MEPA

EPD – Unit D

Black dust in Malta –

A background to this issue and an account of investigations carried out to date

November 2009

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1.0 Executive Summary

This report has been drawn up by MEPA following a request by the Office of the Prime Minister. It describes the various studies and analyses that have been carried out since 1999 in order to determine the nature and possible cause of the sporadic problem of black dust in the south eastern part of Malta.

Major studies on the subject were carried out in 2000 and 2007, with further investigations ongoing throughout 2009 in response to spates of complaints from residents in the area.

In order to take appropriate remedial measures, the first step is to identify the source of the 'black dust'. The chemical and other analysis carried out so far does not clearly indicate any particular single source. Moreover, analysis of the air quality in the area shows that the limits set out by the relevant European Union directives on air quality are not being exceeded. MEPA will continue monitoring and studying this issue to identify trends, sources and possible remedial measures.

2.0 The Stacey Report – September 2000

2.1 Background and methodology

This report was commissioned some time in the latter part of 1999, following complaints from members of the public living in the south-east of Malta (Fgura, Tarxien, Sta Lucija, Zabbar, Paola).

The report had to:

- Determine how much dust is deposited in the area.
- The Composition of the samples.
- Attribute the dust components to specific sources (if possible).

The exact terms of reference are not available to MEPA. At the time MEPA had not yet been set up by means of the merger of the former Planning Authority and the former Environment Protection Department.

According to the minutes of the Fgura Local Council meeting held on the 22nd October 1999 (attached to this dossier) "This nuisance started 3 years ago [ndr 1996], it was also said that the problem persists with the wind blowing from different directions. It was noted that recently these localities have experienced an intensification of the problem" – *Dan l-inkonvenjent beda tlett snin ilu, fejn saret referenza li dan qed jippersisti b'irjiehat differenti ukoll. Dan l-ahhar żmien żdied b'mod konsiderevoli f'dawn l-inhawi*, (refer to minute no 3).

Dust deposition gauges were installed in 5 monitoring locations spread around Malta. These deposition gauges were essentially 2 litre polyethene bottles, with a conical funnel attached at the open end and were similar to the British deposit gauge as per BS 1747: Methods for measurement of air pollution. The samplers were installed as shown in the table below:

Sample Number	Location
1	Fgura Local Council Office in Carmel Street
2	Mr Calleja's (Deputy mayor in 1999) house.
3	145, Tower Road, Sliema.
4	64, Carmen Street, Sliema.
5	Dingli Mayor's (in 1999) house, Dingli.

The dust "fall out" sampling programme ran from the 14th December 1999 to the 18th July 2000 (a total of 214 days). The samplers were changed approximately once every month.

The collected samples went sent over to AEAT in the UK. The dust samples were dried in an oven and the dust deposition rates (in mg of dust deposited per metre squared per day) were calculated. The samples were then characterised by optical microscopy, scanning electron microscopy/energy dispersive x-ray spectrometry (SEM/EDX) and X-ray Fluorescence (XRF) . A total carbon analysis of the samples was also performed.

2.2 Results of the Stacey Report

In the results section the Stacey report compared the results of the speciation analyses by XRF, for all the samples from each of the 5 sampling locations. Apart from other components, the speciation analysis performed by AEAT tested for three "possible power station indicators", namely vanadium (V) oxide (V_2O_5), nickel oxide (Ni O) and sulphur trioxide (SO_3).

The Fgura "fall out samples" (collected from both the Local Council Office and the Fgura Deputy Mayor's house) had markedly higher amounts of SO_3 than the samples from the other three localities.

Locality	Survey average Percentage SO_3.
Fgura, Local Council Office.	3.33
Fgura, Deputy Mayor's House.	7.28
Sliema, 145 Tower Road.	0.50
Sliema, Carmen Street.	0.77
Dingli, Deputy Mayor's House.	0.49

In addition no nickel oxide and vanadium (V) oxide were found in the dust collected from Sliema Tower Road, Sliema Carmen Street and Dingli. On the other hand low levels of nickel oxide were detected in 1 out of 5 samples from both the Fgura Local Council office and the Deputy Mayor's house. Vanadium (V) oxide was detected in 4 out of 5 samples from the Fgura Local Council Office and in 4 out of 5 samples from the Fgura Deputy Mayor's house.

Vanadium and Nickel are minor constituents of heavy fuel oil (around 60 mg/kg and 50 mg/kg respectively) and following the combustion of heavy fuel, they are released into the atmosphere with all the other unburnt material. In combustion residues they are highly likely to be found as oxides and not in the elemental state.

Other compounds were detected in the samples from all the localities, most of these compounds such as calcium oxide, aluminium oxide and silicon oxide were attributed to natural sources.

The Fgura dust samples usually contained large quantities of coarse dust particles similar to the flyash emitted by power stations. The size distribution varied between 70 – 300 micrometers in size. This is an order of magnitude of at least 7 to 30 times the particle size (10 micrometres) considered to pose a particular risk to human health. Particles with a size of 10 micrometres or less may lodge in the alveoli of the lungs and potentially act as carriers for toxic substances. Larger particles do not normally lodge in the lungs in this manner.

According to the report the 70 micrometer particles would reach the ground approximately within 3km of the source while the 300 micrometer particles would reach the ground approximately within 1 km of the source. This suggests that a local source is responsible for this phenomenon. This was further reinforced by the fact that the Fgura samples were morphologically different from the Sliema and from the Dingli samples.

Finally the Stacey report analysed the chemical speciation data in the light of the wind data obtained from the Met Office. According to this report "when the prevailing winds were westerly, concentrations of vanadium, nickel and sulphur were detected in the Fgura dust, suggesting that emissions from the power station were having an effect on local deposited dust".

Sampling Period	14-Dec-99 to 17-Jan-00	17-Jan –00 to 14-Feb-00	14-Feb-00 to 13-Mar-00	15-May-00 to 14-Jun-00	19-Jun-00 to 18 –Jul -00
Wind Direction	Westerly	Westerly	Westerly	Variable	North Westerly
Wind Speed (m/s)	5.02	4.99	4.96	4.40	4.23
% vanadium Local Council	1.63	0.31	0.18	Not detected	0.20
% Vanadium Deputy Mayor's House	Not detected	0.37	0.92	Not detected	Not detected
% nickel Local Council	Not detected	0.12	Not detected	Not detected	Not detected
% nickel Deputy Mayor's House	Not detected	Not detected	0.32	Not Detected	Not Detected
% sulphur trioxide. Local Council	0.50	9.79	2.17	0.58	3.63
% sulphur trioxide. Deputy Mayor's House	8.58	14.63	7.65	1.61	3.94

This led the consultant working on the report to conclude that the oil fired power station at Marsa potentially had an impact on the deposition of dust in Fgura.

3.0 Post 2000 Scenario

MEPA is informed that the electrostatic precipitators fitted on boilers 6, 7 and 8 at the Marsa Power Station were put back in service in January 2000. The precipitator had been previously taken out of service and modified, following the shift to heavy fuel oil (rather than coal) in 1994-1995. The efficiency of these precipitators is typically around 70% (meaning that they capture *circa* 70% of the dust from the flue gases flowing through them). MEPA is not in a position to say whether or not, this was prompted by the Fgura dust "fall out" investigations which at the time were still under way. Such an issue could possibly be clarified by Enemalta.

Following the negotiations between Malta and the EU, Malta switched to 1% sulphur fuel (from 3.5% sulphur fuel) in April 2004. Lower sulphur fuel also contains lower amounts of ash meaning a lower amount of combustion residue.

In the meantime MEPA was set-up in 2003 and was nominated as the Competent Authority for environmental protection. Since this time, apart from regular but isolated reports of black dust episodes, there were no major complaints registered at MEPA on this issue from the date on which MEPA was set up until August 2007.

In August 2007 MEPA received a spate of complaints on the deposition of black dust in Fgura. During this period, increased deposition of black dust in the Fgura area was also confirmed to the Authority by reliable sources (including reliable MEPA and OPM employees who live in the area).

4.0 2007 Investigations

4.1 Background and methodology

Given the conclusions of the Stacey report, it was at the time assumed that the Marsa Power Station was responsible for this incident. However given the changes in the operations at the Marsa Power Station in the pre-accession period, MEPA considered it opportune to conduct a confirmatory test and also to widen the scope of the investigations in order to rule out other potential sources such as the Malta Shipyards, the mobile incinerator at the civil abattoir[1] and diesel engines (traffic). This was done so as to have scientific backing when requesting Enemalta to make the required modifications with the aim to find a solution to this nuisance.

MEPA officials were tasked with the collection of dust "fall out" samples from the residents of the Fgura area. In the meantime the Enemalta Corporation, the civil abattoir and the Malta Shipyards were asked for a sample of boiler flyash, mobile incinerator fly ash and grit used for ship maintenance activities, respectively. A sample of diesel soot from the tail pipe of a heavy goods diesel vehicle was also collected.

No fly ash from the mobile incinerator was available and MEPA's officials were given a sample of the incinerator residue This was discarded since it looked visually different from the Fgura "fall out" dust. The other samples were analysed by SEM/EDX. This method was chosen because it was at the time readily available in Malta, is relatively quick in producing results and apart from giving information on the composition of the sample, it also gives information on the morphology (or shape) of the particles making up the sample under test. One has to keep in mind that it was expected that this analysis would confirm the conclusions of the Stacey report.

The samples were analysed at the Diagnostic Science Laboratories (DSL) division of Heritage Malta in Bighi. The Fgura "fall out" samples, the Enemalta flyash, Malta Shipyards grit and the diesel soot samples were characterised by optical microscopy, electron microscopy and energy dispersive X-ray spectroscopy. The latter technique allows a quick, qualitative analysis of the sample.

[1] This has been taken out of service following the determination of IPPC permit IP 0004/07/A for the incinerator in Albert Town, Marsa on the 30 October 2007.

4.2 Results

The grit from ship maintenance activities at the Malta Shipyards and the diesel soot appeared totally different from the "fall out" particles.

The picture on the left of Figure 1 shows a sample of the fall out particles as seen under a microscope; the sample on the right shows the ship maintenance grit under an optical microscope.

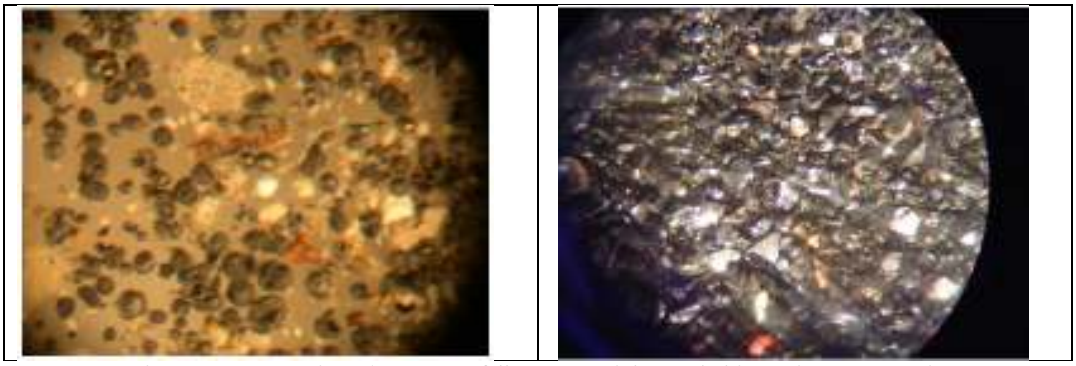


Figure 1: Comparison between "fall out" particles and ship maintenance grit.

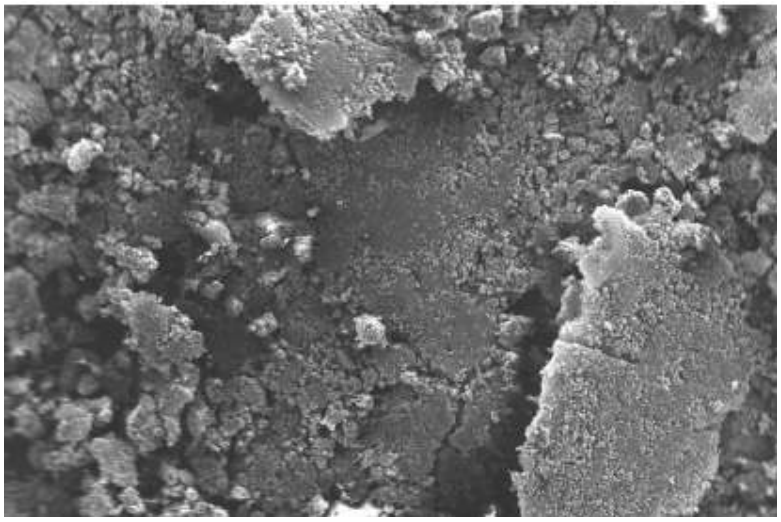


Figure 2: Soot from a diesel engine

Figure 2 shows a sample of the soot from a diesel vehicle when viewed under a scanning electron microscope.

The possibility of diesel vehicles and of the Malta Shipyards being the source of the nuisance was thus ruled out.

The "fall out" particles had a blackish colour, were spherical in shape and porous. They are normally referred to as "cenospheres". Figure 3 shows one of the "fall out" cenospheres under a scanning electron microscope.

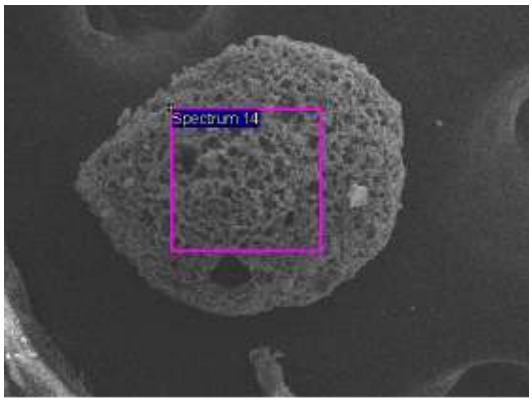


Figure 3: A Fgura "fall out" particle under SEM.

It was noted that the "fall out" particles had a very similar shape to the flyash particles collected from the Marsa Power Station (see Figure 4).

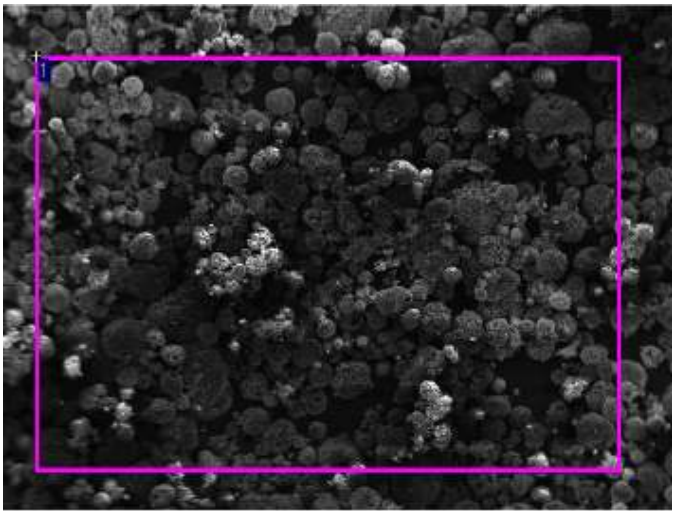


Figure 4: SEM picture of flyash from the Marsa Power Station.

A characterisation by energy dispersive X-ray spectroscopy showed that traces of nickel and vanadium could be detected in the power station flyash, see the arrows below.

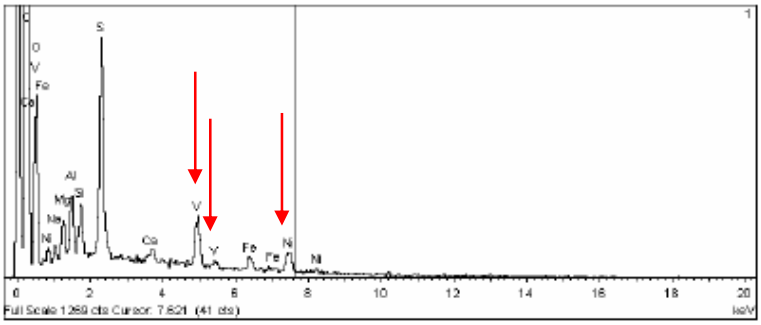


Figure 5: An EDX spectrum of the Mara Power Station Flyash.

However no traces of these metals were detected in all the other 8 samples, taken from the following locations:

Sample 1	Triq il-Ħuttafa, Fgura.
Sample 2	Triq il-Kampanella, Fgura.
Sample 3	Triq il-Ġojjin Fgura.
Sample 4	Triq Ħaż Żabbar, Fgura.
Sample 5	Triq San Tumas Fgura.
Sample 6	Vjal Kottoner Fgura.
Sample 7	Triq W. Lassell, Fgura.
Sample 8	Triq il-Kuluvert, Fgura.

A number of factors could have influenced this result, namely that these metals might not have been present at sufficiently high concentrations in the "fall out" particles to enable detection by EDX. Since the findings of the Stacey report could not be confirmed, MEPA concluded that further analysis by standardised methods such as Inductive Coupled Plasma - Mass Spectrometry or Atomic Absorption Spectroscopy (ICP-MS/AAS) were required.

Once a fresh set of analysis was required it was decided that the samples would be sent to an accredited laboratory (most probably abroad due to the fact that the prices are more competitive – this was confirmed through an expression of interest made previously for the analysis of PM_{10} samples) and that the "fall out" dust would be sampled using equipment similar to the British deposit gauge so as to avoid contamination by other "dusts" present in air.

However the intensity of the problem decreased considerably by October 2007 and the samplers were not installed. In the meantime MEPA decided to monitor for fine dust (PM_{10}) in the locality and also to analyse these samples for a number of heavy metals.

5.0 Fgura PM_{10} monitoring

5.1 Background and methodology

Malta is legally bound to implement the provisions of Directive 1999/30/EC (relating to limit values for sulphur dioxide, oxides of nitrogen, particulate matter and lead in ambient air) which stipulates thresholds for fine dust in ambient air. Particulate matter is the terminology used to define PM_{10} which is the fine dust fraction (having a diameter of 10 micrometre or less) is not visible to the naked eye, is airborne for long periods of time and can also travel kilometres. PM_{10} is the dust fraction relevant to human health since such particles are not filtered by the respiratory system and if very fine, and the smallest fractions ($PM_{2.5}$) can also end up into the bloodstream.

On the contrary, the "fall out" dust has a much larger size range, and would have been deposited within minutes of emission from the source. The correlation (if any) between ambient levels of PM_{10} and dust "fall out" has not yet been established.

MEPA decided to monitor for PM_{10} so as to "test" compliance with the applicable legislation and thus determine if there are high levels of fine dust (PM10) in the Fgura area. Moreover, compliance with Directive 2004/107/EC (relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air) was also tested so as to discover more about the levels of the constituents of this fine dust fraction.

A low volume sampler fitted with 47 mm quartz fibre filters and a sequential filter changer was installed on the roof of the Local Council office in Carmel Street in order to sample for PM_{10} in ambient air in Fgura, as per MSA EN 12341 (Air quality - Determination of the PM_{10} fraction of suspended particulate matter). The PM_{10} dust fraction samples were sent to an accredited lab in Austria (Umweltbundesamt GmbH) for the analysis of a number of metals including lead, nickel, vanadium, arsenic and cadmium. The sampling period was of a duration of 22 days, i.e. from the 11 to the 22 October 2007 and from the 08 to the 19 November 2007.

5.2 Results

Analysis of the PM_{10} fraction of the dust yielded the following results for nickel and vanadium, which are characteristic "tracers" of heavy fuel oil, which is the same fuel used by Marsa Power Station:

Metal	Highest daily reading	Daily limit Value	Average concentration over the sampling period	Statistically corrected annual average	Annual Limit Value
nickel	22.2 $ng.m^{-3}$	n/a	9.7 $ng.m^{-3}$	4.8 $ng.m^{-3}$	20 $ng.m^{-3}$ (from Directive 2004/107/EC)
vanadium	24.5 $ng.m^{-3}$	1000 $ng.m^{-3}$ (WHO guidelines)	18.7 $ng.m^{-3}$	9.3 $ng.m^{-3}$	370 $ng.m^{-3}$ (statistically corrected WHO daily limit value) no EU limit value is available.

The above table shows that although there were specific peaks of nickel and vanadium on specific days of the sampling period, the average concentration of these metals are within the limit values specified by EU legislation and WHO guidelines respectively. Analysis for the other metals covered by Directive 2004/107/EC (arsenic and cadmium) as well as for lead covered by 1999/30/EC also showed that the levels of these metals were well within the limits established by the relevant EU Directives. In fact the highest daily readings were at least 3 times lower than the annual limit values in the relevant Directive. It is perhaps worth mentioning that it is not customary in this sort of analysis to compare a short term average (e.g. a daily average) to a longer term limit value (e.g. an annual limit value). Long term limit values are set lower than shorter term limit values due to the fact that former are meant to take into consideration cumulative effects. To this effect and to counteract for the fact that the sampling period was a relatively short one, a "statistically corrected average" was compiled using real time such that a comparison with the long term limit values could be made.

If one had to statistically correct the bimonthly average concentration of arsenic, cadmium and lead in order to obtain "annual" values the following results would be obtained:

Metal	Statistically corrected concentration in Fgura.	Annual limit values from EU Directives
lead	7 $ng.m^{-3}$	500 $ng.m^{-3}$
arsenic	0.19 $ng.m^{-3}$	6 $ng.m^{-3}$
cadmium	0.16 $ng.m^{-3}$	5 $ng.m^{-3}$

Similar analyses were conducted on the PM_{10} dust fraction sampled from Zejtun, Msida, Kordin and Għarb, with the samplers located at the site of MEPA's real time monitoring locations. The figures below compare the statistically corrected annual averages of these pollutants (lead, nickel, vanadium, arsenic and cadmium) from the different sampling points to the limit value derived from EU Directives.

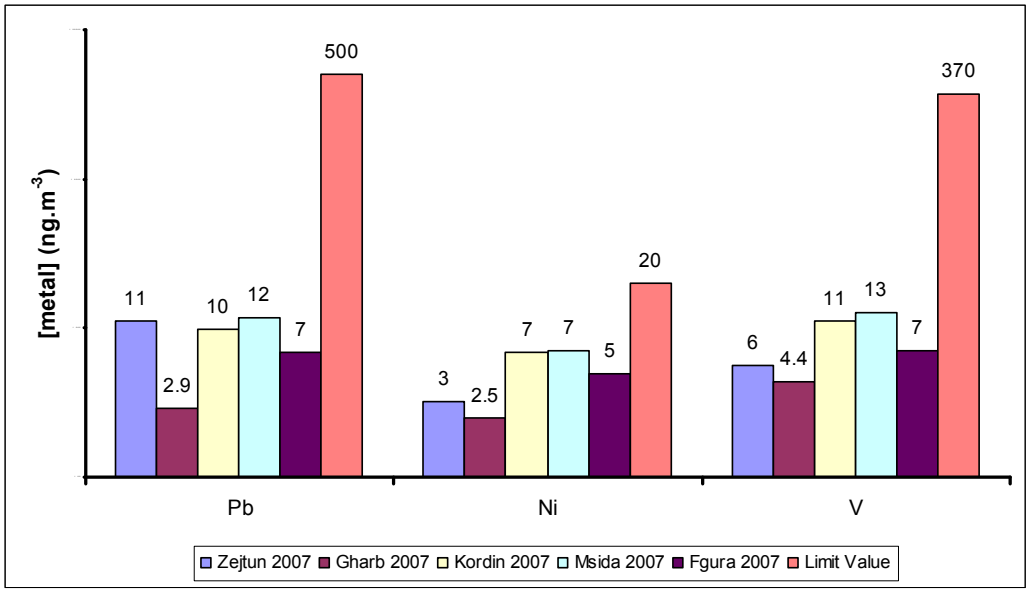


Figure 6: Concentrations of lead, nickel and vanadium.

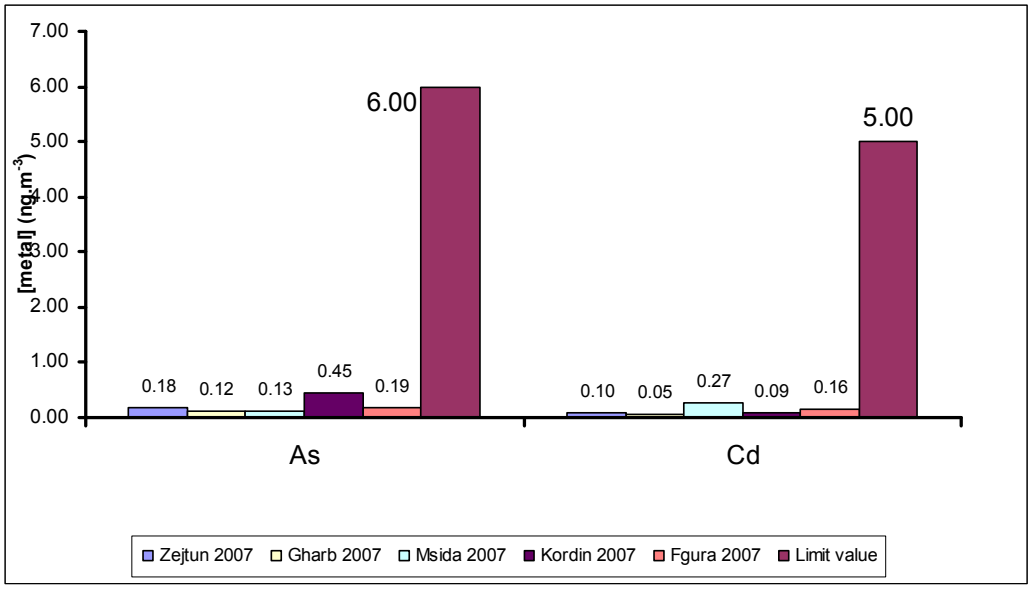


Figure 7: Concentrations of arsenic and cadmium.

As can be seen from figure 6, the concentration of lead, nickel and vanadium in ambient air in Fgura are lower than in Msida and in Kordin, and slightly higher than in Zejtun. Għarb is a rural background station and the concentrations of pollutants are expected to be lower than anywhere else.

Concentrations of arsenic and cadmium are exceptionally low everywhere, with the concentration of arsenic being higher than anywhere else in Kordin but still well below the limit value by a factor of more than 10 (see figure 7).

Cross-analysing the daily variation in the concentrations of nickel and vanadium, there seems to be a correlation between the occurrence of peaks in the concentration and wind blowing from a North-Westerly direction. However more data points would be required in order to obtain a statistically meaningful result.

The daily PM_{10} limit value as per Directive 1999/30/EC of 50 μg/m³ was exceeded three times throughout the 22 day period of study (i.e. from the 11 to the 22 October and from the 08 to the 19 November) as per table below:

Date	PM_{10} concentration in Fgura.	%age exceedance
13 October 2007	51 μg/m³	2
19 October 2007	74 μg/m³	48
20 October 2007	52 μg/m³	4

According to Directive 1999/30/EC, the daily limit value for PM_{10} can be exceeded up to 35 times in any calendar year. The influence of wind direction on the occurrence of exceedances of the PM_{10} limit value warrants further investigation.

Again it has to be stressed that the black dust nuisance suffered by the Fgura residents can in no way be attributed to PM_{10} which as stated earlier on can be considered to remain airborne for long periods of time. In fact this analysis was not carried out in order to settle the issue of the source of this nuisance, but in order to assess whether the residents of Fgura are being exposed to pollutant concentrations higher than those prescribed by the relevant sections of the EU *Acquis*. The findings clearly indicate that those limits were not being exceeded.

Matters concerning Enemalta Corporation

6.1 Flyash analysis

In late 2008 Enemalta reported problems with the disposal of flyash, due to the lack of suitable sites for the landfilling of this waste. Enemalta asked MEPA if encapsulation in concrete would be an acceptable solution for MEPA. In reply to this query, MEPA asked Enemalta to commission a set of analysis in order to determine amongst other things the levels of a number of metals in the flyash. These results were forwarded to the authority on the 13 January 2009 and show that flyash from the Marsa Power Station contains high levels of magnesium, vanadium and nickel, as per table below (minute number 6 is the part of the report compiled by ALcontrol labs relating to the analysis of the Marsa Power Station Flyash).

Metal	Concentration in Sample 1 (g/kg)	Concentration in Sample 3 (g/kg)
magnesium	4.0	160.0
nickel	3.9	19
vanadium	4.3	92

Sample 1 was a flyash sample taken from boiler 7; sample 3 was a furnace deposit from boiler 3. This shows that nickel, vanadium and magnesium are present at sufficiently high levels in flyash (and in furnace residue) to enable at least detection.

6.2 "Switching off" of the precipitators in Marsa Power Station

On the 09 January 2009, Enemalta informed MEPA that following problems with the disposal of flyash Enemalta had to "switch off" the electrostatic precipitators at the Marsa Power Station. The boiler and precipitator schedule is shown in Figures 8, 9 and 10. As can be seen from these figures the Precipitators at the Marsa Power Plant had been switched off throughout most of 2009.

In November 2009, Enemalta informed MEPA that that the precipitators had once again been switched on So far MEPA is not informed of the solution Enemalta found for the disposal of the flyash generated by the precipitators.

Figure 8: Boiler 6 Schedule.

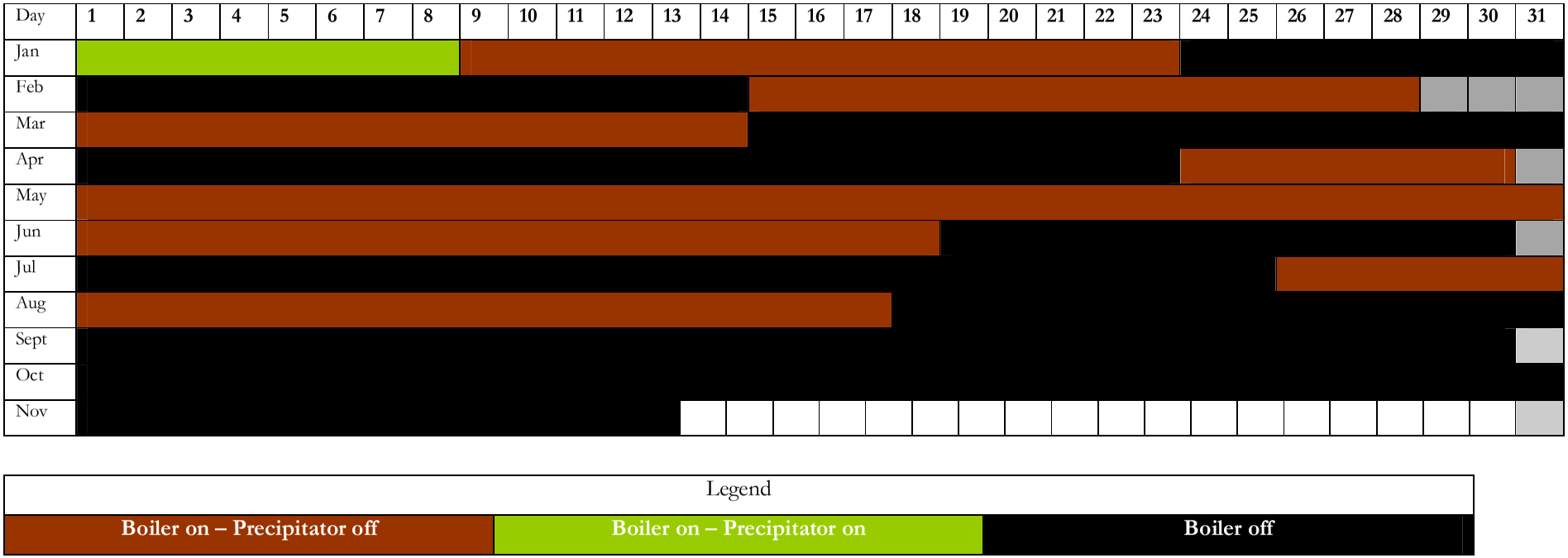


Figure 9: Boiler 7 schedule.

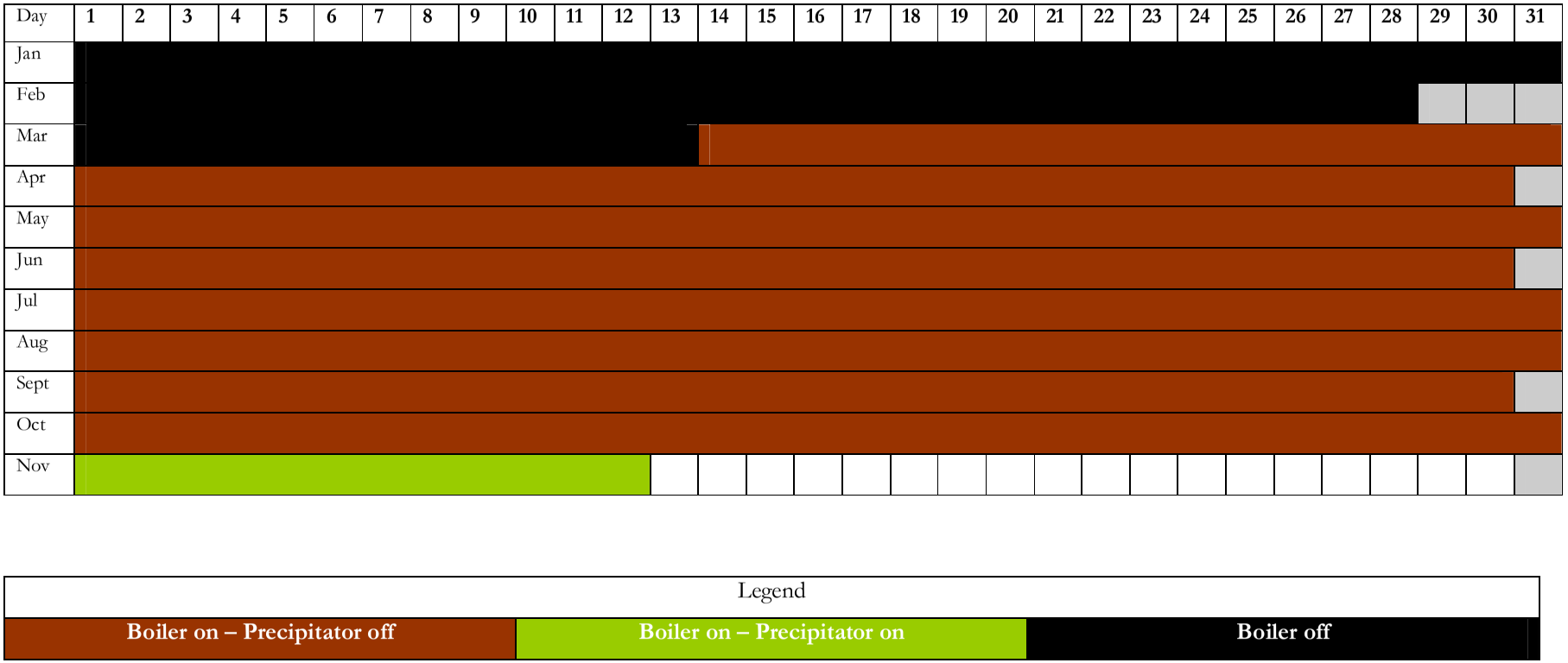
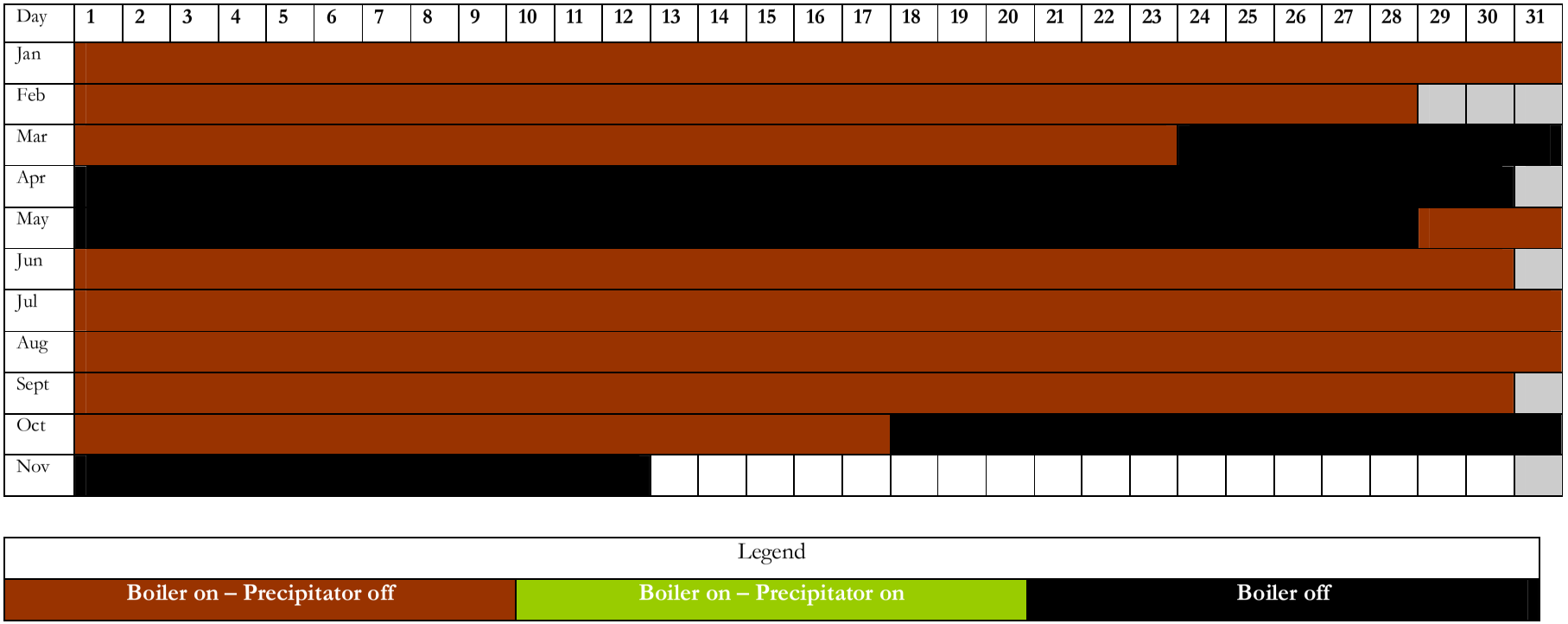


Figure 10: Boiler 8 Schedule.



6.3 IPPC permit

The IPPC permit (IP 003/07/A) (refer to minute number 7) for the Marsa Power Station was determined by the MEPA Board on the 26 March 2009 and can be downloaded from http://www.MEPA.org.mt/ippc-applications-installations-mps. This permit is a result of the obligation which translates from the Directive on Integrated Pollution Prevention and Control (IPPC).

The permit includes amongst other conditions limit values for dust, sulphur dioxide and oxides of nitrogen. These limit values cannot be higher than those set by the Large Combustion Plants Directive (LCP-D) 2001/80/EC. However, Malta has applied the limited lifetime derogation for this plant under Article 4(4)(a) of the LCP-D. This means that the limit values of the Directive are not applicable to this plant if Malta informs the Commission that the plant in question will not be operated for not more than 20,000 hours starting on the 01 January 2008 and finishing no later than the 31 December 2015.

In this case the limit values were negotiated between the regulator and the operator on the basis of what could realistically be considered as good practice for an old plant such as Marsa. The limit values shown below were set and included in the permit. These limit values are now legally binding.

Pollutant	LCP-D emission limit value.	IPPC permit limit value
sulphur dioxide	1700 mg/Nm^3	1700 mg/Nm^3
nitrogen dioxide	450 mg/Nm^3	1000 mg/Nm^3
dust	50 mg/Nm^3	150 mg/Nm^3

By comparison, the LCP-D emission limit value is the level considered as a Best Available Technology for modern plants.

In the IPPC permit for the Marsa Power Station MEPA included the following two conditions enabling the Local Councils most affected by emissions from the Marsa Power Stations to conduct a study on the impact of the power station on their locality at the operator's expense.

Condition 1.3.2

"The Local Councils most affected by emissions from the Marsa Power Station including Floriana, Valletta, Hamrun, Marsa, Paola and Fgura may jointly and in agreement with both the Authority and the operator, establish independent ambient air monitoring systems to monitor for levels of particulate matter, nitrogen oxides, sulphur dioxide, carbon monoxide, as well as any other parameters that may be agreed with the Authority at the expense of the operator."

Condition 1.3.3

"The Local Councils most affected by emissions from the Marsa Power Station including Floriana, Valletta, Hamrun, Marsa, Paola and Fgura may jointly and in agreement with the Authority, jointly appoint an independent expert to assist in the interpretation of the emission data made publicly available pursuant to condition 1.3.1."

In addition, in the permit letter (refer to minute number 8) which was sent to the operator, MEPA included a fee of €30,000 which was meant to cover the expenses incurred by MEPA in order to commission a dispersion model which will analyse the impact of the Marsa Power Station on the air quality in the localities nearby.

6.4 Current Emission Levels

The IPPC permit for the Marsa Power Station includes conditions on the monitoring of the pollutants through the use of automated measurement systems (as per the relative CEN standards) in the waste gases from the power station. The operator is to submit monitoring results every quarter and is to include a summary of these results in the Annual Environmental Report.

The automated measurement systems were installed at the Marsa Power Station in July 2009.. Throughout the month of August 2009, which is a month of peak demand for electricity, Enemalta reported the following average monthly (refer to minute number 9) concentrations of sulphur dioxide, nitrogen oxides and dusts in the exhaust gases from its chimneys at the Marsa Power Station measured by the automated measuring systems which had just been commissioned.

Boilers	Plant	Sulphur dioxide	Nitrogen oxides	Dust
3 & 4	MPS1	1309 mg/Nm^{-3}	724 mg/Nm^{-3}	56 mg/Nm^{-3}
5 & 6	MPS2	1500 mg/Nm^{-3}	939 mg/Nm^{-3}	70 mg/Nm^{-3}
7	MPS3	1378 mg/Nm^{-3}	954 mg/Nm^{-3}	61 mg/Nm^{-3}
8	MPS4	1097 mg/Nm^{-3}	770 mg/Nm^{-3}	35 mg/Nm^{-3}

Boiler start-up and boiler shut down are excluded from compliance with emission limit values and emissions are not monitored during these periods. It is also worth mentioning that Enemalta carries out soot blowing regularly. During soot-blowing a jet of high pressure steam is used to mechanically dislodge any particles which remain entrapped in the system. The particles are all discarded into the atmosphere. Soot blowing is a "necessary evil" in the sense that not carrying it

out would entail losses in the efficiency and an increase in the concentrations of certain pollutants. A schedule of all the soot blowing operations carried out from January to August 2008 is also being attached to this dossier.

7.0 2009 dust "fall out" soiling episodes

In late July early August 2009, MEPA received a spate of complaints on the deposit of large quantities of dust on buildings in the South east of Malta, especially in Fgura. Following the complaints MEPA decided to sample for the "fall out" dust using a method similar to BS 1747. The aim was to send these samples abroad together with various fly ash samples and characterise these samples for size distribution and metal content (including magnesium, nickel and vanadium, which are tracers of heavy fuel oil).

The samplers were installed on the 28th August 2009 on the roofs of 4 buildings in Fgura, the sites were chosen following a meeting with the Deputy Mayor. The sampling locations were as follows:

Location 1: Local Council Office, Carmel Street, Fgura.

Location 2: Local Council building, Hompesch Road.

Location 3: Local Council Club House in Gnien Parti Redent Gauci.

Location 4: Private Residence in Triq l-Iskola.

In the meantime a "fall out" sample was collected from Triq il-Kavallier De Guaras, Tarxien and characterised by SEM/EDX. The sample was composed of cenospheres however no nickel, vanadium or magnesium was detected in these particles. Some of the EDX spectra do include nickel (See Figures 11) and vanadium however these were not labelled by the instrument but by the analyst. This essentially means that the instrument did not detect these metals and that the analyst just placed a label on that part of the abscissa (x-axis) on which peaks of nickel and vanadium should be seen. In fact as can be seen from all the spectra, these supposed nickel and vanadium peaks are indistinguishable from any noise in the baseline12.

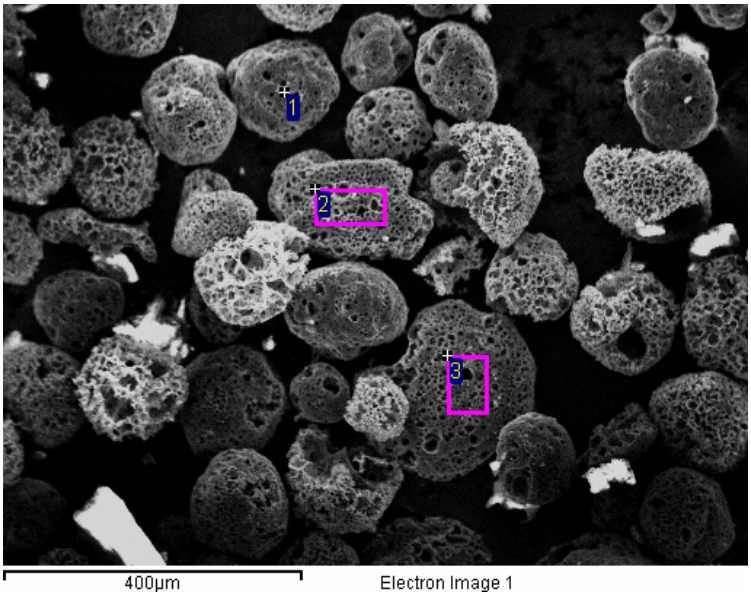


Figure 11: SEM of the "fall out" particles from Triq De Guaras, Tarxien.

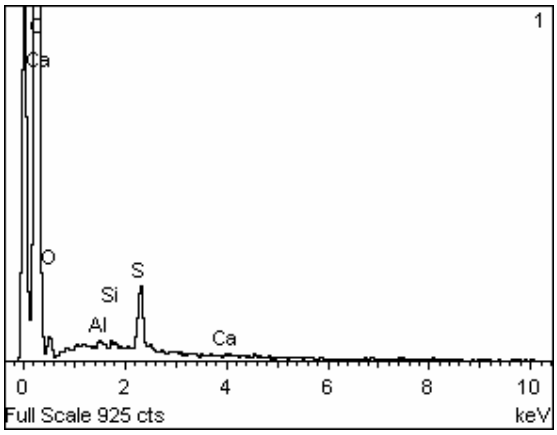


Figure 12: EDX spectrum of the "fall out" particles from Triq De Guaras, Tarxien.

The samplers were checked regularly however, from the 28 August till the 22 October not enough dust was deposited in the samplers. MEPA's foreign contractors require at least 10 grammes of sample to enable a meaningful scientific determination according to laboratory protocols. Moreover the occasional rainy days rendered the sampling campaign in vain for size characterisation of the particles.

Furthermore, MEPA is not equipped for reactive inspections, as its monitoring infrastructure is mainly oriented towards regular ambient monitoring as required by EU Directives. Hence, acquiring the required materials for the samplers from MEPA's suppliers took around two working weeks. It is also important to note that the dust fallout problem seems to have abated considerably after August and this explains MEPA's failure to collect further samples.

MEPA has also been recently receiving and logging complaints from other areas in the Maltese Islands including Qormi, Hamrun, B'Kara, Sliema, Paola and Mellieha. During the month of October 2009, MEPA received a total of 9 complaints concerning black dust. Only one was from the south-eastern region (Paola). The others were from Mellieha (4), Qormi (1), Hamrun (1), Birkirkara (1) and Sliema (1). Most of these are probably attributable to local sources or pollution from traffic.

8.0 Conclusion

The Malta Environment and Planning Authority is still carrying out investigations on the black dust issue. As a way forward MEPA will focus on the following action points:

1. MEPA will map the location of the complaints in order to determine whether the nuisance could be traced to a localised point source.
2. If enough dust deposits in the samplers which have been reinstalled in three out of the four sampling locations in Fgura, the samples will be sent abroad together with Enemalta flyash samples for a comparative analysis.
3. MEPA has entered into negotiations with Prof . Alfred J Vella from the University of Malta for his assistance in carrying out further investigations, and of this problem. MEPA is currently awaiting Prof Vella's detailed proposal for further investigations.
4. MEPA will also attempt to analyse statistically the data from its stations in order to identify any possible trends.