



Environmental Consultancies & Options (ECO)

Environmental Impact Assessment

Extension Project of Light Soda Ash Plant, 2016



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Khewra, District Jhelum Pakistan

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Sr No	TABLE OF CONTENT	Page No
	EXECUTIVE SUMMARY	i
1.	INTRODUCTION	
1.1	Purpose of Report	1-2
1.2	Identification of Project	1-2
1.3	ICI Pakistan Limited - The Proponent	1-2
1.3.3	Principal Activities	1-5
1.3.4	The Khewra Soda Ash Company	1-5
1.3.5	Principal Business Premises	1-7
1.3.7	Environmental Management Activities	1-8
1.4	Details of Consultant	1-9
1.5	Overview of Activities for the Proposed Project	1-9
1.6	Project Nature, Area & Location	1-9
1.7	Environmental Management Plan Cost	1-10
2.	SCOPE AND METHODOLOGY	
2.1	Environmental Impact Assessment (EIA)	2-2
2.2	Objectives Of EIA	2-2
2.3	Approach & Methodology	2-2
2.4	Salient Features of The Report	2-4
3.	STATUTORY REQUIREMENTS & STANDARDS	
3.1	Policy Guidelines	3-1
3.2	Environmental Institutions And Administration	3-2
3.3	Laws, Regulations And Guidelines	3-2
3.4	Environmental Guidelines Of The Pakistan EPA	3-4
3.5	Environmental Guidelines Of UNEP and the World Bank	3-9
3.6	International Treaties And Obligations	3-9
3.7	Environmental Assessment Process	3-9
4.	PROJECT DESCRIPTION	
4.1	Type and Category of Proposed Project	4-1
4.2	Project Objectives	4-1

4.3	Alternatives Considered Realistically	4-1
4.4	Site Identification of the Proposed Project	4-2
4.5	Project Components	4-2
4.6	Project Description	4-2
5.	DESCRIPTION OF ENVIRONMENT	
5.1	Physiography of Pakistan	5-2
5.2	Profile- Jhelum City	5-3
5.2.1	Profile- Khewra	5-3
5.3	Physical Environment of Jhelum City	5-4
5.2	Biological Environment of the City	5-13
5.3	Socio-economic Environment (Quality of Life Values)	5-21
5.4	Stakeholder Consultation	5-24
6.	IMPACTS & MITIGATION	
6.1	Impacts during Construction Phase	6-1
6.2	Impacts during Operational Phase	6-7
6.3	Project Intended and Likely Benefits	6-11
7.	ENVIRONMENTAL MANAGEMENT PLAN	
7.1	Introduction	7-2
7.2	Objectives of Environmental Management Plan	7-2
7.3	Regulatory Requirements and Applicable Standards	7-3
7.4	Components of the EMP	7-5
7.5	Institutional Capacity	7-5
7.6	Summary of Impacts Assessment, Mitigation and Management Plan	7-6
7.7	Environmental Monitoring Plan	7-8
8	CONCLUSION	8-1
	ANNEXURES	
	Annex A -Glossary	
	Annex B -List of Abbreviations	
	Annex C -Questionnaire	
	Annex D -Team Responsibilities	

Annex E-Environmental Experts
Annex F-Lab Results
Annex G-Pictorial Profile of Monitoring
Annex H-Waste Management Plan
Annex I-Health & Safety Plan
Annex J-SH & E Urdu Policy
Annex K-Traffic Management Plan
Annex L- Noise Control
Annex M-PPE
Annex N- Fraud Policy
Annex O- Mobile Phone Policy
Annex P- Policy for the use of Asbestos
Annex Q- Product Stewardship Policy
Annex R- Smoking Policy
Annex S- Substance Abuse Policy
Annex T-Layout Map
Annex U- Achievements and Distinctions
Annex V- Geographical Location
Annex W-Written Feedbacks
Annex X- Fire Management System
Annex Y- Site Emergency Handling
Annex Z- References

EXECUTIVE SUMMARY

Consultant

ICI (Imperial Chemical Industries) Pakistan Limited Soda Ash Business plans to extend capacity of its Light Ash plant by 200,000 tons per annum. In keeping with the regulatory requirement of the country, ICI Soda Ash Business has engaged Environmental Consultancies & Options (ECO) to undertake an Environmental Impact Assessment (EIA).

The Proponent

Imperial Chemical Industries (ICI) Pakistan Limited is a 75.81% owned subsidiary of ICI Plc, UK. It was set up as a public limited company in Pakistan in 1952. Today ICI Pakistan's four businesses, Polyester, Soda Ash, Life Sciences and Chemicals manufacture and sell a range of industrial and consumer products. It operates services to a number of industries in Pakistan, including Textiles, Glass, Pharmaceuticals, Agriculture and Livestock, Construction, Automobiles, Chemicals, Cement, Fertilizer, Rubber, Detergents, Footwear, Food, Beverages and Leather.

ICI Soda Ash is the largest Soda Ash producer in the country and caters to approximately 70% of the country's total Soda Ash requirement. Soda Ash Plant in Khewra was established in the 1944, even before the creation of Pakistan starting with a capacity of 18,000 tons per annum.

The company has made huge investments in growing this business and its current annual capacity of 350,000 tons per annum provides assurance to the customers that ICI Soda Ash can be relied upon as a trusted and reliable supplier for high quality Soda Ash. The company utilizes indigenous raw materials to ensure substantial foreign exchange savings through import substitution. The Khewra plant produces two different grades of Soda Ash. One is known as Light Ash whereas the other is known as Dense Ash. Light ash is used as a raw material in the detergents, silicate, paper, chemicals and textile industries whereas dense ash is used as a raw material in the glass industry

Brief Outline of the Report

The Environmental Impact Assessment (EIA) has been organized into following Chapters.

Chapter-1: Describes the purpose of report, identification of project activities proponent, details of consultant and provides a brief description of the project nature, size and location.

Chapter-2: Scope & Methodology

Chapter-3: Statutory Requirements and Standards

Chapter-4: Describes the description of the proposed project.

Chapter-5: The environmental setting of the project area

Chapter-6: Describes screening of potential Environmental impacts and mitigation measures.

Chapter-7: Is an Identification of possible impacts for preparation of Environmental Management and Monitoring Plan.

Chapter-8: Is the conclusion of Environmental Impact Assessment (EIA) report.

The Proposed Project

The proposed project is an extension project of Light Soda Ash Plant (200 KTPA) at ICI Soda Ash Khewra. The total area of this proposed extension project of 200 KTPA Light Soda Ash Plant is around 50,000 - 60,000 square meters and it will be completed in 4 years.

Environment Settings

ICI Pakistan Limited, Soda Ash is located at Khewra in the northern part of Punjab at the foot hills of the salt range, longitude 73° at a height of 810 feet above sea level. It is accessible via road from Islamabad in the north and Lahore in the south. A rail track also passes through Khewra. The Khewra Salt Mine (or Mayo Salt Mine) is located in Khewra, north of Pind Dadan Khan, an administrative subdivision of Jhelum District, Punjab, Pakistan. The mine is the oldest and second largest mine in the world and is a part of Salt Range, a mineral-rich mountain system extending about 200 km from the Jhelum River south of Potwar Plateau to where the Jhelum River joins the Indus River.

The main drainage of the region is in the South direction that is prominently shown by the river Jhelum and a drain at the back of ICI, commonly known as Gorge. The climate is dry with temperature reaching to mean maximum 41°C and extreme

maximum 49°C and down to mean minimum 5 °C and extreme minimum 1°C. January is the coldest month, while June is the hottest month. The average annual rainfall in the area is approximately 647 mm and mainly occurs in July, August and September during summers while in January, February and March during winters. Underground water resources are not adequate. The sub-soil water at this place is suitable for industrial purposes.

The area is rich in biological resources and different floral species that are found in the vicinity of project area includes the big trees, middle size trees, ground covers, shrubs, bushes, seasonal plants and climbers. A number of mammals, birds, reptiles and insects are also found in Khewra region. Khewra is the second largest populated City of Jhelum and administratively subdivided into two Union Councils. The population of Khewra city is near about 35000 peoples. Khewra is known as a best tourist city of Jhelum District because of Khewra Salt Mine Tourist Resort.

Main sources of livelihood here is mining, industries, trade, agriculture and cultivation. A few numbers of people also work in the nearby cities. The project site is well connected to the rest of the country through Lahore-Islamabad Motorway and has adequate education, health and transport facilities. Two sites of archaeological importance including Chua Syeden Shah and Katas are found in this area. Both sites are unlikely to be effected by the project activities, mainly due to the distances and also because of the higher altitude of the archaeological sites.

Potential Project Impacts & Mitigation

Environmental impact is the repercussions of an activity or specific land use on the physical/social environment as a consequence of emissions, waste disposal, water and power usage, etc.

The nature and scope of work and the environmental setting of the AOI (established through Checklist) indicates that there will neither be any significant adverse impact to the environment nor there would be any irreversible ecological damage due to the project activities. All the adverse impacts either would be temporary or would be easily mitigable. The projects benefits on the other hand would easily outweigh any small and temporary adverse impacts. The project will have significant positive environmental and social benefits by uplifting the employment opportunities in and around the project area.

Environmental concerns could be Physical, Biological and Socio-cultural. These impacts will be temporary, reversible, phased over a period of time, localized and manageable.

The air quality was analyzed and found reasonably clean and no any obvious source of air pollution was located in the vicinity of the project area of influence. However there are kacha paths and may cause dust pollution during traffic movement. Air quality shall be controlled by regular spraying of water on kacha paths. All vehicles, machinery, equipment and generators used during construction activities will be kept in good working conditions to minimize the exhaust emissions. Cutting & burning trees and shrubs as a fuel shall be prohibited and clean source of energy should be provided. Noise, air quality and water sources shall be monitored periodically, as specified in EIA report. All the work activities should be restricted within the allowed working hours.

The Project will not have any significant impacts on fish, fishermen communities, wildlife and wildlife habitat. However, monitoring measures have been recommended to ensure that any unforeseen impacts can be identified, compared with baseline and mitigated during the implementation stage. Socioeconomic conditions of the project area will generally have positive impacts due to the project implementation i.e. availability of jobs.

It is very important to protect the water sources during the project activities from accidental spills of diesel or any chemical, as any spill could percolate to the groundwater through the sandy stratum at site. All the solid waste and wastewater generated from the project activities and contractor camp shall be disposed-off according to the waste disposal plan, which would be a component of the EMP.

There is also a process established to deal with the stakeholder or affected people's concerns, complaints and grievances about the project environmental performance. The verbal or written grievances will be received recorded and replied in a systematic way using an understandable and transparent process that is gender responsive, culturally appropriate and readily accessible to all segments of the affected people at no cost and without retribution. Continuous environmental monitoring will be carried out for the entire project activity, to ensure due diligence of environmental performance. The EMP will also ensure reporting of all non-conformances and their rectification within a specified period of time along with safety, health and environment (SHE) audits.

Proposed Monitoring

Environmental monitoring is one of the keys for effective management of environmental quality. Monitoring support is essential in almost all stages of pollution control and abatement programs. The decisions based upon monitoring results are far reaching, and require an accurate, reliable and comprehensive database.

Following environmental parameters were monitored for the proposed project:

- Drinking Water (Chemical and Physical Analysis)
- Surface Water (Chemical and Physical Analysis)
- Waste Water (Chemical and Physical Analysis)
- Soil Quality Analysis
- Ambient Air Quality and Noise Levels

The mitigation measures to be adopted to minimize potentially negative impacts, their success can only be determined by a programme to:

- ✓ Monitor any changes in the biophysical and social characteristics of the environment;
- ✓ Determine if these changes result from project or non-project causes;
- ✓ Identify and determine the impact of non-compliance with the EMP by the Contractor with particular regard to emissions and discharges that contravene adopted standards;
- ✓ Assess the effectiveness of impact mitigation; and
- ✓ Highlight any concerns unforeseen in the EMP and recommend additional mitigation.

In conjunction with the Contractor, the Construction Manager will monitor air quality, noise level, monthly consumption of materials including aggregates, hazardous materials, fuel, water and electricity, the disposal of surplus earth materials and other solid and liquid wastes. The monitoring of Health and Safety shall, include but not be limited to H&S signage, the availability and use of protective headgear, footwear and other clothing, the occurrence of accidents and the potential for accidents in relation to general site condition.

Conclusion

After assessing the significance of potential impacts, the environmental consultants, ECO have concluded that:

“All environmental and social issues involved during the project activities are manageable, therefore it is concluded that the project is environmentally friendly, financially viable, economically sustainable, generally neutral and pro-poverty elevation”.

Chapter - 1

INTRODUCTION

Chapter - 1

INTRODUCTION

1.1 Purpose of the Report

The Khewra Soda Ash Company, a predecessor of ICI Pakistan Limited is considering capacity enhancement of Light Ash plant by 200,000 tons per annum at ICI Pakistan Soda Ash Works, Khewra, district Jhelum. ICI Pakistan Limited Soda Ash Works has devised mission to achieve certain environmental objectives besides the existing local legal requirements. Consultants hereby were hired for providing Consultancy for carrying out Environmental Impact Assessment (EIA) and the purpose of report is for obtaining Environmental Approval from EPA.

1.2 Identification of Project

ICI Pakistan Soda Ash Works is located at Khewra, district Jhelum. This plant was initially commissioned with a production capacity of 18 KTPA. Since then, the plant has undergone a number of Capacity Expansions / Debottlenecking and the “Nameplate” capacity after the last expansion project completed in 2009 has been increased to 350 KTPA.

A step in the form of further expansion is the proposed capacity enhancement of Light Ash plant by 200,000 tons per annum thereby increasing the nameplate capacity of Light Ash plant to 550,000 tons per annum. Hardware additions / changes shall be required throughout the different stages of process.

Cuurent Capacity	Proposed Capacity	Total Capacity
350 KTPA	200 KTPA	550 KTPA

1.3 ICI Pakistan Limited - The Proponent

ICI (Imperial Chemical Industries) Pakistan Limited, Head Office is located in Karachi, Pakistan. ICI Pakistan was acquired by Younas Brother Group in December 2012 after its parent shareholder AkzoNobel NBV decided to divest its shares from all other ICI owned businesses in Pakistan, except the paints business. Paints are now listed as a separate entity in the stock exchange with the name of AkzoNobel Pakistan

Limited. All the remaining business merged to form ICI Pakistan Limited, which now operates under the flag of Younas Brother Group.

1.3.1 Background

ICI has consistently developed new and innovative areas of businesses, since its formation in December 1926, by the merger of four of the largest chemical companies in the UK. ICI today is a collection of world-class businesses, many of them leaders in their sectors. They are strongly led, technologically sophisticated with healthy and sustainable long-term growth prospects. The company has a range of over 50,000 products, more than 38,000 employees and over 200 manufacturing facilities in 55 countries worldwide.

ICI Pakistan Limited was 75.81% owned subsidiary of ICI Plc, UK. It was set up as a public limited company in Pakistan in 1952. ICI's presence in this part of the world, however, predates the formation of the public limited company and indeed, Pakistan itself.

1.3.2 ICI Pakistan - Through Years

The history of ICI Pakistan predates the formation of Pakistan. From a small trading concern with a single manufacturing unit, over the decades, the company has transformed into one of the largest industrial conglomerates of the country enjoying an iconic stature.

1944	ICI establishes its first manufacturing site for the production of Soda Ash at Khewra.
1953	The Khewra Soda Ash Company is incorporated as a public limited company.
1965	ICI Pakistan acquires Fuller Paints Limited.
1966	The name of Khewra Soda Ash Company changes to ICI Pakistan Manufacturers Limited.
1968	ICI Pakistan Manufacturers Limited commissions its Specialty Chemicals Plant in Karachi.
1970	ICI Pakistan Manufacturers Limited sets up a Pharmaceutical Factory in Naryanganj East Pakistan. After 1971, the factory became part of ICI Bangladesh Manufacturers Limited.
1973	Fuller Paints changes its name to Paintex Limited.

1982	ICI Pakistan Manufacturers Limited sets up a Polyester Plant at Sheikhpura with a capacity of 12,000 tons.
1985	Imperial Chemical Industries Pakistan (Private) Limited and Paintex Limited merge into ICI Pakistan Manufacturers Limited.
1987	The company changes its name to ICI Pakistan Limited.
1991	ICI Pakistan PowerGen Limited is incorporated as a public limited company.
1994	ICI Pakistan increases capacity of Soda Ash Plant by 50,000 tons.
1996	ICI Pakistan increases Polyester Fiber capacity to 60,000 tons and Polymerization capacity to 91,000 tons.
1998	ICI commissions its PTA Plant at Port Qasim Karachi.
2000	PTA Business demerges to form a separate entity, Pakistan PTA Limited.
2001	Soda Ash Site completes Automation Cogeneration & Debottlenecking Project.
2002	ICI Pakistan increases capacity of Polyester Plant by 44,000 tons. The Pharmaceutical and Animal Health Segment was combined with the Agrochemicals and Seeds Segment to form the company's Life Sciences Business.
2006	As a part of an asset modernization and improvement plan the Polyester Business commissions a sixth processing line.
2007	ICI Pakistan completes 50,000 tons expansion of its Soda Ash plants.
2008	AkzoNobel, one of the largest coatings and chemicals company in the world becomes the ultimate holding company of ICI Pakistan Limited.
2009	ICI Pakistan completes 65,000 tons expansion of its Soda Ash plant. Polyester Site completes Cogeneration Project. Pakistan PTA Limited is acquired by Lotte Worldwide Group.
2010	ICI Pakistan Foundation implements a PKR 50 million pan-country Flood Relief & Rehabilitation Program providing food and medical care and constructing two villages for affectees.
2011	AkzoNobel demerges the Paints Business into a separate legal entity, Akzo Nobel Pakistan Limited.
2012	Lucky Holdings Limited acquires majority shareholding from AkzoNobel and becomes the ultimate holding company of ICI Pakistan Limited.
2013	Launch of new corporate identity, vision and values.
2014	Extension project 2014-2015

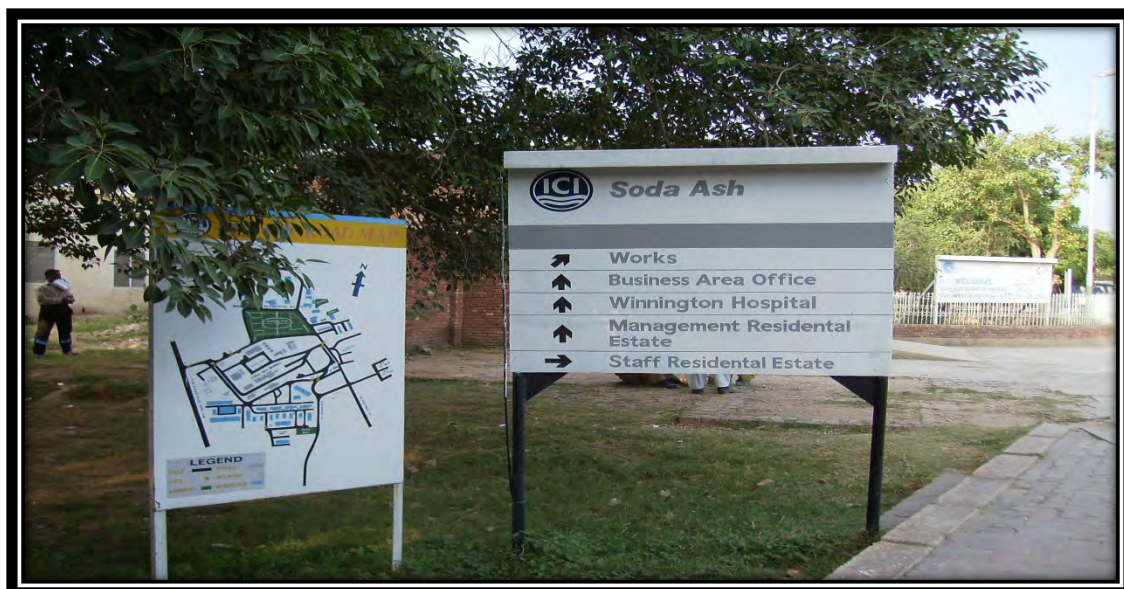
1.3.3 Principal Activities

Today ICI Pakistan's four businesses, Polyester, Soda Ash, Life Sciences and Chemicals manufacture and sell a range of industrial and consumer products. These include Polyester Staple Fibres, POY Chips, Light and Dense Soda Ash, Sodium Bicarbonate, Uniqema Specialty Chemicals, Polyurethanes, and Adhesives and arrange manufacture on a toll basis of Pharmaceutical and Animal Health products.

It operates services to a number of industries in Pakistan, including Textiles, Glass, Pharmaceuticals, Agriculture and Livestock, Construction, Automobiles, Chemicals, Cement, Fertilizer, Rubber, Detergents, Footwear, Food, Beverages and Leather, with back-end relationships in twenty three countries. It also markets Seeds and Agrochemical products and in addition is engaged in trading various specialized chemicals for use in different Industries in Pakistan. In 1995 ICI Pakistan Limited set up a USD 490 million PTA manufacturing facility at Port Qasim, near Karachi, which was commissioned in 1998. In 2001, the PTA business was demerged to form Pakistan PTA Limited, a subsidiary of ICI Plc UK.

1.3.4 The Khewra Soda Ash Company

The Khewra Soda Ash Company, a predecessor of ICI Pakistan Limited, set up a soda ash manufacturing facility in Khewra in 1944 with a capacity of 18,000 tons per annum. This facility was sited next to the salt range as rock salt and limestone; two key raw materials for manufacturing soda ash were available here in abundance.



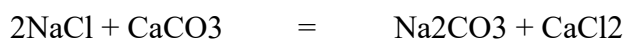
The company has made huge investments in growing this business and its current annual capacity of 350,000 tons per annum provides assurance to the customers that ICI Soda Ash can be relied upon as a trusted and reliable supplier for high quality Soda Ash. The company utilizes indigenous raw materials to ensure substantial foreign exchange savings through import substitution. In 1995, the business commissioned a 10ktpa plant for the manufacture of Sodium bicarbonate, which was further expanded to 20ktpa in 2004. Besides, the business also produces 250 tons per day of dense ash (Na_2CO_3), which is an essential raw material for glass making.

ICI Soda Ash is the largest Soda Ash producer in the country and caters to approximately 70% of the country's total Soda Ash requirement. The Business mainly uses indigenous raw materials and locally made equipment.

The Khewra plant produces two different grades of Soda Ash. One is known as Light Ash whereas the other is known as Dense Ash. They differ only in particle sizes and density. Dense Ash is in fact made from Light Ash and is chemically identical to Light Ash, but has a density twice as much.

1. **Light Ash:** Used as a raw material in the detergents, silicate, paper, chemicals and textile industries
2. **Dense Ash:** Used as a raw material in the glass industry

The process used in the manufacture of Soda Ash is called the Solvay's Ammonia Soda Process. The major raw materials used are salt, limestone, coke and ammonia. In essence the reaction is represented as follows:



1.3.5 Principal Business Premises

Business Premises	Address
Head office	ICI House. 5 West Wharf, P.O Box # 4731 Karachi 74000
Factory	ICI Soda Ash, Khewra, Distt. Jhelum
Project site	ICI Soda Ash, Khewra, Distt. Jhelum
Lahore office	ICI House, 63 Mozang Road, P.O. Box # 3025 Lahore.

1.3.6 Achievements and Distinctions

- ◆ It is a highly ethical company with a strong environmental & safety record.
- ◆ ICI Pakistan has a most diverse portfolio of products amongst multinational companies operating in Pakistan.
- ◆ In recognition of the significant improvements, the Soda Ash Business was awarded the SHE Excellence Leadership Award from the year 1999 - 2003.
- ◆ ICI Soda Ash was awarded Chairman Safety Shield in 2003 and Chief Executive's From 2004 onwards Soda Ash Business has won " Chief Executive Merit Certificate and several SH&E initiative awards " in the year 2004.
- ◆ A leader in Safety, Health and Environment, the Business also won ICI plc Chief Executive Trophy in 1998.
- ◆ Recently, in appreciation of substantial developments ICI was awarded with HSE&S trophy for the year 2010 to Soda Ash Business.
- ◆ ICI Pakistan nominated for "Sustainability Innovation Award" in 2014 by Business School Lausanne Switzerland for its recognized sustainability practices.
- ◆ The Soda Ash Business achieved a landmark of: SHE Performance since LTC (Loss Time Case)

ICI Employees 3.02 Million Hrs

Supervised Contractors 26.87 Million Hrs

Other Contractors	4.59 Million Hrs
Injury free hrs	7.66 Million Hrs

It continues to exercise responsible care towards the environment and the community.

1.3.7 Environmental Management Activities

ICI Pakistan Limited Soda Ash is committed to ensure that all operations are carried out with due regard for environmental protection and to meet legal requirements. This is achieved through the implementation of company environmental management plan (EMP) and Safety Health and Environment (SH &E) policies. The SH &E policies of ICI are given in **Annex-J**.

This Plan enables environmental issues to be efficiently and systematically managed for continuous improvement. A key element within any EMP is the evaluation of the effects of operations on the environment. Emissions and discharges from the proposed operation are compared to internal requirements and with industry and government standards. Potential environmental impacts on the environment are then evaluated and prioritised action plans developed to reduce environmental effects.

In addition to the evaluation of environmental effects, the EMP ensures that all personnel comply with company's SH &E standards. This includes the auditing of facilities and training of ICI Pakistan Limited personnel on the environmental sensitivities in areas of operation. Such studies add to the scientific understanding of the environmentally sensitive areas of interest. ICI has devised "Sustainability Key Performance Indicators (KPIs)" to achieve certain environmental objectives besides the existing local legal requirements.

1.4 Details of Consultant

The ECO is a professionally run, engineering and consultancy firm with strong backup of highly qualified, experienced personnel. The company has specialized diversified fields and continuously identifying the current and future demands related to environment and engineering. The ECO has evolved into a technologically robust conglomerate with manufacturing interests in Metallurgy, Specialty Chemicals, Oil Field Chemicals and Water and Wastewater Treatment and Alternate Energy. The ECO is serving market niche with a broad range of high technology products and services to a wide spectrum of industries in Pakistan. Environmental Consultancies and Options is a member of Groups of Companies. The other members are:

- Global Waste Management (GWM)
- Global ECO Lab(GEL) [ISO 9001:2000 Certified]
- Global Technologies (GT)

1.5 Overview of Activities for the Proposed Project

ICI Pakistan Limited Soda Ash Business plans to extend capacity of its Light Ash plant by 200,000 tons per annum. The proposed activities will include the following:

- Construction Phase (Civil Work)
- Commissioning and Operation

1.6 Project Nature, Area & Location

1.6.1 Project Area & Location

The proposed project area is about 50,000 - 60,000 Sq.m of land. The proposed project will be in Khewra (District Jehlum of Punjab).

Project	Total Area (Sq. m)	Structured Area (Sq. m)
200 KTPA Light Ash Expansion	Around 50,000 - 60,000	Around 20,000

1.6.2 Project Cost

The estimated cost for the construction of the proposed project would be 90.4 million USD.

1.6.3 Project Duration

The proposed project will be completed in 4 years.

1.6.4 Man-power Requirements

Estimated Labor required for the proposed project is as follows:

Construction Phase: 600

Operational Phase: 60

1.7 Environmental Management Plan Cost

The Environmental Management Plan should be implemented to enhance the project benefits. The annual EMP budget is one million PKR.



Figure 1.2: Location Map of Proposed Project Site (Google Earth)

Chapter - 2

SCOPE & METHODOLOGY

Chapter – 2

SCOPE AND METHODOLOGY

2.1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Environmental Impact Assessment (EIA) is a systematic identification and evaluation of potential impacts of proposed projects, plans, programs or legislative actions relative to the physical, chemical, biological, cultural and socio economic components of the total environment.

2.2 OBJECTIVES OF EIA

The objectives of EIA are to:

- Assess and establish the existing environmental and socio economic conditions in the project area
- Assess the potential environmental or socio economic impacts of project activities and identify issues of concern
- Propose mitigation and monitoring measures that can be incorporated into the design of the project to remove or reduce any damaging effects as far as possible, and to control and monitor residual impacts
- Assess the proposed activities to ensure that they comply with the relevant environmental and social regulations and standards
- Prepare an EIA report as per the relevant guidelines for submittal to the concerned Environmental Protection Agency (EPA)

2.3 APPROACH & METHODOLOGY

Detailed methodology is described as follows:

The project activities were discussed with ICI Soda Ash personnel. Preliminary information was obtained.

2.3.1 Step - 1: Scoping / Data Collection

In this step, information relating to the physical, technical and environmental parameters is collected from the Client (if any) and other agencies such as WWF, IUCN, EPA, SUPARCO and Development Directorates, etc. Local inhabitants were interviewed in detail to understand the socio-economic, culture and customs of the area. An extensive literature review was also carried out in this step.

Following information was collected from the Technical and SH&E departments:

- o Details of project activities
- o Legislative obligations
- o Environmental data through physical survey (Monitoring of Effluent, Air Quality and Drinking Water Quality). Following data was collected through field visits and secondary data available with various agencies:

<i>Physical Surveys:</i>	<i>Technical Surveys:</i>
<ul style="list-style-type: none"> ▪ Proposed environmental study area ▪ Climatology ▪ Topography, Geology ▪ Hydrology, Hydrogeology ▪ Ecology, flora and fauna ▪ Socio - economic conditions ▪ Sensitive Areas ▪ Land use patterns 	<ul style="list-style-type: none"> ▪ Process details ▪ Utilities availability ▪ Liquid Effluent Generation ▪ Air Emissions ▪ Solid waste generation ▪ Transportation mechanisms ▪ Storage of chemical

2.3.2 Step - 2: Data Analysis

The data collected in step-1 was analyzed in the framework of Pakistan Environmental Protection Act, 1997.

2.3.3 Step - 3: Environmental Impact Assessment

The data collected in previous phases was used to investigate existing environmental conditions and assess the potential impacts of the proposed activities. Although the major emphasis remained on the compliance of the client's operations with the national legislation. Available internationally guidelines were also reviewed and mitigations measures were developed to ensure environmentally safe practices.

2.3.4 Step - 4: Environmental Impact Assessment (EIA) Report

The finding of the study was communicated to the client in the form of a Draft Environmental Impact Assessment (EIA) Report. The report has been prepared in accordance with the relevant guidelines of the Pakistan Environmental Protection Agency.

The discussion and comments of the client regarding the recommendations by the consultants were considered and appropriate modifications were incorporated in the Draft Report to be presented as a final report.

2.4 SALIENT FEATURES OF THE REPORT

The Environmental Impact Assessment Report (EIA) has been organized into nine (9) chapters. **Chapter-1** describes the activities of the project proponents and provides a brief introduction of the proponent and the project. **Chapter-2** is the definition of Environmental Impact Assessment and its study, objectives and methodology. **Chapter-3** is an overview of national and international legislation and guidelines relevant to project activities and the environmental impact assessment process. **Chapter-4** describes in detail the project activities. The environmental setting of the project area including the physical sampling plan is discussed in **Chapter-5**. The project impacts, mitigation and alternatives are discussed in details in **Chapter-6**. An Environmental Management Plan (EMP) is detailed out in **Chapter-7**. Results and Discussion are discussed in is detailed out in **Chapter-8**. The conclusion of the Environmental Impact Assessment is discussed in **Chapter-9**.

Chapter - 3

LEGAL FRAMEWORK

Chapter – 3

LEGAL FRAMEWORK

A number of laws exist in Pakistan, containing number of clauses concerning protection of the environment. However, the first legislation on environmental protection was issued in 1983. The Pakistan Environmental Protection Ordinance, 1983 was the first legislation promulgated for the protection of environment. Pakistan Environment Protection Agency was established in 1984. No significant environmental policy, guidelines and regulations were carried out till early 1990's. The National Conservation Strategy was developed and approved by the federal cabinet in 1992. Provincial Environmental Protection Agencies were also established in 1992-1993. National Environmental Quality Standards (NEQS) were established in 1993. Detailed environmental guidelines started in 1996. The National Assembly and the Senate conferred National Environmental Protection Act in 1997.

3.1 Policy Guidelines

The National Conservation Strategy (NCS) is the primary document addressing environmental issues of the country. NCS is duly recognized as the National Environmental Action Plan by various international donor agencies including the World Bank. The document identifies 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural environment. One of these areas is biodiversity conservation. Others include the restoration of rangelands, pollution prevention and abatement, and preservation of cultural heritage.

The Pakistan Environmental Protection Act, 1997 is the key legislation empowering the government to frame regulations for the protection of the environment. Detailed rules, regulations and guidelines required to enforce the Environmental Protection Act are still in various stages of development. Pakistan is a signatory to the Convention on Biological Diversity and is thereby obligated to develop a national strategy for the conservation of biodiversity. A Biodiversity Working group has been constituted under the Ministry of Environment, Local Government and Rural Development to develop a Biodiversity Action Plan for the country. The Biodiversity Action Plan has been developed after an extensive consultative process and compliments the NCS and the proposed provincial conservation strategies. It identifies the causes of biodiversity

loss in Pakistan and suggests a series of proposals for action to conserve in the country. The Pakistan Environmental Protection Council (PEPC) has approved the plan and while the provincial steering committees are in the process of being formed, a federal steering committee is already in place.

3.2 Environmental Institutions and Administration

The Constitution of Pakistan distributes the legislative powers between the federal and the provincial governments through "Federal and Concurrent Lists" attached to the Constitution as appendices. The Federal list depicts the areas and subjects on which the Federal government has exclusive powers. The second, concurrent list contains areas and subjects on which both Federal and Provincial governments can enact laws. The Ministry of Climate Change is responsible for environmental issues at federal level. The NCS unit within the Ministry ensures implementation of the National Conservation Strategy.

3.3 Laws, Regulations and Guidelines

3.3.1 Pakistan Environmental Protection Ordinance, (PEPO) 1983

The Pakistan Environmental Protection Ordinance (PEPO) 1983 was the first piece of legislation specifically established to tackle the issue of environment. This Ordinance provided for the establishment of a Council to frame policies on standards for the environment, and the establishment of an agency to implement the policies and enforce the standards.

As a result the Federal Government of Pakistan established the Pakistan Environmental Protection Council and the Pakistan Federal Environmental Protection Agency (FEPA). The Ordinance permitted FEPA to delegate powers to any Government agency and it is understood that under this power the NWFP, EPA and Punjab EPA were set-up in 1989. One particular task of the FEPA was to set National Policy and Standards. Under the provisions of PEPO 1983, the FEPA established the National Environmental Quality Standards (NEQS) that were gazetted as Statutory Notification in 1993. These standards are applicable to all development projects through all phases of pre-construction, construction and operation. NEQS have been issued for liquid effluents and for industrial gaseous emissions and also for municipal effluents, motor vehicle exhausts and noise emissions. Pakistan Environmental Protection Act was introduced in December 1997 to provide for protection, conservation, rehabilitation and improvement of the environment, for prevention and control of pollution and for sustainability of all development activities. The Act

includes the following additional clauses that are pertinent to establishment of Proposed Project:

- ❑ S.R.O. 339 (1)/2001 – In exercise of the powers referred in Section 33 of the PEPA 1997 (XXXIV of 1997), Pak – EPA has, with the approval of the Federal Government introduced “Pak-EPA (Review of IEE and EIA) Regulations, 2000.
- ❑ Clause 14 – “Handling of Hazardous Waste” requires anyone who generates, collects, consigns, transports, treats, disposes of stores, handles or impacts any hazardous waste has to have a permit to do so from FEPA.
- ❑ Clause 16 – “Environmental Protection Order” permits FEPA to enforce protection measures and remediation where contamination of the environment has taken place. Where an order is not carried out, FEPA has the authority to carry out the required works and to recover the costs from the person responsible for the source of environmental contamination.
- ❑ Clause 18 – “Offences by Bodies Corporate” identifies individual responsibility and liability to prosecution where contravention of an Ordinance is committed by a body corporate.
- ❑ Clause 30 – “Ordinance to over-ride other laws”, takes precedence over other laws in effect at the time.

3.3.2 Pakistan Environmental Protection Act, 1997

Pakistan Environmental Protection Act, 1997 is the basic law that empowers the Government of Pakistan to develop policies and guidelines for the protection of natural environment. Details of the laws applicable are described below:

The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste. Some portions from the Act are reproduced below for reference purposes.

- ❑ Section-11 (1): "Subject to the provisions of this Act and the rules and regulations made there under no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollution or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards."
- ❑ Section-12 (1): "No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination (IEE) or, where the project is likely to cause an adverse

environmental effect, an Environmental Impact Assessment (EIA), and has obtained from the Federal Agency approval in respect thereof".

- Section-14: "Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party".

3.3.3 Environmental Guidelines of the Pakistan EPA

Sets of environmental guidelines to facilitate environmental assessment studies have been developed under the statutory cover of the Pakistan Environmental Protection Act, 1997. The following guidelines have been developed through a consultative process:

- Guidelines for the preparation and review of environmental reports
- Guidelines for Public Consultations
- Guidelines for sensitive and critical areas
- Sectoral Guidelines

3.3.4 The Punjab Environmental Protection Act, 1997 (Amended 2012)

12. Initial Environmental Examination and Environmental Impact Assessment

(1) No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof.

(2) The Provincial Agency shall— (a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or (b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to—(i) trade, manufacturing or business activities,

processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director-General of the Provincial Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or (ii) international relations, Punjab security or maintenance of law and order, except with the consent of the Government; or (iii) matters covered by legal professional privilege.

(4) The Provincial Agency shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

(5) Subject to sub-section (4) the Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Provincial Agency shall maintain separate Registers for initial environmental examination and environmental impact assessment project, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

3.3.5 Pakistan Environmental Protection Agency Review of IEE and EIA Regulation, 2000

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations provide the necessary details on preparation, submission and review of the IEE and EIA.

Categorization of projects for IEE and EIA is one of the main components of the Regulations. Projects have been classified on the basis of expected degree of adverse environmental impacts. Project types listed in Schedule-II are designated as

potentially less adverse effects. Schedule-I projects require an IEE to be conducted, rather than a full-fledged EIA, provided they are not located in environmentally sensitive areas. Salient features of the regulations relevant to the proposed project are listed below:

- ❑ Categories of projects requiring IEE and EIA are issued through two schedules attached with the Regulations. Oil and gas extraction projects including exploration, production, gathering systems, separation, and storage are included in an IEE category.
- ❑ The IEE/ EIA must be prepared, to the extent practicable, in accordance with the Pak-EPA environmental Guidelines discussed in the sections to follow.
- ❑ A fee, depending on the cost of the project has been imposed for review of the IEE and EIA.
- ❑ The submittal is to be accompanied by an application in prescribed format included as Schedule-IV of the Regulations.
- ❑ The EPA is bound to conduct a scrutiny and reply within 10-days of submittal of report (a) confirming completeness (b) asking for additional information, or (c) requiring additional studies.
- ❑ The EPA is required to make every effort to complete the review process for the IEE within 45-days, and of the EIA within 90-days, of issue of confirmation of completeness.
- ❑ When EPA accords their approval subject to certain conditions, the following procedure will be followed:
 - Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions
 - Before commencing operation of the project, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE/ EIA.
- ❑ There is a requirement for an EMP to be submitted with the request for obtaining confirmation of compliance.
- ❑ The EPA is required to issue confirmation of compliance within 15-days of receipt of request and complete documentation.
- ❑ The IEE/ EIA approval will be valid for three years from date of accord.

The regulations of monitoring report are required to be submitted to the EPA after the completion of construction followed by annual monitoring reports during operations.

3.3.6 National Environmental Quality Standards (NEQS)

The National Environmental Quality Standards (NEQS) developed under the Pakistan Environmental Protection Act 1997 establishes the following discharge concentration standards:

- ❑ Maximum allowable concentration of the Pollutants, (32 parameters) in emission and liquid industrial effluents discharged to inland waters, sewerage treatment and the sea
- ❑ Maximum allowable concentration of pollutants (16 parameters) in gaseous emission
- ❑ Maximum allowable exhaust emissions and noise emission from vehicles.
- ❑ Maximum allowable noise level from vehicles
- ❑ Maximum allowable limits for Drinking Water
- ❑ Maximum allowable limits for Ambient Air Quality

3.3.7 National Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2001

Under these rules, industrial units are responsible for self-monitoring and reporting environmental monitoring data to Federal EPA. Some of the pertinent sections of these rules are reproduced as below:

Para (3): "Responsibility for reporting. - All industrial units shall be responsible for correct and timely submission of Environmental Monitoring Reports to the Federal Agency".

Para (4): "Classification of industrial units. - On the basis of the pollution level of an industrial unit, the Director-General shall classify the unit into category "A", "B" or "C" for liquid effluents, and category "A" or "B" for gaseous emissions:

Provided that till such time as the pollution level of an industrial unit is determined, it shall be classified according to the type of industry to which it belongs, as shown in Schedule I for liquid effluents and in Schedule II for gaseous emissions".

Para (5): "Category-A industrial units. -

1. An industrial unit in category "A" shall submit Environmental Monitoring Reports on monthly basis-

(a) In respect of liquid effluents, for priority parameters listed in column 3 of Table A of Schedule III:

Provided that during start-up or upset conditions, priority parameters mentioned in column 4 of Table-A of Schedule III shall be recorded on hourly basis;

(b) In respect of gaseous emissions, for priority parameters listed in Table B of Schedule III.

2. An industrial unit in category "A" shall maintain a record of the times during which start-up and upset conditions occur, and shall mention the total time elapsed in such conditions in its monthly "Environmental Monitoring Report".

Para (6): "Category-B industrial units- An industrial unit in category "B" shall submit Environmental Monitoring Reports on quarterly basis-

(a) In respect of liquid effluents, for priority parameters listed in Table A of Schedule IV;

(b) In respect of gaseous emissions, for priority parameters listed in Table B of Schedule IV".

Para (7): "Category "C" industrial units. - An industrial unit in category "C" shall submit Environmental Monitoring Reports on biannual basis for priority parameters in respect of liquid effluents listed in Schedule V".

Para (8): "Monitoring conditions of EIA approval. - The provisions of these rules shall be in addition to, and not in derogation of, the monitoring conditions laid down in an EIA approval".

3.3.8 Safety Regulations

- Following laws and regulations directly or indirectly govern the occupational health and safety issues during the currently studied production activities:
- Factories Act, 1934
- PEPA Laws, 2000
- Labor Laws
- Electricity Rules, 1937
- Nuclear Safety & Radiation Act, 1990.

3.3.9 Other Regulations

- The Forest Act, 1927

- ❑ Rules for Prohibition and Regulation of Fishing Burbooster, Labeo Rohita, Catlacatla, Cirrhina, and Mirgala less than 10 inches in length. (No. 2989/54-6541-D (f), 1954)
- ❑ West Pakistan Land Reform Rules, 1959
- ❑ West Pakistan Land Reforms Regulation, 1959, MLR No. 64
- ❑ West Pakistan Wildlife Protection Ordinance, 1959
- ❑ Wildlife Protection Rules, 1960
- ❑ The Land Acquisition Act, 1984
- ❑ Wild Birds and Animals Protection Act, 1992

3.4 Environmental Guidelines of UNEP and the World Bank

Some of the environmental guidelines of UNEP and the World Bank are as follows:

- ❑ Environmental Impact Assessment Training Resource Manual, Draft 1996, UNEP
- ❑ Pollution Prevention and Abatement Handbook 1998: Towards Cleaner Production (WB/UNIDO/UNEP, 1999)
- ❑ Environmental Assessment Sourcebook, Volume-I: Policies, Procedures and Cross-Sectoral Issues (WB, 1991a)
- ❑ Environmental Assessment of Energy and Industry Projects (WB, 1991a)

3.5 International Treaties and Obligations

Pakistan is a signatory to various international treaties and conventions on the conservation of the environment and wildlife protection. Some of these treaties and conventions are as follows:

- ❑ UN Convention on Biological Diversity, Rio-de-Janeiro (1992)
- ❑ Convention of the Conservation of Migratory Species of Wildlife Animals (1979)
- ❑ International Plant Protection Convention (1952)

3.6 Environmental Assessment Process

The environmental assessment process is governed by the following documents:

- ❑ The Pakistan Environmental Protection Act, 1997
- ❑ Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000.
- ❑ Pakistan Environmental Protection Agency Guidelines for the preparation and review of environmental reports.

Submission of environmental assessment study report to obtain No-Objection-Certificate (NOC) was made mandatory by the Pakistan Environmental Protection ordinance (1983) and the Pakistan Environmental Protection Act (1997). Section 12(1) of the Pakistan Environmental Protection Act (1997) stipulates that no project involving construction or any change in the physical environment can be undertaken unless an IEE or an EIA is conducted, and approval (NOC) is received from the relevant provincial Environmental Protection Agency.

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulation (2000) categorize projects into various schedules based on the anticipated environmental hazards. Projects with fewer environmental hazards are listed in Schedule-I and are required to carryout an Initial Environmental Examination (IEE). Projects with significant environmental hazards are grouped as Schedule-II. Projects listed in Schedule-II require that a detailed Environmental Impact Assessment (EIA) is carried out. Projects listed under Schedule-I will require a detailed EIA if the project is to be located in a sensitive area.

3.7 Cutting of Trees Act, 1992

The Cutting of Trees Act mandates that no person shall, without prior written approval from authorized officer shall cut, fell or damage trees growing in:

- ❑ First Zone (Area adjacent to and beyond the external frontier of Pakistan to a line at four kilometers measured from the external frontiers of Pakistan) if the number of remaining trees in any field falls short of the number to be calculated at the rate of fifteen trees per acre.
- ❑ Second Zone (Area adjacent to and beyond the first zone extending towards Pakistan to a line of four kilometers measured from the first zone) if the number of remaining trees in any field falls short of the number to be calculated at the rate off ten trees per acre.

3.8 Legal Requirement

Pakistan Environment Protection Agency (Review of IEE & EIA) Regulation 2000, Schedule-II clearly states the list of project requiring EIA. The proposed project of Extension of Light Soda Ash Plant of ICI Pakistan Limited at Khewra (District Jehlum) falls under Schedule-II (EIA) in Category J.

Chapter - 4

PROJECT DESCRIPTION

Chapter – 4

PROJECT DESCRIPTION

The proposed project is described below, with particular emphasis on aspects related to the environment.

4.1 Type and Category of Proposed Project

Environment Protection Agency, Punjab (Review of IEE & EIA) Regulation 2000, Schedule-II clearly states the list of project requiring EIA. The proposed project of extension of Light Soda Ash Plant by ICI Soda Ash Works Khewra (District Jehlum) falls under Schedule-II (EIA) category J.

4.2 Project Objectives

Responding to the national priorities and local demands, ICI Pakistan Soda Ash Business has proposed the expansion of Light Soda Ash Plant by 200,000 tons per annum thereby increasing the nameplate capacity of Light Ash plant to 550,000 tons per annum in order to fulfill the following objectives;

- To defend market share opposite an ambitious competitor & realize efficiencies of scale
- To Remain competitive
- To maintain status as preferred supplier
- To become fully self sufficient to meet customer needs
- To maintain & increase presence in regional markets
- To create new employment opportunities as a part of the project activities scope

The site development activities will include design, construction, installation/erection of plant and machinery and associated activities of manufacturing and production.

4.3 Alternatives Considered Realistically

The proposed project is extension of a Manufacturing Plant in order to enhance the production of Light Soda Ash. The proposed project site is within the existing premises of ICI Pakistan Soda Ash Works Khewra, district Jhelum. The project site or its surrounding area is neither residential nor protected or environmentally sensitive, therefore no site alternatives are considered.

4.4 Site Identification of the Proposed Project

The proposed project site is within the existing premises of ICI Pakistan Soda Ash Works Khewra, district Jhelum Punjab. The main drainage of the region is in the South direction that is prominently shown by the river Jhelum and a drain at the back of ICI, commonly known as Khewra Gorge. This is a natural drain for rain water coming from the northern mountains.

The nearby locations are as follows;

East Side: Sadowal, Bhelowal

West Side: Rajput Colony, New Modern Colony, Jootani, Sardi Mohalla

North Side: Dandot Cement Factory, Khewra Railway Station, PMDC

South Side: Pind Dadan Khan, Bhelowal

Further details regarding nearby locations are given in **Annex-V** and layout map of the proposed project is given in **Annex-T**.

4.5 Project Components

The proposed project includes the following essential components:

4.5.1 Pre-Construction Phase

- Leveling of ground surface

4.5.2 Construction Phase

- External Development, Land scaping, pavement.

4.5.3 Post-Construction Phase

- Maintenance of essential services and supplies.
- Environmental management including waste collection and disposal, janitorial services, horticulture and beautification.
- Periodic as well as annual repair and maintenance of civil structures, machinery and equipment.
- Shifting and relocation of electricity, telephone and gas line if required.

4.6 Project Description

ICI Pakistan Soda Ash Works is located at Khewra, district Jhelum. This plant was initially commissioned with a production capacity of 18 KTPA. Since then, the plant has undergone a number of Capacity Expansions / Debottlenecking and the “Nameplate” capacity after the last expansion project completed in 2009 has been increased to 350 KTPA.

A step in the form of further expansion is the proposed capacity enhancement of Light Ash plant by 200,000 tons per annum thereby increasing the nameplate capacity of Light Ash plant to 550,000 tons per annum. Hardware additions / changes shall be required throughout the different stages of process.

The Khewra plant produces two different grades of Soda Ash. One is known as Light Ash whereas the other is known as Dense Ash. They differ only in particle sizes and density. Dense Ash is in fact made from Light Ash and is chemically identical to Light Ash, but has a density twice as much.

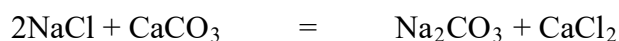
4.6.1 Solvay's Ammonia Soda Process

The process used in the manufacture of Soda Ash is called the Solvay's Ammonia Soda Process.

a) Raw materials

The major raw materials used are salt, limestone, coke and ammonia.

In essence the reaction is represented as follows:



The above reaction, however, does not take place under ordinary conditions. Ammonia gas has to be introduced as a cyclic carbonating agent, which reacts with carbon dioxide to form carbonates and then delivers the carbonate radical to the sodium radical to produce sodium bicarbonate. Sodium carbonate commercially known as soda ash is produced as a result of thermal decomposition of sodium bicarbonate by the calcination process. A part of the soda ash produced is diverted for production of dense ash and refined sodium bicarbonate.

Raw Material / Utilities Consumption

- Rock Salt = 1.60 – 1.70 TPTA
- Ammonia = 4 – 5 Kg PTA
- Limestone = 1.28 – 1.32 TPTA
- Coke = 0.096 – 0.100 TPTA
- Energy = 14.5 – 15.5 MMBTU PTA
- Water = 11 -12 m³ PTA
- Power = 300 – 350 kW PTA
- Steam = 4.5 – 4.8 TPTA

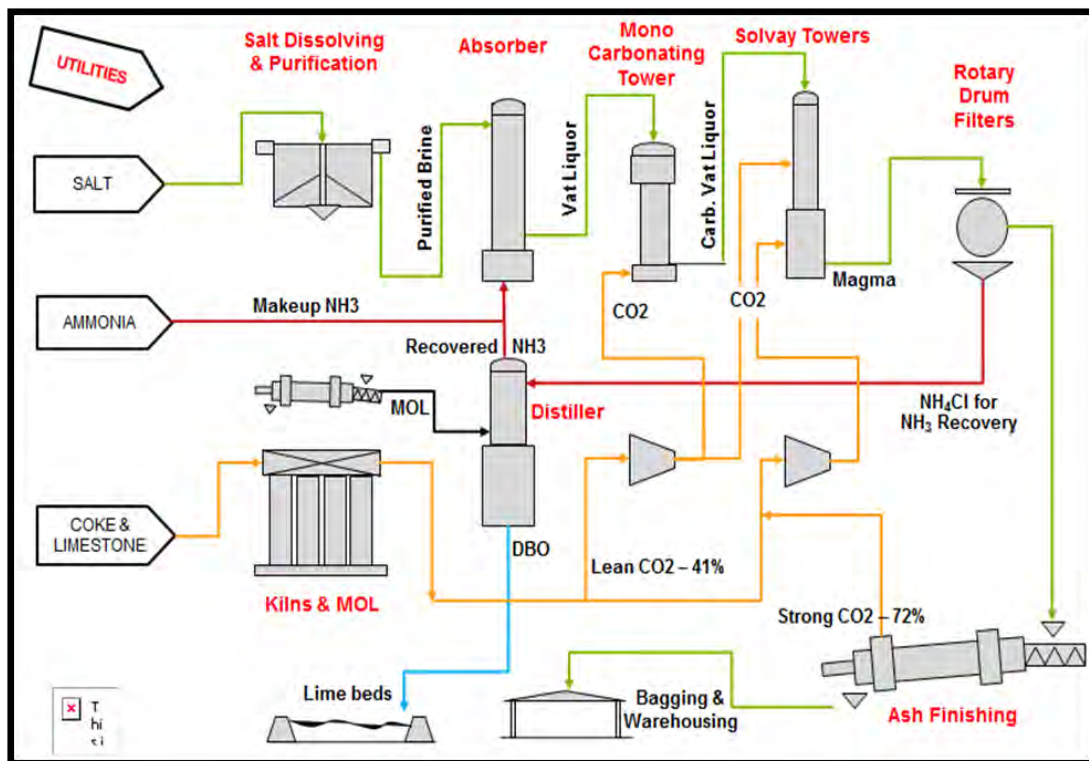


Figure 4.1 Process Block Diagram for the Manufacture of Soda Ash by the Solvay Process

b) Equipment/Machinery Details and Specifications

The main equipment for the project will include the following:

Complete A Building; including 2 Absorbers, 3 Distillers, 2 Mono Carbonating towers, 1 Process Condensate Distiller, 10 Carbonating Towers, 2 Caisee Coolers	2 Calciners (Including all its accessories)
Calciner Gas Cooling and Scrubbing System	Bottom Entry Compressor and its building
Cooling Towers and Process Chiller	Liquor Tank Farm Area
Liquor Pump House	Lower Magma Stock Tank and Magma Pumps
Tower Liquor Circulation Tank and Pumps	Sodium Sulfide and Ammonium Sulfate System
1 Kiln	Kiln gas washers
Burnt Stone Elevators	Lime Bunker
2 Rotary Dissolvers	MOL Stock Tanks and MOL Pumps
Hot Water Tank	Coke Yard and Coke Crusher Area
Top entry compressor and its building	New flat salt dissolving basins, pump house, settlers, ramp etc.
Instrument air compressors	New RO plant & pumping and storage capacity enhancement at Bela for Jhelum River Water supply to plant site to meet additional 4800 m ³ /day JRW requirement post 200 KTPA LA expansion project
New Ash warehouse	Small stacking area for Limestone and Coke
Submersible Water pumps & Storage Tank	Water transfer pumps for Kiln & rotary dissolver

4.6.2 Land use on the site

The project site is located within the premises of ICI Soda Ash Business and is surrounded by residential and commercial areas including New Modern Colony, ICI Officers Colony and ICI Factory Colony etc. No agricultural activity has been observed at the project site.

4.6.3 Road Access

The project site is located at Khewra in the northern part of Punjab at the foot hills of the salt range. It is accessible via road from Islamabad in the north and Lahore in the south. A rail road track also passes through Khewra.

4.6.4 Vegetation features of the Site

The site for proposed project is located in an mineral-rich mountain system and different vegetation species that are found in the vicinity of project area includes the big trees, middle size trees, ground covers, shrubs, bushes, seasonal plants and climbers including Kandiyari, Akash Bel, Peeli Booti, Datura and Dahlia etc.

4.6.5 Proposed Project Area of land

The covered area of the Proposed Light Soda Ash Plant will be Around 50,000 - 60,000 Square meters.

Project	Total Area (Sq. m)	Structured Area (Sq. m)
200 KTPA Light Ash Expansion	Around 50,000 - 60,000	Around 20,000

4.6.6 Cost of the Proposed Project

The total estimated cost of the Proposed Project is 90.4 million USD.

4.6.7 Schedule of Implementation

The proposed project of extending Light Ash Plant will be completed in 4 years.

4.6.8 Human Resource Requirement

The estimated labor required during construction phase will be 600 persons while during operational phase the plant will employ 60 persons.

4.6.9 Water requirement

a. ICI Soda Ash fulfills its water requirements through following sources;

1-Watli Water

Distance from works =15 Km approx.

Pipe dia=6 Inch

Flow =1200 –1500 m³/day

2-Jhelum River Water (Bela)

Distance =10 km approx.

Pipe dia =10 inch X 3 Lines & 16 inch X 1 line

Flow =9800 m³ /day in total from 4 lines

3-Submecible water

No of Bores =8

Operational =5

Flow =80—100 m³/hr

Depth of bore =150-200 ft. approx.

b. Drinking water supply for community

About 40000 gallon /day will be provided through water taps installed around company boundary walls around community and people collect from these taps.

4.6.10 Energy requirements

ICI is self-sufficient in power generation however WAPDA is available as backup in case of turbines outage. Furthermore, power to off-sites like Bela is supplied from WAPDA. The estimated electricity consumption during construction phase will be 150 - 200 KW while during operational phase plant will consume 4.0 - 4.5 MW of electricity.

Chapter - 5

DESCRIPTION OF ENVIRONMENT

Chapter - 5

DESCRIPTION OF ENVIRONMENT

Data used to compile this section was obtained from two main sources: published literature and field survey. Published literature was reviewed to collect available environmental information on the project site including climate, ecological, biological, socioeconomic, cultural conditions and land use. Field survey was also conducted to collect primary data for this study. A team consisting of an environmentalist, a sociologist and a biologist visited the project area.

In order to evaluate the current status of the area, the team studied ecological, biological, economic and cultural characteristics.

5.1 Physical Environment

Pakistan can be divided into five broad physiographical regions. These are the mountainous regions of the north, the western highlands and plateaus, the sub-mountainous Indus region, the Pothwar Plateau, Salt Range, and the Indus Plain.

Brief descriptions of these regions are presented in **Exhibit 3.1**.

Exhibit 5.1: Physiographical Regions of Pakistan

Region	Characteristics	Location	Height
Northern Mountainous	Hindu Kush, Karakoram and Himalayan Mountain Ranges	Northern Part of KPK, Gilgit Agency, Northern Areas and Kashmir	Rises above 8,000-m
Western Highlands and Plateaus	Toba Kakar, Sulaiman, Central Baruhi, Saihan, Central Makran, Makran Coastal and Kirthar Ranges	Mainly in Baluchistan, also parts of Sindh and KPK	Between 1,200 to 3,000 m
Sub-Montane Indus	Alluvium filled Basins	Plains of Peshawar, Kohat and Bannu	Less than 1,000 m
Potwar Plateau and Salt Range	Flat to gently undulating surface, broken by gullies,	Mainly northern parts of Punjab, some parts of KPK	Less than 1,000 m

	accelerated erosion, "bad land" topography		
Indus Plain	Flood plains of the Indus, Jhelum, Chenab, Ravi and Sutlej Rivers	Punjab and Sindh	Less than 1,000 m

5.2 Profile- Jhelum City

Jhelum District is in the Punjab province of Pakistan. Jhelum is one of the oldest districts of Punjab. It was established on 23 March 1849. According to the 1998 census, the district had a population of 936,957, of which 31.48% were urban. Jhelum District has a diverse population of 1,103,000 (2006) which mainly consists of Punjabis. Jhelum is known for providing a large number of soldiers to the British and later to the Pakistan armed forces due to which it is also known as city of soldiers or land of martyrs and warriors. The district of Jhelum stretches from the river Jhelum almost to the Indus. Salt is quarried at the Mayo mine in the Salt Range. There are two coal-mines, the only ones worked in the province, from which the North-Western railway obtains part of its supply of coal. The chief centre of the salt trade is Pind Dadan Khan. The district is crossed by the main line of the North-Western railway, and also traversed along the south by a branch line. Jhelum District has a diverse population of 1,103,000 (2006) which mainly consists of Punjabis. According to Punjab Education Department's annual literacy statistics for 2006, Jhelum had a literacy rate of 79% which is highest in Pakistan. The district of Jhelum, which covers an area of 3,587 km², is administratively divided into four tehsils: Jhelum, Sohawa, Pind Dadan Khan and Dina.

5.2.1 Khewra:

The Khewra Salt Mine (or Mayo Salt Mine) is located in Khewra, north of Pind Dadan Khan, an administrative subdivision of Jhelum District, Punjab, Pakistan. It is Pakistan's largest and oldest salt mine and the world's second largest. It is a major tourist attraction. Khewra Salt Mine is situated in Pind Dadan Khan Tehsil of Jhelum District. Located about 200 km (125 miles) from Islamabad and Lahore, it is accessed via the M2 motorway, about 30 kilometers (20 miles) off the Lilla interchange while going towards Pind Dadan Khan on the Lilla road. The mine is in mountains that are part of a salt range, a mineral-rich mountain system extending about 200 km from the Jhelum River south of

Pothohar Plateau to where the Jhelum River joins the Indus River. Estimation of the total reserves of salt in the mines ranges from 82 million tons to 600 million tons. In raw form it contains negligible amounts of Calcium, Magnesium, Potassium, Sulfates and moisture, with Iron, Zinc, Copper, Manganese, Chromium and Lead as trace elements. Salt from Khewra, also known as Himalayan salt, is red, pink, off-white or transparent. In the early years of British rule, the Khewra mine produced about 28,000 to 30,000 tons per annum; it increased to about 187,400 tons per annum for the five fiscal years ending 1946–7 and to 136,824 tons for the two years ending 1949–50 with the systematic working introduced by Dr H. Warth. The mine's output was reported in 2003 to be 385,000 tons of salt per annum, which amounts to almost half of Pakistan's total production of rock salt. At that rate of output, the tunnel would be expected to last for another 350 years. Khewra Salt Mine is a major tourist attraction, with around 250,000 visitors a year, earning it considerable revenue.

5.3 Physical Environment of Jhelum District

5.3.1 Location

Jhelum city is located at right bank of river Jhelum at N-5 highway previously called G-T road (Rawalpindi – Lahore section). It has got a distance of 165 km from Lahore and 115 km from Rawalpindi. This is an ancient city and is a district head quarter.

5.3.2 Topography:

The Salt Range as a whole, in which the Khewra Gorge is cut, is a flat-topped interlude between the majestic Himalayas in the north and the immense massive Indian Shield in the south. The Salt Range covers a distance of 200 Km with persistent East-West strike; the only exception being its abrupt swing in the west where Indus separates it from the Trans Indus Ranges.

5.3.3 Geography

It is located in the north of the Punjab province, Jhelum district is bordered by Sargodha to its south, Gujrat and the Jhelum River to its south and east, Chakwal to its west, Mirpur to its east, and Rawalpindi to its north.

5.3.4 Drainage Feature

The main drainage of the region is in the South direction that is prominently shown by the river Jhelum and a drain at the back of ICI, commonly known as Gorge. Notably, the

trend of surface water flow during the rainy season is in the same direction. During monsoon season the excessive rainfall undertake the regional trend of drainage, converging on to the region.

5.3.5 Climate

Most of the rain falls in July, August and September during summer months and January, February and March during the winter months. The average annual rainfall in the area is approximately 647 mm. The summer season starts from the month of April and continues till October. May & June are the hottest months with day temperatures usually ranging from 40°C to 49°C. The winter season begins from the month of November and continues till March. January is the coldest month with the mean minimum temperature of 1° C.

The climate is dry with temperature reaching to mean maximum 41°C and extreme maximum 49°C and down to mean minimum 5 °C and extreme minimum 1°C. January is the coldest month, while June is the hottest month. June Monsoon sets in with intermittent torrential rains. The area is not located within any prominent seismic zone, but occasional tremors have been experienced in the past. Various meteorologists have developed classification schemes to describe the local climatic features of Pakistan. Classification based on these schemes is described below. The air quality in the project area has been duly monitored and reported.

5.3.6 Description of Seasons

- ❑ Winters (October to February) are moderate to extreme and dry;
- ❑ Spring (March to April) is pleasant with moderately cold;
- ❑ Summer (May to September) is very hot to humid;
- ❑ Monsoons (June to August) are wet. Although the temperatures are milder but due to appreciable humidity the heat is oppressive; and
- ❑ Post-Monsoon summer (September to October) is moderate and slightly humid.

5.3.7 Temperature

The temperature data was obtained from Meteorological department. Temperature data for this region is shown below in Table 5.1 & 5.2

Table 5.1: Annual Temperature Mean (Max) for the last twelve years (°C)

Years	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
2007	22.0	26.0	35.0	41.0	45.0	45.0	42.0	41.0	36.5	35.0	29.0	25.5
2008	23.0	29.0	35.0	40.0	44.0	49.0	41.0	40.0	38.0	35.0	30.0	27.0
2009	21.0	26.0	37.0	42.0	44.5	43.5	40.0	38.5	40.0	35.0	29.0	28.5
2010	23.0	26.0	31.0	39.0	41.0	47.0	40.0	38.0	41.3	34.1	28.5	28.5
2011	22.0	24.0	34.0	39.0	40.0	47.0	43.0	36.0	39.0	35.5	28.0	25.4
2012	24.0	27.0	35.0	42.0	44.0	48.0	42.0	41.0	38.0	35.0	31.0	27.5
2013	22.0	30.0	37.0	40.0	44.5	42.5	41.0	36.5	40.0	36.0	29.0	28.0
2014	23.0	25.0	31.0	39.0	42.0	47.0	43.0	36.0	39.0	35.5	28.0	25.4
2015	24.0	27.0	35.0	42.0	43.0	48.0	42.0	41.0	38.0	35.0	31.0	27.5

Table 5.2: Annual Temperature Mean (Min) for the last twelve years (°C)

Years	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
2007	5.0	7.0	13.0	17.5	21.0	25.0	25.4	24.0	22.1	17.2	10.0	5.0
2008	5.1	7.0	13.1	17.5	20.0	25.0	25.1	24.4	22.2	17.7	10.4	5.3
2009	5.2	7.0	13.2	17.5	22.0	25.0	25.5	24.2	22.8	17.5	10.0	5.0
2010	5.3	7.0	13.3	17.5	21.5	25.0	25.2	24.6	22.4	17.6	10.3	5.1
2011	5.4	7.0	13.0	17.5	22.1	25.0	25.7	24.3	22.8	17.3	10.0	5.4
2012	4.8	7.0	13.4	17.5	22.2	25.0	25.3	24.7	22.3	17.5	9.90	5.0
2013	5.0	7.0	13.0	17.5	21.0	25.0	25.5	24.0	22.0	17.5	10.5	5.0
2014	5.4	7.0	13.1	17.5	22.1	25.0	25.7	24.3	22.8	17.3	10.0	5.4
2015	4.8	7.0	13.3	17.5	22.2	25.0	25.3	24.7	22.3	17.5	9.90	5.0

5.3.8 Rainfall and Hydrology

In order to predict the fate of the leachate that leaves a landfill site and its potential for contaminating groundwater, an understanding of the flow of water through subsurface materials is necessary. Much of the information about the hydrological conditions is obtained from soil borings and wells installed at the site.

Groundwater is the subsurface water that resides in the zone of saturation. In the zone of saturation, the voids (pores) between the soil particles are filled with water. The water

table is the upper boundary of this zone of saturation. The water table is also defined as the surface at which the fluid pressure in the pores is equal to the atmosphere pressure. Above the water table is the zone of the aeration, or unsaturated zone.

The water table surface in a humid climate tends to follow the topography of the land surface, provided that the aquifer is unconfined. A sloping water table implies that ground water is flowing from a point of higher elevation to one of the lower elevation. The water table intersects the land surface where there is surface water.

When the aquifer is confined by an overlaying impermeable layer, the water will be under pressure and will rise in a well that is cased to the aquifer. The area has set of confined and unconfined aquifers. The water is drawn through tube wells with varying depth of 250-400 ft. ICI Soda Ash is drawing water from Tube wells (250-350). The results of the water drawn through them are given and discussed in this report. The general water quality is saline. The rainfall data for the region is shown in **Table 5.3**.

Table 5.3: Mean Rainfall in the Region (mm)

Years	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
2007	30	50	55	30	25	53	250	230	73	15	10	20
2008	30	54	55	30	24	50	250	231	70	15	11	20
2009	28	45	53	33	23	51	245	233	66	16	9	18
2010	31	54	57	32	26	58	260	235	72	19	12	26
2011	28	45	51	31	23	51	245	233	69	14	9	17
2012	30	51	55	30	23	50	250	230	70	15	10	20
2013	31	42	56	31	27	47	243	228	72	17	11	21
2014	28	45	51	32	23	51	241	229	69	15	9	18
2015	30	51	53	30	24	49	248	230	71	16	10	20

5.3.9 Meteorological Data

Atmosphere 0.1 Mpa (A)

Elevation above Sea Level (810 ft.)

Air Temperature

Maximum 44 °C

Minimum	4.8 °C
Yearly average	26.3 °C
Humidity	
Maximum relative humidity	72%
Minimum relative humidity	34%
Yearly average relative humidity	38.5%
Precipitation (Snow and rain)	
Average precipitation	50.4 mm/year (Avg. of 2002-2013)
Maximum precipitation	882 mm/year in 2010
Maximum snow days	Zero days
Design rainfall intensity for 1 hour	50 mm
Maximum frost days	Zero days
Maximum snow fall weight	Zero kg/m ²
Wind	
Maximum wind velocity	120 km/hr
Strong wind speed	45 knots over 15 days/annum
Maximum gust speed	70 knots
Prevailing wind direction	south East
Seismic Zone	2A

5.3.10 Water Resources

Jhelum River flows in India and Pakistan. It is the largest and most western of the five rivers of Punjab, and passes through Jhelum District. It is a tributary of the Chenab River and has a total length of about 725 kilometers. The drinking water resources in the area are scarce. The water is mostly saline in nature due to the existence of the salt range. The water is generally supplied by the Khewra municipality.

ICI Soda Ash has installed water taps for the local community in order to assist them with the access to the sweet drinkable water from Jhelum River from the pipe line installed by ICI Soda Ash. The drain near Khewra is gorge. This is a natural drain for rain water coming from the northern mountains. It normally remains dry. Only a small stream of in filter gallery brine flows through it. It is collected by ICI and used for salt dissolving.

Ground Water

Underground water is the basic source of water, which exists near the banks of River Jhelum and being used for supplying of potable water to the area, is pumped out by shallow tube-wells. Underground water resources are not adequate. The sub-soil water at these places is suitable for industrial purposes. Most of the other parts of district are deficient in underground water resources. Ground water is available about 300 ft. deep. Table 5.6 shows the results of ground water analysis.

Surface Water

The area has no appropriate surface water available for drinking purposes. Surface water is mostly saline in nature due to the existence of the salt range. River Jhelum passes through Jhelum district is the main source of surface water. Table 5.7 shows the results of surface water quality.

5.3.11 Waste Water

Below table represents laboratory test results in comparison to NEQS. The sample of waste water was collected from Rohi Nullah near the project site.

Table 5.6 Summary of Parameters for Ground Water Quality

Sr. No.	Parameters	Units	NEQS	Concentration	Method
1.	pH Value	....	6.5- 8.5	7.28	pH meter
2.	Chloride	mg/l	<250	64.0	Digital Titration
3.	TDS	mg/l	<1000	570.0	Evaporation
4.	Sulphide	mg/l	.....	BDL	Spectrophotometer
5.	Sodium	mg/l	.....	62.1	Flame photometer
6.	Potassium	mg//	.....	2.7	Flame photometer
7.	Copper	mg/l	2.0	0.07	AAS
8.	Lead	mg/l	≤0.05	BDL	AAS
9.	Nitrate	mg/l	≤50	7.6	Spectrophotometer
10.	Nitrite	mg/l	≤3	0.005	Spectrophotometer
11.	Boron	mg/l	0.3	0.2	Spectrophotometer
12.	Barium	mg/l	0.7	BDL	AAS
13.	Flouride	mg/l	≤1.5	0.24	Spectrophotometer
14.	Total coliforms	Cfu/100ml	0	Nill	Culture
15.	E-Coli	Cfu/100ml	0	Nill	Culture
16.	Turbidity	NTU	<5	BDL	Turbidity meter
17.	Arsenic	mg/l	≤0.05	BDL	AAS

Table 5.7 Summary of Parameters for Waste Water Quality

Sr. No.	Parameters	Units	NEQS	WW
1.	pH Value	...	6-9	7.14
2.	TDS	mg/l	3500.0	260.0
3.	TSS	mg/l	200.0	120.0
4.	BOD ₅	mg/l	80.0	8.0
5.	COD	mg/l	150.0	21.0
6.	Chloride	mg/l	1000.0	24.0
7.	Grease & Oil	mg/l	10.0	0.0
8.	Phenolic Compound	mg/l	0.1	BDL
9.	Sulphate	mg/l	600.0	24.0
10.	Cyanide	mg/l	1.0	0.005
11.	An-ionic Detergents	mg/l	20.0	BDL
12.	Sulphide	mg/l	1.0	0.012
13.	Fluoride	mg/l	10.0	0.34
14.	Ammonia	mg/l	40.0	0.2
15.	Cadmium	mg/l	0.1	BDL
16.	Chromium	mg/l	1.0	0.004
17.	Copper	mg/l	1.0	0.008
18.	Lead	mg/l	0.5	BDL
19.	Nickel	mg/l	1.0	BDL
20.	Silver	mg/l	1.0	BDL
21.	Selenium	mg/l	0.5	BDL
22.	Mercury	mg/l	0.001	BDL
23.	Total Toxic Metal	mg/l	2.0	0.012
24.	Zinc	mg/l	5.0	0.34
25.	Arsenic	mg/l	1.0	0.02
26.	Barium	mg/l	1.5	BDL
27.	Iron	mg/l	8.0	0.14
28.	Manganese	mg/l	1.5	0.005
29.	Boron	mg/l	6.0	0.8
30.	Chlorine Total	mg/l	1.0	0.04

5.3.12 Ambient Air Quality

Ambient Air Quality affects everyone everywhere. Whether it is agricultural dust, pollution from vehicles, or smog from major industry, ambient air can have major effects on the health of individuals. Ambient air quality was also monitored by taking different sites of the proposed project. Table 5.9 shows monitoring results of ambient air quality.

Table 5.8: Summary of Ambient Air Quality Analysis

Sr. No.	Sources	CO	CO2	SO2	NO2	PM10
	Units	ppm	ppm	µg/m3	µg/m3	µg/m3
	NEQS	9		120	80	150
1	Northern Site	BDL	428	13.0	16.0	20
2	Southern Site	BDL	424	28.0	28.0	82
3	Eastern Site	BDL	436	10	12.0	41
4	Western Site	BDL	441	12	26.0	12

Health effects from air pollutants may be experienced soon after exposure or, possibly, years later. Immediate effects may show up after a single exposure or repeated exposure. These include irritation of the eyes, nose & throat, headaches, dizziness, and fatigue. Such immediate effects are usually short term treatable. Sometimes the treatment is simply eliminating the person's exposure to the source of pollution, if it can be identified. Symptoms of some diseases, including asthma, hypersensitivity pneumonitis and humidified fever, may also show up soon after exposure to air pollutants.

The reactions to air pollutants depend on several factors. Age and preexisting medical conditions are two important influences. In other cases, whether a person reacts to a pollutant depends on individual sensitivity, which varies tremendously from person to person. Some people can be very sensitized to biological pollutants after repeated exposures, and some people can be sensitized to chemical pollutants.

5.3.13 Noise

Noise poses quite different problem. Unwanted sound becomes more pervasive and more intense in urban settings, where transport and industrial sources have particularly high nuisance values. Acute exposure to intense noise may temporarily impair hearing, while repeated occupational exposures to high levels can cause permanent deafness. Increased noise levels are also associated with cardio-vascular, endocrine, respiratory, neurological and psychological changes, some of which are indicative of increased stress.

The unit of measurement of sound is decibel and normal human exposure can vary from minimum that the ear can perceive, i.e., 0 dB to the loudest. For comfortable hearing one needs sound at a level of 55 dB and for relaxed conversation a background of 45 dB or less. Acceptable range for noise level is **75 dB (A)**.

Table 5.9: Results Analysis of Noise Monitoring

Sources	Noise Level <i>dB (A)</i>	NEQS
Northern Site	54.6	75dB
Southern Site	54.4	
Eastern Site	55.3	
Western Site	50.0	

5.3.14 Soil

Salt is the predominant feature in Khewra, so it makes the soil saline and not as much suitable for crops and vegetation. There is a long strip of very rich and virgin soil along the Jhelum River.

5.4 BIOLOGICAL ENVIRONMENT

A survey of the local biological environment was conducted which includes the study of flora and fauna of the project area. Around 5,000 trees have been planted in the area in 2014. A further detail regarding this is given below:

5.4.1 Floral Survey

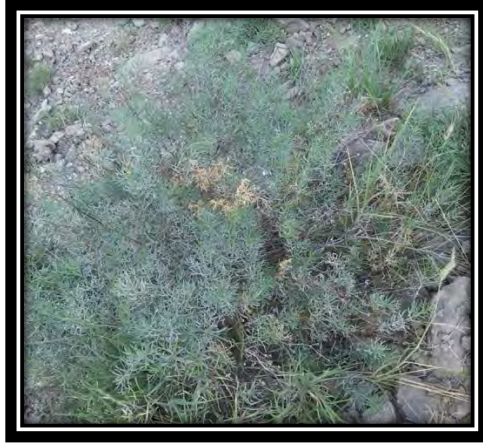
Different species that are found in the vicinity of project area includes the big trees, middle size trees, ground covers, shrubs, bushes, seasonal plants and climbers. The floral survey revealed the common species in the project area are:

Herbs

The floral survey revealed the following types of herbs near the project area:

Sr.No.	Scientific Name	Local Name
1	<i>Althea rosa</i>	Holly hock
2	<i>Aschranthus aspra</i>	Puthkanda
3	<i>Astragalus psilocentros</i>	Tindani
4	<i>Cannabis sativa</i>	Bhang
5	<i>Capsicum annum</i>	Chillies

6	<i>Carthamus oxyacanth</i>	Pohli
7	<i>Chenopodium album</i>	Bathu
8	<i>Cusina minuta</i>	Kandiari
9	<i>Cuscuta reflexa</i>	Akash Bel/ Peeli Booti
10	<i>Datura innoxia</i>	Datura
11	<i>Dhahlia coccina</i>	Dahlia
12	<i>Elytraria acaulis</i>	Pathar Chat
13	<i>Euphorbia hirta</i>	Dodak
14	<i>Fagonis bruguieri</i>	Dhamian
15	<i>Fragis viridis</i>	Wild Strawberry
16	<i>Gladulus spp.</i>	Gladulus
17	<i>Helianthus annus</i>	Sunflower
18	<i>Imparata cylindrical</i>	Kaily
19	<i>Lycopersicum exulentum</i>	Tomato
20	<i>Oputina monocantha</i>	Cactus
21	<i>Oscimum basilicum</i>	Niazbo
22	<i>Paganum harmala</i>	Harmal
23	<i>Petunia hybrida</i>	Petunia
24	<i>Portulaca grandiflora</i>	Portulaca
25	<i>Rhamnus triqueta</i>	Bat Katar
26	<i>Rumex dentatus</i>	Jangli Palak
27	<i>Salivia aegyptica</i>	Tukham Malangan
28	<i>Salsola foetida</i>	Lani
29	<i>Saphora mallis</i>	Khumbi
30	<i>Solanum surrattense</i>	Mahori
31	<i>Zinnia elegans</i>	Zinnia



Paganum harmala (Harmal)



Datura innoxia (Datura)



Salsola foetida (Lani)



Solanum surattense (Mahori)

Shrubs

The floral survey revealed the following types of shrubs near the project area:

Sr. No.	Scientific Name	Local Name
1	<i>Bougainvillea</i>	Buganvilla
2	<i>Cladium bicolor</i>	Cladium
3	<i>Calatropis procera</i>	Aak
4	<i>Calendula officinalis</i>	Calendula
5	<i>Tamarix aphylla</i>	Karir
6	<i>Carya illinoensis</i>	Carya
7	<i>Cestrum diurnum</i>	Din Karaja
8	<i>Cestrum nocturnum</i>	Rat Ki Rani
9	<i>Citrullus colocynthis</i>	Khartuma
10	<i>Citrus grandis</i>	Chakotra
11	<i>Cycas rumphii</i>	Cycus
12	<i>Ficus palmate</i>	Phagwara
13	<i>Ficus racemosa</i>	Gulhar
14	<i>Gardenia florida</i>	Gardenia
15	<i>Hibiscus rosa sinensis</i>	Gurhal
16	<i>Ilex dipyrrena</i>	Chinese shoe flower, Kanderu
17	<i>Jasminum grandiflorum</i>	Chambeli
18	<i>Jasminum samboc</i>	Motia
19	<i>Lagerstroemia floregemia</i>	Lagerstroemia
20	<i>Lantana indica</i>	Lantana
21	<i>Lawsonia inermis</i>	Mehndi
22	<i>Nerium indicum</i>	Kaneer
23	<i>Otostegria limbata</i>	Awani
24	<i>Opuntia sp.</i>	Thohar
25	<i>Panicum antidatale</i>	Bansi
26	<i>Plantago ovata</i>	Ispaghul
27	<i>Plactranthus rugosus</i>	Chicchra
28	<i>Rassinonia aculeate</i>	Rassinonia
29	<i>Rhyza stricta</i>	Virva
30	<i>Rosa indica</i>	Rose
31	<i>Rosa moschata</i>	Jangli Ghulab
32	<i>Sageretia frandrethiand</i>	Koher
33	<i>Sabria azurea</i>	Salvia
34	<i>Tamarix dioca</i>	Lai
35	<i>Thuja orientalis</i>	Mor Pankh
36	<i>Vitis vinifera</i>	Grapes/Angoor/Dakh
37	<i>Withania somnifera</i>	Aksan
38	<i>Zizyphus nummularia</i>	Mallah



Tamarix aphylla (Karir)



Opuntia sp. (Thohar)



Calatropis procera (Aak)

Grasses

The floral survey revealed the following types of grasses near the project area.

Sr.No.	Scientific Name	Local Name
1	<i>Cymbopogon jawarancusa</i>	Khawi
2	<i>Cynadon dactylon</i>	Khabbal grass
3	<i>Dactyloctenium aegyptica</i>	Madhara grass
4	<i>Dendrocalamus strictus</i>	Bamboo
5	<i>Desmortachya bipinnate</i>	Dab
6	<i>Eleusine flagellifera</i>	Chimbar
7	<i>Heteropogon contortus</i>	Surila
8	<i>Saccharum bengalense</i>	Sarkanda



Saccharum bengalense (Sarkandy)

Cynodon dactylon (Khabbal grass)

5.4.2 Fauna in Wild Life (Status of fauna)

Mammals

The fauna survey revealed the following types of mammals near the project area.

Sr. No.	Scientific Name	Local Name	Seen / Reported
1	<i>Bandiota bengalensis</i>	Indian Mole Rat	Seen
2	<i>Canis aurius</i>	Asian Jackal	Seen
3	<i>Funambulus pennanti</i>	Palm Squirrel	Seen
4	<i>Hemichinus auritus collaris</i>	Collard Hedge Hog	Reported
5	<i>Herpestes edwardii</i>	Indian Grey	Seen

		Mongoose	
6	<i>Hystrix indica</i>	Indian Porcupine	Reported
7	<i>Manis crassicaudata</i>	Indian Pangolin	Reported
8	<i>Nesokia indica</i>	Short tailed Mole Rat	Seen
9	<i>Rattus rattus</i>	Black Rat	Seen
10	<i>Sus srofa</i>	Wild Boar	Seen

Birds

The fauna survey revealed the following types of birds near the project area.

Sr. No.	Scientific Name	Local Name	Seen / Reported
1	<i>Accipiter badius</i>	Shikra	Seen
2	<i>Accipiter nisus</i>	Eurasian sparrow hawk	Reported
3	<i>Acridotheres ginginianus</i>	Bank Myna	Reported
4	<i>Acridotheres tristis</i>	Common Myna	Seen
5	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler	Seen
6	<i>Alauda gulgula</i>	Small Lark	Reported
7	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	Reported
8	<i>Anthus rufulus</i>	Paddy Field Pipit	Reported
9	<i>Apus affinis</i>	House Swift	Seen
10	<i>Ardeola grayii</i>	Indian Pond Heron	Reported
11	<i>Calandrella raytal</i>	Sand Lark	Reported
12	<i>Chrysomma sinense</i>	Yellow-eyed Babbler	Seen
13	<i>Cisticola juncidis</i>	Zitting Cisticola	Seen
14	<i>Columba livia</i>	Blue Rock Pigeon	Seen
15	<i>Streptopelia senegalensis</i>	Laughing Dove	Seen
16	<i>Corvus splendens</i>	House Crow	Seen
17	<i>Streptopelia decaocta</i>	Collared Dove	Seen
18	<i>Dicrurus macrocercus</i>	Black Drongo	Seen
19	<i>Dinipium benghalense</i>	Golden-backed Wood pecker	Reported
20	<i>Dumetia hyperythra</i>	Twany-bellied babbler	Reported
21	<i>Egretta garzetta</i>	Little White Egret	Reported
22	<i>Elanus caeruleus</i>	Black-Shoulder Kite	Reported
23	<i>Emberzia striolata</i>	House Bunting	Reported
24	<i>Eudynamis scolopacea</i>	Common Koel	Reported
25	<i>Francolinus pondicerianus</i>	Grey Partridge	Seen
26	<i>Galerida cristata</i>	Crested Lark	Seen
27	<i>Himantopus himantopus</i>	Black-winged stilt	Seen
28	<i>Hirundo fluvicola</i>	Streak-throated Swallow	Reported
29	<i>Hirundo rustica</i>	Barn or Common Swallow	Reported
30	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Seen
31	<i>Hoplopterus indicus</i>	Red-wattled Lapwing	Seen
32	<i>Lanius excubitor</i>	Great Grey Shrike	Seen

33	<i>Lonchura mabbarica</i>	Indian Silverbill	Reported
34	<i>Luscinia svecica</i>	Blue-throat	Seen
35	<i>Merops orientalis</i>	Little Green Bea-eater	Seen
36	<i>Merops philippinus</i>	Blue-cheeked Bee-eater	Seen
37	<i>Mirafra cantillans</i>	Singing Bush Lark	Reported
38	<i>Monticola saxatilis</i>	Rufous-tailed rock Thrush	Reported
39	<i>Motacila alba</i>	White or Pied Wagtail	Reported
40	<i>Myiophonus caeruleus</i>	Blue Whistling Thrush	Reported
41	<i>Nectarinia asiatica</i>	Purple Sunbird	2007 (S)
42	<i>Nycticorax nycticorax</i>	Night Heron	Reported
43	<i>Orthotomus sutorius</i>	Common Tailor Bird	Reported
44	<i>Passer domesticus</i>	House Sparrow	2007 (S)
45	<i>Pericrocotus cinnamomeus</i>	Small Minivit	Reported
46	<i>Pernis ptilorhynchus</i>	Crested Honey Buzzard	Reported
47	<i>Phoenicurus ochruros</i>	Black Redstart	Seen
48	<i>Ploceus philippinus</i>	Baya Weaver	Seen
49	<i>Prinia buchanani</i>	Rofous-fronted Prinia	Reported
50	<i>Prinia gracilis</i>	Graceful Prinia	Reported
51	<i>Prinia inornata</i>	Plain Prinia	Seen
52	<i>Prinia socialis</i>	Ashy Prinia	Reported
53	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Seen
54	<i>Rhipidura aureola</i>	White-borrowed Fantail	Reported
55	<i>Riparia paludicola</i>	Plain Martin	Seen
56	<i>Saxicola caprata</i>	Pied Bush Chat	Seen
57	<i>Sturnus vulgaris</i>	Common Starling	Seen
58	<i>Tephrodornis pondicerianus</i>	Common Woodshrike	Seen
59	<i>Turdoides caudatus</i>	Common Babbler	Seen
60	<i>Turdoides striatus</i>	Jungle Babbler	Seen
61	<i>Upupa epops</i>	Hoppoe	Seen
62	<i>Zosterops palpebrosus</i>	Oriental White Eye	Seen

Reptiles

The fauna survey revealed the following types of reptiles near the project area.

Sr.No.	Scientific Name	Local Name	Seen / Reported
1	<i>Plyas mucosus</i>	Rat Snake	Seen
2	<i>Mromastix harwickii</i>	Spin tailed Lizard	Seen
3	<i>Veranus bengalensis</i>	Monitor Lizard	Reported
4	<i>Bungarus cauruleus</i>	Krait	Reported
5	<i>Vibera Russell</i>	Russel's viper	Reported
6	<i>Geko geko</i>	House wall Lizard	Seen

Amphibians

The fauna survey revealed the following types of amphibians near the project area.

Sr. No.	Scientific Name	Local Name	Seen / Reported
1	<i>Rana tigrina</i>	Frog	Seen / Reported

Insects

The fauna survey revealed the following types of insects near the project area.

Sr.No.	Scientific Name	Local Name
1	<i>Catopsilla pomona</i>	Butterfly
2	<i>Catopsilia pyrantha</i>	Butterfly
3	<i>Capora nerissa</i>	Butterfly
4	<i>Colis crocea</i>	Butterfly
5	<i>Colias palaeno</i>	Butterfly
6	<i>Colias spp.</i>	Butterfly
7	<i>Colotis spp.</i>	Butterfly
8	<i>Danaus chrysippus</i>	Butterfly
9	<i>Danaus genutia</i>	Butterfly
10	<i>Danaus liminiace</i>	Butterfly
11	<i>Componotus herculeanus</i>	Black Ants
12	<i>Dragon Fly</i>	Dragon Fly
13	<i>Parnassius balucha</i>	Butter Flies
14	<i>Apis mellifera</i>	Honey Bees

5.5 Socio-economic Environment (Quality of Life Values)

5.5.1 General

This section provides an overview of the socioeconomic conditions and cultural mores in the project area. Socio economic conditions of the area depend upon the population, employment level, trade and businesses, customs, religion, social activities, occasions, and their social cohesion.

It is to notify that people living in the vicinity mostly belong to a middle class.

5.5.1.1 Population

Jhelum District has a diverse population of 1,103,000 (2006) which mainly consists of Punjabis. **Khewra** is a second populated City of Jhelum and the neighbor City of Pind Dadan Khan Tehsil in Jhelum District, Punjab province, Pakistan. The City is administratively subdivided into two Union Councils and is the location of the Khewra

Salt Mines. The population of Khewra city is near about 35000 peoples. Khewra is known as a best tourist city of Jhelum District because of Khewra Salt Mine Tourist Resort.

5.5.1.2 Ethnic Group

The main ethnic groups in the district are Arain, Baluch, Bodla, Chishti, Dhudhi, Hans, Johiya, Kathia, Khagga, Kharal, Khichi, Langrial, Syal, Waince, Tarohly(Jats), Wattu.

5.5.1.3 Dress

Majority of the people wear Qamiz and Shalwar. English dress; shirt and trousers are common in Faisalabad as well as like other big cities of Pakistan.

5.5.1.4 Employment

In the local area, main source of livelihood is mining and working for different industries, trade, agriculture and cultivation. A few numbers of people also work in the nearby cities.

5.5.1.5 Social Infrastructure

The project site is well connected to the rest of the country through Lahore-Islamabad Motorway. Postal facilities are available in the area. Transport services are available for all directions but inadequate at night time. Gas and Electricity facilities are available for the community.

5.5.1.6 Education

Schooling facilities are adequate. A technical training center is also available in the area. There is one Government Alberuni College and one High School for Boys in Khewra. Pakistan Mineral Development Corporation (PMDC) has arranged education facilities in Khewra city. PMDC has also established a Model High School and a College for girls in Khewra and The Winnington School is also established.

5.5.1.7 Health Facilities

Adequate medical facilities are available in the area. List of medical facilities in the area are as under:

- Allergological Asthma Resort & Hospital Khewra, Punjab, Pakistan
- Khewra Hospital Khewra, Punjab, Pakistan
- Civil Hospital Khewra Pakistan
- Asthma Centre Khewra, Pakistan
- Winington Hospital

5.5.1.8 Crop/ Crop Pattern

1. Grains: Wheat, Maize, Bajra, Rice
2. Oil seeds: Rape Seed, Mustard, Sesamum, Sunflower.
3. Pulses: Moong, Mash, Masoor, Gram.
4. Fodder: Lucern, Jowar, Bajra

5.5.1.9 Fruits and Vegetables

Vegetables in the area include:

1. Chilli
2. Coriander
3. Garlic
4. Ginger
5. Onion
6. Sugar beat
7. Tomato
8. Potato

Fruits of the area mainly include apple, apricot, banana, citrus, dates, grapes, guava, mango, plums, pomegranate, peach and pear etc.

5.5.1.10 Religion

Khewra is mostly a Muslim populated area. People belonging to different religions also reside in Khewra. Few numbers of Hindus, Sikh and Christians are also residing there. A small number of people have developed a firm trust towards these peers due to lack of knowledge and low literacy rate.

5.5.1.11 Dress

Majority of the people wear Shalwar Qameez. English dress; shirt and trousers are also common in Khewra. In ICI Soda Ash workers wear uniform and safety helmets during their working hours.

5.5.1.12 Language

Majority of the people, especially those living in the city speak Punjabi. People living in soda ash business are not generally the citizens of that area and consist of officials posted there belong to different areas of the country. Educated people living in Khewra also understand and speak English.

5.5.1.13 Transportation

All means of transport are available in Khewra. Private cars, Public transport including vans and buses are the principal means of transportation. The rickshaws by QingQi are also very cheap and famous source of transportation. The vehicular movement is significant but not very fluent. Tongas ridden by horse are also used by the people to carry loads from one place to another. There is no airport in the city. The nearest airport to Jhelum is the Benazir International Airport.

5.5.1.14 Historical and Religious Sites

There are two sites of archaeological importance. The first site is a shrine of Chua Syeden Shah which is about 30 km away from Khewra. The other site is Katas (Remains of the Hindu shrine) about 33 km away from Khewra. Katas is an ancient important archeological site, centered on a lake. Both sites are unlikely to be effected by the project activities, mainly due to the distances and also because of the higher altitude of the archaeological sites

5.6 Stakeholder Consultation

5.6.1 General

Social Impact Assessment (SIA) mainly involves the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. These assessments can enable the project implementing authorities to not only identify social and environmental impacts, but also to put in place suitable institutional, organizational and project-specific mechanisms to mitigate the adverse effects. They can also aid in bringing about greater social inclusion and participation in the design and implementation stages of the project. The main types of social impacts that occur as a result of these project related changes can be grouped into five overlapping categories: • Lifestyle impacts – on the way people behave and relate to family, friends and cohorts on a day-to-day basis • Cultural impacts – on shared customs, obligations, values, language, religious belief and other elements which make a social or ethnic group distinct • Community impacts – on infrastructure, services, voluntary organizations, activity networks and cohesion • Quality of life impacts – on sense of place, aesthetics and heritage, perception of belonging, security and

livability, and aspirations for the future • Health impacts – on mental, physical and social wellbeing, although these aspects are also the subject of health impact assessment.

5.6.2 Objectives:

- Identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
- Verify compliance with the environmental regulations and relevant standards;
- Identify problems (non-conformity) and recommend measures to improve the environmental management system;
- Generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle.
- Identify and quantify different categories of project affected people (PAPs) who would require some form of assistance, compensation, rehabilitation or relocation.
- Provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project.

5.6.3 Stakeholder Consultation

Stakeholder's consultancy refers to a process through which the public/stakeholders can influence decisions and share control over development proposals which may affect them. In a participation exercise, the shared analysis, agenda setting and decision making are normally reached through consensus on the main issues between the public and the proponent.

The Environment Protection Act 1997 makes the participation of the local communities mandatory in the planning and design of a development project. United Nations Conference on Environment and Development (UNCED) in 1992 endorsed the process of stakeholders' participation and consultation as one of the key documents of the Conference-Agenda 21. It is obligatory not only to satisfy the legal requirements of the EIA process in Pakistan but also to improve and enhance the social and environmental design of the Project.

5.6.4 Objectives of Stakeholder Consultation

The aims and objectives of public involvement and consultation of this project include:

- To provide information related to proposed Project activities to stakeholders.
- Allowing the public to express their views on the scope and content of an EIA

(and the proposed development action).

- Obtaining local and traditional knowledge (corrective and creative) before decision-making.
- To seek for the participation of all interested parties and to identify stakeholders' interests and issues.
- Ensuring that important impacts are not overlooked.
- Reducing conflict through the early identification of contentious issues.
- Influencing project design in a positive manner (thereby creating a sense of ownership of the proposal).

5.6.5 Methodology

The methodology adopted for the purpose of socio-economic and health assessment was based on general observation, interviews, questionnaires and recording of various parameters for the baseline information. Stakeholders were selected randomly for this process. Secondary data includes mode of transportation, education level and facilities, health facilities, water and sanitation facilities etc. Views of the people about the proposed project were collected by interviewing them using a semi structured questionnaire.

5.6.6 Classification of Stakeholders

One of the most common divisions is between primary and secondary stakeholders. The former consists of those whose interests can be affected directly by a decision on a proposed initiative (examples are local communities living in the Project Area). Secondary stakeholders consist of those who are not directly affected but may be indirectly affected and/or have an ability to influence the decision (examples might be international conservation NGOs or local/national media). Another classification divides stakeholders into internal and external groups. The former are those who are involved in the decision-making and the latter are those having interests that may be directly or indirectly affected.

5.6.7 Analysis

This section provides an overview of the socioeconomic conditions and cultural habits in the project area. Socio economic conditions of the area depend upon the population,

employment level, trade and businesses, customs, religion, social activities, occasions, and their social cohesion.

Education

Previously, the education sector was not as prominent aspect of the citizens’ life as it has become now. The residents living near the project site are not very educated. The literacy rate is very low particularly in women. According to the data collected with the help of a questionnaire, education level of the people living there was as follows:

Some of the population (25%) was illiterate, while percentages of the people having education of primary, middle and matric levels were 20%, 10% and 15% respectively.

At the same time, a good number of people with education above matriculation was also found such as 20% people were intermediate and 15% were graduate.

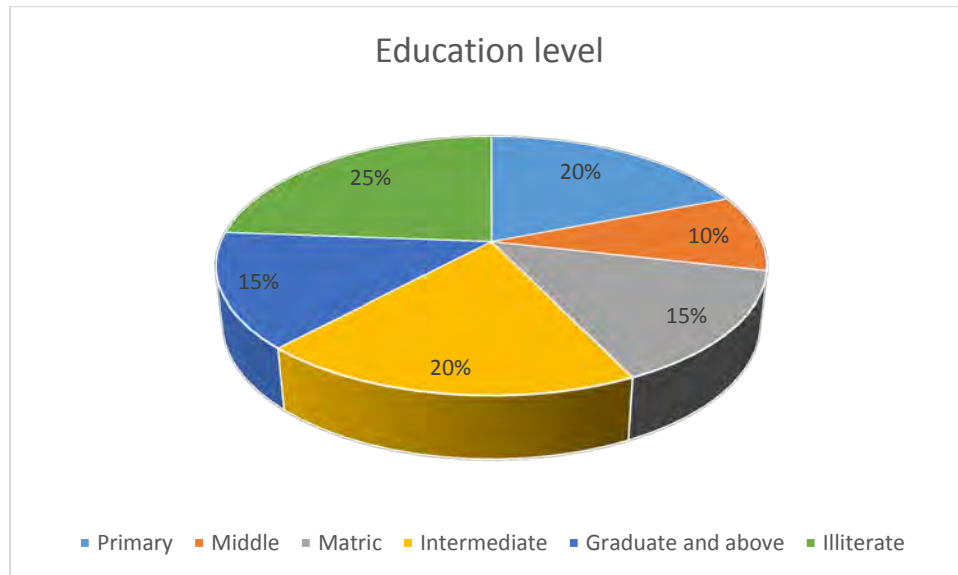


Figure 5.3: Graph shows the percentage of educated and illiterate people

Occupation

Mostly people here are working for different industries, departments, mining and cultivation. Many of them have their own shops and small scale business. Majority of the people are labors, drivers, shop keepers, contractors. The percentages of stakeholders are displayed in the following graph:

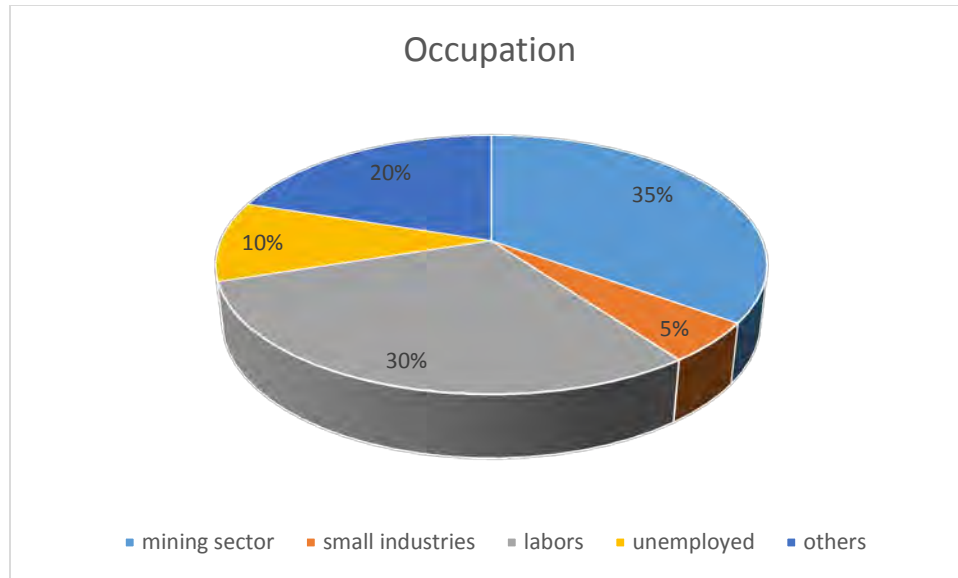


Figure 5.4: Graph showing percentage of occupations

Age

Age of the stakeholders was also recorded. The people interviewed for the socioeconomic assessment belongs to different age groups of which 10% belongs to the age group of 56 and above, 35% belongs to 46-55 years, 40% belongs to 36-45 years and 15% belongs to 20-35 years.

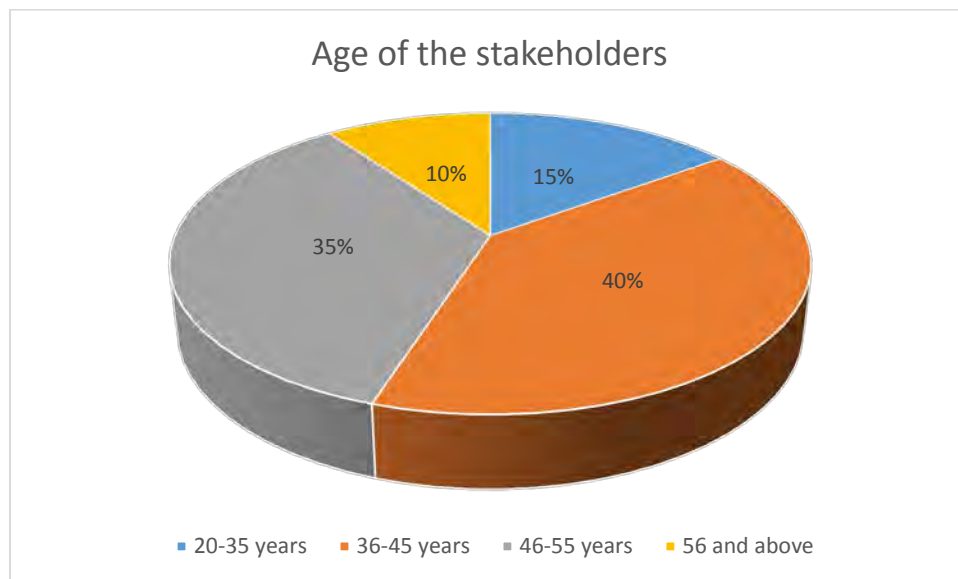


Figure 5.5: Graph showing the percentage of ages

Income

It is to notify that people living in the vicinity mostly belong to a middle class and lower middle class. Labors (60%) are salaried to 12,000 PKR while skilled labors (30%) are

salaried till 30,000 PKR and people belonging to other professions (10%) have salary above 30,000.

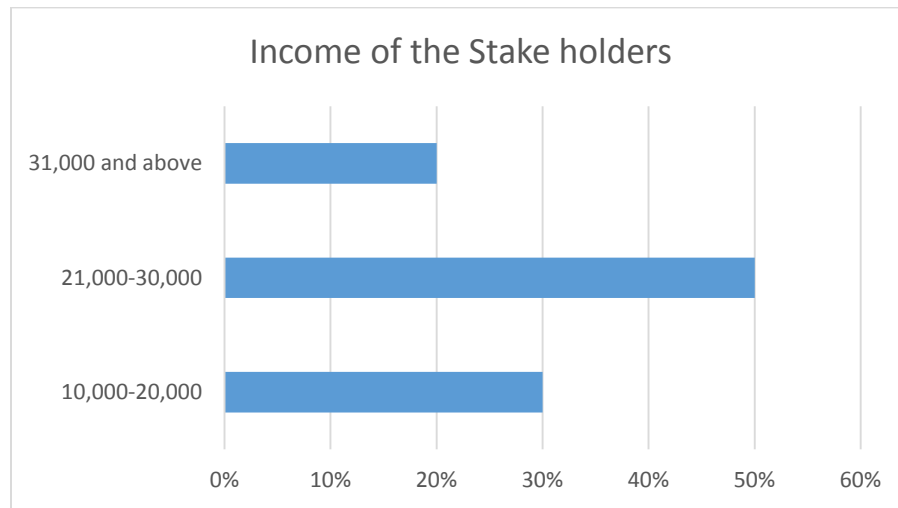


Figure 5.6: Graph showing the percentages of income

House Structure

It was observed that mostly people live in independent family systems, among these families, few like to live in joint family system as the load is distributed among the different earning members of the family. Similarly families who are living in joint family system are of the view that joint family system can create misunderstandings among families and limit the opportunities for progress. Most of the inhabitants have their own houses and very few of them were living on rent. Lower middle class residents mostly have semi-structured houses.

Project Response

The majority people of the nearby communities are strongly in favor of the proposed project. They have the perspective of healthy future which will bring prosperity to their young ones. They also gave comments that these projects will pave the path of development. On the other hand, 3% of people seemed not satisfied with the projects. As they said that these project will bring disturbance to them. They were afraid that these tasks will never be done hence will create a lot of pollution and waste water. They said, if mitigation measures would be provided and monitored then they would have no objection.

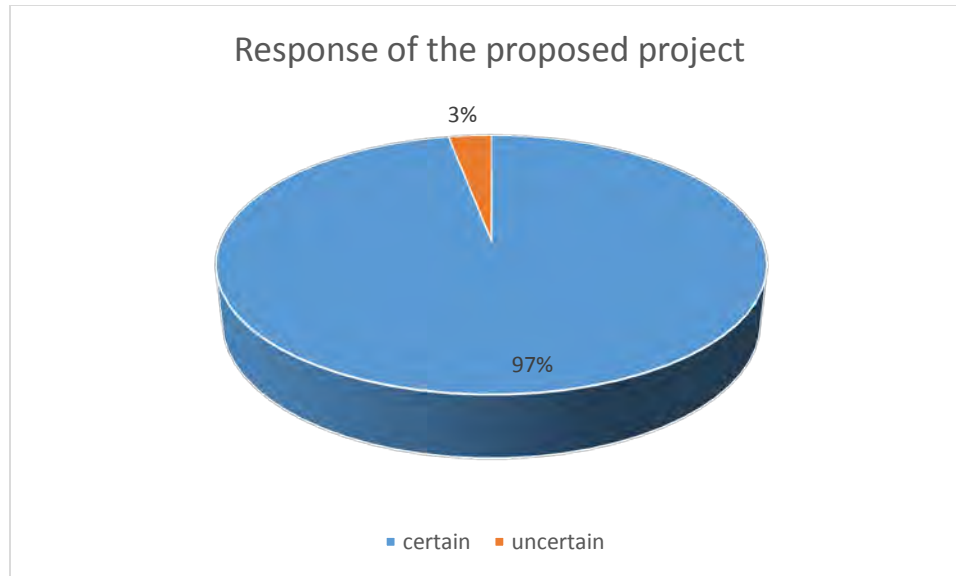


Figure 5.7: Graph showing the percentage of people against and in favor of the proposed project

So we can conclude that if these projects are not harming the natural and green environment, then these projects are environment friendly and without any hesitation and deterioration under risk we can commence the projects. This will enhance the development of the people and they will get desirable result.

PICTORIAL REPRESENTATION OF THE SOCIAL SURVEY



Consultation with the people of church near project site



Consultation with the officials of church near project site



Consultation with a shopkeeper in khewra



Consultation with a cloth shopkeeper near the project area



Consultation with a customer at the cloth center



Consultation with a local shopkeeper near ICI



Consultation with a local shopkeeper of residence near the project



Consultation with a street vender near the factory



Consultation with a customer of street vender near the factory



Consultation with a local passing by the road of project site



Consultation with a local resident near the project site



Consultation with a person living near the project location



Consultation with a local stakeholder passing through the road



Consultation with a local elder of the area

Chapter - 6

IMPACTS & MITIGATION

Chapter - 6

IMPACTS & MITIGATION

The potential impacts of the proposed project on the area's geomorphology, surface and groundwater resources, air quality, biological resources, and socio-cultural environment have been discussed in the following sections. Where appropriate, mitigation measures have also been included to reduce the unacceptable impacts. Likely impacts that trigger the Environmental Management Plan (EMP), and accompanied mitigation measures have been identified in this EIA. The organizational structure and responsibilities of various functionaries towards EMP also have been highlighted, indicated generic environmental control measures that need to be applied during the possible implementation of EMP if and when required. The proposed project of an EIA is not only to address and analyze the expected environmental impacts of a project, but also to enhance project benefits, and to introduce standards of good practice to be adopted for all projects works. The primary objectives are to:

Facilitate the implementation of the mitigation measures required by EPA.

- Define the responsibilities of the project proponent and contractor and provide a means of effective communication of environmental issues between them.
- Identify monitoring parameters in order to ensure the effectiveness of the mitigation measures.
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels

6.1 IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

The impacts during construction phase will be of temporary nature. In this phase, in order to ensure the compliance of the construction contractors with proposed mitigation measures, these measures must be modified in detail by the construction contractors in EMP (Environmental Management Plan).

6.1.1 Impacts on Air Environment

a) Air Pollution

Following are the sources of air pollution during construction phase:

- Transport of construction materials like earthen materials, sand in uncovered form, blown by wind and vibration.
- Open storage of construction materials and sand, blown by wind.
- Earthwork operations including land clearing, dumping, spreading, grading and compaction.
- Other construction activities like preparation of concrete at batching plants.
- Movements of construction machinery and construction materials transport vehicles over unpaved areas.
- Exhausts of the construction machinery and construction materials transport vehicles, mostly using diesel as fuel.

b) Gaseous Emissions

The major pollutants present in air will be oxides of nitrogen and carbon, particulate matter and un-burnt hydrocarbons. The other factors affecting the atmosphere include dust, PM₁₀ and exhausted gases. Minimization measures should be taken to reduce the influence of these factors.

Mitigation measures

- The project construction vehicles having an age of more than 5 years should not be allowed to use.
- Well maintained and operated vehicles and machinery will be used.
- Vehicles will be avoided to leave running unnecessarily.
- Air monitoring should be conducted on regular basis by 3rd party.
- Appropriate speed limits will be established and enforced over all unpaved surfaces.

c) Dust prevention

The dust emission results from the process of transporting soil and sand serving the sub grading as well as execution materials; dust generated from the process of transporting of vehicles will cause air pollution within the area. It could affect workers taking part in the execution process, people in the surrounding residential areas and their business activities.

Mitigation measures

It is necessary to apply mitigation measures:

- Isolating the execution area and applying masking methods during the transportation, set up dust guards surrounding the execution area could reduce 80% of amount of dust resulting from the transportation process.
- Prevent the overloading material and soil to the trucks.
- Notifying people the plan of execution, estimated roads used to transport types of rock and building materials.
- Dust may be also generated during land clearing and storage of soil, and truck movements; and dust emission would aggravate during windy conditions. A mitigation measure includes water spraying of these areas.
- Face masks should be provided to drivers and operators of vehicles and construction machinery.

6.1.2 Noise Pollution

Noise affects directly construction workers. Source of noise will be operation of construction machinery and movement of vehicles. The NEQS noise level limit (for vehicles) is 85 dB (A), at a distance of 75 meters from source. The noise level should be kept under this permissible limit, otherwise these may cause unusual blood pressure variation, physical fatigue, hearing impairment and in acute cases, permanent hearing loss, rupture of ear drum etc. chronic exposure of people to higher noise levels also impairs their efficiency and skill.

Mitigation measures

The solution to minimize these impacts is as following:

- Using specified and regularly maintaining vehicles in good condition.
- Noisy equipments are only operated in short time or reducing the working shift and replaces labors regularly to reduce the time of suffering in high noisy places.
- Do not operate noisy equipments at the rush hours.
- Mufflers should be provided to the drivers, workers in the vicinity of the machinery producing noise more than permissible level.

6.1.3 Solid waste

The source of solid waste during construction phase will comprise of construction debris, waste construction chemicals, waste mechanical equipment and parts, used

oil and domestic solid waste. Indiscriminate disposal of solid waste will lead to ground water pollution.

Mitigation measures

- Raise the workers' awareness to comply with environmental hygiene and strictly domestic solid waste management.
- Contract with local garbage collecting entities to collect and transport solid waste to treat in landfill.
- Hazardous solid waste must be collected and stored in separate bin, treated measures must be taken to present regulation to collect and treat by a contract with local establishment in charge of hazardous waste treatment.

6.1.4 Water Quality Deterioration

During the construction phase, the surfacewater like drains/nullahs/canals/river and ground water may get polluted by the waste disposal from camp sites. The extent of surface and ground water pollution would very much depend upon the implementation of pollution control measures. The increase in pollution of surface and ground water may impair health of the workers and local population, using this water.

a) Mitigations For Domestic Wastewater

- Water will be used prudently during construction activities.
- In order to allay concentration of pollution caused by sewage water, treatment of the waste is recommended before final discharge. According to the PEPA 1997, BOD of all the surface discharges from domestic or industrial wastes should not exceed 80 mg/l. Therefore sewage should be treated by septic tank.
- The sewage should not be let exposed in open areas, which may cause health hazards.
- Minimizing amount of wastewater by recruiting local employee who can self-prepare their accommodation and daily activities and organizing personal in constructing phase in suitability.
- Locating contemporary/mobile toilets at camping area and clearing to ensure environmental hygiene after completion.

b) Mitigations For Surface Water and Construction Wastewater

- Do not allow wastewater to flow freely to the outside environment and use treatment technologies before discharging to environment.

- Do not dispose solid waste on site, avoid overflow rainwater on surface and bring this waste to surface water source.
- Maintain equipment to limit lubricant leakage.

6.1.5 Soil Environment

- The work components have great impacts on soil environment and local people health, and direct impact on construction workers. Therefore, Contractor must comply strictly commitment of building environmental protection.
- In the rainy season, runoff water can affect soil environment. Thus, try to implement digging up an embanking in the dry season, make the ditches for drainage in construction site.
- Having educational methods to raise the workers' awareness to comply with environmental hygiene and strictly domestic waste management by means of installing temporary toilets (mobile or fixed toilets), and build the area for solid waste and contract with local garbage collecting entities to collect and transport to treat in landfill.

6.1.6 Biological Resources

Biological resources include terrestrial and aquatic flora and fauna. The proposed project is extension of already existing unit and no endemic species of fauna and flora are reported here.

Mitigation measures

To reduce impacts on fauna and flora during construction phase of proposed project site, following measures will be adopted:

- No endangered species are reported to exist within the study area. All the necessary precautions will be taken to ensure the minimum disturbance to the local flora and fauna.
- Strict instructions given to all personnel working in project area to refrain from killing, capturing or disturbing any species of bird, reptile or mammal encountered during project activities.
- No removal of vegetation on project site.

6.1.7 Health and Socio-Economy

- It must have the schedule for construction material means on construction traffic route. Contractors must closely cooperate with authorized offices such as traffic

and transportation office to arrange suitable transporting routes and avoid rush hours and traffic intersection to minimize traffic congestion.

- Arising waste must be collected and comply with wastewater dumping regulations.
- Equipping necessary labor protection means for workers: hard hats and covered shoes.
- If construction material gather is not at site, contractor must refer to residence's opinions and reach their agreement.
- Labor safety is a solution to minimize accident during construction. Labor safety is a significant matter which not only involves health and life of direct building workers but their quality of work as well as progress of the project.
- In order to ensure safety during excavation, contractor must comply with time and building schedule to ensure stability of work's components to not prevent daily traffic at site. Suspending construction area shall have illumination equipment at night to avoid causing accidents for workers at site.
- Workers and engineers on site shall strictly comply with regulations on building labor safety. Workers operating constructing machines shall be trained and practiced check operation and worked under technical regulations.
- Workers are well-equipped personal protection means and workers are responsible for taking these protection means such as: protection clothes, glasses and gloves, etc.

6.1.8 Transportation

- On constructing, contractor must direct traffic suitably and must place work signage boards and have guider to direct traffic, must have night warn light, specific signage boards under applicable regulations on traffic safety.
- Work signage boards must contain name on constructing unit, employer, address and telephone to contact with manager to solve exclamation in order that community can present arising problems on time.
- Contractor shall set out detailed schedule of construction material and sand transporting means for construction. Upholding and combining vehicles suitably to avoid overload on these traffic route.
- Having planned to cooperate with traffic police officers and transportation and to whom it may be concerned.

6.1.9 Local Employment

During the construction phase, there will be significant positive impact on the local employment. It is assessed that the local people will get opportunities to get direct construction related jobs.

6.2 IMPACTS AND MITIGATION MEASURES IN THE OPERATIONAL PHASE

The proposed project, right from the decision for its implementation to the operation phase, may cause environmental impacts on three environmental settings such as physical, biological and human.

6.2.1 Liquid Effluents

All effluents are being contained as by-product in the specially built lime beds from where it goes nowhere; as it's proven that the DBO forms a protective impermeable layer, not allowing anything to pass through. This is the safest international practice worldwide. The lime beds are used for plantation afterwards.

6.2.2 Gaseous Emissions

All NEQ requirements will be strictly followed during plant operation i.e. Sox, Nox & particulate dust etc. from boilers.

6.2.3. Solid waste

ICI Soda Ash does not dispose off any solid waste outside the premises. Fly Ash, generated from CFBs is being sold to local cement manufacturers.

6.2.4 Noise

Noise issue would be generated during operational phases.

Mitigation Measures

- Different noisy activities will be scheduled to occur at the same time as less frequent noise activities would be less annoying.
- During operational phase exhaust silencers, quieter cooling fans will be used to minimize noise.
- Personal Protective Equipment's (PPEs) will be provided to the workers.
- Machines will be regularly serviced.

6.2.5 Biological Environment

Biological resources include flora and fauna. The project site is located in the premises of existing ICI Soda Ash Plant. It will not involve removal of vegetation at the project site. Similarly, No endangered species are reported to exist within the study area. However, appropriate mitigation measures will be introduced to minimize contamination of soil and ground water.

6.2.6 Socio-economic Impacts

a) Displacement

The proposed project will be in premises of existing ICI Soda Ash Plant; no displacement of population is envisaged.

b) Employment

There may also be the job opportunities available to the local people.

c) Impacts on occupational Health and Safety

ICI Pakistan Limited pays special attention and encourages their staff to use relevant personal protective equipments e.g. safety shoes, ear plug and goggles etc.

d) No sites of archeological, historical, cultural or religious significance are present on the proposed project site

6.3 PROJECT'S INTENDED AND LIKELY BENEFITS

The proposed project is intended to bring forth qualitative as well as quantitative benefits. The majority of the qualitative benefits are those that will be realized as a result of accomplishment of the project and would continue throughout the lifespan of the project. Some of the significant quantitative benefits likely to accrue from the project can, however be enumerated as under:

- The project indicators depict a positive cost to benefit ratio (CBR) showing that the project is feasible and is likely to bring forth economical and socio-economic benefits in its wake.
- There will be an impetus to production and business.
- The project is likely to create job opportunities in various categories during construction phase.

Some of the likely quantitative impacts of the project can be stated as under:

- Opportunity of labor for the local laborers and others (positive impacts).

- Noise pollution due to the usage of heavy machinery and vehicle movement (negative/temporary impact).
- Impacts related to dust emissions and vibration, if not managed properly (negative/temporary impacts).
- Impacts relating to solid waste generation, if not managed properly (negative impact).

Table - 6.1: Check list of potential impacts for Construction and Operational Phases

Environmental Aspects		Impact Categorization								
		Mild			Moderate			Severe		
		*	**	***	*	**	***	*	**	***
1. Land Resources										
1.	Site for disposal of waste generation and disposal of waste material					✓				
2.	Location of labor camps, material camps, equipment yards and approach roads	✓								
3.	Contamination from diesel and other spills from construction machinery	✓								
4.	Drainages paths roads crossed. Damages by moving machinery					✓				
5.	Installation of batching plants					✓				
6.	Waste disposal Management	✓								
7.	Agriculture land and crop Damage	✓								
8.	Any discharge or diversion of water to a graveyard or archaeological site	✓								
9.	Electrical and mechanical works	✓								
2. Hydrology and Water Resources										
2.1	Impact on source of construction water					✓				
2.2	Contamination of surface water due to diesel and other fluids spilling over from machinery.		✓							
2.3	Protection of construction work from floods	✓								
3. Air Quality and Noise Pollution										
3.1	Dust and smoke and other pollutants		✓							

Environmental Aspects		Impact Categorization								
		Mild			Moderate			Severe		
		*	**	***	*	**	***	*	**	***
3.2	Dust or other pollutant from stored materials and spoil heaps		✓							
3.3	Smoke from burning of waste materials or burning fire wood	✓								
3.4	Noise control from use of old or outdated machinery					✓				
4. Biological Resource										
4.1	Damage to biological resource flora, fauna, biota	✓								
4.2	Impact of construction on aquatic life	✓								
5. Socioeconomic and Cultural Issues										
5.1	Existing services; education health, electricity, and water supply	✓								
5.2	Tribal tensions and local rivalries on canals and aquatic life	✓								
5.3	Land ownership and land acquisition	✓								
5.4	Access to other construction materials					✓				
5.5	Effects on sites of archeological, historical, cultural or religious significance	✓								
5.6	Public safety at construction sites	✓								
5.7	Health and safety of labor and employees on construction site	✓								
5.8	Employment	✓								
5.9	HIV/AIDS and other communicable diseases.		✓							
5.10	Aesthetic / scenic value	✓								
<p>Key:</p> <p>* Avoidable through design (Preventive)</p> <p>** Mitigation through contractor's obligation</p> <p>*** Non-reversible permanent change.</p>										

Chapter -7

ENVIORNMENTAL MANAGEMENT PLAN

Chapter - 7

ENVIRONMENTAL MANAGEMENT PLAN

7.1 Introduction

This document provides an overall approach for managing and monitoring environment and social related issues and describes the institutional framework and resource allocations proposed by ICI Soda Ash to implement the Environmental Management Plan (EMP) for the “Extension of 200KTPA Light Ash”.

During the EIA process mitigation measures have been identified to minimize the adverse environmental impacts of the proposed project and to keep it within acceptable limits. The Environmental Management Plan (EMP) has been developed to effectively implement the monitoring and mitigation measures identified in the EIA. PEPA 1997 (Amended 2012) places strong emphasis on the preparation of EMP during project processing and on setting out conditions and targets to be met during project implementation.

7.2 Objective of Environmental Management Plan

An Environmental Management Plan provides a mechanism to address the adverse environmental impact of a project during its construction, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works.

The objectives of the EMP are to:

- Define the responsibilities of the project proponents, contractors, consultants and other related agencies.
- Facilitate the implementation of the mitigation measures identified in the EIA.
- Define a monitoring mechanism and identify monitoring parameters.
- Provide a procedure for timely action to deal with unfavorable environmental situations.
- Identify training requirements at various levels.

7.3 Regulatory Requirements and Applicable Standards

7.3.1 National Regulatory Requirements

This section provides an overview of the policy framework and national legislation that applies to the proposed project. The project is expected to comply with all national legislations.

The EIA has been conducted in pursuance to all relevant policies, laws and guidelines. These include primarily Punjab Environmental Protection Act 1997(Amended 2012) and Pakistan IEE /EIA review regulations (2000). Outlines of relevant laws and guidelines are provided in this section.

The key regulatory requirements, in the context of environmental protection, applicable to the project under Pakistan legislation are listed in Table-7.1.

Table-7.1: Applicable Regulatory Requirements (Environmental)

Instrument	Requirement	Action
Punjab Environmental Protection Act of 1997(Amended 2012)	Makes it mandatory for the project proponents to carry out an environmental impact assessment and incorporate environmental and social mitigation actions as part of the project planning.	An EIA meets the regulatory requirements was prepared by the consultants and submitted to the Punjab Environmental Protection Agency (EPA).
	Makes it illegal to discharge any effluent or emission in violation of the National Environmental Quality Standards (NEQS).	The design specifications of the project ensure that the relevant components will meet this requirement.
The Punjab Wildlife (Protection, Preservation,	Makes it illegal to undertake any project activity inside a protected area (national	There is no protected area near the proposed site. The proposed project is the extension within the existing

Conservation And Management) Act, 1974	part, wildlife sanctuary, or game reserve).	factory premises.
Antiquities Act, 1975	Makes it illegal to undertake any construction work within 200 ft. (60 m) of a building, site or monument protected under the Act.	No project activity has been planned within 60 m of a protected site. Construction of the structures will be limited within the already acquired land of ICI Soda Ash. During construction/extension, the Contractors will ensure that the prescribed distance is maintained from the sites in the proximity of the construction site.
	Requires that the Department of Archaeology and Museum, Government of Pakistan should be informed if any archaeological artifact is found during excavation.	The Contractor will be required to stop work if any archaeological artifact is found during construction. The Department of Archaeology and Museum, Government of Pakistan will be contacted for further action.

7.3.2 Status of Regulatory Clearances

Prior to implementation of the project ICI Soda Ash will comply with several environmental requirements, such as obtaining EPA clearance (“No Objection Certificate”, compiling acceptable EMP and Clearance Certificate) under section 12 of PEPA Act (Amended 2012), securing tree removal and replanting permits from the provincial departments of Forests and Wildlife (Punjab) and other permissions required from other relevant departments. ICI Soda Ash will also need to confirm that contractors and their suppliers have complied with all statutory requirements and have appropriate and valid licenses and permits for all powered mechanical equipment, permissions for use

of local water supplies in line with the all environmental requirements (e.g. and local authority conditions).

7.4 Components of the EMP

The EMP has the following components:

- Roles and Responsibilities
- Mitigation Plan
- Environmental Monitoring Plan
- Communication And Documentation
- Environmental Training
- Waste Water Management
- Waste Disposal Plan
- Health And Safety Plan
- Traffic Management Plan

The above mentioned components will be followed in the proposed project. These components, as per requirements will be incorporated into various contract documents and agreements needed for the implementation of the project. The components include brief description of the environmental aspects of the project activities, listing of mitigation measures, timing to implement EMP and responsibilities of relevant parties.

7.5 Institutional Capacity

This section provides institutional arrangements for environmental management during the proposed activity and defines the roles and responsibilities of the various organizations/departments.

7.5.1 Management Approach

The responsibilities of different organizations/departments are summarized below:

7.5.2 ICI Soda Ash

At this point, environmental specialist/ consultants must address all environmental aspects in the detailed design. It is recommended ICI Soda Ash should have one technical manager (environmental specialist) to address all environmental aspects in the detailed design and contracting stages. The environmental specialist will:

- Work with ICI Soda Ash to ensure all statutory environmental submissions under PEPA 1997 (Amended 2012) and other related legislations are thoroughly implemented.
- Work with ICI Soda Ash to ensure all environmental requirements and mitigation measures are included in the contract and bidding documents.
- Work with management consultant, supervising consultant and contractors to manage and monitor the implementation of the project EMP.

Overall implementation of the EMP will become ICI Soda Ash responsibility. Other parties to be involved in implementing the EMP are as follows:

7.5.3 Contractor

The contractor of construction activities will be responsible for environmental protection. The contractor should follow environmental protection liabilities under environmental laws of the country, project EIA/EMP provisions and their contract with ICI Soda Ash. The contractor shall also be responsible for communicating environmental & social information and training of staff in all aspects of the EMP.

7.5.3.1 Training Schedule

ICI Soda Ash and contractor will be responsible for providing health and safety training, and briefing environmental requirement of the project to workers and its staff before the commencement of work. Training workshops should be conducted at every six months or twice each year, for the first 2 years (and annually thereafter) to share the monitoring report on the implementation of the EMP, to share lessons learned in the implementation and to decide on remedial actions, if unexpected environmental impacts occur.

7.5.4 Government Agencies

Such as provincial environmental agencies, and bureaus, at the local level, will be responsible for monitoring the compliance with implementation of environmental conditions related to statutory approval of project in their areas.

7.6 Summary of Impacts Assessment, Mitigation and Management Plan

This section provides a corresponding mitigation plan that focuses on countering the project's adverse environmental effects, and assigns responsibility for implementing these measures.

7.6.1 Mitigation Plan

The mitigation plan is a key component of EMP. This section outlines the potential impact of construction work on the physical, biological, and socioeconomic environment and their associated mitigation measures as already identified in EIA report. In order to facilitate the implementation of the EMP, during the preparation for the construction phase the future contractors will be prepared to co-operate with ICI Soda Ash and the local population in the mitigation of impacts. Furthermore, the contractor will be primed through the contract documentation and ready to implement all the mitigation measures and engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. It also assigns responsibility for implementing these measures. Now the guidelines for the implementation of mitigation plan indicated in EIA will cover:

- Lists of mitigation measures which will be directly covered by the environmental consultants under civil or mechanical work.
- The person(s) responsible for ensuring the implementation of the measures.
- The parameters to be monitored for the effective implementation of measures.
- A time scale for the implementation of measures to ensure that the objectives of mitigation plan are fully met

7.6.2 Management Plan

The details of EMP are given in Table 7.2 in the form of a matrix. The impacts have been classified into those relevant to the design/preparation stage, construction stage and operation stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The responsible parties are specified for the purpose of the implementation and the supervision of the EMP. The matrix is supplemented with a monitoring plan (Table 7.3) for the performance indicators. The Environmental Management Plan for the activities likely to have a direct impact on the environment is presented in Table – 7.2.

TABLE – 7.2 ENVIRONMENTAL MANAGEMENT PLAN

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement EMP	Responsibility
PLANNING AND DESIGN PHASE				
Layout and Design	To ensure EMP sufficient to control impacts and compliance with legal requirements of EPA.	Ensure proposed live diversions are agreed and included in contract. Ensure final route to be built by contractor.	Prior to contract signing	ICI Soda Ash
Site Investigation	To ensure the site is feasible to extend the plant	Sampling and testing to provide soil parameters for design and construction. Site investigation for hydrological properties, geology, physical hazards for site development. Consider site alternatives if there is a risk of groundwater beneath or	Before construction	ICI Soda Ash

		around the building can adversely affect the properties of the soil.		
Landscape and Visual Impact	<p>To protect the aesthetic value of the site.</p> <p>To ensure the plant is being extended according to the regulatory requirements.</p>	<p>The proposed project site will be extended within the factory premises.</p> <p>There is no vegetation within the site</p> <p>The plant will not be located within an area of statutory or non-statutory designated landscape.</p> <p>No new landscaping requirements are considered necessary.</p>	Before construction	ICI Soda Ash
Project disclosure	<p>Ensure compliance with statutory requirement of Punjab EPA.</p>	<p>Design all changes to alignment disclosed to EPA.</p> <p>Ensure all changes to alignment are included in the revised EMP.</p> <p>Determine whether changes to alignment need additional environmental assessment, if necessary</p>	Before construction	ICI Soda Ash

CONSTRUCTION PHASE				
Orientation for Contractor, and Workers	To ensure that the Contractor, subcontractors and workers understand the key environmental impacts and their relevant mitigation measures.	Conducting special briefing and / or on-site training for the contractors and workers on the environmental requirement of the project. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities. Periodic progress review sessions to be conducted every six months	Before & after commencement of work. At early stages of construction for all construction employees as far as reasonably practicable.	ICI Soda Ash / Contractor
Plans to control environmental and associated impacts	To avoid impacts that may occur from unplanned activities.	Traffic Management Plan Waste Management Plan Health & Safety Plan Agreed schedule of costs for environmental mitigation measures (including maintenance where applicable).	Site Management Plans will be delivered in final form to ICI Soda Ash one month before construction	Contractor

<p><u>Construction Works</u> Excavation Piling Loading Unloading of materials Compaction</p>	<p>To achieve the goal for development process.</p> <p>To carry out the manufacturing process in an organized manner during operational phase.</p>	<p>Top soil may be used for agricultural purpose or development of city parks.</p> <p>Soil and debris may be managed for planned land filling and landscaping.</p> <p>All stockpiles will be treated with water sprays to prevent dusting or covered correctly with secured tarpaulins where necessary.</p> <p>Mixing of concrete will be done off site and be directly delivered to the required area of the construction site. On site batching will not be used. Any small scale mixing requirements will be undertaken in shielded areas away from sensitive receptors.</p>	<p>During construction</p>	<p>ICI Soda Ash, Contractor</p>
<p>Equipment Maintenance</p>	<p>Achieving the best performance for the equipments and facilities.</p>	<p>Prepare and keep the record of equipment maintenance log.</p> <p>Prepare proper maintenance sheets</p>	<p>During construction</p>	<p>Contractor</p>

	<p>Reduction of the risks associated with operational conditions.</p> <p>Proper maintenance should be carried out for the equipments and project facilities to attain the maximum efficiency within least possible cost.</p>	<p>for vehicles.</p> <p>Use fully tuned vehicles and machinery.</p>		
<p>Communication Routes</p>	<p>To facilitate the area with proper pathways.</p>	<p>Disruptions to be identified in Traffic Management Plan.</p> <p>Inform the public about forthcoming delays.</p> <p>Use appropriate signage.</p>	<p>During construction</p>	<p>Contractor</p>
<p>Public access</p>	<p>Ensure the access to all utilities efficiently without disruption.</p>	<p>Damage to defined utilities to be repaired at Contractors' expense.</p> <p>Maintain vehicular access to emergency services.</p> <p>Maintain pedestrian access to public buildings.</p> <p>Use appropriate signage.</p>	<p>During Construction</p>	<p>Contractor</p>

		Keep roads clean.		
Water Pollution	To minimize impacts on local water source caused by construction activities.	Do not allow wastewater to flow freely to the outside environment and use primary sedimentation tank before discharging to environment.	During construction	Contractor
Soil Erosion	Prevent runoff and control erosion.	Avoid creating excessive slopes. Dispose of excess materials in approved areas to control erosion and minimize leaching of hazardous materials. Save topsoil removed during construction and use to reclaim disturbed areas, as soon as it is possible to do so.	During construction	Contractor
Water Requirements	To fulfill the needs of labors with adequate water supply.	Optimum use of water will be done for civil work. Laborers will be provided with adequate water supply for drinking purpose and sanitation facilities. Any wastages/leakages will be	During construction	Contractor

		<p>avoided at all possible locations.</p> <p>Water quantity being small, no major impact on existing water resources of the study area is envisaged.</p>		
Noise	<p>To minimize noise level and ground vibrations during construction activities.</p>	<p>Equipment/vehicles in poor condition not to be used.</p> <p>Noisy equipment to be located away from sensitive sites.</p> <p>Restricted working hours.</p> <p>All the vehicles and machinery should be properly tuned.</p> <p>Maintenance log sheet should be maintained.</p> <p>Acoustic laggings and silencers will be used in equipments wherever possible.</p> <p>All construction workers working in high noise areas will be provided appropriate PPEs like ear muffs and made to wear them</p>	<p>During construction</p>	<p>Contractor</p>

		<p>during working hours.</p>		
<p>Air quality/Dust</p>	<p>To avoid complaints due to the airborne particulate matter released to the atmosphere.</p> <p>To ensure health and safety of the workers.</p>	<p>Water will be sprinkled on loose top soil to prevent re-suspension of dust into ambient air due to movement of vehicles etc.</p> <p>Cement bags will be separately stored under cover in bales. Sand will be stacked under tarpaulin cover.</p> <p>Possibility of raising green belt along with construction activity</p>	<p>During construction</p>	<p>Contractor</p>

		<p>will also be encouraged.</p> <p>Transport vehicles and construction equipments / machineries will be properly maintained to reduce air emissions.</p> <p>Vehicles and equipments will be periodically checked for pollutant emissions against stipulated norms.</p> <p>All construction workers will be provided appropriate PPEs like dust mask, ear plug, helmet, safety belt etc. and made to wear them during working hours.</p> <p>Damping down will be used to reduce dust emissions.</p>		
Solid Waste	To minimize the environmental impacts arising from waste.	All solid waste regulations to be followed. Unwanted materials disposed off promptly.	During construction	Contractor

		<p>Inert construction material (including excess soil, rubble etc.) can be used as fill.</p> <p>Metal and wood scrap is sold directly for off-site recycling;</p> <p>Domestic waste should be picked up by the municipality and transported to the local landfill.</p> <p>On completion of civil work, all debris etc. will be completely removed from site to avoid any incompatibility with future use.</p>		
<p>Biological resources (flora, fauna)</p>	<p>Conservation of biological resources</p>	<p>As the proposed project will be within premises of an existing industrial premises so no major tree cutting exercise will be there and no major impact on ecology is anticipated.</p> <p>Flora:</p> <p>Be aware of any protected plant species.</p>	<p>During construction</p>	<p>Contractor, ICI Soda Ash</p>

		<p>Replant trees that have to be removed in a similar habitat.</p> <p>Plant yearly additional indigenous trees in the area.</p> <p>Remove invader species</p> <p>Fauna :</p> <p>No endangered species are reported to exist within the study area. All the necessary precautions will be taken to ensure the minimum disturbance to the local fauna.</p>		
<p>Social impacts</p>	<p>To engage local workforce and community in the project.</p> <p>To encourage local support for the project.</p> <p>To ensure minimum impacts to people living close to the project</p>	<p>Provision of alternate routes.</p> <p>Use local labour as far as possible for manual work.</p> <p>Use local educated people for clerical and office work where possible.</p> <p>Encourage monitoring of the project by local groups.</p> <p>Claims/complaints of the people</p>	<p>During construction</p>	<p>Contractor, ICI Soda Ash</p>

	vicinity.	on construction nuisance/damages close to the project sites to be considered and responded promptly by the Contractor		
Historical or culturally important sites	To protect the cultural heritage of the area	Supervising construction. If encountering archaeological finds during construction, the contractor should stop the works and follow the procedure to notify authorized bodies. If works are on historical monument, the construction workers should follow the special condition of construction. Undertake appropriate indigenous and non-indigenous heritage assessments.	During construction	Contractor
Health and Safety	To ensure physical safety of workers. Reduce or eliminate the	Comply with the Occupational health and Safety Policy. Workers need to be given proper personal protective equipment	During Construction	Contractor

	<p>number of accidents and injuries at workplace.</p> <p>Reduce hazards and risks in a particular site.</p>	<p>(PPE).</p> <p>Workers near high noise equipment have to be given PPE.</p> <p>Ensure that the contact details of the police or security company and ambulance services nearby to the site are available.</p>		
<p>Grievance Redress</p>	<p>To ensure that the stakeholder or affected people’s concerns, complaints and grievances about the project environmental performance will be received recorded and replied in a systematic way</p>	<p>Official in charge of people’s grievance will be designated.</p> <p>A leaflet outlining environmental protection measures and listing grievance contact points will be distributed.</p> <p>Community leaders will be given detailed information on the grievance management process.</p> <p>NGOs will be informed in the same manner as the community leaders.</p>	<p>Throughout the project</p>	<p>Contractor</p>

OPERATIONAL PHASE				
Material usage, Handling and Storage	<p>To reduce health risk to workers.</p> <p>To minimize loss of material into surroundings in case of improper storage.</p> <p>To avoid blockage of passage due to sprawl of material.</p> <p>To reduce the adverse impacts caused by spillage and leakage of liquid effluents such as fuel, oils and lubricants etc.</p>	<p>Proper handling and storage practices should be adopted.</p> <p>Monitoring of workplace to identify leakages or spillage.</p> <p>Hazardous waste (such as used oil and oil filters) should be handed over to an approved contractor for recycling oil.</p> <p>Material will be appropriately stored and secured to ensure safe passage between the destinations during transportation. Material will have appropriate cover to prevent spillage and ICI Soda Ash will be responsible for any clean up resulting from any failure.</p> <p>Provide impervious platform and collection tank for spillage of liquid fuel and lubes .</p> <p>Spills from generators, chemicals</p>	Operational phase	ICI Soda Ash

		<p>or disposed waste onsite shall be reported readily in order to seek immediate remedial.</p> <p>No land will be acquired for the storage of materials and machinery under scope of work.</p>		
Air Quality	<p>To minimize the impacts generated directly or indirectly by the machineries and generator potentially causing environmental harm via degradation of air quality.</p>	<p>Adequate control equipment should be installed for minimizing the emission of pollutants.</p> <p>Air monitoring should be conducted on regular basis by 3rd party.</p> <p>The present air pollution level at various locations in the factory is within the allowable limit.</p>	Operational phase	ICI Soda Ash
Dust	<p>To minimize adverse impacts resulting from dust generation.</p>	<p>Provide local exhaust ventilation systems.</p> <p>Regular water sprinkling to reduce visible dust</p> <p>Provide face masks to workers to</p>	<p>Dust control planning will be a line item in the approval of setting up dust producing activities.</p>	ICI Soda Ash

		avoid inhalation of particulate matter and goggles to evade eye irritation.	A schedule of spraying water to be revised regularly.	
Noise	To minimize adverse impacts resulting from noisy machinery.	Provide personal protection gear to the workers such as earplugs, muffs, etc. Noise level monitoring should be conducted regularly to ensure that noise levels during all times are within national noise exposure standards.	Operational phase	ICI Soda Ash
Solid waste	For safe disposal of solid waste to the designated landfill.	For safe disposal of industrial wastes, the management can encourage the use of three R's concept (reduce, reuse and recycle the solid waste). The plant operators should be trained to do their best to produce less solid waste from the process by employing different cleaner production techniques.	Operational phase	ICI Soda Ash

		<p>Solid waste management plan should be integrated with respect to waste segregation, collection, storage and disposal.</p> <p>The domestic waste generated from the administration building will be collected and dumped at appropriate bins inside the plant, from where it will be transported to designated solid waste dumping site daily.</p>		
<p>Surface and groundwater quality</p>	<p>To protect nearby surface and groundwater body from wastewater.</p>	<p>Install a wastewater treatment plant.</p> <p>Regular monitoring of wastewater by the 3rd party.</p> <p>Development of a detailed monitoring plan to monitor the groundwater levels.</p> <p>Promotion of good housekeeping during operation and maintenance.</p>	<p>Weekly</p>	<p>ICI Soda Ash</p>

7.7 Environmental Monitoring

This section provides a Monitoring Plan that identifies the roles and responsibilities of project staff involved in environmental and social monitoring, and lists the parameters that will be used in the monitoring process. Table 7.3 presents the Monitoring Plan for performance indicator.

7.7.1 Objectives

The main objectives of the pre-construction and construction phase monitoring plans will be:

- Checking final alignment for design of project.
- Checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements and EMP have been included.
- Checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and tied to payment milestones, and making sure that any advance works (protection of specimen trees and transplanted) are carried out in good time.
- Monitor the actual project impact on physical, biological and socio-economic receptors.
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds that anticipated in the EIA.
- Ensure compliance with legal and community obligations including safety on construction sites.

The main objectives of monitoring during the operation phase will be to:

- Appraise the adequacy of the EIA with respect to the project's predicted long term impact on the corridor's physical, biological and socio-economic environment.
- Evaluate the effectiveness of the mitigation measures proposed in the EMP, and recommend improvements in the EMP, if necessary.

Table 7.3 ENVIRONMENTAL MONITORING PLAN FOR CONSTRUCTION & OPERATIONAL PHASE

Environmental Quality	Parameters	Details of Location	Method	Standards/ Guidelines	Frequency	Responsibility
Air (emission of dust and exhaust)	Air Quality (PM ₁₀) All relevant stack emissions (CO,NO _x ,SO _x)	<ul style="list-style-type: none"> • Construction sites • Construction camps • Construction site access roads 	<ul style="list-style-type: none"> • Visual control • Technical inspection of machinery • Instrumental measuring 	NEQS	Once a month	ICI Soda Ash
Water Quality	Groundwater Quality (Total Coliform, Fecal E.Coli, pH, TDS, Total hardness, Alkalinity, Nitrates, Chloride, Sodium, iron)	<ul style="list-style-type: none"> • Construction camps; • At construction sites 	<ul style="list-style-type: none"> • Laboratory control. 	National Standards	Once a month	ICI Soda Ash

Environmental Quality	Parameters	Details of Location	Method	Standards/ Guidelines	Frequency	Responsibility
Wastewater Quality	Waste water quality (pH, TDS, BOD ₅ , Chloride, Nitrate), TSS, COD, Iron	<ul style="list-style-type: none"> • Construction camps; • At construction sites 	<ul style="list-style-type: none"> • Waste water management control • Inspection of functionality of water treatment facility ; • Laboratory control. 	NEQS	Once a month	ICI Soda Ash
Noise Level	Noise level on dB (A) Scale	construction site	<ul style="list-style-type: none"> • Instrumental Monitoring 	NEQS	Once a month	ICI Soda Ash
		Potentially affected sensitive receptors	<ul style="list-style-type: none"> • Instrumental Monitoring 	NEQS	Once a month	ICI Soda Ash
Soil Quality	Calcium, Magnesium, Iron Fluoride, Sulphide, Sulphate, Zinc , Barium, pH, Sodium, Potassium	<ul style="list-style-type: none"> • Construction camps • Construction sites • Material and waste storage areas 	<ul style="list-style-type: none"> • Lab control 		<ul style="list-style-type: none"> • Regular inspection • Inspection after completion of works. • Laboratory analysis—in case of pollutant spill 	ICI Soda Ash

Table 7.4 Cost Estimates for Environmental Management

Sr. #	Item	Rs). PKR
1	Water Sampling & Testing	180,000.00
2	Vehicular Emission Testing	30,000.00
3	Air Quality Monitoring	150,000.00
4	Purchase Of PPEs	50,000.00
5	Maintenance Of Equipment	200,000.00
6	Traffic Management	60,000.00
7	Water Sprinkling	50,000.00
8	Waste Disposal	100,000.00
10	Restoration Work	70,000.00
11	EHS Training	25,000.00
	Sub total	9,15,000.00

Chapter - 8

CONCLUSION

Chapter – 8

CONCLUSION

The EIA of the proposed extension project of ICI Soda Ash Khewra, Jehlum regarding to the extension of Light Soda Plant has achieved the following goals:

- Identification of national environmental regulatory requirements that apply to the proposed development activities.
- Identification of the environmental features of the project area and the likely impacts of the project on the environment.
- Recommendation of appropriate mitigation measures that ICI Soda Ash Khewra, Jehlum will incorporate into the project design to eliminate or mitigate all adverse environmental impacts.

Baseline environmental and socioeconomic information was collected from a variety of sources including published literature and field surveys. The information collected was used to compose profiles of the natural and socioeconomic environments likely to be affected by the project. Information for the section describing the project came mainly from ICI Soda Ash Khewra, Jehlum.

An assessment was then made of the potential impacts of the described project on the area's natural and socioeconomic environments.

The impacts of the planned activities in the project area will be insignificant, provided the generic mitigation measures proposed in this report are implemented. In areas where these activities may have a significant impact, additional mitigation measures are given to reduce impacts to as low as reasonably possible.

After assessing the proposed project activities and investigating the project area, the environmental consultants, Environmental Consultancies and Options (ECO) have concluded that:

"If the activities are undertaken as proposed and described in this report, and the recommended mitigation and environmental management measures are implemented/adopted, the project will not result in any long-term or significant impacts on the local community or the environment".

GLOSSARY

EIA (Environmental Impact Assessment): It is the process of identifying, predicting, evaluating and mitigating of effects of biophysical, social and other relevant proposed projects and physical activities prior to major decisions and commitments being made.

IEE (Initial Environment Examination): Initial examination of projects for identification of hazards of project.

Topography: Physical features of any area including soil, water and air are called topography.

PEPA (Pakistan Environmental Protection Act 1997): An act to provide the protection, conservation, rehabilitation and improvement of environment, for the prevention and control of pollution and promotion of sustainable development.

Fauna: Word used for combination of all the species of animals.

Flora: Word used for combination of all the species of plants.

Corporate Social Responsibility: Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.

Institutional Capacity: Capacity can be defined as “the ability to perform functions, solve problems and set and achieve objectives”. Increasing the level of human resources or strengthening organizations, while it may be necessary, may not be sufficient to increase capacity. The way individuals and organizations interact both in the public sector and within society as a whole may be more relevant to the overall level of capacity.

EMP (Environmental Management Plan): An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

NOC (No Objection Certificate): It is a kind of clearance issued by EPA necessary for any project to be constructed.

LIST OF ABBREVIATIONS

BDL	Below Detectable Limit
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
DW	Drinking Water
ECO	Environmental Consultancies & Options
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
GEL	Global ECO Laboratories
GT	Global Technologies
GWM	Global Waste Management
PEPA	Pakistan Environmental Protection Act
PPE's	Personal Protective Equipment's
SH & E	Safety Health and Environment
TDS	Total Dissolved Solids
WW	Waste Water

SOCIO-ECONOMIC SURVEY & HEALTH SURVEY QUESTIONNAIRE

Q. 1. Name of the respondent: -----

Q. 2. Present Residential Address

Q. 3. Gender:

1-Male 2- Female

Q. 4. Age of the respondent: -----

Q. 5. What is your marital status?

1- Single 2- Married 3- Divorced 4- Widow/Widower

Q. 6. Education Level

1-Illiterate 2- Primary 3 - Middle
4- Secondary 5- Higher Secondary 6- Graduate
7- Post Graduate 8- Deeni Uloom

Q. 7. Employment Status

1- Unemployed 2-Employed 3- Housewife
4- Student

Q. 8. Type of Employment

1- Govt. Employee 2- Private Employee 3-Labor class
4- Business 5- Any other

Q. 9. Personal Income (Monthly average)

1- Rs. 1,000---10,000 2- Rs. 10,001---20,000
3- Rs. 20,001-30,000 4- Rs. above 30,000

Annex-C

Q. 10. Other sources of income?

- 1- Over Time 2- Part time
3- Private work 4- Other

Q.11. How many earning members are there in your family?

- 1- 1 2- 2 3- 3
4- 4 5- 5 & above

Q. 12. Which family system do you belong?

- 1- Joint 2- Separate

Q. 13. How many people are there in your household?

- 1- 1-5 persons 2- 6-10 persons 3- 11-15 persons
4- Above 15

Q. 14. How many children are there in your house?

- 1- 1 – 3 2- 4 – 7 3- Above

Q. 15. What is the type of the ownership of your house?

- 1- Self Owned 2- Rented

Q. 16. If rented how much rent you paid?

- 1- 1000—2000 2- 2001--- 3000 3- 3001--- 4000
4- 4001--- 5000 5- 5001----6000 6- 6001---7000
7- 7001----8000 8- 8001---9000 9- 9001---10000 & above

Q. 17. Nature of construction of your house:

- 1-Pacca 2-Semi-Pacca 3-Katcha
4-Temporary settlement

Q. 18. Which of the following facilities are available in your house?

- 1-Electricity 2-Water Supply 3-Gas
4-Telephone 5- Sewerage 6-other

Annex-C

Q. 19. Is there any social welfare trust in your area?

1- Yes 2- No

Q. 20. Nature of social welfare trust in your area?

1- NGO 2- Vocational training institute 3- Women welfares center
4- Women health care centers 5- Any other.....

Q. 21. Are you satisfied with the standard of the Educational Institutions in your area?

1- Yes 2- No

Q. 22. Are you in the favor of proposed project in your area?

1-Yes 2- No

Q. 23. What are the benefits of the proposed project for local community?

1- 2- 3-
4- 5-

Q. 24. Is it become a source of development for the local community?

1- Yes 2- No

Q. 25. How do the project activities affect the environment?

1- By contaminated Water 2- By polluted Air
3- By creating noise pollution 3- Any other
5- All of the above.....
6-Will not affect if the pollution is controlled at the sources

Q. 26. Do you have problem in the Availability for the following facilities?

1- Education 2- Job Opportunities 3- Transport
4- Recreational Places 5- Health services 6- Any other.....
7- None of them.....

Q. 27. Is there any solution for the particular issue?

1- No 2- Yes

Q. 28. Common diseases of an area?

1- 2- 3-
4- 5-

Annex-C

Q. 29. Occupation of the Community inhabitants?

- 1- Business
- 2- Agriculture
- 3- Jobs
- 4- Small Industries
- 5- Others

Q. 30. Do you have any recommendation for the improvement of your area?

.....
.....

Q. 31. Is there any disease particularly associated with project activities?

- 1-
- 2- 3-
- 4- 5-

Annex-D

PROJECT TEAM AND RESPONSIBILITIES

NAME	POSITION	QUALIFICATION	TERM OF REFERENCES
Dr. Asim Mahmood	Director	PhD. & MBA	Mr. Asim would be responsible for: <ul style="list-style-type: none"> • Environmental Assessment & Management. • Supervision of monitoring team for air water noise and soil analysis. • Preparation of technical EMP
Dr. Saamia Saif	Executive Director	PhD. (Environmental Science & Management)	Ms. Saamia would be responsible for: <ul style="list-style-type: none"> • Report writing • Field surveys and consultation with stakeholders • Preparation of Environment monitoring plan • Preparation of technical EMP • Identification of sensitive receptors
Dr. Kausar Jamal Cheema	Environmentalist	PhD	Dr. Kausar will be responsible for: <ul style="list-style-type: none"> • Capacity building & training • Conducting and monitoring of health assessment surveys • Environment health risk assessment and management
Dr. Farooq Ahmed	Environmentalist	PhD. Forestry	Dr. Farooq would be responsible for: <ul style="list-style-type: none"> • Biodiversity assessment • Detailed flora fauna survey of project sites • Identification of threaten and endangered species • Project impacts on flora and fauna
Mr. Shehzad Ahsraf	Environmentalist	M.Phil. Forestry	Mr. Shehzad would be responsible for: <ul style="list-style-type: none"> • Detailed flora fauna survey of project sites
Mr. Muhammad Amir	Sociologist	MA. Sociology	Mr. Amir would be responsible for: <ul style="list-style-type: none"> • Detailed social survey of project sites • Social impact assessment
Mr. Zahid Iqbal	Sociologist	MA. Sociology	Mr. Zahid would be responsible for: <ul style="list-style-type: none"> • Detailed social survey of project sites • Consultation with stakeholders
Ms Sana Shahid	Sociologist	M.Phil Sociology	Ms. Sana would be responsible for: <ul style="list-style-type: none"> • Detailed social survey of project sites

Annex-D

			<ul style="list-style-type: none"> • Social impact assessment
Ms. Sunaina Ashfaq	Project Coordinator (Environmentalism)	M.Phil. (Environmental Science)	<p>Ms. Sunaina would be responsible for:</p> <ul style="list-style-type: none"> • Detailed survey of project sites • Environmental Assessment • Social Assessment • Report Writing • Quality Check
Mr. Ehsan Toor	Project Coordinator	M.Phil. (Environmental Science)	<p>Mr. Ehsan would be responsible for:</p> <ul style="list-style-type: none"> • Detailed flora and fauna survey of project sites • Site Monitoring • Socio-Economic survey & analysis • Report Writing
Mr. Mustafain Haider	Project Coordinator	M.Phil. (Environmental Science)	<p>Mr. Mustafain would be responsible for:</p> <ul style="list-style-type: none"> • Detailed flora and fauna survey of project sites • Site Monitoring • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP) • Report Writing
Mr. Saif Ullah	Chemist	M.Sc.	<p>Mr. Saif Ullah would be responsible for:</p> <ul style="list-style-type: none"> • Detailed survey of project sites • Soil & water samples collection • Onsite Monitoring • Analytical analysis of samples
Mr. Abdul Ghaffar	Field Analyst	B.Sc.	<p>Mr. Abdul Ghaffar would be responsible for:</p> <ul style="list-style-type: none"> • Detailed physical survey of project sites • Ambient Air, noise monitoring and analysis
Mr Asim Jamil	Field Analyst	DAE Environmental Technology	<p>Mr. Asim would be responsible for</p> <ul style="list-style-type: none"> • Soil & water samples collection • Onsite Monitoring • Analytical analysis
Mr Altif Baig	Field Analyst	BS Hons. (Environmental Science)	<p>Mr. Altif would be responsible for</p> <ul style="list-style-type: none"> • Soil & water samples collection • Onsite Monitoring • Analytical analysis

Annex-D

Mr Ghulam Mahauddin	Field Analyst	BSc (Chemistry)	Mr. Ghulam would be responsible for <ul style="list-style-type: none">• Soil & water samples collection• Onsite Monitoring• Analytical analysis
Ms. Maryam Jamil	(Environmentalist)	M.Phil. (Environmental Science)	Ms. Maryam would be responsible for <ul style="list-style-type: none">• Detailed survey of project sites• Environmental Assessment• Social Assessment• Report Writing
Ms. Mahwish Khan	(Environmentalist)	M.Phil. (Environmental Science)	Ms. Mahwish would be responsible for <ul style="list-style-type: none">• Detailed survey of project sites• Environmental Assessment• Social Assessment• Report Writing
Ms Munazza Khan	(Environmentalist)	M.Phil. (Environmental Science)	Ms Munazza would be responsible for <ul style="list-style-type: none">• Detailed survey of project sites• Environmental Assessment• Social Assessment• Report Writing

Annex-E

Environment Practitioners/Specialist

Environmentalist

- Dr. Kausar Jamal Cheema
- Dr. Saamia Saif
- Dr. Asim Mehmood

Sociologist

- Mr Zahid Iqbal
- Mr Muhammad Amir

Ecologist

- Dr. Farooq Ahmed
- Mr Shehzad Ashraf



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Doc # GEL / LAB / 4 / 17
Issue # 02
Issue date: 01.11.2013
PAGE 1 OF 1

CHEMICAL ANALYSIS TEST REPORT

Report reference No: W/32710
Name of Customer: ICI Pakistan Ltd.
Address: Soda Ash Business, Khewra,
District Jhalum, Pakistan
Nature of Sample: Ground Water 200 KTPA Light Ash Expansion Project
Date of sample received: 29.03.2016
Date of completion of analysis: 06.04.2016

Dated: 07.04.2016

Sr. No.	Parameters	Unit	NEQS	Concentration	Method	Remarks
1	pH Value*	....	6.5 to 8.5	7.79	pH meter	
2	Arsenic	mg/l	≤0.05	BDL	AAS	
3	Chloride	mg/l	<250	186.0	Digital Titrator	
4	Turbidity	NTU	<5	BDL	Turbidity meter	
5	Sulphide	mg/l	.....	BDL	Spectrophotometer	
6	Sodium	mg/l	.....	154.3	Flame Photometer	
7	Potassium	mg/l	.....	3.5	Flame Photometer	
8	Total Dissolved Solids*	mg/l	<1000	874.0	Evaporation	
9	Copper	mg/l	2.0	0.040	AAS	
10	Lead	mg/l	≤0.05	BDL	AAS	
11	Nitrate	mg/l	≤50	10.3	Spectrophotometer	
12	Nitrite	mg/l	≤3	0.006	Spectrophotometer	
13	Boron	mg/l	0.3	0.3	Spectrophotometer	
14	Barium	mg/l	0.7	BDL	AAS	
15	Fluoride	mg/l	≤1.5	1.20	Spectrophotometer	
16	Total Coliforms	cfu/ 100ml	0	Nil	Culture	
17	E-Coli	cfu/ 100ml	0	Nil	Culture	

Deviation from standard method if any: Nil
NEQS: National Environmental Quality Standards.

BDL: Below detectable limit

*These parameters are included in the scope of ISO-17025.

AAS: Atomic Absorption Spectrophotometer

NS: Not Specified.


1. Sample analyzed by:


M. Asif Iqbal
Chief Analyst

2. Checked/Verified by:


M. Asif Iqbal
Chief Analyst

3. Signature of incharge of the environmental laboratory:


Name: Ghyasuddin
Designation: Manager
Date: 07.04.2016

END OF THE REPORT



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Doc # GEL / LAB / 4 / 14

Issue # 01

Issue Date: 01-04-12

PAGE 1 OF 1

AMBIENT AIR QUALITY MONITORING REPORT

Report reference No: A/31024
Name of Customer: ICI Pakistan Limited,
Address: Soda Ash Business, Khewra,
District Jhelum, Pakistan.
Project: 200 KTPA Light Ash Expansion Project 2016
Location: Mentioned Below
Date of Monitoring: 29.03.2016
Date of Completion of Analysis: 06.04.2016

Date: 07.04.2016

S. NO.	Location	CO (ppm)	CO ₂ (ppm)	SO ₂ (ug/m ³)	NO ₂ (ug/m ³)	Noise (dBA)	PM ₁₀ (ug/m ³)	Remarks
	NEQS	9		120	80	75	150	
1	Northern Side	BDL	428	13.0	16.0	63.8	20	
2	Southern Side	BDL	424	26	28.0	61.3	82	
3	Eastern Side	BDL	436	10	12.0	63.2	41	
4	Western Side	BDL	441	12	26.0	59.8	12	

Deviation from standard method if any: Nil

BDL: below detectable limit.

This report is not valid for any negotiation.

1. Sample Analyzed by:

M. Asif
Analyst

2. Checked/Verified by:

M. Asif
Chief Analyst

3. Signature of the incharge of the environmental laboratory:

Ghyasuddin
Name: Ghyasuddin
Designation: Manager
Date: 07.04.2016

END OF THE REPORT

PICTORIAL REPRESENTATION OF AIR, WATER, SOIL AND NOISE MONITORING



Waste Management

Purpose

The purpose of this standard is to establish a documented procedure for segregation, handling, storage, disposal and selling of waste.

Scope

This standard is applicable to waste generation, its disposal and selling for recycling/reusing activities of ICI Soda Ash Business Khewra.

Terms and Definitions

Terms used in this standard are defined as:

Waste

Any substance or object which has been, is being or is intended to be, reused, recycled, discarded or disposed of, and includes all kinds of solid and liquid waste resulted from organizational activities, products and services. Wastes are classified as;

1- Scrap

Waste sold to contractor to either reuse or recycle it, such as cardboard, steel, iron, wood etc.

2- Stationery Paper

Paper waste sold for recycling purpose.

3- Hazardous

A substance or mixture of substance which by reason of it's chemical activity, toxicity, flammable, corrosive, or other characteristics, causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect.

4. Labor Contractor

Contractor hired by Logistics department to operate in scrap yard of factory to handle, segregate and store the waste.

5. Scrap Contractor

Contractor which buy scrap to reuse or recycle and transport it from industry premises.

Engineering Department

Role and Responsibility

Related department shall identify, segregate and store wastes in departmental designated areas for wastes.

- WM shall appoint Scrap contractor and Labor contractor.
- WM shall designate the relevant personal for overall control of scrap and scrap yard.

Annex-H

6. Procedure

Scrap

- Related department shall temporarily segregate and store its scrap material in provided bins or containers.
- Engineering department shall collect and deliver the scrap to the designated areas on regular basis.
- Engineering department shall transfer the scrap to the designated area on regular basis.
- Labor contractor shall handle and store the scrap in scrap yard area as
- Scrap shall be kept in designated areas according to their category and type.
- Labor contractor shall assure safety measures for personnel working in scrap area
- Scrap contractor shall transport the scrap from premises to sub-contractor or any other recognized facility after issuance of gate pass by Project Manager duly signed by signatory authority.
- Project Manager shall record and monitor the weight for each type of scrap by using and shall control the working of labor and scrap contractor.
- Project manager shall audit the labor and scrap contractor and their sub-contractors/facilities as per annual plan.

Stationery Paper

- Related department shall temporarily store its used papers in provided bins
- Administration department shall collect and store the papers from all departments on regular basis.
- Person designated by Production shall send the papers to the recycling contractor's facility.
- Contractor shall be overall responsible for assuring the secrecy of wasted confidential documents and records.
- Said person shall record and monitor the weight of papers.



HEALTH, SAFETY, ENVIRONMENT AND SECURITY POLICY

ICI Pakistan Soda Ash Business will ensure that its activities are conducted safely; the health of its employees, contractors, its customers and the public is protected; environmental performance meets contemporary requirements and its operations are run in a manner acceptable to the local communities. The employees, capital, information and other assets are protected from accidental or deliberate harm; damage or loss.

In particular we will:

- Comply with relevant local laws and regulations and take additional measures we consider necessary.
- Ensure that all our activities are conducted in a manner consistent with ICI Health, Safety, Environmental and Security Standards.
- Set demanding targets and measure progress to ensure continuous improvement in Health, Safety, Environmental and Security performance.
- Require every member of staff, and those who work on our behalf, to exercise personal responsibility in preventing harm to themselves, others and the environment, and enable them to contribute to every aspect of Health, Safety, Environmental and Security protection.
- Provide appropriate Health, Safety, Environmental and Security training and information for all ICI employees, contractors and others who work with us or handle our products.
- Regularly monitor the implementation of this policy.
- Promote the interchange of Health Safety, Environmental and Security, information and technology throughout ICI Pakistan.

A handwritten signature in blue ink, appearing to read "Suhail A. Khan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014



ICI PAKISTAN
Soda Ash Business



صحت، تحفظ، ماحولیات اور حفاظت کی پالیسی

آئی سی آئی سوڈا ایش بزنس اس امر کو یقینی بنائے گا کہ اس کے امور محفوظ طریقہ سے سرانجام پائیں۔ ملازمین، ٹھیکیداران، صارفین اور عوام الناس کی صحت کے تحفظ کو یقینی بنایا جائے گا۔ ماحولیاتی کارکردگی کا معیار زمانہ حاضر کی ضرورتوں کے مطابق ہوگا اور اس کے طریقہ ہائے کار مقامی آبادی کے لئے قابل قبول اور ہم آہنگ ہونگے۔ ملازمین، سرمایہ، معلومات اور دوسرے اثاثہ جات کو جان بوجھ کر، حادثاتی طور پر نقصان پہنچانے، توڑ پھوڑ اور ضیاع سے بچایا جائے گا۔ سوڈا ایش بزنس کی خصوصی توجہ و رج ذیل امور پر ہوگی۔

- ☆ تمام مرہبہ قوانین و ضوابط کی پاسداری کرنا اور ایسے مزید اقدامات اٹھانا، جو ہمارے لئے ضروری ہوں۔
- ☆ اس بات کو یقینی بنانا کہ ہمارے تمام امور آئی سی آئی کے اعلیٰ معیار پر مبنی صحت، تحفظ، ماحولیات اور حفاظت کے مطابق عمل پذیر ہوں۔
- ☆ مطلوبہ اہداف مقرر کر کے ترقی کی رفتار کو ماپا جائیگا تاکہ صحت، تحفظ، ماحولیات اور حفاظت کے امور میں مسلسل بہتری کو یقینی بنایا جائے۔
- ☆ تمام رفتائے کار اور نمائندے اپنے آپ کو دوسروں کو اور ماحولیات کو نقصان سے بچانے کے لئے اپنی ذاتی کوششوں کو بروئے کار لاتے ہوئے ادارے کو اس قابل بنائیں گے جو ہمارے ساتھ مال کی ترسیل کا کام کرتے ہیں کہ صحت، تحفظ، ماحولیات اور حفاظت کے متعلق مخصوص تربیت اور معلومات فراہم کی جائیں گی۔
- ☆ پالیسی ہذا کے نفاذ کی باقاعدہ جانچ پڑتال کی جائے گی۔
- ☆ صحت، تحفظ، ماحولیات اور حفاظت کے بارے میں تمام آئی سی آئی میں معلومات اور ٹیکنالوجی کے باہمی تبادلہ کو فروغ دیا جائے گا۔

SAKA

سہیل اسلم خان
وائس پریزیڈنٹ
پولی ایٹرائینڈ سوڈا ایش بزنس
آئی سی آئی پاکستان

یکم جولائی ۲۰۱۲ء

TRAFFIC MANAGEMENT PLAN

Travel demand continues to rise in the city as the population increases and country's economy grows. New road infrastructure is not able to keep up with this increase in travel demand in fact it is impractical to build enough roads and infrastructure to comfortably accommodate this demand. The resulting situation where travel demand exceeds the capacity of the transportation network is traffic congestion. Roads in one area may be affected by issues related to parking and stopping or construction work zones; others by infrastructure bottlenecks that decrease road capacity; and still others by traffic signals that could be better coordinated with existing traffic flow. Traffic in all parts of the city can be affected by poor weather conditions, special events, unexpected collisions and other traffic incidents. The impact of this congestion is significant.

CONGESTION MANAGEMENT PLAN

The Congestion Management Plan of a city builds on the successes and activities, by providing an objectives- driven, performance-based approach to managing congestion. The recommended activities are as:

- Taking a more proactive approach to traffic management on roads, complementing current traffic management activities on City expressways;
- Applying evolving technology to traffic and congestion management, from wireless communication to advanced sensors to social media;
- Providing a “tool kit” from which activities can be chosen and applied to the unique road contexts around the city;
- Strengthening partnerships and information sharing, to improve efficiency and coordination of the City's transportation network.

Benefits of Managing Traffic Congestion


- Lower collision rates and collision severity
- Fewer traffic violations
- Improved personal safety and security

Safety




- Better and more reliable travel time
- Less vehicle delay and stops
- Lower transit wait times/ improved service frequency

Mobility




- Increase in capacity and throughput for all road users

Efficiency



- Lower operating costs

Productivity



- Fuel savings
- Emissions reductions

Energy & Environment



- Less frustration
- More satisfied public

Customer Satisfaction



Annex-K

The Traffic Management Plan (TMP) describes how Contractor proposes to safely manage vehicular, cyclists and pedestrian traffic during the design and construction phase of the proposed project, so that project objectives are fully realized. Contractor acknowledges the safety of road users and the effective management of traffic is paramount to the successful day-to-day activities during the construction phase of this project. This TMP seeks to ensure the certainty of the delivery of the prescribed road user requirements including: provision of a safe environment for workers and the travelling public, and minimizing impacts on the road network.

This Plan operates as the master document to a set of site or zone specific Traffic Management Plans (TMP) and their associated Traffic Control Plans (TCP) and Temporary Works Drawings. Together they deal with the safe and effective management of traffic during the design and construction phase of the project. This TMP is applicable to all staff, employees, subcontractors, and any statutory Service Authorities undertaking service relocations throughout the duration of the contract until project completion and its implementation and on-going development will be managed by the senior project team.

Purpose

The intended purpose of the TMP is to describe how Contractor will implement the work in accordance with the requirements of the project deed.

Scope

This Plan applies to all parts of the construction of the work. It does not apply to the maintenance of the road after opening to traffic. The scope includes:

- The provision for the safe movement of vehicular and pedestrian traffic
- The protection of workers from passing traffic
- The provision for access to properties located within the limits of the work
- The design, construction, maintenance and removal of any necessary temporary roadways and detours

Annex-K

- The provision of traffic controllers
- The installation of temporary signs, road markings, lighting and safety barriers. It also covers maintenance of the existing road corridor, including the existing road and road shoulder that may be used for the temporary diversion of traffic, over the duration of the work.

Key Issues

This TMP addresses the following key issues and processes:

- Safety and amenity of road users and the public;
- Site security, site access and signage;
- Project identification, including advertising and site signage;
- Traffic and road user delay and inconvenience management;
- Speed limit signage;
- Traffic transfer (switch) arrangements and procedures;
- Maintenance during Construction;
- Traffic and Safety Management Responsibilities;
- Impact of construction traffic on local roads and
- Emergency and Incident Response Plans.

The table below shows the risks to be dealt with during the design and construction stage of the project that may affect safety

RISKS	POTENTIAL CONSEQUENCES	PROPOSED RISK TREATMENT
Construction methods may cause disruption to traffic	Traffic delays causing frustration to drivers.	Consider methods of construction at an early stage during the design to reflect community needs and reduce delay times therefore minimizing the impact on

Annex-K

		traffic.
Traffic management-inadequate anticipation and communication of issues	Potential community issues causing dissatisfaction and frustration.	Determine traffic routes and engage with community to refine details. Confirm pre-existing conditions. Consider the need for night assessment. Identify any short-term corrective actions
Severe delays to traffic perceived by the community as a direct result of the construction activities	Community dissatisfaction, claims for loss of trade, time delays.	Establish good public relations from the outset. Erect Early Warning information signs through Variable Message Signs (VMS). Early engagement of affected property/business owners to explain process and ascertain needs and potential effects of changed access.
Local Bus and other commercial operators	Impact bus routes, commercial operations, disruption to business causing frustration	Bus routes to remain unchanged where possible to avoid “changes” due to construction activities. Changes to be managed by Contractor Community Manager to ensure co-ordinated approach
Major Traffic Incident	Local traffic disrupted upsetting locals.	Regular checking of Traffic Management Plan

Annex-K

		<p>implementation.</p> <p>Have procedures in place for rapid recovery, Keep locals informed.</p>
Access to site for deliveries.	Traffic disruption or interference	<p>Community Communication Strategy - access points will be high risk locations and will need detailed consideration.</p> <p>Simplification of traffic staging will simplify access arrangements or minimize impacts.</p> <p>Signage and pre-delivery notifications for delivery routes to be clear and simple.</p>
Traffic Speed	Works in multiple areas across the Project may result in intermittent speed changes that may frustrate road users.	<p>Traffic to generally be reduced to 80kph speeds within construction zone.</p> <p>Construction zone to be full length of the Project.</p> <p>TMP to consider simplifying traffic staging to avoid construction zone impacting on traffic.</p>
Pedestrian access	Potential disruption to progress causing pedestrians to not comply with pedestrian provisions.	<p>Liaise closely with the relevant bodies from an early stage to ensure pedestrian access provisions are adequately addressed, well established and maintained.</p>

Annex-K

Lowering speeds, when it is perceived unnecessary	Poor public opinion and safety for workers if motorists start ignoring limits	Appropriate design of traffic protection measures, intersections, alignments etc. to allow consistent speed limits, i.e., 80km/h where-ever possible.
Too many changed configurations	Unfamiliarity causing potential confusion of road users that may cause traffic incidents.	Keep motorists on existing alignment for as long as possible. Effective use of VMSs for advanced notification and clear direction during any traffic flow adjustments.
Inadequate provisions for break-downs during construction.	Traffic delay	Design temporary break down bays. Consider temporary verges where possible during design of traffic staging.
Public or livestock entering work-site. Unauthorised access to site	Traffic Incident	Provide clear delineation and fencing. Educate community (farmers/neighbours,). Channel interests through formally organised tours.
Dangerous entry and exits to sites and properties	Traffic Incident	Ensure that entries and exits are designed to cater for expected traffic volumes and with respect to sight distances, acceleration and deceleration provision and clear advanced warning signage.
Seasonal traffic variations not	High volumes during holidays	Consider seasonal volumes in

Annex-K

allowed for.	and weekends	programming works. Be aware of reporting and notification requirements
Damage to local roads due to heavy vehicle movements	Vehicle damage and potential incidents. Poor community and council relationship.	Allow for heavy vehicle movements in traffic staging and planning to ensure existing, temporary alignment and pavements are suitable during the construction period.

Strategy for the Project

The roads affected by the construction of the project vary greatly from the heavily trafficked to infrequently used local roads. However, the requirement remains the same as impacts in both cases must be kept to a minimum. Therefore Contractor will:

- Design the works to ensure the current number of lanes exist at all times and minimise lane closures in both number and duration
- Schedule the works to exclude lane closures during Public Holiday Weekends and School Holidays and minimise closures during daylight hours
- Schedule the work to minimise the lane, road occupancy and shoulder closures for tie-ins to existing pavements
- Ensure appropriate controls and procedures are implemented during construction activities to address potential traffic impacts along the project corridor
- Incorporate traffic control measures for construction vehicle movements and works programs in order to minimise traffic and transport impacts on local roads and the existing highway
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in this Plan.

Annex-K

Objectives and Targets

The project objectives have been developed to align with the Project deed. In summary, the key objectives to be adopted by the project team with respect to the TMP are to:

- Keep traffic delays to a minimum
- Minimise disruption to businesses
- Maintain satisfactory property access
- Minimise disturbance to the environment
- Traffic impacts are within the scope permitted by the Planning Approval
- Ensure the safety of employees, contractors, the general public, pedestrians, cyclists and traffic

The Key Review Areas (KRA) associated with the traffic management is summarised in the following table

KRA	Target
Traffic Operations	No unplanned impact on traffic flow due to works Average travel times are maintained during peak periods Provide a safe environment for road users and workers Ensure impacts on road users are kept to a minimum Ensure road users and the community are regularly informed about traffic changes

Annex-L

NOISE CONTROL

1- Purpose

The purpose of this standard is to establish a documented system to identify, monitor and control noise pollution to ensure compliance with the noise regulations.

2- Scope

This standard shall cover all the activities regarding noise control within ICI Soda Ash Khewra.

3- Terms and Definitions

Terms used in this standard are defined as:

Terms	Definitions
Ear plugs	Controls the adverse effect of noise on ears for example ear protector or ear muffle.
Annual monitoring	Regular monitoring of environmental parameters selected from significant impact.
Sound meter	Equipment used for measurement of Noise level.

4- Role and Responsibility

- 4.1-** Related department shall identify high noise exposure areas.
- 4.2-** Related department shall maintain its monitoring plan and submit a copy of this plan to maintenance department. (Incase department has capability to execute its monitoring plan then it is not liable to submit copy of this plan to maintenance department).
- 4.3-** Maintenance department shall arrange equipments for monitoring as per submitted monitoring plans.
- 4.4-** Quality Control department shall control monitoring equipment.
- 4.5-** Quality Control department is authorized to issue monitoring equipment to concerned department.

5- Procedure

- 5.1-** Noise level measurement other than the annual monitoring plan shall be performed in following cases:
 - 5.1.1-** Procurement of new equipment
 - 5.1.2-** Addition of new process/activity
 - 5.1.3-** New projects
 - 5.1.4-** Change in regulations

Annex-L

5.2- Maintenance in coordination of related department shall perform measurements of noise in identified high noise exposure areas.

5.2.1-Noise measurements shall be performed when the plant is under normal running conditions.

5.2.2- Noise regulations shall be considered while risk evaluation.

5.2.3-Areas with significant impact shall be included in annual monitoring. Plan to execute regular monitoring.

5.2.4-Noise measurements of Product, Lifters and Toe cars shall also be included in concerned department's annual monitoring plan for performing regular monitoring.

5.3- Measures shall be taken to avoid, minimize and control abnormal noise.

5.3.1- Associates should assure appropriate measures to control and minimize the noise exposure to ears.

5.3.2- Maintenance department shall assure and confirm preventive maintenance of equipment to avoid abnormal noise.

5.3.3- Maintenance and related department shall consider noise characteristics of the equipment while acquiring new equipments.

5.4- Noise measurement shall be performed with "**Sound meter.**"

5.5- Identified areas where the noise level exceeds the limit "**Ear plugs**" shall be provided to control noise exposure to ears.

5.5.1- Related department shall determine the need and quantity of ear plugs required.

5.5.2- Production control department shall control issuance of ear plugs.

6- Establishment and Revision

This procedure will be reviewed after every two years.

Annex-M

PERSONAL PROTECTIVE EQUIPMENTS

Purpose:

This procedure is designed to develop & implement safe working practices by using suitable personal protective equipment (PPE).

Scope:

Entire plant operation, plant personnel, visitors and contractors

Responsibility:

Definition:

Plant Associate: All plant associates are responsible to adhere to the set procedures and follow the PPE that are identified while doing a task.

PPE – Personnel Protective Equipment

Procedure:

- Carry out a baseline analysis of the workplace activities, to identify the potential hazards.
- PPE being the last control in controlling/eliminating the risk of the hazard, other options like Engineering controls and Administrative controls are considered.
- Quantify the remaining hazard after implementing the engineering and administrative controls.
- Assess and select approved personal protective equipment for that task.
- While selection of PPE following points should be considered –
 1. Choose right PPE to match the Hazard
 2. Seek advice from trained representatives of PPE manufacturer
 3. Discuss and look for alternatives
 4. Check into product claim and test data
 5. Try out PPE and test it to see that it meets all the criteria
 6. Physical comfort of the PPE
 7. Evaluate cost impact
- Train the users about the PPE use, maintenance and storage. Update the training records.
- Label the areas where PPE use is mandatory, with pictures or symbols and in local language to make the required PPE visually obvious.
- Choose the PPE properly to ensure proper fitment and comfort.

Annex-M

- When a chemical process or activity at the workplace is changed, identify the potential hazards.
- Change the PPE accordingly, if required.
- Follow manufacturer's instructions regarding cleaning, storage and use of the equipments.
- Ensure that contractors and visitors are communicated and are trained about the use of PPE, if they are exposed to the identified hazards.

References:

Quality Records:

Revision

To be reviewed after every two years or when required.

History: Revision Date Effective Date Reason(s) for Change



FRAUD POLICY

The ICI Pakistan Soda Ash Business will deal with fraud within the framework of the statement on Business Ethics and its Security Policy, which require a secure working environment to protect people, capital, information and assets from the risk of deliberate harm, damage or loss.

In particular:

- We require all employees to act honestly and in the best interests of the company at all times, and ensure that ICI Pakistan acts with integrity in its dealings with third parties.
- We will ensure that effective controls and procedures are in place for preventing, detecting and dealing with fraud.
- We will ensure that all employees are aware of their responsibility to report details immediately to their line manager (or next most senior person) if they suspect that a fraud has been committed or see any suspicious acts or events.
- We will ensure that the Controller is advised of any significant fraud or attempted fraud.
- We require management to investigate any allegations or evidence of fraud in consultation with the Human Resource Manager and Internal Audit Manager.
- We require employees to assist in investigations by making available all relevant information and by co-operating in interview.
- In appropriate cases, and after proper investigation, we will dismiss without notice employees who are found to be defrauding the company and, where appropriate, press for criminal prosecution and seek financial recovery through civil proceedings.
- We require a post-incident review of any fraud. It will be carried out by Business Management in consultation with Internal Audit Manager.

A handwritten signature in blue ink, appearing to read "SAKHA", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014



POLICY FOR THE USE OF MOBILE PHONES

This policy shall be applicable to all ICI Soda Ash personnel, who use Mobile Phones, company or private owned. Moreover this policy shall be applied to all contractors and other visitors who bring Mobile Phones into a ICI Soda Ash Site.

USE OF MOBILE PHONES IN VEHICLES

- No employee shall use a mobile phone while driving
- Calls that need to be made or responded to by the driver shall be undertaken only from vehicle parked safely at a secure location.
- Passengers operating a mobile phone shall ensure that its use does not become a source of distraction for the driver.
- Mobile phones shall be turned off at petrol pumps and CNG stations.

USE OF MOBILE PHONES IN OTHER AREAS

- Mobile Phone must not be used in areas where it is specifically prohibited e.g. on Airplanes, in Hospitals or where its signal might affect instrumentation or electronic system. It is the responsibility of the user to ensure that it is safe to use Mobile Phone before doing so.
- Mobile Phone can only be used in the offices. It shall not be used inside Control Rooms, Plant Buildings, and other locations inside the Plant premises.
- Employees having their offices inside the Plant premises can carry their Mobile Phones but it shall be kept off while going from Time Office to their office.
- Mobile Phone must not be used in areas where it is likely to offend others, e.g. in Seminar, Conferences, meetings, quiet areas such as libraries etc.
- Use of Mobile Phone shall be avoided in places, where it can put the user at risk of injury e.g. climbing or descending stairs/steps.

Every employee, contractor or visitor shall abide by this Mobile Phone Policy. All employees are responsible for ensuring that this Policy is implemented.

A handwritten signature in blue ink, appearing to read "Suhail A. Khan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan Limited

1st July 2014



POLICY FOR THE USE OF ASBESTOS

It is the ICI Pakistan Soda Ash Business policy to control and as far as possible phase out on a planned basis, the use of Asbestos and Asbestos containing material, from its operations. To achieve this goal, no new asbestos containing material shall be purchased or brought on to the site without the prior approval of the Vice President.

The procedure for “work with Asbestos containing material” will be implemented and audited regularly to confirm compliance with its requirements thereby ensuring that:

- ◆ All Asbestos and asbestos containing material at site is registered.
- ◆ All Asbestos containing material is disposed of as described in the HSE &S procedure.
- ◆ All areas where Asbestos is being used will be registered and precautionary measures in that area will be properly implemented.
- ◆ Health records of all employees working with Asbestos containing material are maintained.

A handwritten signature in blue ink, appearing to read "SAKhan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014



PRODUCT STEWARDSHIP POLICY

ICI Pakistan Soda Ash Business takes responsibility for ensuring that its products meet full expectation of the ICI Pakistan Group's guidance and policies, and have sustained compliance with local laws and regulations in all markets where they are sold

The Business recognizes product stewardship as core to its strategy and operations, and has developed this policy to address all HSE aspects of its products at every stage in their life cycle, from design, through production, sale and use to their eventual safe, healthy and environmentally sound disposal.

KEY FEATURES

- Proactively provide appropriate HSE training and information to all staff, contractors and customers to handle our products responsibly and ethically.
- Provide comprehensive safety data sheets and product information in English and Urdu, as appropriate to our customer's needs.
- Work proactively with customers and suppliers in developing mutually acceptable HSE product improvement goals and have systems in place for monitoring analyzing and responding to customer HSE related incidents and complaints.
- Audit all contractors involved in transport or storage of products on their safety policy, standards and performance.
- Conduct at regular intervals formal HSE assessments, including appropriate life cycle studies on new and existing products.
- Have complete, up to date and easily accessible records of HSE data on all chemicals we use and products we handle.

A handwritten signature in blue ink, appearing to read "Suhail A. Khan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014



SMOKING POLICY

ICI Pakistan Soda Ash Business recognizes the right of its employees to be free from exposure to unwanted tobacco smoke (passive smoking). It also accepts that individuals who still wish to smoke may be allowed to do so, but only under circumstances in which others are not affected in the work environment and there is no housekeeping and /or fire hazard.

The Business shall ensure the above through the implementation of the following.

- Smoking shall not be allowed during meetings, Conferences and Training Workshops. The organizer shall intimate to the participants about the policy at the beginning of the session.
- Smoking shall not be allowed in company provided multi passenger transportation.
- All designated “No Smoking” areas shall be clearly sign posted.
- Instructions with respect to “No Smoking” to the visitors visiting the plant for the first time shall be provided with Visitor Cards.

A handwritten signature in blue ink, appearing to read "Suhail A. Khan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014



SUBSTANCE ABUSE POLICY

It is ICI Pakistan Soda Ash Business policy to manage its activities so as to avoid unnecessary and unacceptable risk to the health and safety of its employees. It recognizes that Substance Abuse can adversely affect the health and safety of its employees and affect their efficiency and productivity. It therefore, requires its employees to attend to their duties in a fit state, unimpaired from the effects of any prohibited Substance abuse. Being unfit for work because of such abuse is strictly prohibited and may lead to dismissal from service.

In support of this policy, Soda Ash Business will:

- Educate its employees about the harmful effects or risk associated with substance abuse.
- Enhance awareness that it is a medically treatable condition and provide in accordance with company rules, assistance to employees in need of and willing to undertake such therapy.
- Treat loss of work time emanating from accepting appropriate assistance in accordance with normal sickness provisions. If an employee refuses or discontinues treatment against advice, normal disciplinary procedure will be followed.
- Take a very serious view of possession, sale, distribution or consumption of a prohibited substance by an employee on Company premises and deal with it in accordance with the requirements of national legislation and Company rules and regulations.
- Not allow access and if needed eject from company premises any visitor who in the opinion of the site management is in possession of or engaged in the sale or distribution of, or under the influence of a prohibited drug or substance.

A handwritten signature in blue ink, appearing to read "SAKhan", with a horizontal line underneath.

Suhail A. Khan
Vice President
Polyester & Soda Ash Businesses
ICI Pakistan

1st July 2014

Annex-U

Achievements and Distinctions:

In recognition of the significant improvements, the Soda Ash Business was awarded the SHE Excellence Leadership Award from the year 1999 - 2003. ICI Soda Ash was awarded Chairman Safety Shield in 2003 and Chief Executive's Merit Certificate in the year 2004. A leader in Safety, Health and Environment, the Business also won ICI plc Chief Executive Trophy in 1998.

A leader in Safety, Health and Environment, the Business also won ICI plc Chief Executive Trophy	1998
ICI Leadership Award for Sustained HSE Excellence	2001,03,05,07
Chief Executive Merit certificate	2002
Winner of ICI Pakistan Chief Executive HSE trophy	2003
Chief Executive HSE&S initiative Awards (2 out of 12)	2003
HSE Excellence Leadership Award	1999 - 2003
Chief Executive Merit Certificate & HSE&S initiative awards (3 out of 12)	2004
Chief Executive HSE&S initiative Awards (4 out of 11)	2005-06
Chief Executive HSE&S initiative Awards (2 out of 12)	2006
R&I Sustainability Award on CSR & Chief Executive HSE&S initiative Awards (4 out of 12).	
Safe Completion of 50KTPA Expansion Project & an Injury Free Year 07 - 2008	
Chief Executive Merit Certificate and HSE&S initiative Awards (04 out of 12), Injury Free Year 08	
Safe Completion of 65KTPA Expansion Project Chief Executive HSE&S initiative Awards (3 out of 12)	2009
One Chief Executive HSE&S initiative Award and Injury free year	2010
Chief Executive HSE&S trophy for the year 2010 to Soda Ash Business	2011
ICI Pakistan nominated for "Sustainability Innovation Award" by Business School Lausanne Switzerland for its recognized sustainability practices.	2014
In appreciation of substantial developments ICI was awarded with HSE&S trophy to Soda Ash Business.	2010

Annex-U

The Soda Ash Business achieved a landmark of:

Man hours since last LTI	
Employees	3.02 Million hours
Supervised Contractors	26.87 Million hours
Independent Contractors	4.59 Million hours
Injury Free for Employees & SCs	7.66 Million hours

Geographical Location

ICI Pakistan Limited, Soda Ash Works is located at Khewra in the northern part of Punjab at the foot hills of the salt range, longitude 73°E at a height of 810 feet above sea level.

It is accessible via road from Islamabad in the north and Lahore in the south. A rail road track also passes through Khewra.

Adjacent Properties

PMDC: One of the oldest salt mine is located in Khewra. The PMDC is working under the federal government of Pakistan. It has a large number of staff who is responsible for the mining of rock salt. The country's largest salt supply has been from this mine.

Railway Station

Khewra railway station is located on a side track, which gets connected to Malakwal Junction from Khewra the track ends at Dandot Station. Bulk salt transportation to other parts of the country has been through the railway wagons.

The railway engine only gets passengers / cargo from Khewra and all its fuel charging and maintenance is done at Malakwal, so the railway does not have any chemicals stored at Khewra.

Dandot Cement

There are two cement factories at this location known as Dalmia Cement which has been operative since pre-partition and the other known as Dandot Cement Co. which was commissioned in mid-eighties. These are located approximately 4-5 kilometers from Soda Ash Works.

A number of chemicals causing contamination to soil / ground water have been used and stored in the cement factory. The water drain coming out from the factory passes about 5 kilometers from the Soda Ash Works. It passes near Bhelowal village and leads down in the southern slopy region.

Affecting the environment, dust emission from the chimneys spreads over a huge area due to the natural air draft in the area.

In the drain the major harmful substances are CaCl_2 . High calcium / magnesium content, gypsum and a number of lubricants.

These effluents have their effect on nearby villages i.e. Bhelowal etc. No such effect has been reported in Khewra. Only the dust emission affects Soda Ash Works.

Annex-V

Oil Depot (Petrol Pump)

It is located near the Soda Ash Works main gate. It has storage facility for high speed diesel and petrol. No incident has been reported about any leakage / seepage of oil in the area.

Police Station

Khewra Police Station is located along the south side boundary wall of works. There is a limited staff of police.

Natural Gas Metering Station

It is located inside the works. Leakages of natural gas and condensate have been reported, but the frequency is very low.

Schools

A number of boys and girls schools are present in the area. Laboratory grade chemicals for experimentation are in use in these schools.

Winnington School Khewra

It is located inside Soda Ash Works. Laboratory grade chemicals for experiments of organic and inorganic chemistry are used in the chemical laboratory.

Jhelum Water Transport Mains

Jhelum River is located about 12 km from Soda Ash Works water is pumped from Bela located in Pind Dadan Khan. One diesel generator is also present. From Bela station water arrives at the Booster Station.

Petrol Pump

One petrol pump is located about 3 km south east from Soda Ash Works. It contains storage facility of HSD and Petrol.

Pind Dadan Khan

It is located 5 km south east from Soda Ash Works. It is the Tehsil Headquarter of the area. Its details are as follows: -

- **College / Technical Institutes**

Alberuni Government College is located about 5 km south east from Soda Ash Works. It has a chemical laboratory for science students. It contains laboratory grade chemicals for experiments of organic and inorganic chemistry. One commerce institute is also present in Pind Dadan Khan. But no chemical substance has ever been used.

Annex-V

- **Petrol Pumps**

Two petrol pumps are located in Pind Dadan Khan. Both have storage facility of HSD and Petrol.

- **General Market**

The chemicals substances sulfuric acid, Soda Ash, lubricants / grease, Freon R-22, hydrochloric acid, welding rods and cement are available in local market.

Khewra Gorge

This is a natural drain for rain water coming from the northern mountains. It normally remains dry. Only a small stream of in filter gallery brine flows through it. It is collected by ICI and used for salt dissolving.

Sr No	Name	Age	Occupation	Area/Address	Feedback	Signature
1	خیر جان اقبال	54	Sheep keeper	New medium colony	ایچھا کام ہے زیادہ ستر سی	
2	سطلان احمد	23	Press Reporter	New medium colony	اس کام سے بھلا سا فائدہ ہے ساری سوسائٹی ستر سی	
3	محمد فاروق	28	Business man	New medium colony	فائدہ ہے اس سے	
4	محمد اشرف	31	Sheep keeper	Rajput colony	زیادہ لوگوں سے آئے سے کھلی بھی کام کر رہے ہیں	
5	ذیشان مصحفی	27	Sheep keeper	Rajput colony	اگر سبھی آلودہ نہ ہوتے ستر سی	

6	پونس	30	Sheep keeper	Rajput colony	جے کے جے سکولز میں ہیں اس بابے میں۔	
7	شہباز اسم	55	Shop keeper	Rajput colony	ICAI کی طرف سے تنظیم ہے۔	
8	سولف ناز	32	Waher	Rajput colony	کوئی کنورسور کے۔	
9	انڈیا راجی	33	Waher	Rajgum	آئندہ میں امن اسم کے فائر ہوگا۔	
10	سینت	35	Waher	Rajgum	ظاہر کیا ہے کہ جدا بھی ساتھ ساتھ ہو گا	

11	اندرم پورہ	41	Worben	Sardi mehalla	پہم تو اس کام سے مطمئن ہیں۔
12	سرت	28	Worben	Sardi mehalla	خلافت کی کمی ہے مفاہتہ روؤں کا بھی ہے۔
13	عالم شہزاد	59	Worben	Sardi mehalla	آمدنی میں امانت ہو گا زیادہ کام مل جائے۔
14	لوہنہ صوبی	65	Worben	ICI officers colony	فائدہ دہی ہے بعد اہم زیادہ کام آج سے زیادہ آگے۔
15	سلطان	19	Worben	ICI officers colony	روزگار رکھنے بہارا اور تیار ہے۔

16	ری	55	Shop keeper	ICI Offices colony	بھلے میں کسی ترقی میں فائدہ ہوگا۔ ادا ہے۔
17	حسین علی	28	Shop keeper	ICI Factory colony	کوئی خاص معلومات نہیں ہے اس معاملے میں۔
18	شہباز	32	Private job	ICI Factory colony	ترقی کا کام ہے میں کسی پر ہے۔
19	اکرم الحق	41	Private job	ICI Factory colony	اصولاً کام ہے علاقے کی ترقی میں ہو رہی ہے۔
20	طاجی بھنگر	48	Private job	ICI Factory colony	مجھے نہیں پتا اس بارے میں۔ نہیں ہے کسی کام ہو رہا ہے۔

21	طرز عملی	45	Shop keeper	ICT officers working	کام کے زیادہ کرنے سے لگائی جی اور روزگار ملے گا۔
22	محمد قمر بیگ	36	Shop keeper	ICT officers working	پیرا ٹیکنی ریلوے تعلقہ تونیس بننا ہے اس کام سے ترقی بھی ہوگی۔
23	شایہ	24	Student	ICT officers working	ڈیڑی کو روزگار ملے گا اس سے پیداوار اور سرمایہ ہوگا
24	محمد خداج	28	job holder	ICT officers working	اچھا کام ہے علاقے کی ترقی کے لئے
25	دھیان	26	Student	ICT officers working	اچھا کام ہے اور زیادہ پروڈکشن سے زیادہ فائدہ ہوگا۔
26	حبیب خان	23	Student	Solution need	پلٹھانج مکمل کیے گا تو ترقی کے علاقے میں بہتری لائی جائے گی۔
27	علی اعجاز	45	job holder	Solution need	مکمل کیے تعلقہ تونیس بننا ہے ترقی کے علم سے ملے گا۔

28	فنیل مگر	52	Sleep keeper	Solway read	ICI کی کارروائی سے جلا بس بسٹ کلاہہ برسا ہے روزگار میں بس
29	کٹانک جاپر	46	Wobur	Solway read	کار رہنے سے آہل س بھی امطافہ ہوگا۔
30	مجنو علی	38	Wobur	Solway read	ایسے کام ہوتے دینے میں جس سے بیس بیت فلاڈہ ہوتا ہے

FIRE MANAGEMENT SYSTEM

1. PURPOSE

To provide guidance to those involved in designing, maintaining and managing fire protection and prevention systems for the ICI Pakistan Soda Ash business.

2. SCOPE

This Procedure supports the ICI Pakistan HSE&S Standards and is applicable to the Soda Ash business. It requires that all facilities should be equipped, maintained and managed, so far as is reasonably practicable, to ensure continued safe and secure operation, effective protection of assets and to prevent adverse environmental impact. It provides procedures to cover fire protection, detection and prevention and defining firefighting measures.

It also supports the ICI Pakistan HSE&S Standard for plant and process design, development and hazard review, in that there should be systems for the management of projects and the design of all new facilities, plants, equipment and processes.

3. DEFINITIONS

3.1 Fire Load

Fire Load is a term used generally to describe the fire capability of a defined facility. It is proportional to the quantity and heat capacity of flammable materials present.

3.2 Passive Fire protection

Passive fire protection measures are those that require no intervention in the event of fire in order for the protection to be effective, e.g. adequate separation, retaining walls, cables and equipment protection, minimize flammability of building material, reducing inventory of flammable material, compartmentation, containment of fuel, fire doors etc.

3.3 Active Fire protection

Active Fire Protection measures are those that require either manual or automatic intervention to achieve the protective function, e.g. emergency isolation valves, water sprays, fixed fire extinguishers system, sprinkler, foam generation system.

3.4 Fire Plans

Fire Plans outline, for a number of foreseeable fire scenarios, the action to be taken both by automatic systems and manual interventions to contain / extinguish the fire and limit damage.

Annex-X

3.5 Fire Prevention

To control the fire load (combustible / flammable material) and eliminate the ignition source.

3.6 Fire Detection

System to detect the fire - manually or automatically, through fire detection system like smoke or heat detector, break glass units etc.

4. RESPONSIBILITIES & REQUIREMENT

4.1 REQUIREMENTS

- a. Appointment of responsible person(s) to undertake (or coordinate) the fire risk assessment(s) and their maintenance.
- b. A fire risk assessment of site(s) to be is carried out of the fire hazards associated with the operations, processes, materials and ignition sources at the location.
- c. Identification of all events which could give rise to a fire or explosion, and assessment of the consequences, including fire propagation and likelihood of the fire.
- d. Based on the assessed fire hazards, effective fire safety management to be determined with defined controls (as identified by the fire risk assessment), and physical systems provided.
- e. Improvement actions to be included in HSE&S Improvement Plans for any deficiencies identified.
- f. Periodic review / update of fire risk assessments, and/or after modification to fire safety management or physical systems and/or location operations.
- g. Assessment of fire risk for new plant and equipment, and implementation of required controls as early as possible in the project phase in order to apply inherent HSE principles and the most cost effective fire prevention and protection solutions.
- h. Development and implementation of fire emergency response plans.
- i. All fire incidents are recorded, investigated, action taken to prevent recurrence and the learning arising from any such incidents incorporated into fire risk assessments.

Annex-X

- j. Specialist audit at regular intervals of the fire safety management systems, physical systems, fire response emergency plans and any other relevant location procedures related to fire prevention.**
- k. Routine testing, inspection and maintenance of physical fire safety systems (both fixed and portable) to ensure appropriate minimum performance standards.**
- l. Training of Location emergency response (fire crews) in firefighting and use of fixed fire protection systems, is undertaken, reviewed and monitored.**
- m. Close liaison with external emergency services to be maintained.**

4.2 RESPONSIBILITIES

4.2.1 Vice President shall

Provide necessary resources and appoint ----- as Responsible Person to provide expertise opinion during Fire Risk Assessments.

4.2.2 HSE Manager shall be responsible for:

- a. Provision and maintenance of firefighting equipment.
- b. Training and provision of adequate communication vis-à-vis fire evacuation to the entire business staff.
- c. Training of firefighting team.
- d. Establish and communicate Emergency Response Procedure (HSE P16.01) to all concerned at Works enabling them to determine their roles during an emergency.
- e. Site instructions on firefighting facility are available and highlight:
 - I. Active fire protection facilities available at site.
 - II. Firefighting team comprising of firefighters from the staff.
 - III. Emergency response fire plan including actions to be taken in the event of failure of key components of the plan.
 - IV. Inspection, audit and reporting requirements of fire protection equipment and system to conduct firefighting drill at least once a year
- f. Annual auditing of Fire Safety Procedure and implementation of highlighted required improvements.

Annex-X

- g. Specialist audit of fire safety management system conducted **once every 3 years** in consultation with Corporate HSE Function.
 - h. Formal investigation of all fire incidents.
 - i. A fire drill is conducted at least once a year **to assess response of concerned person(s), adequacy of fire safety arrangements.**
 - j. Review of fire assessment after every two years and modification updated in fire safety management.
- 4.2.3 **Technical Manager** shall ensure that during modification or installation of a new plant or storage of material, appropriate separation distances are maintained between potential source of fire and equipment / facilities that could be affected.
- 4.2.4 **Departmental Heads / Area Managers** shall be responsible to ensure that
- a. Offices, workshops, sheds, stores, and warehouses, under their control are properly locked at closing hours and potential fire hazards are eliminated.
 - b. All persons in their area are aware of the correct procedures to be followed in the event of fire and the procedures laid down in the safety instructions are met and followed.
 - c. In consultation with the HSE Manager, a fire risk assessment is carried out for fire hazards associated with the operation, processes, materials, and ignition sources within the department and any deficiencies identified shall be incorporated into the HSE&S Improvement plan.
 - d. All firefighting equipment installed in their area is in working order around the clock and defects are reported and rectified on priority.
 - e. Fire / explosion hazards associated with the processes, material and ignition sources in their areas are assessed, documented and communicated to their staff. The assessment shall be reviewed periodically (**on alternate years**) and any deficiencies identified shall be incorporated in the site HSE improvement plans.
 - f. Labeling of flammable material is done as per **ICI Pakistan Corporate Guidelines**; incompatible material that could react to cause a fire or explosion is segregated and stored in restricted areas.
 - g. Classification of hazardous areas in order to prevent fires
- 4.2.5 Line manager shall be responsible to;
- a. Control ignition source in their areas and ensuring that strict procedural controls are implemented in the form of Hot Work Permits,
 - b. Prevention of unauthorized introduction of ignition sources in controlled areas.

Annex-X

4.2.6 Stores and Supply Chain Managers shall control the quantity and location of material that contributes to site fire load.

4.2.7 E & I Manager shall ensure that **all components of** fire detection system (smoke detector, break glass unit) and fire alarm are inspected **at least once every year.**

5. COMMUNICATION AND TRAINING

Sectional heads shall ensure that emergency response and firefighting instructions are communicated with-in their section.

HSE Manager shall ensure that all staff / contractors of the business are provided regular training in Emergency response / evacuation. Records of such training shall be maintained.

6. DOCUMENTATION

a. Records of all fire incidents.

b. **Fire incidents investigation reports.**

c. **Fire Risk Assessments.**

d. **Specialist Fire Audits.**

e. **Inspection Records of Fire Detection and Fire Communication mechanisms.**

f. **Inspection records of fixed and portable fire safety equipment.**

g. **Fire Drill reports**

7. REFERENCES

a. Site Instructions on Fire Protection

b. ICI Pakistan Corporate Guideline 19.01 Fire Safety Management

c. Emergency Response Procedure SA HSE P-16.01 01

d. ICI Pakistan Fire Protection Guides

e. Fire training "Fire protection guide No13"

f. Fire Safety audit Fire protection Guide No 16

8. AMMENDMENTS

This is the 2nd issue, aligned with ICI Pakistan HSE&S Guideline.

APPENDIX-A:**FIRE SAFETY SYSTEM COMPONENTS**

Fire Safety Management System	INCLUDE	BUSINESS CONTROL
FIRE PREVENTION	Limit fire loads. Eliminate ignition source. Flammable/combustible characteristic of material. Arson prevention, electrical equipment specification and storage arrangements. Prevention of loss of containment. Put fire prevention procedure in place.	Hot Work Permit, MSDS and control of flammable material on site. Security procedure for arson control, Hazardous area classification, Smoking Policy, Smoking point Identification
FIRE DETECTION	Means of fire detection e.g. smoke, heat, flame, and radiation. Action on fire detection e.g. automatic / manual and response time for communication with -in the location and with external emergency services, etc. The effects of manning levels and their locations.	Fire Alarm (Smoke detector system) Public Address system Automatic and manual detection and reporting systems available.
FIRE PROTECTION (fixed system)	Active fire protection systems e.g., Sprinklers, water spray system, foam system, gas system, automatic process isolation, electrical power isolation, etc. Water source and supply system for active systems. Passive Fire Protection: Separation (distance) Segregation (physical separation), containment of fire loads, drainage (include run of), capacity of fire pumps, road and site access, drainage and containment (run-off)	Trained fire fighting team Fire detecting (Smoke detectors) Fire Alarm,. Fire Fighting Training. Fire drills, Flammable Material Segregation, Emergency Exit provided. Furnace Oil drainage arrangement, Fuel containing facility. Control of combustible material.
FIRE FIGHTING FACILITIES	Personnel access both for fire fighter and escape. Emergency lighting coverage type, Number and location of portable fire extinguishers, fire blankets, hose, reels, and fire hydrants, Capacity of pumps, road and side access, drainage and containment (run-off)	Portable Fire Extinguishers Fire Ring Main /Hydrant, Fire tender, Foam Generation and injecting Sys. Hydrant & monitors, Water Curtain - 30 nos. of fire hose, 5 hose reel, 23 fire hydrants, 1 portable fire pump, 2 fire pumps,
EMERGENCY RESPONSE	Fire alarms, locations, audibility and visibility, Emergency plans, Fire plans, Means for call out of fire fighting response, Equipment and supplies for emergency response, Mutual aid arrangements with adjacent locations, Communication on-site, during the emergency and with emergency services, Necessary process technical information required to support emergency services. Public information, measures required for environmental damage limitation, Post incident recovery plans.	Two fire alarms at different location. Emergency response procedure, fire-fighting procedure, 2 to 3 minutes call out response, well established emergency equipment, Telephone, Motorola, Public address. Plans and procedures for Emergency response available and implemented. Liaison with Local Administration maintained.
TRAINING	General Basic awareness training in fire precautions, induction training on fire hazards, specific fire hazard training, on site fire response training, full time part time	Basic fire fighting to all staff. Fire hazard is the part of induction training. Twice a week training of fire fighters.

Annex-X

	crew, Training of emergency fire plans, Procedures in place for training and training responsibility, refresher training at regular intervals, Contractor and others personnel training.	Basic fire fighting training given to Contractor staff,
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SITE EMERGENCY HANDLING

1.0 PURPOSE

The purpose of this procedure is to provide clear and detailed instructions to all personnel of Soda Ash Business, for effective handling of all foreseeable emergencies in a way so that Plant, Personnel and Environment are protected from the possible effects of all foreseeable emergencies.

This procedure outlines arrangements to deal with medical emergencies and to provide guidance for minimizing risks arising out of Natural Disaster e.g. earthquakes, Hurricanes and Floods.

2.0 SCOPE

This procedure is applicable to the Soda Ash Works including Watli Water Spring, Jhelum River Pumping and Booster Stations, Coke yard, New SD Basins, Lime beds, Salt Mine , and Limestone quarry located at District Chakwal. It supports the ICI Pakistan HSE&S Corporate Guideline, which requires that management should have systems in place for effective handling of all foreseeable emergencies in a way so that Plant, Personal and Environment are protected from the possible effects of all foreseeable emergencies.

This procedure also covers the requirements for medical and nursing involvement, the initial first aid treatment of casualties and the arrangements for disposal for further treatment of emergencies at the Soda Ash Business.

3.0 DEFINITIONS

3.1 Emergency

An abnormal incident which results or has a potential to result in injury to person, damage to Plant, Materials, Buildings, and / or Environmental damage to atmosphere or water systems.

3.2 Toxic Release

A release of material which could cause harm beyond the immediate vicinity of the release.

3.3 Fire

Fire is defined as a condition when there is a naked flame, there is glowing materials that might burst into flame or ignite something else or there is smoke in sufficient volume and density to suggest that something is burning.

3.4 Major Emergency

There are several types of emergencies that can occur within the Soda Ash Business. These emergencies would arise out of process upsets, equipment failures or minor fires. These can be handled by quick localized action of the operating staff. However, in case of major emergency/ disaster situation, a well-organized emergency response will be required. These major emergencies / disasters can occur due to large fires, explosions, toxic releases (Ammonia / Chlorine) and major building collapse etc. Some typical examples are: -

- Release of liquid / gaseous ammonia from any or all of the 3 x 5 Ts ammonia cylinders.
- Major fire in the Furnace/Diesel oil tanks.

Annex-Y

- Road accident of a mobile ammonia tanker.
- Major explosions in one or more boilers.
- Collapse of Plant 'A' building / structure.
- Collapse of one or more Solvay towers.
- Major fire in the Natural Gas metering station or associated piping.
- Kidnapping / Sabotage / Terrorist action.
- Union strike or lockout.
- Earthquakes.

3.5 Medical Emergency:

Any accident that may lead to one or a number of injuries that may prove to be major in nature.

3.6 Emergency Plan:

A formal and rigorous set of instruction to deal with medical emergencies.

3.7 Toxicology Manager:

Laboratory Manager will also be the toxicology Manager at the Soda Ash Business.

3.8 Occupational Hygiene Manager:

HSE Manager will be the Occupational Hygiene Manager of the Soda Ash Business area.

3.9 Occupational Medicine Manager:

Medical Superintendent will be assigned this responsibility.

3.10 Natural Disasters:

Natural disasters can be the following but not limited to those listed below:

- Earthquake: Convulsion of earth's surface due to faults in strata or volcanic action.
- Hurricane: Violent storm-wind

4.0 RESPONSIBILITIES AND REQUIREMENTS

4.1. REQUIREMENTS

- a. Identification of foreseeable emergency situations (including those with off-site impacts and from security threats), assessment of their potential impact.
- b. Prompt identification of all foreseeable emergencies, and communication arrangement to warn people present on site and summoning of assistance from on site and off site.
- c. Routine checking of emergency response equipment provided at site(s).
- d. Medical resources/facilities for prompt treatment of injured person(s).
- e. Arrangements to mitigate the effect of off-site consequences of on-site emergencies.
- f. Routine practice of emergency handling procedure as per the hazard and risk of emergency situation, lessons learnt from such exercises to be incorporated during next review of emergency plans.

Annex-Y

- g. Assembly points at safe locations for head count / roll call (for employees, contractors and visitors) upon buildings evacuations.
- h. Search operation by trained staff for any missing persons.
- i. Specified roles for each person/group for effective handling of emergency situation.
- j. Sharing of emergency procedures with external emergency services, hospitals, legislative authorities (as appropriate).
- k. Arrangements for briefing to media and effective media handling.
- l. Refresher training of staff engaged in emergency handling.
- m. Relevant operations to be ceased if any arrangement for effective handling of any foreseeable emergency situation (with potential significant consequences) is out of order (even if there is no such emergency situation).
- n. Notification to off-site public members (those required to be displaced), and provision of assistance (upon displacement), plus assessment of potential recovery needs of the community.
- o. Process of Emergency Communication and its Handling

o-1: Detection & Reporting of Emergency:

Anyone in the Works, who sees a fire, hears an explosion or notices an uncontrolled release of ammonia or chlorine etc must take the following actions:

o-2: In case of fire :

Raise alarm by breaking the glass of nearest break glass unit.
Report to Shift Coordinator / Manager through telephone (300/ 401/ 402) or wireless phones or contact Time Office (400/300) if Shift Coordinator/ Manager are not available.

o-3: Declaration of Emergency:

Shift Coordinator, on being informed will access the nature and type of emergency before declaring emergency and sounding the siren. His role statement is attached in Appendix -4

o-4: Emergency Siren:

Emergency will be declared by an up & down siren of 2 minutes. When emergency is declared, all personnel other than plant operators will assemble at their assembly points (List of Assembly points is attached in Appendix-14). Evacuation of plant operators shall be done as per the nature of emergency determined by the emergency controller.

A continuous blast of 90 seconds duration will signify the end of the emergency. After the emergency has been fully controlled, Shift Coordinator would sound the all-clear siren as advised by the Emergency Controller.

o-5: Emergency Handling:

Production Manager / Plant-A Manager and the Emergency Response committee shall be responsible to reach the CCR from where they shall coordinate the emergency handling. They shall perform such duties as

Annex-Y

specified in Appendix-2. Role statements of all other are specified in Appendix-5-11.

4.2. RESPONSIBILITIES

4.2.1. Vice President, who shall initiate the decision to invoke crisis management plan, through the Operations Manager shall ensure that:

- a. The type, scale & potential impacts of all reasonably foreseeable incidents or natural disasters is assessed, including those from security threats, and those with potential off-site effects, and appropriate procedures are developed to minimize damage.
- b. Systems / equipment is available for detection of emergencies with a means of warning people on site and summoning people both from on / off site.
- c. There are arrangements to mitigate the effects of offsite consequences that could cause harm to people and environment.
- d. Emergency procedures appropriate to the Hazards and Risks present [Fire, Spills, Injuries, Medical Emergency etc] at site are in place and practiced. Roles and responsibilities for persons responsible for handling emergencies are defined.

4.2.2. Business HSE Manager shall ensure that:

- a. Each location at plant is covered through Fire Detection / communication network to facilitate emergency communication.
- b. There are identified assembly points for each area / work group [ICI & Contractors], **Appendix-14**
- c. Emergency handling procedures with defined roles and actions for all concerned are in place and regularly practiced **at least once every year**, this should essentially include the clarity about the role and responsibility of Emergency Controllers / Incident managers & Emergency Coordination Committee members.
- d. Emergency / Incident Controller are trained for their assigned role.
- e. Effectiveness of the procedure / system checked through Emergency Drills. Lessons from these drills should be shared with all concerned.
- f. Notification to Corporate HSE Function and to the regulatory authorities (if required).
- g. All equipment provided for initial response to emergency situations is routinely checked to ensure "Fit for Use" healthy condition.
 - h. Fire suits and SCBAs are maintained in ready for use condition so that these can be used for search operation of any missing persons as identified during head count.

Annex-Y

- h. Assess the status of external services emergency vehicles for entry inside the hazardous classified areas and have the necessary hardware (e.g. flame arrestors) developed and made available at required access control points of hazardous areas.

4.2.3. E&I Manager shall ensure:

- a. Routine checking of Emergency Handling / Detection Equipment / systems is carried out to ensure that these are fit for purpose. This is to be ensured through planned checking of all BGUs, Smoke Detectors, sirens, emergency exit doors lights etc.
- b. Systems for regular maintenance of BGUs, Smoke detectors, PA system and sirens to ensure fitness for purpose.

4.2.4. Medical Superintendent shall be responsible to ensure:

- a. Systems in place for prompt treatment of injured person and for liaison with external hospitals depending upon the nature of emergency.
- b. First Aid Boxes are available at Site, regularly checked, shortages made up and periodic refresher training for First-Aiders arranged.
- c. Updated contacts of all Hospitals are available and updated when changes occur. For details consult SI HSE 16.01.01 – 01 A (Management & control of first aid facilities).
- d. Instructions are available for dealing with emergencies involving casualties, taking into account all foreseeable types and number of casualties that may arise. This should include the arrangement for calling for assistance, triage technique for multiple casualties, the initial on site first aid treatment, decontamination procedures, if required, and referral to other hospital. The procedure shall be based on the following principles:
 - Trained First Aid Staff with periodic refresher training.
 - Medicines / Materials adequately stocked.
 - Maintain and upkeep of First-Aid boxes at the plant
 - Ambulance / Emergency van procedure.
 - Winnington Hospital facilities and arrangements: (A full-fledged intensive care unit to be in place and operational to deal with medical and surgical emergencies)

4.2.5. HR Manager, in order to get help support in mitigating the offsite effects of emergencies, shall:

- a. Have an action plan developed and discussed with local authorities.
- b. Have a Community Welfare plan in place.
- c. Ensure that close liaison is maintained with community elders, influential personalities and the district administration.
- d. Be the spokesperson, in case of queries from media or press or local authorities.
- e. For serious injuries / casualties contact the relatives of the injured / deceased person and brief them about the situation.

Annex-Y

- f. Be responsible for fulfilling the transport requirements that may come up for medical emergencies or others.
- 4.2.6. Technical Manager shall ensure that all Scope of Work documents for plant expansions should include data for rainfall, wind velocities and direction, seismic data etc, pertinent to Khewra, so that any future plant expansions and/or additions can be designed to have in-built safeties against natural disasters.
- 4.2.7. **All Area Managers (Plant Managers / Warehouse Managers / Administration & Security Manager) shall ensure that no hot work is allowed, and all vehicles along with drivers / cleaners are taken out of site/ and vigilance in area is increased through patrol if fire hydrants network gets depressurized (due to any reason) or fire detection system communication panel is not operative.**

5.0 COMMUNICATION AND TRAINING

- HSE Manager shall be responsible for communication of this procedure to all Managers including Corporate HSE Function.
- Communication to press / media / regulating authorities shall be carried out by the nominated Business Spokesperson as described in SA HSE P 16.03 01.
- Regular First Aid training to be given by the Medical Superintendent.

6.0 DOCUMENTATION

- List of Emergency Coordination Committee members.
- Facilities required in emergency control center (**detailed in appendix-11**)
- Plan for routine checking / inspection of Emergency Response Equipment.
- Emergency Drill reports.
- Contacts of Emergency Services / Hospitals.

7.0 REFERENCES

SA HSE P 16.03: Procedure for Crisis Management Planning.
ICI Pakistan HSE&S Corporate Guideline 16.01.

8.0 AMMENDMENTS

This is the 7th issue of the procedure, aligned with ICI Pakistan HSE&S CG-16.01.

LIST OF EMERGENCY CONTROLLERS & INCIDENT CONTROLLERS AND THEIR RESPONSIBILITIES

LIST OF EMERGENCY CONTROLLERS:

Production Manager / Plant-A Manager shall act as the Emergency Controller for all plant emergencies. He shall be located at the central control room (CCR) and shall act as the controller for all emergencies occurring at the plant, whether at plant A, Plant-B or Power Services area.

Distribution incidents shall be handled as per **SA HSE P 16.02.01** whereby the Marketing Manager shall be the emergency controller as defined in the procedure.

RESPONSIBILITIES

- a. In consultation with Incident Manager assess damage / potential of emergency.
- b. Decide if Plant Shut Down or Plant Evacuation is required.
- c. Arrange Head count if Evacuation is required and consequently arrange search operation if someone is missing.
- d. Arrange First Aid to injured persons / shifting to works dispensary or hospitals.
- e. Decide / arrange services of outside agencies (Police, Fire Brigade etc).
- f. Liaison with outside agencies if site hand over to outside agencies is needed.
- g. Assess damage once emergency is over and prioritize repair works.
- h. Fill Incident report within 24 hrs.
- i. Communicate to Emergency Coordination Committee members and keep them informed all the time
- j. Be an active member of Investigation Committee to find out the root cause of the incident

LIST OF INCIDENT CONTROLLERS:

During working days / working hours HSE Manager Soda Ash shall be the Incident Manager for all fire and toxic release etc emergencies at the Soda Ash Site. Till the time that the HSE Manager arrives at the incidents site, the Shift Coordinator shall act as the incident controller.

For all Medical Emergencies, Medical Superintendent shall be the Incident Controller.

Distribution incidents shall be handled as per **SA HSE P-16.02.01** whereby the Regional Sales Managers shall be incident controllers as defined in the procedure.

During non-working days / non-working hours Shift Coordinator shall be the Incident controller for all emergencies till the time that the HSE Manager arrives and takes over the role of the incident controller.

RESPONSIBILITIES

- a. Get information about the emergency from Shift Coordinator/ Manager or Time Office.
- b. Be actively involved in controlling Emergency situation i.e., Fire, toxic release/spills or medical emergency.
- c. Provide guidance to Fire Team.
- d. Keep Emergency Controller informed of the situation.
- e. Provide regular feedback to the Emergency control center of any developments in the control of emergency situation

EMERGENCY COORDINATION COMMITTEE**As on: 1st December 2014**

1.	Production Manager (Successor: Plant A Manager)	Chairman
2.	Laboratory & Development Manager (Successor: Design & Development Manager)	Member
3.	Engineering Manager (Successor: E & I Manager)	Member
4.	Admin & Security Manager (Successor: IR Manager)	Member

Medical Superintendent and the HSE Manager can be co-opted as the members if they have no role in the handling of the actual emergency i.e., the emergency are such that does not compromise their roles as Incident Controllers.

The Crisis Management Team shall assemble at the Operations Manager office. This office shall act as their Assembly point so that information can be passed on to them readily and in case Crisis Management Plan is invoked; they can start their actions instantly.

RESPONSIBILITIES OF EMERGENCY CONTROL CENTER COORDINATOR

When the Emergency Control Center (i.e. CCR) is established after declaration of the emergency, the Production Manager/ Plan-A Manager will assume responsibility of Control Center Coordinator with following responsibilities:

- Immediately, on nomination, will inform Shift Coordinator, HSE Manager and Area Managers of his identity and the fact that the Emergency Control Center is established
- Assembles the Emergency control team and assign their roles
- Receive all in coming information from the site and redirect to the concerned Managers.
- Provide coordinated direction to the HSE Manager, Shift Coordinator and Area Manager for managing emergency as well as plant operations.
- Coordinates and arranges emergency repair work and mobilizes essential resources to contain the emergency situation
- File a missing persons report from feedback received from Area Managers and arrange rescue operations.
- Respond to queries from the Crisis Control Center members (If Crisis has been declared) pertaining to update done emergency control/containment and an objectively assessed situation.
- Coordinate and facilitate direct communication of Control Center members with the Shift Coordinator, HSE Manager and Area Manager on specific professional issues concerning the respective members of the Control Center.
- Authorize the end of the emergency after being given all clear by Incident Controller.

Annex-Y

RESPONSIBILITIES OF PRODUCTION MANAGER (Emergency Controller)

Successor: Plant-A Manager

- Proceeds to the Emergency Control Center as leader of the Emergency Control Center and assumes all responsibilities outlined for Emergency Center coordinator.

RESPONSIBILITIES OF ENGINEERING MANAGER

Successor: E & I Manager

- Proceeds to the Emergency Control Center as a member of Team.
- Coordinates and arranges emergency repair work and mobilizes essential resources.
- Plans and arranges Engineering Department's resources contributing towards bringing plant back on line at the earliest at the end of emergency, where required.
- Provide any other Engineering support as required by the Emergency Control center Coordinator.

RESPONSIBILITIES OF LABORTARY & DEVELOPMENT MANAGER

Successor: Design and Development Manager

- Proceeds to the Emergency Control Center as a member of Team.
- Provides MSDS and plant CSI list as per requirement.
- Provides the analytical services when required.
- Provides plant operating scenario as required.

RESPONSIBILITIES OF ADMIN & SECURITY MANAGER

Successor: IR Manager

As required by the Emergency Control Center coordinator, the Admin Manager shall provide the following services:

- In case local emergency services mobilization is required, contacts the Assistant Commissioner, DSP (Police) and Local Administration and requests for vehicles, manpower and police help.
- Ensures that all company vehicles and the drivers are on standby for transportation.
- Establishes contact with the Lahore Flying Club and ensure that the Air Charter Service is put at the Control Center disposal as expeditiously as possible. At the same time attempts should be made to establish a similar facility with the Rawalpindi Flying Club.
- Arranges for announcement and evacuation from Staff Residential Estates as per requirement.
- Provides information to relatives of persons injured and responds to third party queries
- Instructs Security for roadblocks within the Works where required.
- Ensures that all secretarial help available on site is summoned and made available to the Control Center.

CRISIS MANAGEMENT COMMITTEE (CMT)**Contact Numbers**

	Name	Designation	Phone (Off)	Phone (Res)
1	Suhail A Khan	Vice President Business Crisis Manager	(042) 3639383 0346-2221111	(042) 35734583 (042) 35897816
2	Muhammad Umar Mushtaq	Operations Manager	(0544) 231138 (0544) 231495-99 EXT. 303 0300-8431914	(0544) 211495- 99 EXT 202 (0544) 231146
4	Muhammad Taufiq Cheema	Technical Manager	(0544) 231549 0300-88709449	(0544) 231556
5	Hassan Iqbal	Engineering Manager	(0544) 231552 0300-8477188	(0544) 231559
6	Haroon Ahmad Malik	Finance Manager	(0544) 231547 0300-8293799	(0544) 231169
7	Aqil Karim	HR Manager	(0544) 231643 0333-8311873	(0544) 232215
All Above can also be contacted through the telephone exchange: Telephone (0544) 231495 –99 0300-5010267 0300-5010268				
8	Aamir S Chaudhary	Marketing Manager	(042) 36306375 (0300)-8546218	(042) 35837293
Depending on the nature of the crisis, other members may be co-opted, such as the HSE Manager or Medical Superintendent. However this should be done only if they have no role in the handling of the emergency as incident controllers.				
9	Dr. Muhammad Rashid Khan	Medical Superintendent	(0544) 231667 0300-8421108	(0544) 231420
10	Saeed Iqbal	HSE and Training Manager	(0544) 231495-9 Ext – 321 0300-8409936	(0544) 231495-9 Ext – 221

APPENDIX-4: ROLE STATEMENT OF SHIFT COORDINATOR**Successor: Shift Manager**

- a. Access the nature of Emergency and Authorizes the Time Office to sound the appropriate siren and gives him detail of the nature and location of the emergency. Actuates the public address system according to the emergency.

Annex-Y

- b. Reports all emergencies to the Production and HSE Managers.
- c. Ascertains the extent of the disaster/emergency situation by visual inspection from an appropriate vantage point.
- d. Initiates isolation of the leak/fire source, shutdown of affected sections/units on his judgment to minimize the damage to equipment and personnel, before the Emergency Control Center becomes operational. Orders evacuation of an affected area, if required.
- e. In case emergency has been declared and siren sounded, he shall inform Production Manager or progressive successors regarding the Location and extent of leakage/fire or disaster and Wind direction in case of vapor/gas leak or fire. He shall act as the incident controller and guides the Emergency Squad at the time of emergency till the HSE Manager arrives at site and takes over.
- f. Once the Emergency control center has started functioning he shall take over control of plant operations and manage plant operation and provides assistance as required to HSE Manager to control / contain emergency situation as advised by the Emergency controller.
- g. Declare end of emergency by sounding alarm through time keeper when intimated by the Emergency control center.

APPENDIX-5: ROLE STATEMENT OF HSE MANAGER (Incident Controller – Plant Emergency)

Successor: Lab & Development Manager

- a. On hearing the disaster alarm or receiving information on telephone, will rush to the affected area along with appropriate Personal Protective Equipment. (PPE)
- b. After being briefed by the Shift Coordinator, (if direction is being taken over from him) will take over charge of control/containment of emergency situation and rescue activities and lead the Emergency Squad and necessary resource/equipment.
- c. In doing so, remains in constant touch as far as possible with the Emergency Coordinator in the Control Center and provides him up-to-date status on the emergency.
- d. Makes available his advice on specific actions to control/contain affects of emergency to all concerned personnel on the plant.
- e. Liaise in specific with the Emergency Coordinator at the Control Center regarding serious injuries to the employees and members of the public or any threats to the public or Residential Estates.
- f. Updates Emergency Control Center Coordinator on situation and informs him of additional help / backup required.
- g. Facilitates in first aid and evacuation of injured persons.

APPENDIX-6: ROLE STATEMENT OF MEDICAL SUPERINTENDENT (Incident Controller – Medical Emergency)

Successor: Lady Doctor

- a. On being informed of the emergency shall proceed to the Winnington Hospital.
- b. Immediately assumes the role of the leader of the Medical Emergency Response Team, which shall be comprised of the Lady Doctor, and Para Medical Staff who will immediately report at Winnington Hospital on hearing the emergency siren.
- c. Instruct dispensers on duty to take out the medical supplies tools and set up the Operation Theater and available 10 Nos. Oxygen Cylinders.
- d. Receives information on the number of persons injured and makes the Wards ready to receive them. (Accommodation for 20 beds is available at the Winnington Hospital while 20 extra beds can be accommodated in the Welfare Hall. Additional patients will be sent to Tehsil Hospital.

Annex-Y

- e. Contacts Doctors/Para Medical Staff of the Cement Industries and Pind Dadan Khan Tehsil Hospital for help, when required.
- f. Contacts Control Centre for any other outside or specialized help like transportation of patients to the Tehsil Hospital.

APPENDIX-7: ROLE STATEMENT OF CONCERNED AREA MANAGER

- a. Rushes to his area on receiving information of emergency along with adequate Personal Protective Equipment (PPE) and affects a roll call of the area workers after ensuring evacuation, if required, following the safest route. Informs Emergency Control Center of any person missing.
- b. Liaise with the Emergency Control Center to assist in controlling/containing the emergency and rescue operations.
- c. Updates the Emergency Control Center Coordinator on the emergency situation and informs him of additional help / backup required.
- d. Takes over charge of affected area at the end of emergency and initiates repair actions etc. after assessing the damage.

APPENDIX-8: ROLE STATEMENT OF OPERATIONS MANAGER

Successor: Production Manager / Plant-A Manager

- a. Informs the Vice President of the emergency.
- b. Provides backup support to Production Manager (Emergency Controller) at the Works, if required.
- c. In case Crisis is declared, he would proceed to the Crisis Management center to fulfill his responsibilities. In absence of the Vice President, he shall act as the Crisis Committee Chairman.

APPENDIX-09: ROLE STATEMENT OF EMERGENCY SQUAD

The Emergency Squad assemble at the Fire Station in the Works and after forming into teams and identifying the senior most member as leaders under the direction of the Shift Coordinator or HSE Manager, (as the direction is handed over as described earlier) shall be responsible for:

- a. Controlling/containing emergency situations and rescuing people who may get trapped or injured in the Works.
- b. Controlling and containing spreading of Ammonia or Chlorine vapor cloud forming as a result of disaster/emergency from a safe distance.
- c. Fighting fire resulting from the emergency/disaster.
- d. Effecting rescue of personnel trapped in Ammonia or Chlorine cloud or a fire area or in a collapsed building.
- e. Any other job that may be assigned by the Shift Coordinator, HSE Manager (depending upon whoever is directing at that time).

APPENDIX-10: ROLE STATEMENT OF SHIFT TIME KEEPER

The duty Shift Time Keeper on receiving telephone call from the Shift Coordinator or any other staff (who has seen the incident) will carry out the following actions:

- a. Note down the message with the following information:

Name and Works No. of the caller.

Nature of the emergency and its location.

- b. Inform Shift Coordinator (if the caller is not Shift Coordinator) and seek authorization for sounding the appropriate emergency siren. If the Shift Coordinator cannot be contacted, the Time Keeper will sound the fire emergency siren on his own authority.

Annex-Y

- c. He shall inform the Emergency team at the Fire Station (Ph: 500) of the location of the Emergency. In case of external fire he shall arrange transportation for fire fighters.
- d. Inform the following on telephone, giving details as mentioned above.
 - i) HSE Manager
 - ii) Medical Superintendent
 - iii) HR Manager
 - iv) Engineering Manager
 - v) Finance Manager
 - vi) Production Manager
 - vii) Technical Manager
 - viii) Operations Manager
 - ix) Arrange Emergency Van & Emergency Squad.
- d. In case of off hours, obtain the Fire Station key and keep it handy.
- e. Inform the Emergency Squad Members, arriving from the Estate, of the location and nature of the emergency and arrange transport for fire fighters in case of external fire.
- f. Arrange transport/ambulance as desired by the Emergency Controller.
- g. Sound "All Clear" signal.
- h. He shall sound All clear siren on advice of Shift coordinator.

APPENDIX-11: EMERGENCY CONTROL CENTER – FACILITIES REQUIRED

Production Manager / Plant-A Manager shall ensure that the Control Center is equipped with the following at all times:

- a. **Site Plan** main production units marked, critical areas highlighted evacuation sites and casualty collection areas indicated, intervening distances stated.
- b. Similar **Plot Plan** indicating location of Emergency Personal Protective Equipment, fire hydrants/extinguishers / first aid boxes and safety showers and eye fountains.
- c. **Site Map** of plant and surrounding area with location of inhabited areas and their average population clearly marked starting the approximate distance from critical on site facilities. Note location and distance of sensitive congregation of people like schools, hospitals that may need specific responses during an emergency.

Annex-Y

APPENDIX-12:
LIST OF RESPONSIBLE MANAGERS & SUCCESSORS

List of Area Managers to be contacted during an Emergency

	Area	Concerned Manager	Immediate Successors
1	Plant-A	Plant-A Manager	Plant-B Manager
2	Plant-B &C Including Cokeyard, Limebed & S.D. Basins	Plant-B Manager	Plant-A Manager
3	Boiler & Power Services Including Bela, Booster & Watli, CFB	Power Services Manager	Asstt Manager Power Services
4	Workshops Including Engineering / vehicles workshop	Asstt Manager- Workshop & Vehicle	Project & Development Manager
5	Laboratory Shift Lab	Laboratory Manager	Design & Development Manager
6	General Stores	Stores Officer	Finance Manager
7	Administration / Stores offices & Residential Estates	Administration & Security Manager	HR Manager
8	Electrical & Instrument Workshop & Substations & Electrical Equipment's	Electrical Manager	E&I Manager
9	Ammonia Facilities & Tankers	Plant-A Manager	Plant-B Manager

Annex-Y**APPENDIX-13:**
LIST OF FIRE FIGHTERS

S.NO	NAME	SAP #	DEPTT.	SECTION	RESP. Mgr
1	Mohammad Naeem	20040	Prod	Plant A	SM
2	Mohammad Ajmal	20100	Prod	Plant A	SM
3	Mukhtar Hussain Shah	20128	Engg	Electrical & Instrument	MNI
4	M Akram	20145	Engg	Electrical & Instrument	MNI
5	M Amir Malik	20195	Engg	Electrical & Instrument	MNI
6	M Arshad	20202	Prod	Plant A	SM
7	Muzhar Hussain	20210	Engg	Plant B	MTA
8	M Farooq Bhatti	20250	Prod	Plant A	SM
9	Irfan Ahmed	20263	Prod	Plant B	RMAJ
10	Qamar Hussain	20296	Engg	Power Services	ASJ
11	Jamshad Akhtar	20315	Engg	Plant B	MTA
12	Muhammad Ismail	20322	HR	IR & admin	SAS
13	Afsar Noon	20346	Prod	Plant A	SM
14	Touqeer Ahmed	20366	Engg	Plant A	HK
15	Fasil Latif	20377	Prod	Power Services	MSA
16	Sadaqat Ali	20374	Prod	Power Services	MSA
17	Malik Adil	20383	Prod	Plant B	RMAJ
18	Zubair H Shah	20399	Prod	CFB	MSA
19	Shaheen Asghar	20401	Prod	CFB	MSA
20	Malik Muhammad Amir		HR	Admin	MMF
21	Iftikhar Ahmed		HR	Admin	MMF
22	Hafiz Imran Shabbir	20398	Prod	CFB	MSA
23	Mureed Raza	20402	Prod	CFB	MSA
24	Gulfaraz	20400	Prod	CFB	MSA

Annex-Y

APPENDIX-14: LIST OF ASSEMBLY POINTS

No	Location	For Which Staff to Assemble
AP-1	Time Office (South side of cycle stand)	Security, Time office, Canteen Staff and Contractors staff.
AP-2	West of Admin Block	Accounts, IT, Main Office Staff, Fire Station staff, Project office staff.
AP-3	Opposite Design Office (North East Side of Old AWH)	Design Office , PRO, Day Lab, Old AWH, Shift Laboratory and CCR Staff.
AP-4	Entrance of old A-building (North Side)	Plant A-wet Production, BPP / AWH Maint. Staff Calciner No 2
AP-5	North of new A building	Plant A Wet Maintenance Staff, Dispatch Office Staff, Calciner 3/4 Production Staff,
AP-6	South of General Store (Near Vehicle Shop)	Vehicle Shop, Rigging , General Store Staff, Smith shop, Descon boiler Staff
AP-7	South of Mechanical Work Shop (Near Work shop main nterance)	Electrical workshop, Mechanical work shop staff
AP-8	South East of Limestone hopper (Near DBO bridge)	All Bicarb staff, New Engine room, New pump house, Limestone inspection staff ,Training center, Zurn Boiler staff, B plant Maint Staff
AP-9	Near Magma Tank (South Side)	Plant A-dry production & Engineering staff, Maint Shift staff and DA plant staff
AP-10	North east of Kiln near scrubber	All Kiln Production and WPP Staff
AP-11	North of Furnace oil Tank #1	Boiler house Operation & Maint Staff
AP-12	South of BPP under the piping bridge	Power House Operation Staff, Brine Plant production staff
AP-13	Winnington Hospital Male Section (Lawn)	Male Ward Staff
AP-14	Winnington Hospital Female Section (Lawn)	Female Ward Staff
AP-15	SD Basin	All ICI & Contractor Staff New SD Basin Staff, Coke Yard Staff
AP-16	Quarry Crushing Area	All contractors Staff (Quarrying & Crushing)
AP-17	Quarry Office main lawn	All ICI Staff + Contractor Staff (Workshop)
AP- 18	Salt Mine	All ICI Staff + Contractor Staff (Salt Mine)

Crisis Management Team

Crisis Management Team shall assemble at the Operations Manager office. This office shall act as their Assembly point so that information can be passed on to them readily and incase Crisis Management Plan is invoked, they can start their actions instantly and move over into the conference room which is the designated Crisis Management Center

Contractor's Staff Assembly Points

Contract Staff shall all assemble at the security / time office site and have their role calls taken at the said location by the Security Staff at Contractor's Time office.

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