UC Limited

BULK CEMENT Storage Terminal

Laboratory Wharf, Kordin

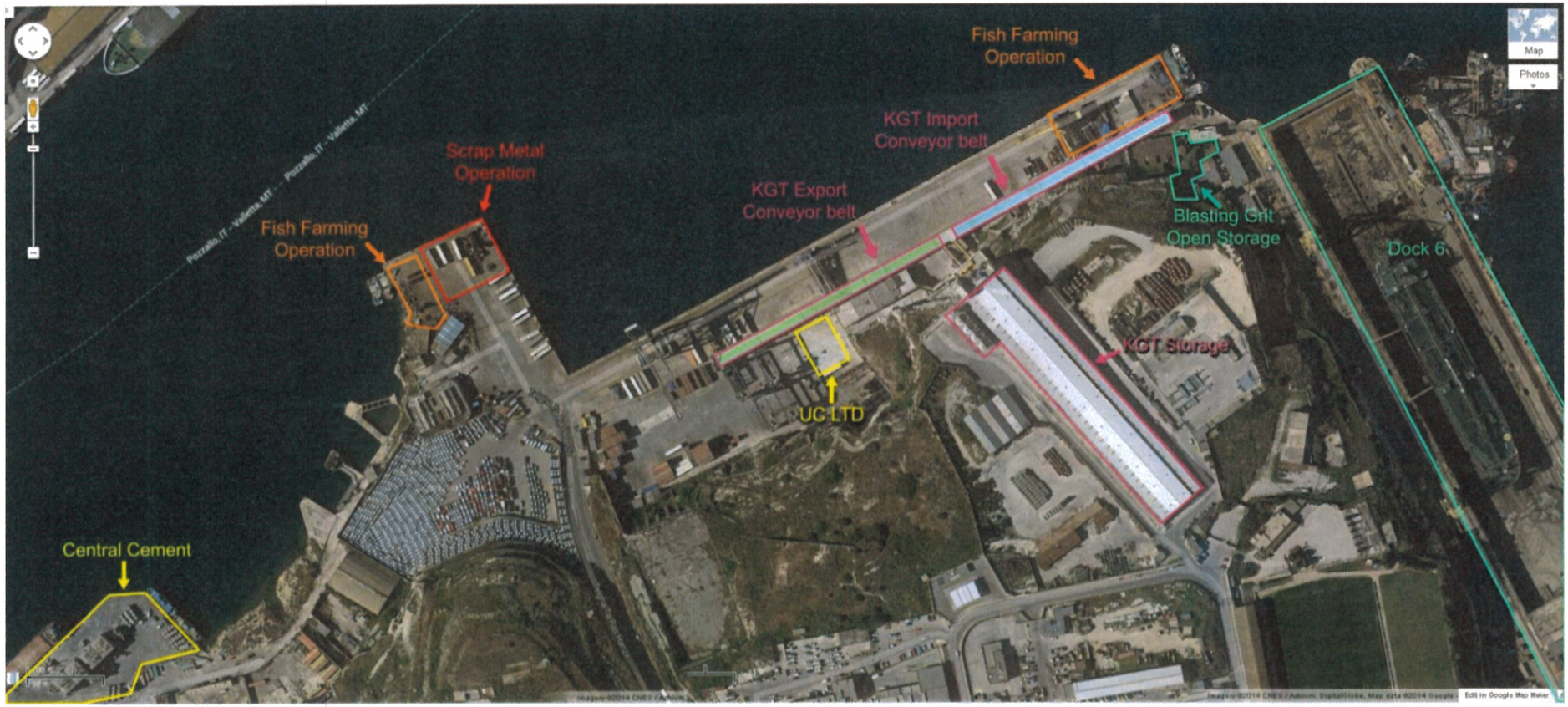
Dok. 14

Contents

- **Overview of the Location & the Surrounding Operations**
- **Timeline of Events** (MEPA permits, prohibitory injunctions etc.)
- **Studies / Risk Assessments**
- **Continuous Emissions Monitoring**

Location & Surrounding Operations

- Laboratory Wharf, Kordin



Port Environment

A number of port activities have been carried out for decades, (some of which include):

- *Various cargo & passenger vessels calling to port*
- *Other cement handling operations*
- *Grain handling*
- *RORO Cargo*
- *Scrap metal handling for export*
- *Grit blasting & spray painting at Palumbo dock 6*
- *Marsa power station*
- *Fish farming operations*

Various Cargo & Passenger Vessels Calling To Port

Cement Handling Operations (Central Cement / Intercement Ltd)

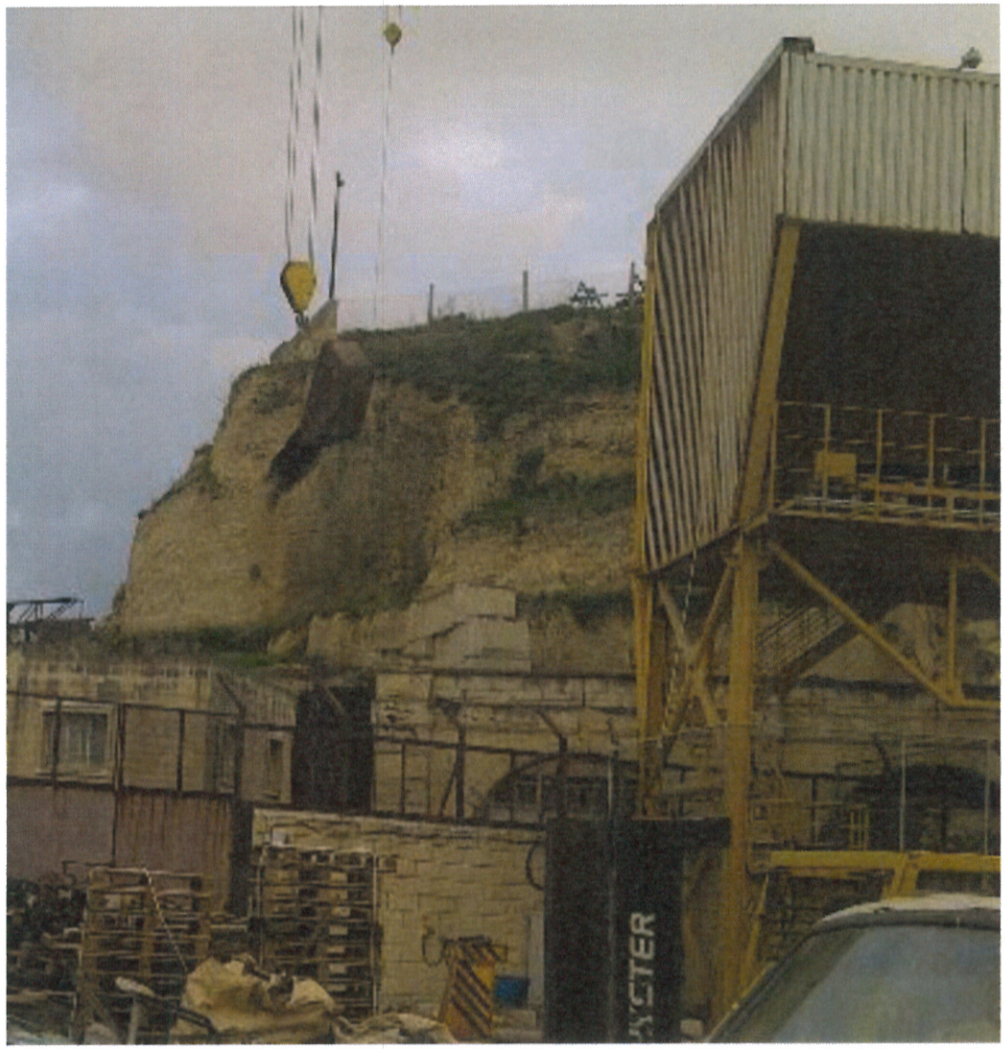
Grain Handling Operations

Grain Handling Operations

RORO Cargo

Scrap Metal Handling

Grit Blasting & Spray Painting at Palumbo Dock 6



Marsa Power Station

Fish Farming Operations

TimeLine of Events

MEPA Permits, Prohibitory Injunctions etc.

October 11th 2012

MEPA issues clearance letter for the erection of the silo.

cementsilo01/12/is/ma

11 October 2012

Mr. Johann Borg
UC Limited
Bastions Street
FGURA

Dear Mr. Borg,

SUBJECT : CEMENT SILO

Further to your enquiry with regards to the above mentioned matter please note that this is related to normal operating procedures which one finds in Ports.

Therefore no planning permission is needed.

Having said that we are initiating procedure to formalise this and included a section in the DNO legislation whereby we formalise port related activities in designated cargo ports.

Please be guided accordingly.

Yours faithfully,

Dr Ian Stafrace
Chief Executive Officer
MEPA

MALTA ENVIRONMENT & PLANNING AUTHORITY
L-AWTORITA' TA' MALTA DWAR L-AMBJENT U L-IPPJANAR

P.O. BOX 200, MARSA MRS 1000, MALTA
TEL: (+356) 2290 0000 • FAX: (+356) 2290 2295
http://www.mepa.org.mt • email: enquiries@mepa.org.mt

October 17th 2012

MEPA reissues clearance letter to include a set of drawings.

Ivan Carabott

From: "Maria Attard" <Maria.Attard@mepa.org.mt>
To: "Doreen Curmi" <Doreen.Curmi@vgt.com.mt>
Cc: "Elson Chng" <Elson.Chng@vgt.com.mt>; "Enrico Overend" <enrico.overend@vgt.com.mt>; <ian.stafrace@mepa.org.mt>; "Ivan Carabott" <ivan@etvan.com>; "Johann Borg" <vincefgura@gmail.com>; "Victor Sladden" <Victor.Sladden@mepa.org.mt>
Sent: 17 October 2012 09:42
Attach: SITE PLAN.pdf; 12069-Ivan Carabott (Kordin)-Silo Details.pdf; 12069-Ivan Carabott (Kordin)-Silo Plan.pdf; Silo Platform - Excavation Levels.pdf; Silo Platform - Technical Detail.pdf
Subject: Cement Silo

Ms. Curmi,

I refer to your e-mail hereunder and our letter dated 11 October 2012 addressed to Mr. Johann Borg.

Further to your enquiry with regards to the above mentioned matter please note that the proposal indicated in the attached plans relates to normal operating procedures which one finds in Ports.

Therefore no planning permission is needed.

Having said that we are initiating procedure to formalise this and included a section in the DNO legislation whereby we formalise port related activities in designated cargo ports.

A clarification letter referring to the attached plans will be mailed to Mr. Borg superseeding our letter of the 11 October 2012.

Please be guided accordingly.

Maria Attard
PA to the CEO
Office of the CEO
Malta Environment & Planning Authority

General : 2290 0000
Direct : 2290 2022
Ext : 2022

23-01-2014

cementsilo02/12/is/ma

17 October 2012

Mr. Johann Borg
UC Limited
Bastions Street
FGURA

Dear Mr. Borg,

SUBJECT : CEMENT SILO

I refer to our previous letter dated 11 October 2012.

Further to your enquiry with regards to the above mentioned matter please note that the proposal indicated in the attached plans relates to normal operating procedures which one finds in Ports.

Therefore no planning permission is needed.

Having said that we are initiating procedure to formalise this and included a section in the DNO legislation whereby we formalise port related activities in designated cargo ports.

Please be guided accordingly.

Yours faithfully,

Dr. Ian Stafrace
Chief Executive Officer
MEPA

encl.

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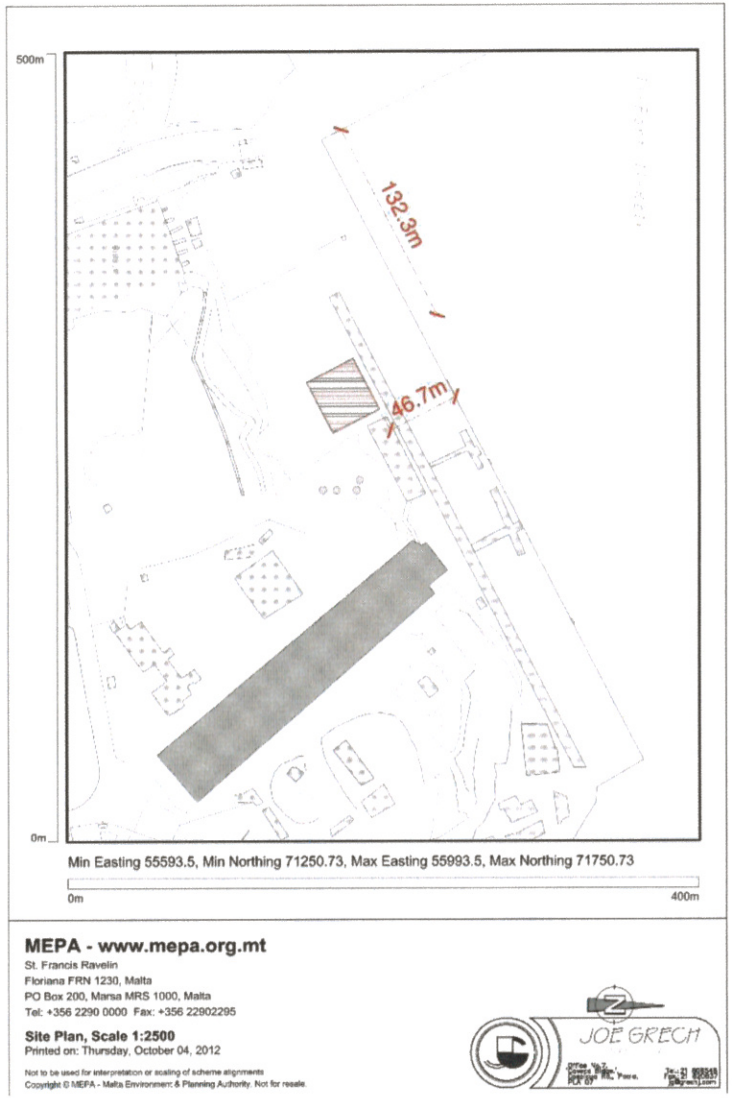
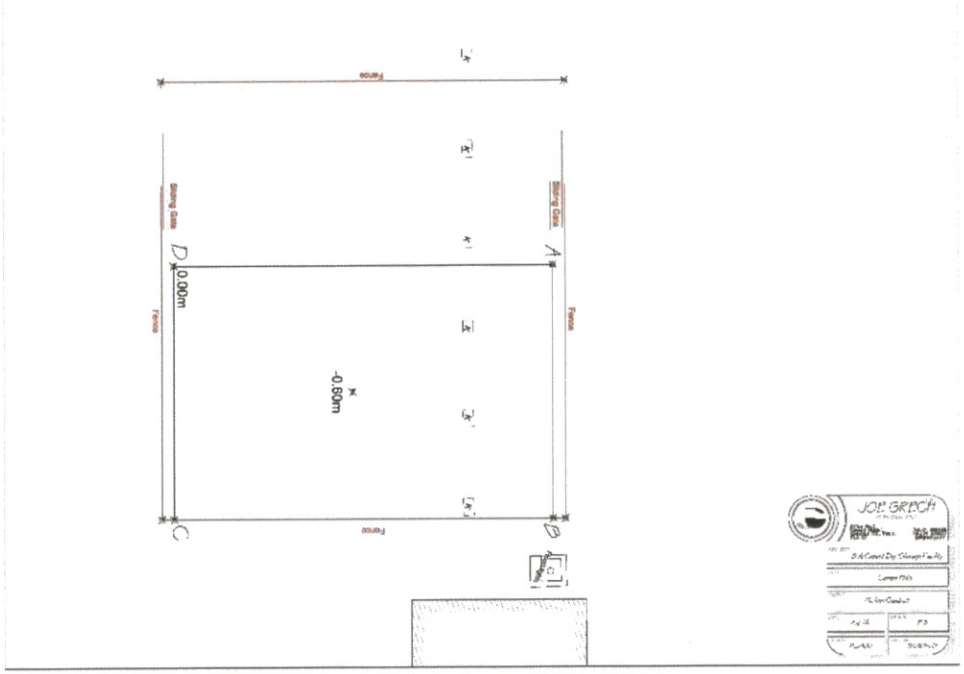
Drawings attached to MEPA's clearance letter dated 17th October 2012

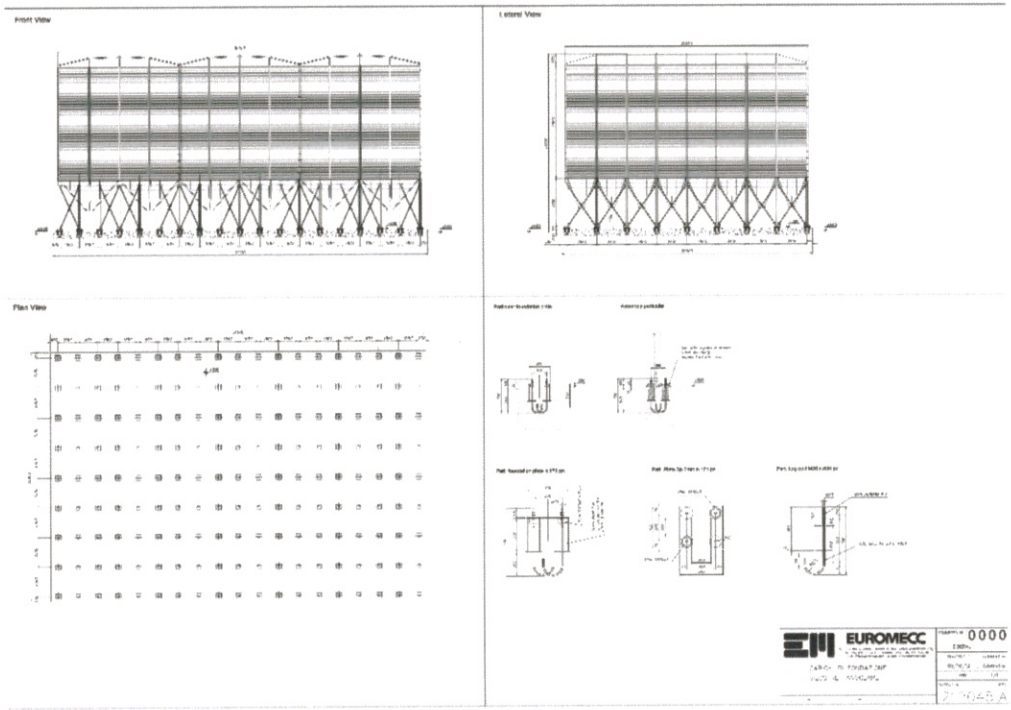


Site Plan

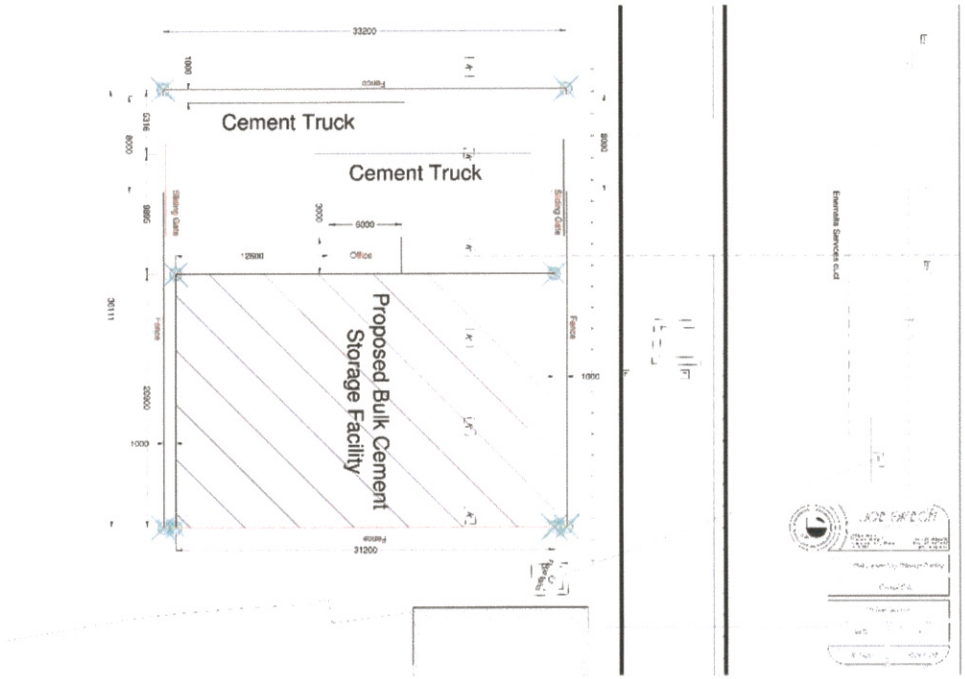
Excavation Levels



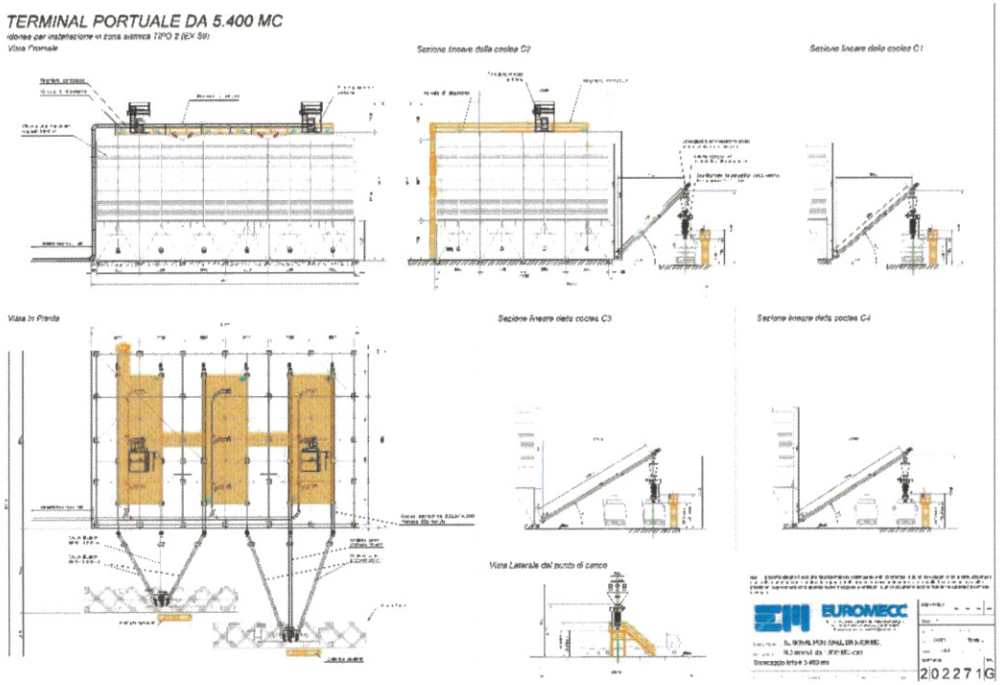
Platform Details & Anchoring Details



Site / Installation Layout



Installation Technical Details



December 20th 2012
Warrant of Prohibitory Injunction to stop works
Mandat 1922/2012/1
Kordin Grain Terminal Compnay Ltd. vs VGT Ltd.
(VGT Ltd. is the lessor of the site UC Ltd. operates from)

January 17th 2013
Onor. Imhallef Anna Felice
Court decided in favour of UC Ltd / VGT Ltd,
Silo assembly resumed

October 10th 2013
UC Ltd filed an application for an environmental permit
EP25/13

November 20th 2013
UC Ltd filed a development application with MEPA.
PA137/14
Sanctioning of Enemalta substation and proposed construction of ancillary rooms *(tools room & toilet, as these were considered to be permanent buildings and not demountable structures like the silo)*

August 13th 2013

Warrant of Prohibitory Injunction to stop works

Mandat 1183/2013 SC

Kordin Grain Terminal Company Ltd. vs UC Ltd.

August 26th 2013

STO Prim Imhallef Silvio Camilleri

(All documents including MEPA clearance letters and technical drawings were submitted and examined by the court)

Court decided in favour of UC Ltd,

Silo assembly resumed

August 26th 2013

MEPA informs UC Ltd that notwithstanding the clearance letter issued by them they were now requesting an environmental permit before the start of the operations.

MEPA

Our Ref : ceo12

26th August, 2013

Mr Johann Borg
UC limited
Bastions Street
Fgura
Malta

Dear Mr BorgVella

Subject : Cement Silo

I refer to our letters dated 11th and 17th October 2012. Please be informed that although a clearance letter has been issued by this office you are still required by law to obtain an environmental permit. Should this permit not be issued our letter will have no validity as you will only be allowed to erect the silo without using it.

You are kindly requested to regularise your position in order to avoid any enforcement action in your regard.

Yours sincerely,

Johann Buttigieg
Chief Executive Officer

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- **As part of the application process to obtain an Environmental Permit, UC Limited carried out a number of studies and submitted the findings / reports to MEPA and to the Environmental Health Directorate. These reports (which will be looked into at the end of this presentation) included;**

- Air Quality Monitoring Exercise

  (carried out by AIS Environmental)

- FMEA Risk Assessment (Failure Modes & Effects Analysis)

  (carried out by Resolve Consulting Ltd)

- Health Impact Review

  (carried out by Dr. Ramiro Cali-Corleo)

During the Environmental Permit's application process, a number of meetings and also a few unadvised onsite visits were held;

- **MEPA Environment Directorate**

Mr. Jonathan Henwood

Mr. Michael Sant

- **Environmental Health Directorate**

Mr. Mario Cassar

Mrs. Miriam Grech

Mr. Louis Vella

Dr. Christine Baluci

Dr. Karen Vincent

- **Port Health**

Mr. Mario Camilleri

Mr. Keith Desira

Silo Assembly and testing was completed in January 2014

The first cement consignment arrived in Malta on January 15th 2014

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Mr. Louis Vella

Dr. Christine Baluci

Dr. Karen Vincent

- **Port Health**

Mr. Mario Camilleri

Mr. Keith Desira

Silo Assembly and testing was completed in January 2014

The first cement consignment arrived in Malta on January 15th 2014

January 15th 2014

While cement discharging was underway, MEPA issued a STOP NOTICE

Avviż Skond L-Artikoli 84 u 86 tal-Att X tal-2010
Dwar l-Ambjent u l-Ippjanar ta' l-Iżvilupp (Kap 504)
Avviż biex Tieqaf

UC Cement Ltd. (C56025)
Ivan Carabott
UC Ltd.
Sannat Lane,
Marsa MRS 1310

Date : 15 Jannar 2014
Ref. Taghna : ECF 0009/14

Jidher li għal-Awtorita' ta' Malta dwar l-Ambjent u l-Ippjanar l-attivita` li qed ssir f' Laboratory Wharf, Kordin, Paola tmur kontra Artikolu 66 ta' l-Att Dwar l-Ambjent u l-Ippjanar (KAP 504).

Il-ksur jikkonsisti f'li:

Qed topera silo tas-cement meta l-applikazzjoni tiegħek għall-permess tal-operat kif rikjest bil-liġi għadha pendenti

L-Awtorita' ta' Malta dwar l-Ambjent u l-Ippjanar tqis li għandha toħroġ Ordni biex Tieqaf skond il-poteri li għandha fl-Artikoli 84 u 86 tal-Att X tal-2010.

L-Awtorita' ta' Malta dwar l-Ambjent u L-Ippjanar tesiġi li l-attivita` indikata f'dan l-Avviż għandha tieqaf immedjatament sakemm tottjeni l-permessi kollha meħtieġa bil-liġi.

Dan l-Avviż għandu effett immedjat.

Maħruġ fi 15/01/2014
Aimée Brincat
Compliance and Enforcement Unit Manager

Aimée Brincat
Għad-Direttur tal-Infurzar

DocNstp

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January 15th 2014

UC Ltd. demanded a warrant of prohibitory injunction against MEPA. UC Ltd was only honouring an agreement entered into with the cement supplier months earlier and had no intention to operate and to dispatch cement. Furthermore delaying / holding the vessel in Malta would have resulted in huge damages running into hundreds of thousands.

Avviz ghas-smigh ta' kawza.
Notice of hearing of a cause.

MAN Nru. 60/2014/1 MCH

REPUBBLIKA TA' MALTA
REPUBLIC OF MALTA
QORTI CIVILI, PRIM' AWLA
CIVIL COURT, FIRST HALL

ONOR. IMHALLEF MARK CHETCUTI

Kawza / *Cause*: UC LIMITED (C65025)
vs.
AWTORITA' TA' MALTA DWAR L-AMBJENT U L-IPPJANAR

Lil / *To the said*: **fuq imsemmi.**

Il-kawza fl-ismijiet hawn fuq imsemmija giet imqieghda fil-lista tal-kawzi li ghandhom
The cause between the said parties is entered in the list for the sitting to be

jinstemghu nhar / *held on the*: Il-Gimgha, 17 ta` Jannar, 2014 Awla fi 10:00 a.m.

Dan jiswa lilek b'avviz u biex taghraf timxi.
This is for your information and guidance.

Mir-Registru tal-Qrati Superjuri.
From the Registry of the Superior Courts.

Mahrug llum / *Issued*: l-Erbgha, 15 ta` Jannar, 2014

VERA KOPJA

Deputat Registratur.
Deputy Registrar.

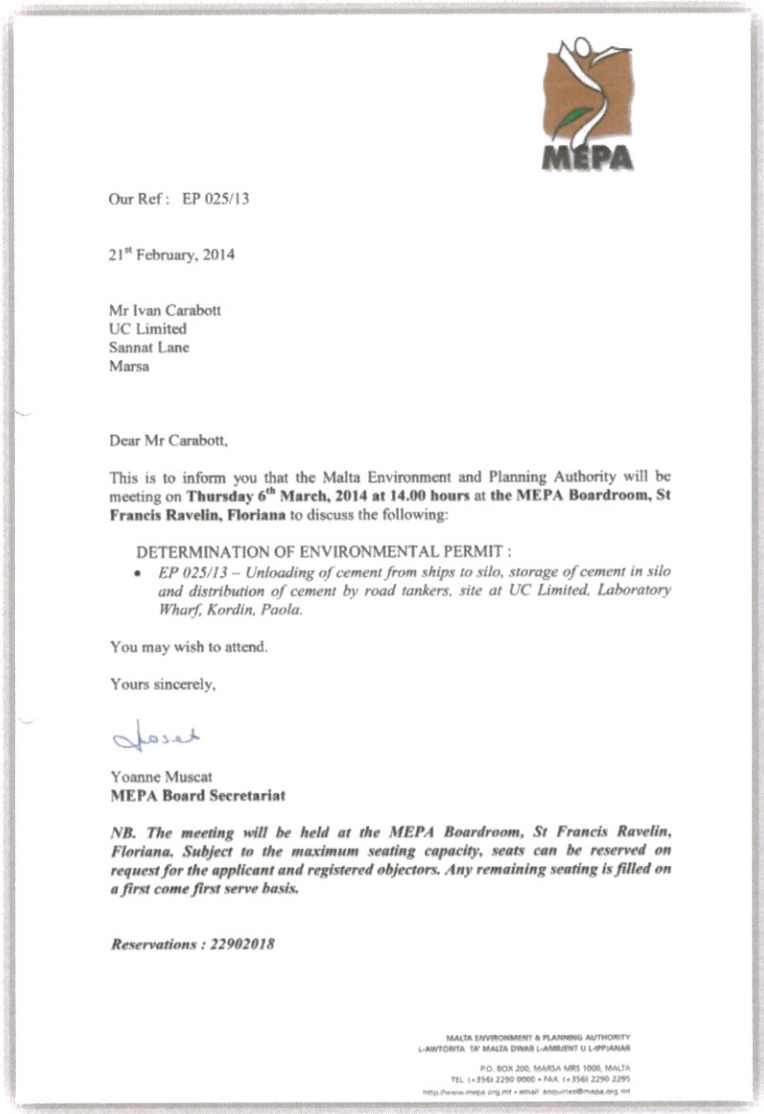
The discharge of cement was completed, but cement was left in the silo, no dispatches were made.

January 16th 2014
Warrant of Prohibitory Injunction to stop operations
Mandat 68/14
Kordin Grain Terminal Company Ltd. vs UC Ltd.

January 29th 2014
Onor Anthony Ellul
Court decided in favour of UC Ltd,

February 21st 2014

UC Ltd. was informed by MEPA that the issuing of the Environmental Permit EP25/13 will be determined on the 6th of March



Our Ref : EP 025/13

21st February, 2014

Mr Ivan Carabott
UC Limited
Sannat Lane
Marsa

Dear Mr Carabott,

This is to inform you that the Malta Environment and Planning Authority will be meeting on **Thursday 6th March, 2014 at 14.00 hours** at **the MEPA Boardroom, St Francis Ravelin, Floriana** to discuss the following:

DETERMINATION OF ENVIRONMENTAL PERMIT :

- *EP 025/13 – Unloading of cement from ships to silo, storage of cement in silo and distribution of cement by road tankers, site at UC Limited, Laboratory Wharf, Kordin, Paola.*

You may wish to attend.

Yours sincerely,

Yoanne Muscat
MEPA Board Secretariat

NB. The meeting will be held at the MEPA Boardroom, St Francis Ravelin, Floriana. Subject to the maximum seating capacity, seats can be reserved on request for the applicant and registered objectors. Any remaining seating is filled on a first come first serve basis.

Reservations : 22902018

MALTA ENVIRONMENT & PLANNING AUTHORITY
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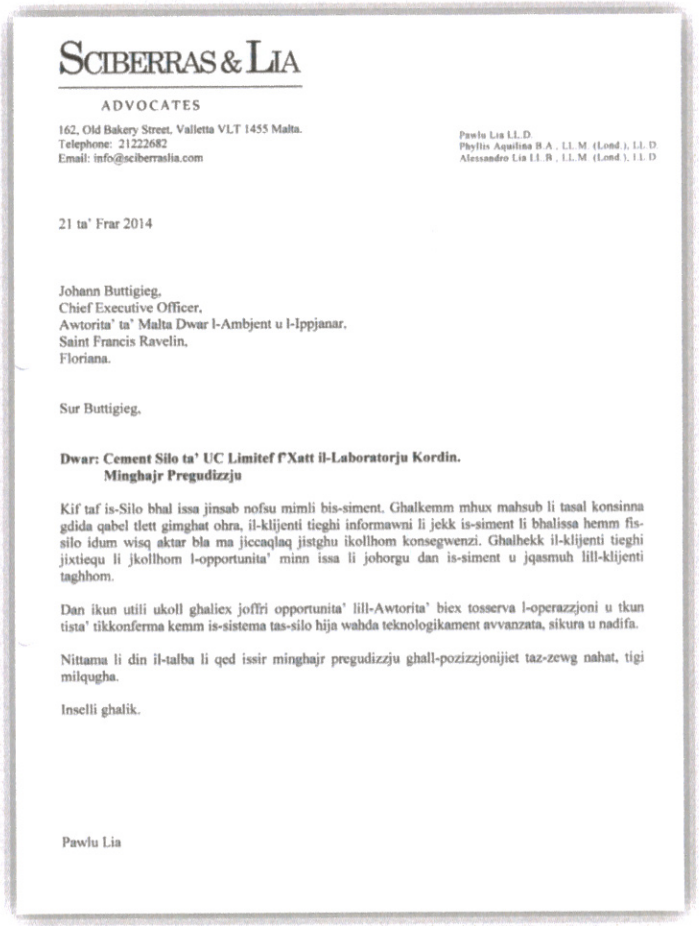
February 21st 2014

In view that all reports relating to the Environmental Permit (EP25/13) were all ready and a hearing date was set, UC Limited has asked MEPA to grant the company a 10 day temporary permission to operate.

This in order to prevent any cement from clogging in the system (since it was stale for weeks) and also to give MEPA the opportunity to see the plant working before actually taking a decision to issue / refuse the permit.



SCIBERRAS & LIA

ADVOCATES

162, Old Bakery Street, Valletta VLT 1455 Malta.
Telephone: 21222682
Email: info@sciberraslia.com

Pawlu Lia LL.D.
Phyllis Aquilina B.A., LL.M. (Lond.), LL.D.
Alessandro Lia LL.B., LL.M. (Lond.), LL.D.

21 ta' Frar 2014

Johann Buttigieg,
Chief Executive Officer,
Awtorita' ta' Malta Dwar l-Ambjent u l-Ippjanar,
Saint Francis Ravelin,
Floriana.

Sur Buttigieg,

Dwar: Cement Silo ta' UC Limitef f'Xatt il-Laboratorju Kordin.
Minghajr Pregudizzju

Kif taf is-Silo bhal issa jinsab nofsu mimli bis-siment. Ghalkemm mhux mahsub li tasal konsinna gdida qabel tlett gimghat ohra, il-klijenti tieghi informawni li jekk is-siment li bhalissa hemm fis-silo idum wisq aktar bla ma jiccaqlaq jistghu ikollhom konsegwenzi. Ghalhekk il-klijenti tieghi jixtiequ li jkollhom l-opportunita' minn issa li johorgu dan is-siment u jqasmuh lill-klijenti taghhom.

Dan ikun utili ukoll ghaliex joffri opportunita' lill-Awtorita' biex tosserva l-operazzjoni u tkun tista' tikkonferma kemm is-sistema tas-silo hija wahda teknologikament avvanzata, sikura u nadifa.

Nittama li din il-talba li qed issir minghajr pregudizzju ghall-pozizzjonijiet taz-zewg nahat, tigi milqugha.

Inselli ghalik.

Pawlu Lia

February 24th 2014

MEPA has agreed to grant UC Limited a 1 week temporary permission to operate, which would allow MEPA the opportunity to see the plant in full operation.

MEPA

Rif. Taghna : ceo47

24 Frar, 2014

Dott. Pawlu Lia
Sciberras & Lia Advocates
162, Triq l-Ifran
Valletta

Ghaziz Dott. Lia,

Nirreferi ghall-ittra tieghek datata 21 ta' Frar 2014 fejn qed titlob lill-Awtorita permess temporanju sabiex jitbattal is-silo tas-siment.

Bhal ma taf, l-Awtorita' ghamlet ir-rapport finali taghha rigward l-applikazzjoni ghall-permess ambjentali. Invista li ma jidhirx li dan il-permess jista johloq problema, u in vista ukoll li fil-gimghat li gejjin dan il-permess jkun quddiem il-Bord tal-MEPA, tkun opportunita tajba biex naraw l-operat fil-funzjoni tieghu biex jekk hemm bzonn nemendaw xi kundizzjonijiet qabel ma l-permess ambjentali jkun finalizat.

Ghaldaqstant, it-talba tieghek qed tigi milquha u int ghandek tinforma lill-ufficjal tat-taqsima ta l-Infurzar Ambjentali – is-Sinjorina Aimee Brincat (numru tat-telefon 22903040) mill-inqas 24 siegha qabel ma jibda l-operat biex jigi organizzat il-moniterrag li hemm bzonn.

Nselli ghalik,

Johann Buttigieg
Kap Ezekuttiv

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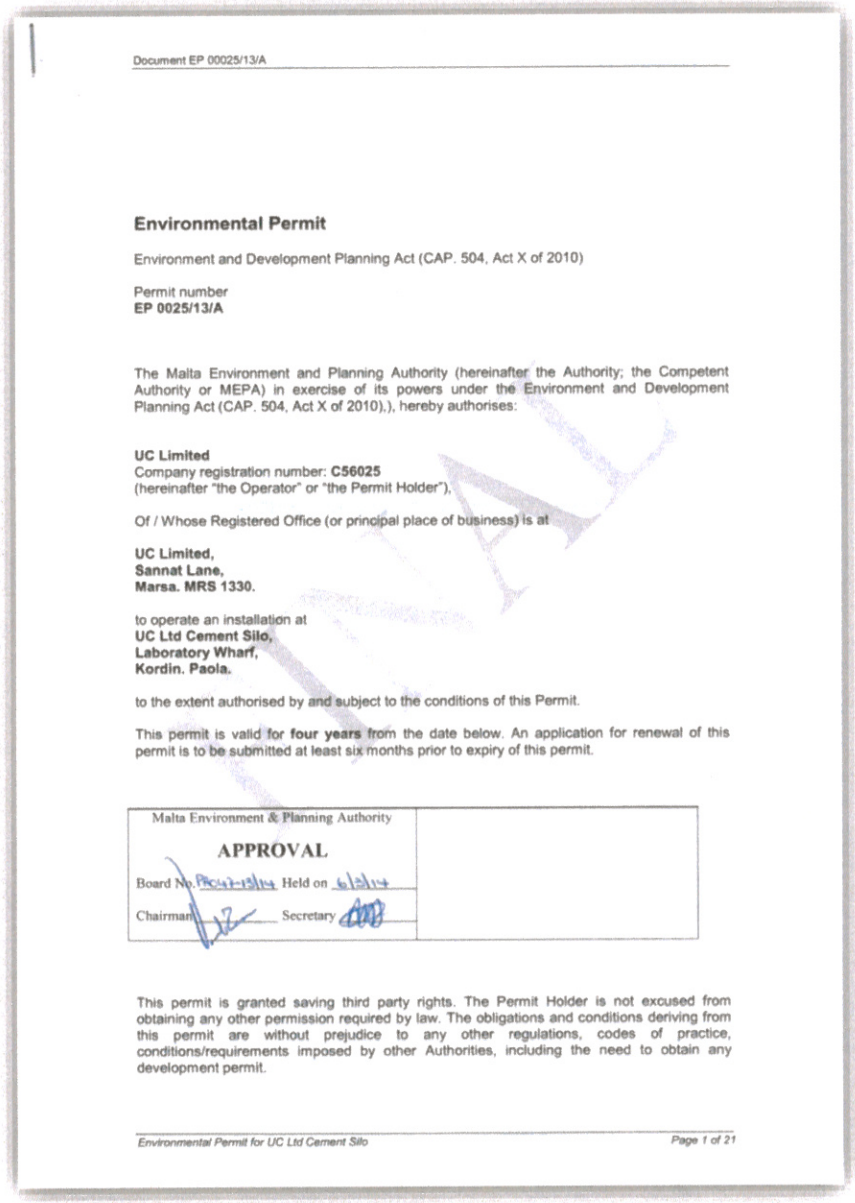
March 6th 2014

MEPA has granted an Environmental Permit to UC Limited.

A number of conditions were imposed.



Document EP 00025/13/A

Environmental Permit

Environment and Development Planning Act (CAP. 504, Act X of 2010)

Permit number
EP 0025/13/A

The Malta Environment and Planning Authority (hereinafter the Authority; the Competent Authority or MEPA) in exercise of its powers under the Environment and Development Planning Act (CAP. 504, Act X of 2010).), hereby authorises:

UC Limited
Company registration number: **C56025**
(hereinafter "the Operator" or "the Permit Holder"),

Of / Whose Registered Office (or principal place of business) is at

UC Limited,
Sannat Lane,
Marsa. MRS 1330.

to operate an installation at
UC Ltd Cement Silo,
Laboratory Wharf,
Kordin. Paola.

to the extent authorised by and subject to the conditions of this Permit.

This permit is valid for **four years** from the date below. An application for renewal of this permit is to be submitted at least six months prior to expiry of this permit.

Malta Environment & Planning Authority

APPROVAL

Board No. PA(1)-13/14 Held on 6/3/14

Chairman ____ Secretary ____

This permit is granted saving third party rights. The Permit Holder is not excused from obtaining any other permission required by law. The obligations and conditions deriving from this permit are without prejudice to any other regulations, codes of practice, conditions/requirements imposed by other Authorities, including the need to obtain any development permit.

Environmental Permit for UC Ltd Cement Silo *Page 1 of 21*

~~March~~ 6th 2014 April

MEPA has granted Development Permit PA137/14.

(Sanctioning of Substation & proposed construction of ancillary rooms)

Copy of Original Decision Notice

Mr Ivan Carabott
UC Ltd
Sannat Lane
Marsa MRS 1310

Date:18 June 2014
Our Ref: PA/00137/14

Application Number:	PA/00137/14
Application Type:	Full development permission
Date Received:	20 November 2013
Approved Documents:	PA 137/14/5A/35B/35C/35D/35E/35F; and supporting documents: *Enemalta:* PA 137/14/39A; *Environmental Health Directorate:* PA 137/14/46A; *and* *Malta Resources Authority:* PA 137/14/65A.
Location:	Valletta Gate Way Terminals, Laboratory Wharf Terminal, Valletta Grand Harbour, Paola, Malta
Proposal:	Sanctioning of substation & proposed construction of ancillary rooms to cement silo plant within port boundaries

Environment and Development Planning Act, 2010
Full Development Permission

The Malta Environment & Planning Authority hereby grants development permission in accordance with the application and documents described above, subject to the following conditions:

1 a) This development permission is valid for a period of FIVE YEARS from the date of publication of the decision in the press but will cease to be valid if the development is not completed by the end of this validity period.

b) This permission relates only to the development as specifically indicated on the approved drawings. This permission does not sanction any other illegal development that may exist on the site.

c) Copies of all approved drawings and documents shall be available for inspection on site by MEPA staff at all reasonable times. All works shall be carried out strictly in accordance with the approved drawings, documents and conditions of this permission. Where a matter is not specified, then the conditions of this permission and of Development Control Policy and Design Guidance shall take precedence and shall modify the drawings and documents accordingly.

d) Where applicable, all building works shall be erected in accordance with the official alignment and official/existing finished road levels as set out on site by MEPA's Land Surveyor. The Setting Out Request Notice must be submitted to the Land Survey Unit of MEPA when the setting out of the alignment and levels is required.

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Studies / Risk Assessments

Air Quality Monitoring Exercise
(carried out by AIS Environmental)

FMEA Risk Assessment (Failure Modes & Effects Analysis)
(carried out by Resolve Consulting Ltd)

Health Impact Review
(carried out by Dr. Ramiro Cali-Corleo)

Air Monitoring Assessment

- The air quality monitoring assessment monitored the concentration of particulate matter prior to the construction of the cement handling and storage facility at Laboratory Wharf, Kordin.

- A 21-day campaign was undertaken between the 8 – 13 October 2013 during which the concentrations of PM_{10}, $PM_{2.5}$ calcium and magnesium ions were recorded.

- Sampling and measurement of PM_{10} and $PM_{2.5}$ was conducted following the European Norms, EN 12341:2001 and EN 14907:2005, as stated in the L.N. 478/2010 (Ambient Air Quality Regulations).

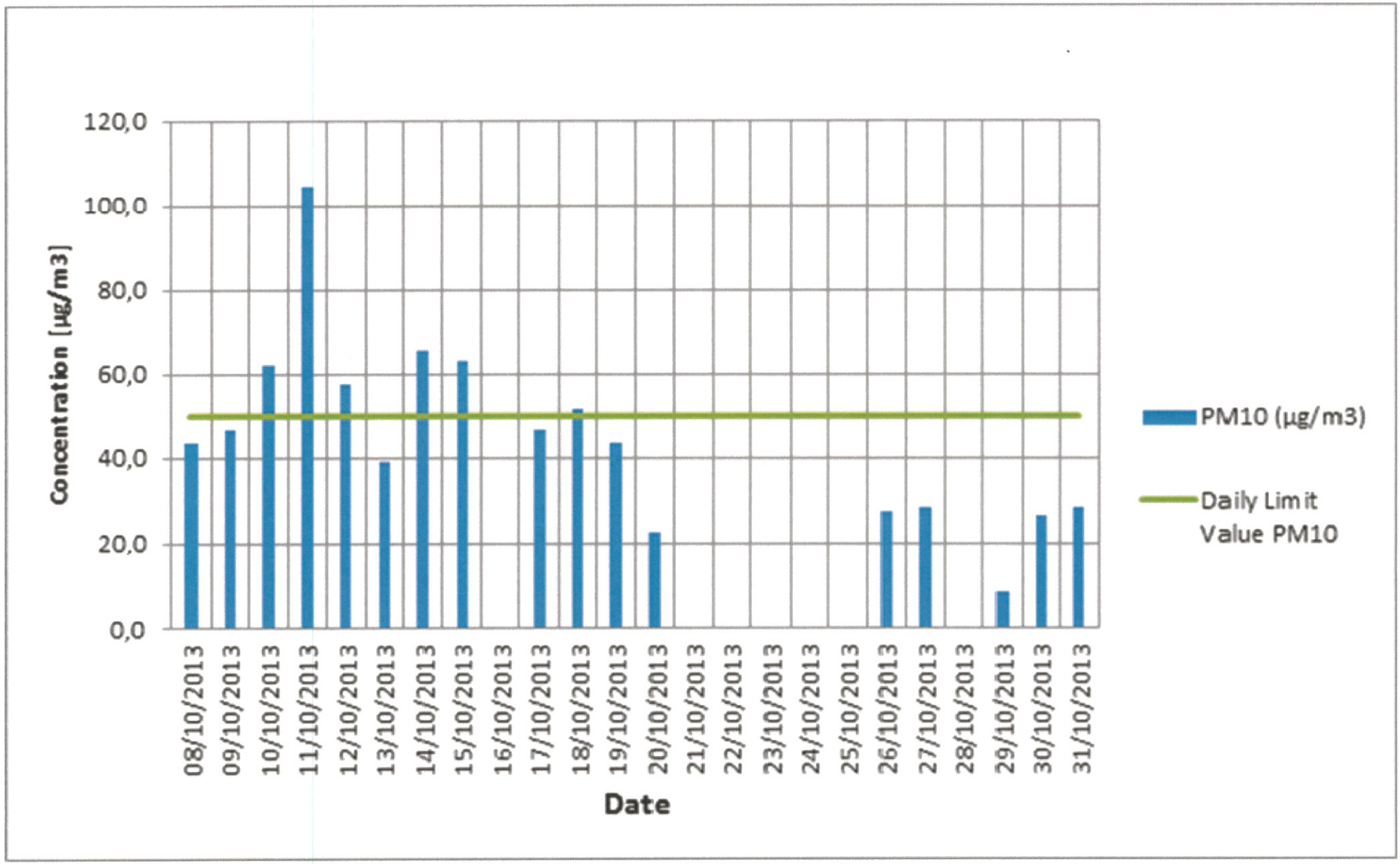
Air Monitoring Results

- The daily limit value for PM_{10} is **50 µg/m³** according to the L.N. 478/2010.

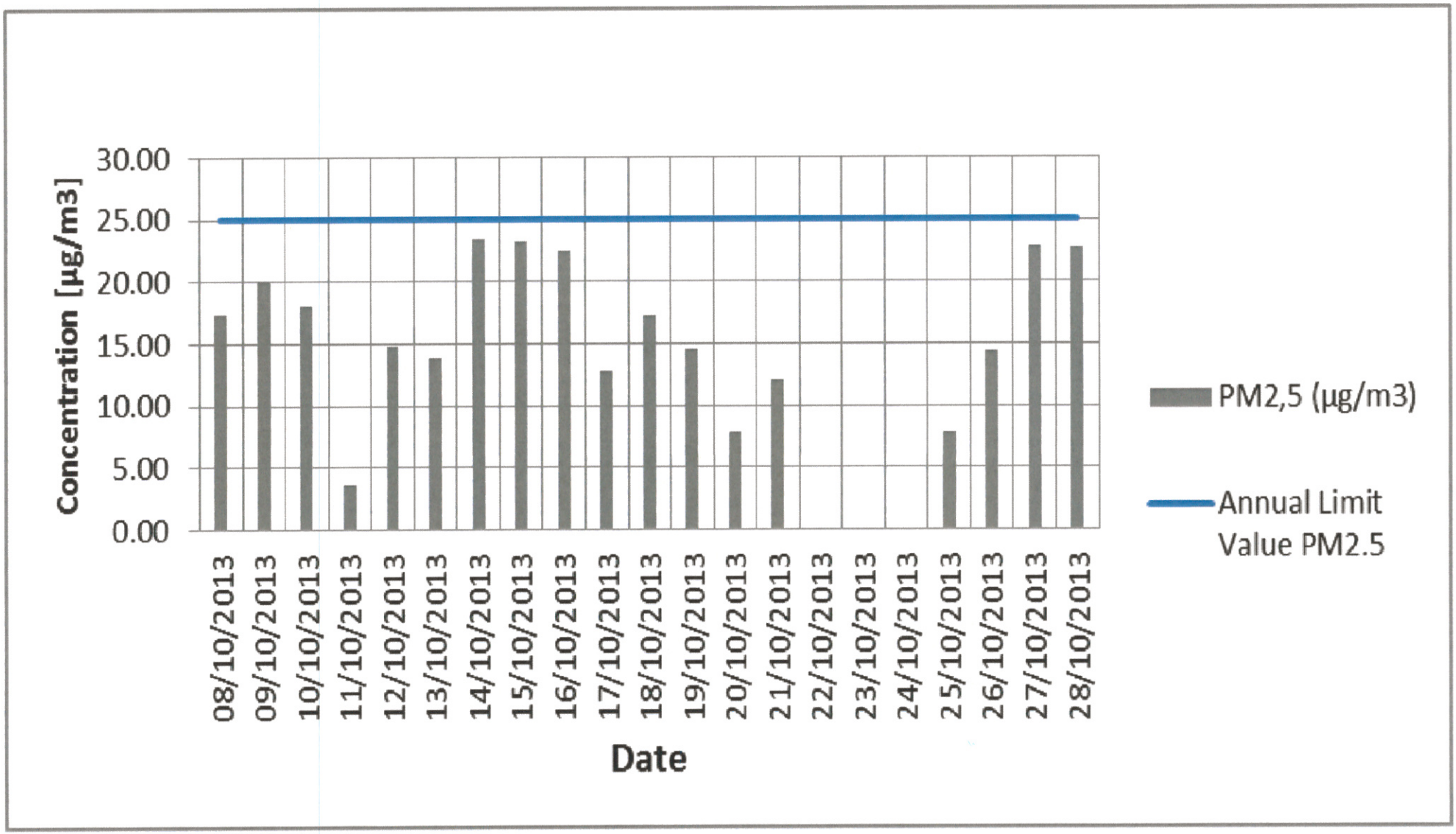
- Concentration of PM_{10}, during **six** days there were exceedances of the daily limit value.

- The annual limit value for $PM_{2.5}$ is 25µg/m³, and given that the monitoring was performed for 21 days, it cannot be established if any exceedances took place. It can be however noted that the daily readings are all below the threshold.

PM_{10} Concentration and Exceedances



$PM_{2.5}$ Concentration



Magnesium and Calcium

- The purpose of monitoring these parameters was to elaborate an accurate assessment of the air quality and to evaluate any possible relationship between the pollutant concentrations, pollutant sources, its location and time of the year.
- Magnesium concentrations were always below the quantification limit of 0.09µg/m^3.
- Results from the Kordin MEPA station was selected to provide a reference, as it is the one closest to this project's study area. The % Calcium values recorded in the month of October that could be attributed to natural source were analyzed and the mean value calculated as 10%.
- The mean value from our results is 10.2% or 6.52% if we take out the value of 29th which is considered an abnormality. Nevertheless both percentages are in coherence with the other ones found in the reference project of Tuscany and Malta. Therefore the % Calcium resulted in this project could be attributed to natural sources.

Air Quality Remarks

- The PM_{10} concentrations exceeded the limit value of 50 $\mu g/m^3$ on 6 out of 21 days, namely 10-12, 14-15 and 18 October 2013; however no correlation could be identified either with the number of vessel calls on the specific days or with the vessel type. Out of the 21 days, power interruption occurred on 3 days on which no value could be recorded.
- In order to increase the validity of the data, the reported values were cross-checked with the air quality data provided by the monitoring network installed by MEPA (the Kordin station).
- In both cases, high values of PM_{10} were recorded from the SKYPOST and from the MEPA station.
- A feasible explanation refers to the type of activities taking place at these specific monitoring points being located next to the port, and considered to be highly urbanised and industrial.

FMEA Risk Assessment

Failure Modes & Effects Analysis

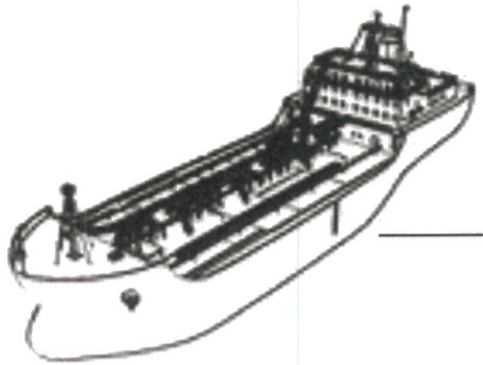
(carried out by Resolve Consulting Ltd)

The Facility & Operation

- Silo Area: 650 square metres
- Loading Area: 450 square metres
- Silo Capacity: 6,000 cubic metres

- Main facility sections:
  - Ship unloading equipment (pipeline)
  - Bulk Cement storage silos
  - Loading stations for cement road tankers
  - Dust bag filtration systems

The Operation



SELF UNLOADING
CEMENT CARRIER

Under/above ground
Ship discharging pipe

Cement Bulk Storage
Silos

Silo discharging by
sealed screw conveyors

Road tanker
loading bellows

Cement Road Tanker

Self Unloading Cement Carrier

- Cement is delivered to the site in purposely designed ships.
- Cement Carriers are specialized ships which are designed and equipped to carry bulk cement and other similar material.
- These vessels are fitted with fluidization systems in the cargo holds which enables the bulk cargo to flow to a central suction point ensuring maximum efficiency in discharging cement.
- Since the vessels are totally enclosed, the operation is environmentally friendly with a dust free operation when discharging pneumatically.
- Pneumatic unloading uses vertical and horizontal screw conveyors to bring the cement from the holds to deck level and into pressure pumps. The pneumatic system uses air pressure to blow the cement through pipelines to the shore terminal located on the quay.

Under/above ground Ship discharging pipe

- Steel pipe crossing the quay and connecting the cement bulk carrier to the silos.
- 300mm in diameter and composed of different sections connected together with DN300 PN10 flanges.
- Gaskets placed in between flanges.
- Section of pipeline located in the vehicle route is placed underground within a fully accessible culvert.

Cement Carrier

Cement Storage Silos

- Capacity: 6,000 m^3
- Material of construction: Steel
- Protected against impact
- Three (3) levels of protection against cement release:

  1. Self-adhesive foam sealant placed between joints
  2. Sealant placed over edges
  3. Brushable body sealing

Silo Discharging Pipes (screw conveyors)

- Totally enclosed screw conveyors.

- Screw conveyors connected together with flanges with gaskets placed in between to prevent leaks.

Road tanker loading bellows

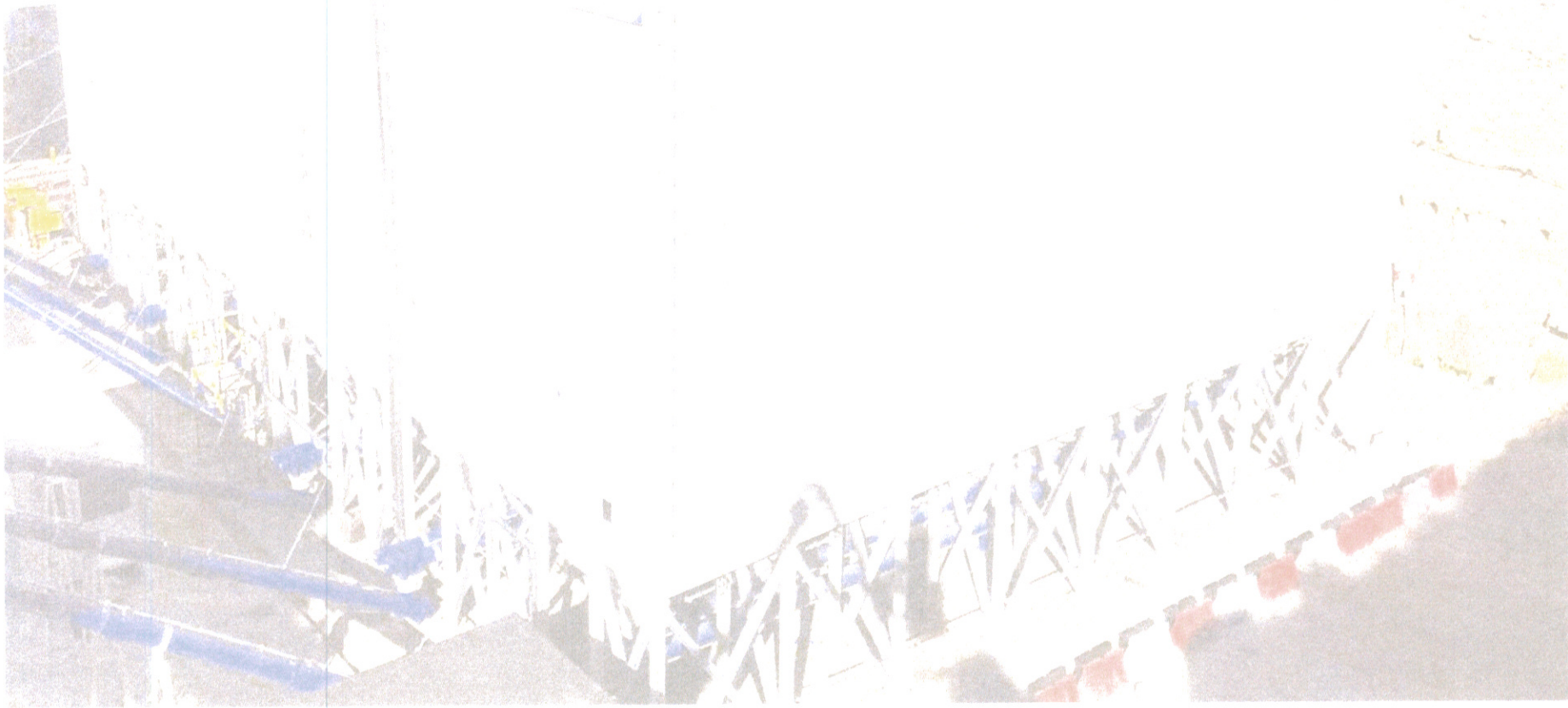
- Bellows are made of flexible neoprene coated with Hypalon which offers high resistance to atmospheric agents, abrasion and high temperature, thus making the loader highly durable.

- In built filtration system.

- Create a perfect seal with road cement bulk tanker.

Risk Assessment

Scope: Dust emissions



Risk Assessment

- FMEA (Failure Modes and Effects Analysis) approach
  - Operation
  - Part
  - Potential Failure Modes
  - Potential Failure Effects
  - Potential Causes
  - Current Controls
  - Recommended Actions
  - Risk Rating (RPN, i.e. Risk Priority Number)

EN 60812:2006: Analysis techniques for system reliability. Procedure for failure mode and effects analysis (FMEA)

Environmental (Dust Emissions) Risk

Table 1 - Severity

Descriptor	Numeric Rating	Definition
Catastrophic	4	Environmental contamination beyond the perimeter of the plant.
Critical	3	Environmental contamination within the perimeter of the plant.
Marginal	2	Localised environmental contamination.
Negligible	1	No potential for environmental contamination by dust release.

Table 2 - Occurrence

Descriptor	Numeric Rating	Definition
Frequent	6	Likely to occur frequently.
Probable	5	Likely to occur several times in the plant's usage over one year.
Occasional	4	Likely to occur sometime in the plant's usage over one year.
Remote	3	Unlikely to occur but possible.
Improbable	2	So unlikely that occurrence may not be experienced.
Incredible	1	Virtually impossible.

Table 3 - Detection

Descriptor	Numeric Rating	Definition
Very Low	5	Plant operators cannot detect a dust release and informed of a dust release by others.
Low	4	Plant operators are not likely to detect a dust release.
Moderate	3	Plant operators may detect a dust release.
High	2	Plant operators will likely detect a dust release.
Very High	1	Plant operators will almost certainly detect a dust release.

Environmental (Dust Emissions) Risk

Risk Priority Number (RPN) = *Severity x Occurrence x Detection*

Table 4 - Risk Priority Number

RPN Range	Descriptor
1 - 40	Low Risk - Ensure that all control measures installed are subject to a strict maintenance regime and that they are checked prior to operation.
41 - 80	Medium Risk - Ensure that all control measures installed are subject to a strict maintenance regime and that they are checked prior to operation. Seriously consider taking additional measures to lower the risk to low.
81 - 120	High risk - Suspend operations and take remedial action to lower the risk level.

Risk Assessment (FMEA)

Item No	Operation	Part	Potential Failure Mode	Potential Failure Effect	Potential Causes	Reference Images (App 3)	Severity	Current Control Measures	Occurrence	Detection	Risk Priority Number (RPN)
1 /cont..	Discharging of cement from ship to storage silos	Storage Silos - steel panels, hopper and roof	Failure to contain cement within structures.	Dust emissions	Corrosion of silo material.	1	2	- New plant and protected with paint	3	2	12
					Panel joints pulled apart due to external impact.	2	4	- Silos are constructed on a concrete plinth and away from main traffic routes. - A secure fence is installed around the silo perimeter. - Area is supervised.	2	1	8
					Failure of silo supporting structure due to excessive filling of silos, consequently overloading them.	3, 4	4	- Fifteen level indicators uniformly distributed within the silos which automatically raise an alarm in the event of overfilling during ship unloading. - Filling is carried out in direct communication with the ship. - Storage facility allows for full visibility of silo contents and their distribution. Location of discharge is controlled by plant operatives.	2	1	8
					Failure of sealants between joints due to erosion caused by cement dust sliding over.	5, 6, 7	3	- Three layers of protection 1. Self-adhesive foam sealant placed between joints and compressed by means of bolts holding panels together 2. Sealant placed over edges 3. Brushable body sealing compound placed over 1 and 2 - Daily visual inspection from the outside of the plant by plant operatives.	3	2	12
					Loose bolts due to vibration generated by uneven slippage of material within silo.	-	3	- Visual inspection and periodic tightening to the specified torque.	3	3	18
					Loose bolts due to insufficient tightening by installers.	-	3	- All bolts were tightened as part of the commissioning process.	3	3	18
					Activation of overpressure safety valve due to broken springs.	8	4	- Periodic maintenance as per equipment manual.	3	1	12
					Activation of overpressure safety valve due to poor calibration.	8	4	- Periodic maintenance as per equipment manual.	3	1	12
					Collapse of trench covers due to excessive weight of vehicles travelling over them.	9	4	- Trench covers are to be designed and certified by a structural engineer.	2	1	8

Dust Emissions Mitigation Measures

Ship Unloading

- 15 microwave continuous level indicators are installed and uniformly distributed within the silo. These give real time cement level readings to the silo operators.
- 12 Maximum level sensors (rotating type) are also installed. These send signals automatically to the silo plc / computer when the maximum level is soon to be reached.
- Silo Filling is carried out in continuous direct communication with the ship's crew via two way radios an by means of a visible / audible signal (traffic lights type).
- Two dust filters having a filtration surface of $90m^2$ each are installed on the roof of the silo. Both filters are fitted with a continuous automatic cleaning system. Both filters are also fitted with an emission sensor which would raise an alarm in the control cabin should the permitted values be exceeded.
- Six calibrated overpressure / under pressure valves are installed above silos.

Dust Emissions Mitigation Measures

Filtration Units

- Silos:

Two dust filters having a filtration surface of 90m² each are installed on the roof of the silo. Both filters are fitted with a continuous automatic cleaning system. Both filters are also fitted with an emission sensor which would raise an alarm in the control cabin should the permitted values be exceeded.

- Truck loading bellows:

Cement trucks are loaded by 'Torex Bellojet' dust free loading bellows. Both truck loading bellows are fitted with filtering cartridges having a filtering surface area of 10m².

Dust Emissions Mitigation Measures

Road tanker Loading

- The 'Torex Bellojet' loading bellows form a tight seal between the conical section of the bellow and the tanker.
- The aspiration cycle continues for a further 60s after loading is complete in order to collect airborne cement dust particles present within the road tanker. The air is filtered by the bellojet built-in 8 filter system.
- A traffic light signal to the truck driver only turns green once the bellow has been disengaged.
- The road tanker lid is closed within approximately 10s of disengaging the 'Torex Bellojet' loading bellow. This is possible since loading is attended at all times and the lid is swiveled around over the tank opening without any delay once the bellow has been cleared from its path.
- A level probe consisting of a rotary blade that interrupts flow when the level of material already deposited touches the blade.

Conclusion

- All cement handling activities are controlled.
- Engineering controls integrated in design.
- Most probably the cleanest construction related dust handling operation on the island.
- Worst case scenario of a dust release is identified immediately, hence mitigation measures may be taken in a timely manner.

Health Impact Review

(carried out by Dr. Ramiro Cali Corleo)

Health Impact Review

- **Summary and conclusion**

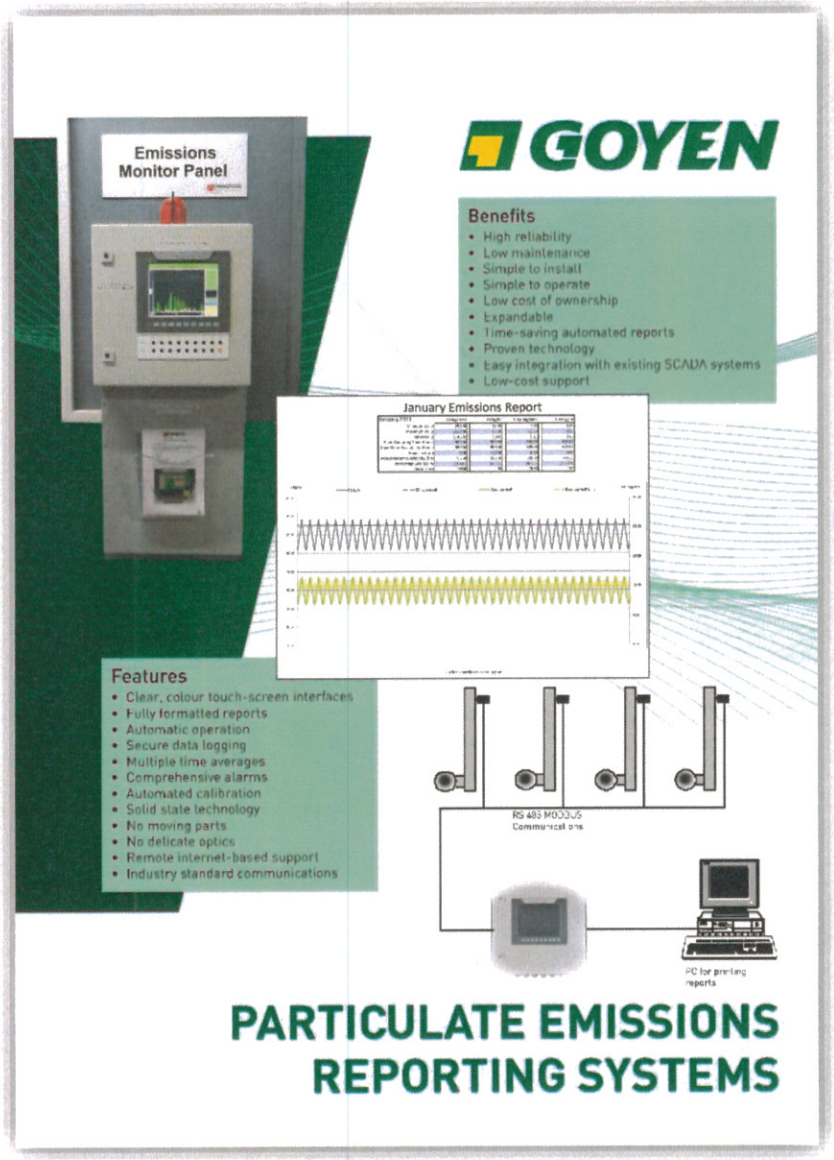
Cement dust is a highly toxic compound however as long as a high vigilance, including regular active air quality monitoring, for fugitive dust is maintained, the declared standards are properly implemented and the recommended mitigating measures applied, the health risk is expected to be within the accepted standards. It is unlikely that this silo operation will be completely free from all fugitive cement emissions and so the possibility that the grain being handled nearby will be subject to a level of contamination from cement dust remains present even following the application of best practices. This is unlikely to be a significant health risk to consumers if monitoring of any contamination to the grain and equipment is carried out should any contamination of the ambient air with cement dust be identified, particularly in the days following loading and unloading of the cement silos and should any grain contamination be identified, rending the grain unfit for consumption, the equipment is to be appropriately cleaned and the affected foodstuff not permitted to enter the food chain. This does obviously involve a pecuniary element and a commercial liability risk which is beyond the scope of this report to discuss.

- **Comments on Health Impact Review**

All papers referred to in this report were based on studies conducted on much bigger / high profile operations, i.e. in cement factories (including quarry areas, kiln areas etc.) and not in cement storage facilities. Most of the studies were conducted in third world countries and studies conducted in developed countries (USA, Norway etc.) did not yield any findings. Studies are between 15 and 35 years old, since then both technologies and environment / public health legislations have evolved.

Continuous Emissions Monitoring

A Continuous Emissions Monitoring System was installed



System Description

The Sensing System

The system utilises EMS6 AC Coupled Triboelectric technology, comprising a duct/stack-mounted IP65 electronics housing with integral sensing element protruding into the duct. As particles travel through the process they develop a charge, which is transferred as the particle passes or impacts the sensing element. The resulting current is amplified, filtered, rectified and further filtered leaving only at the AC component. This gives a linear representation of the concentration in the gas stream. The reason for measuring the AC component is that compared to the DC component, the electronics are more sensitive. The AC signal is substantially less affected by influences such as amplifier noise and process parameters, which includes the build-up of process dust on the sensing element. The EMS6 totally filters out 50 Hz and 60 Hz frequencies related to the mains supply. The EMS6 linear representation of concentration has been validated by independent laboratories and has also been tested and certified for monitoring dust emissions according to the UK Environment Agencies 'MCERTS' standard.

Data Transfer, Processing & Storage

The main user interface of the system comprises an advanced PLC with integrated HMI panel. The PLC is connected to one or more EMS6 using an RS485 multi-drop serial communications line and utilises the industry standard MODBUS RTU protocol. Data from the EMS6 monitoring heads is transmitted in response to routine requests by the PLC. The PLC applies calibration factors, averages and displays the data as well as storing it to a removable data storage card. The HMI panel provides operators with a simple, yet comprehensive and convenient interface that allows them to readily observe real-time and historical data as well as alarm conditions for each of the monitoring points. The panel also provides a mechanism for initial configuration of the system and ongoing diagnostic information. Stored data can easily be transferred to a remote PC for secure back-up storage, analysis and reporting purposes. A user at the remote PC can also directly view and control the PLC.

Calibration

Like all particulate monitoring systems, for accurate quantitative measurement, the system must be calibrated against a standard reference method. There are many accredited laboratories who can perform such calibrations, and upon completion of the calibration exercise these laboratories supply calibration reports identifying calibration factors for each point concerned. The HMI panel provides a simple user interface to automate this calibration process. The function removes the need for customers to get bogged down logging data and calculating new calibration factors.

Configuration & Reporting

The system is extremely flexible and can be configured to suit specific application requirements. Systems are supplied with MS Excel templates that automatically access data files and produce fully formatted reports suitable for submissions to environmental regulators. Reports are generated with just a few keystrokes, saving a considerable amount of valuable time.

Configuration extends to:

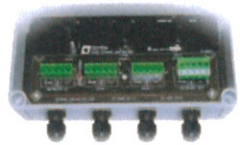
- The number of sensing heads connected to the system
- Alarm levels & ranges
- Operator displays
- Hardware configurations

EMS6 Monitoring Heads

Each head is a self-contained monitoring unit with a 1" BSPT male thread, allowing connection to a duct-mounted 1" BSPT socket. Various sensing elements exist to suit different applications, including solid probes, flexible probes and even grid type arrangements for large areas. Each head is totally self-contained and has a single electrical connection which includes 12 V DC power and the RS/85 signal. All heads include internal selection of the MODBUS address and a gain setting used to optimise the measurement for the particular application. For very dirty applications a compressed air purge can be connected to minimise contamination at the base of the sensing element.

Network Junction Boxes

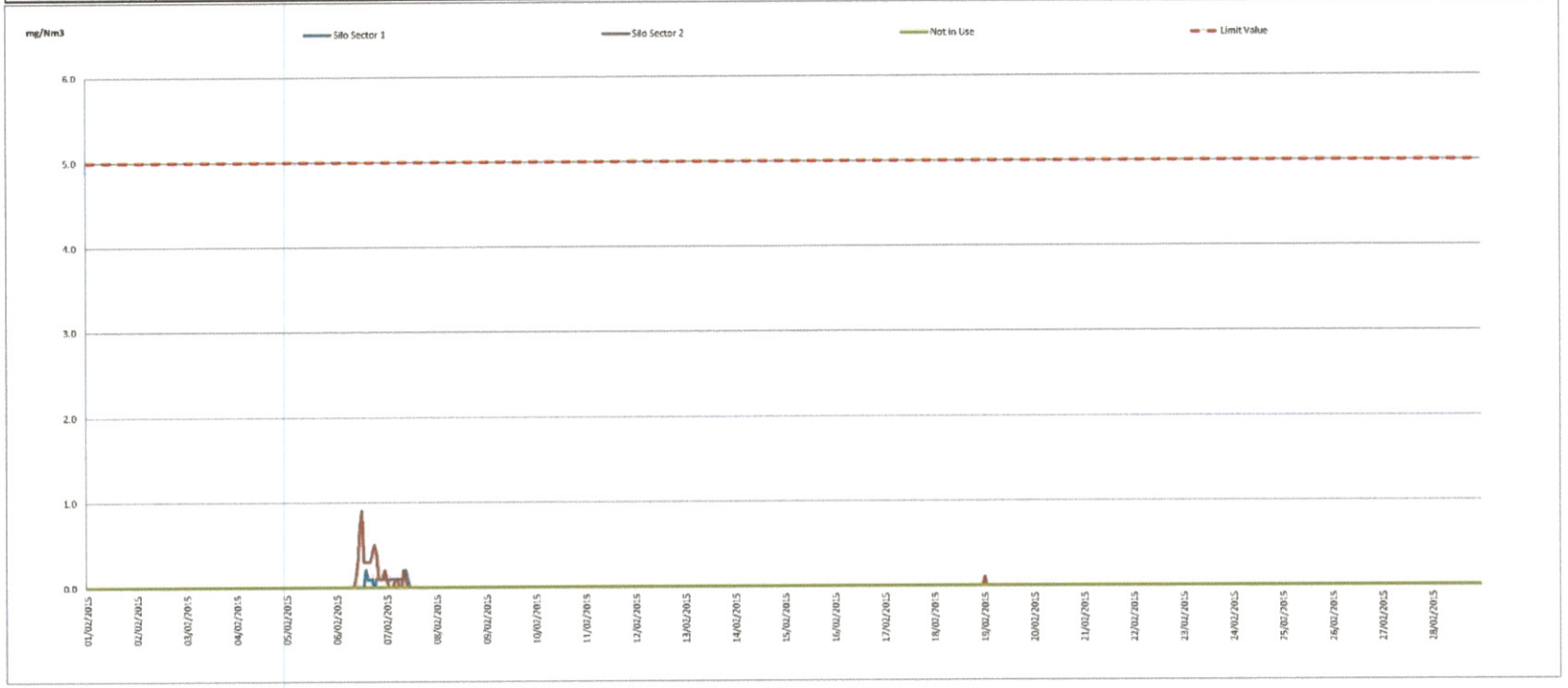
RS485 communications systems provide a very simple and cheap installation method for interconnecting instrumentation systems. The specification does, however, dictate that all devices are connected in a simple bus arrangement, which can sometimes be difficult to implement in practice. The ANJ1 Network Junction Box simplifies wiring layouts, easing compliance with the wiring requirements and reducing installation costs. They also provide an extremely useful diagnostic function when fault finding is required.



Emissions Reports are sent to MEPA on a monthly basis

February Emissions Report - UC Limited (Lab Wharf)

February 2015	Silo Sector 1	Silo Sector 2	Not in Use
Min	0.0	0.0	0.0
Max	0.2	0.9	0.0
Mean	0.0	0.0	0.0
Minutes in Alarm	0.0	0.0	0.0
Plant Operating Time (Hours)	672.0	672.0	0.0
Measurement Availability (%)	100.0	100.0	0.0



An Annual Emissions Summary Report is also submitted to MEPA as part of the Annual Environmental Report as stipulated in the Environmental Permit EP25/13

Annual Emissions Summary - UC Limited (Lab Wharf)

Jan to Dec	2015	January	February	March	April	May	June	July	August	September	October	November	December	Total/Mean
Channel 1	Silo Sector 1													
	Min	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
	Max	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Mean	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
	Minutes in Alarm	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
	Plant Operating Time (Hours)	744.0	672.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1416.0
	Measurement Availability (%)	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7
Channel 2	Silo Sector 2													
	Min	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
	Max	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
	Mean	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
	Minutes in Alarm	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
	Plant Operating Time (Hours)	744.0	672.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1416.0
	Measurement Availability (%)	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7
Channel 3	Not in Use													
	Min	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
	Max	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
	Mean	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
	Minutes in Alarm	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
	Plant Operating Time (Hours)	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
	Measurement Availability (%)	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