8.1 CONCLUSION

1. The district of Sundargarh in Orissa state has around 46 sponge iron industries. The major heavy industry in the area is Rourkela Steel Plant (RSP). Orissa produces sponge iron around 20,000 tons per day, out of which in Sundargarh district alone has been estimated to be 6625 tons per day.

2. The sponge iron plants consume 10 MT of iron ore and 9 MT of coal annually. These plants produce 5.9 MT of sponge iron per annum. The following chart indicates the input and output for the production of one ton of sponge iron.

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
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<tbody>
<tr>
<td>i 1.6 – 1.75 tons of iron ore</td>
<td>i 1.8 – 2.0 tons of CO₂</td>
</tr>
<tr>
<td>ii 1.20 – 1.50 tons of coal</td>
<td>ii 0.25 tons of Dust</td>
</tr>
<tr>
<td>iii 0.035 – 0.05 tons of Dolomite</td>
<td>iii 0.29 tons of coal char</td>
</tr>
<tr>
<td>iv 1.5 – 2 tons of water</td>
<td>iv 0.02 tons of water vapours</td>
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3. Sponge iron plants in the study area emit lot of black smoke, dust and other gaseous matters, which are quite significant. The sponge iron plants are located adjacent to the villages. Movement of trucks carrying raw materials is high. Houses in the villages, roofs, walls and floors even at Rourkela city are covered with fine black dust. The leaves of gardens and forests, agriculture fields are also loaded with fine black dusts. Layers of soot accumulate on skin and eyes, experience burning sensation if long hours are spent in the vicinity areas. Dumps of char and iron ore scraps lie along road side, which when blown in air creates dangerous situation all around.

4.(i) Present study indicates that, pollution of air adversely affect health, agricultures, water resources, soil and local livelihood. Some sponge iron plants either did not install Electro Static Precipitator (ESP), mandatory to control hazardous emission or do not run properly to save money. Installation and use of ESP can restrict the production of dust up to two tons provided it is run properly. Otherwise around 10 tons per day of dust are emitted in to the atmosphere.

(ii) Air pollution is most significant in sponge iron industries. Air pollutants include SPM, SO₂, NO, CO, CO₂ etc. The SPM contains some heavy metals like Cd, Ni, and Cr etc. in traces.
The average value of TSPM at monitoring stations remains above the prescribed standard of 140 µg/m³.

Rourkela – Rajgangpur area received about 34 Tons per day (TPD) of total suspended particles (TSP) and 45 TPD of SO₂ which is higher compared to other industrial areas. Out of 34 TPD of TSP, the sponge iron plants contribute about 7.8 TPD.

The concentration of SO₂ and NOₓ are within limits (as per prescribed standard) at monitoring stations. Now after adoption of pollution control measures, it is in decreasing trend.

Carcinogenic wastes are emitted from stacks or the chimney in the sponge iron plant. Lower the height of the stack more is the probability of emission settling in and around the areas close to the sponge iron plants.

Sponge Iron Plants do not contribute much towards water quality deterioration. However the surface run off from the SI plants premises pollutes water drainage system. The ground water may be affected when solid wastes like fly ash, char, and iron scrap are dumped in to the ground.

In soil quality of the survey area the ratio of total organic carbon (TOC) to total organic Nitrogen (TON) is above 10 indicating that the area has not enough Nitrogen as compared to TOC which hampers the productivity of soil. Agriculture is also affected. The amount of sodium varies from 0.006 to 0.05 % in different areas. Similarly potassium content also varies from 0.02 – 0.47 %. The soil of Tarkera & Sitalpara of Rourkela study area contains maximum potassium.

The agricultural land in nearby areas of Sponge Iron Industries are suspected to be gradually become less productive due to increasing accumulation of black dust particles on soil.

The vegetation in any area always acts as a sink for atmospheric pollutants. About 235 plants have been identified in the non-forest regions of Rourkela – Rajgangpur region. Many highly pollution tolerant plants have been identified.

Human health as well as livestock in the study area have been affected due to different types of coal ash, dust and gases. The higher incidence of diseases (acute as well as chronic) among people as mentioned below have been recorded in the study area as reported by different hospitals of that area.

i) Upper Respiratory Tract Infection (URTI)

ii) Pneumoconiosis / Skin diseases
iv) Tuberculosis
v) Pleurisy.

10. The cattle population is affected severely as they take crop residues and grasses overladden with black dust, breath polluted air and drink the surface water. The milk and meat are contaminated which in turn may affect human beings.

11. The state pollution control Board is trying of monitor the environmental conditions as a matter of routine. Sometime closure notice is also served to different sponge iron industries when pollution norms are violated. However, after few days things again become as usual.

8.2 RECOMMENDATIONS

1. Since the number Sponge Iron industries in the study area are predominantly high, they must adopt effective pollution control measures for control of air pollutants for the sake of health of the inhabitants in the area.

2. Dust along with black particles flowing constantly towards Rourkela city must be checked instantly through stringent action by Pollution Control Board and district administration wherever possible.

3. The quality standard of Air, Water, Soil and Noise should be monitored regularly and reviewed from time to time by OSPCB. In addition to this, all Sponge Iron plants must have their own environmental monitoring system with requisite equipments, methodology and trained manpower to tackle the situation.

4. Since thousand and thousands of uncovered trucks carrying raw materials enter the study area daily, they make the environment filled with dust; bring about damage to the roads. Vehicular traffic must be controlled. Strategically all trucks should be either covered or sprinkled with water over the raw materials to reduce direct dispersal of dust. Roads in those areas should be properly constructed to withstand the load.

5. All vehicles must be checked for air pollution and should be given a certificate “Pollution Under Control “ (PUC) as required under rule 116 (1) and 115 (7) of Motor Vehicle Amending rule 1993. Apart from issuing PUC mandatory for all kinds of vehicles, there should be frequent surprise checks and penalty should be imposed on the defaulters as per the Act.
6. Use of air horns in the city, public places and crowded places should be banned. The vehicles should not generate noise more than the limit prescribed by the regulatory authorities.

7. The traffic police on roads, industrial workers inside industries and the public should not be exposed to noise levels more than the prescribed limits.

8. Public awareness programmes for environmental protections should be organized more frequently by the authorities.

9. Waste water at source and hazardous wastes from Rourkela steel Plant as well as in all ancillary industries including sponge iron industries in the study area must meet the quality criteria before discharging into the common water stream/river. Appropriate water pollution control measures must be ensured by OSPCB authorities.

10. If possible the concept of Common Effluent Treatment Plant (CETP) should be installed at desired places especially at Kalunga area.

11. The municipalities and NACs must take care of public health most efficiently. They must ensure complete check of city sewage entering into ponds or rivers of the area.

12. Attempts should be made to clear the algae blooms into the water bodies by mechanical methods or by application of prescribed algaecides. In this case also suitable fish varieties that are capable of scavenging biological, organic and inorganic load of the water bodies may be cultivated.

13. Public awareness should be created about the potential hazards of using polluted water and citizens' role in maintaining the water bodies so that the desired use can be maintained inexpensively.

14. Hazardous things if produced in the industries must be destroyed effectively irrespective of their quantity.

15. The hazardous wastes like explosives, rejected toxic chemicals are required to be disposed off separately. The collection, transportation and disposal crews must be trained to identify and handle such wastes safely.

16. Biochemical wastes should be collected separately and incineration and ashes generated should be buried at secured landfill site.
17. Hospitals and Nursing homes should set up common incinerators. The wastes which are not in incinerable condition should be pre-treated, disinfected and then should be disposed off in an environmentally sound manner.

18. Biomedical wastes except glass wares should not be recycled or reused.

19. Pollution tolerant plants should be planted on the road sides and in and around the industrial premises in a scientific and quite organized manner. In particular, the dump sites should be properly rehabilitated by suitable plantation and development of greeneries.

20. The Department of Forest and Environment and the State Pollution Control Board should take stringent action against the defaulting Sponge Iron plants. The concept of “Polluter must Pay” in terms of money and development in the surrounding areas must be followed for cleaning up of the environment to keep it ecofriendly for all.