



**Isle of Man**  
**Government**

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**Summary of Peel Bay Sediment Monitoring Results**

## **Context**

This summary of sediment sampling results is assembled from analysis of sample taken in September 2013, June 2014, August 2104, September 2014 and December 2014, to accompany the trial disposal at sea of approximately 4,000 tonnes of dredged sediment from Peel Marina, in May 2014.

## **Summary**

The results presented here have clearly identified that the dumping signature in sediment concentration is found in Peel Bay, following the trial disposal of 4,000 tonnes of dredged material from Peel Marina.

It is also clear that Peel Bay itself had significant contamination issues prior to the disposal of dredged material from Peel inner Harbour. This was in most noticeable in sediments in the southern part of the bay.

## **Results**

### **Offshore Sediment Analysis**

Sediments analysed from the bay and licenced dump site show that prior to disposal of the dredged material the bay had some heavy metal contamination, with arsenic, nickel and lead exceeding OSPAR level 1 limits at certain sites. However, the average values for all metals prior to deposition of the dredged material were below OSPAR level 1 criteria. Post-dredge disposal results indicate that levels of all heavy metals have steadily increased in the offshore waters of the bay and licenced dump site and with the exception of nickel all metals analysed now exceed OSPAR level 1 criteria (see table 1).

In order to aid the assessment of the data several indicative values have been used. For sediments (beach and offshore surveys) the OSPAR guidance has been followed, which provides a two-tier evaluation for sediments with the lower tier (level 1) indicating that sediments are contaminated and that disposal to sea would come under scrutiny. OSPAR level 2 would indicate that sediments are beyond acceptable limits for dumping at sea. Whilst these criteria are primarily intended for the assessment of contaminated sediments they are used here to indicate impacts of heavy metal contamination in Peel Bay.

To aid the interpretation of the data a 'traffic light system' of coding is given in the following tables:

- Yellow indicates that heavy metal concentration are at or above 50% of the OSPAR level 1 limit, suggesting heavy metals are above background levels and indicate a degree of heavy-metal contamination.
- Red boxes indicate that sediment heavy metal concentrations exceed OSPAR level 1 and the sediment would be classed as contaminated.

	As	Cd	Cr	Cu	Ni	Pb	Zn	Heavy Metal impact
<u>Pre dump</u> Sept 2013 average	17.26	0.25	28.64	9.82	22.22	46.72	85.24	Yes
Range(mg/kg)	10.9-33.8	0.23-0.28	20-38	4.6-13.5	16-31	31-82	63-109	Yes
<u>Survey 1 post- dump</u> average 3/6/14	13.81	0.45	24.11	8.67	18.13	57.36	94.36	Yes
Range(mg/kg)	9.0-17	0.27-0.87	17-28	3.9-28.9	11.5-20	27-146	60-176	Yes
<u>Survey 2 post- dump</u> average 3/8/14	12.24	0.302	22.02	6.96	19.32	32.62	76.98	Yes
Range (mg/kg)	9.8-13.8	0.2-0.4	16-24.6	4.6-9.4	16.7-20.60	22.4-38.6	53-108	Yes
<u>Survey 3 post- dump</u> Average 29/9/14	17.43	0.47	24.57	15.8	22.2	58.36	145.7	Yes
Range (mg/kg)	15.2-20.9	0.39-0.57	0.32-38.7	11.8-23.5	19.3-23.9	42.3-79.4	124-174	Yes
<u>Survey 4 post-dump</u> Average 4/12/14	26.2	0.86	52.2	26.6	20	76.5	180	Yes
Range mg/kg	15-42.8	0.64-1.0	32-90	15-36	18-22	52-121	150-203	Yes
OSPAR Action Level 1	20	0.4	50	30	30	50	130	
OSPAR Action Level 2	70	4	370	300	150	400	600	

Table 1. Offshore sediment heavy metal concentration averages and concentration ranges for the pre-dump survey and four subsequent post-dump surveys (all expressed as mg/kg dry weight). OSPAR action level concentrations are given for comparison purposes. Red indicates that the value exceeds OSPAR action level 1, yellow indicates heavy metal concentrations are at or above 50% of the OSPAR action level 1.

Average metal concentrations in the offshore environment of Peel Bay and licenced dump sites have increased between pre-dumping and current levels. Average cadmium concentrations have increased by approximately 240% between pre and post dredging activities, similarly lead concentrations have increased by 64%, arsenic by 51%, chromium by 83%, zinc by 110% and copper by 170%.

Comparison of the heavy metal concentrations between the pre and post dredge disposal operation shows that concentrations of both lead and cadmium increased significantly immediately following the discharge of sediment from the breakwater. The concentrations of metals in the vicinity of the breakwater initially decreased, but have subsequently shown a marked increase over the course of the study. Cadmium concentrations remain elevated and are still significantly higher than those recorded before sediment disposal. Both cadmium and lead concentrations at this locality remain above OSPAR action level 1.







Conversely sediments deposited into the marine environment can be ingested directly by edible marine animals and can build up relatively quickly to concentrations which can lead to health issues in humans if they consume this seafood in sufficient quantities.

### **Q7 What are the harmful contaminants in the silt?**

**A7** If present in high enough quantities lead, cadmium and Polycyclic Aromatic Hydrocarbons (PAH's) can have an impact on health.

These three contaminants are present in the sediment but it is important to point out that the risks they present to health are normally associated with exposure to the solid forms of the materials such as dust or inhalable fractions such as vapours.

Contaminants dissolved in water are not thought to be as hazardous unless they are present in very high concentrations and consumed over a significant period of time.

In this case the contaminants are expected to be securely held within the bunded area of the facility. Water outflows will be monitored carefully.

The contaminants in the silt are naturally occurring on the Island and can be found in the soils and old mine workings in the Foxdale area. The attached table (see appendix) provides data for the levels of key contaminants in both the Foxdale former mine working area and Peel Marina. A comparison of the data shows that silt from the Marina is safer than soil in the vicinity of former mine workings. Samples from the 'deads' show significantly higher levels again and these areas have been used for recreation for many years without any known adverse health effects.

### **Q8 What measures are in place to manage risks from the Poortown facility?**

**A8** The measures designed into the Poortown facility include a retaining bund, an impermeable polythene membrane to prevent contaminated water leaching into the ground, a bank of settlement lagoons and a filter system to catch PAHs.

The vast majority of the solid fraction is therefore retained and not available to the environment.

Water which does run off from the stored deposits will contain only a small quantity of the contaminants and this water will pass through a bank of settlement lagoons which will allow the majority of any solid material contained in it to sink to the bottom and be retained. Contaminants are therefore greatly reduced and released into the environment at a much slower rate than they would be at sea.

The bund and delivery vehicle access arrangements have been designed to prevent direct run off onto adjacent land.



Measures will be adopted as the sediment is extracted from the Marina to allow much of the water to drain back into the basin, thereby minimising the volume and salinity of any water transported to the Poortown location.

Further to this, analysis of the water quality in the stream adjacent to the facility at Poortown has identified pre-existing, naturally high, concentrations of some metal contaminants which will form the basis of a discharge licence against which any possible changes to pollutant levels can be measured as the deposition of the materials progresses. The levels to be specified in the licence are in alignment with UK statutory Environmental Quality Standards and therefore not likely to pose any risk to livestock reared in the fields adjacent to the watercourse.

Regular sampling of run-off and leachates will be undertaken.

### **Q9 What will happen if the control measures are not effective?**

**A9** A regular sampling regime will identify any problems should they arise and DEFA and DOI officers will work together to ensure that appropriate measures are implemented should they be required.

Additional controls could include, enhanced filtering measures such as reed beds and shell screens (both proven techniques) or using tankers to remove run-off in the event that prolonged periods of heavy rain stretch the capacity of the settlement lagoons.

### **Q10 Why did you commence work on the Poortown site without first going through the planning process?**

**A10** Although the DOI could have deposited all 18,000 tonnes of silt at sea in a short period, it recognised that although that would have been legal on the Island, it would have been environmentally irresponsible, economically damaging and internationally unacceptable. Once it became clear that disposal on land was the best environmental option the DOI considered all the existing landfill sites on the Island but found that none were suitable.

As DOI is obliged to dredge harbours and as the Public Health Act contains specific provisions for emergency developments, the Department could have done the works without seeking permission. The Minister decided that it would be better if the Department made a planning application so that everyone can see what is being planned and why. The planning process was started at the same time that the Public Health Act Direction was being considered; the application will be submitted within a week of the start of operations.

The Department's planning enforcement policy has for many years made this option clearly available to those who find themselves in similar difficulty. Copies of this document are freely available on the Department's website.

**Q11 Why was there no public consultation or notification before the work at Poortown commenced?**

**A11** The Poortown location was only identified as the main option for further consideration in mid-March 2015. Prior to that, the efforts of DOI and DEFA officers had focussed on pre-existing disposal sites or locations closer to Peel.

Once it became clear that the only option to avoid a situation in which public health might be put at risk, the Poortown possibility was further explored.

Feasibility and design work progressed quickly and in parallel and it became clear that the location was viable as a temporary storage solution towards the end of March.

Under the terms of the Public Health Act work can commence before any public consultation period but in this case it would have been preferable to give the German Commissioners a few days advanced warning, as was provided to the Peel Commissioners. While this omission was not deliberate, this opportunity was missed and Minister Gawne has personally apologised to the German Commissioners for this.

**Q12 What is happening about a permanent solution?**

**A12** DOI has promised German Commissioners that the Poortown site will not be used as a permanent waste disposal site. DOI wants to use the temporary store for no more than 5 years and will start work immediately on identifying a long term solution to the need for a new problematic waste disposal site. It is unlikely that a new site can be open before 2018 at the earliest but the dredged silt will be removed from Poortown as soon as a new site is available.

**Q13 How will the silting problem in Peel be dealt with or avoided in future?**

**A13** DOI engineers are currently working to assess the viability of options which could be used to control the amount of silt entering into the marina. However, it is likely that a small amount of material will be dredged from the Marina each year and disposed of at sea in compliance with relevant environmental standards

**Q14 Does the legislation need to be reviewed?**

**A14** Manx legislation is under regular review to ensure that it is fit for purpose. In this case it appears to have functioned well as planning and environmental protection laws acted as deterrents to inappropriate choices regarding deposition of the silt. The emergency provisions of the Public Health Act allowed the development of a pragmatic temporary storage option once all other alternatives had been thoroughly considered.

**Q15 Could the Government have handled this better?**

**A15** Yes. With hindsight the original design of the marina was flawed and work on removing silt should have been carried out as part of a regular maintenance regime. In future, appropriate environmental impact assessments will be used to identify such issues and guard against such problems. The Government response over the past year has however been much more positive and responsible.

DOI and DEFA have worked together to identify and develop a good temporary solution which gives them control of the situation. They will continue to work together to use the time gained to develop permanent solutions and ideally to put the material to good use.

Importantly, the Island will be viewed by its neighbours as a responsible jurisdiction which deals with its own problems rather than disposing of its potentially harmful waste into a sea which is shared by all.

**Q16 Has the recent testing identified any food safety issues?**

**A16** The monitoring continues to show that the commercially fished sea food is safe for human consumption. However, we would advise again that the mussels from the entrance to Peel harbour should not be used for human consumption as a consequence of the naturally high levels of metal contaminants in the river sediments which have been present for generations.

In the light of what has been learnt from the recent monitoring, DEFA intends to continue the sampling process in order to ensure the impacts are fully understood.

**Heavy Metals in Foxdale former mine-working area, and Peel Marina**

Important note: The analytical results from which these data are extracted relate only to the samples tested, which had been taken for specific investigatory purposes in locations where mine contamination was suspected – no inference regarding heavy metal content in soils not similarly contaminated by residues from mine workings is implied nor should be inferred.

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Peel Marina sediment (5 samples taken by DEFA in 2013)	40 - 49	3 - 6	34 - 41	75 - 126	1,570 – 2,480	29 - 34	870 – 1,420
Soils from Foxdale area in vicinity of mines (range of majority) excluding obviously mine spoil	20 - 200	1 - 13	10 - 60	10 - 260	400 – 6,500	8 - 80	250 – 5,000
Mine spoil from 'deads' area	up to 460	up to 17	up to 30	up to 670	up to 70,000	up to 35	up to 1,900
Sample taken from road spillage outside Highwayman Pub – Monday 13 <sup>th</sup> April 2015	27.5	5.6	29.3	118	1,866	23.1	1,307

All results in milligrams per kilogram (mg/kg) dry weight

70,000 mg/kg corresponds to 7% lead, which may indicate some un-extracted lead ore.  
The above data are from analysis carried out by the Government Laboratory.

Mr Lenartowicz, Government Analyst, has quantified these results with regard to the 8-hour workplace exposure limits. If the silt dried and became suspended in the air in the form of inhalable dust, in visibly dusty atmosphere, none of the metals present would exceed the 8-hour work place exposure limits.

In addition the Government Laboratory has analysed water from the river downstream of the Poortown site

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
River water from downstream of field adjacent to Poortown Quarry, 5/03/15	<5	<0.5	<5	25.8	57.9	12.1	85.8
All results in micrograms per litre (µg/l)				N.B 1000 µg/l = 1 mg/l			



