



STRATEGIC ENVIRONMENTAL IMPACT ASSESSMENT FOR TRAVANCORE TITANIUM LTD FURNACE OIL SPILL

Field visit conducted on 10-2-2021

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1. INTRODUCTION

Integration of environmental sustainability and disaster resilience is an important and challenging aspect in post-disaster development and reconstructions towards build back better. Strategic Environmental Impact Assessment (SEIA) refers to the environmental assessment of policies, plans, and programmes (Gupta & Nair, 2013). It is defined as a systematic process for evaluating the environmental consequences of the proposed policy, programme, or plan initiative and their alternatives to ensure they are fully included and appropriately addressed at the earliest suitable stage of the decision-making process (Risse & Brooks, 2008). SEIA helps to realise the importance of integration of environmental objectives into social and economic goals a society pursues. It helps bring environmental issues, which are concerned as the fringes of the development process. SEIA has the advantages for integrated decision making and Sustainable development. SEIA is a continuous, iterative, and adaptive process (Barasa, 2016).

The frequency of disasters experienced by some countries should certainly place disaster risk at the forefront of development planners' minds. Environmental degradation is contributing to increasing disaster losses. For instance, in many countries deforestation has disrupted watersheds and resulted in siltation of riverbeds, leading to more severe droughts and floods. Every anthropogenic activity has some impact on the environment. However, a society's development is dependent on utilizing environmental goods and services for its food, security, and other needs and cannot survive without these socio-ecological interactions.

Environmental impact assessment has been a proven tool over the past 35 years and has a good track record in evaluating the environmental risks and opportunities of project proposals and improving the quality of outcomes. SEIA is a family approach by using a variety of tools like the availability of data, level of definition of PPP, knowledge of direct and indirect impacts, and available time frame. At present, SEIA is neither legally required in India nor has the government published any guidelines for SEIA. With the implementation of economic reform, opening up of the economy to the outside world, and ongoing developmental activities, the natural resources are becoming more and more scarce; the resource consumption and its pressure on the environment is increasing. Thus, there is a need for evolving SEIA of future policy, programme, or plan initiatives and their alternatives to meet the requirement of the people and economic development on one hand and conserving the fragile environment and natural resources on the other.

SEIA for Oil spill leakage from the TTPL help us to Evaluate the existing policy, plan, and programmes to generate learning and make a mid-course correction in the future.

2. OIL SPILL INCIDENT: TRAVANCORE TITANINUM PRODUCTS LTD.

Travancore Titanium Products Ltd (TTPL) oil spill leakage occurred on 10.02.2021 by 2.00 AM. The pipeline (4" diameter, Mild steel pipeline) transferring furnace oil from 60KL storage tank to boiler got ruptured. The leak was arrested by around 7.55 AM. The drain let from the factory directly opens to an old canal which directly drains into the sea. The existing

drain let was blocked by solid waste and plastics. About 4750 litres of furnace oil from the state-run TTPL leaked into the sea over a four km stretch which spread from the Veli coast in a northward direction. The oil patches were visible on the seashore in the four-kilometre stretch. Could not find oil content in seawater in the breaking zone during the site visit. No drifts were seen in the southward's direction.

SEIA for the oil spill from TTPL makes the advantages of support to integrated decision making i.e., SEIA can identify the potential environmental impacts of the proposed actions and consider different alternatives of meeting the desired objectives. SEIA can contribute to sustainable development and reinforcement of Environmental assessment at project levels. Strategic issues that would require to be attended. SEIA helps to realise the importance of integrated environmental objectives into social and economic goals a society pursues. It helps bring environmental issues, which often are considered on the fringes of the development process, into center-stage and provide weightage to equal to the social and economic issues.



Figure 1: Location

3. OBJECTIVES

- To assess the Social, Environmental and Economic impacts of the oil spill
- To propose suitable measures for the restoration of oil-contaminated shoreline

4. SEIA STEPS

Screening

Kerala has a coastal line of about 590 km and the entire coast is prone to oil spill as we have an oil transportation route adjacent to the coastline. Besides this, there are several factories and industries located near the coastal belt. The goal of SEIA is to enable the formulation of an oil contingency plan with the integration of environmental and social considerations into planning.

TTPL is the largest manufacturers and supplier of titanium dioxide pigment in India, with an average production of 40-45 tons per day. The company has its sulphuric acid plant for captive consumption. TTPL started production of Titanium Dioxide through the sulphate Route in 1951. The installed capacity of the plant was 1800 tons per annum. Full swing production started in 1954. The company started its first expansion programme in 1957 for doubling the annual production capacity from 1800 to 3600 tonnes. TTPL was taken over by the Government of Kerala in 1960. In 2010 the TTPL got ISO certification.

The oil spill contingency plan of TTPL for the state is not yet approved. The State Pollution Control Board along with the Coast Guard must develop a detailed Oil contingency plan for the state by considering the existing system in Kerala and with the help of all stakeholders. Contingency plans should be developed for both State and District, and each company-specific. Offsite and onsite emergency plans are essential for such chemical factories. Whenever a contingency occurs, the response should be made clear and the roles of officials should be defined. Proper training and Mock drill should be carried out periodically up to grass root level.

Indian Coast Guard has prepared a National Oil Spill contingency plan in 2015 detailed the structure of responding stakeholders, Emergency coordination structure, Emergency response units, incident management teams, etc. Disaster Management Unit of Greater Mumbai Municipal Corporation developed Standard operating procedure for Coastal oil spill. Some countries developed detailed Plans for such emergencies.

There is no onsite or offsite oil spill contingency plan for TTP Ltd. The company has an overall production of 40 to 45 tons of titanium dioxide per day. Around 7 different types of chemicals were produced from TTPL. Around 1000 employees (600 permanent and 400 temporary staffs) are associated with TTPL. So, in case of an oil spill, there is no existing contingency plan developed by TTPL. Proper checking of in and out pipelets was delayed by the company. The discharge of Effluents through the drainage creates lots of social and environmental problems. The technical aspects of dealing with an oil spill are important, the effectiveness of the response of a major pollution event will ultimately depend upon the quality of the contingency plan and the organization and control of the various aspects of the clean-up operation are important.

Scoping

The unexpected oil spill from TTP Ltd. created havoc on the Social and Environmental Imbalance in the area. Around 4750 Litres of furnace oil leaked, as per the media reports the incident happened around 2.00 AM. The leak was arrested by 7.50 AM only noted by the public. This is a major security negligence from the side of TTPL. The oil spill resulted in the polluted of the seashore and destruction of marine ecosystems.

When the oil was spilled, it spreads and moves to the surface of the sea while undergoing several chemical and physical changes. One more important aspect to remember is that the potential human and environmental effects of oil spilled depend on not only the quantity and type of oil spilled but also the location and different ecological and coastal conditions. The oil spill created Environmental, Social and Economic Impacts to the society.

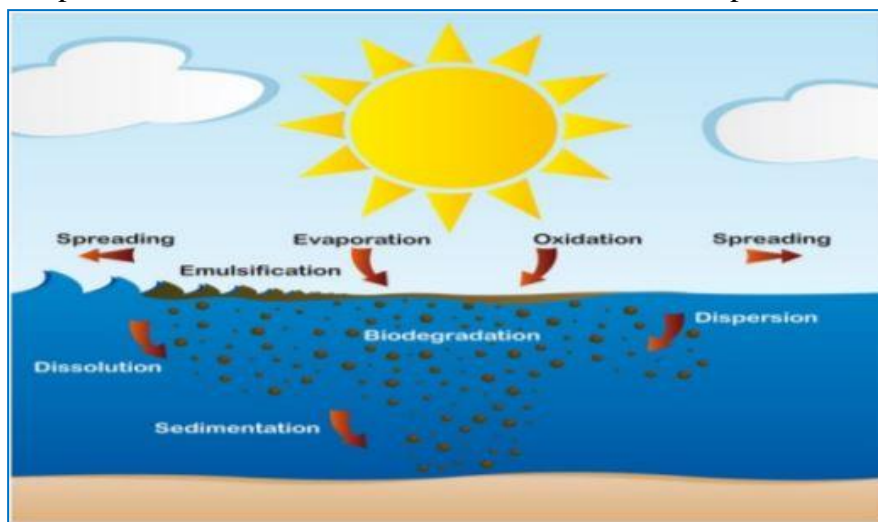


Figure 2: Weathering processes action on Oil at Sea (Source: ITOPF Handbook 2009)

Environmental Impacts

The furnace oil leaked from TTPL is in the grade of class 3 oil types. Around 4750 liters of oil leaked from the plant. The leaked oil polluted the Sea and the coast. The effluents from the factory are carried away by the existing drainage which opens directly to the sea. It should be checked whether the effluents are treated or not and whether they satisfy the legislation and norms of the Kerala State Pollution Control Board.

Oil has a direct impact on water and soil. The chemical composition of oil mixes with the water and creates a new substance known as "mousse". This mousse becomes even more sticky than oil alone, causing it to stick to organisms and materials much more readily. Mousse resembles food for several animals and attracts certain curious birds and marine life. For people attempting to clean the slick, the oil-water mixture is extremely hard to dispose of and eventually retains little value as the oil itself. Long-term damage to species and their habitats and nesting or breeding grounds is another concern. Sea turtles are to be especially vulnerable to oil and can suffer internal and external damage from oil spill. Dolphins, sea turtles and whales are known to breathe at sea surface and ingest oil after an oil spill resulting in respiratory irritation, inflammation, Emphysema/pneumonia, gastrointestinal inflammation,

ulcers, bleeding, diarrhoea, and may cause damage to organs (Yuewen and Adzigbli, 2018). A dead sea turtle was found noticed from the site.

Oil spills can release extremely high C30-C38 concentrations (above 80 $\mu\text{g/l}$), significant alkane and PAH levels (20-60 $\mu\text{g/l}$) and showed high toxicity values (Yuewen and Adzigbli, 2018).

Oil spill become a potential source of contamination for groundwater (Bai et al., 2019). The leaked oil can pollute the household wells. Some houses are in the proximity of factory and near the drainage. The drainage channel was completely destructed due to the flow of oil.

Socio-economic Impacts

Oil spills can affect human beings in different ways: like health impacts due to breathing of oil vapours, eating contaminated seafood, drinking contaminated waters, etc. Oil spills can cause serious risks to fishing activity; contamination can affect stocks and disrupt business activities by fouling gear or impeding access to fishing sites. Contamination of coastal amenities e.g., recreational activities, leading to serious effects on tourism and related industries. The boats and nets kept on the seashores will get soaked with this oil.

The drastic impact of oil pollution on the marine environment and the economic dependence of coastal communities on marine industries such as fishing, tourism, etc. became an increasing problem. Coastal industries using seawater intake e.g., Power plants, desalination plants, etc. may also be seriously affected. Tourism was banned for some days in these areas and fishing was banned for a week. This affected the families who depend on these incomes.



Figure 3: Oil spill through the drainage and coast



Figure 4: Oil accumulated at the coast.



Figure 5: Sea turtle



Figure 6: Oil patches on seashore

5.RECOMMENDATIONS

For a SEA to be effective, it needs to be tailored to the planning process that it is intended to support. To identify the existing gaps a stakeholder consultation is included in SEA.

- Restoration of the sand may be done by using proper treatment methods. The contaminated sand should be removed from the shore and neutralised.
- Pollution Control Board shall ensure through Factories and Boilers Department that the process of preparing the chemical spill contingency plans for State, Districts, all factories and storages are complete and annually updated.
- During emergencies response shall be funded from Public Liability Insurance Act 1991 and a separate mechanism of funding shall be established for the purpose jointly by Pollution Control Board and Factories and Boilers Department.

- It should be ensured that the victims of the accidents are benefited through the Public Liability Insurance Act 1991.
- Mock drills and trainings should be conducted periodically based on the contingency plans.
- A local emergency team may be constituted on the premises of all factories with the help of Volunteers (Civil Defence, Sannadha Sena and Emergency Response Teams of Local Self Governments) to be the first responder in times of emergency situations
- The discharges from the factories to the public areas should be strictly prohibited.
- Baseline data analysis may be done for making the SEA process more effective, for which a publicly accessible repository of environmental data is stored in Kerala Spatial Data Infrastructure and updated annually.

REFERENCES

Bai X., Song K., Liu J., Mohamed A.K., Mou C., & Liu D. (2019). Health risk assessment of groundwater contaminated by oil pollutants based on numerical modeling. *International journal of environmental research and public health*, 16(18): 3245. <https://doi.org/10.3390/ijerph16183245>

Barasa P.J. (2016). Strategic environmental assessment (SEA) for energy sector - Case study of Olkaria Geothermal Expansion Programme in Nakuru Country, Kenya. In: 36th Annual Conference of the International Association for Impact Assessment, Aichi-Nagoya, 2016.

Gupta A.K., & Nair S.S. (2013). Applying environmental impact assessments and strategic environmental assessments in disaster management. In: *The role of ecosystems in disaster risk reduction*, Renaud, Sudmeier-Rieux and Estrella (eds.), United Nations University Press, Tokyo, Japan.

Risse N., & Brooks N. (2008). Strategic environmental assessment and adaptation to climate change. OECD.

Yuewen D., & Adzigbli L. (2018). Assessing the impact of oil spills on marine organisms. *Journal of oceanography and marine research* 6(1). <https://doi.org/10.4172/2572-3103.1000179>

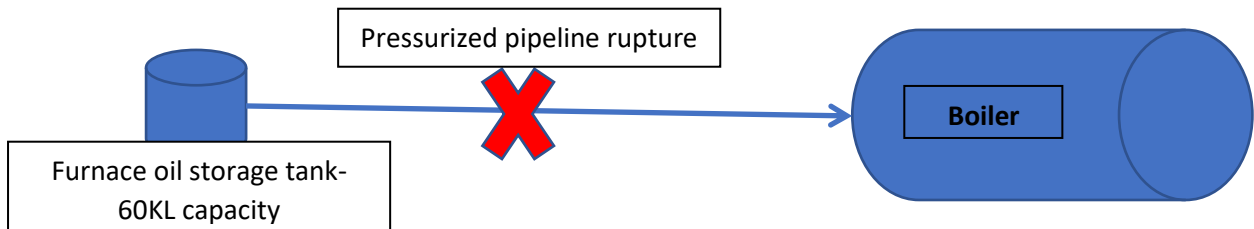
Travancore Titanium Products Ltd.

Incident date: 10.01.2021

Incident time: 7.40 AM

Report by: Safety Engineer, KSEOC

Description of incident: The pipeline (4" diameter, Mild steel pipeline) transferring furnace oil from 60KL storage tank to boiler got ruptured.



Leak in the pipeline was arrested at around 7.55 AM. Immediately after the incident, the factory drain to the sea was entirely blocked and diverted.

Observations:

- About 2000L of furnace oil leaked into the sea.



- The sand was contaminated to around 4.5 Kms to the north of the discharge point.



- The existing drain of TTPL was found to be over polluted. Solid waste was not segregated.



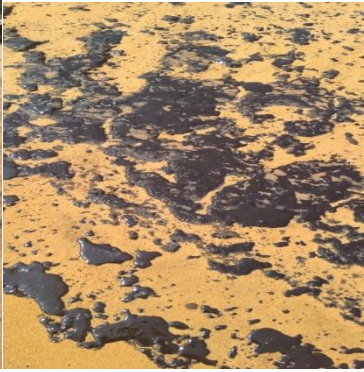
- Study to be conducted on effect of aquatic life after the spill. A turtle was found dead, which might not be due the oil spill, but the other contaminants trough the drain need to be identified and analysed.



- The local people should be made aware of the possible spills through the drain. Training on first aid measures in case of similar spillages should be communicated to the local people.



- The contaminated sand has to be removed from the respective areas and collected in separate containers, and should be disposed accordingly. (Handed over to KEIL)



Trivandrum Titanium field visit report HA (Oceanography) on 10/02/2021

- ~10m oil spread towards the beach from breaking zone in the specific location
- Checked both north (~2km away) and south (~1km away) beaches from the channel location
- Littoral drift (oil) was towards north (~2-3km) from the channel location. Beach sand shows oil content as patches
- No oil drift towards south from the location
- Localists gave the report that oil content was there in sea water in the morning
- Couldn't find oil content in sea water in breaking zone during the visit
- Titanium company churned up the sand in certain locations to remove the oil content in the surface which is not a scientific method to remove oil from beaches.