MINISTRY OF TOURISM
TOURISM DEVELOPMENT AUTHORITY
USAID-EEPP

OBJECTIVE 8.2.1 DOCUMENTATION
VOLUME III

ENVIRONMENTAL MONITORING UNIT
YEAR 2003 REPORTING ACTIVITIES

(RSSTI) Red Sea Sustainable Tourism

(TDA) Tourism Development Authority

(USAID) United States Agency for International

Submitted in satisfaction of the Means of Verification 8.1.2
Tranche II
of the
Egyptian Environmental Policy Program
USAID – TDA

June 30, 2003

Acknowledgment

This program has been developed and implemented through the General Department for Environmental Affairs of the Tourism Development Authority (TDA), in collaboration with the Egyptian Environmental Affairs Agency (EEAA), and the Red Sea Sustainable Tourism Initiative (RSSTI). It was funded through the USAID - Egyptian Environmental Policy Program (EEPP), and implemented by PA Government Services (PA Consulting Group) .

Accordingly, we wish to greatfully acknowledge the participation of:

Eng. /Mohamed Magdi Qobeisi	Chief Executive Officer of TDA
Eng./ Mohamed Ali Ahmed	General Manager for Environmental Affairs, and EEPP/RSSTI General Coordinator

TDA Team:

Geologist/ Mohamed Hassanein	Manager of Environmental Dept., and Head of Environmental Monitoring Unit (EMU)
Eng. /Khaled Mostafa	Engineer at the Environmental Dept., and Inspector at EMU
Biologist/ Amr Abdel Hamid	Marine Sciences at the Environmental Dept., and Inspector at EMU
Eng./ Mohamed Rashad	Planner at the Planning Dept., and member of the EMU team
Chemist/ Aziza Abou El-Nil	TDA Chemistry and Lab Equipment Consultant

And from RSSTI (PA Consulting):

Mr. Gerald Meier
Dr. / Assem El-Gazzar

We also extend our appreciation to TDA consultants and RSSTI consultants, for their technical endeavors in preparing the EMU programs.

Environmental Measurements For Boilers and power Generating Stations

Environmental Measurements For Boilers and power Generating Stations

TABLE OF CONTANT

Environmental Monitoring Unit 2003 Reporting activity

Environmental Monitoring Unit

Monthly Report 1

For the period March 1 – March 31, 2003

Environmental Monitoring Unit, Tourism Development Authority
Monthly Activity Reporting Form

Report Number:	001			**Beginning**	**Ending**
Date:	April 15,2003		**Period Covered:**	March 1, 2003	March 31, 2003
Reporting Officer and Title:	Mohammad Hassenein, Manager, Environmental Monitoring Unit				

I. Summary Activities:

Activity	*Count*
Environmental Compliance Inspections*	0
Environmental Management Inspections**	0
Baseline and Background Data Collection	44
Management Recommendations Issued	0
Compliance Enforcement Notices Issued	0
Compliance Follow-up Inspections	0
Management Recommendations Follow-up	0

**** Inspections resulting in binding compliance notices requiring corrective action in accordance with contract or legal requirements. Follow-up inspections required.***

***** Inspection resulting in non-binding environmental management recommendations***

II. Locations Visited:

Location Name	Facility Point of Contact	Affiliation
Golden Five		Chief Engineer
Soma Bay		Chief Engineer
Reemy Vera		Chief Engineer
Lily Land		Chief Engineer
Oberoi Hotel		Chief Engineer
Hurghada Hills		Chief Engineer
Jasmine Village		Chief Engineer
Sahl Hasheesh		Chief Engineer

	Coral Beach		Chief Engineer
	Egyptian Engineers		Chief Engineer
	Melia Pharon		Chief Engineer
	Hostamark Hotel		Chief Engineer
	Desert Resorts		Chief Engineer
	Conrad Hilton		Chief Engineer
	Ali Baba		Chief Engineer

III. Monthly Activity Summary Narrative:

Using the data collection forms developed in February, staff from the environmental unit began the collection of relevant data from environmentally sensitive locations with in the TDA project area. Efforts were concentrated on properties located between Hurghada and Safaga. Data were collected to identify the location, description and environmentally important elements of the various properties. This was the first effort to identify potential environmental liability in the project area and will continue until all existing properties along the Red Sea are cataloged. Data sheets containing the results of this inspection are contained in attachment 1.

Contracts for the development of standard environmental survey forms and analysis guidelines were issued for the inspection of Fuel Stations, Power Generating stations, Solid Waste Disposal, and Mangrove resources. These guidelines are expected to be completed by early May, 2003.

IV. Specific Problems Identified and Actions Taken:

None identified during this reporting period.

V. Attachments and Supporting Documentation

Attached completed survey forms for sites visited as noted in section II.

Reporting Officer Signature:_____

Eng. Mohammad Hassenein

Date: ____April 15, 2003_____

ATTACHMENTS FOR MONTHLY REPORT MARCH 2003

COMPLETED
ENVIRONMENTALLY SENSITIVE FACILITY SURVEYS

Power Plants

Wastewater Treatment Plants

Desalinization Plants

Marinas

Environmental Monitoring Unit

Monthly Report 2

For the period April 1 – April 30, 2003

Environmental Monitoring Unit, Tourism Development Authority
Monthly Activity Reporting Form

Report Number:	002			**Beginning**	**Ending**
Date:	May 15,2003		**Period Covered:**	April 1, 2003	April 30, 2003
Reporting Officer and Title:	Mohammad Hassenein, Manager, Environmental Monitoring Unit				

I. Summary Activities:

Activity	*Count*
Environmental Compliance Inspections*	0
Environmental Management Inspections**	0
Baseline and Background Data Collection	14
Management Recommendations Issued	0
Compliance Enforcement Notices Issued	0
Compliance Follow-up Inspections	0
Management Recommendations Follow-up	0

**** Inspections resulting in binding compliance notices requiring corrective action in accordance with contract or legal requirements. Follow-up inspections required.***

***** Inspection resulting in non-binding environmental management recommendations***

II. Locations Visited:

Location Name	**Facility Point of Contact**	**Affiliation**
South Safaga, mangrove		
North Quseir, mangrove		
El Sharrm el Bahry, mangrove		
El Sharm el Kebly, mangrove		
South of El Sharm el Kebly, mangrove		
Marsa Shagra, mangrove		
North Shams Alam, mangrove		
Delta Wadi al Jimal, mangrove		

	Sharm al Luliah, mangrove		
	South Abu Ghusun, mangrove		
	Qula'an, mangrove		
	Hamata, mangrove		
	Lahamy, mangrove		

III. Monthly Activity Summary Narrative:
During April, consultants delivered two reports containing environmental guidelines for inspection. These related to Mangroves and Power Generating Stations. On receipt of the mangrove report, EMU staff embarked on the inspection and baseline data development for the mangroves identified along the Red Sea Coast. Fourteen mangroves were evaluated and data are contained in the attachments to this report.
IV. Specific Problems Identified and Actions Taken:
None identified during this reporting period.

V. Attachments and Supporting Documentation
Attached completed survey forms for sites visited as noted in section II.

Reporting Officer Signature: _____
Eng. Mohammad Hassenein

Date: May 15, 2003

ATTACHMENTS FOR MONTHLY REPORT April 2003

COMPLETED
MANGROVE SURVEYS

Environmental Monitoring Unit

Monthly Report 3

For the period May 1 – May 31, 2003

Environmental Monitoring Unit, Tourism Development Authority
Monthly Activity Reporting Form

Report Number:	003			**Beginning**	**Ending**
Date:	June 15,2003		**Period Covered:**	May 1, 2003	May 31, 2003
Reporting Officer and Title:	Mohammad Hassenein, Manager, Environmental Monitoring Unit				

I. Summary Activities:

Activity	*Count*
Environmental Compliance Inspections*	17
Environmental Management Inspections**	0
Baseline and Background Data Collection	0
Management Recommendations Issued	0
Compliance Enforcement Notices Issued	0
Compliance Follow-up Inspections	0
Management Recommendations Follow-up	0

**** Inspections resulting in binding compliance notices requiring corrective action in accordance with contract or legal requirements. Follow-up inspections required.***

***** Inspection resulting in non-binding environmental management recommendations***

II. Locations Visited:

Location Name	Facility Point of Contact	Affiliation
Soma Bay, General Utilities	Eng. Hassan Bahagat	Chief Engineer
Sheraton, Soma Bay		
Oberoi, Sahal Hasheesh		
Steigenberger, El Gouna		
Baradisio, Elgouna		
Sheaton Miramar		

III. Monthly Activity Summary Narrative:
During the month of April, Consultants were engaged to develop guidelines for the measurement of emissions from boilers and generating stations, as well as indoor air quality and noise in the workplace measurements. These guidelines were delivered in may and a field program of inspection was conducted at the facilities noted in section II of this report. As the measurements made were compared to existing Egyptian law and standards, these inspections constituted Environmental Compliance Inspections, the first of their kind in the development of the TDA EMU. Noise, Emissions, and indoor air quality were examined and found to be in compliance with existing norms in all cases. 17 separate analysis were made at 6 facilities the results of which are presented in the attachment to this report.
IV. Specific Problems Identified and Actions Taken:
None identified during this reporting period.

V. Attachments and Supporting Documentation
Attached completed survey forms for sites visited as noted in section II.

Reporting Officer Signature:_____
Eng. Mohammad Hassenein

Date: ____June 15, 2003_____

ATTACHMENTS FOR MONTHLY REPORT MAY 2003

COMPLETED
AIR QUALITY AND NOISE EMISSIONS INSPECTIONS

Development of Environmental Monitoring Guidelines

for Mangrove distribution Sites

Assessment of mangrove status along the Red Sea development area and the potential environmental interactions associated with their growth sites

May, 2003

Background:

Mangrove forests are one of the wetland ecosystems having high importance in economy and ecology. Mangroves have been shown to create a sheltered environment for many immature forms of marine fauna, including commercially important species of fish, moulscus, and crustaceans, thereby creating an important ecological niche as the “the nurseries of the sea”. Traditional uses of mangroves are: firewood and charcoal; forage; medicine; purification of polluted water; and mangrove regions used as natural fish fry area. Also, the mangrove coasts are wonderful landscapes for tourism.

From Hurghada southward along the Red Sea coast the mangrove is a notable and common feature of the vegetation of the littoral landscape. *Avicennia marina* (Shora) grows in pure stands. The usual habitat of the mangrove is shallow water lagoons, bays, sharms, corals or sand bar parallel to the shore. In some localities *Avicennia marina* grows on the terrestrial side of the shore line e.g. delta of Wadi El-Jimal and Marsa Shagra. The bushes are either growing in salt marsh or partly covered by sand hillocks. This situation is apparently due to the silting of shore-line zone originally occupied by mangroves.

The ecology of mangroves along the Egyptian Red Sea coast was the subject of very few studies. This report updates our knowledge on the status of mangrove vegetation in the development areas (Hurghada – Hamata sector). The following objectives are considered: 1) identification of the mangrove status and the potential environmental problems associated with

mangrove sites e.g. grazing, trampling, cutting, etc., 2) providing an inventory of plant species associated mangroves e.g. seagrasses, macroalgae and halophytes, and 3) description of the distribution pattern, density, crown cover and height of mangrove species.

These results are useful in the development of monitoring data sheet to assess the effects of these activities on growth and productivity of mangrove species. This information will be used by TDA in the development of their environmental monitoring program.

Methods

The distribution and abundance status of fourteen mangrove sites along the Red Sea coast (Hurghada-Hamata) were recorded. The sites are presented using Latitude and Longitude obtained from GPS and stored in decimal format (i.e. degrees with minutes and seconds appended in their decimal form). The cover values of mangrove and the associated flowering plants, seagrasses and seaweeds were assessed in 10m x 10m quadrats using five points DAFOR-scale (Brodie 1985). Identification of species was according to Tackholm (1974) and Boulos (1995).

In each site, the height and canopy cover of 5 mangrove trees are recorded. Also, five branches were collected to study the morphological attributes in relation to a set of measured environmental factors. These attributes are: number of leaves, leaf area and number of fruits. The number of pneumatophores and the number juvenile plants were recorded in each site. Information on the phenology, regeneration, grazing, trampling and human impact are collected about each site.

A soil sample at depth 0-10 cm was taken from each stand dominated by *Avicennia marina*. Electrical conductivity of 1:5 soil extract (EC: mS/cm) was measured with a YSI Incorporated Model 33 Conductivity Meter. The extract reaction (pH) was determined using a combined pH Meter digital ion analyzer Model 5986-60 with a glass electrode. Organic matter was determined by the Walkely-Black method (Wilde et al., 1979).

Results

Fourteen sites of mangrove growth are recorded in the development areas (Hurghada – Hamata sector). Three of these sites are new records for the mangrove growth: 1) South Sharm El-Bahry (25 51 03 N, 34 25 30 E), 2) North Shams Alam 24 41 54 N, 35 05 13 E), and 3) Sharm Luliah (24 36 16N, 35 07 19E), where *Avicennia marina* grows on the terrestrial side of the shore line, and the bushes are either growing in salt marsh or partly covered by sand hillocks.

Table 1 shows the abundance status of *Avicennia marina* in the study sites. Four sites (1, 2, 5 &13) were dominated by *Avicennia marina* (cover > 75 %); six sites (3, 6, 9, 11, 12 & 14) showed abundant growth of mangrove (cover 50-75%); two sites showed frequent growth (cover <50 %); and the other two sites namely: Marsa Shagara and Sharm Luliah have few bushes of *Avicennia* with vegetative cover less than 10 %.

The associated species

Three groups of associated plants are recorded in the 14 study sites:

a. The flowering plants associated with mangrove in dry habitat are 11 species. These species are recorded with mangrove in dry habitat. *Zygophyllum album* is the most common associate (10 sites), followed by *Limonium axillare* (7 sites) and *Nitraria retusa* (4 sites).

b. Seagrass “bed or meadows” are grass-like flowering plants with extensive root system. Four species are recorded as an associated with mangrove in shallow water habitat. *Halodule uninervis* was recorded in 4 sites.

c. Seaweeds: The muddy substrate under mangle vegetation is not favorable habitat for algal growth, only a few species (e.g. *Enteromorpha compressa* and *Laurantia obtusa),* and mats attached to pneumatophores and the basis of the mangrove trees.

Habitat type

The development of mangle vegetation is found in the Red Sea coast of Egypt on saline mud deposited in the deltas of wadis, quiet bays and sharms where a relatively stable land surface have been developed. Mangles are also found on coral reef platforms in the lagoon like seawater. In the study area, *Avicennia marina* grows in eight sites of mud flats with shallow water (sharms and lagoons); and in six terrestrial sites of the shore line (Table 2). The mangrove bushes are highly developed in shallow water compared with the terrestrial habitat.

Mangrove height

The maximum height of *Avicennia* was recorded in mud flat habitat, at low soil salinity (4.1 meter south Sharm El-Kebly, 3.9 meter Lahmy). Stunted growth forms of mangroves are recorded in the salt marsh habitat and along the marginal zones of mud flat habitats (height is less than 1 meter), this may be attributed to the effect of soil salinity and camel grazing.

Mangrove density

The density of *Avicennia marina* in 10 x 10 m quadrats was low in salt marsh habitat ranging from 1 to 3 bushes (Marsa Shagra). Th number increases upto 15 individual trees and shrubs in mud flat habitat (Sharm Kebly and Sharm Bahry).

Crown cover

The crown cover of mature *Avicennia* varied greatly according the habitat. Generally, salt marsh and sand dunes sites (Marsa Shagara and North Shams Alam) are covered by widely spaced mangrove plants with crown cover ranged from 1.3 to 2.7 m^2 per individual. The mud flat sites (South Safaga, South Abu Ghsun, Hamata, etc) have extensive growth of mangrove. The crown cover ranged from 1.3 to 32.9 m^2 per individual. A huge mangrove bush was recorded in Sharm Luliah with crown cover 88 m^2.

Leaf number

There was a relatively lower number of leaves in stressed sites (Marsa Shagra, 6-13 per branch), compared with mud flat sites (Sharm El-Bahry, 17-24 per branch).

Fruit number

The number of fruits was relatively high in less disturbed sites. The highest number of fruits per branch (8-14) was recorded in Site 1 (south Safaga). The mangrove growing in salt marsh habitat showed no fruits or very few fruits 1 or 3 per bush (delta of Wadi el-Jimal).

Regeneration

The regeneration of mangrove was recorded in 4 sites namely: South Safaga, North Quseir, Sharn Bahry and Sharm kebly. The number of juveniles ranged from 4 to 12 per square meter. No seedlings or juveniles are recorded in salt marsh and sand dune habitat. The physical environment seems to affect the regeneration of mangrove in the study area.

Environmental Impacts

Damages and Grazing

Human impacts were identified and qualitatively assessed. Overutilization of mangroves by wood cutting and livestock grazing are abundant in the sites south Marsa Alam. Intense grazing was recorded in Lahmy, Hamata, and Wadi El-Jimal. Trampling and grazing make stunted growth form of mangrove due to the destruction of respiratory roots and the reduction of vegetative growth (Table 2).

Soil characteristics

a. Soil Salinity: The electrical conductivity (EC) of 1:5 soil extract ranged from 4.4 mmohs/cm (Sharm El-Kebly) to 32.5 mmohs/cm (Marsa Shagra).

b. Soil reaction: The soil reaction of the soil samples collected from the studied mangrove sites was slightly acidic to neutral. It varied from 6.51 (Marsa Shagra) to 7.81 (the delta of Wadi Lahmy).

c. Soil organic matter: The percentage of organic matter in the mangrove soil showed a wide range of variation. It varied from 0.2 % (North Quseir) to 2.6% (Marsa Shagra).

Recommendations

1. There are significant differences in the size and health of the surveyed mangrove and its biodiversity. Furthermore, it is important to monitor the mangrove growth as well as the environmental changes along the Red Sea coast.
2. Monitoring the gradual changes of mangrove areas using geographical information system (GIS) techniques.
3. Tagging individuals for continuous monitoring of survival, growth and associated physical factors like salinity and soil characteristics of naturally dispersed propagules in and out tree fall gaps and various distances from the shore.
4. A large scale plantation of mangroves in the damaged sites e.g. Marsa Shagra is an immediate need.

Monitoring of the natural mangrove growth

This report presents information on the May 2003 field survey of the mangrove distribution and status in the development areas along the Red Sea coast (Sector from Hurghada to Hamata). It is also, to select long term monitoring sites. These monitoring sites will be monitored to determine the extent and cause of natural variation (e.g. inter-annual variability) of key ecological attributes.

Monitoring is a system of repeated investigation of defining biological processes to detect changes over time. It is essential to detect the health of mangrove and its environment and to gain an understanding of factors which influence the stability of mangrove along the coast.

It also includes an investigation of the gain in species richness under certain circumstances such as the faunistic and floristic recruitment of species new to a monospecific natural mangrove stand.

Procedures

A-Site selection:

Two sites are selected for monitoring *Avicennia marina*:

- Site 1 is El-Sharm El-Bahry (25 52 08N, 34 25 30E), the mangrove is growing in water and mud flat soil. The site is not disturbed, the plant are healthy and many juveniles are growing.

- Site 2 is Ras Baghdady (the delta of wadi El-Jimal, 24 40 47N, 35 05 06E). The mangrove is growing landward on salt marsh and is forming sand hillocks along the shore. The site is subjected to heavy grazing and human activities. No regeneration recorded.

B- Tools used for assessment:

1. Measuring density in permanent quadrats from water zone to landward zone (Site 1).
2. Measuring canopy cover of individuals growing landward
3. Measuring species composition.
4. Calculation of species diversity.

C- Estimation of reproductive success:

Procedures

1. Tagging 10 branches on 5 individuals using plastic threads.
2. Counting the number of flower buds per branch per month.
3. Counting the number of flower per branch per month.
4. Counting the number of fruits per branch per month.
5. Determine litter fall gram per meter per month.

Calculations

% of flower success = {(no. of flowers/∑no.of buds+no. of flowers+no. of fruits)}x100

% of fruit success = {(no. of fruits/∑no. fls.+no. of frs.)}x100

References

Boulos, L. 1995. Flora of Egypt, checklist. Al Hadara Publishing, Cairo, Egypt. 283 pp.

Brodie, J. 1985. Practical Ecology Series. Grassland Studies. George Allen & Unwin (Publishers) Ltd. 100 pp.

Täckholm, V., 1974. Students Flora of Egypt. Cairo Univ. Cairo, 888 pp.

Wilde, S.A., Corey, R.B., Iyer, J.G. and Voigt, G.K., 1979. Soil and Plant Analysis for tree culture. 5th ed. Oxford and IBH publishing Co., 224 pp.

Appendices

Appendix 1: Monitoring data sheet

REPORT ON
ENVIRONMENTAL MEASUREMENTS
FOR BOILERS AND POWER GENERATING STATIONS AT SELECTED TDA INVESTOR OPERATIONS ALONG THE RED SEA

For the period May 15 – 18, 2003

May 2003

Executive Summary

This report is to exhibit the results and analysis of the environmental measurements conducted on the period 15 – 18/5/2003 at the Red Sea area (Hurghada). These environmental activities reflect part of continuous practices being followed by Red Sea Sustainable Tourism Initiative (RSSTI). The measurements also show to what extent the managements of the evaluated facilities are committed to the Egyptian and globe clean environment.

The report covers six hotels and resort facilities, they are:

- Soma Bay Central Utilities
- Sheraton (Soma Bay)
- Oberoi Sahl Hasheesh (South Magaweesh)
- Steigenberger (El-Gouna)
- LTI Paradisio (El-Gouna)
- Sheraton Miramar (El-Gouna)

The measurements and their repeats in this report are as follows:

Property	Conducted Measurements			
	Emissions from Boiler Stack	Emissions from Generator Stack	Indoor Air Quality	Noise level
Soma Bay Central Utilities				X
Sheraton Soma Bay	XX		X	X
Oberoi Sahl Hasheesh	XX	X	X	X
Steigenberger (El-Gouna)	X			X
Paradisio (El-Gouna)	X			X
Miramar (El-Gouna)	X		X	X

Exhaust Gas Analysis

The exhaust gas analysis is to examine the compliance of the emissions with the environmental law. Article No. 42-c and annex No. 6 of the executive statutes of the Egyptian law 4/1994 on environment concern the maximum permissible limits for emissions from sources of fuel burning. The pollutants under consideration here are carbon monoxide, sulfur dioxide, nitrogen oxides, and smoke (soot).

On 14/4/2001, article No. 42-c was modified through the Prime Minister Decree No. 495/2001 to suit the proper technical and environmental operations in boilers. The following table indicates the environmental limits for emissions from boilers and power generation units.

Maximum Permissible Limits for Pollutants when Burning Fuels in Boilers and Power Generation Units

Parameter	Units	Maximum Permissible Limits from Boilers (Decree 495/2001)	Maximum Permissible Limits from Power Generation Units	
			Existing	New
Carbon monoxide	mg/m^3	250	4000	2500
Sulfur dioxide	mg/m^3	3400	4000	2500
Nitrogen oxides	mg/m^3	300	300	300
Soot	mg/m^3	50	250	250

Indoor Air Quality

The indoor air quality measurements are to examine the levels of some parameters that affect, directly, the safety and comfort of the workers, staff, and personnel within the working areas.

The measured parameters when evaluating the indoor air quality are:

- Heat stress,
- Respirable paticulate matters (PM10), and
- Concentration of volatile organic compounds VOC's (if any).

Heat stress

The heat stress gives idea about the combined effect of temperature and relative humidity in view of the surrounding air speed (ventilation effect). The permissible levels of heat stress, as given by the executive statutes of the environmental law, are related also to the nature of work being hard (such as labor work) or mild such as office work. They also depend on the percentage of rest time in comparison with the work time. For medium-hard work with 25% rest time, the heat stress is 28 °C. Annex No. 9 gives more details about permissible levels of heat stress as follows.

Nature of work and resting time	Mild work	Medium work	Hard work
Continuous work	30.00 °C	27.80 °C	25.80 °C
75% work, 25% rest	30.58 °C	28.80 °C	26.80 °C
50% work, 50% rest	31.58 °C	29.58 °C	28.80 °C
25% work, 75% rest	32.80 °C	31.80 °C	30.80 °C

Respirable paticulate matters (PM10)

The particulates that have been measured and recorded are those having sizes equal to or below 10 μm. This size has received more importance in the executive statutes of the

environmental law and is referred to as “the Respirable Particles”. This is due to the fact that hairs at the front of the nose remove all particles over 10 μm, therefore, they are not jeopardous to the respiratory system. The executive statutes of the environmental law, annex No. 8, stated that the upper-ceiling limit for the inhalable total particulates in the work place is 5 mg/m^3. However, in the open air (outdoor quality) the limit is 70 $\mu g/m^3$.

Volatile Organic Comounds (VOC's)

Volatile Organic Comounds (VOC's) are known for their jeopardizing effect on respiratory system when they are inhaled with high concentration and on skin when they are often handled.

Regarding the tourism sector and in some places, such as in laundry area, workforce can be exposed to some VOC's especially when some organic cleaning agents, solvents, and detergents are used. For instance, in the majority of dry cleaning machines, it was found that tetrachloroethylene (perchloroethylene) is used as cleaning agents.

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products. Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels. When bringing clothes from the dry cleaners, they release small amounts of tetrachloroethylene into the air; by this way a laundryman can be exposed to tetrachloroethylene.

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Irritation may also result from repeated or extended skin contact with it. These symptoms occur almost entirely in work environments when people have been accidentally exposed to high concentrations of this organic compund.

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known. Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethylene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

For the aforementioned reasons, the concentration of these agents are to be measured within the laundry area to look into their levels and to take enough measures. For employees, they must be warned against tetrachloroethylene and forced to wear musks, and for managements, they must be advised to provide the dry clean area with good ventlation system.

It is worth noting that the threshold limits, according to law 4/1994, for exposing to tetrachloroethylene are as follows:

Continuous exposure for 8 hours a day five days a week	5 ppm
Exposure for a short time of only 15 minutes (not repeated for 4 times during the same day; the period between each short time must be at least 60 minutes.	10 ppm

Noise level

The permissible noise levels, as given by the executive statutes of the environmental law, are related to the exposing time. For an 8-hour shift, the permissible limit of noise levels is 90 dB. Annex No. 7 gives relation between noise levels and corresponding exposing time as follows.

Exposing time (hr)	8	4	2	1	½	¼
Permissible noise-level (dB)	90	95	100	105	110	115

The following table is also to show the maximum permissible noise levels inside places of productive activities.

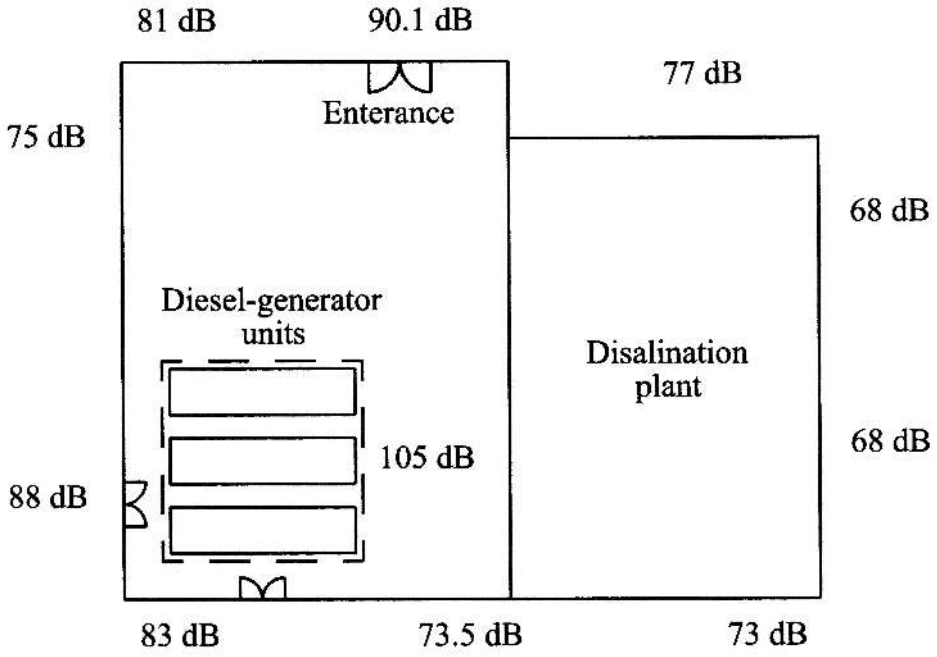
Type of place and activity	Maximum permissible noise level (dB)
Work place (factories and workshops) with up to 8-hour shift and aiming to limit noise hazards on sense of hearing	90
Work place where acoustic signal and good audibility are required	80
Work place for the follow up, measurement and adjustment of high performance operations	65
Work rooms for computers, typewriters or similar equipment	70
Work rooms for activities requiring routine mental concentration	60

RESULTS AND ANALYSIS

The results of the conducted measurements and their analysis at the six different tourism facilities are displayed in the following subsections.

1) Soma Bay Central Utilities

In this location, the could not access the stacks, consequently, could not measure the emission levels from the three diesel-generator units. On the other hand, the team could measure and record the noise levels in the area surrounding the central diesel-generator plant. The noise levels are schematically plotted in the following figure.



The area surrounding the centeral utility plant is not a residential or inhabited area, therefore, there are no environmental limits for noise pollution. Inside the plant itself, as long as the noise level is 105 dB, it is allowed for the technicians to stay only for 1-hour period for the maintenance purposes.

Inside the administration building the noise levels were recorded as follows:

In the hall: 71.0 – 72.5 dB.

Inside the offices: 66.0 – 70.0 dB.

It is advisable to refer to the maximum permissible noise levels for compliance.

2) Sheraton (Soma Bay)

In Sheraton (Soma Bay) hotel, two fire-tube boilers were environmentally evaluated. Moreover, indoor air quality (heat stress, PM10, and concentration of VOC's) and noise level were measured within the laundry area. The noise level was also measured inside the most noisy management office. The results and their analysis are as follows.

The two steam boilers have the following data:

First boiler (water heater) 45 hp

Type:	Fire-tube
Capacity:	45 hp
Manufacturer:	KEWANEE (ILLINOIS)
Serial No.:	KW 4.0 – 166 – GO
Heating surfaces:	166 ft^2
Burner:	Gas/Oil (Dual) burner manufactured by KEWANEE
Water pressure:	60 psig

Second boiler (water heater) 168.7 hp

Type:	Fire-tube
Capacity:	168.7 hp
Manufacturer:	KEWANEE (ILLINOIS)
Serial No.:	KW 4.0 – 619 – GO
Heating surfaces:	619 ft^2
Burner:	Gas/Oil (Dual) burner manufactured by KEWANEE
Water pressure:	60 psig

Results of the Exhaust Gas Analysis in the Stack of the 45-hp Boiler (Water Heater)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	28	250
Sulfur dioxide	mg/m^3	543	3400
Nitrogen oxides	mg/m^3	98	300
Soot	mg/m^3	10	50
Oxygen	%	12.85	—
Gas temperature	°C	184	—

2) Sheraton (Soma Bay) - Continued

Results of the Exhaust Gas Analysis in the Stack of the 168.7-hp Boiler (Water Heater)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	29	250
Sulfur dioxide	mg/m^3	792	3400
Nitrogen oxides	mg/m^3	155	300
Soot	mg/m^3	15	50
Oxygen	%	8.45	—
Gas temperature	°C	210	—

Carbon monoxide, sulfur dioxide, and nitrogen oxides were measured in ppm; however, they were recorded in mg/m^3 to ease the comparison with the permissible environmental limits.

Heat stress

Heat stress was measured within the laundry and found = 28.12 °C.

If this value is judged against the permissible level of heat stress, considering medium work with 75% work, 25% rest, then the case is marginal and the place needs better ventilation.

Respirable paticulate matters (PM10)

PM10 was measured within the laundry and found = 0.035 mg/m^3, which is very much complying.

Volatile Organic Comounds (VOC's)

The concentration of tetrachloroethylene was measured when the laundryman just opens the door of the dry clean machine (in the vicinity of the door) and within the laundry area. The results are as follows:

Just in the vicinity of the door when the door was opened	12 ppm
Within the laundry area	5 ppm

Noise level

The noise level was measured in the laundry area and inside one of the offices. The results are as follows:

In the laundry area	69 dB
Inside one of the offices	60 dB

3) Oberoi Sahl Hasheesh (South Magaweesh)

In Oberoi Sahl Hasheesh (South Magaweesh) resort, two fire-tube boilers were environmentally evaluated. Moreover, indoor air quality (heat stress, PM10, and concentration of VOC's) and noise level were measured within the laundry area. The noise level was also measured inside the most noisy management office. The results and their analysis are as follows.

The two steam boilers are identical, their data are:

Type:	Fire-tube
Capacity:	2 Ton/hr steam @ operating pressure of 10.4 bar
Manufacturer:	Cochran (Wee Chieftain) England
Design Cod:	BS2790 – Class 1
Burner:	Solar fuel burner manufactured by Cochran (England)
Burner rating:	To supply heat release enough to produce 2240 kg steam per hour
Controlling signal:	Steam presuure (at the adjusted adjusted operating pressure)

Results of the Exhaust Gas Analysis in the Stack of Boiler #1 (2-Ton/hr)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	25	250
Sulfur dioxide	mg/m^3	921	3400
Nitrogen oxides	mg/m^3	104	300
Soot	mg/m^3	20	50
Oxygen	%	3.64	—
Gas temperature	°C	182	—

Results of the Exhaust Gas Analysis in the Stack of the Boiler #2 (2-Ton/hr)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	29	250
Sulfur dioxide	mg/m^3	1089	3400
Nitrogen oxides	mg/m^3	125	300
Soot	mg/m^3	20	50
Oxygen	%	3.28	—
Gas temperature	°C	176	—

3) Oberoi Sahl Hasheesh (South Magaweesh) - Continued

Results of the Exhaust Gas Analysis in the Stack of the Diesel-Generator Unit (No load operation)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	270	2500
Sulfur dioxide	mg/m^3	154	2500
Soot	mg/m^3	10	250
Oxygen	%	18.37	—
Gas temperature	°C	173	—

Carbon monoxide, sulfur dioxide, and nitrogen oxides were measured in ppm; however, they were recorded in mg/m^3 to ease the comparison with the permissible environmental limits.

When evaluated, the diesel-generator unit was operating under no-load condition.

Heat stress

Heat stress was measured within the laundry and found = 27.4 °C.

If this value is judged against the permissible level of heat stress, considering medium work with 75% work, 25% rest, then the case is complying.

Respirable paticulate matters (PM10)

PM10 was measured within the laundry and found = 0.063 mg/m^3, which is complying.

Volatile Organic Comounds (VOC's)

The concentration of tetrachloroethylene was measured when the laundryman just opens the door of the dry clean machine (in the vicinity of the door) and within the laundry area. The results are as follows:

Just in the vicinity of the door when the door was opened	14 ppm
Within the laundry area	3 ppm

Noise level

The noise level was measured inside two different suites, namely 504 and 505. The two suites are in the nearby to the water treatment plant. The results are as follows:

Suite 504	54 dB
Suite 505	53 dB

4) Steigenberger (El-Gouna)

In Steigenberger (El-Gouna) hotel, one fire-tube boiler (water heater) was environmentally evaluated. The noise levels were recorded near boiler house and in the vicinity of the pool pumps and fire pump. The results and their analysis are as follows.

The boiler (water heater) data are:

Boiler No.:	102/1
Type:	Fire-tube
Capacity:	equivalent to ½ Ton/hr steam
Manufacturer:	Hartley & Sugden (West Yorkshire England)
Burner:	Solar fuel burner manufactured by Nu Way (England)
Controlling signal:	Circulating water temperature (adjusted at 80 °C)

Results of the Exhaust Gas Analysis in the Stack of Boiler #102/1

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	58	250
Sulfur dioxide	mg/m^3	1244	3400
Nitrogen oxides	mg/m^3	209	300
Soot	mg/m^3	25	50
Oxygen	%	6.29	—
Gas temperature	°C	321	—

Carbon monoxide, sulfur dioxide, and nitrogen oxides were measured in ppm; however, they were recorded in mg/m^3 to ease the comparison with the permissible environmental limits.

The heating surfaces of this boiler need cleaning from the gas-side (inside of the tubes). This will enhance the heat transfer from flame and hot gases to the heated water, consequently, the temperature of the exhaust gases will drop to the normal temperature (≈ 180 – 200 °C). The boiler efficiency will be also increased by almost 5%.

Noise level

The noise levels were also measured near boiler house and in the vicinity of the pool pumps and fire pump. The results are as follows:

Near boiler house	77 dB
In the vicinity of the pool pumps	74 dB
In the vicinity of the fire pump	72 dB

5) LTI Paradisio (El-Gouna)

In Steigenberger (El-Gouna) hotel, one vertical fire-tube boiler (water heater) was environmentally evaluated. The noise levels were measured inside some guest rooms (indoor and outdoor, with and without airconditioning running) The noise levels were also measured inside offices in the neighborhood of the WWTP. The results and their analysis are as follows.

The boiler (water heater) data are:

Boiler type:	Vertical fire-tube 2-pass water heater
Capacity:	equivalent to 1 Ton/hr steam
Burner:	Solar (light oil) fuel burner
Controlling signal:	Circulating water temperature (adjusted at 70 °C)

Results of the Exhaust Gas Analysis in the Stack of Boiler (Water heater)

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	38	250
Sulfur dioxide	mg/m^3	1192	3400
Nitrogen oxides	mg/m^3	150	300
Soot	mg/m^3	10	50
Oxygen	%	6.46	—
Gas temperature	°C	325	—

Carbon monoxide, sulfur dioxide, and nitrogen oxides were measured in ppm; however, they were recorded in mg/m^3 to ease the comparison with the permissible environmental limits.

The heating surfaces of this boiler need cleaning from the gas-side (inside of the tubes). This will enhance the heat transfer from flame and hot gases to the heated water, consequently, the temperature of the exhaust gases will drop to the normal temperature (≈ 180 – 200 °C). The boiler efficiency will be also increased by almost 5%.

Noise level

The noise levels were measured at different places, which thought to be closer to sources of noise. The results are as follows:

Outdoor of guest room # 118	50 – 65 dB
Indoor of guest room # 215 with A/C put off	38 dB
Indoor of guest room # 215 with A/C put on	54 dB
Outdoor of offices near WWTP	65 – 71 dB
Indoor of offices near WWTP, A/C put on	55 dB
Indoor of offices near WWTP, A/C put off	44 dB

6) Sheraton Miramar (El-Gouna)

In Sheraton Miramar (El-Gouna) hotel and resort, one (out of two) fire-tube boiler was environmentally evaluated. Indoor air quality (heat stress, PM10, and concentration of VOC's) and noise levels were also evaluated in different areas and places of activities. The results are as follows.

When evaluation procedure started, the exhaust gas analysis showed that the boiler was environmentally non-complying. After slight tune up process the boiler has become marginally complying. However, from the technical point of view and to restore its efficiency, and conceivably the second one, the boiler needs to be more tuned up.

Results of the Exhaust Gas Analysis in the Stack of the Boiler

Parameter	Units	Measured Values	Permissible Environmental Limits
Carbon monoxide	mg/m^3	243	250
Sulfur dioxide	mg/m^3	1169	3400
Nitrogen oxides	mg/m^3	122	300
Soot	mg/m^3	30	50
Oxygen	%	10.83	—
Gas temperature	°C	97	—

Carbon monoxide, sulfur dioxide, and nitrogen oxides were measured in ppm; however, they were recorded in mg/m^3 to ease the comparison with the permissible environmental limits.

Heat stress

Heat stress was measured within the laundry and found = 26.6 °C.

If this value is judged against the permissible level of heat stress, considering medium work with 75% work, 25% rest, then the case is complying.

Respirable paticulate matters (PM10)

PM10 was measured within the laundry and found = 0.040 mg/m^3, which is very much complying.

Volatile Organic Comounds (VOC's)

The concentration of tetrachloroethylene (perchloroethylene) was measured within the laundry area when the door of the dry clean machine was opened; the concentration of the tetrachloroethylene was found = 4 ppm.

The concentration of the tetrachloroethylene (perchloroethylene) was measured within the chemical store (the container was sealed) and found = 1.5 ppm

6) Sheraton Miramar (El-Gouna) – Continued

In the workshop, and in view of the wood painting activities and the likely existance of solvents vapor, different VOC's were measured in the surrounding air. Those organic vapors are usually dispersing in the air and inhaled by the technicians. The obtained results are as follows:

Parameter	Permissible Environmental Limits (ppm)	Location	Measured values (ppm)
Acetone	750	Close to the technician	108
		Allover the place	64
Formaldehydes	2	Close to the technician	10 *
		Allover the place	0.2
Iso-Propyl-alcohol	400	Close to the technician	134
		Allover the place	117
Methyl-ethyl-ketone	200	Close to the technician	161
		Allover the place	156

* The results show that all the measured values are complying (safety and environmental wise) except for one value for formaldehydes, which is higher than the safe value. The location of this high value is in the vicinity of the technician. The good point is the technician was wearing musk while he was painting.

It is worthy to spread some light on the formaldehyde and its health effect.

Aldehydes are organic compounds containing the group —CHO attached to a hydrocarbon. As air pollutants, a number of them have an unpleasant smell and can be irritant to nose and eyes; many can be poisonous.

Formaldehyde, (H—CHO), is the simplest for of aldehydesm, having a disagreeable odor and is suspected carcinogen. When formaldehyde is subjected to a warm atmosphere (or sunlight) in the presence of an oxidizer e.g. air with the reaction aided by bacteria), it forms formic acid (H—COOH). The formic acid is known to be highly irritant and poisonous even in small concentration. As a 40% solution in water called formalin, formaldehyde is used as preservative for biological specimens.

Conclusively, it is advisable for all workers in the area to keep wearing the protection musks while in the working area.

6) Sheraton Miramar (El-Gouna) – Continued

Noise level

The noise level was in different areas and places of activities. The results are as follows:

Inside the staff cafeteria (almost no occupancy)	64 dB
Reception area (lobby)	66 dB
Laundry area	64.9 dB
Workshop (Carpentry and woodwork area)	72 dB
Workshop (Chief office)	59 dB

SAMPLES OF UNITS
SURVEYS

EMU Utility Survey: Marinas

Property Name:	Hurghada Hills	**Date of Survey**	3/19/2003	**Surveyor**	Khaled&Amro

Marina Location:	**GPS File Reference Number**	**Coordinate Location Latitude**	**Coordinate Location Longitude**	**Datum**
	31912A	27º 04' 18"	33º 53' 25"	WGS84

Marina Facilities:	**Accomodations**	
1	Number of Berths	
2	Maximum Vessel length (meters)	
3	Sanitary Waste Collection	
4	Fresh Water	
5	Electric power hookups	
6	Telephone Communications	
7	Emergency Medical	
8	Light maintenance Facilities	
9	Heavy Maintenance Facilities	
10	Launching Ramp	
11	Boat Lift	
12	Diesel Fuel	
13	Gasoline	

14	Overnight stays permitted	
15	Food Service	
16	Customs clearence	
17	Diesel Fuel Pumps	
18	Gasoline Fuel Pumps	
19	Spill Control Facilities	

Marina Fuel Storage Tanks		Fuel Type	Storage Tank Capacity (Liters)	Tank Type (above ground (AG) Below Ground (BG))	GPS File Reference Number	Coordinate Location Latitude	Coordinate Location Longitude	Datum
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							

SYSTAMP	RECNUM	WORKSHEET	PROPNAME	DATESURV	SURVEYOR
6/24/2024 11:23	1	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	2	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	3	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	4	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	5	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	6	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	7	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	8	1	Hurghada Hills	0	Khaled&Amro
6/24/2024 11:23	9	2	Egyptian Engineers	0	Khaled&Amro
6/24/2024 11:23	10	2	Egyptian Engineers	0	Khaled&Amro
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6/24/2024 11:23	27	4	Goled Five	0	Khaled&Amro
6/24/2024 11:23	28	4	Goled Five	0	Khaled&Amro
6/24/2024 11:23	29	4	Goled Five	0	Khaled&Amro
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6/24/2024 11:23	31	4	Goled Five	0	Khaled&Amro
6/24/2024 11:23	32	4	Goled Five	0	Khaled&Amro
6/24/2024 11:23	33	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	34	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	35	5	Reemyvera Hotel	0	Khaled&Amro
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6/24/2024 11:23	37	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	38	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	39	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	40	5	Reemyvera Hotel	0	Khaled&Amro
6/24/2024 11:23	41	6	Lillyland	0	Khaled&Amro
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6/24/2024 11:23	48	6	Lillyland	0	Khaled&Amro
6/24/2024 11:23	49	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	50	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	51	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	52	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	53	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	54	7	Desert Rose	0	Khaled&Amro
6/24/2024 11:23	55	7	Desert Rose	0	Khaled&Amro

6/24/2024 11:23	56	7	Desert Rose	0	Khaled&Amro	
6/24/2024 11:23	57	8	Conrad	0	Khaled&Amro	
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6/24/2024 11:23	59	8	Conrad	0	Khaled&Amro	
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6/24/2024 11:23	64	8	Conrad	0	Khaled&Amro	
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6/24/2024 11:23	66	9	Jasmin Village	0	Khaled&Amro	
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6/24/2024 11:23	68	9	Jasmin Village	0	Khaled&Amro	
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6/24/2024 11:23	152	19	0	0	0
6/24/2024 11:23	153	20	0	0	0
6/24/2024 11:23	154	20	0	0	0
6/24/2024 11:23	155	20	0	0	0
6/24/2024 11:23	156	20	0	0	0
6/24/2024 11:23	157	20	0	0	0
6/24/2024 11:23	158	20	0	0	0
6/24/2024 11:23	159	20	0	0	0
6/24/2024 11:23	160	20	0	0	0

MRNAGPS	MRNALAT	MRNALONG	MRNADATUM	NUMBRTH	MAXVESL	SANWSTE	FRSWA
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
31912A	27º 04' 18"	33º 53' 25"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32010A	27º 05' 12"	33º 51' 52"	WGS84	0	0	0	0
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32012A	27º 05' 25"	33º 51' 21"	WGS84	6	0	√	√
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32014A	27º 06' 05"	33º 50' 31"	WGS84	30	0	0	0
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32208A	27º 05' 53"	33º 50' 58"	WGS84	13	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32211A	27º 05' 55"	33º 50' 49"	WGS84	3	0	0	√
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0

32212A	27º 06' 11"	33º 50' 18"	WGS84	0	0	0	0
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32214A	27º 06' 15"	33º 49' 57"	WGS84	5	12m	0	√
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
32310A	27º 06' 26"	33º 41' 58"	WGS84	9	0	0	0
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PWRHK	TELEP	MEDICL	LTMTNC	HVMTNC	LCHRMP	BOTLFT	DIESLFL	OVENITE	FODSVC
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220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
220-380 K.W	√	0	√	0	0	0	0	0	0
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√	0	0	0	0	0	0	0	√	0
√	0	0	0	0	0	0	0	√	0
√	0	0	0	0	0	0	0	√	0
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	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
	0	√		0	0	0	0	0	0	0	0
√			0	0	0	0	0	0	0	0	0
√			0	0	0	0	0	0	0	0	0
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CUSCLRN	DIESPMP	BENZPMP	SPCFAC	MTNKC	FUELTYP	MTKCAP	MTKCFG	MTKGPS
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0	0	0	0	4	0	0	0	0
0	0	0	0	5	0	0	0	0
0	0	0	0	6	0	0	0	0
0	0	0	0	7	0	0	0	0
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0	0	0	0	2	0	0	0	0
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0	0	0	0	2	0	0	0	0
0	0	0	0	3	0	0	0	0
0	0	0	0	4	0	0	0	0
0	0	0	0	5	0	0	0	0
0	0	0	0	6	0	0	0	0
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mrlong2	mrlong3
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41	58
41	58
41	58
41	58
41	58

Variable Name	Form Name	Description
SYSTAMP	Not on form	Internal date and time stamp, not on form
RECNUM	Not on form	Internal sequence record number, not on form
WORKSHEET	Not on form	Internal worksheet number for data verification and troubleshooting, not on form
PROPNAME	Property Name	Name of the individual property where facility is located.
DATESURV	Date of Survey	Date survey was completed.
SURVEYOR	Surveyor	Names of the surveying officials.
MRNAGPS	GPS File Reference Number	GPS internal file number containing the position information for the location of the Power Plant (may have multiple generators).
MRNALAT	Coordinate Location Latitude	Latitude location of the power plant.
MRNALONG	Coordinate Location Longitude	Longititude location of the power plant.
MRNADATUM	Datum	Reference datum for location of the power plant.
NUMBRTH	Number of Berths	Count number of slips or berths.
MAXVESL	Maximum Vessel length (meters)	Maximum size vessel facility can accommodate.
SANWSTE	Sanitary Waste Collection	Are there facilities to discharge sanitary wastes.
FRSWA	Fresh Water	Freshwater available for vessels (true/false).
PWRHK	Electric power hookups	Electric power available for vessels.
TELEP	Telephone Communications	Telephone available for marina use.
MEDICL	Emergency Medical	Emergency medical services available within 30 minutes of marina.
LTMTNC	Light maintenance Facilities	Marina has light boat maintenance facilities (minor repairs, tune-ups etc).
HVMTNC	Heavy Maintenance Facilities	Marina has heavy boat maintenance facilities (major hull repairs, engine overhaul, major unit replacements such as engine, drive units etc.
LCHRMP	Launching Ramp	Launching ramp available
BOTLFT	Boat Lift	Boat lift available.
DIESLFL	Diesel Fuel	Diesel fuel available.
OVENITE	Overnight stays permitted	Overnight stays at slips permitted.
FODSVC	Food Service	Food service available to marina guests.
CUSCLRN	Customs clearence	Egyptian National immigration and customs clearence facility.
DIESPMP	Diesel Fuel Pumps	Number of diesel fuel pumps available for vessels.
BENZPMP	Gasoline Fuel Pumps	Number of gasoline pumps available for vessels.
SPCFAC	Spill Control Facilities	Marina has spill control equipment for oil, fuel spills.
MTNKC	Marina Fuel Storage Tanks	Storage tank number 1-8 as listed on form.
FUELTYP	Fuel Type	Fuel type diesel or gasoline
MTKCAP	Storage Tank Capacity (Liters)	Storage tank capacity (liters).

MTKCFG	Tank Type (above ground (AG) Below Ground (BG) elevated (EL))	Tank configuration (above ground - AG, Below Ground - BG, Elevated - EL)
MTKGPS	GPS File Reference Number	GPS internal file number containing the position information for the location of the storage tank.
MTKLAT	Coordinate Location Latitude	Latitude location of the fuel storage tank.
MTKLONG	Coordinate Location Longitude	Longititude location of the fuel storage tank.
MTKDATM	Datum	Reference datum for location of the fuel storage tank.

Variable type	Units
Generated from Excell NOW() function.	
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integer	
text	
date	
text	
text	
text	deg min sec
text	deg min sec
text	
integer	
meters	
logical	
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logical	
logical	
logical	
logical	
logical	
logical	
logical	
logical	
logical	
logical	
logical	
logical	
text	
text	
real	liters

text

text

text deg min sec

text deg min sec

text