Case Summary

Misr for Chemical Industries

Company Information:

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Position:	*Head of Environmental Department, Head of planning sector*
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Sector:	*Public Sector*
Number of labors:	*770*
Sub - Project Title No(1):	*Installing new WWTP.*
Sub - Project Title No(2):	*Substituting of Calcium hypochlorite unit by Sodium hypochlorite production.*
Type of Project:	*Water pollution control*

1. Basic Information:

1.1 Main Product:

Main Products	Average Annual production
Caustic Soda	42 000 Tons
Liquid Chlorine	22 400 Tons
Chlorine Gas	37 000 Tons
Hydrochloric acid	10 000 Tons
Sodium hypochlorite	120 000 Tons
Calcium hypochlorite	49 500 Tons

1.2 Raw Material:

Raw materials		Current Consumption, t/y	
Salt (Sodium Chloride)		101,838	
Sulfuric acid		790	
Calcium Oxide		1,474	
Utilities	**Usage**	**Consumption, m3/y**	**Source**
Water	Domestic	12,326	General Municipal line
	Cooling	316,800	
	Process	429,432.3	
	Boiler house	57,123	
	Total	***815,681.3***	
Utilities	**Type**	**Consumption /y**	
Fuel	Mazot (fuel oil), t/y	----	
	Solar (diesel oil, t/y	----	
	Natural gas, m3/y	150,828	
Utilities	**Source**	**Consumption**	
Electricity	National Grid	103,288,600kW	
	Self-generated	-----	

1.3 **Project Location:**

El Max – Alexandria –Egypt.

Surrounding area:

The factory is surrounded by several industries there are:

- *Alexandria Cement Portland Co. from east side.*
- *Alexandria Carbonate co. from west side.*
- *El Nasr for Salting Co. from south side.*

1.4 **Project Objectives:**

- *Reduce the high levels of chlorine and total suspended solids caused by Calcium Hypochlorite production as the new Sodium Hypochlorite unit generates low levels of TSS & Cl2 to comply with law 9/2009. Therefore, it will save in chemicals consumption (especially for sodium bisulphite).*
- *Reduce the capacity of chemical treatment unit which will be installed to treat the end-of-pipe effluent in order to reach compliance.*
- *Reduce the hydraulic and Pollution loads of the discharged effluent to the sea.*
- *Eliminate the air emissions caused by slaking of calcium oxide to get milk of Lime which is the raw material for calcium hypochlorite production.*

Parameters	Load, tons/yr.		Pollution load reduction	Percent load reduction
	before	after		
TSS	8811.64	21	8790.64	99.76%
Chlorine	2970	----	2970	100%
Total load	11781.64	21	11760.64	99.8%

1.5 **Project Description:**

The factory consists of eight main production units:-

- *Raw Salt Handling Unit.*
- *Salt Solution Treatment and Clarification Unit.*
- *Electro Hydrolysis unit*
- *Chlorine production unit.*
- *Hydrochlorite Acid Production Unit.*
- *Sodium Hydroxide Flakes Production Unit.*
- *Sodium hypochlorite and calcium hypochlorite production units (Emergency Plant).*
- *Bleaching powder production unit.*

In addition to the previous production units, there are service units which are mainly chemical storages, steam boilers station, workshops, ware houses and industrial and domestic wastewater treatment plants.

Regarding the liquid waste, the company discharges its untreated effluent directly to EL Mex Bay. This effluent does not comply with law 9/2009 for discharging to sea as it has high pH, TDS, TSS and CL2. Therefore, ***the company intends to treat the industrial effluent to reach compliance by the following method:***

1- Pre-Chemical Treatment Unit for TSS removal:

Installing primary clarifier using coagulant and flocculent for removal of TSS from wastewater effluents discharged from Salt washing & handling unit, Brine treatment (ion exchange regeneration) and purge &clarifier sludge.

2- pH adjustment and Cl2 removal:

The treated effluent from the primary clarifier will be combined with the other wastewater streams generated from different production units and chemically treated for pH adjustment and chlorine removal (if needed especially after stopping the calcium hypochlorite production).

The existing chemical treatment plant is deteriorating & not working efficiently and needs to be rehabilitated to treat larger flow reaching 650 m^3/day.

The rehabilitation will include:

- *Increasing the collecting tank capacity to reach (650-700 m3/day flow) for 24 hrs retention time.*
- *Increasing the reaction tank to a capacity suitable for handling the daily flow.*
- *Replacing the existing automatic pH adjustment unit.*
- *Replacing the existing chemical dosing systems.*

3- Final Chemical Treatment Unit:
After pH adjustment and Cl2 removal stage, the treated effluent will be mixed with the other clean streams (boilers blow down, cooling tower blow down, turbine regeneration and laboratory streams) in the final receiving basin. This effluent will be further clarified using secondary clarifier to reach the compliance limits for TSS.

4- Sludge dewatering:
Chemical sludge produced from the primary and secondary clarifiers will be collected and pumped to the sludge holding tank.

Then sludge is pumped to a filter press after conditioning using polyelectrolyte solution. Dewatered sludge is then collected, bagged and sent for final disposal as non-hazardous waste.

For Sodium hypochlorite process Description:

First, caustic soda (Conc. 50%) is diluted with water to reach 18% conc. in a dilution tank. This dilution generates a significant increase in temperature so the dilute caustic soda is then passed through a heat exchanger to reduce its temperature to the suitable reaction temperature.

The caustic soda (18% conc.) is then transferred to a circulation tank (A), where chlorine gas is injected and exothermic reaction takes place to form sodium hypochlorite which is quickly cooled by passing through a heat exchanger cooled by chilled water to avoid disintegration of sodium hypochlorite. This step is repeated until the suitable temperature is reached. During these previous steps cold water is injected to the circulation tank to produce 12% sodium hypochlorite.

After reaching the required concentration (12% sodium hypochlorite), the product is transferred to a storage tank. The above steps are repeated in circulation tank (B).

Total TSS load reduction: Expected load reduction is 8790.64 t/y

Productivity Increase: *No increase in productivity will result from the sub-project implementation since it is a new IWWT system installation project, Also there will be no increase in productivity by substituting calcium hypochlorite by sodium hypochlorite since the new Na hypochlorite production unit will have the same capacity as the old Calcium Hypochlorite production unit.*

Decrease in Energy: *N/A.*

1.6 Project Components:

Installing new WWTP will be awarded as a turn-key job including all the following items:

- *Primary clarifier using coagulant and flocculent for removal of TSS.*
- *PH adjustment and Cl2 removal.*
- *Collecting & reaction tank.*
- *Final Chemical Treatment unit.*
- *Sludge dewatering.*

Sodium hypochlorite production unit consists of:

- *Caustic soda tank conc. 18%*
- *Circulation tanks for sodium hypochlorite.*
- *Heat exchanger unit for caustic soda.*
- *Heat exchanger unit for sodium hypochlorite (A) & (B).*
- *Chilled water unit.*
- *Storage tank.*

1.7 Actual Project Cost:

Sub - Project Title No(1): *Installing new WWTP.*
EPAP finance 5,036,000 L.E

Sub - Project Title No(2): *Substituting of Calcium hypochlorite unit by Sodium hypochlorite production.*
EPAP finance 3,156,788 L.E

1.8 EPAP Technical Support:

PMU TA hired a national consultant to assets the company in preparing the following:

- *Tender Document.*
- *Update Compliance Action plan (CAP).*
- *Environmental assessment*
- *Environmental Impact assessment*

2. Eligibility Criteria

2.1 Environmental:

- *By Substituting of Calcium hypochlorite unit by Sodium hypochlorite production & installing new WWTP, it is expected that TSS will become compliant with Law 4/94 amendment to law 9/09 for the Environment with an estimated reduction in pollution loads as follows:*
  - 99.76 % reduction of TSS

2.2 Financial aspects:

- *EPAP finance is 5,036,000 L.E + 3,156,788 L.E*
- *Loan agreement signed on 20 January 2013.*
- *The payback period is 6 months.*

3. Project Procedures

3.1 Technical Procedures:

Technical Document	Submitted	Approved	Date
Environmental Assessment	Y	Y	Aug. 2012
Compliance Action Plan (CAP)	Y	Y	Feb. 2008
Environmental Impact Assessment (EIA)	Y		
Technical Agreement	Y		

3.4 Implementation Procedures:

3.4.1 Procurement Procedures:

- *The company follows its commercial practice acceptable to co-financer condition to issue (1 stage bidding documents) a commercial competitive practice (CCP) for:*
  - *Installing new WWTP.*
  - *Substituting of Calcium hypochlorite unit by Sodium hypochlorite production*

3.4.2 Status of Implementation:

Sub-Project No. (1):

Technical Document	Submitted	Date	
		Achieved	Planned
Credit worthiness certificate	Y	2/8/2011	
Financial Agreement	Y	20/1/2013	
Bidding document	Y	Sep.2012	
Opening (Envelops A – Technical)	Y	6/11/2012	
Opening (Envelops B – Financial)	Y	19/1/2013	
Awarding and Contracting	Y	28/1/2013	
Installation and Commissioning	N		Sep. 2013
Monitoring: Q1:	N		Dec. 2013
Q2:	N		Mar. 2014
Q3:	N		Jun. 2014
Q4:	N		Sep. 2014

Sub-Project No. (2):

Technical Document	Submitted	Date	
		Achieved	Planned
Credit worthiness certificate	Y	2/8/2011	
Financial Agreement	Y	20/1/2013	
Bidding document	Y	Sep.2012	
Opening (Envelops A – Technical)	Y	7/11/2012	
Opening (Envelops B – Financial)	Y	27/11/2012	
Awarding and Contracting	Y	12/2/2013	
Installation and Commissioning	N		Sep. 2013
Monitoring: Q1:	N		Dec. 2013
Q2:	N		Mar. 2014
Q3:	N		Jun. 2014
Q4:	N		Sep. 2014

Conclusion:

- *It is clear that the tendering process has gone through proper channels and that the channels and the selection process was fair, unbiased and took into consideration the financial merits. The procurement procedures were according to the company's commercial practice cover EPAP II basic procurement principles Economy, efficiency, fairness and transparency.*