ARAB REPUBLIC OF EGYPT
MINISTRY OF STATE FOR ENVIRONMENTAL AFFAIRS
EGYPTIAN ENVIRONMENTAL AFFAIRS AGENCY

Study Report
Prepared for the project:

Promotion of Strategies to Reduce Unintentional Production of POPs in the Red Sea and Gulf of Aden (PERSGA) Coastal Zone

UNIDO PERSGA Project Number: GH / RAB / 08 /

Regional Organization for the Conservation of Environment of the Red Sea and Gulf of Aden (PERSGA)

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CONTENT

LIST OF ABBREVIATIONS

Annum (Year), 365 days	a
Air Pollution Control (system)	APC(s)
Arab Republic of Egypt	ARE
Best available techniques	BAT
Best environmental practices	BEP
Blast Furnace	BF
Basic Oxygen Furnace	BOF
Central Agency for Public Mobilization and statistics	CAPMAS
Cleaner Production	CP
Commission for Sustainable Development	CSD
Egyptian Environmental Affairs Agency	EEAA
Egyptian National Cleaner Production Center	ENCPC
Electric Arc Furnace	EAF
Electrostatic Precipitator	ESP
European Union	EU
Geographical Information System	GIS
Global Environment Facility	GEF
Gram	g
Hexachlorobenzene	HCB
Industrial Development Authority	IDA
Information and Decision Support Center	IDSC
Integrated Coastal Zone Management	ICZM
International Organization for Standardization	ISO
League of Arab States	LAS
Medium-sized Project	MSP
Megawatt Hour	MWH
Meter	m
Monitoring and evaluation	M&E
Ministry of Agriculture and Land Reclamation	MOA
Ministry of Electricity and Energy	MOEE
Ministry of Health	MOH
Ministry of Interior	MOI
Ministry of Labor force and Immigration	MOLI
Ministry of Petroleum	MOP
Ministry of State for Environmental Affairs	MSEA
Ministry of Trade and Industry	MOTI
Ministry of Transport	MOT
National executing agency	NEA

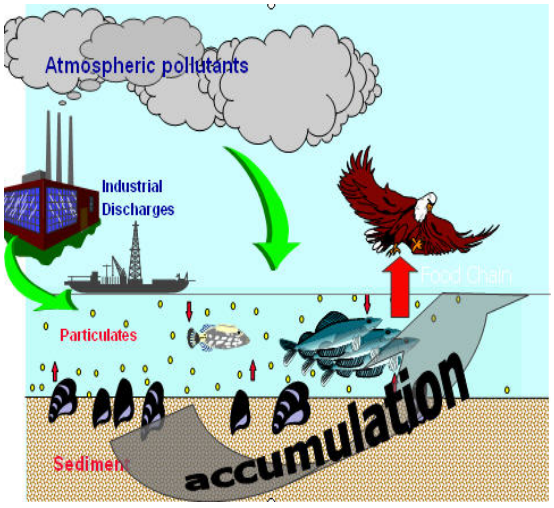
National Implementation Plan	NIP
Not Applicable	NA
Not Detected	ND
Non-governmental organization	NGO
Polychlorinated biphenyls	PCBs
Polychlorinated dibenzo-p-dioxins and dibenzofurans	PCDD/PCDF
Project Coordination Unit	PCU
Project Management Committee	PMC
Project National Steering Committee	PNSC
Persistent organic pollutants	POPs
Red Sea and Gulf of Aden	RSGA
Regional executing agency	REA
Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden	PERSGA
Tera Joule	TJ
Ton (metric)	t
Toxic Equivalent	TEQ
Toxic Equivalent Factor	TEF
Strategic Approach for International Chemical Management	SAICM
Strategic Action Programme	SAP
Stockholm Convention	SC
United Nations Development Program	UNDP
United Nations Environmental Program	UNEP
United Nations Industrial Development Organization	UNIDO
United Nations Institute for Training and Research	UNITAR
Unintentionally produced POPs	UP-POPs
World Bank	WB

SUMMARY

Persistent Organic Pollutants (POPs) consist of chemicals – pesticides (such as DDT), industrial chemicals (such as polychlorinated biphenyls [PCBs]), and unwanted by-products of industrial processes or combustion / waste incineration / open burning of wastes (such as polychlorinated dibenzo-dioxins and furans) – that are dangerously resistant to environmental degradation. With no or little alterations of their original composition, POPs are transported to oceans and coastal areas by air, water and soil, via direct industrial effluents, sewages and solid source releases, as well as irrational dumping and dredging of waste.

The Stockholm Convention (SC) deals mainly with 12 POPs, sometimes referred to as "the dirty dozen" (now 9 new substances are added to the convention), which are of major concern due to their toxicity, long term persistence and their ability to move to far off places by moving from one matrix to the other from their original places of production / use / disposal and accumulate in the fatty tissues of humans and animals.

What makes POPs so dangerous is that they are easily transportable and globally pervasive, and that they pose serious health risks to all living organisms.



POPs bio-accumulate in the fatty deposits of animals and plants and get passed on down the food-chain. They have been linked to alterations in the functioning of hormone systems in fish, wildlife and have been linked to a range of health concerns in humans as well, including cancer, immune-toxicity, thyroid and liver malfunction, nervous system damage, reproductive complications, hormonal disruptions, behavioral problems, allergies, birth defects, and developmental disorders. Fish, predatory birds, mammals and humans are high up in the food chain and absorb the greatest concentrations levels. These POPs can (in minute amounts):

- Interfere with human's immune system
- Cause cancer, allergies, acne and other skin disorders
- Cause birth defects
- Damage the central nervous system

These chemicals act as endocrine disrupters and have major impact on wild life. They can cause:

- Abnormal thyroid function in birds and fish

- Decreased fertility in birds, fish and sea mammals
- Malformation in many avian and aquatic species
- Alteration of immune system in birds and mammals

They can interfere at three levels of biodiversity via:

- The generic level
- The population species level
- Community / ecosystem level

Due to the great concern in protecting the human health and environment from POPs, Egypt signed the Stockholm Convention on 17/5/2002 and ratified it on 2 / 5 / 2003, so Egypt has approved and issued its NIP on 31/8/2005.

As an interim financial instrument, the GEF is assisting countries to prepare and develop their National Implementation Plans (NIPs) through systematic capacity building and training, inventory taking and action plans development. In the action plans, there is a need for priority setting for future planning and implementation of the Countries' obligations to Stockholm Convention. One of these is actions to be taken in relation to compliance with Article 5 concerning chemicals of Annex C of the Stockholm Convention. Reductions of releases of Dioxins and Furans have been identified as priority actions for the Red Sea and Gulf of Aden Coastal zone.

Coastal areas have always been a major focus of development of human civilizations. Many coastal cities and towns worldwide have cultures and ways of life that go back over many centuries. More than half of the world's population currently lives within 60 km of the shoreline – a statistic that could rise to three quarters by 2020. Moreover, 16 of the 20 mega cities of the world are located in coastal areas. Among the numerous threats caused by rapid population growth, development and industrialization in or near coastal areas, is the introduction of Persistent Organic Pollutants.

POPs in the PERSGA Region:

The coastal zone of the Red Sea and Gulf of Aden has been witnessing a rapid economic and tourism growth in the last three decades. This is expected to continue in the future. Several coastal investment projects are still in planning in Egypt, Jordan, Saudi Arabia, Sudan and Yemen, mainly in the petroleum, cement, fertilizers and petrochemical industries. This is not to mention the change in the style of life of the new generations by planning new modern cities at the coastal zone. Rapid industrialization will create high pollution rate and hotspots. As a result the use of raw materials, chemicals and energy will increase as well.

The proposed project (Promotion of Strategies to reduce unintentional production of POPs in the Red Sea and Gulf of Aden [PERSGA] coastal zone) will build on the existing cooperation and collaboration experiences of the participating countries (and their effort on sustainable coastal zone management) and the integration of the industrial sector with the Stockholm

Convention (SC) requirements in the Red Sea coastal zone to reduce and/or eliminate unintentionally produced persistent organic pollutants (UP-POPs).

Four PERSGA countries (Egypt, Jordan, Sudan and Yemen) have become Parties of the SC and during regular consultation meetings of PERSGA, they have also agreed that close cooperation is needed to collectively implement the SC's measures concerning introduction of best available techniques (BAT) and best environmental practices (BEP) for the coastal zone industries.

The countries have further agreed that it could be possible that a larger impact on the environment and the coastal zone economy be attained if the cooperation is made at regional level rather than each country intervenes alone at the industries of its own coastal zone.

Consequently, PERSGA has approached UNIDO for assistance through developing and implementing a Medium-Sized Project (MSP) to enable the introduction of BAT and BEP to the industrial sector of the coastal zone
.
It is important to note that Saudi Arabia is a self financed country, Somalia is politically unstable and Djibouti has expressed problems of language and preferred not to join the four countries.

Objective

The objective of the proposed project is to reduce and/or eliminate the unintentional production of POPs (UP-POPs) in key sectors (cement, incineration, metallurgy, pulp and paper) recognized as important source categories in Annex C of Article 5 of the Stockholm Convention through the introduction of BAT/BEP strategies in the industrial sector of the coast in the PERSGA eligible member countries. By achieving this goal, the project will permit PERSGA member countries attain compliance with their obligations under the Stockholm Convention on POPs, particularly those related to the industrial sector releases of UP-POPs. The project will further contribute to the improvement of human health and environmental conditions in the coastal zone as the project is linked to national sustainable development plans of the participating countries

The project will eventually help in sharing experiences among these countries and support those who have faced or are facing difficulties in the last stages of development of a sound management plans for reduction and elimination of dioxins and furans.

PERSGA has produced the "Agenda for the New Millennium: Sustainable development in the Red Sea and Gulf of Aden". Accordingly, PERSGA prepared the "Integrated Strategy and Business Plan", which is aligned with PERSGA commitments towards the WSSD proceedings as well as with the capacity 2015 initiative.

PERSGA has approached UNIDO seeking assistance in developing a GEF MSP to develop an action plan and strategy for the elimination of the UP-POPs in the

PERSGA region, in particular the reduction and elimination of the unintentional production of POPs as per Article 5 of the Stockholm Convention and to promote the use of BAT and BEP.

In this respect, Egypt has prepared the National Action Plan to explain the current situation of unintentional releases of POPs in the Red Sea coastal areas within the borders of Egypt, specifically the governorates of the Red Sea, South Sinai and Suez.

General Country Baseline:

The country over decades has gone through a major economic development while the population increased from 48 million in 1986 to 60 million in 1996 and in 2006 according to census final results of CAPMAS it becomes 76,699,427 million (inside and outside Egypt). While the total area is more than one million km^2, only 35,000 km^2 (%7.83) of the total area are habitable and most of it lies along both sides of Nile River.

Most of the industrial activities except some mining and oil exploration are concentrated in this area. Like in any developing country, chemicals are widely used in industry, agriculture, trade and health. While agrochemicals and pharmaceuticals are well controlled under the country's strict registration scheme, quality control laws, and periodic monitoring and registration schemes, the industrial chemicals used in various outlets have no strict control measures, causing lack of information on toxicity and environmental fate. The country, through various Governmental decrees, is a signatory to many chemical and environment related Global Conventions. In particular, Egypt is a major player in the region for Basel Convention on hazardous waste (Egypt has regional center for Basel Convention for transfer of technologies and training [BCRC – Egypt]), and also to the Rotterdam Convention on Prior Informed Consent, In addition to SC. Egypt is playing an efficient role for preparing the Strategic Approach for International Chemical Management (SAICM).

Egypt over the years, has initiated a number of laws/decrees related to air emission control, banning highly toxic and persistent pesticides, introducing strict regulations for importing /producing/using/exporting toxic and hazardous chemicals. The country possesses good quality laboratories to carry out residue analysis for crops, food, contaminated land, and chemical residues in many environment /human/animal matrices. The country faced major obstacles when it came to the unintentional POPs; Public awareness on chemical safety, data collection/assessment and management/dissemination of data, carrying out regular monitoring of toxic chemicals and interpretation of their economic/social/health impact, understanding and introduction of Best Available Techniques and Best Environmental Practices (BAT/BEP) in relevant industry sectors and above all land remediation and right technology adoption for disposal of toxic/hazardous wastes. Under this context, the enabling activities of GEF project on POPs gave an excellent opportunity to assess the country's capacity/capability and help in drawing out strategies/action plan for sound management of chemicals especially the industrial and unintentional POPs.

The Red Sea Coastal Zone Base Line

The Red Sea Coastal Zone is blessed with a variety of regional merits such as climate, coastal beaches that are famous for water and marine treasures, including coral reef and different kinds of fish and snails, as well as marine islands … etc .

Such merits directed developmental activities towards the touristic sector as a pioneer project of integrated development that could be invested in the marine environment that in turn could be a base for touristic attraction in the Red Sea Region. Hence, environmental Law number 4/1994 which was amended by Law number 9/2009 and its executive regulations was issued as a developmental means for regulating human interference, through investment, with the marine environment and protecting it as a national value in the economics of local, national investment in the Red Sea Coastal Zone.

In general, the Governors of this zone believe that the stability of the environmental law perceptions is an important factor for pushing touristic development forward. There are also other aspects of development in the Governorates related to minerals and fish in addition to valleys cultivation whether by underground water or by water flows. There is also the transportation sector that connects the governorates vertically or horizontally to other governorates and marine ports**.**

Coastal areas have always been a major focus for the development of human civilizations. Many coastal cities and towns worldwide have culture and way of life that go back over centuries. They have rich potential to modern society and have a strategic role to play in meeting the needs and aspirations of current and future populations. However, rapid population growth, world economy and the extensive development activities in many coastal areas not only have degraded the natural resources but also lead to increasing pressure on the integrity of both the marine and coastal ecosystems. Although non-coastal communities have pressing environmental issues, maintaining sustainability in the coastal development is of particular importance.

Coordination Mechanism:

The mechanism of setting up of multidisciplinary National Committee (NC) was set in motion. The NC was formed consisting of experts and representatives from the relevant Ministries, and competent Authorities. In addition, a constant dialogue with competent EEAA Regional Branches and departments in an atmosphere of open discussions, participation and partnership.

A meeting was held to explain the purpose of the SC to all the participants, various aspects of SC, the country's position with respect to management of POPs chemicals in general and its unintentional releases in particular. The meeting also discussed the Governorates and other stakeholders overall responsibility for complying with SC and the purpose of the project which is to develop.

Inventory Results of Unintentional POPs and Priority Sectors for BAT/BEP Introduction:

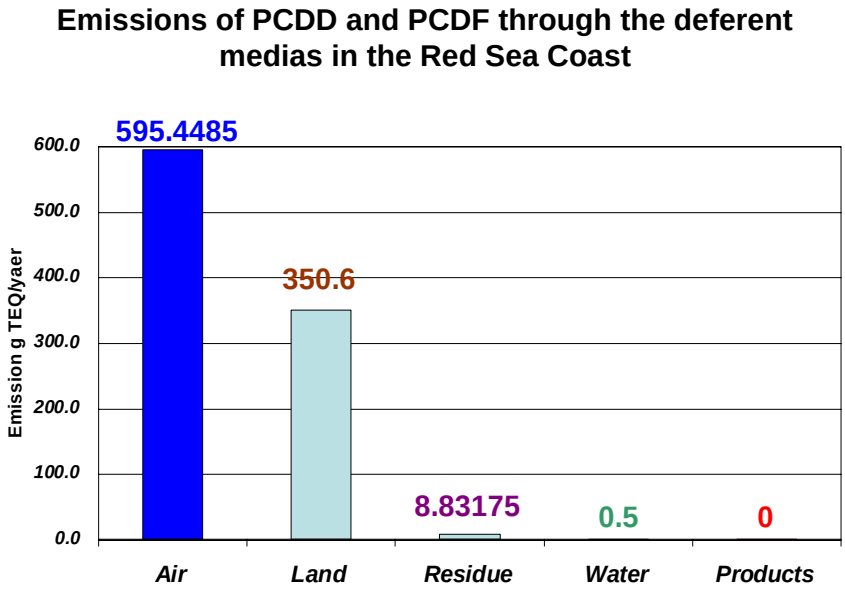
These mainly refer to polychlorinated dibenzo-p-dioxins and dibenzofurans, capacity has been built through understanding of the UNEP toolkit (Standardized Toolkit for Identification and Quantification of Dioxin/Furan Releases) and its limitations, also through field visits.. By virtue of ratification of SC, the law 4/94 which was amended by Law number 9/2009 automatically covers release of unintentional POPs. The survey studies revealed that the current situation of unintentional POPs in Red Sea Coast is not compatible with the obligations of Annex C of the Stockholm Convention.

The survey covered all categories and total default emissions in the Egyptian Red Sea coastal zone are shown in the figure below [the high emission was to air (595.4485 gTEQ/a which represents 62.249 % of total emission), followed by the emission to land (350.6 gTEQ/a which represents 36.772 % of total emission) and after them the emission to residue (8.8317 gTEQ/a which represents 0.926 % of total emission) then the emission to water (0.512 gTEQ/a which represents 0.052 % of total emission)].

Implementation of the project has given an overview of the Red Sea Coastal Zone, its present capacity and future requirements to comply with the SC including applying of the BEP/BAT in the different activities inside this region.

According to the inventory results we suggest the priority sectors for BAT/BEP introduction in the Red Sea Coastal Zone in Egypt to be as following:

- Uncontrolled burning processes (public dumpsites) in the Red Sea Governorates, the ownership are the Red Sea, Suez and South Sinai Governorates , they need at least 3 secured sanitary landfills, and 3 Centers for waste recycling and establishing fertilizer plants with budget of about 15 million dollars for each (for the 1st stage short term action plan).
- Medical waste incineration in Suez Governorate, Ministry of Health is the competent responsible Ministry in handling hazardous waste in medical services (they need two units working as central system including the collection, transportation, storage, treatment, and safe disposal from the residues with budget of about 10.0 million dollars).
- Power generation in Suez Governorate (2 stations), the ownership is the Ministry of Electricity and Energy.
- Ferro Manganese company in South Sinai Governorate (public sector)
- Petroleum refineries in the three governorates.
- Production of mineral products (like cement production).
- Sewage and sewage treatment.



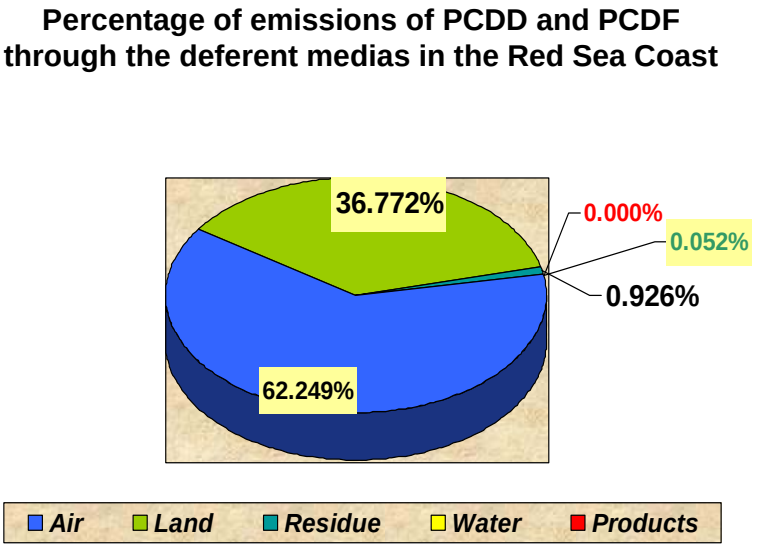


Chart (1) Emission of PCDD and PCDF through deferent Medias in the Egyptian Red Sea Coastal Zone.

Also we recommend that:

a. EEAA regional branches can continue to implement inventory of small enterprises as sources of dioxins and furans emission after they take the training courses in the regard.
b. Cooperation and continuation of activities are necessary to verify, update and check the validity of the submitted data.

c. To continue updating of the inventory results through site visits.
d. Information campaigns and targeted training of all people dealing with POPs.
e. Training for all staff of EEAA regional branches on using toolkits.

Major Observations and Shortcomings:

During the implementation of the Inventory many factors emerged some of which are already well known and some are new. The country is well equipped with many institutions/research laboratories, legal mechanism, data collection/management, responsible media and intergovernmental cooperation mechanism/private women welfare organizations. With particular emphasis on the management of unintentional releases of POPs, the project revealed many shortcomings in media awareness, linking environmental contamination with country's socio/economic impacts, introduction of BAT/BEP in industries, waste handling and management.

At present, the country is also totally incapable of handling the various if not all issues related to unintentional POPs. So, action plans related to capacity building in all these areas should be highlighted to overcome country's shortcomings on a national priority basis.

Recommendations to Comply with Stockholm Convention to Reduce Releases of PCDDs/PCDFs in the Red Sea Coastal Zone of Egypt:

a. Setting a plan for awareness and education of the public concerning the hazardous effect of UN-POPs, also this plan should be prepared for stakeholders, decision makers in public and private sectors, women and children, on how to reduce the hazardous effect on human health and environment.
b. Setting a plan for the protection of public health from potential hazards of exposure to unintentional releases of POPs, and setting a strategy for raising awareness campaigns.
c. Prevention of uncontrolled burning processes of solid waste and biomass in random landfill, especially plastic products, also prevention of burning rice straws in open fields and encouraging its recycling.
d. Applying BAT/BEP in medical waste incinerators to reduce the releases of dioxins and furans.
e. Applying BAT/BEP in industry and using alternative chemicals to reduce the releases of dioxins and furans from industrial sources.
f. Applying BAT/BEP in power generation stations and using natural gas to reduce releases of dioxins and furans.
g. Using of unleaded fuel and catalysts in transportation sector.
h. Applying BAT/BEP and reuse of the gas produced during refining instead of flaring it in petroleum industry.
i. Applying BAT/BEP and using alternatives in petroleum oils waste treatment stations.

j. Training of workers, scientists, women and youth organizations, staff and administrators on how to deal with unintentional produced POPs.
k. Making information on unintentional produced POPs available to the public through different channels of the Media (TV, Radio and printed materials).

Cooperation with other Projects Concerning POPs in Egypt:

The Egyptian national consultant of PERSGA project was also one of the national environmental consultants for the World Bank and UNIDO Project (Inventorying, Safeguarding and Managing POPs in Egypt), with the aim of completing and updating the existing partial inventory of PCBs oil, PCBs contaminated equipments, and obsolete Pesticide stock, the project was implemented 1n collaboration between ENCPC and CSD (Switzerland).

As a result of this inventory, PCB oils in Egypt can be estimated to be more than 420 times the original estimates of the NIP (2005) ,there is a minimum of 7,000 transformer containing more than 8,400 tons of PCB contaminated oil (>50ppm). In addition, we have found a widespread dispersion of diluted PCB contaminated oil with concentration <50ppm.

For obsolete pesticides, we have found that a total of 2,232 tons exist in stocks held at various locations in the country. Of this amount, at least 6.5 tons are POPs. A minimum of 220 tons of new POPs are also included in this inventory. The main holders of obsolete pesticides are the public sector, especially the Ministry of Agriculture. Holders don't have plans for their disposal, bad conditions of storage (e.g. El-Saff store) and its location near habitations and food stockpiles. Warehouse presents particular risks to human health and to the environment.

This project was originally designed with the aim of identifying specific industrial facilities in Egypt which contributed most to releases of PCDD/F to the environment and where projects could be implemented to demonstrate BAT and BEP and achieve significant improvements in performance. The identification of these facilities was to be based upon the information gathered to produce the inventory of releases of PCDD/F in Egypt. Unfortunately, it became clear during the project, that there was not sufficient information available to complete this task. Detailed information that would be used to develop an inventory of PCDD/F releases and that would allow assessment of industrial and non-industrial process emissions of PCDD/F releases were not available.

Consequently, the terms of reference were revised to take account of the lack of a detailed inventory of PCDD/F and to focus on making efforts designed to identify important sectors and facilities and to develop an outline of steps that would need to be taken to underpin the development of a full-scale project to implement improved control of PCDD/F in Egyptian industry.

1 ITRODUCTION

Promotion of strategies to reduce unintentional production of POPs (specially Dioxins and Furans) have been identified as a respective national priority for the Red Sea and Gulf of Aden Coastal Zone Countries of PERSGA, and that they are committed to take appropriate actions towards the reduction of the releases of unintentionally produced persistent organic pollutants (UP-POPs).

Due to the trans-boundary movement of POPs and the special nature of the coastal zone of the Red Sea and the Gulf of Aden, it is of importance to take preventive measures to reduce the negative impact of industrial activities and human settlements on the environment of the coastal zone. These preventive measures can be more effective if they are undertaken in a coordinated manner at the regional level. It can be further improved if the regular collection and interpretation of environment related scientific data are also undertaken at the regional level, together with the development of harmonized legislations and interventions, under the regional umbrella of PERSGA.

The Stockholm Convention (SC) on Persistent Organic Pollutants (POPs) was enacted on May 22, 2001. The "SC" binds its parties to the elimination of the production and use of POPs; limited use of selected substances is exempted under stringent conditions.

1.1 Project Objectives

The objective of the proposed project is to reduce and/or eliminate the unintentional production of POPs (UP-POPs) in the key sectors of industry (cement, incineration, metallurgy, pulp and paper) recognized as important source categories in Annex C of Article 5 of the Stockholm Convention through the introduction of BAT/BEP strategies in the industrial sector of the coast in the PERSGA eligible member countries. By achieving this goal, the project will permit PERSGA member countries attain compliance with their obligations under the Stockholm Convention on POPs, particularly those related to the industrial sector releases of UP-POPs. The project will further contribute to the improvement of human health and environmental conditions in the coastal zone as the project is linked to national sustainable development plans of the participating countries.

The primary objective of the project is to assist the Arab Republic of Egypt in implementing Article "C" of SC on Persistent Organic Pollutants (POPs) in the Red Sea Coastal Zone in order to:

a. Identify all sources of Annex(C) POPs releases withen the coastal zone including potential contaminated locations,
b. Develop the coastal zone dioxin and furan inventory as per the latest version of the "Standardized Toolkit for Identification and Qualification of Dioxin and Furan Releases",
c. Identify the different parties concerned with unintetionally releases of POPs.
d. Promote and facilitate the development of a strategy for the introduction of BAT and BEP to the coastal zone of Red Sea and Gulf of Aden in order to reduce unintentional production of POPs,

and to have solid baseline data for selecting the demonstration locations for BAT/BEP implementation.

e. Set up criteria for priotirization among the identified locations.

In general the project outcomes emphasize:

a. Setting criteria for selecting the priority locations and sectors for BAT/BEP introduction, proposing the time duration and estimated cost for the reduction/elimination of unintentional releases of POPs and their adverse effects on public health and the environment.
b. Raising awareness of the public at large for safe handling of chemicals in general and of unintentional releases of POPs in particular.

1.2 Stockholm Convention

The Stockholm Convention (SC) on Persistent Organic Pollutants (POPs) was enacted on May 22, 2001. The "SC" binds its parties to the elimination of the production and use of POPs; limited use of selected substances is exempted under stringent conditions.

To comply with the Convention, Egypt:

a. Developed the National Implementation Plan (NIP) for the implementation of its obligations under this Convention;
b. Transmitted its implementation plan to the Conference of the Parties after two years of the date on which SC enters into force (May, 2005).
c. Cooperation directly or through global, regional and sub-regional organizations, such as this cooperation between Egypt and PERSGA, including women's groups and groups involved in the health of children, in order to facilitate the development and updating of the implementation plan and inventory.
d. The activities which were done in the period after the NIP submission:
    - Pesticides collection.
    - PCBs survey.
    - Open burning controls.
    - MONET in Africa.

1.3 Country Baseline

2.4.1 Geography and Population

Egypt is one of the biggest countries in Africa. It enjoys a unique geographical location, being situated on the northeastern corner of the African continent.

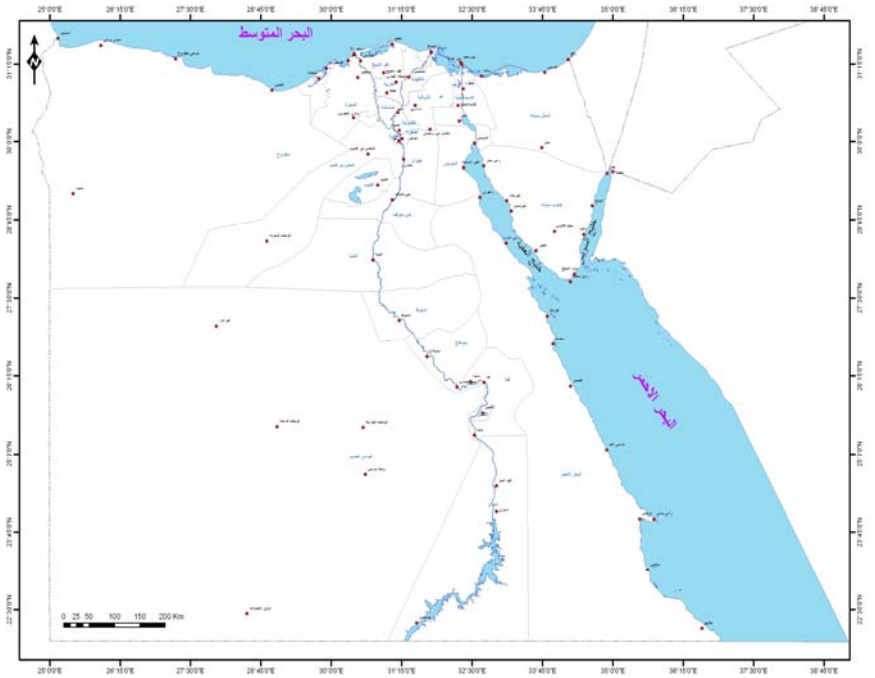


Figure (1) Egypt map

The population increased from 60 million in 1996, to 76,699,427 million (inside and outside Egypt) in 2006 according to census final results of CAPMAS. While the total area is more than one million km^2, only 7.83% of the total area is habitable and most of it lies along both sides of Nile River.

The Climate of Egypt is determined by many factors, chief of which are location, terrain and overall system of atmospheric pressure and water surface. Basically Egypt lies within the dry tropical region, except for the northern parts that lie within the warm moderate region, with a climate similar to the Mediterranean region, characterized by hot dry summers, and moderate winters with little rainfall, increasing along the coastal areas.

1.3.1 Red Sea Basin Profile

The Red Sea Basin is blessed with a variety of regional merits such as climate, coastal beaches that are famous for water and marine treasures, including coral reef and different kinds of fish and snails, as well as marine islands … etc.

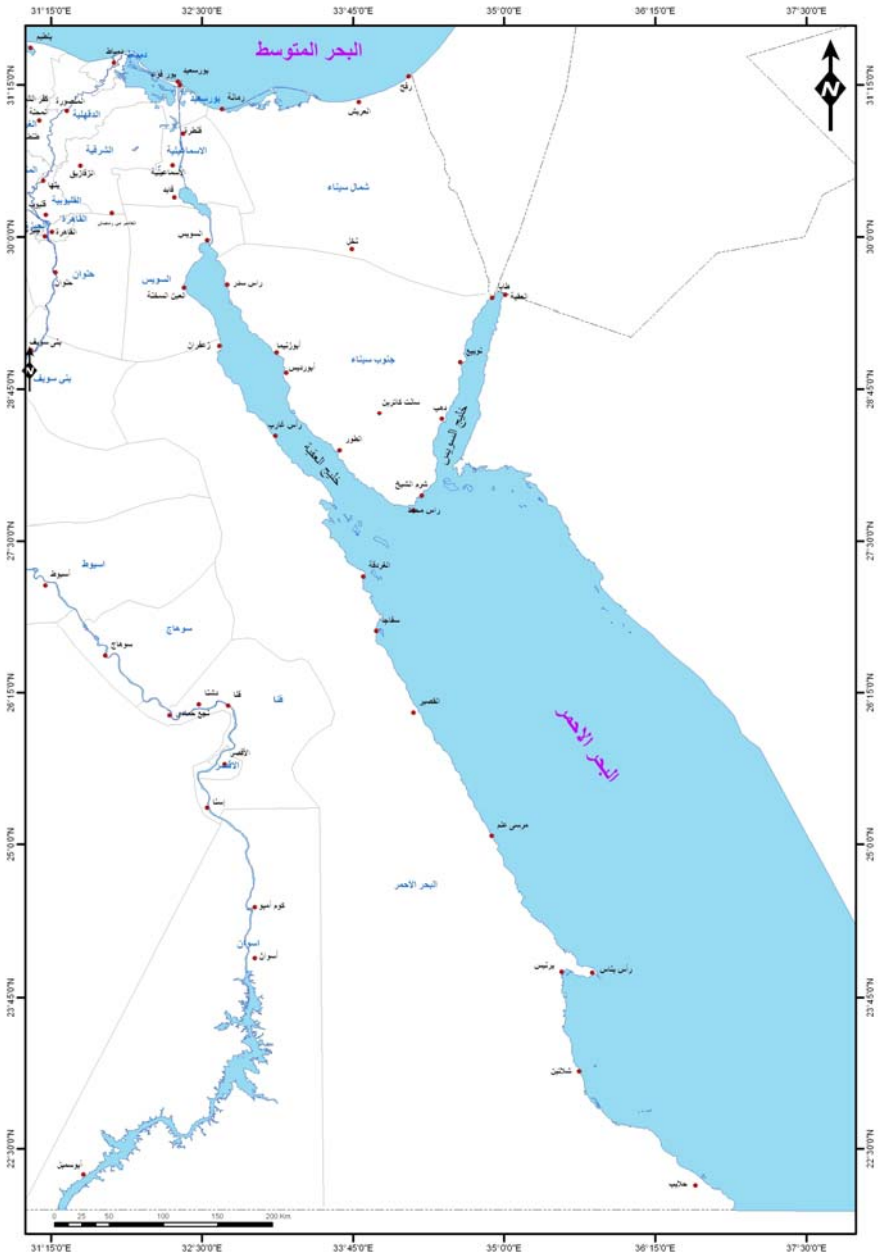


Figure (2): Red sea, Suzie and South Sinai Governorates.

Such merits directed developmental activities towards the touristic sector as a pioneer project of integrated development that could be invested in the marine environment that in turn could be a base for touristic attraction in the Red Sea Region.

Ever since the old ages, the Red Sea region is blessed with a unique environmental system all along the coast of the Red Sea that extends to reach 1941 km.

The Red Sea region is also one of the warmest and driest areas in the world, where temperature during day in summer months exceeds +40 ◦c but is rarely

less than +20 ◦c in winter. The north of the Red Sea is often colder than its south, and the climate in the Red Sea Region is hot and wet in summer as the evaporating sea water caused by hot sun rays, raise the level of humidity. This high humidity level increases thick mists in the early morning over the water and on land. Generally, the Red sea Region is known for little rain, but sometimes heavy rains occur in winter (especially in January and February). Such heavy rains lead water to flow down the heights in a short time reaching down to the low valleys causing the phenomenon of water flows known to residents of such areas. Moreover, winds and storms may occur but they are rarely strong in a way that causes risks. Winds are often sandy veiling sun light sometimes. All through the year, north winds blow in the red Sea Region most of the time, while very strong west winds, called the Egyptian winds, blow during winter.

1.3.2 The Red Sea Valleys

The Red Sea is one of the main sources of water drainage. The Rain water falling in the eastern part of the desert is all drained from all the valleys to the Red sea. During spring and autumn two water flows of different severity occur in the only source of the water in the wells and springs of the eastern desert. However, when the water flows are severe they drift any rocks or buildings on their way. The severity of the water flow depends on an number of factors the most important of which are the quantity of the falling water, the time of its fall, the degree of the drainage basin where water gathers and runs into one stream, the kind of the rocks over which the water flow runs and the thickness of plants that slow the movement of the running water.

All the valleys of the Red Sea mountain series are considered a natural source of draining water directly to the sea. Most of the Red Sea valleys slope toward the east – north and only a minority of the valleys slopes from the east to the west except far El – Hawdein valley that slopes from the eastern – north. Water – flows are a natural phenomenon and their risks can be avoided and effects of building residential and industrial establishing dams to reduce the speed of the water flowing through the main stream. Other dams could be built on some valleys in order to store water and let it penetrate the soil to fill the underground reservoirs. Because water is rare in the regions of the eastern desert and the Red Sea, it is not advisable to waste any water available and it should be used to the fast drops.

1.3.3 The Red Sea Islands

The number of Egyptian islands in the Red Sea reaches about 40 island, some of which are close to the beach and some are in the middle of the deep water. The most important of these islands are the coastal group located close to "Gobal strait", including islands of "Shedwan", "Ghanem", "Khaysoum", "Towal", "Asharfy", "Gobal", "Tiran" and "Sanafir". The islands are located in one line along "Elzait Mountain" and "Ras Gamsha". What distinguishes this area is the shallow water and the spread of different shapes of coral reefs that are scattered all around the islands or surrounding their coasts.

The biggest of these islands is "Shedwan" whose area is about 42 squares Km, the "Towal" of 21 square Km. The smallest of the islands are the two of "Gamsha" islands that are about 0.05 and 0.35 square Km.

The most important of the islands in the deep water of the Red Sea are three, "Abu El-Kayzan", "El-Zabarjad" and "El-Akhawein". With the increase of interest in the protection of the Red Sea environment, 22 of theses islands are now considered a natural reserve that should be protected according to law 102/1983. The Island of "Zabarjad" is the best habitat for turtles and protecting this island means protecting Turtles against extinction.

Within the location of Hurghada city, there is the island of "Gifton that is considered one of the most important touristic regions in the Red Sea as it is surrounded with a variety of coral reefs and is distinguished with its enormous biological diversity. The islands of "Abu Menkar", "Camels Valley", "Safaga" and "Khaysoum" are also distinguished with the "Mangarof" trees.

2.4.3 Suez Governorate

Country	Egypt
Capital	Suez
Population	512,135 (census 2006)

Figure (3) Map of Egypt with Suez highlighted

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- Suez governorate is one of the Canal and Sinai governorates. It is situated east of Delta, north of Suez Gulf, linked with other Egyptian governorates by main roads railroads, and ring road.
- The governorate is famous for its technical training centers, the petroleum-engineering expertise and petrol refineries.
- There are five important ports in Suez governorate: (El-Sokhna port, Tewfiq port, Adabeya port, petrol basin port, and El-Atka fishing port). There are three sorting area, serving export and import commodities, in addition to a specialized area / container for oil tanks and petroleum refinery.
- The governorate is famous for its natural resources such as (limestone, clay, coal, petroleum, marble, line and stone quarries)
- Suez governorate has many famous tourist attractions such as (El-Ein El-Sokhna area, an important recreational and medical center) in addition to a variety of historic sites like Moses' springs, Muhammad Aly Palace, Roman Catholic Church and Judaic Hill at El- Khoor).
- Suez Gulf is the most important source of petroleum production in Egypt.
- The governorate is one of the important sites for the large cement companies in Egypt.
- There is an industrial city at Ataka, and the industrial development organization (IDA) made an expansion for its area to become 1168 feddan.
- Suez public free zone was established in 1975 on two locations:-

- Port Tewfik location (an area of 75660 m2), adjacent to Suez port's fence
- Adabeya location (an area of 247208 m2) overlooking Suez bay coast at 5km distance from Adabeya Port.

- Suez city is a strategically located. Its maritime and commercial port enjoys additional advantages e. g. :(roads & communication networks, five ports, faculties and institutes and labor force).
- It is equipped with utilities and basic infrastructure (roads, water, sewage system, electricity, telecommunications network, a customs integrated unit, a maritime unit and a security unit).

Fields of investment

- Petrochemicals industry, tints and detergents, fertilizers, petroleum services and petroleum equipment leasing, petrol refineries, and natural gas liquefaction.
- Glass industry, all types of iron industry, metal and mineral products.
- Ships, yachts and fishing boats industry, navigation services, ship supplying and provisioning.
- Coal fracturing and carbon industries.
- Administrative Management and operation of port maritime services.

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Suez Governorate	Households				Number of Individuals in Public Houses				Total Population		
	Number of Households	Number of Members			Number of Public Houses	Number of Individuals					
		Male	Female	Total		Male	Female	Total	Male	Female	Total
Urban	122,431	257,762	250,544	508,306	161	3,125	704	3,829	260,887	251,248	512,135
Total	122,431	257,762	250,544	508,306	161	3,125	704	3,829	260,887	251,248	512,135
* Includes Egyptians and foreigners											

Table (1): Population and Housing Census 2006 * Suez (CAPMAS)

1.3.4 Red Sea Governorate

Country	Egypt
Capital	Hurghada
Population	288.661 (Census *2006*)

Figure (4) Map of Egypt with Red Sea highlighted

Red sea Governorate is one of the biggest governorates in Egypt with a total area of 120000 km² and history extends back to the pharos, the Romans the Christians era and the Islamic era, its unique & amazing beaches and coral reefs made it one of the favorite tourist destination attracting lots of tourists, diving and snorkeling fans from all over the world. It is located between the Nile and the Red Sea in the southeast of the country and its southern border forms part of Egypt's border with Sudan.

The Governorate consists of six cities as follows Ras Gharib, Hurghada, Safaga, Quseir, Marsa Alam and Shalateen.

Red Sea is the best diving location worldwide where the averages better visibility, ranging from 20 meters to well over 40 meters.

The desert with its unique natural and cultural heritage resources of pristine wilderness and spectacular scenery for mountains made the eco tourism and the desert safari unforgettable experiences

Red Sea Governorates protectorates covering 42000 km ² equal to 42 % of all the Egyptian protectorates. The total area of Red Sea Protectorates about 21% of the Governorate total area**....**

Red Sea Governorate	Households				Number of Individuals in Public Houses				Total Population		
	Number of Households	Number of Members			Number of Public Houses	Number of Individuals					
		Male	Female	Total		Male	Female	Total	Male	Female	Total
Urban	58,091	121,674	99,454	221,128	353	46,582	8,018	54,600	168,256	107,472	275,728
Rural	3,332	6,501	5,809	12,310	15	592	31	623	7,093	5,840	12,933
Total	61,423	128,175	105,263	233,438	368	47,174	8,049	55,223	175,349	113,312	288,661
* Includes Egyptians and foreigners											

Table (2): Population and Housing Census 2006 * Red Sea (CAPMAS)

The length of the Red Sea coast reaches to about 1080 km, starting from El-Zafarana in the north until the Egyptian-Sudanese boarders deep in the south, and this area represents about 1/3 of the total coastal areas in Egypt.
It extends from Southern of Cairo – Suez desert road till the boundaries of Egypt with Sudan. This is a sterile area characterized by a range of mountains 2000-meters high that stretch along the coast of the Red Sea. It is rich with minerals and quarries. Kusair, Ghurgada, Ras Gharb, Safaga, Halayeb and Shalatene are small Red Sea harbours.

The Red Sea Governorate extends vertically. It is bounded on the east by the Red Sea Coast, on the west by the mass of mountains looking over the Nile Valley and meeting with its governorates (Bani Sweif- Menia- Assyout- Suhag- Qenna- Aswan), and on the north by the two governorates of Suez and Giza. This location provides the Red Sea Governorate with an important status in foreign trade in addition to the merit of fishing activities and coastal tourism. The management system of the Governorate has also been developed and its geographical boarders amended since the residential resolution of constructing the governorate in 1940 then appointing a mayor for the governorate in 1961.

Profiles of Economic and industrial Sectors:

- Data in this section reflects increasing of some industries, such as mining, Petroleum production, hydrogenated oil, Manganese, Phosphate and natural gas, in addition to food industry.

- Red Sea Governorate have many of the natural resources that put it in front of the Egypt governorates in containing of the natural resources and it is due to the geographic nature that characterize the governorate, and the most of them are(Petroleum, Iron, Gypsum, Marble, Gold ,Sands, Granite, Manganese, Phosphate, Lead , Tin Aluminum, Potassium, Calcium, Carbonate Quartz, etc.

1.3.5 South Sinai Governorate

Country	Egypt
Capital	El-Tor

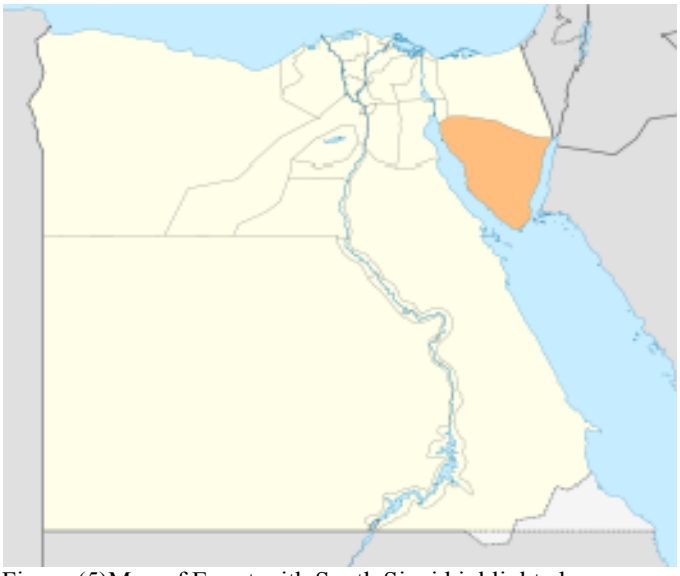

Figure (5)Map of Egypt with South Sinai highlighted

South Sinai Governorate is one of the governorates of Egypt. It is in the east of the country, covering the southern half of the Sinai Peninsula.

The major cities include:

- El-Tor, the capital;
- Dahab
- Saint Katherine city
- Sharm el-Sheikh
- Taba
- Nuweiba

Sinai is the veritable gateway to Egypt from the east. It is triangular in shape, and stretches for 400 km from north to south, and 200 km from east to west. It is generally hot during the summer, stormy and exposed to cold air currents during the winter.

Sinai is divided into:

(1) The Northern Part: Includes the coastal strip, which extends from Rafah to Port-Said. Water is abundant in this area due to heavy rainfalls.

(2) The Central Part: This is a steep rocky plateau 3000 feet (915 m) above sea level. Water in this part is scarce.

(3) The Southern Part: This is a steep rocky area 10000 feet (3000 m) above sea level; Water is abundant due to heavy rainfall.

South Sinai covering an area of 28,438 km2 is located in the peninsula of land between the Gulf of Suez on the west and the Gulf of Aqaba on the east.
The area is characterized by its:

- Natural and reasonably pristine environment with five protected areas, covering 40% of the land area of South Sinai, having been declared since 1983;
- Tourism potential with over 1.7 million international tourists visiting the area in 2003;
- Petroleum resources along the Gulf of Suez which account for much of the oil production in Egypt;
- Mineral resources, being a significant producer of non-metallic and ornamental stone.

The land area can be divided into four broad geographical regions:

- Gulf of Suez with little tourism, four significant towns, most of South Sinai mineral and petroleum production industry,
- Gulf of Aqaba which is the prime tourism local, and practically no agriculture;
- The central mountains which are very dry and have no towns except St Katherine, the population is almost exclusively Bedouin and there is a small amount of agriculture at Wadi Feiran, there are few tourism activities, the exceptions being the cultural attractions of St Katherine and desert camping and safaris;
- And the northern desert which has almost no settlements, agriculture, tourism or other attractions, and is entirely flat desert unrelieved by prominent features.

The 610 kilometers of coastline contain some of the most significant tourist destinations of the country, whilst inland there are also attractions. The area is defined by the demands of tourists, Bedouin, national protectorates and the desire of central Government to increase the population of the area by migration from other areas of Egypt.

Tourism provides the economic platform for the area and it is essential that development of this sector is sustainable and maintains the image of the area as a top draw destination.

Bedouin tribes form a declining share of the population of the area; any plans for the future of the Governorate must include the needs of this indigenous population and steps must be taken to ensure their cultural heritage is respected.

The five South Sinai Protectorates – Ras Mohamed National Park, Nabq Managed Resource Protected Area, Abu Galum Managed Resource Protected Area, Taba Protectorate and St. Katherine's Protectorate - cover a total area of 9,836 km2. This represents 33% of the governorate surface area, and includes 52% of the terrestrial side and entire littoral and sub littoral extent of the Egyptian coastline of the Gulf of Aqaba.

A document developed by the Ministry of Planning sees a massive increase in population from current (2003) levels of about 98,000 to 700,000 by 2017.

In1981, the Egyptian Government launched plans and studies for the rapid integrated development of all of Sinai, and the first large infrastructure projects were begun. South Sinai coastal settlements were developed as core towns, and the first resort tourist establishments were set up, mostly by private Egyptian investors, exploitation of the off-shore oil fields in the Gulf of Suez began in parallel.

South Sinai Governorate	Households				Number of Individuals in Public Houses				Total Population		
	Number of Households	Number of Members			Number of Public Houses	Number of Individuals					
		Male	Female	Total		Male	Female	Total	Male	Female	Total
Urban	13,681	28,229	17,570	45,799	410	21,588	9,028	30,616	49,817	26,598	76,415
Rural	9,865	22,381	18,239	40,620	717	27,791	5,262	33,053	50,172	23,501	73,673
Total	23,546	50,610	35,809	86,419	1,127	49,379	14,290	63,669	99,989	50,099	150,088
* Includes Egyptians and foreigners											

Table (3): Population and Housing Census 2006 * South Sinai (CAPMAS)

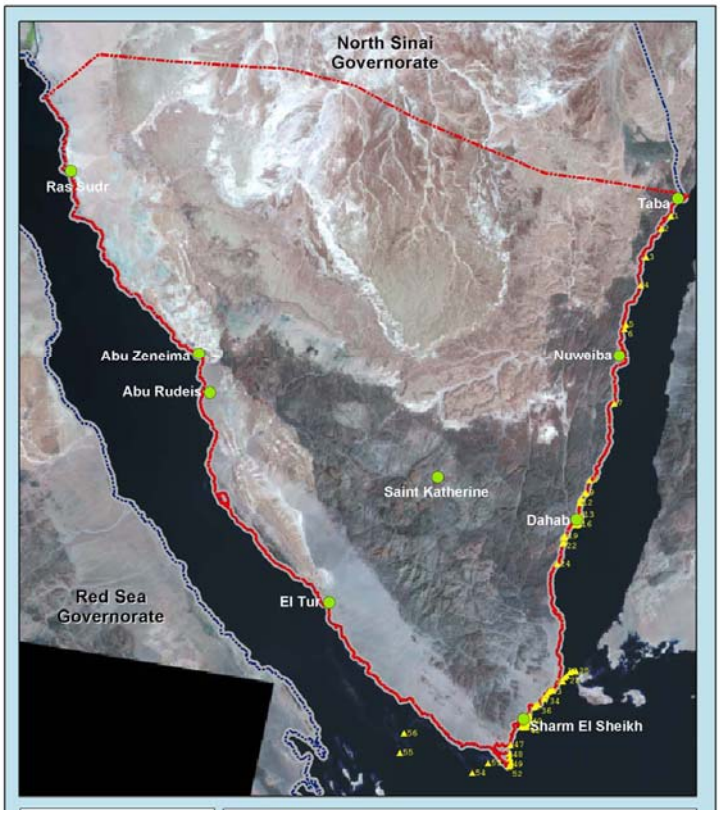

Figure (6) South Sinai Cities

In 1979, the Sinai Peninsula was split into north and south governorates, with the capital of South Sinai Governorate located at El Tor

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The Census of 1986 recorded a total population in South Sinai of 28,576 inhabitants. The population at the time of the 1996 Census was 54,826 inhabitants, representing an extremely rapid demographic build up of over 6.7% per year over the inter-census period, which reflect the tremendous investments, both public and private, which occurred over the period and which, by all indicators, are continuing and even accelerating. The fastest growing town was Sharm El Sheikh (17.4% per annum), along with its associated villages (16.3% per annum). Dahab was the second fastest growing city, followed by Abu Zeneima, and Nuweiba.

1.3.6 Economic Profile and Environmental Significance of the Red Sea.

The total area of the Red Sea is small in comparison with other seas and oceans; it has a remarkable significance as Water Bridge in international trade. The Red Sea is also blessed with the most beautiful and longest coral reefs in the world, and it also contains groups of colorful, beautiful and special fish and Sea Creatures. Moreover, the Red Sea is located in a region that was the cradle of ancient and significant Civilizations and the three main heavenly religions-Islam, Christianity and Judaism.

Although , the Red Sea itself relatively contains small amounts of oil, its economic importance cannot be ignored as it is located among the prominent oil fields in the Arab Gulf, the constitute Saudi Arabia, Kuwait, Bahrain, U.A.E and Oman and the biggest oil consumers in western Europe. Moreover, scientists have discovered other minerals in the Red Sea that could be of great value in the future. Deep at the bottom in the salty hot water of the Red Sea, there are thick layers of sediments containing great amounts of valuable minerals such as gold, Lead, raw iron, copper, silver and zinc.

The Red Sea region is also characterized by the beautiful nature that has recently attracted tourists who come to enjoy the sight of the beautiful coral reefs of the clear, warm water. Tourists are also attracted to the vast deserts with its wild beautiful creatures, and enjoy "safari tourism" or desert tourism in the Red Sea desert region.

The Red Sea is distinguished with a unique biological diversity. It is famous for its various coral reefs, (mangrove) trees, sandy and rocky beaches, marshy grounds and salty swamps. Such environments contain a unique biological diversity including a variety of different kinds of fish that exceed 1000 types, solid coral reefs that exceed 205 types, soft coral reefs that exceed 100 types, birds that exceed 300 types, sea mammals that exceed 300 types, moss that exceeds 500 types. There are also more than 11 types of sea herbs, 4 types of turtles, more than 2000 types of sea

invertebrates such as crabs, starfish, worms and other creatures in addition to hundreds of wild animals, desert plants and other in the salty swamps.

2 METHODOLOGY

For evaluation of current and expected future releases of the unintentionally produced POPs, UNEP's document version 2.1 "Standardized Toolkit for Identification and Quantification of dioxin and furan releases", UNEP, Geneva, 2005, provides a methodology for making inventories of dioxins and furans using activity data from a country combined with emission factors as well as allowing the use of country data.

2.1 Inventory Approach and Methodology

a. Organizing survey using UNEP chemicals standardized toolkit and inventory forms.
b. Providing guidelines and coordinating the inventory by the national consultant.
c. Sending the inventory forms to collect the information from different sectors.
d. Collecting information and available processed data from all stakeholders.
e. Checking the available data for unclear, incomplete, suspected data for clarification.
f. Organizing several field visits to evaluate data and to discuss problems in implementing inventory with stakeholders and EEAA departments (all Ministries, companies, factories and other concerned authorities that have cooperated with us in the preparation of the inventory were addressed to guarantee data credibility).
g. Organize some meeting with competent department in the related ministries, authorities, companies and factories that are considered as hotspots to make sure of the validity of the data used in inventories of dioxins and furans, and amending inaccurate results and relying on newly checked results.
h. Preparing the final form for inventory reports on dioxins and furans after amendment

2.2 Inventory Stakeholders {detailed stakeholders are mentioned in Annex (1)}

a. Relevant Ministries
b. Competent Authorities
c. Public sector companies
d. Private sector companies
e. Governorates
f. Regional branches of EEAA
g. Non governmental organizations

2.3 Inventory Problems

a. Difficult accessibility to available of data
b. Missing infrastructure for inventory such as:

(1) Data bases
(2) Lack of training on POPs inventory

c. Lack of communication
d. Lack of knowledgeable personnel
e. Reluctance of industries and even Competent Authorities officers to provide information
f. Use of different units of calculations
g. Lack of cooperation from some industries
h. Providing very approximate data by some sectors due to the difficulty of calculating all dioxins and furans releases

2.4 Assumptions

We use the following assumptions for the calculations of PCDD/PCDF emissions:

a. Medical waste incineration (according to the data received from Ministry of Health)
    - We suppose that each incinerator works 8 hours/day, 5 days/week for 52 weeks/year, and
    - 50% of the incinerators were classified as 2-controlled, batch type combustion, no/minimal APCS and the other 50% were classified as 3-controlled, batch type combustion, good APCS

b. Fossil fuel power plants (according to the data received from Ministry of Electricity and Power)
    - We suppose that each permanent power station works for 7000 hr/year and each alternate power station works for 1760 hr/year.

c. Ceramics Production (according to the data received from the factory)
    - We suppose that the average weight of one square meter of ceramic equal to 17.5 kg

d. Transport (according to the data received from Ministry of Interior /General Traffic Department and Ministry of Petroleum and Ministry of Transport) :
    - We suppose that we use only unleaded fuel in all 4-stroke and 2-stroke engines,
    - For 4-stroke engines we suppose that (class 3)unleaded fuel with catalyst represents 25% of the total No. of engines, and (class 2)unleaded fuel without catalyst represents 75% of the total No. of engines (according to oral discussion with the General Traffic Department),
    - For 2-stroke engines we suppose that all engines use unleaded fuel without catalyst (class 2),
    - Since the consumption data of fuel was given in liters (L) , so a conversion factor of 0.00074 (for gasoline) was used to

convert liters into tons (1 L of gasoline has a mass of 0.74 kg), and a conversion factor of 0.00085 (for diesel) was used to convert liters into tons (1 L of diesel has a mass of 0.85kg),

- For railway trains (according to the data received from Ministry of Transport / Egyptian National Railway Authority / Transport Planning Authority) , we suppose that each train consumes 3L of diesel fuel used per 1 km distance,
- For working days of vehicles (according to the survey done with owners and drivers of vehicles) we suppose that each vehicle works for 250 days/year,
- For heavy oil fired engines (ships) we suppose that for every 10,000 ton weight of vessels consume 1 ton / hr of heavy oil , and each ship remains about 24 hours during crossing Suez Gulf and Egyptian Red Sea coasts (we obtain the data from some experts working in that field),

e. Waste burning and accidental fires (according to the data received from Ministry of Environment [Central Department of Hazardous Substances and Wastes, EEAA Regional Branches for the concerned Governorates], and Red Sea, Suez , South Sinai Governorates)
   - We suppose that 50% of the total amount of landfill wastes were burnt,
   - For accidental fires in houses, factories and vehicles we take the average of accidents for the last 5 years (according to the data received from Ministry of Interior / Civil Protection Authority and EEAA Department for Environmental Disasters -Emergency Operation Center),

f. Petroleum industry (according to the data received from Ministry of Petroleum, EEAA Regional Branches for the concerned Governorates], and Red Sea, Suez , South Sinai Governorates) :
   - We convert the amount of gas burned from ft^3 to m^3 by using the conversion factor (1 ft3 = 0.028 m^3).
   - The amount of gas burned/ day=76.420 million ft^3 in Red Sea Governorate (as an example for calculation method), which is the amount of gas burned /year =27893.3 x 10^6 ft^3 (1 year = 365 day), the amount of gas burned /year = 781.0124 x10^6 m^3 (1 ft^3 = 0.028 m^3).

g. Smoke Houses (according to the data received from Ministry of Tourism , EEAA Regional Branches for the concerned Governorates and CAPMAS) and after asking some of the workers in this field :
   - We suppose that each smoke house installation produces an average of 50 kg smoking food / day
   - We suppose that each smoke house installation in any hotel produces an average of 100 kg smoking food / week which equal to 5.2 t/year.

- We suppose that the residue represents 6 – 10 % with average about 8 % of the total production (by weight).

h. Dry Cleaning (according to the data received from Ministry of Tourism , EEAA Regional Branches for the concerned Governorates and CAPMAS) and after asking some of the workers in this field :
   - We suppose that the amount of distillation residue = 5 – 15 kg / month with average of 10 kg / month which equal to 0.120 t / year for each dry cleaning laundry.

i. Tobacco Smoking (according to the data received from Ministry of Health, Ministry of Tourism , EEAA Regional Branches for the concerned Governorates and CAPMAS) :
   - We suppose that the number of smokers represents about 20% of the total population (for each Governorate).
   - We suppose that the number of smokers represents about 10% of the total No. of tourists (for each Governorate).
   - We suppose that every person smoke 20 cigarette /day x 365 day / year =7300 cigarette / year.

j. Landfills and waste Dumps (according to the data received from Ministry of Environment [Central Department of Hazardous Substances and Wastes, EEAA Regional Branches for the concerned Governorates], Red Sea, Suez , South Sinai Governorates , and CAPMAS):
   - We suppose that 50% of the total amount of landfill wastes were disposed.
   - Ws suppose that the leachate represents about 10% of the amount disposed

k. Sewage and Sewage Treatment (according to the data in the Toolkit ,and the data received from Ministry of Environment [Central Department of Hazardous Substances and Wastes, EEAA Regional Branches for the concerned Governorates], Red Sea, Suez , South Sinai Governorates , and CAPMAS):
   - We suppose that the sludge generation at waste water treatment plants = 0.4 % of raw sludge in effluent water
   - We suppose that the effluent contains 3 % of dry matter.

3 - RELEASE ESTIMATES INTO THE MAIN SOURSE CATEGORIES

General

The assessment of unintentionally produced chemicals provided the information required for elaboration and implementation of the action plan required under Article 5 of the Convention. This Article requires each Party, within two years of entry into force of the Convention, to develop an action plan to identify, characterize and address the unintentional release of POPs listed in Annex C of the Stockholm Convention.

Dioxins (polychlorinated di-benzo-p-dioxins, PCDDs) and furans (polychlorinated di-benzo-furans, PCDFs) are two of the twelve Persistent Organic Pollutants (POPs) addressed in "Stockholm Convention on Persistent Organic Pollutants". This Convention is considered a major achievement for Egypt as it starts by immediately targeting 12 particularly toxic POPs for reduction heading towards eventual elimination.

According to the Stockholm Convention (Article 5) there are two categories of unintentional chemical by-products: polychlorinated dioxins and furans. Although, these compounds have no commercial use, dioxins and furans result from combustion and from industrial processes when producing pesticides, poly vinyl chloride, and other chlorinated substances. Dioxins and furans are the most potent cancer-causing chemicals known yet.

The objective of the preliminary inventory of releases to the environment is to carry out a preliminary evaluation of current and expected releases of the chemicals in Annex C of the Convention in the Red Sea coastal zone of Egypt, to give details about the relevant and existing laws and policies related to the management of releases of these chemicals and to evaluate their effectiveness and deficiencies.

According to part II in Annex C of the "Stockholm Convention on Persistent Organic Pollutants" Polychlorinated di-benzo-p-dioxins and di-benzo furans, hexachlorobenzene and polychlorinated biphenyls are unintentionally formed and released from thermal processes involving organic matter and chlorine as a result of incomplete combustion or chemical reactions. The following industrial source categories have the potential for comparatively high formation and release of these chemicals to the environment:

a. Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge
b. Cement kilns incinerating hazardous waste
c. Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching
d. The following thermal processes in the metallurgical industry:
   (1) Secondary copper production
   (2) Sinter plants in the iron and steel industry

(3) Secondary aluminum production
(4) Secondary zinc production

Moreover, Part III in Annex C of The "Stockholm Convention " lists other source categories for dioxins and furans, hexachlorobenzene and polychlorinated biphenyls that may also be unintentionally formed and released from the following source categories, including:

a. Open burning of waste, including burning in landfill sites.
b. Thermal processes in the metallurgical industry not mentioned in Part II.
c. Residential combustion sources.
d. Fossil fuel-fired utility and industrial boilers.
e. Firing installations for wood and other biomass fuels.
f. Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially the production of chlorophenols and chloranil
g. Crematoria
h. Motor vehicles, particularly those burning leaded gasoline; which require addition of dichloroethylen
i. Destruction of animal carcasses.
j. Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)
k. Shredding plants for the treatment of end of life vehicles
l. Smoldering of copper cables
m. Waste oil refineries

Accomplishments

The evaluation of current situation of unintentionally produced POPs listed in Annex C of the Convention in Red Sea Coast is not compatible with supplement C of the Stockholm Convention, as shown in the next table.

Chemicals	Status	Current situation
(PCDDs/PCDFs) Polychlorinated dibenzo-p-dioxins (CAS: 1746-01-6) and dibenzofuranes (CAS: 110-00-9)	Some sources use high technology and others use low technology	Not Compatible with Stockholm Convention

3.1 MAIN CATEGORY NO I – WSTE INCIENERATION

3.1.1 Municipal solid waste incineration

This activity does not exist in Egypt

3.1.2 Hazardous waste incineration

3.1.2.1 General information

Till now only one cement company in Egypt (Suez Governorate) incinerate hazardous wastes in cement kilns.

3.1.2.2 Activity data

Table no 1 total number of **Hazardous waste incineration production**

Governorate	**Production** *year
Suez (Elmasrya for Cement)	26970
Total	**26970**

3.1.2.3 Emission factors

With annual expected releases of 0.0202 g TEQ/a to air and 0.809 g TEQ/a to residue according to calculations using the Standardized Toolkit for identification and quantification of dioxin and furan releases.

3.1.3 Light fraction shredder waste incineration

This activity does not exist in Egypt coastline**.**

3.1.4 Sewage sludge incineration

This activity does not exist in Egypt coastline.

3.1.5 Waste wood and waste biomass incineration

This activity does not exist in Egypt coastline.

3.1.6 Animal carcasses burning

This activity does not exist in Egypt coastline.

3.1.7 Medical Waste Incineration

3.1.7.1 General information

The number of hospital incinerators in The Red Sea Coast is 13 Incinerators (two of them are not working), Suez Governorate has 3 incinerators, Red Sea Governorate has 3 incinerators and South Sinai Governorate has 7 incinerators.

3.1.7.2 Activity data

Table no 2 total number of Medical Waste Incineration production

Governorate	Production *t/year
Red Sea	57.5
	57.5
Suez	153.5
	153.5
South Sinai	51.5
	51.5
Total	**525**

Incineration: 8 hours/day and 5 days/weak for 52 weeks/year

3.1.7.3 Emission factors

The expected levels of dioxins and furans emissions from these incinerators were estimated using the Standardized Toolkit for identification and quantification of dioxin/furan releases, with annul releases of 0.92 g TEQ/a to air and 0.264 g TEQ/a to residue .

3.1.7.4 Result

According to the detailed inventory and this estimation, Chart (2) shows that Suez Governorate has the largest expected emission of dioxins and furans (0.542 g TEQ/a to air [58% of the total emission from Red Sea Governorates] and 0.144 g TEQ/a to residue), as compared with what expected for the other Governorates at the Red Sea Coast.

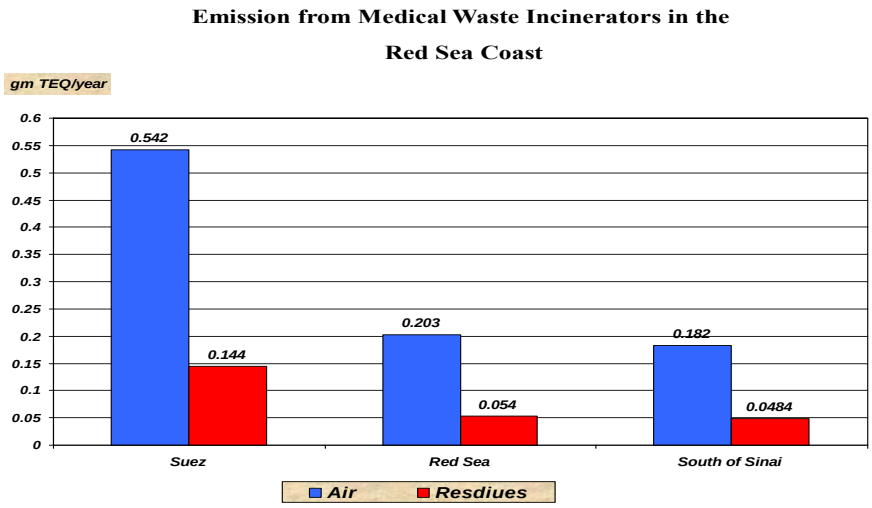


Chart (2) Emission from medical waste incineration

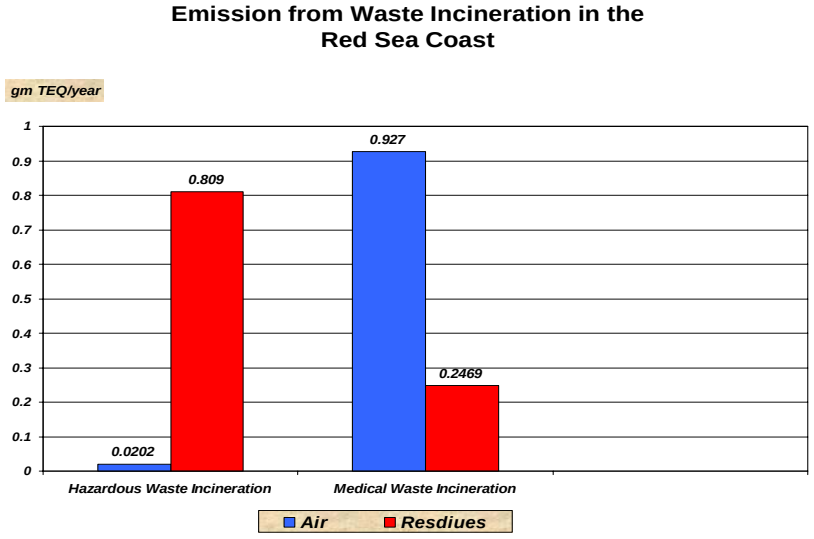


Chart (3) Emission from Waste incineration in the red sea coast

The above chart shows that the emission to air from medical waste incinerators is 45.89 times more than that from hazardous waste incineration, and the emission to residue from medical waste incinerators is about 0.305 times less than that from hazardous waste incineration.

3.2MAIN CATEGORY NO – 2 FERROUS AND NON FERROUS METAL PRODUCTION

3.2.1 Iron ore sintering

This activity does not exist in Egypt

3.2.2 Coke production

This activity does not exist in Egypt

3.2.3 Iron and steel production plants and foundries

3.2.3.1 General information

The inventory includes two iron and steel companies in Suez governorate.

3.2.3.2 Activity data

Table no 3 total number of Iron and steel production plants and foundries Production

Factory	***Production*** t/year
C. Iron and Steel Production (Suez Steel Company)	300000
C. Iron and Steel Production (El Ezz Company for Steel)	500000
Total	8**00000**

3.2.3.3 Emission factors

Annual release of 0.08gTEQ/a to air and 1.20gTEQ/a to residue

3.2.3.4 Result

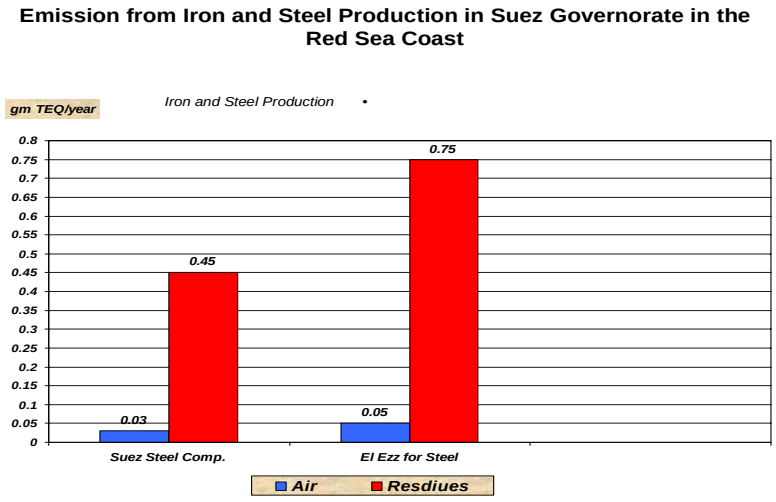


Chart (4) Emission from iron and steel Production in Suez Governorate in the red sea coast

3.2.3.5 Other Non-Ferrous Metal Production :

3.2.3.5.1 General information

The inventory includes one company for the production of Ferro manganese.

3.2.3.5.2 Activity data

The production of Other Non-Ferrous Metal Production (Ferro Manganese Company) 16500 ton/year

3.2.3.5.3 Emission factors

Annual expected releases of 1.65g TEQ/a to air

3.2.3.5.4 Result

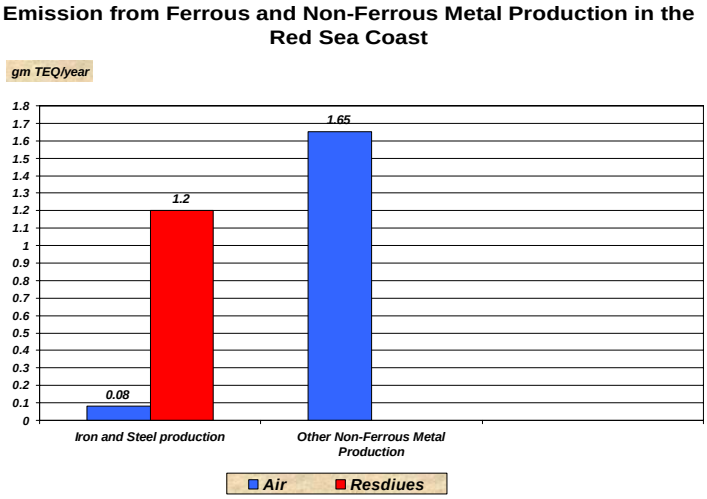


Chart (5) Emission from Ferrous and Non-Ferrous Production in the red sea coast

The above chart shows that the emission to air from other non-ferrous metal production (one Ferromanganese Company) is 20.63 times more than that from iron and steel production (two steel companies).

3.2.4 Copper production

This activity does not exist in Egypt coastline**.**

3.2.5 Aluminum production.

3.2.5.1 Incomplete information

Some firms did not send any written information but give their answer orally that they have not any sources of dioxin and furan (for example Alico Egypt for Aluminum and Glass).

3.2.6 Lead production

This activity does not exist in Egypt coastline.

3.2.7 Zinc production

This activity does not exist in Egypt coastline

3.2.8 Brass and bronze production

This activity does not exist in Egypt coastline**.**

3.2.9 MANGESIUM Production

This activity does not exist in Egypt coastline.

3.2.10 Thermal non-ferrous metal production

This activity does not exist in Egypt coastline**.**

3.2.11 Shredders

This activity does not exist in Egypt coastline.

3.2.12 thermal wire reclamation

This activity does not exist in Egypt coastline

3.3 MAIN CATEGORY 3 - HEAT AND POWER GENERATION

3.3.1 Fossil Fuel Power plants

3.3.1.1 General information

The inventory includes 19 fossil fuel power plants for generating electricity in the Red Sea Coastal zone.

3.3 .1.2 Activity data

Table no 4 total number of Fossil Fuel Power plants Production

Governorate	Production TJ
Red Sea	5485.769
Suez	38808
South Sinai	5133.532
Total	**49427.301**

3.3.1.3 Emission factors

Annual expected releases of 0.10233g TEQ/a to air .

3.3.1.4 Result

According to the detailed inventory and this estimation, Chart (9) shows that Suez Governorate has the largest expected emission of dioxins and furans to air, as compared with what expected from the other Governorates at the Red Sea Coast.

The emission to air from fossil fuel power plants in Suez Governorate is 35.93 times more than that from fossil fuel power plants in Red Sea Governorate and is 37.31 times more than that from fossil fuel power plants in South Sinai Governorate, and this is due to the old technology used in the fossil fuel power plants in Suez Governorate and the high power production (~78.5% of the total power production in the Red Sea Coast of Egypt).

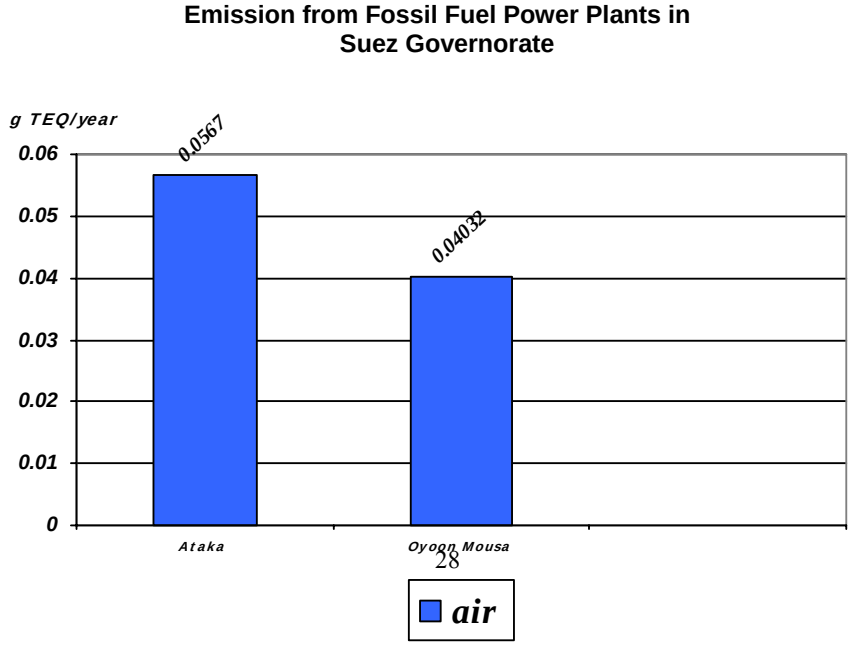


Chart (6) Emission from Fossil Fuel Power Plants in the Suez Governorate

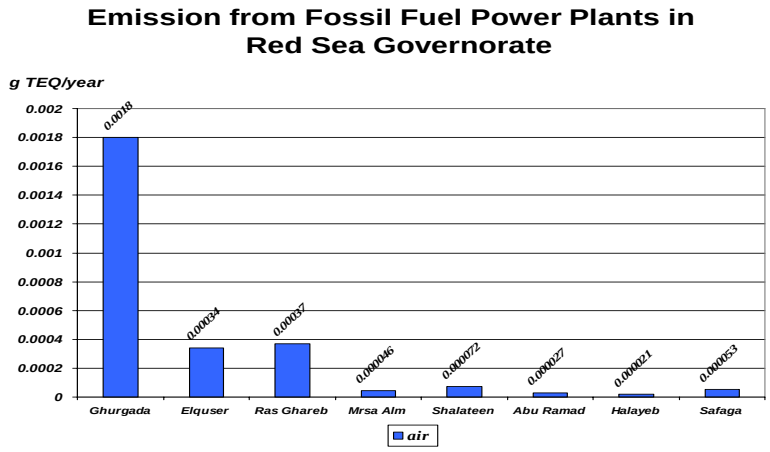


Chart (7) Emission from Fossil Fuel Power Plants in the Red Sea Governorate

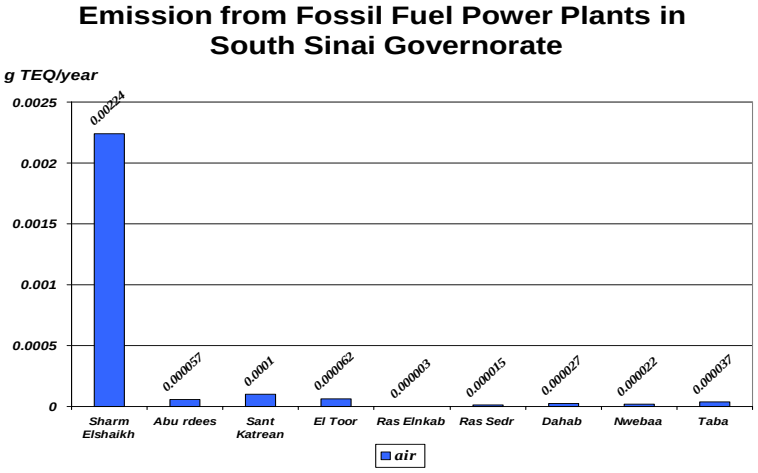


Chart (8) Emission from Fossil Fuel Power Plants in the South Sinai Governorate

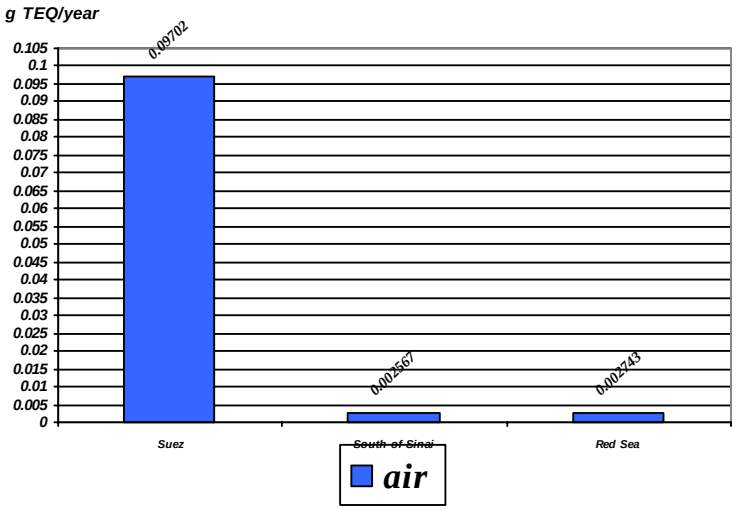


Chart (9) Emission from Fossil Fuel Power Plants in the Red Sea Coast

3.3.2 Biomass power plant

This activity does not exist in Egypt coastline

3.3.3 Landfill and biogas combustion

This activity does not exist in Egypt coastline

3.3.4 House hold heating and cooking – biomass

This activity does not exist in Egypt coastline

3.3.5 Domestic heating-fossil fuels

This activity does not exist in Egypt coast line

3.4 MAIN CATEGORY NO 4 - PRODUCTION OF MINERAL PRODUCT

3.4.1 Cement Production:

3.4.1.1 General information

The inventory includes 4 companies for cement production in the Suez Governorate.

3.4.1.2 Activity data

Table no 5 total number of Cement Production:

Factory	***Production*** t/year
Suez Cement company (Suez Factory)	2,330,830
Suez Cement company (Elkattamya Factory)	1,424,216
Egyptian Cement Company	10,000,000
Arabian Cement Company	2,000,000
Total	**15755046**

3 .4.1.3 Emission factors

Annual expected releases of 0.787g TEQ/a to air. The highest emission from Egyptian Cement Company (0.5 g TEQ/a to air) is due to the large amount of cement produced per year (10,000,000 ton/a) which represents about 63.5% of the total annual production in Suez Governorate

.

3.4.1.4 Result

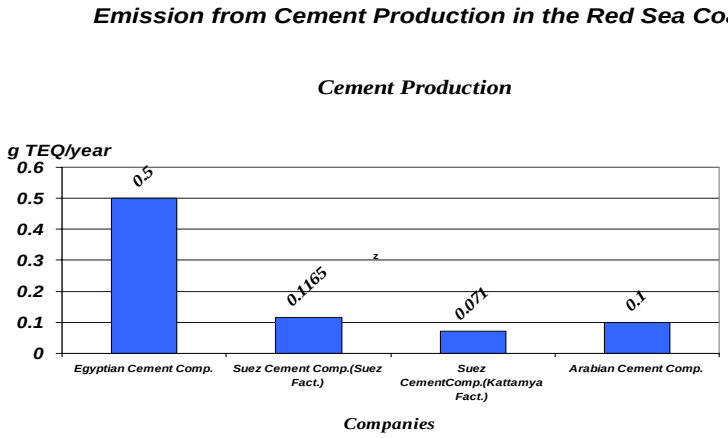


Chart (10) Emission from Cement Production in the Red Sea Coast

3.4.2 Lime Production:

3.4.2.1 General information

The inventory includes one company for lime production in the Suez Governorate.

3.4.2.2 Activity data

Table no 6 total number of **Lime Production**

Factory	***Production*** t/year
Suez Lime Company	24000
Total	**24000**

3.4.2.3 Emission factors

Annual expected releases of 0.00168 g TEQ/a to air.

3.4.3 Brick

This activity does not exist in Egypt coastline

3.4.4 Glass Production:

3.4.4.1 General information

The inventory includes one company for glass production in the Suez Governorate.

3.4.4.2 Activity data

Table no 7 total number of **Glass Production**

Factory	**Production** t/year
Medical Glass company	36000
Total	**36000**

3.4.4.3 Emission factors

Annual expected releases of 0.00054 g TEQ/a to air.

3.4.5 Ceramics Production:

3.4.5.1 General information

The inventory includes one company for ceramics production in the Suez Governorate.

3.4.5.2 Activity data

Table no 8 total number of **Ceramics Production**

Factory	**Production** t/year

Ceramica Aldorado Company (Suez)	433750
Total	**433750**

3.4.5.3 Emission factors

Annual expected releases of 0.00868 g TEQ/a to air.

3.4.6 Asphalt Mixing:

3.4.6.1 Activity data

Table no 9 total number of **Asphalt Mixing Production**

Governorate	**Production** t/year▫
Red Sea	750000
Suez	630000
South Sinai	1060000
Total	**2440000**

3.4.6.2 Emission factors

The inventory shows an annual expected releases of 0.1708 g TEQ/a to air.

3.4.6.3 Result

From the chart below we see that for the Egyptian Red Sea Coast cement production represents the highest releases to air than that from other mineral products mentioned in category (4).

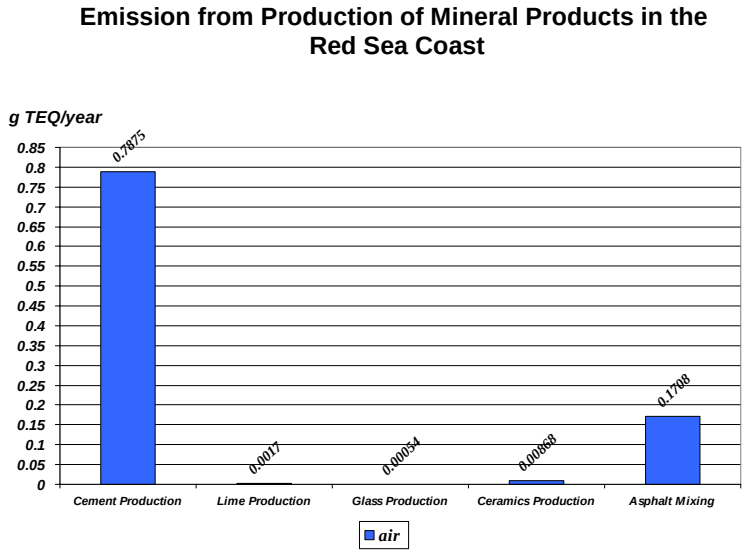


Chart (11) Emission from Mineral Products in the Red Sea Coast

3.4.7 Oil shale production

This activity does not exist in Egypt coastline.

3.5 MAIN CATEGORY NO 5 TRANSPORT

3.5.1 4 – Stroke Engines:

3.5.1.1 General information

The inventory was made on most 4-Stroke transportation means in the Red Sea Coast Governorates, and we suppose that 25% of the total fuel consumption was unleaded fuel with catalyst.

3.5.1.2 Activity data

Table no 10 total number of **4-Stroke Engines in the Red Sea Governorate consumption**

Governorate	Consumption *t/year
Red Sea	47607.4
	15869.1
Total	**63476.5**

Table no 11 total number of **4-Stroke Engines in the Suez Governorate consumption**

Governorate	Consumption *t/year
Suez	83277.9
	27759.3
Total	**111037.2**

Table no 12 total number of **4-Stroke Engines in the South Sinai consumption**

Governorate	Consumption *t/year
South Sinai	33849.8

	11283.3
Total	**45133.1**

3.5.1.3 Emission factors

the highest emission was from Suez Governorate (0.00832gTEQ/a) followed by Red Sea Governorate (0.00476gTEQ/a) and then South Sinai Governorate (0.00338gTEQ/a, with annual expected releases from Red Sea Coast Governorates of 0.01647g TEQ/a to air.

3.5.2 2 – Stroke Engines:

3.5.2.1 General information

The inventory was made on most 2-Stroke transportation means in the Red Sea Coast Governorates.

3.5.2.2 Activity data

Table no 13 total number of **2 – Stroke Engines consumption**

Governorate	**Consumption** *t/year
Red Sea	3496.5
Suez	3951.6
South Sinai	2149.5
Total	**9597.6**

3.5.2.3 Emission factors

The highest emission was from Suez Governorate (0.0099gTEQ/a) followed by Red Sea Governorate (0.0087gTEQ/a) and then South Sinai Governorate (0.0054gTEQ/a) , with annual expected releases from Red Sea Coast Governorates of 0.0234 g TEQ/a to air.

3.5.3 Diesel Engines:

3.5.3.1 General information

The inventory was made on most Diesel transportation means in the Red Sea Coast Governorates.

3.5.3.2 Activity data

Table no 14 total number of **Diesel Engines consumption**

Governorate	Consumption *t/year
Red Sea	128605.3
Suez	174053.5
South Sinai	54626.3
Ships from &to Suez Canal and Red Sea Ports	475.929
Total	**357761.03**

3.5.3.3 Emission factors

The highest emission was from Suez Governorate (0.0174gTEQ/a) followed by Red Sea Governorate (0.0129gTEQ/a) and then South Sinai Governorate (0.0055gTEQ/a) , with annual expected releases from Red Sea Coast Governorates of 0.03585 g TEQ/a to air.

- For transportation we found that the large emission to air from Suez Governorate is due to the large number of transportation means, and this is referred to the high population in this governorate which represents about 54% of the total population of the three governorates.

3.5.3.4 Incomplete information

Providing very approximate and incomplete data by some sectors , for example the data obtained from the Ministry of Interior/Traffic Department did not mention the fuel consumption of transportation means also did not mention the type of vehicles in Suez Governorate, so we take the information from the book (Egypt Description by Information 2009-Years of Development - 8th Edition) issued by the Egyptian Cabinet Information and Decision Support Center, and from the Statistical Year Book for Year 2008 issued by CAPMAS, and we try to have the answer fuel consumption from some users and drivers.

3. 5.4 Heavy Oil Fired Engines:

3.5.4.1 General information

The inventory was made on most heavy oil fired engines (ships) of marine transportation sector in the Red Sea Coast (from and to Suez canal and Red Sea Ports).

3.5.4.2 Activity data

Table no 15 total number of **Heavy Oil Fired Engines consumption**

Ship Traffic	Fuel Consumption *t/year
From & To Suez Canal	1638108
Red Sea Ports	41640
Total	**1679748**

3.5.4.3 Emission factors

Annual expected releases from Red Sea Coast of 6.7190 g TEQ/a to air.

3.5.4.4 Result

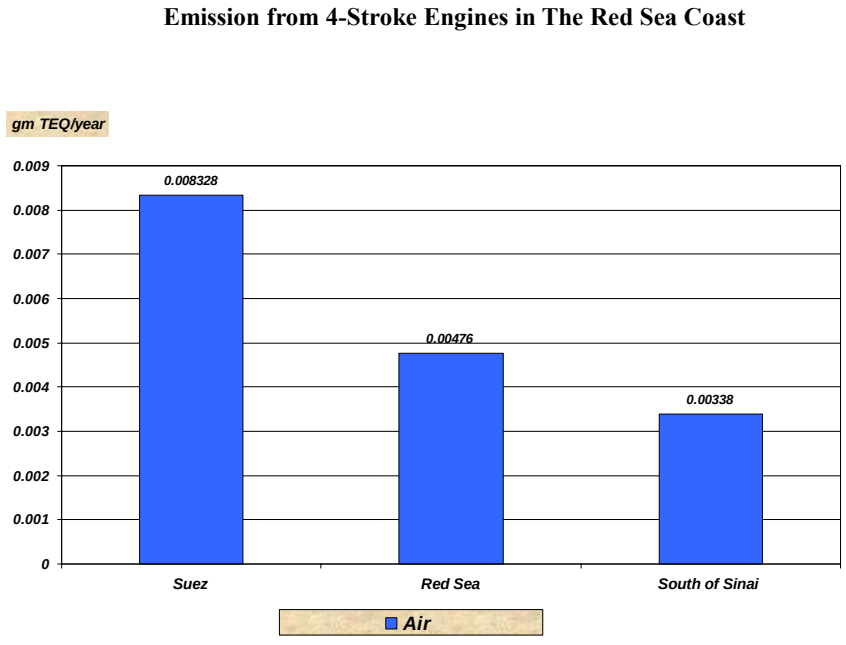


Chart (12) Emission from 4 –Stroke Engines in the Red Sea Coast

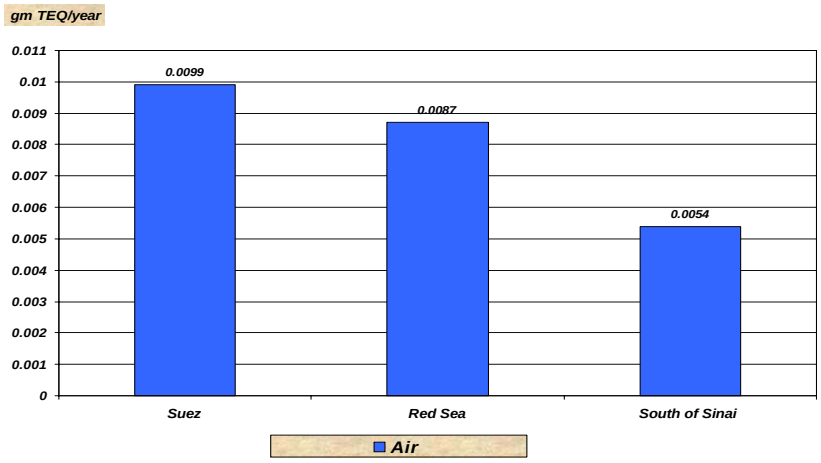


Chart (13) Emission from 2 –Stroke Engines in the Red Sea Coast

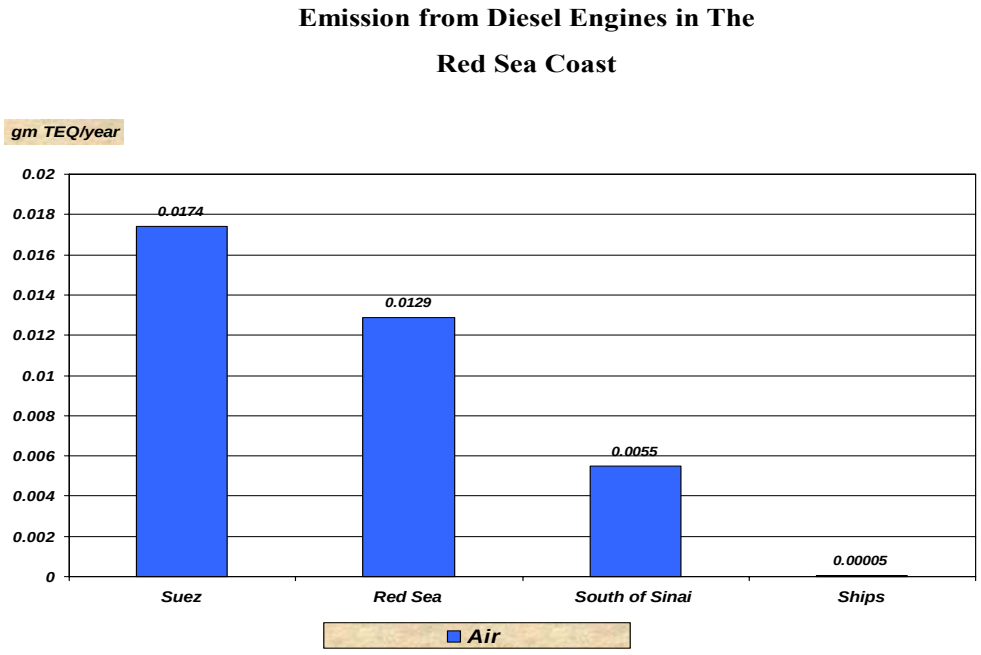


Chart (14) Emission from Diesel Engines in the Red Sea Coast

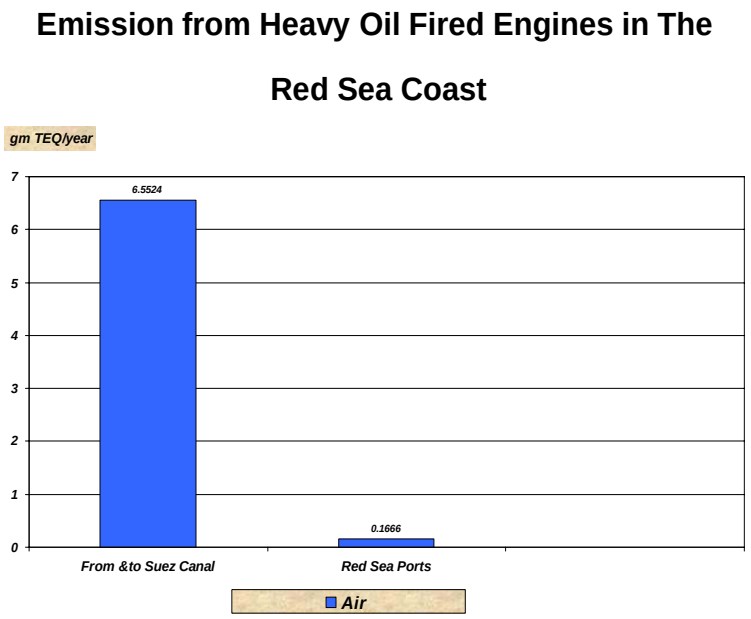


Chart (15) Emission from Heavy Oil Fired Engines in the Red Sea Coast

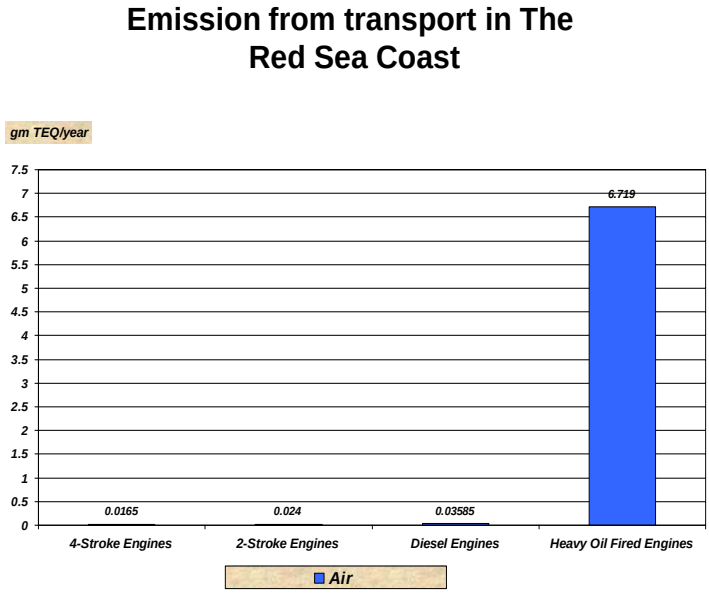


Chart (16) Emission from Transport in the Red Sea Co

3.5.4.5 Incomplete information

There is no data about fuel type and consumption for ships crossing or passing through Suez Canal, and so we consult some experts working in that field to assume the data used in calculation**.**

3.6 MAIN CATEGORY NO 6 – OPEN BURNING PROCESSES

3.6.1 Fire/burning – biomass

This activity does not exist in Egypt coastline

3.6.2 Landfill Fires :

|3.6.2.1 General information

Municipal solid waste are collected and dumped in special places where, self ignition combustion of waste takes place releasing dioxins and furans.

3.6.2.2 Activity data

Table no 16 total number of **Landfill Fires production**

Governorate	**Production** t/year▫
Red Sea	237250
Suez	164250
South Sinai	182500
Total	**584000**

3.6.2.3 Emission factors

The expected levels of dioxin and furan emissions from these dump sites were estimated using the Standardized Toolkit for identification and quantification of dioxin/furan releases, with annul releases of 584g TEQ/a to air and 350.4 g TEQ/a to land**.** According to the inventory and the estimations**.**

3.6.2.4 Result

Chart (15) shows that Red Sea Governorate has the largest expected emission of dioxins and furans, as compared with what expected from the other Governorates at the Red Sea Coast due to the amount of waste and the number of landfill sites.

3.6.3 Accidental Fires in Houses, Factories:

3.6.3.1 General information

The inventory was made on the average of annual accidents in the three governorates (the last recent accident was at Suez Governorate at Attaka which results in burning of about 7 ships).

3.6.3.2 Activity data

Table no 17 total number of **Accidental Fires in Houses, Factories**

Governorate	**Amount of material burned**

	t/year
Red Sea	60
Suez	400
South of Sinai	117
Total	**577**

3.6.3.3 Emission factors

Annual releases of 0.2308 g TEQ/a to air and 0.2308g TEQ/a to land.

3.6.4 Accidental Fires in Vehicles:

3.6.4.1 General information

The inventory was made on the average of annual accidents in the three governorates.

3.6.4.2 Activity data

Table no 18 total number of **Accidental Fires in Vehicles**

Governorate	No. of fired vehicles /year
Red Sea	5
Suez	7
South of Sinai	2
Total	**14**

3.6.4.3 Emission factors

Annual releases of 0.00131 g TEQ/a to air and 0.00026g TEQ/a to land.

3.6.4.4 Result

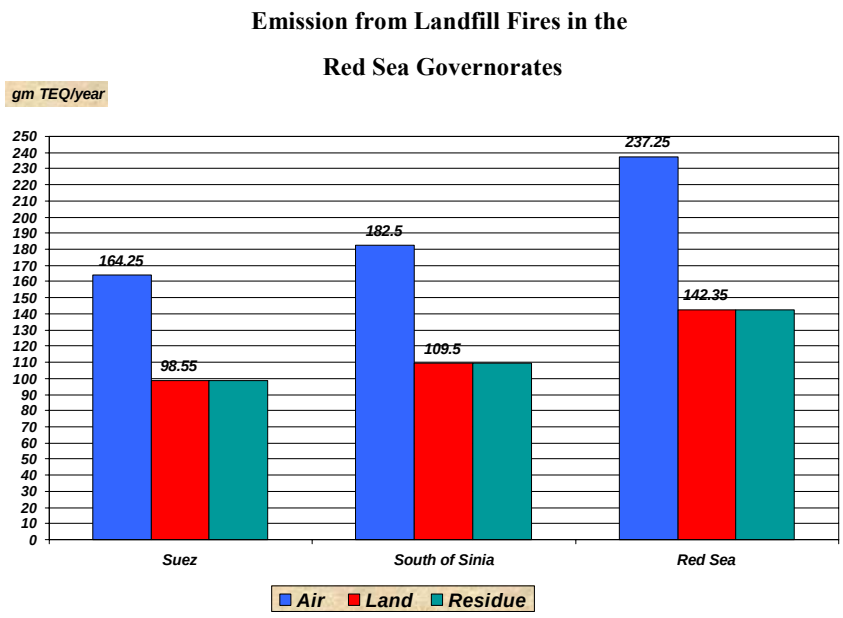


Chart (17) Emission from Landfill Fires in the Red Sea Governorates

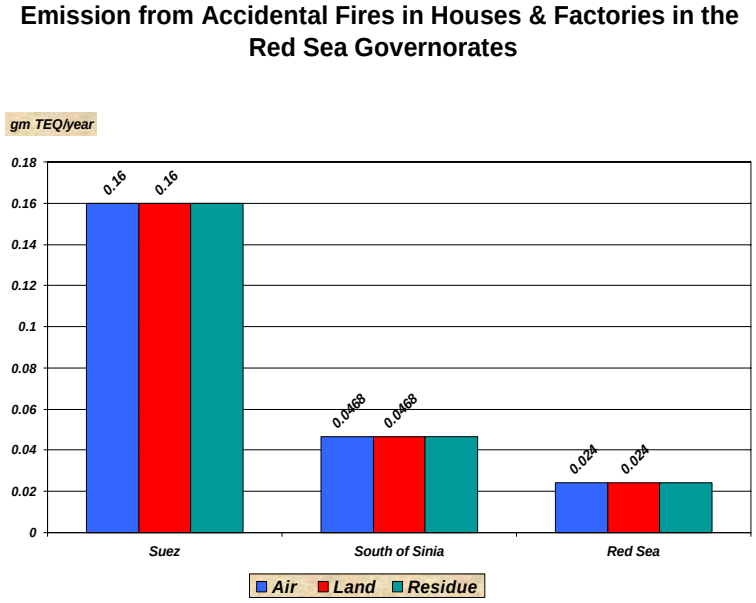


Chart (18) Emission from Accidental Fires in Houses and Factories in the Red Sea Governorates

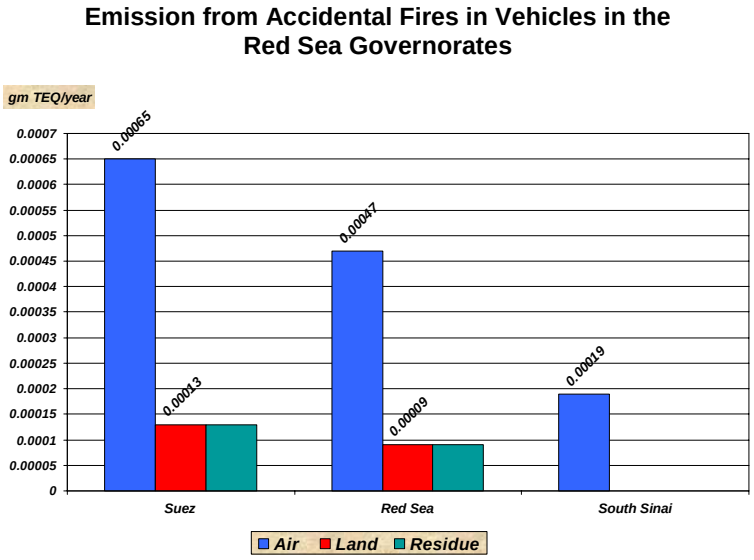


Chart (19) Emission from Accidental Fires in Vehicles in the Red Sea Governorates

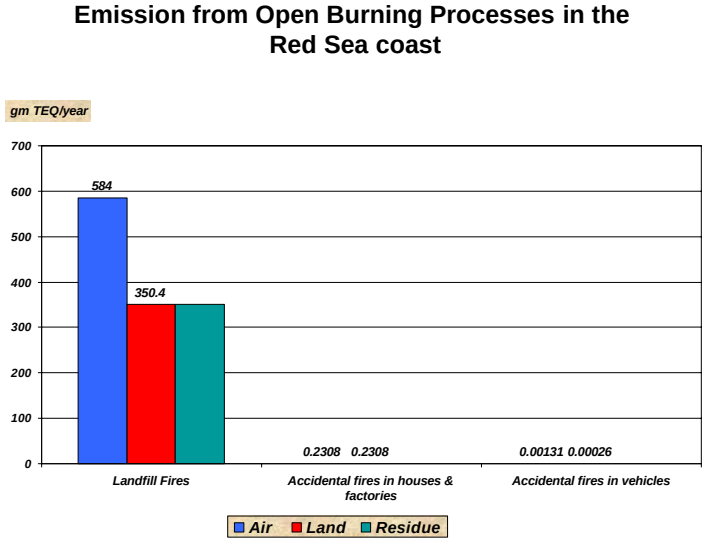


Chart (20) Emission from Open Burning Processes in the Red Sea Coast

- For open burning processes we found that the emission to air and land from landfill fires represents the largest emission than that from other sources.

3.6.6 Industrial fires

This activity does not exist in Egypt coastline.

3.7 MAIN CATEGORY NO 7 PRODUCTION AND USE OF CHEMICALS AND CONSUMED GOODS

3.7.1 Pulp and paper mills

3.7.1.1 Incomplete information

Some companies did not send any information about the production processes, air pollution controls, and daily/monthly or annual production (for example: textile and paper production), and this is due to that they consider the inventory would lead to some stricter environmental requirements.

3.7.2 Chemical industry

This activity does not exist in Egypt coastline.

3.7.3 Petroleum Industry (refineries) :

3.7.3.1 General information

The inventory was made on most Petroleum Industry (refineries) factories in the Red Sea Coast Governorates.

3.7.3.2 Activity data

Table no 19 total number of **Petroleum Industry (refineries)**

Governorate	Amount of Gas Burned (m^3 /year
Red Sea	781012400
Suez	210829591
South Sinai	1131475310
Total	2123317301

3.7.3.3 Emission factors

from South Sinai Governorate (0.3394gTEQ/a) followed by Red Sea Governorate (0.2343gTEQ/a) and then Suez Governorate (0.0632gTEQ/a) (due to the large amount of petroleum production from South Sinai and Red Sea Governorates), with annual expected releases from Red Sea Coast Governorates of 0.636992 g TEQ/a to air.

3.7.3.4 Result

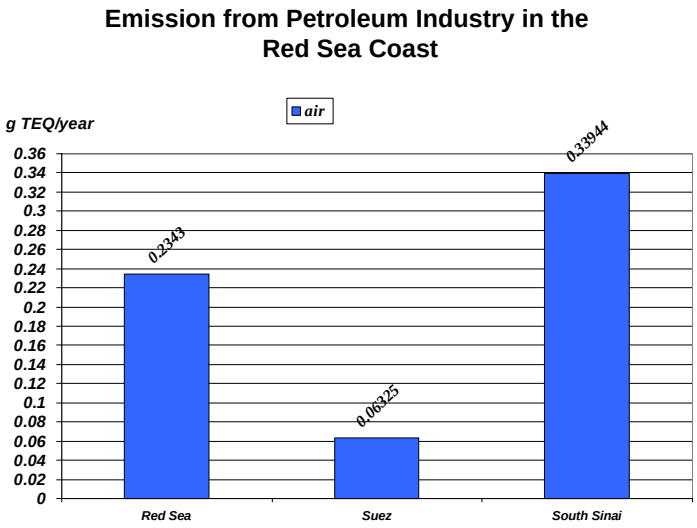


Chart (21) Emission from Petroleum Industry (refineries) in the Red Sea Coast

3.7.4 Textile plants

3.7.4.1 Incomplete information

***** Some companies did not send any information about the production processes, air pollution controls, and daily/monthly or annual production (for example: textile and paper production), and this is due to that they consider the inventory would lead to some stricter environmental requirements.

*For Textile production and we could not obtain data about this item from the concerned governorates till now.

3.7.5 Leather plants

3.8 MAIN CATEGORY NO 8 – MISCELLANEOUS

3.8.1 Drying of biomass

This activity does not exist in Egypt coastline.

3.8.2 Crematoria

This activity does not exist in Egypt coastline.

3.8.3 Smoke houses

3.8.3.1 General information

The inventory was made on the average number of smoke houses in the three governorates.

3.8.3.2 Activity data

Table no 20 total number of Smoke houses production

Governorate	Production t/year▫
Red Sea	2189.6
Suez	590.4
South Sinai	2538.0
Total	**5318.0**

3.8.3.3 Emission factors

with annual releases of 0.03177 g TEQ/a to air, and 0.00850 g TEQ/a to residue and the high emission was expected from South Sinai Governorate (0.01523 g TEQ/a to air and 0.00406 g TEQ/a to residue) due to the highest number of hotels in this governorate, and the low emission was expected from Suez Governorate (0.00354 g TEQ/a to air and 0.00094g TEQ/a to residue) due to the lowest number of hotels in this governorate than the other governorates.

3.8.3.4 Result

Emission from Smoke Houses in The Red Sea Coast

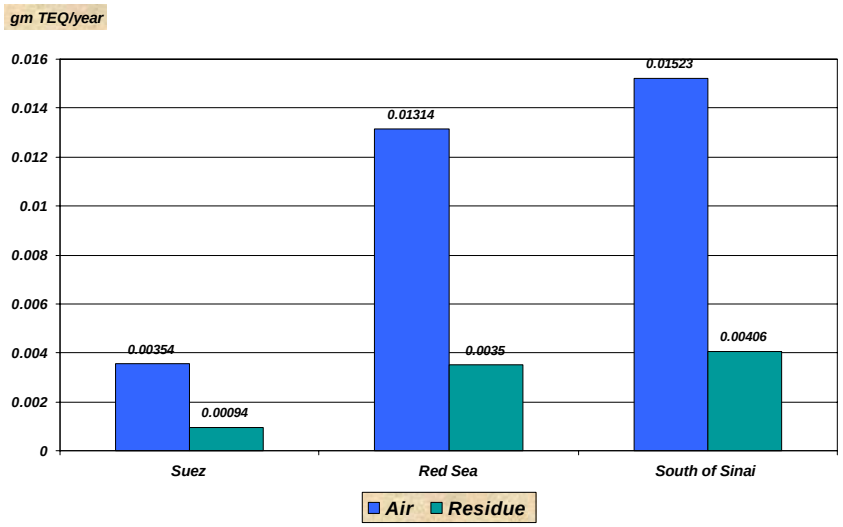


Chart (22) Emission from Smoke Houses in the Red Sea Coast

3.8.4 Dry Cleaning

3.8.4.1 General information

The inventory was made on the average number of dry cleaning laundries in the three governorates.

3.8.4.2 Activity data

Table no 21 total number of **Dry Cleaning distillation**

Goernovrate	Total amount of distillation residue t/year
Red Sea	27.60
Suez	4.80
South Sinai	34.80
Total	67.2

3.8.4.3 Emission factors

Annual releases of 0.00336 g TEQ/a to residue, and the high emission was expected from South Sinai Governorate (0.00174 g TEQ/a) due to the highest number of hotels having dry cleaning laundries in this governorate, and the low emission was expected from Suez Governorate (0.00024 g TEQ/a) due to the lowest number of hotels having dry cleaning laundries in this governorate.

3.8.4.4 Result

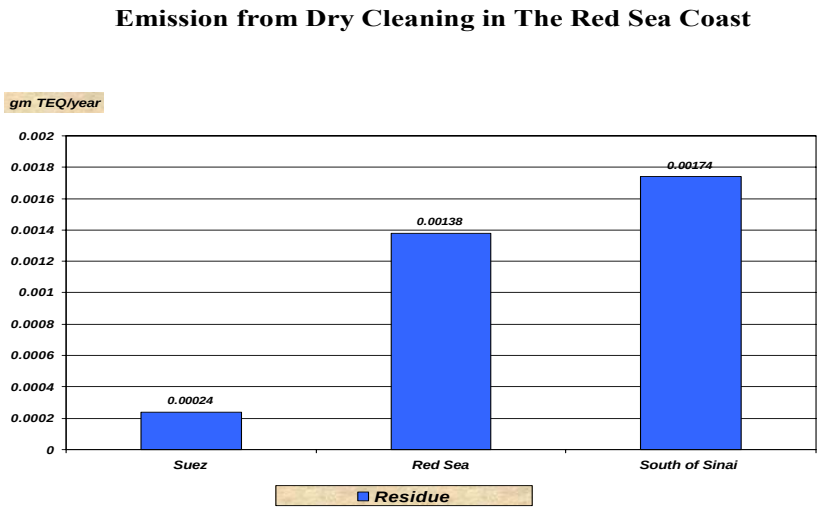


Chart (23) Emission from Dry Cleaning in the Red Sea Coast

3.8.5 Tobacco smoking

3.8.5.1 General information

According to the total population number:

The inventory was made on the average number of smokers in the three governorates

3.8.5.2 Activity data

Table no 22 total number of **Tobacco smoking**

Governorate	Total Population	Total No. of Smokers (20%)
Red Sea	**288' 661**	**57' 732**
Suez	**512' 135**	**102' 427**
South Sinai	**150' 088**	**30' 018**
Total	**950' 884**	**190' 177**

3.8.5.3 Emission factors

Annual releases of 0.000139 g TEQ/a to air, and the high emission was expected from Suez Governorate (0.0000748gTEQ/a) due to the high population than the other governorates, and lower emission from South Sinai Governorate (0.0000219 g TEQ/a) due to the low population than the other governorates.

3.8.5.4Result

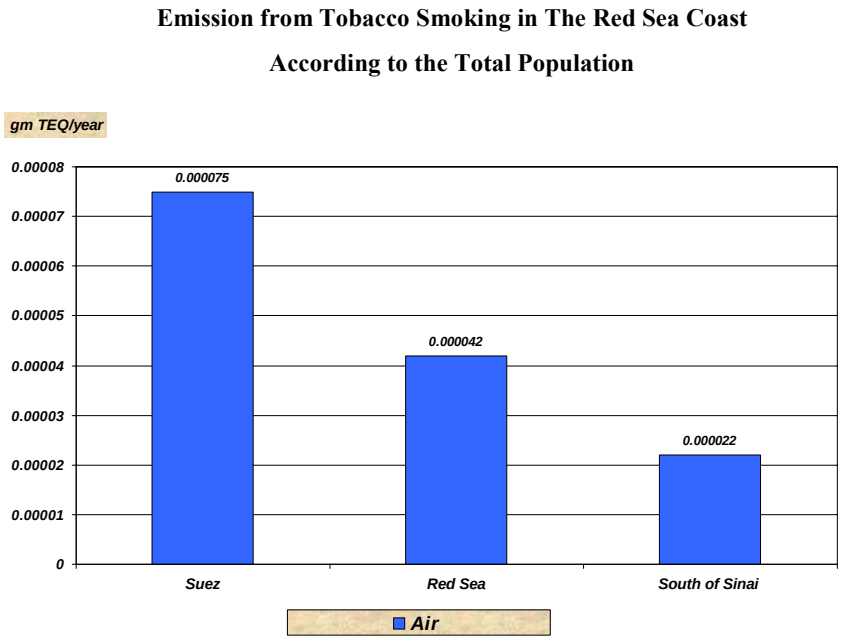


Chart (24) Emission from Tobacco Smoking in the Red Sea Coast According to the Total Population

According to the total number of population and tourists

3.8.5.5 General information

The inventory was made on the average number of smokers according to the total No. of population and tourists in the three governorates.

3.8.5.6 Activity data

Table no 23 total number of **According to the total number of population and tourists**

Governorate	Total Population	Total No. of Tourists/year
Red Sea	288' 661	28' 851' 060

Suez	**512' 135**	**1' 609 ' 650**
South Sinai	**150' 088**	**31' '779 ' 090**
Total	**950' 884**	**62 ' 239 ' 800**

3.8.5.7 Emission factors

Annual releases of 0.00468 g TEQ/a to air, and the high emission was expected from South Sinai Governorate (0.00234 g TEQ/a) due to the high No. of tourists than the other governorates, and lower emission from Suez Governorate (0.000192 g TEQ/a) due to the low No. of tourists than the other governorates.

3.8.5.8 Result

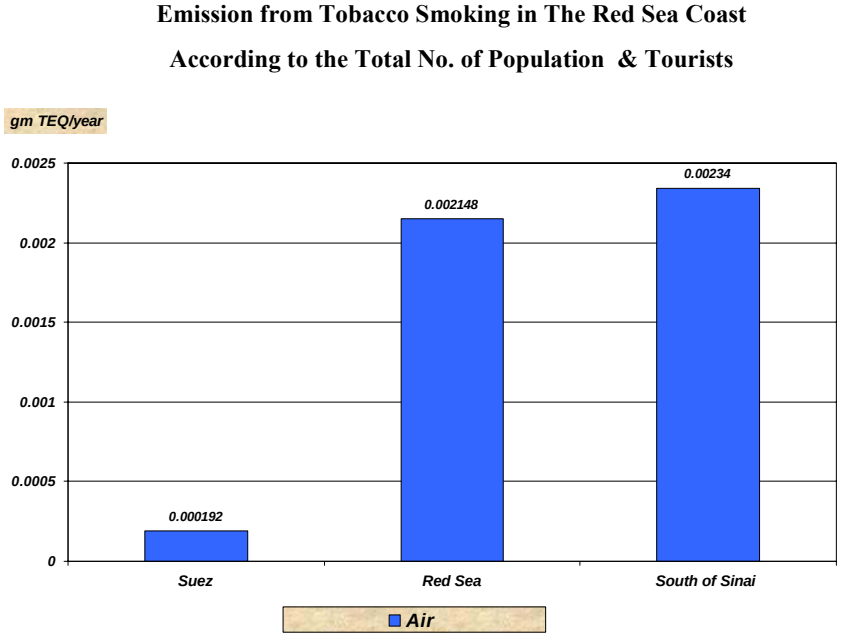


Chart (25) Emission from Tobacco Smoking in the Red Sea Coast

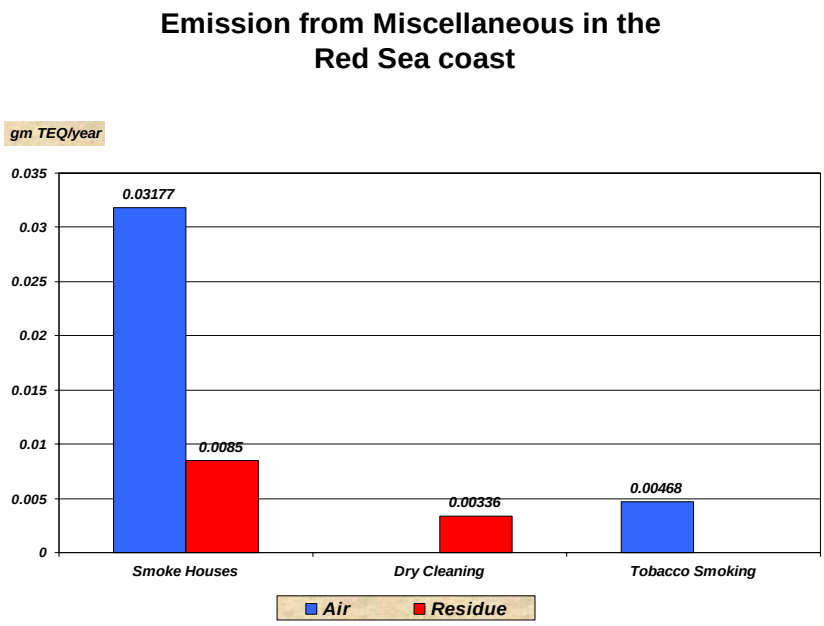


Chart (26) Emission from Miscellaneous in the Red Sea Coast

3.9 MAIN CATEGORY NO 9 – DISPOSAL/LANDFILL

3.9.1 Landfill leachate

This activity does not exist in Egypt coastline.

3.9.2 Sewage and Sewage Treatment

3.9.2.1 General information

The inventory was made on sewage and sewage treatment in the Red Sea Coast Governorates.

3.9.3.4 Activity data

Table no 24 total number of **Sewage and Sewage Treatment production**

Governorate	**Production** m^3/year▫
Red Sea	$37x10^6$
Suez	$99x10^6$
South Sinai	$119x10^6$
Total	225 x106

3.9.3.5 Emission factors

and the highest emission was from South Sinai Governorate (0.2380 gTEQ/a to water and 1.428gTEQ/a to residue) followed by Suez Governorate (0.1980 gTEQ/a to water and 1.1880 gTEQ/a to residue) and then Red Sea Governorate (0.0740 gTEQ/a to water and 0.444gTEQ/a to residue), with annual expected releases from Red Sea Coast Governorates of 0.510 gTEQ/a to water and 3.060 g TEQ/a to residue.

3.9.2.4 Result

Emission from Sewage and Sewage treatment in the Red Sea Governorates

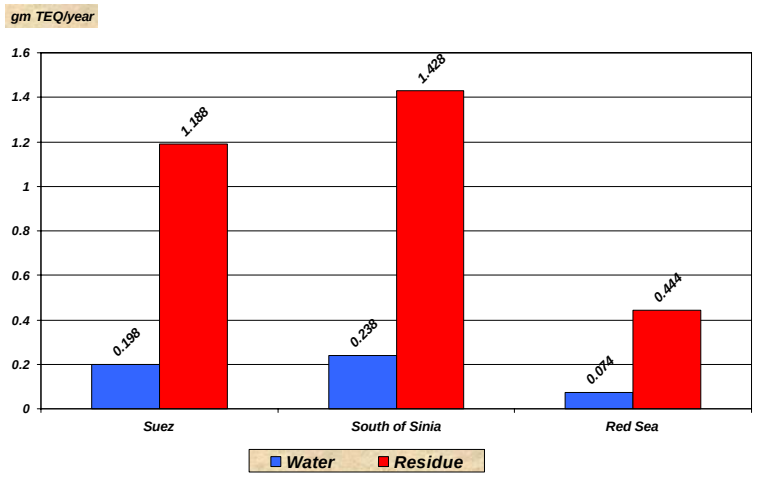


Chart (28) Emission from Sewage and Sewage Treatment in the Red Sea Governorates

Emission from Disposal / Landfill in the Red Sea Coast

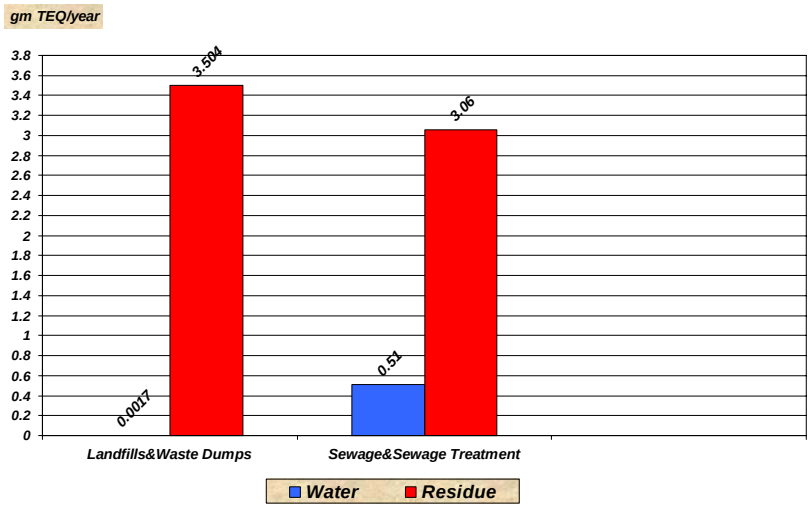


Chart (29) Emission from Disposal / Landfill in the Red Sea Coast

3.9.4 Open Waste Dumps

3.9.4.1 General information

The inventory was made on landfills and waste dumps in the Red Sea Coast Governorates.

3.9.4.2 Activity data

Table no 25 total number of Open Waste Dumps production

Governorate	**Production** t/year▫
Red Sea	237250
Suez	164250
South Sinai	182500
Total	

3.9.4.3 Emission factors

The highest emission was from Red Sea Governorate (1.4235gTEQ/a to residue) followed by South Sinai Governorate (1.0950gTEQ/a to residue) and then Suez Governorate (0.9855gTEQ/a to residue), with annual expected releases from Red Sea Coast Governorates of 3.5040 g TEQ/a to residue and 0.0017 gTEQ/a to water.

3.9.3.4 Result

Emission from Landfills and Waste Dumps in the Red Sea Governorates

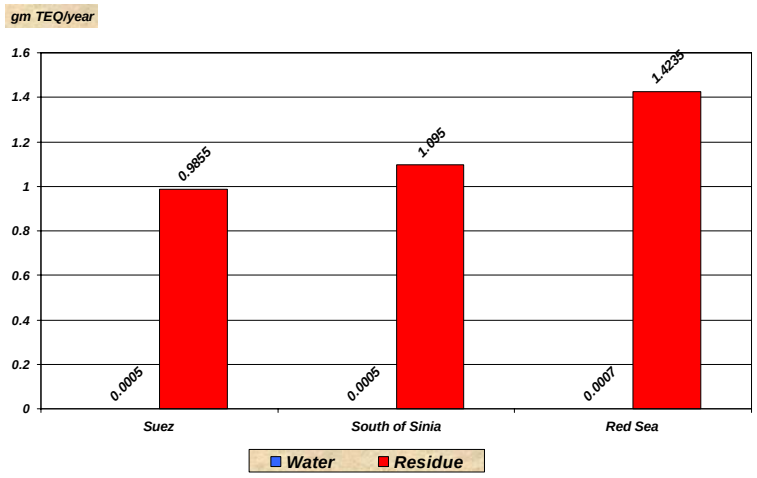


Chart (27) Emission from Landfills and Waste Dumps in the Red Governorates

3.9.4.5 Incomplete data

Some Governorates give incomplete data about dumpsites, amount and type of waste, and amount of burned wastes due to lack of knowledgeable personnel, so we take the information from EEAA regional branches in the concerned governorates and from EEAA central department of hazardous substances and wastes, also the data published in the statistical year book for year 2008 issued by CAPMAS to help us in calculations.

3.9.4 Composting:

There was only one composting plant in Red Sea Governorate with capacity of 160 t / day, but unfortunate it was burnet, and not working till now,.
There is another plant under construction in South Sinai Governorate with capacity of 240 t / day, and it is expected to start at 2011.

3.9.4 Waste Oil Treatment:

For waste oil treatment, according to the data obtained from the Ministry of Petroleum / Egyptian General Petroleum Corporation only one company in Egypt located in Alexandria Governorate is responsible for this issue till now, and there is no waste oil treatment in Red Sea Coast.

3.10 MAIN CATEGORY NO 10 - IDENTIFICATION OF POTENTIAL HOTS SPOTS

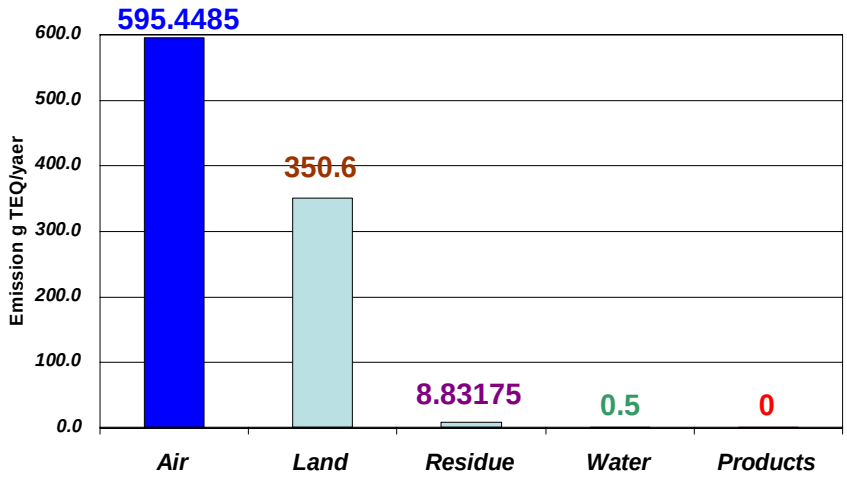
- Dumps of wastes/residues from categories1-9, especially when incidental or accidental landfill fires have occurred (in the three governorates), and this is the main responsibility of the governorates in cooperation with the concerned ministries and authorities (MOH, MOTI, EEAA...etc) to take actions to reduce/ prevent these incidental or accidental fires.
- Sites of relevant accidents, especially accidental fires in houses, factories and ships, and this is the main responsibility of the Governorates , Ministry of Interior (Civil Protection Authority and Traffic department), Ministry of Trade and Industry, Ministry of Transportation/Marine Safety Authority and Ministry of Manpower and Immigration for reviewing all aspects , safety precautions and occupational health before giving license to any of these sites and projects also MSEA/EEAA for environmental impact assessment of the projects, and Ministry of information and NGOs in cooperation with the concerned Ministries and Authorities for developing and designing media campaigns through TV and radio programs to enhance awareness of decision makers ,owners of the projects, workers, child and women.

Notes:

- The inventory of unintentionally persistent organic pollutants (POPs) in Red Sea Coast depend on the theoretical results calculated by using Standardized Toolkit for Identification and Quantification of Dioxin and Furan releases prepared by UNEP chemicals , so these results should be checked by sample analysis. The sites for the on-site sampling for PCDDs/PCDFs laboratory analysis were mentioned in annex (6).

- From these results it was found that there is a big problem into air as shown in chart (30), where the emission to air represents 62.249% from the total emission to different Medias, and 98.1% of this emission to air comes from landfill fires.

Emissions of PCDD and PCDF through the deferent medias in the Red Sea Coast



Percentage of emissions of PCDD and PCDF through the deferent medias in the Red Sea Coast

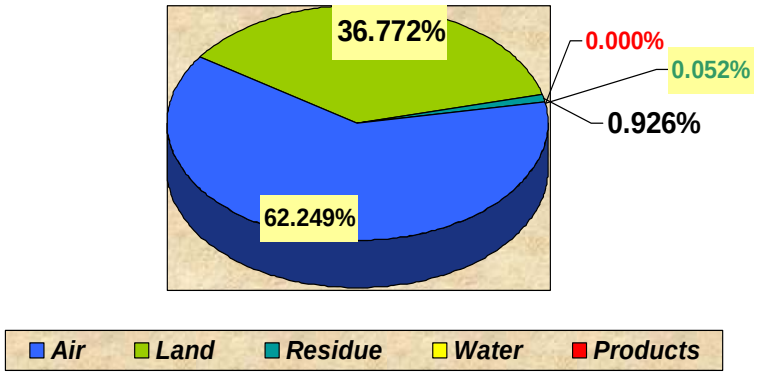


Chart (30) Comparison between emissions of dioxins and furans into different Medias In the Red Sea Coast

4 – ASSESSMENT OF THE INVENTORY RESULTS

Category 1 –Waste Incineration

Hazardous Waste Incineration

- **NIP results**

In NIP there was no of any cement companies for hazardous waste disposal in Egypt.

- **The present inventory results**

In this inventory only one cement company till now in Suez Governorate used the hazardous waste with the inputs, and as alternative fuel in cement kilns, with annual expected releases of 0.0202 g TEQ/a to air and 0.809 g TEQ/a to residue according to the estimated calculations using the Standardized Toolkit for identification and quantification of dioxin and furan releases.

Medical waste incineration

- **NIP results**

According to NIP results the annual releases was 0.536g TEQ/a to air, and 0.9 g TEQ/a to residue, and South Sinai Governorate had the largest expected emission of dioxins and furans, as compared with what expected for the other Governorates at the Red Sea Coast.

- **The present inventory results**

The expected levels of dioxins and furans emissions from medical incinerators were estimated using the Standardized Toolkit for identification and quantification of dioxin/furan releases, with annul releases of 0.92 g TEQ/a to air and 0.264 g TEQ/a to residue. Chart (1) shows the detailed inventory and this estimation shows that Suez Governorate had the largest expected emission of dioxins and furans, as compared with what expected for the other Governorates at the Red Sea Coast.

These results show an increase of annual releases to air (according to the present inventory) by 72% due to the increase in population and so the increase in medical waste from hospitals.

Category 5 –Transport

Heavy Oiled Fired Engines

- **NIP results**

The calculation according to NIP did not take this subcategory into consideration due to lack of information obtained about the movement of ships from and to Suez Canal and Red Sea ports,

- **The present inventory results**

  In the present inventory results we take this subcategory into consideration according to data available which shows that an annul expected releases of 6.719 g TEQ/a to air

Category 6 –Open Burning Processes

Waste Burning and Accidental Fires

- **NIP results**

In NIP the annual expected releases of dioxin and furan emissions from dump sites were estimated to be 82.73gTEQ/a to air and 39.78 g TEQ/a to land, with high expected emission from Suez Governorate,

- **The present inventory results**

The expected levels of dioxin and furan emissions from dump sites were estimated using the Standardized Toolkit for identification and quantification of dioxin/furan releases, with annul releases of 584g TEQ/a to air (with increase of more than 700% than found in NIP), and 350.4 g TEQ/a to land (with increase of more than 880%% than that found in NIP). According to the detailed inventory and this estimation, Chart (15) shows that Red Sea Governorate have the largest expected emission of dioxins and furans, as compared with what expected from the other Governorates at the Red Sea Coast. This increase in emission may be due to the increase of population and activities like tourism.

Other Categories

- For other categories the calculations in NIP did not show the emission in different governorates, but it appears as plant or factory (1), (2) etc. thus we cannot compare between them

  .

- For waste oil treatment, according to the data obtained from the Egyptian General Petroleum Corporation only one company in Egypt located in Alexandria Governorate is responsible for this issue till now, and there is no waste oil treatment in Red Sea Coast Governorates.

- For Textile production, we could not obtain data about this item from the concerned governorates till now.

- These activities not found in the Red Sea coast:
  - Crematoria (category 8 – miscellaneous)

- Destruction of animal carcasses,
- Shredder plants for the treatment of end of life vehicles,
- Thermal wire reclamation.

The table below shows a comparison between NIP (2005) results and present inventory (PERSGA) results:

Category/Sub-Category	NIP Results	Present Inventory Results (PERSGA)	Remarks
Category1–Waste Incineration B. Hazardous Waste Incineration	There was no of any cement companies for hazardous waste disposal in Egypt till issuing the NIP	Only one cement company in Suez Governorate use the hazardous waste with the inputs, and as alternative fuel in cement kilns, with annual expected releases of 0.0202 g TEQ/a to air and 0.809 g TEQ/a to residue	Elmasreya cement company now incinerate about 27,000 ton of hazardous waste /year
Category 1–Waste Incineration C. Medical Waste Incineration	The annual releases was 0.536g TEQ/a to air, and 0.9 g TEQ/a to residue, and South Sinai Governorate had the largest expected emission of dioxins and furans	The annul releases of 0.92 g TEQ/a to air and 0.264 g TEQ/a to residue. and Suez Governorate had the largest expected emission of dioxins and furans	These results show an increase of annual releases to air (according to the present inventory) by 72% than that mentioned in NIP (2005) due to the increase in population which lead to the increase in medical waste from hospitals
Category 2–Ferrous and Non-Ferrous Metal Production C. Iron and Steel	Not Specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt	The inventory includes two iron and steel plants in Suez Governorate with annual expected releases of 0.08gTEQ/a to air and 1.20 gTEQ/a to residue	Can't be compared

Category2–Ferrous and Non-Ferrous Metal Production J. Other Non-Ferrous Metal Production	Not Specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt	The inventory includes one company for the production of ferromanganese with annual expected releases of 1.65gTEQ/a to air	Can't be compared
Category 3–Heat and Power Generation a. Fossil Fuel Power Plants	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,..(38 plant in all Egypt) with annual expected releases of 2.92177gTEQ/a to air in all Egypt	The inventory includes 19 fossil fuel power plants for generating electricity in the Red Sea Governorates with annual expected releases of 1.0233gTEQ/a to air, with largest expected releases from Suez Governorate	The expected releases from the Red Sea Governorates in the present inventory represents about 35% of expected releases in all Egypt as mentioned in NIP (2005)
Category 4– Production of Mineral Products a. Cement kilns	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt	The inventory includes 4 companies for cement production in Suez Governorate with annual expected releases of 0.787gTEQ/a to air	Can't be compared
Category 4– Production of Mineral Products b. Lime	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt ,with annual expected releases of 2.7 gTEQ/a to air in all Egypt	The inventory includes 1 company for lime production in Suez Governorate with annual expected releases of 0.00168 gTEQ/a to air	Can't be compared

Category 4– Production of Mineral Products d. Glass	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt ,with annual expected releases of 0.099 gTEQ/a to air in all Egypt	The inventory includes 1 company for glass production in Suez Governorate with annual expected releases of 0.00054 gTEQ/a to air	Can't be compared
Category 4– Production of Mineral Products e. Ceramics	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt ,with annual expected releases of 0.056 gTEQ/a to air in all Egypt	The inventory includes 1 company for ceramics production in Suez Governorate with annual expected releases of 0.00868 gTEQ/a to air	Can't be compared
Category 4– Production of Mineral Products e. Asphalt Mixing	Not specific for Red Sea Governorates but mentioned as plant 1,2,3,...in all Egypt ,with annual expected releases of 0.795 gTEQ/a to air in all Egypt	The inventory shows an annual expected releases of 0.1708 gTEQ/a to air in the Red Sea Governorates	The expected releases from the Red Sea Governorates in the present inventory represents about 21.5 % of expected releases in all Egypt as mentioned in NIP (2005)
Category 5– Transport a. 4-Stroke Engines b. 2-Stroke Engines c. Diesel Engines	Not specific for Red Sea Governorates but mentioned for all Egypt ,with annual expected releases of 1.3025 gTEQ/a to air in all Egypt	The inventory shows an annual expected releases of 0.0764 gTEQ/a to air in the Red Sea Governorates	The expected releases from the Red Sea Governorates in the present inventory represents about 5.9 % of expected releases in all Egypt as mentioned in NIP (2005
Category 5– Transport d. 4-Heavy Oil Fired Engines	The calculation didn’t take this subcategory into consideration	an annul expected releases of 6.719 g TEQ/a to air	Not calculated in NIP (2005)

Category 6–Open Burning Processes b. 1-Landfill Fires	The annual expected releases were estimated to be 82.73gTEQ/a to air, and 39.78 g TEQ/a to land with high emission from Suez Governorate	An annul expected releases of 584g TEQ/a to air, and 350.4 g TEQ/a to land with high emission from Red Sea Governorate	An increase in the emission to air of more than 700%,and an increase in the emission to land of more than 880% than that found in NIP (2005) due to the increase in population and activities
Category 6–Open Burning Processes b. 2-Accidental Fires in Houses, Factories b. 4- Accidental Fires in Vehicles	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.0232g TEQ/a to air, and 0.231 g TEQ/a to land with high emission from Suez Governorate	Not calculated in NIP (2005)
Category 7– Production and Use of Chemicals and Consumer Goods -Petroleum Refineries	Not Specific for Red Sea Governorates but mentioned for all Egypt	An annul expected releases of 0.63699g TEQ/a to air	Can't be compared
Category 8– Miscellaneous c. Smoke Houses	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.03177 g TEQ/a to air & 0.00850 g TEQ/a to residue	Not calculated in NIP (2005)
Category 8– Miscellaneous d. Dry Cleaning	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.00336g TEQ/a to residue	Not calculated in NIP (2005)
Category 8– Miscellaneous e. Tobacco Smoking	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.004680 g TEQ/a to air	Not calculated in NIP (2005)

Category 9–Disposal / Landfill a. Landfills and Waste Dumps	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.0017g TEQ/a to water & 3.504 g TEQ/a to residue	Not calculated in NIP (2005)
Category 9–Disposal / Landfill b. Sewage and Sewage Treatment	The calculation didn't take this subcategory into consideration	An annul expected releases of 0.510g TEQ/a to water & 3.060 g TEQ/a to residue	Not calculated in NIP (2005) Not calculated in NIP (2005)
Category 9–Disposal / Landfill e. Waste oil disposal	Only one company in Alexandria Governorate for waste oil disposal	There is no companies in Red Sea Governorates for waste oil disposal	Can't be compared

Table (4): Comparison between NIP (2005) results and present inventory (PERSGA) results

5 PRIORITY SECTORS AND LOCATIONS FOR BAT/BEP INTRODUCTION

5.1 Introduction to BAT/BEP

Under the Stockholm Convention on Persistent Organic Pollutants, Parties shall promote in some cases and require in others the use of best available techniques, and promote the application of best environmental practices.

To facilitate implementation of article 5, Parties recognized the need for a harmonized framework for elaboration of comparable release inventories of annex C chemicals, and for detailed state-of the-art guidelines on best available techniques and guidance on best environmental practices.

Development of such a harmonized framework and guidance was initiated by UNEP Chemicals in broad cooperation with experts from developed as well as developing countries, before the Convention entered into force. Currently this process continues under the Convention with the goal of keeping all relevant documents and procedures up-to date and developing them further as necessary and appropriate.

The state of the science with regard to both the measurement of releases and levels present in the environment of chemicals listed in Annex C and what is considered "best" available techniques and "best" environmental practices will advance with time. This guidance will be periodically updated to keep up with these changes.

The Convention identifies the term "best" as "most effective in achieving a high general level of protection of the environment as a whole" The Depending on the process that is a source of chemicals listed in Annex C, economic and social conditions in a country are a factor in determining what are "best" available techniques and "best" environmental practices. Where processes are relatively large scale, capital intensive and involve large and continuous throughputs (e.g. cement kilns firing hazardous wastes, sinter plans in the iron and steel industry, fossil fuel-fired utilities, large waste incinerators) the technologies and practices used and enterprises that manage them are rather similar worldwide. In such cases, best available techniques and best environmental practices can be applied in much the same way in all countries. Where processes are relatively smaller in scale (crematoria, home heating and cooking, industrial boilers, motor vehicles) or involve smaller scale management of wastes (waste incineration, open burning), the technologies and practices available may vary greatly from country to country. In these cases, determining what are best available techniques and best environmental practices will need to include an analysis of economic feasibility of the various options available. As such, "best" may mean best option that is economically feasible under the socio-economic conditions present.

5.2 General Principles and Approaches

When applying the guidelines and guidance to sources of chemicals listed in Annex C of the Stockholm Convention, Parties may find it useful to consider some general environmental management principles and approaches that may be supportive of the Convention. The following is indicative of some of these general environmental management principles and approaches.

(1). **Sustainable development.** "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

(2). **Sustainable consumption.** "The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations."

(3). **Development and implementation of environmental management systems.** "A structured approach for determining, implementing and reviewing environmental policy through the use of a system which includes organizational structure, responsibilities, practices, procedures, processes and resources."

(4). **Use of science, technology and indigenous knowledge to inform environmental decisions.** "Increase the use of scientific knowledge and technology and increase the beneficial use of local and indigenous knowledge in a manner respectful of the holders of that knowledge and consistent with national law;" and "Establish partnerships between scientific, public and private institutions, including by integrating the advice of scientists into decision-making bodies to ensure a greater role for science, technology, development and engineering sectors."

(5). **Precautionary approach.** "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

(6). **Internalizing environmental costs and polluter pays.** "National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment."

(7). **Pollution prevention.** "The use of processes, practices, materials, products or energy that avoids or minimizes the creation of pollutants and waste, and reduce overall risk to human health or the environment."

(8). **Integrated pollution prevention and control.** "This principle aims to achieve integrated prevention and control of pollution arising from large-scale industrial activities. It lays down measures designed to prevent or, where that is not practicable, to reduce emissions in the air, water and land from these activities, including measures concerning waste, in order to achieve a high level of protection of the environment taken as a whole."

(9). **Co-benefits of controlling other pollutants.** For instance, pollution prevention and control of other contaminants may also contribute to the reduction and elimination of chemicals listed in Annex C.

(10). **Cleaner production.** "The continuous application of an integrated preventive environmental strategy to processes, products and services to increase overall efficiency and reduce risks to humans and the environment. Cleaner production can be applied to the processes used in any industry, to products themselves and to various services provided in society."

(11). **Life cycle analysis.** "A system-oriented approach estimating the environmental inventories (i.e. waste generation, emissions and discharges) and energy and resource usage associated with a product, process or operation throughout all stages of the life cycle."

(12). **Life cycle management.** "An integrated concept for managing the total life cycle of goods and services towards more sustainable production and consumption, building on the existing procedural and analytical environmental assessment tools and integrating economic, social and environmental aspects."

(13). **Virtual elimination.** "The ultimate reduction of the quantity or concentration of the toxic substance in an emission, effluent, or waste released to the environment below a specified level of quantification. The 'level of quantification' means, in respect of a substance, the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods."

(14). **Community Right to Know**. "In the field of environment, improved access to information and public participation in decision-making enhance the quality and the implementation of decisions, contribute to public awareness of environmental issues, give the public the opportunity to express its concerns and enable public authorities to take due account of such concerns.".

5.3 Formation of PCDD/PCDF

Thermal processes[1]

Carbon, oxygen, hydrogen and chlorine, whether in elemental, organic or inorganic form, are needed. At some point in the synthesis process, whether present in a precursor or generated by a chemical reaction, the carbon must assume an aromatic structure.

There are two main pathways by which these compounds can be synthesized: from precursors such as chlorinated phenols or de novo from carbonaceous structures in fly ash, activated carbon, soot or smaller molecule products of incomplete combustion. Under conditions of poor combustion, PCDD/PCDF can be formed in the burning process itself.

The mechanism associated with this synthesis can be homogeneous (molecules react all in the gas phase or all in the solid phase) or heterogeneous (involving reactions between gas phase molecules and surfaces).

PCDD/PCDF can also be destroyed when incinerated at sufficient temperature with adequate residence time and mixing of combustion gases and waste or fuel feed. Good combustion practices include management of the "3 Ts" – time of residence, temperature and turbulence, and sufficient excess oxygen to allow complete oxidation. Use of a fast temperature quench and other known processes are necessary to prevent reformation.

Variables known to impact the thermal formation of PCDD/PCDF include:

- Technology: PCDD/PCDF formation can occur either in poor combustion or in poorly managed post-combustion chambers and air pollution control devices. Combustion techniques vary from the very simple and very poor, such as open burning, to the very complex and greatly improved, such as incineration using best available techniques;

- Temperature: PCDD/PCDF formation in the post-combustion zone or air pollution control devices has been reported to range between 200 °C and 650 °C; the range of greatest formation is generally agreed to be 200 – 450 °C, with a maximum of about 300 °C;
- Metals: Copper, iron, zinc, aluminium, chromium and manganese are known to catalyse PCDD/PCDF formation, chlorination and dechlorination;
- Sulphur and nitrogen: Sulphur and some nitrogen-containing chemicals inhibit the formation of PCDD/PCDF, but may give rise to other unintended products;
- Chlorine must be present in organic, inorganic or elemental form. Its presence in fly ash or in the elemental form in the gas phase may be especially important;
- PCB are also precursors for the formation of PCDF.

Research has shown that other variables and combinations of conditions are also important.

Industrial-chemical processes

As with thermal processes, carbon, hydrogen, oxygen and chlorine are needed. PCDD/PCDF formation in chemical processes is thought to be favoured by one or more of the following conditions:

- Elevated temperatures (> 150 °C);
- Alkaline conditions;
- Metal catalysts;
- Ultraviolet (UV) radiation or other radical starters.

In the manufacture of chlorine-containing chemicals, the propensity for PCDD/PCDF formation has been reported as follows:

Chlorophenols > chlorobenzenes > chlorinated aliphatics > chlorinated inorganics

5.4 Waste management considerations

Burning of waste has the potential for comparatively high unintentional formation and release of persistent organic pollutants to the environment. Waste incinerators are therefore listed as Part II source categories in Annex C of the Stockholm Convention. Open burning of waste, including burning of landfill sites, can also lead to the unintentional formation and release of persistent organic pollutants, and is listed as a Part III source category in Annex C. The application of best available techniques and best environmental practices to these sources should take into consideration environmentally sound waste management practices. Environmentally sound waste management reduces the release of persistent organic pollutants and is also an important factor in avoiding health problems and in promoting sustainable use of resources.

Important principles applicable to the prevention and reduction of waste include the source reduction principle; the integrated life cycle principle; and the principle of recovery of reusable and recyclable components, to the greatest possible extent. In many cases, this will be facilitated by separating at the source those wastes that can be composted, reused or recycled. The remaining waste should be treated and disposed of in an environmentally sound way. Reliable solutions for all steps – the collection system, the recycling actions, and the final disposal – should be adapted to the local circumstances, taking into account such factors as opportunities for waste prevention, the composition of waste, the available recycling processes, the existing structures, and financial, economic and social aspects.

In general priority should be given to approaches that prevent the formation and release of chemicals listed in Annex C of the Convention. Improved waste management approaches should be employed with the aim of avoiding open and other uncontrolled burning of wastes, including burning of landfill sites. When considering proposals to construct new waste disposal facilities, consideration should be given to alternatives such as activities to minimize the generation of municipal and medical waste, including resource recovery, reuse, recycling, waste separation and promoting products that generate less waste. Under this approach, public health concerns should be carefully considered.

The present section deals with these issues but it cannot replace a comprehensive examination of all the specific questions related to waste management.

5.5 The importance of waste management to the environment and health

Sound waste management is an important element in the protection of human health and the protection of the environment. It also helps to avoid the loss of resources. Careless landfilling may pollute water bodies; burning of waste on landfills or in inappropriate incinerators or open burning can release high levels of chemicals listed in Annex C and other toxic substances such as polycyclic aromatic hydrocarbons, heavy metals and particulate matter. For this reason a holistic approach to improving the waste management system will have positive effects in a number of areas.

Waste management consists of many different areas of intervention. As a first step waste prevention and reduction can help reduce the generation of waste, and its hazard potential, to a minimum. In industrial processes the development and use of low-waste and non-waste technologies have had a positive effect in decreasing the amount of waste requiring treatment. Greater emphasis on producer responsibility may also help to solve or at least reduce waste management problems. (see figure 1)

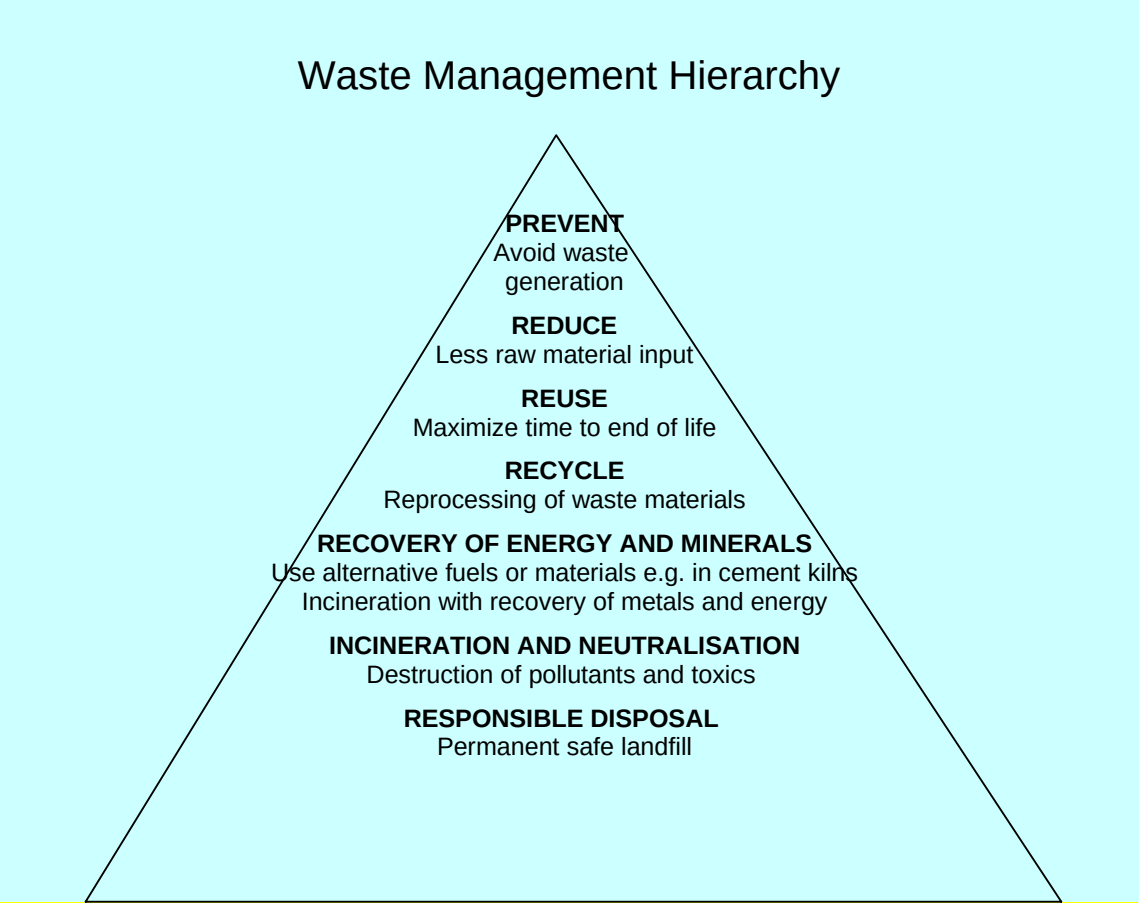


Figure (7) : Waste management hierarchy

5.6 Priority Sectors and Locations for BAT/BEP Introduction

Priorities related to national objectives were set through the participation of the National Steering Committee of the project and different EEAA regional branches and departments together with stakeholders.

Priority sectors and locations for BAT/BEP were set according to the current national situation and the results of the POPs inventory

We should take into consideration that the objectives related to hotspots would be short-term national objectives, while others related to health and social adverse effects of POPs would be long-term ones. Generally speaking, national objectives related to POPs were defined as follows:

(1) Setting priorities according to the result of POPs inventory, and taking into account the health and environmental impact of POPs and the availability of alternative solution, also hot spots.
(2) Assessment of institutional and legal infrastructure concerned with the management of POPs.
(3) Requirements and procedures needed for implementation.

(4) Assessment of capacity-building related to compliance with the Convention.
(5) Assessment of socio-economic impacts of using /reducing POPs including their alternatives and the use of BAT/BEP.
(6) Assessment of risks, health and environmental effects of POPs.
(7) Assessment of monitoring, research and development capabilities.

According to the points mentioned above and the inventory results we suggest the priorities to be as following:

- Uncontrolled burning processes (public dumpsites) in the Red Sea Governorates, the ownership are the Red Sea, Suez and South Sinai Governorates , they need at least 3 secured sanitary landfills, and 3 Centers for waste recycling and establishing fertilizer plants with budget of about 15 million dollars for each (for the 1st stage short term action plan).
- Medical waste incineration in Suez Governorate, Ministry of Health is the competent responsible Ministry in handling hazardous waste in medical services (they need two units working as central system including the collection, transportation, storage, treatment, and safe disposal from the residues with budget of about 10.0 million dollars).
- Power generation in Suez Governorate (2 stations), the ownership is the Ministry of Electricity and Energy.
- Ferro Manganese company in South Sinai Governorate (public sector)
- Petroleum refineries in the three governorates.
- Production of mineral products (like cement production).
- Sewage and Sewage Treatment

5.7 CRITERIA FOR SELECTING THE PERIORITY LOCATIONS FOR BAT/BEP IMPLEMENTATION

Setting priorities will be carried out in this report through the results of the inventory; moreover, it is necessary that such criteria take account of health, environmental and socio-economic impact, also child and women. So in this part, country's specific criteria have been set as a preliminary step toward prioritizing the national objectives. In addition, reviewing of the work done to establish the baseline situation has taken into account health and environmental impacts of POPs, also, a preliminary priority assessment for Egypt has been conducted.

Approach and Methodology

a. The following points are taking into consideration as a result of studying the current situation according to inventory results:
   (1) Revision, assessment and checking of data included in the steps of the inventory process
   (2) The legal system
   (3) The institutional system
   (4) Research capabilities

(5) Technical potentials
(6) Infrastructure
(7) Capacity –building (individuals, equipment, etc).

b. Developing a vision of the criteria.
c. Estimating the weight of each criterion.
d. Checking such criteria with the National Steering Committee and concerned departments at the EEAA.
e. Adapting the criteria to be compatible with the present situation in Egypt for the purpose of complying with the Stockholm Convention and other related agreements (Basel and Rotterdam)
f. The criteria were revised in accordance with the Stockholm Convention and its objectives

Accomplishments and Results

a. Preparing the criteria on which priorities are to be set, taking into consideration health and social effects of the POPs.
b. Accordingly, these criteria were established for the country:

(1) Impact on public health
(2) Impact on the environment
(3) Social and economic impacts
(4) Level of awareness
(5) Emission quantities
(6) Polluted areas
(7) Financial requirements
(8) Availability of infrastructure (individuals- equipments, etc.)
(9) Regional and international adverse effects.
(10) Compliance with the Stockholm convention on POPs and other relevant environmental agreements
(11) Capacity building
(12) The ability to transfer and develop sound, clean, sustainable economic technology
(13) acute effects on health and the environment
(14) Assessing and monitoring the levels of pollutants in the environment
(15) Assessing and monitoring vulnerable exposed population groups such as children, women and the aged
(16) Legal framework for compliance with the Convention.

ANNEXES

1 PROCESS BY PROCESS SUMMARY AND ANALYSIS

1.1 General

According to part II in Annex C of the "Stockholm Convention on Persistent Organic Pollutants" Polychlorinated di-benzo-p-dioxins and di-benzo furans, hexachlorobenzene and polychlorinated biphenyls are unintentionally formed and released from thermal processes involving organic matter and chlorine as a result of incomplete combustion or chemical reactions. The following industrial source categories have the potential for comparatively high formation and release of these chemicals to the environment:

a. Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge
b. Cement kilns incinerating hazardous waste
c. Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching
d. The following thermal processes in the metallurgical industry:
    (1) (1)Secondary copper production
    (2) Sinter plants in the iron and steel industry
    (3) Secondary aluminum production
    (4) Secondary zinc production

Moreover, Part III in Annex C of The "Stockholm Convention " lists other source categories for dioxins and furans, hexachlorobenzene and polychlorinated biphenyls that may also be unintentionally formed and released from the following source categories, including:

a. Open burning of waste, including burning in landfill sites.
b. Thermal processes in the metallurgical industry not mentioned in Part II.
c. Residential combustion sources.
d. Fossil fuel-fired utility and industrial boilers.
e. Firing installations for wood and other biomass fuels.
f. Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially the production of chlorophenols and chloranil
g. Crematoria
h. Motor vehicles, particularly those burning leaded gasoline; which require addition of dichloroethylen
i. Destruction of animal carcasses.
j. Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)
k. Shredding plants for the treatment of end of life vehicles
l. Smoldering of copper cables
m. Waste oil refineries

1.2 Process by Process Summary and Analysis

- Reviewing the project documents.
- Reviewing the inventory of the annex (c) POPs of the national implementation plan (NIP).
- Identifying all sources of releases of dioxin and furan (Annex C POPs) within the coastal zone.
- Studying the Standardized Toolkit for identification and quantification of dioxin and furan releases.
- Defining the assumption techniques used to assess the annual production data for the calculations of the releases.
- Identifying the sources of the data required (Ministries, Authorities, Governorates, etc.)according to that mentioned in the toolkit:
  - Main source categories identification.
  - Subcategories identification.
- Preparing a list of the stakeholders contacted in the survey (concerned ministries, authorities, governorates, regional branches of EEAA at the concerned governorates, concerned companies according to the main source categories and subcategories identification). Annex (1) shows a detailed list of stakeholders contacted in the survey.
- Preparing the questionnaire for different source categories in Arabic language and modifying it to match with the Egyptian guidelines for each industrial sector [as shown in Annex (2)].
- Studying industrial database and other activities which can be considered as sources of dioxin and furan according to the standardized toolkit also using the databases developed by the Ministry of Trade and Industry.
- Field visits to the locations which were identified as a source of dioxin and furan (concerned ministries and authorities, governorates, regional branches of EEAA at the governorates, important sites and companies).
- Developing letter forms for each industrial sector to be sent with the questionnaires to the intended activities and to governorates also to the regional branches of EEAA.
- Gathering the data from the collected questionnaires.
- Field survey for revising and checking the collected data.
- Estimating the emissions from the identified sources by using the default emission factors as provided by the standardized toolkit.
- Defining the number of relevant laws which control releases from different processes in the inventory. Listing any emission limit values, technology restrictions and monitoring requirements for air, land and water releases
- Gathering the regulations, guidelines and technical standards addressing (Annex C Pops), Annex (4) shows a list of regulations, guidelines and technical standards addressing annex C Pops, including limit values and fines for polluters.
- Preparing and reviewing the databases on the identified sources of annex C POPs and estimate the annual releases.
- Final inventory of releases of PCDD/PCDF from all the related activities listed in the toolkit.
- Identify the national priorities (preparing a list of priority sectors and locations for BAT/BEP as shown in section 9).

- Development of criteria for selecting the priority locations (as shown in section 10).
- Identifying locations where BAT/BEP implementation could provide meaningful reduction in the releases of POPs.
- Preparing and reviewing the coastal zone inventory report.

2 DETAILED SUPPOTING DATA

The detailed data supporting the emission calculation are mentioned in Annex (3) which includes the estimated calculation from the following categories:

- Hazardous waste incineration.
- Medical waste incineration.
- Iron and steel production.
- Other non – ferrous metal production.
- Heat and power generation (fossil fuel power plants).
- Production of mineral products:
  - Cement production
  - Lime production
  - Glass production
  - Ceramics production
- Transportation :
  - 4-Stroke engines
  - 2- Stroke engines
  - Diesel engines
  - Heavy oil fired engines
- Waste burning and accidental fires:
  - Landfill fires
  -Accidental fires in houses and factories
  - Accidental fires in vehicles
- Petroleum industry.
- Smoke houses
- Dry cleaning residues
- Tobacco smoking.
- Landfills and Waste Dumps
- Sewage / sewage treatment

3 INCOMPLETE INFORMATION

The incomplete information in the inventory:

- Some companies did not send any information about the production processes, air pollution controls, and daily/monthly or annual production (for example: textile and paper production), and this is due to that they consider the inventory would lead to some stricter environmental requirements.

- Some Governorates give incomplete data about dumpsites, amount and type of waste, and amount of burned wastes due to lack of knowledgeable personnel, so we take the information from EEAA regional branches in the concerned governorates and from EEAA central department of hazardous substances and wastes, also the data published in the statistical year book for year 2008 issued by CAPMAS to help us in calculations.

- Some Authorities did not send any answer or any response to our letters (for example General Authority of Red Sea Ports, General Authority for Veterinary Services), so we take the information from the book (Egypt Description by Information 2009-Years of Development - 8th Edition) issued by the Egyptian Cabinet Information and Decision Support Center and from the Statistical Year Book for Year 2008 issued by CAPMAS.

- Some firms did not send any written information but give their answer orally that they have not any sources of dioxin and furan (for example Alico Egypt for Aluminum and Glass).

- There is no data about fuel type and consumption for ships crossing or passing through Suez Canal, and so we consult some experts working in that field to assume the data used in calculation).

- Providing very approximate and incomplete data by some sectors , for example the data obtained from the Ministry of Interior/Traffic Department did not mention the fuel consumption of transportation means also did not mention the type of vehicles in Suez Governorate, so we take the information from the book (Egypt Description by Information 2009-Years of Development - 8th Edition) issued by the Egyptian Cabinet Information and Decision Support Center, and from the Statistical Year Book for Year 2008 issued by CAPMAS, and we try to have the answer fuel consumption from some users and drivers.

- For Textile production and we could not obtain data about this item from the concerned governorates till now.

4 Stakeholders Contacted in the Survey:

The concerned Ministries:

- Ministry of Petroleum.
- Ministry of Transport.
- Ministry of Electricity and Energy.
- Ministry of Trade and Industry.
- Ministry of Tourism.
- Ministry of Health.
- Ministry of Interior.
- Ministry of Agriculture and Land Reclamation.
- Ministry of Labor Force and Immigration.
- Ministry of State for Environmental Affairs

Governorates:

- Suez Governorate.
- Red Sea Governorate.
- South Sinai Governorate.

Agencies and Authorities:

- Egyptian Environmental Affairs Agency (EEAA).
- Egyptian General Petroleum Corporation.
- Industrial Development Authority (IDA).
- Information and Decision Support Center (IDSC)
- General Organization for Planning Transport Projects.
- Egyptian General Organization for Roads and Bridges.
- Civil Protection Agency.
- General Department for Police of Environment and water Surfaces.
- Traffic General Department.
- Red Sea ports Authority.
- Suez Canal Authority.
- General Agency for Veterinary Services.
- Holding Company for Egypt Electricity.
- Federal of Egyptian Industries.
- Chamber of Chemical Industries.
- Chamber of Metallurgical Industries.
- Central Agency for Public Mobilization and statistics (CAPMAS)

EEAA Regional Branches:

- Regional Branch for East Delta.
- Regional Branch for Red Sea Governorate.

Companies:

- Public Companies in the Concerned Governorates. (Misr Electricity Holding Company, Chemical Holding Company, etc.).

- Private Companies in the Concerned Governorates (Cement Companies, Iron and Steel Companies, Chemical Companies, Ceramic Companies, Glass Companies, Aluminum Companies, Lime Companies, etc.).

5 Translated Questionnaire:

Questionnaire No.	Questionnaire type	نوع الإستبيان	رقم الإستبيان
Questionnaire 1	Waste Incineration	حرق المخلفات	الإستبيان رقم (1)
Questionnaire 2	Ferrous and Non-Ferrous Metals Production	إنتاج المعادن الحديدية وغير الحديدية	الإستبيان رقم (2)
Questionnaire 3	Power Generation and Heating	توليد الطاقة والحرارة	الإستبيان رقم (3)
Questionnaire 4	Mineral Production	إنتاج التعدين (مواد التشييد والبناء)	الإستبيان رقم (4)
Questionnaire 5	Transport	النقل	الإستبيان رقم (5)
Questionnaire 6	Uncontrolled Combustion Processes	عمليات الإحتراق العشوائي	الإستبيان رقم (6)
Questionnaire 7	Production and Use of Chemicals and Consumer Goods	إنتاج واستخدام الكيماويات والسلع المستهلكة	الإستبيان رقم (7)

الاستبيان رقم(1) حرق المخلفات

نوع المنشأة	المخلفات البلدية الصلبه المخلفات الصناعية مخلفات المستشفيات مخلفات على هيئة قطع صغيرة حمأة الصرف الصحي مخلفات الخشب والمخلفات الحيوية جثث الحيوانات	[ ] [ ] [ ] [ ] [ ] [ ] [ ]
الموقع (مدينة/محافظة)		
اسم المـنشأة		
العنـــــوان		
اسم المسئول		
الـوظـيـفة		
تلـيـفـــون		
فاكـــــس		
البريد الإلكتروني		
عدد الأفران		
نوع التشغيل	**تشغيلة (مثال: 100كجم / تشغيلة)** **حرق شبه مستمر (مثال : 8 ساعات / يوم)** **حرق مســـتــمر (24 ساعة/ يوم)**	[ ] [ ] [ ]
القدرة التشغيلية السنوية (للوحدة)	**التصميمية** (طن/ ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن/ يوم) t/d (يوم/ سنة) d/a (ساعة / سنة) h/a (طن/ سنة) t/a	**الفعلية**
القدرة التشغيلية السنوية (الكلية)	(طن/ ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن/ يوم) t/d (يوم/ سنة) d/a (ساعة / سنة) h/a (طن/ سنة) t/a	
نوع الفرن	حرق كمي محاط بالماء(بوبات) مهد مائع موقد	

	فرن دائر أخرى (برجاء تحديد النوع)	
درجة حرارة الفرن	الفرن الرئيسي (درجة مئوية) المرحلة الثانية/ الغرفة الثانية (درجة مئوية)	
نوع نظام التحكم في ملوثات الهواء (APCS)	مرسبات الكتروستاتيكية سيكلونات كيس ترشيح وحدة تنقية الغاز الرطبة وحدة تنقية الغاز الجافة حقن جيرى حقن قلوي/ هيدروكسيد صوديوم حقن كربون نشط / حقن فحمى فلتر كربوني نشط محول محفز (SCR) وحدة تنقية مزودة بمروحة أخرى (برجاء تحديد النوع) لا يوجد	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
نظام استرجاع الحرارة	**يوجد** [ ]	**لا يوجد** [ ]
حرارة الغازات	**عند مدخل** (APCS) **(5م)** [ ]	**عند مخرج** (APCS) **(5م)** [ ]
معدل تدفق الغازات الخارجة	**م3/ س (غاز جاف)**	

المتبقيات		**كيفية التخلص**	
رماد مترسب	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]
رماد متطاير	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]
مياه (ملوثة)	**طن/سنة** [ ]	**تخلص** [ ]	
حمأة (كمادة جافة)	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]

نتائج التحاليل (هواء، ماء,رواسب،منتج)

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

النوع	**معامل الإنبعاثات (الكمية المكافئة للسميات بالميكرو جرام/ طن)**				
	هواء	**ماء**	**تربة**	**منتج**	**رواسب**

	الإنبعاثات السنوية (الكمية المكافئة للسميات بالميكروجرام /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	تربة	منتج	رواسب

الاستبيان رقم (2) : إنتاج المعادن الحديدية وغير الحديدية

نوع المنشأة	التلبيد	[ ]	
	فحم الكوك	[ ]	
	حديد و أو/صلب	رئيسي [ ]	ثانوي [ ]
	سبك	رئيسي [ ]	ثانوي [ ]
	نحاس	رئيسي [ ]	ثانوي [ ]
	الومنيوم	رئيسي [ ]	ثانوي [ ]
	رصاص	رئيسي [ ]	ثانوي [ ]
	زنك	[ ]	
	سبائك النحاس/البرونز	رئيسي [ ]	ثانوي [ ]
	ماغنسيوم	[ ]	
	معادن أخرى غير حديدية	رئيسي [ ]	ثانوي [ ]
	تقطيع المعادن	[ ]	
	أخرى	رئيسي [ ]	ثانوي [ ]
المدينة /المحافظة			
اسم المنشأة			
العنـــــوان			
اسم مسئول الاتصال			
الوظـــيفة			
تلـيفـــون			
فاكـــــس			
البريد الإلكتروني			
نوع المدخلات			
نوع المخرجات			
عدد الأفران			
نوع التشغيل	تشغيلة (مثال:- 100كجم / كمية)		[ ]
	شبه مستمر (مثال :- 8 ساعات / يوم)		[ ]
	مســـتـــمر (24 ساعة/يوم)		[ ]

		التصميمية	الفعلية
القدرة التشغيلية السنوية (للوحدة)	(طن / ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن / يوم) t/d (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a		
القدرة التشغيلية السنوية (الكلية)	(طن/ ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن/ يوم) t/d (يوم/ سنة) d/a (ساعة / سنة) h/a		

	(طن/ سنة) t/a		
نوع الفرن	فرن صهر معادن فرن حث فرن كهربي (ERF) -------- فرن دائر يدوي أخرى (برجاء تحديد النوع)		
حرارة الفرن	الفرن الرئيسي (5م) ما بعد الحرق / الغرفة الثانية (5م)		
الوقود الرئيسي	النوع		طن/ساعة
الوقود الثانوى/الوقود البديل	النوع		طن/ساعة أو %
نوع نظام التحكم في ملوثات الهواء **(APCS)**	مرسبات الكتروستاتيكية سيكلونات كيس ترشيح جهاز غسل الغاز رطب جهاز غسل الغاز جاف حقن جيرى حقن قلوي/ هيدروكسيد صوديوم حقن فحمى / حقن كربون نشط فلتر كربوني نشط محول محفز (SCR) نظام تنقية مزود بمروحة أخرى (برجاء تحديد النوع) لا يوجد		[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
نظام استرجاع الحرارة	**يوجد** [ ]		**لا يوجد** [ ]
حرارة الغازات	**عند مدخل (APCS) (5م)** [ ]		**عند مخرج (APCS) (5م)** [ ]
معدل تدفق الغازات الخارجة	**م3/ س (غاز جاف)**		

المتبقيات		**كيفية التخلص**	
رماد مترسب	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]
رماد متطاير	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]
مياه (متخلفة)	**طن/سنة** [ ]	**تخلص** [ ]	
حمأة (كمادة جافة)	**طن/سنة** [ ]	**إعادة تدوير** [ ]	**دفن** [ ]

نتائج التحاليل (هواء، ماء,رواسب)

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

النوع	معامل الإنبعاثات (الكمية المكافئة للسميات بالميكروجرام/ طن)				
	هواء	ماء	تربة	منتج	رواسب
	الإنبعاثات السنوية (الكمية المكافئة للسميات بالميكروجرام /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	تربة	منتج	رواسب

الاستبيان رقم(3) : توليد الطاقة والحرارة

نوع الوحدة	وحدة توليد الطاقة		
	فحم ليجنيت فحم بيتومني فحم الأنثراسيت أخري		[ ] [ ] [ ] [ ]
	غاز طبيعي		[ ]
	خشب		[ ]
	غاز المدافن		[ ]
	غازات الصرف الصحي		[ ]
	الكتلة الحيوية (برجاء تحديد النوع)		[ ]
	وحدات الاحتراق الصناعية(الصغيرة)		[ ]
	فحم (نوعه) ليجنيت فحم بيتوميني فحم انثراسيت أخرى		[ ] [ ] [ ] [ ] [ ]
	خشب طبيعي		[ ]
	حرق أنواع أخري من الكتلة الحيوية قصب السكر تابيوكا قطن خيرزان (بامبو) موز متبقيات الحصاد أخرى (برجاء تحديد النوع)		[ ] [ ] [ ] [ ] [ ] [ ] [ ]
	أخرى (برجاء تحديد النوع)		
المحافظة/ المدينة			
اسم المـنشأة			
العنـــــوان			
اسم مسئول الاتصال			
الـوظـــيفة			
تلـيفـــون			
فاكـــــس			
البريد الإلكتروني			
نوع العملية	تشغيلة (كمية) (مثال:- 100 كجم / كمية) شبه مستمر (مثال : 8 ساعات / يوم) مســـتـــمر (24 ساعة / يوم)		[ ] [ ] [ ]
القدرة التشغيلية السنوية		التصميمية	الفعلي

(للوحدة)	(طن / ساعة) t/h - تيراجول/ساعة (TJ/h) (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن / يوم) t/d - تيراجول/ساعة (TJ/h) (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a - تيراجول/ساعة (TJ/h)		
القدرة التشغيلية السنوية (الكلية)	(طن/ ساعة) t/h (ساعة / يوم) h/d (تيراجول/سنة) TJ/a		
نوعية الفرن / المحرقة	غلاية سخان شعلة توربين (غازات داخلية) آلة احتراق (داخلي) أخرى (برجاء تحديد نوعيتها)		
درجة حرارة الفرن	الفرن الرئيسي (5م) ما بعد الحرق / الغرفة الثانية (5م)		
نوع نظام التحكم في ملوثات الهواء(APCS)	مرسبات الكتروستاتيكية [ ] سيكلونات [ ] كيس ترشيح [ ] جهاز غسل الغاز رطب [ ] جهاز غسل الغاز جاف [ ] حقن جيرى [ ] حقن قلوي/ هيدروكسيد صوديوم [ ] حقن فحمى/كربون نشط [ ] فلتر كربوني نشط [ ] محول حفزي (SCR) [ ] نظام تنقية مزود بمروحة [ ] أخرى (برجاء تحديد النوع) [ ] لا يوجد [ ]		
نظام استرجاع الحرارة	**يوجد [ ]**	**لا يوجد [ ]**	
حرارة الغازات	**عند مدخل (APCS) (5م) [ ]**	**عند مخرج (APCS) (5م) [ ]**	
معدل تدفق الغازات الخارجة	**م3/ س (غاز جاف)**		

المتبقيات		**التخلص من المتبقيات**	
رماد مترسب	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**
رماد متطاير	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**
مياه (متخلفة)	**طن/سنة [ ]**	**تخلص**	
حمأة (كمادة جافة)	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**

نتائج التحاليل (هواء، ماء,رواسب)

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

النوع	معامل الإنبعاثات (الكمية المكافئة للسميات بالميكروجرام/ طن)				
	هواء	ماء	ارض	منتج	رواسب
	الإنبعاثات السنوية (الكمية المكافئة للسميات بالميكروجرام /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	ارض	منتج	رواسب

الاستبيان رقم (4) : إنتاج التعدين(مواد التشييد و البناء)

نوعيـة الإنتاج	**اسمنت** **جير** **طوب(طابوق)** **زجاج** **سيراميك** **خلط أسفلت**	[ ] [ ] [ ] [ ] [ ] [ ]
المحافظة /المدينة		
اسم المـنشأة		
العنـــــوان		
اسم المسئول		
الـوظـــيـفة		
تلـيـفـــــون		
فاكـــــــس		
البريد الإلكتروني		
عدد الأفران		
المدخلات	**النوع:**	**الكمية:**
وقود اساسى	**النوع:**	**الكمية:**
وقود ثانوي/ وقود بديل	**النوع:**	**الكمية:**
نوع العملية	**جاف** [ ]	**مائي** [ ]
نوع العملية	**تشغيلة** **شبه مستمر** **مســـتـــمر**	**(مثال:- 100 كجم / تشغيلة)** **(مثال :- 8 ساعات / يوم)** **(24 ساعة / يوم)** [ ] [ ] [ ]
		التصميمية **الفعلية**
القدرة التشغيلية السنوية (للوحدة)	(طن / ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن / يوم) t/d (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a	
القدرة التشغيلية السنوية (الكلية)	(طن/ ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن / يوم) t/d (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a	
حرارة الفرن	الفرن الرئيسي (5م) ما بعد الحرق / الغرفة الثانية (5م)	

نوع نظام التحكم في ملوثات الهواء (APCS)	مرسبات الكتروستاتيكية سيكلونات كيس ترشيح جهاز غسل الغاز رطب جهاز غسل الغاز جاف حقن جيرى حقن قلوي/ هيدروكسيد صوديوم كربون نشط / حقن فحمى فلتر كربوني نشط محول حفزى (SCR) مروحة تقوية أخرى (برجاء ذكر النوع) لا يوجد	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
نظام استرجاع الحرارة	**نعم [ ]**	**لا [ ]**
حرارة الغازات	**عند مدخل (APCS) (5م)** **[ ]**	**عند مخرج (APCS) (5م)** **[ ]**
تدفق الغازات الخارجة	**م3/ س (غاز جاف)**	

الرواسب		**التخلص**	
رماد مترسب	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**
رماد متطاير	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**
مياه (متخلفة)	**طن/سنة [ ]**	**تخلص**	
حمأة (كمادة جافة)	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن [ ]**

نتائج التحاليل (هواء، ماء,رواسب)

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

	معامل الإنبعاثات (ميكروجرام مكافئ/ طن)				
النوع	**هواء**	**ماء**	**تربة**	**منتج**	**رواسب**

	القياسات السنوية (جم مكافئ /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	تربة	منتج	رواسب

الاستبيان رقم (5) : النقل

المنطقة(المحافظة / المركز)			
اسم المـنشأة			
العنـــــوان			
اسم المسئول			
الـوظـــيفة			
تلـيفـــون			
فاكـــــس			
البريد الإلكتروني			
نوع الوقود	بنزين مخلوط	بنزين غير مخلوط	ديزل/ أخرى
الاستهلاك السنوي للوقود (لتر/ سنة)			
عربات المسافرين			
عدد العربات			
الكثافة على الطرق / سيارة/ كيلومتر (كم/ سنة)			
استهلاك الوقود لتر/كم أو لتر/ساعة			
الاستهلاك السنوي الكلى (لتر/ سنة)			
APCS (نعم/لا)			
الحـــــــافلات			
عدد الحـــــافلات			
الأداء السنوي للطرق / سيارة / كيلومتر (كم/ سنة)			
استهلاك الوقود (لتر/كم) أو (لتر/سنة)			
الاستهلاك السنوي (لتر/سنة)			
الاستهلاك السنوي (طن/سنة)			
APCS (نعم/لا)			
الحافلات/ عربات النقل			
عدد العربات			
الكثافة على الطريق/ عربة / سنة (كم/ سنة)			
استهلاك الوقود (لتر/كم) أو (لتر/سنة)			
الاستهلاك السنوي(لتر/سنة)			
الاستهلاك السنوي (طن/سنة)			
APCS (نعم/ لا)			
الســــــفـــن			
عدد السفن			

الأداء السنوي (كم/ سنة)			
استهلاك الوقود (لتر/كم) أو (لتر/سنة)			
الاستهلاك السنوي (لتر/سنة)			
الاستهلاك السنوي بالطن (طن/سنة)			
APCS (نعم/لا)			
القطـــــارات			
عدد القطارات (اى كان نوع الوقود)			
أداء السكك الحديدية لكل عربة في السنة (كم/ سنة)			
استهلاك الوقود (لتر/كم) أو (لتر/سنة)			
الاستهلاك السنوي للوقود (لتر/سنة)			
الاستهلاك السنوي بالطن (طن/ سنة)			
APCS (نعم/لا)			

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

	معامل الإنبعاثات (ميكروجرام مكافئ / طن)				
النوع	هواء	ماء	تربة	منتج	رواسب
	القياسات السنوية (جم مكافئ /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	تربة	منتج	رواسب

ملحوظة : **{ APCS}** تعنى المادة المحفزة للبنزين و الإزالة الجزئية للديزل

الاستبيان رقم (6) : عمليات الاحتراق العشوائي

المنطقة(المحافظة/المدينة)						
اسم المـنشأة						
العنـــــوان						
اسم المسئول						
الـوظـــيفة						
تلـيفـــــون						
فاكـــــــس						
البريد الإلكتروني						
حرق الكتلة الحيوية						
نوع الكتلة الحيوية (مثال الصنوبر، قصب السكر)	كمية الكتلة الحية لكل هكتار حرق (طن/هكتار)		المساحة المحترقة لكل هكتار في السنة (هكتار / سنة)		كمية الكتلة الحية المحترقة بالطن لكل سنة (طن/سنة)	
1.						
2.						
3.						
4.						
5.						
اجمالى						
الحرق المفتوح للمخلفات ،وحوادث الحرائق						
الإحصائيات العامة للمخلفات						
المخلفات المتولدة (بالطن)	للفرد يومياً		للفرد سنوياٍ		اجمالى / سنة (طن)	
نوع المصدر	كمية المخلفات المحترقة لكل فرد (طن/سنة)		عدد السكان		كمية المخلفات المحترقة سنويا (طن/سنة)	
	%	(طن/سنة)	%	(طن/سنة)	%	(طن/سنة)
1. حرائق المدافن						
2. الحرائق العشوائية بالمقالب						
3. الحرق المكشوف للخشب (مخلفات الهدم و البناء)						
المنطقة						
	عدد المساكن المحترقة سنويا (عدد/سنة)				عدد السيارات المحترقة سنوياً (عدد/سنة)	
4. حوادث الحرائق بالمنازل و المصانع						

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

النوع	معامل الإنبعاثات (ميكروجرام مكافئ/ طن)				
	هواء	ماء	تربة	منتج	رواسب
	القياسات السنوية (جم مكافئ /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	ارض	منتج	رواسب

الاستبيان رقم (7) : إنتاج و استخدام الكيماويات والسلع المستهلكة
(الإنبعاثات فى الهواء و الماء)

صناعة الكيماويات نوع المنشأة	**صناعة لب الورق** **صناعة الورق (أولية أو إعادة تدوير)** **لب أو ورق- المتكاملة** **إنتاج كلور عضوي** **ثنائي كلوريد الإيثيلين** **بولى فينيل كلوريد** **مبيدات الحشرات** **انتاج غاز الكلور** **(الكترود الجرافيت)** **صناعة تكرير البترول** **صناعة النسيج و الصباغة** **صناعة الجلود**		[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
المحافظة/ المدينة			
اسم المـنشأة			
العنـــــوان			
اسم المسئول			
الـوظـــيفة			
تلـيفـــون			
فاكـــــس			
البريد الإلكتروني			
الطاقة الإنتاجية:استهلاك المواد الخام	**النوع**	**الكمية**	**(طن/سنة)**
الطاقة الإنتاجية : المنتج النهائي	**النوع**	**الكمية**	**(طن/سنة)**
المادة المستخدمة فى عملية التبييض			
نوع العمليات	**مـهد ثابت** **مـهد مائع** **أخرى**		
نوع العملية	**تشغيلة (كمية) (مثال:- 100 كجم / كمية)** **شبه مستمر (مثال :- 8 ساعات / يوم)** **مســـتـــمر (24 ساعة/ يوم)**		[ ] [ ] [ ]
القدرة العملية السنوية (للوحدة)		**المتوقع**	**الفعلي**
	(طن / ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w (طن / يوم) t/d (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a		
	(طن/ ساعة) t/h (ساعة / يوم) h/d (يوم / أسبوع) d/w		

القدرة العملية السنوية (الكلية)	(طن / يوم) t/d (يوم/ سنة) d/a (ساعة/ سنة) h/a (طن/ سنة) t/a		
حرارة العمليات/الإنتاج	(5م)		
صرف المياه (لتر/ساعة , م3/ سنة)			
معالجة المياه	أحواض ترسيب بحيرة اكسجينية معالجة ثنائية معالجة ثلاثية أخرى (برجاء تحديد النوع)		
تولد الحمأة	طن/سنة		
التخلص من الحمأة	مدافن (طن/سنة) تسميد أراضى في موقع التولد (طن/سنة) محارق (طن/سنة) أخرى (برجاء تحديد النوع) (طن/سنة)		
نظام التحكم في أنواع ملوثات الهواء (APCS)	مرسبات الكتروستاتيكية سيكلونات كيس ترشيح جهاز غسل الغاز رطب جهاز غسل الغاز جاف حقن جيرى حقن قلوي/ هيدروكسيد صوديوم كربون نشط / حقن فحمى فلتر كربوني نشط محول حفزى (SCR) مروحة تقوية أخرى (برجاء ذكر النوع) لا يوجد		[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
حرارة الغازات	**عند مدخل (APCS) (5م)** **[ ]**	**عند مخرج (APCS) (5م)** **[ ]**	
تدفق الغازات الخارجة	**م3/ س (غاز جاف)**		

الرواسب		**التخلص**		
رماد مترسب	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن**	**[ ]**
رماد متطاير	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن**	**[ ]**
مياه (متخلفة)	**طن/سنة [ ]**	**تخلص**		
حمأة (كمادة جافة)	**طن/سنة [ ]**	**إعادة تدوير [ ]**	**دفن**	**[ ]**

نتائج التحاليل (هواء، ماء,رواسب)

التصنيف و التقييم النهائي (يملأ بواسطة مقيمي المعلومات)

النوع	معامل الإنبعاثات (ميكروجرام مكافئ/ طن)				
	هواء	ماء	تربة	منتج	رواسب
	القياسات السنوية (جم مكافئ /سنة)				
النشاط السنوي (طن /سنة)	هواء	ماء	تربة	منتج	رواسب

6 Detailed supporting data

- Calculations of waste incineration.
  - Hazardous waste incineration (Cement Kilns).
  - Medical waste incineration.
- Calculations of ferrous and non – ferrous metal production.
  - Iron and steel production.
  - Other non – ferrous metal production.
- Calculations of heat and power generation
  - Fossil fuel power plants.
- Calculations of production of mineral products:
  - Cement production
  - Lime production
  - Glass production
  - Ceramics production

- Calculations of transport :
  - 4-Stroke engines
  - 2- Stroke engines
  - Diesel engines
  - Heavy oil fired engines

- Calculations of open burning processes:
  - waste burning and accidental fires
    - Landfill fires
    - Accidental fires in houses and factories
    - Accidental fires in vehicles

- Calculations of production and use of chemicals and consumer goods.
  - Petroleum industry (refineries)

Calculation Table of PCDD / PCDF Emissions

Category 1 - Waste Incineration -
B – Hazardous Waste Incineration

Governorate	Production *t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/year				
			Air				Residue	Air				Residue
Suez (Elmasrya for Cement)	26970	4.High technology combustion , Sophisticated APCS	0.07				30	0.0202				0.809
Total	**26970**							**0.0202**				**0.809**

Calculation Table of PCDD / PCDF Emissions

Category 1 - Waste Incineration
C- Medical Waste Incineration

Governorate	Production *t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/year				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	57.5	2-Controlled, Batch type combustion, no/minimal APCS.	3000				20	0.173				0.0012
	57.5	3-Controlled, batch type combustion ,good APCS	525				920	0.03				0.053
Suez	153.5	2-Controlled, batch type combustion, no/minimal APCS.	3000				20	0.461				0.0031
	153.5	3-Controlled, batch type combustion ,good APCS	525				920	0.081				0.1412
South Sinai	51.5	2-Controlled, batch type combustion, no/minimal APCS.	3000				20	0.155				0.0010
	51.5	3-Controlled, batch type combustion ,good APCS	525				920	*0.027*				0.0474
Total	**525**							**0.927**				**0.2469**

Incineration: 8 hours/day and 5 days/weak for 52 weeks/year*

Calculation Table of PCDD / PCDF Emissions

Category 2 – Ferrous and Non-Ferrous Metal Production

Factory	*Production* t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
C. Iron and Steel Production (Suez Steel Company)	300000	3-Clean scrap/virgin iron, EAF designed for low PCDD/PCDF emission, BOF furnaces	0.1				1.5	0.03				0.45
C. Iron and Steel Production (El Ezz Company for Steel)	500000	3-Clean scrap/virgin iron, EAF designed for low PCDD/PCDF emission, BOF furnaces	0.1				1.5	0.05				0.75
J. Other Non-Ferrous Metal Production (Ferro Manganese Company)	16500	1- Thermal non-ferrous metal processes – contaminated scrap, simple or no APCS	100					1.65				--
Total	**816500**							**1.73**				**1.20**

Calculation Table of PCDD / PCDF Emissions

Category 3 - Heat and Power Generation
A. Fossil fuel power plants

Governorate	Production TJ	Classification	Emission Factor µg TEQ/TJ			Emission g TEQ/a		
			Air	Water	Residue	Air	Water	Residue
Red Sea	5485.769	5-light fuel oil/natural gas	0.5	ND	ND	0.002743	ND	ND
Suez	38808	3- heavy fuel fired power boilers	0.5	ND	ND	0.097020	ND	ND
South Sinai	5133.532	5-light fuel oil/natural gas	0.5	ND	ND	0.002567	ND	ND
Total	**49427.301**					**0.10233**	ND	ND

Calculation Table of PCDD / PCDF Emissions

Category 3 - Heat and Power Generation
A. Fossil fuel power plants

Governorate	Station	*Production* TJ	Classification	Emission Factor µg TEQ/TJ			Emission g TEQ/a		
				Air	Water	Residue	Air	Water	Residue
Suez	Ataka *	22680	3- heavy fuel fired power boilers	2.5	ND	ND	0.05670	ND	ND
Suez	*Oyoun Mousa	16128	3- heavy fuel fired power boilers	2.5	ND	ND	0.04032	ND	ND
South of Sinai	Sharm El * Sheekh	4477.536	5-light fuel oil/natural gas	0.5	ND	ND	0.002238	ND	ND
Red Sea	*Hurghada	3607.632	5-light fuel oil/natural gas	0.5	ND	ND	0.0018	ND	ND
South of Sinai	Abo Rdees*	115.92	5-light fuel oil/natural gas	0.5	ND	ND	0.57×10^{-4}	ND	ND
South of Sinai	*Sant Katreen	206.64	5-light fuel oil/natural gas	0.5	ND	ND	1.03×10^{-4}	ND	ND
Red Sea	El Qoser*	699.3	5-light fuel oil/natural gas	0.5	ND	ND	3.4×10^{-4}	ND	ND
Red Sea	Ras Khareb*	740.88	5-light fuel oil/natural gas	0.5	ND	ND	3.7×10^{-4}	ND	ND
Red Sea	Mrsa Alam*	92.4	5-light fuel oil/natural gas	0.5	ND	ND	0.462×10^{-4}	ND	ND

* Permanent station (working for 7000 hr/year)
** Alternate station (working for 1760 hr/year)

Calculation Table of PCDD / PCDF Emissions

Category 3 - Heat and Power Generation
A. Fossil fuel power plants

Governorate	Station	***Production*** TJ	Classification	Emission Factor µg TEQ/TJ			Emission g TEQ/a		
				Air	Water	Residue	Air	Water	Residue
Red Sea	Shalateen *	143.64	5-light fuel oil/natural gas	0.5	ND	ND	0.718×10^{-4}	ND	ND
Red Sea	*Abo Ramad	53.9	5-light fuel oil/natural gas	0.5	ND	ND	0.269×10^{-4}	ND	ND
Red Sea	Halayeb *	42.84	5-light fuel oil/natural gas	0.5	ND	ND	0.2142×10^{-4}	ND	ND
South of Sinai	**El Tor	125.4528	5-light fuel oil/natural gas	0.5	ND	ND	0.62×10^{-4}	ND	ND
South of Sinai	Ras El Naqb**	5.829	5-light fuel oil/natural gas	0.5	ND	ND	0.029×10^{-4}	ND	ND
South of Sinai	**Ras Sedr	29.1456	5-light fuel oil/natural gas	0.5	ND	ND	0.145×10^{-4}	ND	ND
South of Sinai	Dahab **	55.616	5-light fuel oil/natural gas	0.5	ND	ND	0.27×10^{-4}	ND	ND
South of Sinai	⋆⋆*Nwebaa*	43.648	5-light fuel oil/natural gas	0.5	ND	ND	0.22×10^{-4}	ND	ND
South of Sinai	⋆⋆*Taba*	73.744	5-light fuel oil/natural gas	0.5	ND	ND	0.368×10^{-4}	ND	ND
Red Sea	⋆⋆*Safaga*	105.177	5-light fuel oil/natural gas	0.5	ND	ND	0.525×10^{-4}	ND	ND

* Permanent station (working for 7000 hr/year)
** Alternate station (working for 1760 hr/year)

Calculation Table of PCDD / PCDF Emissions

Category 4-Production of Mineral Products
A- Cement Production

Factory	*Production* t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Suez Cement company (Suez Factory)	2,330,830	4-wet kilns, dry	0.05					0.1165				
Suez Cement company (Elkattamya Factory)	1,424,216	4-wet kilns, dry	0.05					0.071				
Egyptian Cement Company	10,000,000	4-wet kilns, dry	0.05					0.500				
Arabian Cement Company	2,000,000	4-wet kilns, dry	0.05					0.100				
Total	**15755046**							**0.7875**				

Calculation Table of PCDD / PCDF Emissions

Category 4 – Production of Mineral Products
B. Lime Production

Factory	*Production* t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Suez Lime Company	24000	2-Lime production using dust abatement	0.07					0.00168				
Total	**24000**							**0.00168**				

Calculation Table of PCDD / PCDF Emissions

Category 4 – Production of Mineral Products
D. Glass production

Factory	Production t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Medical Glass company	36000	2-Glass production using dust abatement	0.015					0.00054				
Total	**36000**							**0.00054**				

Calculation Table of PCDD / PCDF Emissions

Category 4 –Production of Mineral Products
E. Ceramics Production

Factory	Production t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Ceramica Aldorado Company (Suez)	433750	2-Brick production using dust abatement	0.02					0.00868				
Total	**433750**							**0.00868**				

Calculation Table of PCDD / PCDF Emissions

Category 4 – Production of Mineral Products
F. Asphalt Mixing

Governorate	Production t/year▫	Classification	Emission Factor µg TEQ/t of material burned					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	750000	Mixing plant with no gas cleaning , poor fuels	0.07					0.0525				
Suez	630000	Mixing plant with no gas cleaning , poor fuels	0.07					0.0441				
South Sinai	1060000	Mixing plant with no gas cleaning, poor fuels	0.07					0.0742				
Total	**2440000**							**0.1708**				

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport
A. 4-Stroke Engines

Governorate	Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
Red Sea	47607.4	2. Unleaded fuel without catalyst.	0.1	0.00476
	15869.1	3. Unleaded fuel with catalyst.	0	0
Total	**63476.5**			**0.00476**

- We suppose that class 3. unleaded fuel with catalyst represents 25% of the total No. of 4 – Stroke Engines

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport
A. 4-Stroke Engines

Governorate	Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
Suez	83277.9	2. Unleaded fuel without catalyst.	0.1	0.008328
	27759.3	3. Unleaded fuel with catalyst.	0	0
Total	**111037.2**			**0.008328**

- We suppose that class 3. unleaded fuel with catalyst represents 25% of the total No. of 4 – Stroke Engines

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport

A. 4-Stroke Engines

Governorate	Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
South Sinai	33849.8	2. Unleaded fuel without catalyst.	0.1	0.00338
	11283.3	3. Unleaded fuel with catalyst.	0	0
Total	**45133.1**			**0.00338**

- We suppose that class 3. unleaded fuel with catalyst represents 25% of the total No. of 4 – Stroke Engines

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport
2 - Stroke Engines

Governorate	Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
Red Sea	3496.5	2. Unleaded fuel without catalyst	2.5	0.0087
Suez	3951.6	2. Unleaded fuel without catalyst	2.5	0.0099
South Sinai	2149.5	2. Unleaded fuel without catalyst	2.5	0.0054
Total	**9597.6**			**0.02340**

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport
C. Diesel Engines

Governorate	Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
Red Sea	128605.3	Diesel Engines	0.1	0.0129
Suez	174053.5	Diesel Engines	0.1	0.0174
South Sinai	54626.3	Diesel Engines	0.1	0.0055
Ships from &to Suez Canal and Red Sea Ports	475.929	Diesel Engines	0.1	0.00005
Total	**357761.03**			**0.03585**

Calculation Table of PCDD / PCDF Emissions

Category 5 -Transport
D. Heavy Oil Fired Engines

Ship Traffic	Fuel Consumption *t/year	Classification	Emission Factor µg TEQ/t	Emission g TEQ/year
			Air	Air
From & To Suez Canal	1638108	D. Heavy Oil Fired Engines	4	6.5524
Red Sea Ports	41640	D. Heavy Oil Fired Engines	4	0.1666
Total	**1679748**			**6.7190**

- We suppose that the consumption for every 10,000 ton weight of vessels consume 1ton / hr (heavy oil) , and each ship remains about 24 hrs during crossing Suez Gulf and Egyptian Red Sea coasts

Calculation Table of PCDD / PCDF Emissions

Category 6 – Open Burning Processes
B. Waste Burning and Accidental Fires

Governorate	Production t/year▫	Classification	Emission Factor µg TEQ/t of material burned					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	237250	1-Landfill fires	1000		600		[600]	237.25		142.35		[142.35]
Suez	164250	1-Landfill fires	1000		600		[600]	164.25		98.55		[98.55]
South Sinai	182500	1-Landfill fires	1000		600		[600]	182.50		109.5		[109.5]
Total	**584000**							**584**		**350.4**		**[350.4]**

▫Ws suppose that 50% of the total amount were burnt.

Calculation Table of PCDD / PCDF Emissions

Category 6 - Open Burning Processes
B. Waste Burning and Accidental Fires

Governorate	Amount of material burned t/year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/year				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	60	2-Accidental fires in houses, factories	400		400		[400]	0.024		0.024		[0.024]
Suez	400	2-Accidental fires in houses, factories	400		400		[400]	0.160		0.160		[0.160]
South of Sinai	117	2-Accidental fires in houses, factories	400		400		[400]	0.0468		0.0468		[0.1152]
Total	**577**							**0.2308**		**0.2308**		**[0.2308]**

Calculation Table of PCDD / PCDF Emissions

Category 6 - Open Burning Processes
B. Waste Burning and Accidental Fires

Governorate	No. of fired vehicles /year	Classification	Emission Factor µg TEQ/t					Emission g TEQ/year				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	5	4-Accidental fires in vehicles	94 (per vehicle)		18(per vehicle)		[18](per vehicle)]	0.00047		0.00009		[0.00009]
Suez	7	4-Accidental fires in vehicles	94 (per vehicle)		18(per vehicle)		[18](per vehicle)	0.00065		0.00013		[0.00013]
South of Sinai	2	4-Accidental fires in vehicles	94 (per vehicle)		18(per vehicle)		[18](per vehicle)	0.00019		0.00004		0.00004]
Total	**14**							**0.00131**		**0.00026**		**[0.00026]**

Calculation Table of PCDD / PCDF Emissions

Category 7 – Production and Use of Chemicals and Consumer Goods
C. Petroleum Industry (Refineries)

Governorate	Amount of Gas Burned (m^3 /year	Classification	Emission Factor µg TEQ/ m^3 of gas burned			Emission g TEQ/a		
			Air	Water	Residue	Air	Water	Residue
Red Sea	781012400	Flares	0.0003	ND	ND	0.234303	ND	ND
Suez	210829591	Flares	0.0003	ND	ND	0.063249	ND	ND
South Sinai	1131475310	Flares	0.0003	ND	ND	0.339440	ND	ND
Total	2123317301					0.636992		

- 1 ft^3 = 0.028 m^3.
- For Red Sea Governorate, the amount of gas burned =27893.3 x 10^6 ft^3/year = 781.0124 x10^6 m^3/year.
- For Suez Governorate, the amount of gas burned =7529.62825 x 10^6 ft^3/year = 210.829591 x10^6 m^3/year.
- For South Sinai Governorate, the amount of gas burned =40409.83249 x 10^6 ft^3/year = 1131.47531 x10^6 m^3/year.

Calculation Table of PCDD / PCDF Emissions

Category 8 -Miscellaneous
C. 2 – Smoke Houses

Governorate	Production t/year▫	Residue t/year▫	Classification	Emission Factor					Emission g TEQ/a				
				Air µg TEQ/ t	Water	Land	Product	Residue µg TEQ/ t Residue	Air	Water	Land	Product	Residue
Red Sea	2189.6	175.168	2-Clean fuel, no afterburner	6	NA	NA	ND	20	0.01314	NA	NA	ND	0.00350
Suez	590.4	47.232	2-Clean fuel, no afterburner	6	NA	NA	ND	20	0.00354	NA	NA	ND	0.00094
South Sinai	2538.0	203.040	2-Clean fuel, no afterburner	6	NA	NA	ND	20	0.01523	NA	NA	ND	0.00406
Total	**5318.0**	**425.440**							**0.03177**	**NA**	**NA**	**ND**	**0.00850**

* We suppose that each smoke house installation in the concerned governorates produces 50kg of smoking food / day.
* We suppose that each smoke house installation in any hotel produces 100 kg of smoking food / week x 52 weeks/year = 5.2 t/year.
* We suppose that the residue represents 6 – 10% with average of about 8% of the total production (by weight).
* We suppose that No. of hotels = 248 , 27 and 315 in each governorate respectively.
* We suppose that No. of other smoking facilities = 50 , 25 and 50 in each governorate respectively.

Calculation Table of PCDD / PCDF Emissions

Category 8 -Miscellaneous
D. 2 – Dry Cleaning

Governorate	No. of dry cleaning laundries	Total amount of distillation residue t/year	Classification	Emission Factor µg TEQ/t of distillation residue	Emission g TEQ/year
				Residue	Residue
Red Sea	**230**	**27.60**	**2.** Normal Textiles	**50**	**0.00138**
Suez	**40**	**4.80**	**2.** Normal Textiles	**50**	**0.00024**
South Sinai	**290**	**34.80**	**2.** Normal Textiles	**50**	**0.00174**
Total	**550**	**67.2**			**0.00336**

* We suppose that the amount of distillation residue = 5 – 15 kg / month for each dry cleaning laundry with average amount of distillation residue = 10 kg / month = 120 kg / year for each dry cleaning laundry

Calculation Table of PCDD / PCDF Emissions

Category 8 -Miscellaneous

E. 2 – Tobacco Smoking (according to the total No. of population only)

Governorate	Total Population	Total No. of Smokers (20%)	Consumption *Cigarette/year	Classification	Emission Factor pg TEQ/Cigarette	Emission g TEQ/year
					Air	Air
Red Sea	**288' 661**	**57' 732**	**421' 443' 600**	**2.** Cigarette	**0.1**	**0.00004214**
Suez	**512' 135**	**102' 427**	**747' '717' 100**	**2.** Cigarette	**o.1**	**0.00007477**
South Sinai	**150' 088**	**30' 018**	**219' 131' 400**	**2.** Cigarette	**0.1**	**0.00002191**
Total	**950' 884**	**190' 177**	**1' 388' 292' 100**			**0.00013882**

* We suppose that every person smoke 20 cigarette/day x 365 day =7300 cigarette/year
* We suppose that the average number of smokers = about 20% of the total population .

Calculation Table of PCDD / PCDF Emissions

Category 8 -Miscellaneous

E. 2 – Tobacco smoking (according to the total No. of tourists only)

Governorate	Total No. of Tourists/year	Total No. of Smokers/year (10%)	Consumption *Cigarette/year	Classification	Emission Factor pg TEQ/Cigarette	Emission g TEQ/year
					Air	Air
Red Sea	**28' 851' 060**	**2 ' 885 ' 106**	**21' 061' 273' 800**	**2.** Cigarette	**0.1**	**0.002106**
Suez	**1' 609 ' 650**	**160 ' 965**	**1' 175' 044' 500**	**2.** Cigarette	**0.1**	**0.000118**
South Sinai	**31' '779 ' 090**	**3 ' 177 ' 909**	**23' 198' 735' 700**	**2.** Cigarette	**0.1**	**0.002319**
Total	**62 ' 239 ' 800**	**6 ' 223 ' 980**	**45' 435' 054' 000**			**0.004543**

* We suppose that every person smoke 20 cigarette/day x 365 day =7300 cigarette/year .
* We suppose that the average number of smokers = about 10% from the total tourists number .

Calculation Table of PCDD / PCDF Emissions

Category 8 -Miscellaneous

E. 2 – Tobacco smoking (according to the total No. of population and tourists)

Governorate	Total Population	Total No. of Tourists/year	Consumption *Cigarette/year	Classification	Emission Factor pg TEQ/Cigarette	Emission g TEQ/year
					Air	Air
Red Sea	**288' 661**	**28' 851' 060**	**21' 482' 717' 400**	**2.** Cigarette	**0.1**	**0.002148**
Suez	**512' 135**	**1' 609 ' 650**	**1' 922' 761' 600**	**2.** Cigarette	**0.1**	**0.000192**
South Sinai	**150' 088**	**31' '779 ' 090**	**23' 417' 867' 100**	**2.** Cigarette	**0.1**	**0.00234**
Total	**950' 884**	**62 ' 239 ' 800**	**46' 823' 346' 100**			**0.00468**

* We suppose that every person smoke 20 cigarette/day x 365 day =7300 cigarette/year .
* We suppose that the average number of smokers = about 20% of the total population .
* We suppose that the average number of smokers = about 10% of the total tourists number.

Calculation Table of PCDD / PCDF Emissions

Category 9 – Disposal / Landfill
A. Landfills and Waste Dumps

Governorate	Production t/year▫	Classification	Emission Factor pg TEQ/L in water & µg TEQ/t in Residues Disposed of					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	237250	2-Non-hazardous wastes	NA	30	NA	NA	6		0.0007			1.4235
Suez	164250	2-Non-hazardous wastes	NA	30	NA	NA	6		0.0005			0.9855
South Sinai	182500	2-Non-hazardous wastes	NA	30	NA	NA	6		0.0005			1.0950
Total	**584000**								**0.0017**			**3.5040**

▫Ws suppose that 50% of the total amount were disposed
▫Ws suppose that the leachate represents about 10% of the total amount.

Calculation Table of PCDD / PCDF Emissions

Category 9 – Disposal / Landfill
B. Sewage and Sewage Treatment

Governorate	Production m^3/year▫	Classification	Emission Factor pg TEQ/L of sewage water effluent & µg TEQ/t of sewage sludge					Emission g TEQ/a				
			Air	Water	Land	Product	Residue	Air	Water	Land	Product	Residue
Red Sea	$37x10^6$	2-Urban environments	NA	2	NA	-	100		0.0740			0.444
Suez	$99x10^6$	2-Urban environments	NA	2	NA	-	100		0.1980			1.188
South Sinai	$119x10^6$	2-Urban environments	NA	2	NA	-	100		0.2380			1.428
Total	225 x106								0.5100			3.060

▫Ws suppose that 1 m3 = 1000 L.
▫Ws suppose that the sludge generation at wastewater treatment plants = 0.4% of raw sludge in effluent water.
▫Ws suppose the effluent contains 3% of dry matter

7 List of Regulations, Guidelines and Technical Standards Addressing Annex C Pops, Including Limit Values and Fines for Polluters

a. Environmental Policy, Sustainable Development Policy

The challenge of Egyptian environmental policy is to achieve a balance between the needs of a developing nation while protecting its natural resources. Environmental policy is coordinated by MSEA/EEAA; it is a product of a consultative process that involves all stakeholders: the public at large, NGOs, private sector, government departments/agencies and finally legislative bodies. The strategic objective of the environmental policy in Egypt is to introduce and integrate environmental concerns relevant to protecting human health and managing natural resources into all national policies, plans, programs and projects of the national development plan. The medium-term objective is to preserve natural resources, biological diversity, and national heritage within a context of sustainable development. The short-term objective is to reduce current pollution levels, minimize health hazards and to improve the quality of life for citizens and residents in Egypt.

b. General Legislative Framework

The general framework of the Environment Law No.4/1994 which was amended by Law No.9/2009 reflects the interest of Egypt in improving the quality of its environment, and in implementing the principles of sustainable development nation-wide.
The Law includes a whole chapter on hazardous substances and wastes and on setting criteria for various air polluting sources, whether stationary or mobile, including those producing POPs unintentionally.

Egypt accepts its share of responsibility for the state of the environment on Planet Earth; it actively participates in the relevant mechanisms of international co-operation. Through activities within its territory and through support for activities in other areas, Egypt is taking part in dealing with existing environmental global issues. Egypt is committed to the criteria for sustainability: (1) minimization of the demands on non-renewable resources, prudent use of renewable energy and material resources, and minimal use of the land resources, (2) minimization of negative impacts on the environment, emissions into air and water, soil contamination, waste production, and noise levels as well as minimization of all potential hazards and risks to the environment, (3) consistent protection and improvement of basic natural and human capital.

Emission standards and their enforcement as an integral part of air pollution programs are dealt with in a major way in the national environment Law 4/1994 which was amended by Law No.9/2009. Applying these standards has become a nation-wide practice.

Starting from Egypt's ratification on the Stockholm Convention, and after that issuing and approving the NIP, the regulation of the Convention had taken the legality and force of the low.

So Egypt are applying strategies and action plans of the NIP, therefore these strategies and action plans are obligatory for complying with the Convention, exactly the same as low 4/1994 which was amended by Law No.9/2009 and its Executive Regulations that mentioned before.

c. Annex (6) Table (4) of the Executive Regulation of Law 4/1994 which was amended by Law 9/2009 states that:

The maximum limits of dioxin and furan emissions from medical waste incinerators should not exceed 0.1 n gm /m^3.

d. Annex (8) Table (1) of the Executive Regulation of Law 4/1994 which was amended by Law 9/2009 states that:

The maximum limits of air pollutants inside the work place according to type of industry should not exceed the limits in the table below:

Substance	Threshold Limits			
	Mean Time in 8 hours		Limits of exposure for a short period	
	P.P.M	Mg/m^3	P.P.M	Mg/m^3
Aldrin		0.25		
Chlordane		0.5		
DDT		1		
Dieldrin		0.25		
Indrin		0.1		
Heptachlor		0.05		
Lindan		0.5		

e. Annex (10) of the Executive Regulation of Law 4/1994 which was amended by Law 9/2009 :

For non degradable polluting substances which industrial establishments are prohibited from discharging into the marine environment:

-Inorganic Substances (Mercury, Lead, Cadmium, Cobalt, Nickel, Zink, Silver, Cupper,…etc)except for concentration limits mentioned in annex (1)in the Executive Regulations of the law.

- Organic Substances:

Organophosphorous pesticides
Dimethoate
Malathion
Organochlorine pesticides
Aldrin
Dieldrin

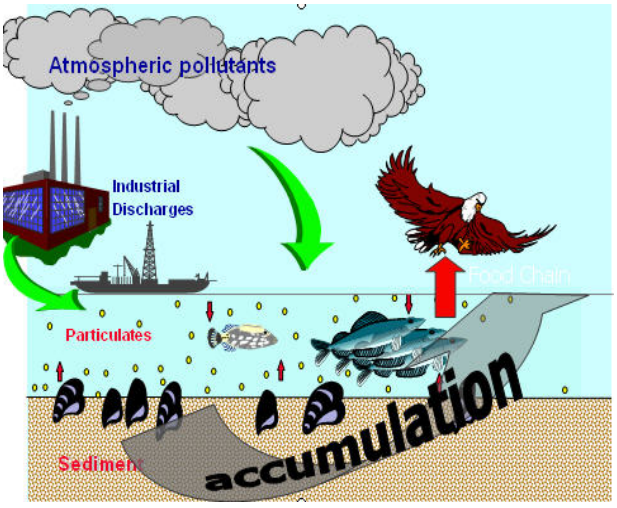
DDT
Chloridane
Endrin
Polychlorinated Biphenyl's (PCBs)
2,3,5,6 Tetrachlorobiphenyle
2,3,6 Trichlorophenyl
Polynuclear Aromatic Hydrocarbons
Benzo(a) Pyrene
Naphthalene

- Solid substances like (Plastic, fishing nets, ropes, containers)
- And other organic pollutants like (Toxaphene, Merix, Heptachlor, Hexachlorobenzene) and toxic substances determined by International Conventions ratified by Egypt.

8 Threat to Human Health and Environment, and Impact of Releases on Workers in Some Industries at Red Sea Coast:

Persistent Organic Pollutants (POPs) consist of chemicals – pesticides (such as DDT), industrial chemicals (such as polychlorinated biphenyls [PCBs]), and unwanted by-products of industrial processes or combustion (such as dioxins and furans) – that are dangerously resistant to environmental degradation. With no or little alterations of their original composition, POPs are transported to oceans and coastal areas by air, water and soil, via direct industrial effluents, sewages and solid source releases, as well as irrational dumping and dredging of waste.

Persistent organic pollutants (POPs) are organic substances which demonstrate toxic effects, resist degradation, bio accumulates, and transported through different environmental media and cross state borders and can deposit far from the location of releases, posses a probable significant health and environmental hazard .



What makes POPs so dangerous is that they are easily transportable and globally pervasive, and that they pose serious health risks to all living organisms. POPs bio-accumulate in the fatty deposits of animals and plants and get passed on down the food-chain. They have been linked to alterations in the functioning of hormone systems in fish, wildlife and have been linked to a range of health concerns in humans as well, including cancer, immune-toxicity, thyroid and liver malfunction, nervous system damage, reproductive complications, hormonal disruptions, behavioral problems, allergies, birth defects, and developmental disorders

POPs enter the environment from various sources and in this way can lead to their leakage into food chains. As an example, we may mention the combustion of wastes, where their emission into the atmosphere can occur if the incineration plants are not equipped with the proper level of waste purification, and also when high concentrations of POPs are bound onto the surface of ash particles. If this ash is not dumped at specialized dumping sites, POPs may enter the atmosphere, water and soil and as such can enter air, water and food chains.

The amount of POPs which enter the human body by inhalation, food ingestion or by contact with the skin, may do not present an immediate health

hazard (acute poisoning) .It is however important to keep in mind that the effect of POPs is of long- term and currently we are unable to predict, on the bases of the content of these substances in the human body, whether the individual will be sick, for example with cancer, or not. It remains a certainty, however, that the less POPs are found in our body, the lower the risk of health hazards.

a. Cement Industry:

The spread of cement industry is due to the availability of good quantities of raw materials that are needed in industrial processes such as lime stone and Dolomite.

Workers in this industry are exposed to professional diseases:

- Lung dust diseases: It is caused by exposure to newly released dust of silica or of substances containing silica in a percentage that exceeds 5% An example here is work in mines.
- The impact of heat and light reflections of white stones on the eyes.
- Recurrent exposure to heat and strong light reflections lead to damages in the eyes or weak sight.
- Professional deafness: that is cause by repeated explosions of rocks.
- Cancer due to exposure to emissions of dioxin and furan

b. Oil Industry:

Workers in the field of oil industry are exposed to the following risks:

- Toxicity by oil or oil gases and compounds and its complications. This toxicity is caused by any work that requires handling or using oil, oil gases or compounds, and any work that requires exposure to such substances whether solid, liquid or gas.
- First – Stage skin Cancer and chronic skin and eye inflammation and ulcers. This is caused by any work that requires using, handling or exposure to tar, Butamine, mineral oils, and compounds or wastes of such substances, or by exposure to any other irritating substance whether solid, liquid or gas

c. Mineral Industries (Aluminum - Copper).

Workers in this field are exposed to a number of risks due to work with different minerals that cause them a lot of diseases during preparation, extraction or usage of such minerals or their compounds, through exposure to resulting dust, or during the preparation of paints and colors containing compounds or salts of these elements.

d. Waste Incinerators

Hospital medical waste incinerators release a great number of pollutants whether gas, such as carbon monoxide, carbon dioxide dioxin and furan, or solid, represented in the remaining ashes of burning solid substances. These pollutants lead to a variety of diseases such as cancer and carbon monoxide toxicity due to its reaction with hemoglobin in the blood, or the increase of carbon monoxide level in the atmosphere which leads to different climatic changes

9 The Sites for the On – Site Sampling for PCDDs / PCDFs Laboratory Analysis:

a. Hazardous waste incineration (Cement Kiln):

Egyptian Cement Company (Ain Elsokhna-Suez governorate).

b. Medical waste incineration:

- 3 medical waste incinerators in Suez Governorate (Portawfic, km5 Ismailia-Suez desert road, Suez medical insurance).
- 3 medical waste incinerators in Red Sea Governorate (central Ras Ghareb hospital, Hurghada Fever hospital, General Petroleum Company).
- 7 medical waste incinerators in South Sinai Governorate (El –Tor general hospital, Abu Rdees central hospital, Sharm el Sheikh international hospital, Ras Sidr central hospital, Saint Katherine hospital, Nuweiba hospital, Taba hospital).

c. Iron and steel production:

- Suez steel company (Suez Governorate).
- El Ezz for steel (Suez Governorate).

d. Ferro manganese company (Suez Governorate).

e. Cement production:

- Egyptian cement company (Ain Sokhna -Suez Governorate).
- Suez Cement company (Suez factory- Suez Governorate).
- Suez Cement company (Kattamya factory- Suez Governorate).
- Arabia cement company (Ain Sokhna -Suez Governorate).

f. Fossil fuel power plants:

- 2 stations in Suez Governorate (Ataka, Oyoon Mousa)
- 8 stations in Red Sea Governorate (Hurghada, Alkosair, Ras Ghareb, Marsa Alam, Shalatean, Abu Ramad, Halayeb, Safaga).
- 9 stations in Red Sea Governorate (Sharm el Sheikh, Abu Rdees, Saint Katherine, El-Tor, Ras el Nakab, Ras Sedr, Dahab, Nuweiba, Taba).

g. Lime production:

Suez Company for lime production (Suez Governorate).

h. Ceramics production:

Ceramic Aldorado Company (Suez Governorate).

i. Landfill fires:

- 1 landfill in Suez Governorate.
- 11 landfills in Red Sea Governorate (Hurghada, Safaga, Alkosair, Marsa Allam{5 landfills at km5 Marsa Allam city, km13 Marsa Allam- Edfo road, km50, km 110 south Marsa Alam city, 3km south elsheikh elshazly village}, Shalatean, Ras Ghareb {2 landfills , one at a distance of 6 km from the city Sheikh fadl road, and the other one outside Zaafarana village)}.

- 8 landfills in South Sinai Governorate (Ras Sedr- -south of the city, Abu Znema - south of the city, Abu Rdees - south of the city, Saint Katherine – north east of the city, El Tor south east of the city, Sharm el Sheikh - northeast of the city, Dahab – north of the city , Nuweiba – south west of the city)

j. Textile production:

Misr Iran textile company (Suez Governorate).

k. Paper production:

Imac Company for paper production (Suez Governorate).

l. Petroleum industry (refineries):

- 3 companies at Suez Governorate,
- 19 companies at Red Sea Governorate (17 companies around Ras Ghareb city, 2 companies around Hurghada city), South Sinai Governorate (Balaeam, General and Suez).
- 3 companies at South Sinai Governorate**.**

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