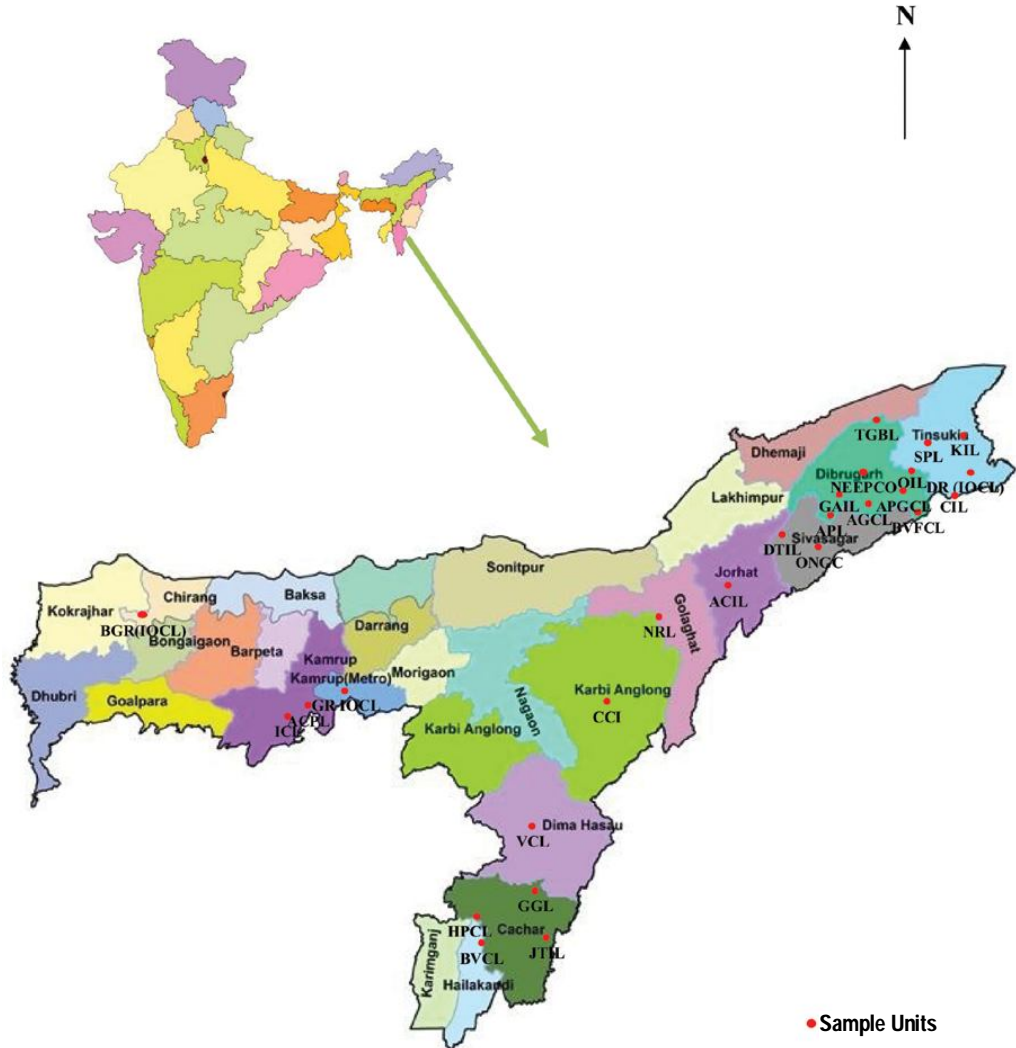


CHAPTER II

Brief Profile of the Selected Industrial Units of AssAm

Map of Assam

(Indicating location of sample units under industry groups)



2.1 Introduction

The issue of environmental protection and sustainable development of natural resources to preserve the fragile ecological balance for future generations is of vital importance. Assam, the largest economy in the North East Region of India, is the most industrially advanced state in the region by virtue of its comparatively favourable geographical location and the availability of reasonable infrastructure facilities. The state has vast resources and potential for industrial development which needs to be planned in a sustainable manner, while giving special consideration to the unique and invaluable natural environment and preserve the delicate ecological balance. The state has moved towards inclusive growth by a balanced pattern of industrial investment. The Industrial Investment Policy was initiated in 2008 to create conditions for income and employment generation in the state. The Policy identified some specific sectors which offer tremendous opportunities for income and employment generation in Assam. Moreover, it is worth to mention that industry sector in Assam is giving 13.04 % to the State GDP.

Assam is a state rich in mineral resources and has developed many natural resource based industries in recent times. Assam is a major producer of oil and natural gas. Most of the oilfields are located in the Upper Assam region of the Brahmaputra Valley. Assam has four oil refineries with a total capacity of 7 MMTPA. Other industries are coal, chemical fertilizer plant, petrochemical industries, paper mills and a cement plant industry in the public sectors which are functioning profitably in the State. Also, the 150 years old Tea industry occupies an integral place in the economy.

This chapter deals with the brief profile of the twenty five selected companies under ten industry groups of Assam, who are contributing significantly in the economic development of the state. These industries are also involved in different environmental activities as they are categorized under the red and orange industries of Assam. The map of Assam is also shown in this chapter indicating the specific location of the industrial sample units. The industries identified are:

1. Cement,
2. Oil Refinery,
3. Fertilizer,
4. Petrochemicals
5. Paper,
6. Power,
7. Coal,
8. Petroleum and natural gas,
9. Plywood, and
10. Tea.

2.2 Brief Profile of the selected industrial units of Assam

The brief profile of the sample industrial units of Assam is presented below:

2.2.1 Industry: Cement

Assam has an abundant mineral resources and limestone is considered as one of the important mineral for the manufacture of cement. Due to the availability of high quality limestone in the region, there are several cement

factories which have come up in Assam in recent times. Three major large scale cement manufacturing units are selected for this study which is described in brief below:

2.2.1.1 Cement Corporation of India (CCI), Bokajan Cement Company

Bokajan Cement Company was incorporated in 1977, as a unit of Cement Corporation of India (CCI) with a capacity of 198000 MT Tonnes. The unit is located in difficult area in Karbi Anglong District of Assam which was set up more from a socio economic point of view of serving the neighbouring areas with cement, rather than only from normal economic consideration. The company manufactures various types of cements like ordinary Portland Cement & Pozzolana Portland Cement of different grades, viz., 33, 43, 53 grades under strict quality control with the brand name of CCI Cement. As a part of anti-pollution measures, the company has taken initiatives to make the environment around its factories dust free by installation of ESP systems in the old plants not having this facility. Bokajan Cement Factory has bagged the National Safety Award for the year 1990.

2.2.1.2 Vinay Cements Ltd. (VCL)

Vinay Cements Ltd. (VCL) was set up in 1989 with a capital of ₹270 million and is located in Umrangshu, Dim Hasao District of Assam in the midst of the beautiful state of Assam. At the time of set up, the company was one of the largest private sector investments in the North East Region and has played a pioneering role in the development of the region. Since inception, Vinay Cements

Ltd. has been a leading manufacturer of cement in the North East of India for the last seventeen years. The main products of the company are clinker and cement. The products of this company is sold under the brand name 'Vinay', with over 94 percent brand recall, its products have been used to build homes, bridges, dams and oil well. The Company has also taken initiatives to maintain highest standards of Environment Management and Occupational Health & Safety Management and are in the process of obtaining ISO 14001 including compliance with World Bank / IFC guideline, OHSAS18001, social accountability management system (SA 8000) and Quality Management System (ISO 9001).

2.2.1.3 Barak Valley Cements Ltd. (BVCL)

Barak Valley Cements Ltd. (BVCL) has been engaged in the business of manufacturing cement since 1999. Barak Valley Cements Ltd. is situated in Badarpurghat, Hailakandi, Assam. The company markets its product under the brand name "Valley Strong Cement". BVCL is also involved in the extraction / mining and crushing of limestone and other minerals, tea plantation and other agricultural activities and power generation and distribution business with a capacity of 1000 TPD. The wholly owned subsidiary, Badarpur Energy Private Ltd. (BEPL) has obtained the Host Country Approval for its 6 MW Bio-mass based Power Project in Assam for CDM from the Ministry of Environment and Forests. In order to protect the environment, the company has undertaken "Mass Tree Plantation Motto" in unused lands lying with the landlord for the plantation purpose. In this regard, the Company has already taken up approximately 3000 bighas areas of land under this scheme. BVCL has also developed an Ever Green

Hill by planting different samplings to enhance the bio-diversity around the plant site covering North-East to East-South corner and also other sites. The Company also took the initiative of “Arboriculture” on Badarpur-Adarkona PMGSY road stress of 1.6 KM road side planting of ornamental and medicinal trees, etc. The company also celebrates World Environmental Day and other awareness programme towards Corporate Social Responsibility.

2.2.2 Industry: Fertilizer

Fertilizer industry is another important industry in Assam. Brahmaputra Valley Fertilizer Corporation Ltd. (BVFCL) is one of the major public sector fertilizer companies in India. It is considered the pioneer in using associated natural gas for producing nitrogenous fertilizer. The brief profile of the company is given below:

2.2.2.1 Brahmaputra Valley Fertilizer Corporation Ltd. (BVFCL)

Brahmaputra Valley Fertilizer Corporation Ltd. (BVFCL) was founded in 1969 in Namrup, Assam. The company was formerly known as the Namrup Fertilizer Complex and changed its name to Brahmaputra Valley Fertilizer Corporation Ltd. in April 2002. The Namrup Complex of BVFCL comprise of three separate units designated as Namrup-I, Namrup-II and Namrup-III. The company’s products are nitrogenous fertilizers mainly urea and ammonia. It offers vermi-compost and bio-fertilizers. The company also trades pesticides, fertilizers and vegetable seeds. In order to take care of pollution due to arsenic solution in carbon dioxide removal section of Ammonia-II Plant, the process route being

changed to non-arsenic route in the revamp measures being implemented. In a similar way, in order to eliminate chromate effluent from Chromate Treatment Plants, which treat blow downs from the Cooling Towers, the cooling water treatment routes are being changed to non-chromate treatment plant. BVFCL has set up an air monitoring van which moves around the industry premises to check the extent of pollution. The BVFCL is engaged in welfare programmes such as introduction of hospitals, schools, open stadium, indoor stadium, daily market, clubs and other facilities like drinking water. BVFCL also organizes Farmers' Training Programmes for providing modern farming techniques in rural areas.

2.2.3 Industry: Oil Refinery

Assam is popularly known for its oil and refineries. The country's first refinery is in the state of Assam. There are four refineries in Assam which are successfully engaged in crude oil refining. In this study, the whole population of oil refineries', i.e., Indian Oil Corporation Ltd. and Numaligarh Refinery Ltd. have been selected. The brief profile of these industrial units is discussed below:

2.2.3.1 Indian Oil Corporation Ltd (IOCL)

Indian Oil Corporation Ltd. was established on 30th June, 1959 under the name of Indian Oil Company Ltd. Later in 1964, Indian Oil Company Ltd was merged with Indian Refineries Ltd and formed a new corporation called the Indian Oil Corporation Ltd (IOCL). The IOCL together with its subsidiaries are mostly engaged in refining, transporting and marketing petroleum products in India. They are also engaged in exploration, production and marketing of oil. Moreover, it

is India's largest company sales wise with a turnover of ₹ 2, 47,479 crores. In Assam, there are three refineries under IOCL viz, Digboi Refinery, Guwahati Refinery and Bongaigaon Refinery (earlier Bongaigaon Refinery and Petrochemicals Ltd. till 2008). The brief profile of these refineries are-

2.2.3.1.1 Digboi Refinery

The Digboi Refinery in Assam is India's oldest refinery established in 1901. Originally, it was a part of Assam Oil Company which became part of Indian Oil Corporation Ltd. (a unit of Assam Oil Division) in 1981. The Digboi Refinery processed 0.66 million tonnes of crude oil during the year 2013 as against 0.62 million tonnes of crude oil processed in 2012, which is India's largest company by sales with a turnover of ₹4,57,553 crore and profit of ₹7,019 crore for the year 2013-14. The main products of this refinery are LPG, Naphtha, Motor Spirit, Superior Kerosene, High Speed Diesel, Furnace Oil and Raw Petroleum Coke. It also produces one of the best qualities of Paraffin Wax, besides other products like Aromex, Jute Batching Oil, Mineral Turpentine Oil, Solar Oil etc. The Refinery is ISO-9001, ISO-14001 and OHSAS accredited, its laboratory was accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL). The Digboi Refinery has been compliance with relevant environmental regulations and laws. The refinery uses sweet natural gas, tall stacks (more than 30 meters) for proper dispersion of pollutants in all Boilers and furnaces and also takes care of low benzene in MS Ambient Air quality monitoring around refinery premises as per National Ambient Air Quality Standard.

2.2.3.1.2 Guwahati Refinery

The Guwahati Refinery was set up in 1962 at Noonmati, Assam as a unit of Indian Oil Corporation Ltd. as the first Public Sector Refinery of India with an initial crude processing capacity of 0.75 MMTPA. The refining capacity of Guwahati refinery was gradually increased to 1.0 MMTPA. The Guwahati petrochemicals plant is the first refinery in the country which belongs to the public sector under IOCL. The products produced by the Refinery include the LPG, Motor Spirit, Aviation use Turbine Fuel, Kerosene Oil, High Speed Motor Diesel, Light use Diesel Oil. Maximum products produced from Guwahati Refinery are evacuated through this pipeline and some also through road transportation. Guwahati Refinery is also committed in its responsibility towards the society and its community in addition to safeguarding and preserving nature's ecological balance. In this regard, the Refinery has constructed the Sanjeevani Udyaan keeping in mind the preservation of ecological balance. The motto "Prakriti Ke Saath – Pragati Ki O'r" explains its commitment to environment. Some of the environmental activities of this refinery involve planting of trees, improving drainage systems, cleanliness drives and substantive programmes adopted on World Environment Days to improve awareness of individuals and collective responsibilities towards environmental preservation. The Refinery has regularly improved its operations in terms of implanting energy efficient state-of-the-art technologies and production of clean fuels. Also, Ambient Air Quality Monitoring Station which monitors ambient air quality continuously has been set up in order to check air pollution. The Refinery has taken initiatives for solid waste management and has been identified areas in the refinery where it plans to utilize solar energy

for getting hot water. The Refinery is also qualified for the TPM Excellence Award and will soon acquire the TPM Sustainment Award certification. The Refinery is accredited with the ISO-9001 certification given by International Quality Standards. It has also received the ISO-14001 certification for Environment Management System and the Occupational Health and Safety Management System (OSHMS), which is also a strong International Standard. The Integrated Management System encompassing the ISO 9001, standards 14001, OHSAS-18001 and ISRS ensures global standards of excellence in field of Quality Management Systems. The DNV Foundation has certified the Guwahati Refinery with Safety as its utmost priority of the Refinery and the Level 8 Certification by the International Safety Rating System proves the various safety practices and measures for employees by the Guwahati Refinery.

2.2.3.1.3 Bongaigaon Refinery

The Bongaigaon Refinery is the eighth largest refinery of Indian Oil Corporation Ltd. situated at Dhaligaon in Chirang district of Assam. The Refinery was formed upon the amalgamation of Bongaigaon Refinery & Petrochemicals Ltd. (BRPL) with Indian Oil Corporation Ltd. (IOCL) on March 25, 2009. Bongaigaon Refinery earlier known as Bongaigaon Refinery & Petrochemicals Ltd. was established in 1974 and was also known for petrochemical - manufacturing facility. The Government of India held the entire equity of the Company till 1991. In the year 2001, 74.46 equity of Bongaigaon Refinery was divested to Indian Oil Corporation Ltd. BRPL became a subsidiary of Indian Oil from March, 2001. In India, the unit was the first indigenous refinery to have an integrated Petrochemical

complex at one location. The unit has two Crude Distillation Units, two Delayed Coker Units and a Coke Calcination Unit with a processing capacity of 2.35 MMTPA of crude oil. Presently, the refinery produces a wide range of petroleum products namely LPG, Naphtha, MS, SKO, HSD, LDO, LSHS, LVFO, RPC, CPC, Needle coke and solvents (Petrosol and Bonmex-II) by processing Assam Crude and Ravva Crude (from the Ravva oil fields of Krishna Godavari Basin). Bongaigaon refinery has also undertaken special endeavours towards environment protection and conservation. The refinery has developed an ecological park and a pond surrounding it containing 65,000 cubic meter of water, through which the storm water drains of the plant are routed for final discharge. Another natural pond with a capacity of 30,000 cubic meter of water has developed into an environment-friendly park-cum-pond for migratory birds. In addition, a rain water harvesting system has been installed in the Bongaigaon township complex and the installation of solar water heating systems (SWHS) and solar photovoltaic systems (streetlights) is underway. In recognition of its environmental initiatives, Bongaigaon refinery has been a recipient of numerous prestigious awards, the Refinery was honoured with the Indira Gandhi Paryavaran Puruskar by the Ministry of Environment, as well as the Greentech Environment Excellence Gold Award 2008 and National Award for "Prevention of Pollution" from the Ministry of Environment and Forests on September 16, 2010.

2.2.3.2 Numaligarh Refinery Ltd. (NRL)

Numaligarh Refinery Ltd. (NRL) has been set up in 1993 in Numaligarh, Golaghat district of Assam, engaged in refining and marketing of crude oil. The

company started its commercial productions from October 2000. NRL is a Schedule 'B' / Miniratna CPSE in Petroleum (Refinery & Marketing) sector under the administrative control of Ministry of Petroleum & Natural Gas. NRL is a subsidiary of Bharat Petroleum Corporation Ltd. which holds 61.65% equity shares. The main products of Numaligarh Refinery are liquid petroleum gas, naphtha, motor spirit, aviation turbine fuel, superior kerosene oil, high speed diesel, raw petroleum coke, calcined petroleum coke and sulphur High Speed Diesel, Euro –II/III Motor Spirit Liquefied Petroleum Gas, Aviation Turbine Fuel, Superior Kerosene Oil, Naphtha Fuel Oil, Raw petroleum Coke/Calcined Coke etc. NRL is one of the latest refineries of the country adopting latest process technologies for secondary processing units as well as upgradation of residues / heavy ends, thereby ensures optimum value addition. Towards environmental protection, NRL has been pursuing a focused programme by adopting safe and eco-friendly technologies, sound design and engineering practices. The Company has a well defined Environment Management System (EMS) under ISO 14001, OSHAS 18001 and ISRS Protocols. In Environment Management systems, NRL has been upgraded and certified against the latest version of the standard i.e., ISO 14001: 2004 replacing the earlier ISO 14001: 1996, which it earned since inception. A dedicated environment management cell is working continuously for improvement, monitoring, safeguarding and reporting of environmental issues of the refinery. The Refinery produces environment friendly fuels complying with National and International standards to minimize vehicular emissions.

2.2.4 Industry: Petrochemicals

Petrochemicals industry is another major industry in Assam. Assam Petrochemicals Ltd. is selected in this study is discussed as under:

2.2.4.1 Assam Petrochemicals Ltd. (APL)

Assam Petrochemicals Ltd. was set up in Namrup in 1971 with an objective of utilizing reserves of natural gas in the upper Assam oil fields and also to cater the requirement of methanol and formalin by state government of Assam with joint participation of Assam Industrial Development Corporation (AIDC) and the public. Primarily, it started with manufacturing of petrochemicals using natural gas as a feedstock. Only a small quantum of natural gas was then used in fertilizer industry and power generation. Then it started with a small Methanol plant with Formaldehyde and a few Urea Formaldehyde resins as downstream projects with technology supplied by Mitsubishi Gas Chemicals Co. Inc, Japan. Commercial production of APL began in 1976. Later in 1989, the company established a methanol plant. The company is marketing its products in Bengal, Delhi, Haryana, Uttaranchal, Bihar, Nepal, Bhutan, etc. Assam Petrochemicals Ltd. is the first company in the north eastern region to float a public issue. The company has a manufacturing capacity of 100 TPD of methanol and formalin each. Thus the annual production of these products is 33,000 tonnes each. The company creates awareness on health, safety and protection of environment among all levels of employees, total elimination of accidents and significant reduction in numbers of personal injuries, minimize the impact on the environment through pollution control, reduction of natural resources consumption and emissions and

reduction recycling of wastes, identification and elimination of potential hazards at workplace through the use of an effective safety management system, promotion of personal hygiene and communal hygiene in order to reduce the necessity for curative treatment and consequent loss of man-days.

2.2.5 Industry: Pulp and Paper

Pulp and paper industry is one of the major industries in the state. At present, Cachar and Nagoan paper mill under Hindustan Paper Corporation Ltd. (HPCL) is the only public sector industry operating in Assam which is described as under-

2.2.5.1 Hindustan Paper Corporation Ltd. (HPCL)

Hindustan Paper Corporation Ltd. (HPCL) started manufacturing paper and paper products from its two plants in Assam, viz., Nagoan Paper Mill and Cachar Paper Mill in October 1985 and April 1988 respectively. Nagoan Paper Mill (NPM) is an integrated pulp and paper mill with a capacity of 1 lakh MT per annum of writing and printing paper (including 20,000MT newsprint) manufactured from 100% bamboo. The mill has a raw material yard, equipped with fire fighting network, where upto 80,000 MT of bamboo can be stored. Cachar Paper Mill (CPM) is the only major industrial undertaking in south Assam and the adjoining states of Mizoram, Meghalaya and Tripura. Despite lack of infrastructural facilities in a remote location, CPM has a continuous record of steady improvement. During the year 2006-07, the mill recorded the highest annual production of 103155 MT registering over 103% capacity utilization. The

company's main products are cultured paper, paper boards and newsprint along with small quantities of caustic soda and chlorine. The company has installed appropriate systems for controlling and monitoring pollutants in the manufacturing units in accordance with the prescribed environmental standards and regulations. The company has undertaken plan of action to convert existing mercury cell based Caustic & Chlorine Plant to membrane cell based plant and other environmental projects to comply with CREP guidelines. Also, NPM and CPM are accredited with ISO 14001: 2004 Certification.

2.2.6 Industry : Power (Thermal power)

Power (Thermal power) industry is an important industry in the state. For this study, Namrup thermal power under Assam Power Generation Corporation Ltd. and North Eastern Electric Power Corporation Ltd. (Assam Gas Based Power Plant, Katalguri) have been undertaken. These two sample companies are discussed in brief below:

2.2.6.1 Assam Power Generation Corporation Ltd. (AGCL), Namrup Thermal Power Station (NTPS)

Namrup Thermal power is one of the oldest base load thermal power stations in India with gas turbines using natural gas as the fuel. It was first built and commissioned in 1965. The first three gas turbine units were supplied by M/s. Westinghouse Electric Corporation., USA. Subsequently, capacity addition was made. The total installed capacity of NTPS was 134MW. Namrup Thermal Power became the part of Assam Power Generation Corporation Ltd. which was

constituted in 2004 after unbundling of ASEB through State Power Sector Reform Programme under the provision of Electricity Act, 2003. The main objective of the company is to generate maximum energy mainly to meet the requirements of the electricity in the state of Assam and other north east states at minimum possible cost. The company's mission is to focus on consumers, consciousness on environment and become reliable electricity supplier for the benefit of society. In Namrup Thermal Power station, the Rapid Environmental Impact Assessment (EIA) study has been carried out to determine the environmental impacts on different disciplines of environment that would be caused due to construction and operation of the proposed units and to formulate an Environmental Management Plan (EMP) consisting of recommendations of mitigatory measures to control the adverse impacts and formulation of an Environmental Monitoring Programme.

2.2.6.2 North Eastern Electric Power Corporation (NEEPCO), Assam Gas Based Power Plant

Assam Gas Based Power Plant was set up in 1995 with a capacity of 291 MW operating under North Eastern Electric Power Corporation (NEEPCO), which is an electricity generation public sector undertaking owned by the Government of India under the Ministry of Power. The power plant is situated at Kathalguri, Bokuloni Village, Dibrugarh District with an area of 0.21 km. The plant has a combined cycle gas turbine and natural gas which is obtained from the oil fields of upper Assam. The plant gets water resource from river Buridihin to carry on its generation activities. In order to achieve the objective of sustainable

development, Environmental Impact Assessment (EIA) is carried out for each project. This unit of NEEPCO takes cognizance of the possible impact on environment and ecology and adopts suitable measures to negate any adverse effect on environment and ecology during the execution and operation & maintenance of its projects. Every care is being taken to implement and abide by the laws of the land in respect of environment and ecological safeguards.

2.2.7 Industry: Coal

Assam has large reserves of coal too. The State is said to contain about 1200 million tonnes of coal reserves. The entire coal in this region is unique in the sense that it is highly volatile (36% - 42%), has low ash content (3% - 15%) and possesses high crackling index (10% - 29%). The North Eastern Fields, a unit of Coal India Ltd. is a sole coal unit in the state and has been selected for the study, which is mentioned below:

2.2.7.1 Coal India Ltd. (CIL), North Eastern Coal Fields (NEC)

Coal India Ltd. (CIL) as an organized state owned coal mining corporate came into being in November 1975 in the name of North Eastern Coalfields (NEC) at Margherita, Tinsukia District of Assam. Although North Eastern Coalfields contains meagre quantity of mineable coal reserves, is one of the country's best coalfields having good quality coal characterized by very low ash content, high sulphur, high volatile matter and high caking index. One of the inherent tendencies of coal mining is degradation of the land and environment. The company is constantly addresses the impact of mining activities across

environmental and social issues. Eco-friendly mining systems have been put in place in all of its mining areas. To make environmental mitigation measures more transparent, CIL (NEC) introduced state-of-the-art Satellite Surveillance to monitor land reclamation and restoration for all opencast projects. Coal India has made afforestation over an area of around 32,000 Hectares while the total forest area degraded due to mining operation is around 12,800 Hectares, which means, for every hectare of forest land degraded, made plantation in 2.5 Hectares of land. CIL (NEC) committed to minimize the adverse impact of coal mining on environment through well structured Environment Management Plans and sustainable development activities. As a part of 'Clean & Green' programme, massive plantation has been taken up by NEC, CIL wherever land is available and has till date planted over 73 million trees. CIL has also started integration of Environment Management System (ISO: 14001) with Quality Management System (ISO: 9001) and till date have successfully achieved certification of 53 of its projects.

2.2.8 Industry: Petroleum and Natural Gas

Petroleum and natural gas is a valuable source of resources found in the region. In Assam, almost all the petroleum producing areas of the Brahmaputra Valley, especially Naharkatia, Moran, Lakwa and Rudrasagar contain associated natural gas. There are LPG bottling plants at Duliajan, North Guwahati, Silchar, etc. Under the Petroleum and Natural Gas Industry, six major companies of Assam were selected. These are, namely, Oil India Ltd., Assam Gas Company

Ltd., Gas Authority of India Ltd., and Oil and Natural Gas Corporation Ltd., India Carbon Ltd. and Assam Carbon Products Ltd.

2.2.8.1 Oil India Ltd. (OIL)

Oil India Ltd. (OIL) is the second largest national oil and gas company in India engaged in the business of exploration, development and production of crude oil and natural gas, transportation of crude oil and production of LPG. It has a history of discovery of crude oil at Digboi, Assam in 1889. On February 18, 1959, Oil India Private Ltd. was incorporated and subsequently expanded to oil fields of Naharkatiya and Moran in Assam. Oil India Ltd was incorporated as a private limited company on February 18, 1989 as Oil India Pvt. Ltd. The Authorized share capital of the Company is ₹2000 Crores. The Issued, Subscribed and Paid share capital of the company is ₹601.14 Crores. It includes different segments like crude oil, natural gas, Liquefied petroleum gas (LPG) and pipeline transportation. The Company has over 120,000 sq. km of Petroleum Exploration License Mining/ Lease areas for its exploration and production activities. OIL carries out regular building programmes with employees & contractors to sensitize them on various environmental issues. Various awareness days like World Environment Day, World Water Day, Clean Day, Earth Hour etc. are observed in all OIL installations in collaboration with stakeholders to stimulate awareness on global and national environmental issues.

2.2.8.2 Oil and Natural Gas Corporation Ltd. (ONGC)

The origins of ONGC can be traced to the Industrial Policy Statement of 1948, which called for the development of petroleum industry in India. ONGC offices were set up at Nazira in 1962, after acquiring this site from the Assam Company Ltd. in 1959. The products of the company are Crude Oil, Natural Gas, Naptha, Liquefied Petroleum Gas, Ethane/Propane, Superior Kerosene Oil, Low Sulphur Heavy Stock, High Speed Diesel, High Speed Diesel, Aviation Turbine Fuel. ONGC has produced more than 600 million metric tonnes of crude oil and supplied more than 200 billion cubic metres of gas since its inception. Today, ONGC is India's highest profit making corporate. It has a share of 77 % in India's crude oil production and 81 % in India's natural gas production. Currently, Assam Asset operates 48 production installations, 21 drilling rigs and 19 works over rigs. In addition, there is a network of 230 kms of trunk pipelines and 2000 kms of flow lines. All operational installations have been accredited with QHSE (Quality, Health, Safety and Environment) certifications, conforming to statutory guidelines. ONGC has taken up concept of constructing green building, the essence of which would be to address all these issues in an integrated and scientific manner with due compliance to the guidelines of GRIHA (Green Rating for Integrated Habitat Assessment). Apart from complying with the environmental legal requirements, ONGC, as a responsible corporate citizen has taken many initiatives to conserve nature and minimize impact of their operations.

2.2.8.3 India Carbon Ltd. (ICL)

India Carbon Ltd. was established in 1961 in Guwahati, Assam. India Carbon's primary business is the manufacture and supply of high quality Calcined Petroleum Coke which is the purest form of Carbon, containing over 99.5% of it. Along with the Calcined Coke, the Company also specializes in the production of Electrode Carbon Paste and Tamping Paste used widely in the Ferro Alloys and Allied industries and also in the production of Carbide. Both the Electrode Carbon Paste as well as the Tamping Paste is produced from a mixture of different carbonaceous material (CPC, Calcined Anthracite Coal, etc.) and Soft Pitch which is used as a binder. ICL is also one of the few companies to go beyond the required norms for the betterment of the environment. Conservation of energy and water resources has forever been a key objective for the Company. Moreover, the installation of high end Gas Cleaning Systems has ensured that industrial pollution is kept to a minimum and is causing no damage to the environment. The ICL takes care for flora and fauna better than the fact that they are growing some of the worlds' most beautiful and delicate flowers on the very premises in which their factory operates. The company has taken various steps in order to protect and improve the ambient environment and aesthetics of the area surrounding its manufacturing plants. Some of the steps taken by the company are afforestation, conservation of water, minimization of waste, installation of some of the highest cost environment protection system above and beyond those adopted as a standard industry practice.

2.2.8.4 Assam Gas Company Ltd. (AGCL)

Assam Gas Company Ltd is a limited Company owned by the Govt of Assam came into inception on March 31, 1962 in Shillong with its registered office at Duliajan, Assam. The company is engaged in transporting natural gas to industrial, commercial and domestic consumers for use as energy source and raw material. The Company has a capacity to transport 5.5 MMSCMD of natural gas. The AGCL has successfully established branch offices in 14 locations. Starting with its first gas transportation business with Namrup Thermal power station of ASEB in 1967, the company reached to a new height and it presently, the premier natural gas distribution company in the country. It has a staggering network of underground natural gas trunk and distribution pipelines that serves about 350 Tea estates, 400 commercial establishments, about 20,000 domestic consumers and several big industrial consumers in the districts of Dibrugarh, Tinsukia, Sivasagar, Jorhat, Golaghat and Cachar. In Present times, the Company's authorized share capital is ₹20 crore and paid up capital is ₹16.91 crore. AGCL has received a hallmark ISO certification in the year 2000 and subsequently it got up gradation to ISO 9001: 2008 in the year 2010. The AGCL has been declared under category 'A' by the Department of Public Enterprises, Govt of Assam based on sound financial performance over a number of years among the 34 functioning State level public sector undertakings. The Company has been paying regular dividends to the Govt. of Assam and also the CM's Relief Fund. Rajiv Gandhi National Safety Award was earned by the company for its adherence to safety rules and there has been no untoward incidence for a quite long period of time. They are committed to maintain continual improvement in Health, Safety and Environment (HSE) management

along with good performance and zero accident goals. They also comply with all environmental awareness by considering eco friendly approach; educate their employees in respect of Health, Safety and Environment by giving adequate training periodically and to protect employees in their employment from risks resulting from factors adverse to health.

2.2.8.5 Assam Carbon Products Ltd. (ACPL)

Assam carbon Products Ltd. was established in 1963 as a metal graphite and copper powder manufacturing unit in Bamunimaidan, Guwahati, Assam. The main products of this company are Carbon Brush, Current Collectors, Carbon Bearings, Carbon Seals, Felt & Insulations, SIG and other graphite products. The company ensures applicable statutory and regulatory compliances to its business operations at all sites pertaining to Environmental and Occupational Health & Safety. It carries out operations in such a manner to avoid unacceptable risks to human health and safety. The company also tries to minimize the environmental impact on previous, current and likely future operations. Supply product of the company ensures the absence of unacceptable risk to human health, safety and environment. Trained employees and contractors are involved in relevant Environmental and Health & Safety matter. In order to ensure that the above key principles are followed effectively, the company has been conducting periodic management reviews of its Environmental and Health & Safety Management System.

2.2.8.6 Gas Authority of India Ltd. (GAIL), LPG Plant, Lakwa

Gas Authority of India Ltd. (GAIL) was incorporated in August 1984 as a Central Public Sector Undertaking (PSU) under the Ministry of Petroleum & Natural Gas (MoP&NG). It is located in Lakwa, Dibrugarh, Assam. The main product of the company is Polyethylene. The company has developed GAIL action plan to traverse towards higher renewable energy contribution to National grid and in own operations. All steady-state plant operations of GAIL are certified under ISO 14001 environmental management systems. To address climate change, they have taken several measures to reduce energy consumption and also to lower GHG emissions. The company has taken initiatives in rain water harvesting resulted in an increase in the water level in many villages and have facilitated increased irrigation and cultivation of crops. The most significant waste products generated from their operations include used oil, lube oil and oily sludge. The CBCP authorized waste handlers were appointed to process and dispose of waste products ensuring minimum impact on the environment.

2.2.9 Industry: Plywood

The plywood industry is an important agro-based industry in Assam. Kitply Industries Ltd. and Sarada Plywood Industries Ltd. are the two important companies in Assam, which are discussed in brief below:

2.2.9.1 Kitply Industries Ltd. (KIL)

Kitply Industries Ltd. was originally incorporated on 26th August 1982 in Assam as Sudershan Plywood Industries Private Ltd., a leading company of the S.P. Goenka Group. It became a public limited company on 1st April, 1985. The company started manufacturing various grades of plywood from 1986 at its factory in Tinsukia, Assam. The products were marketed under the trade name 'Swastik'. The product of the company is Decorative Laminates, Plywood, Blockboard, Adhesives. Kitply is India's foremost manufacturer of plywood and blockboard. Its operations are spread throughout the country with five modern factories and 30 sales offices. It has a workforce of about 10,000 persons and a countrywide distribution network of over 1,000 dealers. The Kitply Industries Ltd also gives preference to work in harmony with nature, safeguarding the earth's beauty for the present and future generations. They conserve energy and resources in all their activities. They promote the development of products and technologies that minimize environmental impact, while at the same time taking into account the maintenance of people's safety and health.

2.2.9.2 Sarda Plywood Industries (SPI)

Sarda Plywood Industries (SPI) established in 1957, is the flagship company of a prestigious Chitlangia Group having significant presence in paper and tea besides plywood and allied products. The manufacturing facility is located at Jeypore in Assam, the home of plywood manufacturing. Companies' products are Plywood, Blockboard, Doors, Decorative plywood, innovative products – Fabply and Fire resistant doors. The company also manufactures water plywood,

special decorative plywood and the products are well known as the Duroply, Duro board, Duroteak and Pumaply brands. Duroply plywoods are bonded with specially formulated synthetic resin adhesives. Duroboards are blackboards made from seasoned timber while Pumaply is a water-proof, heat and termite-resistant plywood. It is diversified into manufacturing special woolpack, high-density polyethylene (HDPE) bags by setting up a 100% EOU with a buy-back agreement with Elders, Australia. Energy conservation, wherever possible, have already been implemented by this industry. However, efforts to conserve and optimize the use of energy through improved operational methods and other means have also been started.

2.2.10 Industry: Tea

Tea industry occupies an important place in Assam among the agriculture-based industries. In Assam, tea is grown both in the Brahmaputra and Barak plains. Tinsukia, Dibrugarh, Sibsagar, Jorhat, Golaghat, Nagaon and Sonitpur are the districts where tea gardens are mostly found. Assam produces 51% of the tea produced in India and about 1/6th of the tea produced in the world. In 1970, the Guwahati Tea Auction Centre was established for better marketing of the tea produced in the region. This is the world's largest CTC tea auction centre and the world's second largest in terms of total tea. It now auctions more than 150 million kg of tea valued at more than ₹550 crores annually. Tea industry has contributed substantially to the economy of Assam. About 17 percent of the workers of Assam are engaged in the tea industry. Five important tea companies which were mainly engaged in both plantation and production are purposively selected on the basis of

availability of Annual Reports of respective companies. Below is a brief profile of the tea companies:

2.2.10.1 Assam Company India Ltd. (ACIL)

Assam Company India Ltd. was established on February 12, 1839 by a Deed of British Parliament and was the first tea plantation company in the world. The Company was incorporated on 15th March 1977 in Assam and the Certificate of Commencement of business was obtained on 28th June 1977. At present, the company operates 15 factories and owns 15 tea estates and gardens spread over 14000 hectares. ACIL has manufacturing capacity of 15 million kg of tea. The tea estates of this company are Digulturrung Tea estate, Dinjan Tea Estate, Rungagora Tea Estate, Nudwa Tea Estate, Thanai Tea Estate, Hazelbank Tea Estate, Maijan Tea Estate, Greenwood Tea Estate, Khoomtaie Tea Estate, Borborooah Tea Estate, Doomur Dullung Tea Estate, Kondoli Tea Estate, Salonah Tea Estate, Kotalgoorie Tea Estate, Mohokutie tea Estate, Hajua Tea Estate, Oaklands Tea Estate. The Estates strive to reduce the environmental impact from the use of pesticides and herbicides by only using environment friendly chemicals. The company have taken measures to reduce environmental pollution by creating a vegetated protection Buffer Zone to prevent chemical run off to Terrestrial and Aquatic Eco systems. The Pest Management system of the company is complied with numerous Minimal Residue Levels (MRL) in accordance with the European Legislation.

2.2.10.2 Dhunseri Tea and Industries Ltd. (DTIL)

The Dhunseri Tea Company was incorporated in 1961 when S L Dhanuka group took over the management of the company in 1955 from James Finlay & Company. In 1970, the company was renamed as Dhunseri Tea & Industries. In 1980, the company acquired the Namsang and Dilli Gardens in Assam. It took over Bahadur Tea Company and amalgamated it with DTCL on 1st April 1991. In 1994, it acquired three more tea estates -- Santi tea estate, Khetojan tea estate and Khagorijan tea estate. The activity of the company is not only confined to cultivation but also selling tea in packed form. The company has set up packaging plants near its gardens, and markets them under the Lal Ghora and Kala Ghora brands. During 1998-99, the Company raised a sum of ₹8 Crores by issue of 15% Secured Non-convertible Debentures on private placement basis with financial institutions to augment long-term resources of the Company for working capital requirements. At Dhunseri, environment management has always been of paramount importance as the Company made considerable efforts in maintaining the highest environmental and safety standards. The initiatives were undertaken by the company and created environmental cell for the tea divisions to review activities, report shortcomings and undertake steps towards augmenting efficiencies, installed automatic closed conveyor system at the coal fired thermic fluid heater to collect bed ash into ash silos to avoid dust emission, executed significant environmental impact assessment studies for new activities, reviewed existing processes and took corrective action as per the existing Environmental Management Plan, disposed bio-medical waste generated from the tea garden hospital safely.

2.2.10.3 Jayshree Tea and Industries Ltd. (JTIL), Dewan Tea Estate

Jayshree Tea and Industries Ltd., is a conglomerate of B.K Birla Group were incorporated on 27th October, 1945. The company is the third largest tea producer in the world with 27 Tea Estates spread across India and also owns tea estates in the best quality tea producing belt of East Africa. The company have tea gardens in different parts of Assam. Jayshree Tea and Industries Limited acquired the Dewan Tea Estate in the year 1963, located in the Cachar region of Barak Valley, Assam, which produces one of the finest Cachar teas from this region. The company has its own tea processing factories and Tea Packaging and warehousing facilities. The soil status and climate of this estate are conducive to producing good quality teas. The management has made requisite investments in improving the quality and productivity of the output and as a result, the garden has been recipient of number of awards from Tea Board. The garden management has taken number of labour welfare initiatives and programs like Health, Education, Cultural and sports.

2.2.10.4 Goodricke Group Ltd. (GGL), Koomber Tea Garden

Goodricke Group Ltd. has two tea gardens in Assam. Koomber Tea Garden was incorporated to Goodricke Group Ltd in 1975 and is based in Cachar, Assam. The garden not only grows and cultivates tea but also involved in manufacturing tea and also treats, blend, process, buy, sell and deal in tea in various forms. The specific attention is given to the health, safety and welfare of the workers. Regular workshops and seminars for workers are being organised from time to time. These are in addition to the statutory rules as applicable.

Afforestation and environment protections are key areas which are specifically covered and include integrated pest management systems, effluent treatment and community schemes to enhance awareness of protecting the environment. The garden is also accredited to Rain Forest Alliance certification.

2.2.10.5 Tata Global Beverages Ltd. (TGBL)

Tata Global Beverages Ltd was established in the year 1983 when James Finlay sold their shareholding in the company. Today, it is the second largest tea company in the world. The Company not only manufactures tea, but also cultivates and manufactures black tea and instant tea. Moreover, the company also cultivates coffee, pepper and other plantation crops and conversion of coffee into products, such as roast and ground coffee and instant coffee. Others products of the company are natural mineral water, other minor crops, curing operations of coffee and trading of items required for coffee plantations. Apart from manufacturing, the company is doing various activities towards protection of environment. The products which company sells are good for consumers, good for the environment and good for the people in their global supply chains. The Company spent a total of ₹46.99 Million on various environmental initiatives across the locations. At present, the Company is not monitoring the GHG emissions involved in transport but planning to develop strategies to capture them. The company is giving attention to regeneration of local flora and fauna, especially Shola regeneration, which helps in water conservation and thus led to increase in the water availability in Assam.

Table 2: Brief profile of the sample companies/ units under industry groups in summarized form:

Industry	Company/ Unit	Type of Industry	Location	Year of inception	Products manufactured
Cement	Cement Corporation of India, Bokajan Cement Company	Public	Bokajan, Karbi Anglong	1965	Ordinary Portland Cement (OPC) & Pozzolana Portland Cement
Cement	Vinay Cements Ltd.	Private	Umrangshu, North Cachar Hills Dist	1989	Clinker, raw materials, stores scrap, etc
Cement	Barak Valley Cements Ltd.	Private	Badarpurghat, Hailakandi	1999	Extraction / mining and crushing of limestone and other minerals.
Fertilizer	Brahmaputra Valley Fertilizer Corporation Ltd.	Public	Namrup	1969	Nitrogenous fertilizers mainly urea and ammonia
Oil Refinery	Digboi Refinery-Indian Oil Corporation Ltd.	Public	Digboi, Tinsukia, Assam	1901	LPG, Naphtha, Motor Spirit, Superior Kerosene (SKO), High Speed Diesel (HSD), Furnace Oil (FO), and Raw Petroleum Coke.
Oil Refinery	Guwahati Refinery-Indian Oil Corporation Ltd.	Public	Guwahati, Assam	1962	LPG, Motor Spirit, Aviation use Turbine Fuel, Kerosene Oil, High Speed Motor, Diesel, Light use Diesel Oil
Oil Refinery	Bongaigaon Refinery (earlier known as Bongaigaon Refinery and Petrochemicals Ltd) - Indian Oil Corporation Ltd.	Public	Bongaigaon, Assam	1974	Liquefied Petroleum Gas, Motor Spirit, Straight Run Naphtha, Superior Kerosene Oil, Aviation Turbine Fuel, High Speed Diesel, Light Diesel Oil, Low Sulphur Heavy Stock, etc
Oil Refinery	Numaligarh Refinery Ltd.	Public	Numaligarh, Golaghat, Assam	1993	liquid petroleum gas, naphtha, motor spirit, aviation turbine fuel, superior kerosene oil, high speed diesel, raw petroleum coke, calcined petroleum coke, and sulphur
Petro Chemicals	Assam Petrochemicals Ltd.	Public	Namrup	1971	Methanol and Formalin
Pulp and Paper	Hindustan Paper Corporation Ltd. (HPCL), Cachar Paper Mill	Public	Panchgram, Hailakandi	1988	Paper, paper boards and newsprint along with small quantities of caustic soda and chlorine.
Power	Assam Power Generation Corporation Ltd.	Public	Namrup Thermal Power Station	1965	construct, generate, operate and maintain power stations
Power	North Eastern Electric Power Corporation Ltd., Assam Power Gas Based Plant	Public	Kathalguri Dibrugarh	1976	investigate, design, construct, generate, operate and maintain power stations
Coal	Coal India Ltd, North Eastern Coal Fields	Public	Margherita, Tinsukia	1975	Non-coking coal

Contd...

(Contd table...)

Petroleum and Natural Gas	Oil India Ltd.	Public	Duliajan, Dibrugarh	1959	Crude oil, Natural Gas and LPG
Petroleum and Natural Gas	India Carbon Ltd	Private	Guwahati	1961	Calcined Petroleum Coke Electrode Carbon Paste and Tamping Paste, etc.
Petroleum and Natural Gas	Oil and Natural Gas Corporation Ltd., Assam Asset.	Public	Nazira, Sibsagar	1962	Crude Oil, Natural Gas, Naptha, Liquified Petroleum Gas, Ethane/Propane, Superior Kerosene Oil (SKO), Low Sulphur Heavy Stock (LSHS), High Speed Diesel, High Speed Diesel, etc
Petroleum and Natural Gas	Assam Gas Company Ltd.	Public	Duliajan, Dibrugarh	1962	Supply of natural gas to industrial, commercial and domestic consumers for use as energy source and raw material
Petroleum and Natural Gas	Assam Carbon Products Ltd.	Private	Bamunimaidan, Guwahati	1963	Calcined Petroleum Coke Electrode Carbon Paste Electrode and Tamping paste, etc
Petroleum and Natural Gas	Gas Authority of India Ltd.- LPG Plant	Public	Lakwa, Dibrugarh,	1984	Polyethylene
Plywood	Sarda Plywood Industries Ltd.	Private	Jeypore	1957	Plywood, Blockboard, Doors, Decorative plywood, Innovative products
Plywood	Kitply Industries Ltd.	Private	Tinsukia	1982.	Decorative Laminates, Plywood, Blockboard, Adhesives
Tea	Assam Company India Ltd.	Private	Jorhat	1839	Plantation and manufacturing of tea
Tea	Dhunseri Tea and Industries Ltd.	Private	Sibsagar	1961	Plantation, production and packaging of tea
Tea	Jayshree Tea and Industries Ltd., Dewan Tea Estate	Private	Cachar	1963	Plantation; Tea processing factories; Tea Packaging; and warehousing facilities
Tea	Goodricke Group Ltd. Koomber Tea Company Pvt. Ltd	Private	Cachar	1975	Plantation, treats, blend, process, buy, sell and deal in tea in various
Tea	Tata Global Beverages Ltd	Private	Dibrugarh	1983	Processing of Tea, Coffee and Other Products

Source: Compiled by researcher