.05	0.6	0.7	0.5	0.7	0.8	200	400
9	Chloride as CL	5	12	15	23	54	58	250	1000
10	Phosphate – P	0.01	0.8	0.6	0.6	1.2	1.3	-	-
11	Ammonia	0.5	21	14.7	12	15	12	-	-

	– N								
12	Nitrate as N	0.05	1.6	1.2	1.3	1.6	0.9	45	NR
13	TKN as N	0.5	35	42	46	49	48	-	-
14	Calcium	0.2	2.6	2.7	3.6	6.3	8.4	75	200
15	Magnesium	0.2	2.2	1.9	2.4	5.6	6.1	30	100
16	Total hardness**	0.2	15	13	17	25	26	200	600
17	Sodium	0.1	9	11	19	43	63	-	-
18	Potassium	0.1	0.3	0.5	2.1	4.3	5.6	-	-
19	Aluminium	0.009	BDL	BDL	BDL	BDL	BDL	0.03	0.2
20	Copper	0.0004	0.02	0.02	0.01	BDL	0.01	0.050	1.5
21	Cadmium	0.0006	BDL	BDL	BDL	BDL	BDL	0.003	NR
22	Chromium	0.01	BDL	BDL	BDL	BDL	BDL	0.05	NR
23	Iron	0.001	0.32	0.66	0.45	0.41	0.55	0.3	0.1
24	Lead	0.009	BDL	BDL	BDL	BDL	BDL	0.01	NR
25	Manganese	0.002	0.16	0.09	0.06	0.09	0.05	0.1	0.3
26	Mercury	0.09	BDL	BDL	BDL	BDL	BDL	0.001	NR
27	Nickel	0.005	BDL	BDL	BDL	BDL	BDL	0.02	NR
28	Zinc	0.001	BDL	BDL	BDL	BDL	BDL	5	15

Grab Sample: All parameters are expressed in mg/l except Ph; Expressed as $CaCO_3$.
BDL – Below detectable limit; NR- No Relation. $ - Indian Standard Drinking Water-Specification; [IS 10500;2012] (Second Revision); @ - Permissible limit in the absence of alternate source.

110. On the characteristics of water and soil samples from various sites as identified by the Writ Petitioners, it is reported as follows:

> **"7.0 Characteristics of Water and Soli/ Sediment Samples from varios Sites as Identified by Petitioners**
>
> To assess the impact of any industrial discharge onto land from the company in the vicinity of the industry, water samples were collected from the location as identified by the Petitioners. Water samples were collected from the paddy field adjacent to the industrial site of M/s NGIL, and drain where effluent discharge pipeline was damaged. The physico-chemical characteristics of water samples are presented in **Table 8**. Soil/ sediment samples were also collected from the above referred locations as identified by the Petitioners. Control soil sample was collected from the garden area within the industry premises to compare the characteristics in terms of hazardous constituents. The constituents analysed in the samples are presented in **Table 9**. Plate V presents the photographs of the sites identified by the Petitioners."

Table 8: Physicochemical Characteristics of water samples[#] from various sites as identified by Petitioners (Sampling: May 12, 2016)

Sr. No	Parameters	Method detection limit	Water Samples From	
			Paddy field adjacent to compound wall of M/s NGIL	Natural drain near the paddy field where the pipe carrying treated effluent of NGIL to Chalakudy River is damaged
1	pH	0.02	6.2	6.5
2	Alkalinity[**]	0.2	1.6	2.2
3	SS	5	150	76
4	TDS	5	564	455
5	COD	2	36	15
6	BOD	2	18	9
7	Dissolved Oxygen	0.1	0.5	0.3
8	Sulfate as S	0.05	175	160
9	Chlorides as Cl	5	120	86
10	Ammonia as N	0.5	2	1.3
11	TKN as N	0.5	12	15
12	Phosphate as P	0.01	0.5	0.1
13	Cyanide as CN	0.01	BDL	BDL
14	Oil & Grease	2	BDL	BDL
Heavy Metals				
15	Aluminum	0.009	0.52	0.12
16	Copper	0.0004	0.007	0.004
17	Cadmium	0.0006	0.002	0.001
18	Total Chromium	0.01	BDL	BDL
19	Iron	0.001	5.88	2.45
20	Lead	0.009	0.01	
21	Manganese	0.002	0.75	0.56
22	Mercury	0.09	BDL	BDL
23	Nickel	0.005	BDL	BDL
24	Zinc	0.001	0.045	0.017

Grab Sample: All parameters are expressed in mg/l except Ph; Expressed as $CaCO_3$.
BDL – Below detectable limit;

Table 9: Physicochemical Characteristics of soil and sediments samples[#] from various sites as identified by Petitioners (Sampling: May 12, 2016

Sr. No	Parameters	M/s NGIL Campus garden (Control)	Paddy filed adjacent to compound wall of M/s NGIL	Natural drain near the paddy field where the pipe carrying treated effluent of NGIL to Chalakudy River is damaged
Proximate analysis of samples				
1	pH	9.2	6.2	5.5
2	Moisture content (%)	22.5	1.6	2.2
3	Volatile matter (%dry weight)	25.3	150	76
4	Fixed Carbon (%dry weight)	7.8	564	455
5	Ash Content (%dry weight)	89.7	36	15

CHNS analysis (% magnitude)				
6	Carbon (C)	20.2	30.6	26.8
7	Hydrogen (H)	1.2	0.6	0.8
8	Nitrogen (N)	2.5	2.7	3.7
10	Sulfur (S)	15.6	12.6	16.7
Heavy metal (mg/Kg)				
15	Arsenic	0.06	0.06	0.05
16	Copper	0.009	0.007	0.004
17	Cadmium	1.9	2.5	1.6
18	Total Cadmium	12.6	12.8	11.2
19	Iron	52.7	56.6	47.8
20	Lead	20.5	16.6	18.7
21	Manganese	2.54	1.25	1.56
22	Mercury	BDL	BDL	BDL
23	Nickel	0.1	0.2	0.1
24	Zinc	0.89	0.75	0.57

Grab Sample: BDL-Below Detection Limits. Method detection Limit for Mercury: 0.09 mg/kg

111. Based on these findings, the following conclusions and monitoring are reported:-

- " The industry was operational during the inspection period and the production (tonnes/day) of various products on the days of inspection & monitoring were as follows:

Date	Ossein & Limed Ossein	Dicalcium phosphate	Meat meal
11/05/2016	18.12	34.00	0.40
12/05/2016	17.98	36.50	0.60
As per Consent	21.6	40.5	3.0

- As observed during the inspection at the industry premises, M/s NGIL has complied with the implementation of all the recommendations of NEERI. As regarding one recommendation i.e. cleaning of weeds along the banks of Chalakudy river, M/s NGIL awaits the approval from kadukutty Gram Panchayath for implementing the same.
- The concentration of VOCs detected in the ambient air as monitored at various locations within the industry premises were insignificant. The probable sources of the VOCs detected in the ambient air could be vehicle emissions and combustion of biomass as the constituents generating the detected compounds are not used in the process by the company.
- Benzene concentration as monitored within the industrial premises was conforming to the National Standards of 5µg/m^3 (annual time weighted average concentration). No regulatory standards exist in the country for other VOC compounds.

- The new bio-filter installed and commissioned for odour control in process unit areas is working efficiently, and as monitored the odorous sulphur compounds were not detectable at the new bio-filter site.
- The concentration of sulphurous odourous compounds in ambient air in the process unit areas as monitored during the present inspection were observed to be comparatively much lower than as monitored in May 2014 prior to the implementation of the blower & ducting system and bio-filter as per NEERI's recommendations for odour control.
- As monitored the sulphurous odourous compounds concentration in ambient air within the industrial premises were below detectable limit. No regulatory standards exist in the country for the monitored odourous sulphur compounds.
- Based on the physic-chemical analysis of various effluent samples of ETP, the final treated effluent being discharged into Chalakudy river conform to the discharge Standards stipulated by the KSPCB for m/s NGIL; and also the CPCB General Standards for Discharge (Annexure – VII).
- The 2nd anaerobic digester implemented is presently treating ~950 m^3/d. This has facilitated additional usage of biogas in the boiler thereby reducing the fuel oil consumption to the tune of 1450 litres per day.
- The concentration of the major parameters analysed in Chalakudy river water samples monitored at five locations from 2.0 km upstream of intake well of M/s NGIL (Vynthala pump house) to 3.0 km downstream of treated effluent discharge location of M/s NGIL (Mambra irrigation pump house) are within to the Acceptable Limits of the Drinking Water Specifications (IS10500:2012 Second revision).
- The chemical analysis of ETP sludge sample shows absence of any hazardous constituent in the sludge.
- The characteristic of the water samples collected from various locations as identified by the Petitioners do not indicate presence of any major pollutants in concentrations that can be attributed to any discharge / disposal of polluted waste from the industrial activity of M/s NGIL.
- The characteristics of the soil samples from the paddy field adjacent to the industry and also the sediment sample from the drain as identified by the Petitioners do not indicate any major change in characteristics as compared to control sample.

Finally, NEERI humbly submits before the Hon'ble Court that NEERI conducted the inspection including monitoring of air, water and sludge samples to assess the impact of various emissions from the company despite the adversities that resulted due to provocation, abuses and threats by the Petitioners and their Advocates as briefed in Annexure VI.

Plate VI presents the photographs of some of these incidents that occurred during the inspection.

112. Thus the NEERI report with regard to the implementation of the recommendations of NEERI and the directions of the KSPCB, establish that the industry has already implemented all the recommendations except the cleaning of weeds along the banks of the Challakudy river. It is thus clear that the industry has performed their part even with regard to the implementation of the recommendation, which remains to be fully implemented, by submitting a letter dated 06.08.2015 to the Kadukutty Grama Panchayat for permission to undertake cleaning of weeds along the banks of the river. The new bio-filter installed and commissioned was found working efficiently. The final treated effluent being discharged into Chalakkudy river was found conforming to the discharge Standards stipulated by the KSPCB and also the general Standards for discharge fixed by CPCB. The second anaerobic digester is found to be treating 930 m^3 per day which has facilitated additional usage of biogas in the boiler, thereby reducing the fuel oil consumption to the tune of 1450 litres per day. The analysis of ETP sludge sample establish that does not have any

hazardous constituent. However, the petitioners and others are still not satisfied with the measurements taken by the industry.

113. The applicants in the Original Applications had sought for an inspection by CPCB. While so, Original Application 412 of 2016 (PB) was filed which was heard separately. In that application, the Tribunal by order dated 29th September 2016, directed the CPCB to file an interim report as well as a detailed report including the management of sludge and AAQ in the industry forthwith. Pursuant to the said direction, the CPCB inspected the premises and studied the various processes of the industry and collected samples at different points of ETP, outlet after delay pond and at final disposal point in the industry premises. Based on the analysis of samples, the CPCB has drawn the following conclusions:

> "● The treated effluent from delay pond is diluted with the back wash water of sand filers (fresh water sand filter) before discharging into the river. This resulted in dilution of TDS, COD and Chlorides concentrations from 1014 mg/l to 2944 mg/l,331 mg/l to 47 mg/l and 2323 mg/l

to 1663 mg/l respectively at the final disposal point.

- The DO & MLSS concentrations are 1.5 mg/l & 786 mg/l respectively is very less in aeration tank.

- The Ammonical nitrogen concentration at the final outlet is exceeding 1.1 times than the prescribed standard.

- This indicates the unscientific operation and improper maintenance of ETP which needs to be rectified immediately."

114. To assess the status of river water quality, the water samples and sediments were collected at three points, i.e. upstream of discharge point, confluence/discharge point and downstream of discharge point. The sediment samples were collected using bottom sampler and depth sampler to water collection at the depth of 5 m from surface water. The result of analysis of river water and sediment are as follows:

Table 2: Analysis results of river water samples

S.No	Parameter	Sampling points of River Chalakudy			Drinking Water Standards
		Upstream of discharge point	Confluence Point	Downstream of discharge point	
1	pH at 25°C	7.4	6.6	6.4	6.5-8.5
2	EC µs/cm at 25°C	39	70	57	-
3	TDS mg/L	30	82	38	500
4	BOD mg/L	BDL	BDL	BDL	-
5	COD mg/L	4.5	3.3	6.2	-
6	Total Hardness mg/L	8	20	18	200
7	Calcium mg/L as Ca	1.6	4.8	4.8	75-200
8	Magnesium mg/L as Mg	0.9	1.9	1.4	30-100

9	Chloride mg/L	2.4	10.8	8.3	250
10	Alkalinity mg/L	10	13	12.6	200-600
11	Sulphate mg/L	1.62	1.41	1.71	200-400
12	DO mg/L	7.9	7.7	7.4	6 and above
13	Sodium mg/L	2.9	3.2	3.0	-
14	Potassium mg/L	0.7	0.7	0.7	-
15	Mercury mg/L	BDL	BDL	BDL	0.01
16	Arsenic mg/L	BDL	0.05	BDL	0.01
17	Copper mg/L	BDL	BDL	BDL	-
18	Cadmium mg/L	BDL	BDL	BDL	0.03
19	Total Chromium mg/L	BDL	BDL	BDL	0.05
20	Iron, mg/L	0.55	0.44	0.37	0.3
21	Manganese, mg/L	0.05	0.04	0.04	0.1
22	Nickel, mg/L	BDL	BDL	BDL	0.02
23	Lead, mg/L	BDL	BDL	BDL	0.01
24	Zinc, mg/L	BDL	BDL	BDL	5
25	Cobalt, mg/L	BDL	BDL	BDL	-

Table 6 : Analysis results of river sediment

S.No	Parameter	Sediment from upstream of discharge point	Sediment from confluence point	Sediment from downstream of discharge point
1	Arsenic mg/L	BDL	BDL	BDL
2	Copper mg/L	0.12	0.08	BDL
3	Cadmium mg/L	BDL	BDL	BDL
4	Total Chromium mg/L	0.42	0.46	0.08
5	Iron, mg/L	281	286	4.65
6	Manganese, mg/L	2.53	1.99	0.50
7	Nickel, mg/L	0.21	0.13	0.04
8	Lead, mg/L	BDL	BDL	BDL
9	Zinc, mg/L	0.42	0.23	0.33
10	Cobalt, mg/L	0.11	0.05	BDL
11	Mercury, mg/L	The analysis is under progress.		

115. From the finding of the result of the analysis, it is inferred that the river water quality at all points is meeting Indian Standard Drinking Water Standards except for iron that

indicates the water is not suitable for drinking purpose without any treatment. The results were compared with drinking water standards, since it is a major source of drinking water for all domestic purposes to the large population in the Kathikudam Panchayat. Industry has raised serious objection to this. As rightly pointed out by the learned senior counsel appearing for the industry, the objection with regard to the parameters of the river samples is based on the presence of iron. The analysis of the river water samples show that at the upstream of discharge point, the iron was 0.55 mg/l, at the confluence point, it was 0.44 mg/l and at the downstream of discharge point, it was 0.37 mg/l. The drinking water standard parameter of iron under the Drinking Water Standard is 0.3 mg/l. Therefore, it is seen that at the effluent point and downstream discharge point, it exceeds the standard parameter i.e 0.3 mg/l. But at the same time, even the parameter found at the upstream of discharge point is 0.55. If that be so, when the parameter at the downstream of discharge point and the effluent point, the iron is in excess of the parameter found in the upstream, it makes absolutely

clear that the industry is not either responsible or contributed for the excess iron content in the river water.

116. Similarly, the results of analysis of river sediment as given in the report, show that heavy metal concentration is meagre except for the iron concentration. The iron concentration in the river sediment from upstream of discharge point is 281 mg/l, sediment from confluence point is 286 while at the downstream of discharge point is 4.65 mg/l. Even though river water and sediment analysis show that the iron is in excess, based on that fact alone, it cannot be found that it is due to the effluent being discharged by the industry. It is more so, when the analysis of the waste water samples collected from ETP and final outlet shows that the parameter of iron found at the inorganic stream was 0.44 mg/l, and at the organic stream was 2.52 mg/l. The parameter found at the outlet of tertiary clarifier was 0.33 mg/l. At the same time, the parameter found at the outlet of delay pond was 0.5 mg/l and at the final disposal point it was 0.64 mg/l.

117. On the compliance of source emissions, the unit is having 11 stacks attached to 3 boilers, bag filters attached to DCP plant and DG sets. Source emission monitoring was carried out at five stacks attached to different processes to access the efficiency of Air Pollution Control Devices installed. The source emission monitoring result shows the parameters for particulate matter at the firewood boiler was 105 mg//$Nm^{3,}$ at the biogas & LSHS DCP drier-2 was 128 mg/$Nm^{3,}$, at biogas fired DCP-I was 93.8 mg/$Nm^{3,}$, at bag filter drier 1 was 34.3 mg/$Nm^{3,}$, at bag filter drier II was 424 mg/$Nm^{3.}$. The standard fixed by KSPCB is 150 mg/$Nm^{3.}$ Sulphur Dioxide found at biogas & LSHS DC Drier -2 was 160 mg/Nm^3, at biogas fired DCP1 was 113 mg/Nm^3, while it was not found at the biogas filter drier 1 and drier II. The conclusion is that the unit is meeting emission standards with respect of firewood boiler and bag filter -1 and the particulate matter concentration is exceeding 2.8 times than the stipulated standard at bag filter 2. It indicates that the bag filters installed are inadequate to control particulate matter emissions to meet the norms.

118. To meet the odour management, the unit has taken the following measures:

1. The crushed bone is stored in closed shed.

2. The crushed bone processing is carried out in closed shed.

3. The duct system is provided in crushed bone storage and pre-treatment area and the sucked air is treated through bio filters 1 and 2 as observed by the team."

This indicates that the bio-filters are working satisfactorily.

119. On the hazardous waste management, it is reported that the unit has provided hazardous waste storage yard having concrete flooring and stored in designated storage yard and disposed of as per the authorisation conditions.

120. On the Ambient Air Quality monitoring, it is inferred that the parameters PM_{10}, SO_2, and No_2 are meeting with 24 hourly National Ambient Air Quality Standards.

121. ETP Sludge Management: The report shows that the average quantity of sludge generated per day is 15 to 18 tonnes/day. The unit is found stored with huge quantity of sludge in bio-compost yard and left unutilized in a shed covered on three sides by tarpaulin. It is found that due to non issuance of licence from local Panchayat, the bio-compost process was stopped its operation since two years and the unit was disposing the sludge as nutrisoil at Kaliyapuram village, Palakkad District which is located at a distance of about 98 kms upto March 2016. The CPCB team inspected the dumpsite at Kaliyapuram and found that huge quantity of sludge was dumped in open area and left unutilized. The samples from sludge dumpsite and at sludge storage yard of the industry were collected to check for any heavy metal contamination. The results of the analysis of the sludge from the sludge dumpsite and sludge drier are as follows:

Table 7 : Analysis results of sludge from sludge dumpsite and sludge drier

Sl. No	Parameter	Sludge from dumpsite	Sludge from sludge drier	Sludge from bio-compost yard	Specifications of Organic Fertilizer as per notified Fertilizer

					(Control) order, 1985
1	Arsenic mg/L	BDL	BDL	BDL	10.00
2	Copper mg/L	BDL	0.08	0.20	300.00
3	Cadmium mg/L	BDL	BDL	BDL	5.00
4	Total Chromium mg/L	0.15	0.43	BDL	50.00
5	Iron, mg/L	1.66	377	1.38	-
6	Manganese, mg/L	1.64	4.59	3.13	-
7	Nickel, mg/L	0.10	0.15	0.11	50.00
8	Lead, mg/L	BDL	BDL	BDL	100.00
9	Zinc, mg/L	0.50	0.25	0.79	1000.00
10	Cobalt, mg/L	BDL	0.07	BDL	-
11	Mercury, mg/L	The analysis is under progress.			

BDL: Below Detection Limit.

122. In conclusion, it is reported that the concentration of heavy metals is within the standards of organic fertilizer. The unutilized sludge accumulated over a period of time in the Kaliyapuram area is severely affected by rains and the analysis of sludge, confirms the same, which is highly dangerous to

surrounding environment. The sludge generated by the unit was earlier used as bio-compost for agricultural purpose. The analysis results are compared with the Standards in the Fertilizer (Control) Order, 1985 notified by Government of India, Ministry of Agriculture and Rural Development,(Department of Agriculture & Co-operation) New Delhi dated 25.09.1985. The process of analysis of mercury was not completed when the report was filed. After filing of the report, the report of the mercury analysis was submitted by the CPCB, which shows that the mercury contents of the sludge from dumpsite (Kaliyapuram) is 0.025mg/kg, river sediments at upstream point is 0.025 mg/kg, at confluence point is 0.04 mg/kg, at downstream point it was 0.24mg/kg respectively, while it was 0.148 mg/kg at the sludge from sludge drier, 0.08 mg/kg at the bio-compost yard and the mercury content of organic Fertilizer (Control) Order, 1985 is 0.15 mg/kg. Based on this analysis, the CPCB concluded that the concentration of mercury in all the samples is well within the standards prescribed in the Specifications of Organic Fertilizer except at downstream sediment. The sludge generated by the industry was earlier used as bio-compost for

agricultural purpose. As the analysis results are compared with the standards in the Fertilizer (Control) Order 1985, the following suggestions were made:

> "Although from the analysis it is inferred that the sludge is non-hazardous in nature , the industry shall not store any of the sludge generated from ETP in open area in the premises as well as at the surrounding environment. The industry shall ensure proper storage and safe disposal of sludge generated. The industry shall compulsorily carry out third party analysis through NABL accredited analysis laboratory for determination of presence of mercury in HCL before using in the process."

123. It is the specific case of the industry that they are not using any HCl containing mercury. According to the industry, they are purchasing the HCl from M/s. Travancore Cochin Chemicals Ltd (TCC) Kochi and M/s. Chemplast Sanmar Limited. Therefore, there is no possibility of any mercury concentration in the sludge. There is no material to show that the HCl alone purchased by the Industry is containing mercury. Moreover from the report of the analysis of mercury as stated in the report of CPCB, it is clear that the excess of mercury found in the discharge point of the industry cannot be

attributed to the industry. The report also shows that the quality analysis tests for mercury are done by the industry for HCl in their quality control laboratory. The HCl analysis record for the period from 21.09.2016 to 04.10.2016 indicates that concentration of mercury is nil. It is evidently clear from the CPCB report that the industry shall compulsorily carry out third party analysis through NABL accredited laboratory for determination of presence of mercury in HCl before using in the process.

124. As per the Consent, the industry is permitted to draw 3000 m3 per day of water from river Chalakkudy. The industry has installed flow meters to measure the quantity of water intake from the river. The records are maintained in log book and same was cross verified. During inspection, the rate of water consumption was in the range of 2933-2974 m^3/day. There is no separate flow meters installed to quantify the water consumption for processing and domestic purpose. As per the condition of the Consent order, the industry is permitted to discharge treated effluent about 3000 m^3/day .To quantify the effluent discharge per day at the final disposal point, no

separate flow meter was installed. During inspection the CPCB found that the treated effluent is diluted with backwash water of sand filter before discharging into the river. MLSS concentration found in the aeration tank was 736 mg/l. According to CPCB, it indicates the re-circulation of sludge from secondary clarifier to aeration tank is not proper. The concentration of Ammonical Nitrogen at the final outlet was 52.9 mg/l slightly higher than the standard fixed by KSPCB (50 mg/l). It was also found that the dilution of TDS, COD and Chlorides concentration from 4014 mg/l to 2944 mg/l, 331mg/l to 47 mg/l, and 2323 mg/l to 1663 mg/l respectively due to the dilution of the treated effluent from delay pond with backwash water of sand filters before discharging into the river. So also, the concentration of TDS and Chlorides at final outlet is 2944 mg/l and 1663 mg/l which are very high when compared to drinking water standard limit. It is also found that there is no mechanism installed to detect leakage/breakage in the conduit carrying treated effluent to a distance of 900 meters and that too, it passes through the irrigated land and canal and final outlet is submerged 5 meter below in the river. It was also reported that as the industry has stored huge

quantity of sludge in bio-compost yard and left unutilized in a shed covered in three sides with tarpaulin , it may be lead to fugitive emission. And the bio-compost process was stopped since from two years due to non issuance of licence from local Panchayat.

125. Based on these findings the CPCB provided the following suggestions to the industry:

> "i. To obtain certificate of analysis from the HCl suppliers indicating mercury concentration each time whenever HCl is supplied to the unit;
>
> ii. To conduct third party analysis through NABL accredited Laboratory for presence of mercury in HCl before using in the process;
>
> iii. To install separate flow meters to quantify the water consumption for domestic usage and manufacturing process;
>
> iv. To install flow meters at all the processing unit to quantify the water utilized in each process;
>
> v. To draw fresh water from downstream side of the unit and discharge the treated effluent on upstream side;
>
> vi. To install flow meters at ETP inlet and outlet to quantify waste water generation and its discharge to assess the actual quantification;

vii. To maintain the concentration of dissolved oxygen & MLSS at the level of 1.0-1.5mg/l and 2500-3000 mg/l respectively to increase the efficiency of aeration tank and to ensure proper operation of biological treatment system;

viii. To ensure proper scientific operation and maintenance of ETP to meet the standards prescribed without dilution;

ix. To relay the existing discharge pipeline (900 mts) above ground level in time-bound manner;

x. The facilities shall be provided at the outfall point as per norms for inspection and as well as for sample collection;

xi. To adopt appropriate technologies to recycle the treated effluent at the maximum extent and to minimize the discharge of effluent into the river;

xii. To construct sewage treatment plant to treat the domestic sewage generated within the premises and to use the treated water for green belt development;

xiii. To ensure the bio-gas generated from anaerobic digester is utilized completely as fuel and maintain records on daily basis;

xiv. To ensure the continuous operation & maintenance (i.e.24 X 7) of bio filters in order to avoid odour nuisance in unit premises;

xv. To refurbish the s tack as per Emission Regulation Part III published by CPCB with

respect to safe guards, portholes & sampling platform;

xvi. To phase out the usage of firewood in the boilers and alternative fuel shall be used;

xvii. To augment the existing bag filters adequately to meet the prescribed standards;

xviii. To operate the continuous ambient air quality monitoring station as per norms at appropriate location which is fee from obstructions;

xix. To conduct ambient air quality monitoring routinely at the boundary of premises to cover all directions in addition to existing CAAQM station; and

xx. To take necessary steps for removal and safe disposal of unutilized sludge dumped at Kaliyapuram at the earliest possible time.

126. In addition, the KSPCB was directed to (1) amend the consent condition for installation of electromagnetic flow meters at ETP inlet & outlet;(2) to meet the standards for TDS and Chlorides in consent condition in tune with drinking water standards as the treated effluent is discharged into the river;(3) to instruct that no solid waste are to be stored and accumulated anywhere unscientifically in the unit, even though the ETP sludge is declared as non-hazardous. Similarly, the

sludge shall not be used for irrigation purpose in food crops as per the directions of the Ministry of Environment and Forests and Climate Change. The MoEF & CC directed the industry that though the ETP sludge of the industry is found to be non-hazardous, the sludge shall not be used for irrigation purpose in food crops, to amend the consent condition for disposal of sludge to TSDF site. As the sludge generated from the industry was sent to the river, the standards for TDS and Chlorides shall be included in the Consent condition and to conduct sludge analysis as per Schedule II of Hazardous Waste Management Rules, 2016 for ETP sludge generated from the industry and based on the results of analysis, to amend the conditions for sludge management in the Consent Order. The arguments of the learned senior counsel for the applicants is that in the absence of proper compliance, it cannot be found that there was no disposal of the untreated effluent into Chalakkudy river.

127. The main crux of the arguments of the learned senior counsel appearing for the applicants is that there has

been no material balance or water balance as undertaken by the industry and without proper balancing of the materials used and the effluent generated, it is not possible to properly find out the pollution being caused by the industry. The argument is that the total raw materials consumed by the industry is 115.048 TPD, which includes 74 TPD of crushed bone, 81.4 TPD of HCl (since 68% is water content in HCl, the actual quantity of HCl is 26.048 TPD) and 15 TPD of hydrated lime. The permitted quantum of the product is 62.1 TPD consisting of 13.3 TPD of Ossien, 8.3 TPD of limed Ossein, 40.5 TPD of Di-calcium Phosphate and therefore, the balance out of the raw materials used deducting the permitted quantum of products, namely, 52.948 TPD should be the process waste generated by the industry and annually, the total generated waste would be 19326.02 tonnes. It is pointed out that according to the form submitted by the industry, for getting approval for organic fertilizer sold by it, the total annual production capacity per day is 7 MT and per annum is 2600 MT. It is pointed out that as per the verification form of the PCB dated 23.06.2012, the industry is permitted to generate a total of 18,000 MT of ETP waste, of which 2/3rd is converted as

nutri soil and 1/3rd is sold to outside parties as semi solid sludge, for which two numbers of biogas plants are installed. So, it is argued that 12000 MT is cleared to be sold as 'nutrisoil' and 12,000 MT is to be used in the biogas plants. It is therefore argued that there is a gap of 1326.02 TPA between the waste generated by the industry and the waste permitted to generate from the ETP. Though the case of the industry is that the sludge generated from the industry is sold as compost and even if it is assumed that 12000 TPA of sludge is converted and sold as fertilizer, there is no accounting for 7326.02 (19326.02 – 12000) TPA of solid waste. It is also found out that as per the details furnished in the report of NEERI dated May 2014, regarding the raw material consumption and product details, the total raw material consumed during 2008-2009 is 48314.12 TPA including crushed bone 32134 TPA , HCl 31841 TPA and hydrated lime 5991 TPA and the total waste generated is 25205.12 TPA. The total waste that can be accounted for is only 18,000 TPA of ETP sludge, out of which only 12000 TPA can be converted into fertiliser and therefore, deducting the maximum fertilizer that can be produced, namely 12,000 TPA, the waste unaccounted is 13205.12 TPA. It is also

pointed out that similar data furnished for the year 2009-2010 shows that the total raw material consumed is 44,904.36 TPA and the total production including Ossein 3159 TPA, Limed Ossein 3194 TPA and DCP 14862 TPA and deducting it from the total raw materials consumed, the total waste generated would be 23,689.36 as 12,000 TPA is the maximum fertilizer that can be produced, according to the applicants, the unaccounted waste is 11,689.36 TPA (23689.36 – 12,000) It is also pointed that that for the year 2010-2011, the waste unaccounted is 11,097.44 TPA and for the year 2011-2012 it would be 8975.96 TPA and for the year 2012-2013, the total raw materials consumed was 44904.36 TPA and the total production was 21979 TPA and therefore, the balance of 22925.36 should be the total waste generated and deducting the maximum fertiliser that can be produced i.e. 12000 TPA, the waste unaccounted for was 10925.36 TPA. It is argued that there is no accounting for the actual waste generated from the process and how many tonnes of fertilizer has been sold during these years have not been disclosed to find out the exact quantity of unaccounted waste generated.

128. Learned counsel pointed out that as per the reply of KSPCB furnished on an application under RTI Act, the total sludge generated is 750 tonnes per annum. But the report of CPCB shows the sludge generated from the ETP is only 15 to 18 TPD and this translates to 5475 to 6570 TPA and, if this is the quantum of sludge generated from the ETP, there is a great variance in the material balance and there should be a proper balancing of the raw materials and the waste generated. Learned counsel argued that the unaccounted waste, in fact, is illegal discharge into the Chalakkudy river without permission and thus the river water is polluted.

129. The industry denied this allegation. Learned Senior Counsel pointed out that the industry maintained a strict material balance. The argument is that the gross material consumption is 170.5 TPD consisting of 74 TPD of crushed bone, 15 TPD of lime and 81.4 TPD of Hydrochloric Acid. Out of these, the HCl concentration used is 30% and 70% is water and therefore, the net quantity of HCl is only 24.4 TPD and thus, the net quantum of material consumed is only 113.4 TPD. Learned Senior counsel pointed out that the dried Ossein

production is 13.3.TPD and wet Ossein required for gelatin production is pumped into the liming plant, where it is treated with lime for 35-45 days and treated lime as a whole is transported to the gelatine unit for gelatine manufacture and the limed Ossein production is 8.3 TPD.

130. The Mono-calcium Phosphate (MCP) generated during acidulation is pumped to the Di-calcium Phosphate (DCP) plant and treated with hydrated lime solution for converting MCP to DCP at pH 5.6 to 5.8 The settled DCP slutty is filtered, dried, packed and stored in closed storage yard. The DCP production is 40.5 TPD. The sinews and bone meal separated during crushed bone pre-treatment and is converted to meat meal by dry process and wet process. Learned Senior counsel pointed out that the dry form is packed and sold to local farmers as meat meal. The meat meal production is 1 TPD. The bone meal separated after crushed bone washing is cooked with steam and dried and sold to the farmers as sterilized bone meal, which has since been stopped. Therefore, it is pointed out that the total production is 63.1 TPD, namely, 13.3 TPD of Ossein, 8.3 TPD of limed Ossein, 40.5 TPD of DCP

and 1 TPD of meat meal. The waste generated is treated in the ETP. It is pointed out that after the process of waste generated in organic stream, the next process is degradation of organic compounds in the anaerobic digester 1 and 2 and 21 TPD equivalent of solid substance is converted into biogas at the rate of 3000 cu.m. per day and in the inorganic stream, the effluent is treated in the flash mixer, followed by Flocculator, Primary clarifier, Diffused Air Flocculator, followed by Aeration tank and the sludge from primary clarifier is taken into thickener followed by Rotary Vaccum Drier, filter press and sludge drier and the final sludge generated together in organic stream and inorganic stream amounts to 25 TPD. The effluent from DAF 1 and 2, further undergoes secondary and tertiary treatment and finally discharged into the Chalakkudy river after treatment. Further, during pre-treatment of crushed bone 3.5 TPD of bone meal and sinews is generated. Therefore, it is clear that the total waste generated would be 28.5 TPD. Approximately 21 TPD equivalent mass of biogas is generated in the anaerobic reactor and therefore, the total output would be 112.6 TPD, almost equal to the input and therefore, there is material balance.

131. Learned Senior counsel pointed out that the argument of the learned counsel appearing for the applicants that there is no material balance and there is unaccounted waste, is based on the erroneous presumption that the arithmetic difference between the raw material consumption and production amount to waste. But, it does not take into account the loss of mass during the manufacturing process in liquid and gaseous state and it does not take into account the mass equivalent of the biogas being generated in the anaerobic reactors and if this is taken into account there is material balance.

132. Learned counsel further argued that the industry is permitted to generate 18000 TPA of solid waste, amounting to 49.31 TPD and the waste generated has always been within the said parameter and though the report submitted by KSPCB shows that the sludge generated from the ETP is only 15 to 18 TPD, it is not based on the scientific measurements and thus, contrary facts are stated by the applicants.

133. The case of the applicants is that as the maximum capacity of two anaerobic bio-digesters at the rate of 930 cu.m per day would be only 1860 and not 3000 as claimed by the industry and the effluent from DCP stream is not treated in the bio-digesters and the industry has no other treatment system in place to remove dissolved solids, suspended solids present in the effluent stream and in addition, 3.5 tonnes of waste is generated from bone processing. Even according to the industry, the first anaerobic digester was commissioned only on 22.03.2014 and the second digester was commissioned during October, 2015. The industry has not explained how the huge volume of sludge and waste was managed before and after the installation of the digesters. It is the case of the applicants that biogas is a mixture of methane and carbon dioxide and the biogas from the digestion of raw effluent from the Ossein plant and sludge from the primary clarifier and secondary clarifier of the ETP is expected to have a composition of roughly 65% of methane and 35% of carbon dioxide Converting approximately 21 TPD of solid substance to biogas, it would generate atleast 21 TPD of biogas. It is also pointed out that according to the industry, the pair of digesters that convert the raw effluent

from the Ossein plant directly to biogas generates 1500-3000 m^3 per day per tank. Therefore, the total capacity of the biogas plants would be 3000-6000 m^3 per day. So, it is argued that to fully account for converting approximately 21 TPD of solid substance to biogas, the other pair of digesters – processing sludge from the primary clarifier and the secondary clarifier of the ETP would need to have the capacity to generate the remainder of the biogas, i.e.at least 12000 – 15000 m^3 per day and in fact, the biogas plants for processing sludge from the primary clarifier and the secondary clarifier of the ETP have the capacity to generate the biogas at a rate of 12000-15000 m^3 per day, which is not possible. The applicants had calculated the production capacity to generate biogas based on the dimension and the height of the tanks as furnished by the industry, namely, each tank has a diameter of 8 M and height of 7 M. It was therefore argued by the applicants that each digester can hold only 352 cu.m of effluents and can digest only a maximum volume of 704 M^3 in both the digesters in 46 hours and therefore, the claim of the industry about the conversion of 21 MT of solids into biogas on daily basis can never be correct. It is argued that considering the capacity of

two digesters, the maximum volume they can process is 11,019 M^3 effluent in 30 days. The argument, therefore, is that there is a net shortfall in the treatment capacity of 42,981 M^3 effluent and therefore, there is a clear mismatch of the input and the waste generated. This conclusion was based on the diameter and the height of the tank of the digesters. The industry filed a memo on 06.01.2017 pointing out that the actual diameter of each tank is 18 meters and not 8 meters and there was a clerical error in the written submissions filed earlier, based on which, the applicants have contended that there is mismatch between input and the waste generated. To make the matter clear, the industry has filed an additional reply showing that the anaerobic digesters convert approximately 21 TPD of solid substance to biogas. It is pointed out by the industry that the bio digesters are fitted with flow meters and the flow of the effluents into the digesters can be measured. The total quantum of effluent generated in the organic and inorganic stream was approximately 2900 cu.m per day and out of this, the sludge of 1860 cu.m per day of effluent from the organic stream is processed and 21 TPD equivalent of solid is converted to

biogas. It is pointed out that totally there are 4 digesters, in the ETP system. Out of this, one pair of digesters converts the raw effluent from the Ossien plant directly to biogas and the raw effluent from the equalization basin/effluent collection tank is directely fed into the anaerobic digesters and another pair of digesters converts feed from the primary clarifier and the secondary clarifier to biogas. According to the industry, at the inlet of raw effluent fed into the bio-digesters, the TSS is 3757 mg/l and the discharge at the outlet is 975 mg/l. So also, the TDS at the inlet is 12611 mg/l and outlet is 5860 mg/l and Chloride at the inlet is 4587 mg/l and at the outlet is 4587 mg/l. The TDS - Chlorides at the inlet is 8024 mg/l (12611 – 4587) and at the outlet is 1273 mg/l (5860 – 4587) and the flow rate at the inlet is 82.6 m^3/h. According to the industry, the inlet sludge is a total of 23.36 TPD, namely, 3757 TSS X 82.6 (Average flow rate per hour) X 24 (Hours) = 7.45 MTD; TDS minus chlorides = 8024 X 82.6 X 24 = 15.91 (7.45 MTD + 15.91 MTD). So also, the outlet sludge is a total of 4.45 TPD namely, 975 TSS X 82.6 (Average flow rate per hour) X 24 (Hours) = 1.93 MTD; TDS minus Chlorides = 1273 X 82.6 X 24 = 2.32 (Total -1.93 + 2.32). Thus, the total outlet sludge

is 4.45 MTD. It is the case of the industry that the difference between the above two values would be the amount of solid mass converted to gas. Therefore, the total mass of solid substance converted into gas is 18.91 MTD (23.36 TPD – 4.45 TPD and the sludge processed in the biogas plant feed from the primary clarifier and the secondary clarifier together would come to 2.8 MTD and the grand total from all plants would be 18.91 MTD + 2.8 MTD = 21.71 MTD . Therefore, it is clear that 21 MTD equivalent amount of solid substances is converted to biogas.

134. The applicant filed a memo dated 07.01.2017 in response to the document, namely, Technical Specifications of the Biogas Plant, produced by the industry, contending that the industry has to state the capacity of each anaerobic reactor, the flow of rate of each anaerobic reactor, the retention time, the effluent parameter of the effluent inflow from the organic stream, the quantity of biogas generated from the process and the ratio of BOD, COD oxidised and biogas produced. It is argued that as per the report of NEERI dated May, 2014, the reactor designed for a flow rate of 930 M^3 per day with

hydraulic retention time of 42 hours and the anticipated methane generation from the bioreactor is 0.45 m^3 per kg of COD oxidised and therefore, the retention time of 42 hours will be taken into account while computing the biogas produced and COD oxidised. It is also argued that as per NEERI report dated May 2014 where the effluent parameter is provided, the BOD to COD ratio with Ossein is shown as 0.42-0.48 and DCP 0.90-0.92 and it is not believable that the raw effluent from the DCP plant alone have BOD and COD levels, which ought to be much higher. Even if the figures stated therein are correct, the total effluent generated from the Ossein plant is 83.90 cu.m.per hour, which would be 2013.6 cu.m per day equivalent to 2013600 litres and as per the report of NEERI, the TSS is 3757 mg/l and TDS is 12611 mg/l and the total solids load of 16.358 g/l of effluent and the total solid, thus, would be 16.358 X 2013600 , namely, 32938468.8 grams or 32948.4688 kilograms or 32.9384 tonnes. The total solid load in the DCP effluent stream would be 1127.5 mg/l with TSS and 28267.5 mg/l of TDS and thus, the total of solid load would be 29.395 mg/l and the total effluent from DCP stream as provided is 33.50m^3/hour, which is 804 cu.m. per day or

804000 litres a day. According to the applicants, the total solids present in the DCP stream is 804000 X 29.395. The argument is that the total solids present in both the streams together would be 32.9384 + 23.63358 tonnes, which amounts to 56.57198 tonnes and even as claimed by the industry, if 21 tonnes of solids equivalent of biogas is produced, there would be a balance of 35.57198 tonnes of solids, which is not being treated. The argument is that as per the contentions of the industry, the total final sludge generated from the organic and inorganic stream amounts to 25 TPD only. 3.5 tonnes of solids which would equivalent of 21 TPD, was broken down in the biogas plant generating biogas and thus, the total production would be 63.1 TPD, which is claimed to be equal to the input. The applicants would contend that even in that case, the total solids present in the organic and inorganic stream is 56.57198 tonnes, much more than the permitted input of 150.048 TPD. It is also argued that the waste balance propounded by the industry is grossly incorrect and even if 21 tonnes is broken down in the anaerobic digester out of 32.9384 tonnes of solids in the organic stream, 11.9384 tonnes a day remains from the organic stream and the waste from pre-treatment of bones is

3.5 tonnes a day and together with the waste from the inorganic DCP stream, the total would be 39.07198 tonnes a day of waste remains and therefore, in any event,10.57198 tonnes a day of waste is unaccounted. The applicants would also contend that it is impossible to process 3000 cu.m per day at the anaerobic digester as there is a delay time of 42 hours also to be taken into account. The argument is that from the table furnished in the NEERI report dated May 2014 COD is 8635 mg/l and the total COD present is 2013600 litres equivalent to 17387436 grams or 17387.436 kilograms and the total volume of methane generation at the rate of 0.45 M^3 per kg of COD oxidised is only 7824.3462 M^3 and if that is to be correct, there should be 100% oxidisation of COD which will not occur in any anaerobic reactor. It is also contended that there is no basis or substance on the assertion of the applicants that 21 TPD equivalent of solid substances is converted into biogas and therefore, it is quite clear the industry is not accounting huge quantity of untreated effluent , which is clandestinely being discharged into Chalakkudy river and therefore, necessary directions are to be issued.

135. The industry clarified the suspicion created by the applicant by filing written submissions, pointing out that the methodology adopted by the applicant based on TSS and TDS is not correct and he has not taken into account the various critical aspects. It is pointed out that the total input is 113.4 TPD and the total product is 63.1 TPD. The total sludge generated is 25 TPD, Bone meal and sinews generated is 3.5 tonnes per day and if 21 TPD equivalent solid substance is converted into biogas, as claimed by the industry, the output is also equal to the input and there is no unaccounted balance as canvassed by the applicants. It is pointed out that the bio-digesters are fitted with flow meters and the flow of the effluents into the bio-digesters can be measured and the total quantum of effluent generated in the organic and inorganic stream is approximately 2900 cu.m. per day and out of this effluent, the sludge in 1860 cu.m. per day from the organic stream is processed and 21 TPD equivalent of solid is converted into biogas. The industry pointed out that there are a total of 4 bio-digesters in the ETP system and one pair of digesters converts the raw effluent from the Ossein plant directly to the biogas. The raw effluent from the equalization

basin/effluent collection tank is directly fed into the anaerobic digesters. The other pair of digesters converts feed from the primary clarifier and the secondary clarifier to biogas. The Industry pointed out that TDS and TSS and Chlorides in raw effluent fed into the bio-digesters and that in the outlet of the bio-digesters, as per the report of NEERI dated May 2014, TSS is 3757 mg/l and at the outlet 975mg/l, TDS is 12611 mg/l and at the outlet 5860 mg/l, Chloride is 4587 mg/l and at the outlet 4587 mg/l. The Chlorides are same at the inlet and outlet, as they do not undergo conversion in the bio-digesters. The TDS-Chlorides (TDS minus Chlorids) at the inlet is 8024 and at the outlet is 1273. The flow rate is 82.6 m^3/h The inlet sludge of TSS should therefore be 3757 X 82.6 X 24 hours which would be 7.45 MTD. The TDS minus chlorides at the inlet would be 8024 X 82.6 X 24 , which would be 15.91 TPD. Therefore, the total inlet would be 23.36 TPD. At the outlet, according to the industry, TSS would be 975 X 82.6 X 24 hours, which would be 1.903 MTD,TDS minus Chlorides would be 1273 X 82.6 X 24 hours = 2.32 TPD. Thus, the total outlet would be 4.45 TPD.

136. The argument is that the difference between the above two values would amount to solid mass converted into gas and therefore, the total mass of solid substance converted into gas would be 23.36 TPD – 4.45 TPD, namely 18.91 MTD. It is pointed out that the sludge processed in the biogas plant fed from the primary clarifier and the secondary clarifier, in the inlet would be 80 m^3 per day X 4 %, namely 3.2 MTD and in the outlet would be 80 m^3 per day X 0.5 %, namely 0.4 MTD and thus, the total quantity converted is 2.8 MTD. Learned counsel appearing for the industry thus, would submit that the grand total from all the plants would amount to 21.71 MTD and from the above calculations, 21 MTD equivalent amount of solid substance is converted into biogas and therefore, the contention that there is no material balance, canvassed by the learned counsel appearing for the applicants, is not correct.

137. Reports of the NEERI and the CPCB would establish that the wash water generated by washing of crushed bone after the pre-treatment is directly fed into the ETP and after the washing, the crushed bone goes to the acid bath for treatment with 4% concentrated HCL to produce Ossein and

from there, the Ossein is taken to the paddle washer for washing and removing free acid and impurities. In the paddle washer neutralization of ossein is conducted using hydrated lime. After neutralization, Ossein is dried and packed. The Mono calcium phosphate generated from acidulation process is pumped to DCP Plant to manufacture DCP and treated with hydrated lime solution for conversion of MCP to DCP and the impurities from the DCP plant are taken to the ETP Plant. DCP slurry is filtered using Rotary Drum Vacuum filter (RDV), dried and packed and stored. The filtrate and supernatant generated during the process is sent to ETP through open drain and the effluent is taken to equalization basin of DCP and equalised process effluent goes to flash mixer and then taken to Flocculator1 and 2 , primary clarifier and thereafter to aeration tank 1 and from there to the secondary clarifier and then again to flash mixer and then to Flocculator and then to tertiary clarifier and then to collection tank, and from there to the sand filter and then to delay pond and then to collection tank. The treated water is reused . The treated effluent from the collection tank and the polishing pond, back wash water from the sand filter are discharged into the Chalakkudy river. From

the neutralization basin, the processed effluent goes to the buffer tank and from there to the anaerobic tank and from there the Lamella Clarifier and from there, it goes to flash mixer. Therefore, the flash mixer receives effluent from the DCP: process as well as from the Ossein process and from the flash mixer, it goes to Flocculatorfrom where it goes to Primary clarifier 1 and 2 where biogas is produced by oxidation of COD.

138. The applicants originally attacked the case of the industry that 21 TPD equivalent of solid substance is converted into biogas based on the details furnished by the industry regarding the diameter of the bio digesters. Instead of 18 m, it was wrongly shown as 8 meters. The mistake in mentioning the actual diameter of the bio-digester was corrected and thereafter, the calculation of the capacity of biogas was furnished by the industry and on going through the entire aspect of the matter, we cannot agree with the case of the applicants that 21 TPD biogas was generated from the bio-digesters. As pointed out by the industry when the total quantum of solids excluding the chlorides which do not undergo any conversion in the biodigesters, the inlet sludge

would be 23.36 TPD while the outlet sludge would be 4.45 TPD. Therefore, the difference is 18.91 MTD, which was necessarily the total mass of solids converted into biogas. In addition to that, the solid processed in the biogas stream from the primary clarifier and the secondary clarifier as contended by the industry is taken into consideration, the total quantity converted would be 18.9 TPD + 2.8 TPD = 21. 7 TPD, which would corroborate the case of the industry that 21 TPD of total substance is converted into biogas. Therefore, it could be seen that when the quantity of material consumed by the industry is 113.4 TPD, the total waste generated would be 28.5 TPD and when the quantity of waste converted to biogas at the bio-digesters is taken into consideration, namely, 21 TPD, the total out put would be 112.60 TPD and therefore, we do not find any difference in the material balance as alleged by the applicants.

139. Therefore, on the analysis of the entire facts and materials, we hold that there is no material to establish that the industry has discharged sludge along with the treated liquid effluent into the Chalakkudy river. The sludge generated by the industry is non hazardous and non toxic. The Effluent

Treatment Plant is functioning efficiently and as of now the discharge of the treated effluent from the ETP to the Challakudy river has no adverse impact on the river water or the ground water. The points are answered accordingly.

140. **Point No.7**: From the materials produced and evaluated earlier, it is clear that before the commissioning of the digesters, the industry could not have treated the entire effluent to achieve the prescribed parameters. But, that position has now been changed as the industry has already started commissioning the bio-digesters. Hence, we find no scope for the earlier grievance, provided the ETP including the bio-digesters are working properly to their optimum. At the same time, based on the findings recorded in the report submitted by the CPCB in the Original Application 412 of 2016, (PB) and in the light of the materials available, we find it necessary to issue certain directions for remedying the injury caused to the environment and also to completely avoid causing any pollution by the operation of the industry. The industry had stocked huge quantity of sludge generated at Kaliyapuram dumpsite in Palakkad district and left it

unutilized and unattended. Even though the presence of mercury found in the sludge cannot be attributed to the respondent industry and the sludge is non toxic and non hazardous, the sludge when left unattended, would necessarily cause pollution of the ground water. The industry is, therefore, bound to remove the same from the site and dispose it in accordance with the rules without further delay. As no balancing of the materials and the water used and discharged, based on the permissible quantity as provided in the order of Consent granted by the Pollution control board, it is also necessary to direct the KSPCB to conduct a proper water balancing and material balancing to check any portion of the untreated effluent being discharged into the land or water body. To facilitate proper balancing of materials and water, it is necessary to direct the industry to install flow meters of the processing units to account the exact quantify the water drawn as well as discharged.

141. Therefore, based on the above materials discussed including the reports submitted by the NEERI, KSPCB and CPCB, and applying the precautionary principle to avoid any

possibility of causing pollution to both air and water in the environment, we find it necessary to issue the following directions:

i. The respondent industry M/s.Nitta Gelatin India Ltd. shall install separate flow meters to quantify the water consumption for domestic usage and manufacturing process.

ii. The respondent industry shall install flow meters at the process limit to quantify the water utilised/processed.

iii. The respondent industry shall install flow meters at the ETP inlet and outlet to quantify the waste water generation and its discharge to assess the actual quantity.

iv. The respondent industry shall maintain the concentration of dissolved and MLSS at the level of 1.0 – 1.5 mg/l and 2500 – 3000 mg/l respectively, to increase the efficiency of aeration tank and also to ensure proper operation of biological treatment system.

v. The respondent industry shall ensure proper scientific operation and maintenance of ETP to meet the prescribed standards without dilution.

vi.The respondent industry shall adopt appropriate technologies to recycle the treated effluent to the maximum extent and to minimise the discharge of effluent into the river.

vii. Ultimately, the respondent industry shall make every effort to achieve Zero Liquid Discharge (ZLD) to the extend possible.

viii. The respondent industry shall construct a sewage treatment Plant to treat the domestic sewage generated within the premises. The treated effluent from the sewage treatment plant shall be used for gardening and for the development of green belt.

ix. The respondent industry shall ensure that the biogas generated from anaerobic digester is utilised completely as fuel. They shall maintain records of

the biogas generation, which is utilised as fuel on daily basis.

x. The respondent industry shall ensure continuous operation and maintenance of the bio filters to avoid any odour nuisance in the premises of the industry.

xi. The respondent industry shall refurbish the stack as per Emission Regulation Part III published by CPCB with respect to safe guards and sampling platform.

xii. The respondent industry shall phase out the usage of fire wood in the boilers and alternative eco-friendly fuel only shall be used.

xiii. The respondent industry shall augment the existing bag filters adequately to meet the prescribed standards.

xiv. The respondent industry shall operate the continuous Ambient Air Quality monitoring system

as per the norms at the appropriate location, which is free from obstructions.

xv. The respondent industry shall re-lay the existing discharge pipeline, which takes the treated effluent from the ETP to the Chalakkudy river, above the ground level in a time bound manner. The re-laying of the discharge line shall be done in such a way as to discharge the treated effluent upstream side, while making arrangement to draw fresh water from downstream side.

xvi. The respondent industry shall take immediate steps for removal and safe disposal of unutilised sludge dumped at Kaliyapuram of Palakkd district, within four months from the date of this judgment. The industry shall also take steps for the removal and safe disposal of all sludge generated and stored within the premises of the industry, within a period of six months.

xvii. The Kerala State Pollution Control Board (KSPCB) shall amend the conditions in the Consent

granted to the respondent industry, providing installation of electro-magnetic flow meters at the ETP inlet and outlet.

xviii. The KSPCB shall amend the conditions in the Consent granted to the industry to include standards for TDS and Chlorides in tune with the standards prescribed for drinking water for the treated effluent discharged into Chalakkudy river, as it is a source of drinking water for the public.

xix.The KSPCB shall closely monitor the working of the industry and see that no solid waste including the sludge generated in the industry is stored and accumulated un-scientifically anywhere in the premises of the industry.

xx. The KSPCB shall also take steps to see that the sludge generated by the industry is not used for irrigation purpose in the food crops, in accordance with the instructions of MoEF & CC.

xxi .The KSPCB shall amend the condition in the Consent order for disposal of sludge to TSDF site.

xxii. The KSPCB shall inspect the industry within a month, from the date of the judgment, and shall file a status report before the Tribunal, which shall be placed before the Bench.

xxiii. Thereafter the KSPCB shall inspect the industry once in every three months and monitor the working of the industry its progress in the implementation of the directions issued and its effect on the environment and ecology and submit a quarterly report before the Tribunal.

xiv. The KSPCB shall conduct periodical audit of the materials consumed and the effluents discharged by the industry. Such audit is necessary for balancing the materials including water consumption and the effluents being discharged/disposed, so as to avoid any possibility of polluting the water, environment and ecology.

142. The applications are disposed accordingly with no order as to costs.

Justice M.S.Nambiar
Judicial Member

P.S.Rao
Expert Member