STATES OF JERSEY

COMMITTEE OF INQUIRY: TOXIC INCINERATOR ASH DUMPING IN THE ST. HELIER WATERFRONT LAND RECLAMATION SCHEMES

Lodged au Greffe on 10th June 2008
by Senator S. Syvret

STATES GREFFE

PROPOSITION

THE STATES are asked to decide whether they are of opinion –

to establish a Committee of Inquiry in accordance with Standing Order 146 in order to examine all matters relating to the handling and dumping of toxic ash from the Island's municipal waste incinerator into the marine land reclamation sites and other areas; and, specifically –

(a) to examine the breakdown in public administration which enabled the irresponsible and unsafe dumping of the toxic ash and to examine why this was able to occur and to consider what improvements and safeguards should be introduced in order to ensure that public administration is subject to effective checks and balances;

(b) to consider what, if any, additional monitoring and precautions should be introduced to safeguard human health from the toxins within the reclamation sites;

(c) to consider what, if any, additional measures should be taken to protect the marine environment from the toxins within the reclamation sites;

(d) to consider whether States departments placed Jersey – and by extension the United Kingdom – in a position in which it has breached its obligations under the OSPAR Convention as a result of the dumping;

(e) to examine and report on any related matters which the Committee considers relevant to its inquiry.

SENATOR S. SYVRET

REPORT

It is plain on the evidence, as described in this report alone, that the health and welfare of the people of Jersey, the Island's environment and the marine environment which we share with our neighbours, have been needlessly put at risk because of a systemic and cultural failure of public administration in the Island.

A complete breakdown in effective checks and balances within the Island's public administration has occurred.

The evidenced facts being clear – the States of Jersey must finally face the truth and learn the necessary lessons.

The land reclamation sites which surround St. Helier's harbour area are toxic waste dumps.

Moreover – they are toxic waste dumps which have needlessly exposed the public to potential human health risks.

Moreover – the land reclamation sites are toxic waste dumps which are sea-porous and subjected to the vast hydro-pneumatic forces generated by Jersey's 13 metre tides.

Therefore St. Helier's land reclamation sites represent a massive source of potentially hazardous leachate into the sea.

How on Earth was this able to happen?

The States finally needs to recognise that the ash dumping – whilst a problem of itself – was really a symptom of a greater problem, namely, an apparent intrinsic inability of the Island's government to subject itself to meaningful and effective regulation.

Longer-serving members of the States and members of the public may recall that for many of the early years of the controversy – when people first started to object to the ash dumping – it was frequently claimed that there was no problem, that the ash did not represent a threat to human health, that it was "inert", that it posed no risk to the environment and that it was not toxic. Sometimes one still hears claims to that effect. Let there be no mistake about this: the ash is toxic; it always has been; even setting aside components of the ash such as dioxins, furans and polychlorinated biphenyls (PCBs), which only really became understood by science in the last half-century, many of the toxic heavy metals that are components of the ash have long been known to badly damage human health. In some cases this knowledge has existed for well-over a century.

Even now the incinerator and the handling and disposal of the resultant ash fail to meet acceptable standards. However, some improvements in the handling and disposal of the ash took place from the mid-1990s – after years of campaigning in the face of official denials. This leaves a period of time from the opening of the incinerator in the late 1970s to the mid 1990s when the behaviour of the Island's public authorities can only be described as utterly irresponsible and cavalier.

The question that therefore arises is this –

> **How is it that the entire panoply of public administration in Jersey – some parts of which have specific duties to protect human health and the environment – can have failed to take proper steps to protect people and the environment from the toxic ash over a period of at least 15 years?**

I know the answer to this question and it is a question that goes to the very heart of whether Jersey is, in fact, structurally and culturally capable of governing itself in a manner compatible with the health and welfare of its people? This proposition and inquiry is the test.

Why is an inquiry necessary?

To gain an expertly informed assessment of the ash dumping, its history, the deficiencies – be they organisational or cultural – of public administration which allowed this toxin-dumping to continue unchecked for so long, the long-term issues arising from the heavy pollution of the sites and to produce a detailed report and set of

recommendations – for protecting human health, the management of the pollution in the sites, and of improvements to public administration so as to safeguard against similar failings in the future.

Why a Committee of Inquiry?

Having taken a long-term interest in this subject I know from personal experience that – sadly – a great number of straightforward lies have been told to politicians by certain civil servants. Therefore only a quasi-judicial process such as a Committee of Inquiry will be able to compel attendance of witnesses and examine them under oath – any untruths being spoken then being perjury. The States of Jersey (Powers, Privileges and Immunities) (Committees of Inquiry) (Jersey) Regulations 2007 contain a wide range of powers to enable the Committee to operate effectively and also make it clear in Regulation 8(3) that the immunity from civil or criminal proceedings given to a witness does not apply *"to evidence given or documents produced by that person which he or she knows to be untrue"*.

It is the case that Committees of Inquiry can, by law, regulate their own proceedings. The relevant passage from standing orders is this –

"**147 Committee of inquiry: proceedings**

(1) A committee of inquiry may regulate its own procedure for the conduct and management of its proceedings including, but not limited to, venue and adjournments.

(2) Proceedings before a committee of inquiry shall be held in public unless the committee, in the interests of justice or the public interest, decides that all or any part of the proceedings shall be in private."

The powers of a Committee of Inquiry are described in detail in the States of Jersey (Powers, Privileges and Immunities) (Committees of Inquiry) (Jersey) Regulations 2007. In respect of taking evidence under oath, Regulation 6 says –

"**6 Power to administer oath**

(1) A committee of inquiry may require a person appearing before it to give evidence on oath.

(2) The chairman of a committee of inquiry is authorized to administer the oath for this purpose."

Whilst it is accepted that the Committee of Inquiry will make its own decisions in respect of the procedure it chooses to follow, this proposition is brought forward in the hope that the proceedings will be held in public unless it is absolutely necessary to here any evidence in camera.

It is also my view that the Committee of Inquiry will not be able to access the truth unless it takes evidence under oath – with the resultant risk of perjury should any witness knowingly state falsehoods to the Committee.

The Evidential Background

Jersey's municipal waste incinerator commenced operation in 1979. It is also worth noting in passing that the incinerator itself produces such high degrees of toxicity and pollution from its chimney that it has been illegal to operate any such plant in the European Union for over a decade. Were Jersey a full-member of the EU – the incinerator would, by law, have been closed down.

Returning to the casual dumping of the combined ash into Jersey's land reclamation sites, this practice continued from 1979 until approximately 1995 – when, finally, after many years of campaigning – the authorities were compelled to adopt a safer and more responsible disposal methodology.

In the early 1990s, Jersey's Public Services Department, in response to concerns, commissioned Warren Spring Laboratory to undertake an analysis of emissions from the incinerator. Included was a detailed analysis of the ash produced by the incinerator. The table I reproduce below is to be found on page 29 of the WSL report–

Table 1

TABLE 9 –CONCENTRATIONS OF METALS IN COMBINED RESIDUAL ASH

METAL	UNIT 2	UNIT 3
	µg g	µg g
Mercury	0.46	0.29
Vanadium	62.3	56.1
Chromium	212	244
Manganese	937	937
Cobalt	21.2	17.7
Nickel	60.3	74.9
Copper	18110	1160
Zinc	6200	4540
Arsenic	54.2	34.4
Selenium	1.41	0.53
Cadmium	33.5	34.0
Tin	274	272
Antimony	177	83.8
Thallium	0.45	0.33
Lead	4170	2020

Amongst the other information in the report are two tables – 11A and 11B – to be found on pages 30 and 31 of the WSL report. These two tables describe the '**CONCENTRATIONS OF DIOXINS AND DIBENZOFURANS IN COMBINED RESIDUE ASH**", for units 2 and 3 respectively. These showed the total dioxin and dibenzofuran content of the combined ash from unit 2 to be 6.4112 ng-g, and a concentration of 0.5014 ng-g for unit 3.

Thus the WSL report demonstrates scientifically that the combined ash from the incinerator contains a variety of toxic heavy metals and polychlorinated compounds such as dioxins and furans which are a proven threat to human health. To further demonstrate this fact I reproduce below a section of a table titled "Toxic Effects of Common Hazardous Compounds". This is from page 476 of "Hazardous Wastes: Sources, Pathways, Receptors" by Richard J. Watts, published by John Wiley & Sons, ISBN 0-471-00238-0.

Table 2

Chemical	Acute Effects	Chronic Effects
Polychlorinated Biphenyls PCB's	Minimal acute toxicity (0.5 g/Kg to 11.3Kg	Chloracne; increased liver enzymes; possible reproductive effects; act as cancer promoters
Dioxins and Furans PCDDs/PCDFs	Chloracne, headaches, peripheral neuropathy	Induction of microsomal enzymes; altered liver metabolism; altered T-cell sub-sets; immunotoxicity; strongly implicated in carcinogenicity (may be a promoter)
Inorganic Compounds Arsenic	Loss of blood, intestinal injuries, acute respiratory failure	Myelogeneous leukaemia, cancer of skin, lungs, lymph glands, bladder, kidney, prostate and liver
Cadmium	Vomiting, cramping, weakness, and diarrhoea	Oral ingestion results in renal necrosis and dysfunction; induces lung, prostate, kidney,

		and stomach cancer in animals; no documented human cancer
Hexavalent chromium	Readily absorbed by the skin where it acts as an irritant and immune-system sensitizer; oral absorption results in acute renal failure	Lung cancer
Mercury	Central nervous system impairment including injury to motor neurons; renal disjunction	Central nervous system dysfunction, memory deficits, decrease in psychomotor skills, tremors
Nickel	Not highly toxic, headache, shortness of breath	Immune system effects resulting in allergic contact dermatitis

It appears that the WSL study did not test for polychlorinated biphenyls (PCBs) but it is likely that PCB is also present in the ash given its past use in electrical equipment. Only 5 of the 15 metal components of the ash identified in the WSL report are described in Table 2 so one must consider the fact of the existence of additional hazardous components in the ash to those listed in the table.

Therefore, when considering human exposure to the ash and potential health impacts, we must acknowledge that we are ***not*** dealing with the possible effects of just one toxin – but ***a cocktail of toxins.*** Depending upon the degree and type of exposure, the potential health impact could be greater than that predicted for a single toxin. Moreover, there may be a synergistic effect, that is, an additional effect greater than that which might be predicted from exposure to the individual toxins or the toxins combined.

In terms of real-world human health impacts of exposure to the incinerator ash, it might be hypothesised that we are unlikely to be dealing with acute effects. It is likely that if any human health impacts flow from exposure to the ash, it is the chronic effects, rather than the acute effects that we need to be particularly concerned with. If any chronic effects have occurred, the most likely cohort of the affected will be site workers exposed to the combined ash. It should be stated that no manifestation of ill health effects potentially caused by the ash have yet been detected. It is to be hoped that none occur, although a detailed epidemiology study would need to be undertaken over an extended period of time.

However – and this is one of the prime concerns underpinning this proposition – if no human health impacts have occurred – it is more by luck than judgment.

The States of Jersey has committed gross errors, and exhibited a cavalier attitude to the dumping of the ash. These include the dumping of the combined ash – a proven cocktail of toxins – into a sea-porous land reclamation site; leaving the dumped ash exposed to the air for extended periods of time enabling the dried ash to be blown across pedestrian areas and onto nearby buildings; causing people to become exposed to the ash; failing, for many years, to protect workers on the sites from close exposure to the ash over extended periods of time and failing to properly take into account the long-term future use of the sites once completed.

In its error-strewn and incompetent handling of the incinerator ash, the States of Jersey has played Russian roulette with the health of this community and our environment.

It has always been – even as a lay-person – very easy to establish 3 basic facts –

1: that the incinerator ash was a cocktail of proven toxic components;

2: that dumping the ash in a manner that exposed workers, the public and the marine environment to it was not a good idea;

3: that other dumping methodologies which could be employed would be an improvement; for example, disposing of the ash in lined pits or binding the ash in some form of matrix material thus rendering it into a less environmentally available form.

If a lay-person could readily establish these facts within days of taking an interest in the subject, how can it be that every relevant States agency failed, to a lesser or greater extent, to respond in an adequate and/or timely manner to issues associated with the ash dumping over a period of at least 15 years?

And what does this say concerning the quality and safety of public administration in Jersey?

What risk do these sites pose to the marine environment in the next 50, 100 or 150 years? And is this our problem? Dr. Michael Romeril, the Environmental Adviser, in a report of 1992, quotes a figure of 17, 217 tonnes of combined ash dumped in 1988 alone. As is well documented, the volume of waste going to incineration, and consequent ash disposal, has risen steadily over the years. However, let us make a conservative estimate for the amount of ash dumped from 1988 until 1995 when dumping practice changed. Take a conservative average of 17,000 tonnes per year and multiply by 8. This gives a figure of 136,000 tonnes of combined incinerator ash dumped in the site in a reckless manner – in this 8 year period alone.

But it should be noted that this figure completely excludes the many tens of thousands of tonnes of combined ash dumped from when the incinerator first came on-stream in 1979.

Dr. Romeril goes on to quote the amount of some of the heavy metals in the 17,217 tonnes for the single year 1988 –

> "approximate total input per year of 440kg cadmium, 4.8kg mercury and 64,000kg lead. Whilst salts of these metals are not particularly soluble, an aging and mineralization process may continue for hundreds of years. (Hjelmar, 1987)"

Some important observations –

- These volumes need to be multiplied for every year of dumping from 1979 until 1995.
- These figures deal only with 3 of the 15 metals identified as components of the ash by the WSL report.
- These figures do not deal with the dioxin, furan and PCB content of the ash. These toxins, whilst not water soluble, could nevertheless be transmitted to the broader environment through the sea water acting as a vector for ash from the sites. Additionally, these toxins may be released to the environment every time contaminated areas of the waterfront are excavated.

However, the "official" view of the relevant States departments of the risks these contaminants pose was remarkable for the simple incompetence and dishonesty which was routinely displayed.

Indeed so lax and incompetent were the Public Services Department, that it took until the mid-1990s for it to produce a report that considered future strategies for dumping the ash – and even then the report only came about as a result of sustained political pressure. This leaves us considering a period of nearly 2 decades of cavalier irresponsibility and intransigence on the part of the Island's waste disposal authorities.

To say that the report itself, 'Incinerator Plant Ash Disposal – Strategies for the Future', was riddled with inadequacies would be an understatement. In the early 1990s, oyster farmer and marine biologist, Mr. Tony Legg took a detailed interest in the ash dumping and related issues. He produced a number of papers which he supplied to the authorities and interested politicians, myself included.

In a commentary on the PSD report referred to above, dated February 1995, Mr. Legg makes the following observation –

> "The document contains numerous technical errors, misinterpretations and, it would appear, deliberate attempts to confuse and mislead lay politicians. If this is a document to lay to rest the "criticisms originating from sources with little knowledge or experience of the complex issues involved" then it falls well short of the mark and exposes instead the Department's poor grasp of wider issues. It also exposes the Department as wishing to avoid, rather than comply, when their position as enforcer/competent authority should be beyond reproach."

Speaking as someone who witnessed the performance of the Public Services Department at first hand, as a member of the Committee from the end of 1990 until 1993 until I resigned over this issue, I can only agree entirely with Mr. Legg's assessment of the performance and motivations of the Department.

In a paper written in respect of the then proposed dumping of ash in the south of La Collette site, Mr. Leg considered the potential for Cadmium to leach –

> "From the above observations it is evident that an oxidising environment that is high in chlorine, that fluctuates in salinity, that occasionally is anoxic with free sulphide ions, that has a water table comprised of tidal and field water capacity interstitial solute, and has energy put into the system by tidal movement of that solute, is very well suited to making cadmium bioavailable. In addition, the ash material is already in an oxidised state, thereby speeding up the process.

> "In situ, the ash is likely to be just above the MHWS mark and some 2 meters deep with c. 1 mete overburden. After normal rainfall or windblown spray this zone will be at field capacity with water filling all available pore spaces. When the tide rises or falls this water will be moved and exchanged, salinities will change, waters will drain and cadmium enriched leachate will form."

Although written in respect of proposals to dump ash in a layer above MHWS across the La Collette 2 site, thes observations could apply to the West of Albert site where ash was dumped extensively in a layer across much of the land reclamation scheme. The processes described could be occurring now or begin to occur in the future. A further factor that must be of grave concern is the potential for tidal forces to extract material from the sites. This is problematic for several reasons, not least that such erosion would cause the toxic ash to be taken into the marine environment in substantial quantities. There is a risk of significant quantities of infill material being removed from the reclamation sites through the action of the sea. Mr. Legg also highlighted this danger in a paper–

> "Hydropneumatic Erosion: This process warrants most consideration. It is the process that leads to 'Blow Hole' formation on exposed cliff faces. Where wave action is severe, voids are formed within the eroded face. Subsequent wave action then compresses air within the void which can then expand explosively. Of interest is that this process can continue many tens of meters from the point of wave action and many meters above the high tide mark. (St. Catherine's Breakwater had a void 26 meters deep caused by this process, 25 km fetch). It may be that no area within the new reclamation is risk free from this process including high level profiles."

POSSIBLE HEALTH IMPACTS

In 2001 the Health and Social Services Committee, under my Presidency, requested its officers to prepare a report which examined the health implications of the contaminated reclamation sites. The then Medical Officer of Health, Dr. John Harvey, and Health Protection Officer, Steve Smith, co-authored a report titled: 'Health Impact of the West of Albert Pier Reclamation Site.' I quote from that report here –

> "Recent published studies have recognised the possible cumulative and synergistic effect of multiple hazardous agents, and have looked at the effect of exposure to hazardous sites, not individual toxins. The exposure risk is residence near to contaminated sites.

> "The risk of adverse birth outcomes has been the focus of two such studies. A study of all residence near landfill sites in Great Britain showed small excess risks (c.10-20%) of some congenital anomalies and low birth weight. This was not greater near sites with special waste (i.e. known toxic waste such as

incinerator ash) possibly because these sites were subject to strict regulation. The authors noted that the small excess could be due to residual confounding (unmeasured effect of deprivation) or data artefacts. Another Europe wide study showed higher levels of risk for congenital anomalies. This study, known as EUROHAZCON used data from 7 registers in 5 countries. It showed an increased risk (2–3 times higher) for mothers living within 3km of landfill sites.

> "A study in Canada showed increased risks of certain cancers for men living near solid waste landfill sites. The increases of twice the risk were shown for cancer of the pancreas in men living within 1.25km, cancer of the liver for those living within 1.5km, and non-Hodgkin's lymphoma within 2km."

As far as I am aware, this work by Dr. John Harvey and Steve Smith, represents the very first time frank and professional information concerning possible health impacts arising from the ash dumps, was put before any States committee – this after 23 years of incinerator operation. One can only wonder what else the public and the Island's politicians are not told?

The observations of Dr. Harvey and Mr. Smith quoted above show that a link between waste dumps and ill-health has been demonstrated epidemiologically. It also illustrates the fact that medical science is a constantly evolving field of work. It is feasible that in the not distant future, medical science may concluded that multi-toxin compounds, such as the incinerator ash, represent a greater threat to human health than is recognised today. It should be noted that the toxicity of substances is rarely down-graded.

More usually, as scientific knowledge advances, substances are demonstrated to be more toxic than previously thought. Even the scientific orthodoxy of the day can prove to have been wrong. Organophosphate pesticides and asbestos were at one time not regarded as posing a particular health risk. Likewise BSE was thought to be not transmittable to people and thus did not represent a human health risk. The prevalent scientific orthodoxy of the day was wrong.

However – it must be recognised that when considering the incinerator ash we are not dealing with *speculative* toxicity. As shown above, many of the components of the ash are proven, known toxins.

The long-term failure of the Environmental Health Department (now known as the Health Protection Department) has to be regarded with the utmost seriousness. There is simply no hiding place from this fact. Until the arrival in the department of Dr. John Harvey and Steve Smith, the Environmental Health Department, preceding MOHs and Health and Safety at Work failed in their duty to intervene and seek to protect the public from a health risk posed by the mass dumping of an unambiguously toxic material. How could this have happened and what needs to be done to ensure that no similar failure occurs again?

For example, questions need to be asked of Dr. Richard Grainger, a former Medical Officer of Health, concerning his failure to act appropriately in this matter.

In a letter to me, dated 15th August 1995, Environmental Adviser, Dr. Michael Romeril, enclosed a letter he had received from Dr. Grainger, dated 11th July 1995. In this letter Dr. Grainger said –

> "I have liaised with Tony Bruce, who has taken over from Tony Littlewood as Chief Environmental Health Officer, and can confirm that we will be involved as and when necessary on this issue. Certainly, investigations that we have taken up to now, do not show this to be a major health issue, although obviously a highly emotive political problem."

Dr. Grainger's intransigent attitude to the subject is further demonstrated in the fact that the Public Services Department quoted his media comments in their report concerning future ash dumping strategies –

> "All of these statements have originated from uninformed sources. The reality is, as usual somewhat different –
>
> (a) The Medical Officer of Health was reported in the Jersey Evening Post on 7 September 1993 as follows: "Dozens of people die every year from smoking related diseases such as cancer and

emphysema but not one death has been traced to refuse waste – if we want to clean the atmosphere we should do something about it (smoking)."

A number of observations have to be made concerning Dr. Grainger's comments –

- Smoking is indeed a serious human health threat and that fact is widely known amongst the public, most of whom are able to take decisions to cease their exposure to tobacco smoke. People are generally unaware that that the ash is a threat to their health, and the exposure of workers and the public to its toxic components is entirely involuntary.

- Exposure to the toxic components of the ash of people who may face other health risks, such as smoking or pre-existing medical conditions, represents an *additional* health burden – *not* an alternative health burden.

- Dr. Grainger refers specifically to "refuse waste", not the combined incinerator ash and its toxic components – a demonstrably toxic material, tens of thousands of tons of which are layered across the reclamation sites. The ash was dumped in a manner that routinely exposed workers and the public to it.

- Dr. Grainger asserts that "not one death has been traced to refuse waste". This assertion is certainly wrong. For decades medical science and health protection experts have recognised the fact that refuse waste, especially in concentrated dumps, represents a variety of threats to human health. These include infection from putrescent waste, threats from vermin, exposure to dusts from such material, lung damage, the ingestion or inhalation of toxic substances in the refuse and the potential for illnesses such as emphysema, cancer and renal failure as a result of chronic, long-term exposure to hazardous substances emitted by waste dumps, for example to the air or water supplies.

- Can it be considered remotely professional or ethically acceptable to simply brush aside and dismiss public exposure to thousands of tonnes of material that contains a cocktail of toxins, such as cadmium, mercury, arsenic, lead, dioxins, furans and PCBs, by simply pointing to another hazard, such as smoking?

The attitude of Dr. Grainger came as no surprise to me, it being all of a piece with the self-interested denials of every other culpable States agency. In the early 1990s former Senator Nigel Querée and I arranged to meet with Dr. Grainger to discuss our concerns with the ash dumping. We pointed out that the ash was toxic and presented photographic evidence that showed the haphazard and irresponsible dumping of the ash next to areas where the public were walking. His response was to angrily and fearfully dismiss our concerns. The most he conceded was that the seagulls feeding on the unburnt putrescent waste in the ash might be contaminated. It should be remembered that we are not considering a material that *might, hypothetically* be toxic. The ash contains a cocktail of proven toxins.

Dr. Grainger's approach should be compared and contrasted with other expert medical opinion. Neither the previous Medical Officer of Health, Dr. John Harvey, the then acting MOH, Dr. Duncan Nicholson or senio Health Protection Officer, Steve Smith have ever disputed the facts that the ash was toxic, that people should not be exposed to it and that the dumping practices of the 1980s and early 1990s were wrong and unacceptable.

In May 2002, at the request of my Health and Social Services Committee, the United Kingdom Chemical Incident Response Service was asked to undertake chemical hazard investigation of the West of Albert site. That report, by Giovanni Leonardi, is included as an Appendix. As a part of this work, an overview of previous documents was undertaken. Mr. Leonardi summarised some earlier findings–

"Arsenic, cadmium, copper, lead and zinc in stockpiled or fresh combined ash from the site, as well as quenched bottom ash, are considerably higher than the threshold values considered acceptable by ICRCL guidance for domestic gardens and allotments, parks, playing fields, open spaces, hard cover and built up

areas. Mercury concentration in the same samples is at the ICRCL threshold value for domestic gardens and allotments. Ash, arsenic, cadmium, lead, copper and zinc content exceeds the Dutch action level for contaminated land, whereas chromium content exceeds the Dutch trigger level."

Later in the report, Mr. Leonardi went on to address the following question–

"**24. Is there a pathway between the source of the contamination and any potential targets (human, animal etc.)?**

There are four potential pathways:

- direct contact between humans and contaminated soil on the site
- bioaccumulation of dioxins and mercury in the food chain, and possible human exposure via the food chain
- migration of dioxins and metals to the sea and impact on sea life. This is the major potential effect of groundwater flows described in section 11
- migration of dioxins and metals to fresh water and possible human exposure via water. It is unclear how much this pathway can in fact be confirmed, but the potential is implicit in the groundwater flows described in section 11."

To recap – we can see from the evidence – I repeat, *evidence* – of the Warren Spring Report, the table from Hazardous Wastes: Sources, Pathways, Receptors, the observations of Dr. John Harvey and Steve Smith and the report by Mr. Leonardi that the ash from Jersey's municipal waste incinerator is a toxic waste.

Moreover – the ash is not merely a simple, single toxin. The ash is clearly a multi-component cocktail of many proven toxic, mutagenic and carcinogenic elements.

HEALTH AND SAFETY AT WORK ISSUES

Having laid out the human health issues above, I need not repeat those facts in this section. We must, however, come to grips with another clear and shocking failure of public administration in the Island. Jersey has legislation – the Health and Safety at Work (Jersey) Law 1989 – designed to protect workforces from occupational hazards. Under this Law employers have a range of legal duties which include –

- making the workplace safe and without risks to health
- keeping dust, fumes and noise under control
- ensuring that articles and substances are moved, stored and used safely
- to take proper precautions to prevent employees being exposed to substances which may damage their health
- to give employees the information, instruction, training and supervision necessary for their health and safety.

Whilst this particular Law came into effect in 1989, the 5 requirements listed above represent a commonsense approach to protecting a workforce of the kind that we would expect any decent, ethical employer to follow. It is also the case that, whilst codified in this Law – there has always been an inescapable general duty of care by a government to protect the public and workers from exposure to known toxins.

By these standards what can we say of the States of Jersey? From the late 1970s when the incinerator first came on-stream until the mid-1990s, the States of Jersey caused and allowed all 5 of these principles and practices to be broken and cast aside in respect of employees – either their own or those of contractors – working on the reclamation site projects.

There are a variety of photographs which show merely *some* of the degree of worker exposure to the ash. The actual dumping was carried out without any visible health and safety precautions for workers transporting, tipping and levelling the ash. Of equal concern is the fact that construction workers carrying out excavations and other such works on the sites were not protected from exposure to the ash and its toxic components. I personally witnessed on many occasions workers shovelling through ash pits and infill contaminated with ash, without any protection. This approach continued until the mid-1990s. However, even now, workers are exposed to the material. To illustrate this fact I quote a further passage from the CIRS report by Giovanni Leonardi –

> "The form of the chemicals present at the site is likely to have been influenced by the presence and movement of water, and predominantly sea water, across the site. This impression is confirmed by reports from the builders that the workers were awash with slurry during the construction work. However, the effect of sea water on the chemicals present on site has not been described in the reports available to CIRS."

I witnessed these construction works and the workers were indeed exposed to pure ash, contaminated infill and ash-rich slurry. This last form of exposure was particularly noticeable during piling operations when water black with ash would gush into the air, often contaminating the men operating the rig.

It was also the case that during the construction of the Esplanade underpass, workers were needlessly and unsafely exposed to substantial volumes of dumped toxic ash when re-excavating the dump site.

The fact that construction workers were needlessly – and unlawfully – exposed to such risks is beyond argument.

What we must do is face up to how things could have gone so wrong – and what new safeguards we need to enact to prevent a repetition.

Conclusion

So – why then did the States of Jersey – why did every relevant public administration agency in the Island – not only fail to handle the ash appropriately from the outset – but for at least 15 years pro-actively engage in deception and cover-ups when concerns were being expressed?

Why did Public Services, Health and Safety at Work, Agriculture and Fisheries, Environmental Health, and Planning and Environment all fail to prevent this disaster – and instead pro-actively engage in concealment?

In many ways – these questions contain within them, their own answer. Which is – having failed to act appropriately at the outset – every agency of the States of Jersey – and the relevant staff within them – then had a mutual interest in closing ranks, maintaining the fictions, deceiving both politicians and the public and engaging in the culture of concealment.

Indeed – precisely the same syndrome we see manifested all too clearly in the Jersey child abuse disaster.

There is simply no escaping the fact that we are dealing with a gross, irresponsible, dangerous and mendacious example governmental failure.

We need to know –

> Why that happened?
>
> How it was able to happen?

Who was culpable?

Why did such a complete breakdown of checks and balances occur?

What lessons need to be learned?

What action we may need to take to remediate the site?

What action we may need to take to examine, on a long-term basis, human health risks and impacts?

What action we may need to take to prevent the many tens of thousands of tonnes of toxic ash escaping into the marine environment in the event that the reclamation sites become eroded, or threatened by rising sea levels and increased wave action as a result of global climate change?

These are just some of the questions which must be answered.

Financial and manpower statement

There will be costs involved in carrying out a public inquiry, but such is the potentially serious and long-tern nature of the ash dumping and of the public administration breakdowns involved, that we have little choice other than to investigate the matter comprehensively.

It is difficult to accurately estimate the likely cost of the Inquiry. To provide a general illustration of costs of Committees of Inquiry I include this table –

COMMITTEES OF INQUIRY SINCE 1998

Timescale and costs

Subject	Establishment of Committee agreed by the States	Members appointed by States	Report presented to the States	Months between appointment of members and final report	C
Beauvoir	**7th October 1998**	**20th October 1998**	**6th July 1999**	**8½ months**	**£ 2,1**
Building Costs	**17th November 1998**	**8th December 1998**	**10th September 2002** **(Interim report on 4th July 2000)**	**45 months**	**£96,8**
Honorary Police	**3rd July 2001**	**27th November 2001**	**3rd December 2002**	**12 ¼ months**	**£5,2**
Housing Trusts	**8th October 2002**	**22nd October 2002**	**13th May 2003**	**6 ½ months**	**£3,4**
Bus tender process	**9th March 2004**	**12th October 2004**	**2nd August 2005**	**9 ½ months**	**£50,2**

Note. **The executive support for the Beauvoir, Honorary Police and Housing Trusts inquiries was provided by an existing Committee Clerk in the States Greffe and the salary cost of this support is not reflected in the above figures. For the 'real' cost of those Inquiries an approximate cost of 50% of a Grade 10 salary for the duration of the Inquiry should be added to the above figures for those 3 Inquiries.**

It seems likely that the Committee of Inquiry will need administrative support from the Greffe at a cost of 50% of a Grade 10 salary; this being in the region of£22,000 to £25,000.

The Committee may well need to employ an independent expert, as Scrutiny Panels do. To illustrate the range of these costs I include this table showing the costs for 2007 –

Centeniers' Role – Magistrate's Court	**£7,086.58**
Overdale	**£175.00**
Early Years	**£11,288.03**
GST	**£21,216.90**
Zero-Ten	**£15,902.31**
JCG	**£4,628.40**
Overseas Aid	**£5,926.69**
Migration Policy	**£5,467.66**
Waterfront	**£1,900.00**
Air Quality	**£6,828.29**
Housing Property Plan	**£13,411.18**
Income Support	**£25,112.26**
Telecoms	**£10,663.97**

It will also need to call expert witnesses, probably from the United Kingdom.

Given the serious and complex nature of the issues, it is more realistic to imagine the costs of this Inquiry being akin to the more serious inquiries such as the bus tender process and the building costs enquiry. Essentially, this would place the estimated costs between £50,000 and £100,000.

This is a significant sum – but it must be remembered that we are dealing with an issue of some gravity and, moreover, a subject which will be a long-term problem for this community. This sum has to be contrasted with the circa £300,000 per annum spent by the Chief Minister's Department on spin-doctors.

Clearly and unavoidably, there will be some cost involved in conducting the Inquiry.

Obviously – it is possible that some significant costs could arise as a result of putting into action any recommendations the Inquiry may make.

But what price human health?

What price protection of the environment?

APPENDIX

Report by Giovanni Leonardi, of the United Kingdom Chemical Incident Response Service, 22nd May 2002

SITE	**INCINERATOR ASH DISPOSAL SITE NEAR ALBERT PIER, ST. HELIER, JERSEY**
DATE	**22 – 05 – 02** TIME **9.50: 17.00**
WHO VISITED	**DR. JOHN HARVEY, DIRECTOR OF PUBLIC HEALTH SERVICES, JERSEY; STEPHEN SMITH, EHO, JERSEY; JOHN SCALLY, WATERFRONT ENTERPRISE BOARD LIMITED, JERSEY; GIOVANNI LEONARDI, CIRS**

INCIDENT SUMMARY

1. **States of Jersey Health & Social Services have been asked to review possible health impacts of contaminated land (including incinerator ash) in view of the current building developments on that site and possible risks to those who will live there, or those who will use the leisure facilities**
2. **States of Jersey are also preparing new waste management strategy and need to discuss potential impact of new incinerator**

FURTHER INFORMATION

1. Who has identified the issue to the Health Authority?

The issue was identified within the Health and Social Services Committee

Local Authority		**Local Residents**		**Other:**	
Environment Agency		**Emergency Services**			

2. How was the issue discovered?

Spill, leak, explosion etc.*		**Planning application**		**Complaint**	
Routine testing **		**Change of land use**	√	**Other:**	

*** or other acute incident**
**** planned by the Environmental Health Department of the Health & Social Services Committee**

3. How long has there been a problem?

The problem was first identified in the mid 1980s. It became an issue in 1995.

4. Who is currently involved in the incident including the incident investigation?

Health and Social Services Committee: Senator Syvret (President), G.E. Jennings (CEO), Dr. J. Harvey (Medical Office of Health), S. Smith (Environmental Health Officer)

Planning and Environment Committee: Senator N.L. Querée (President), J.H. Young (CEO), J. Rice (Environmental Service Unit)

Policy and Resources Committee: Senator P.F. Horsfall OBE (President), Dr. M. Romeril (State Environmental Adviser)

(Continues next page)

Employment and Social Security Committee: Senator T.A. Le Sueur (President), C. Myers (Health & Safety Inspectorate), Mrs. L. McGurty (Health & Safety Inspectorate)

Public Services Committee: J.D. Richardson (Chief Executive Designate)

Housing Committee: E. Le Ruez (CEO)

Waterfront Enterprise Board Limited: M. Bralsford (Chairman), John Scally (Managing Director)

SITE SPECIFIC INFORMATION

5. Where is the site? (Postcode if possible)

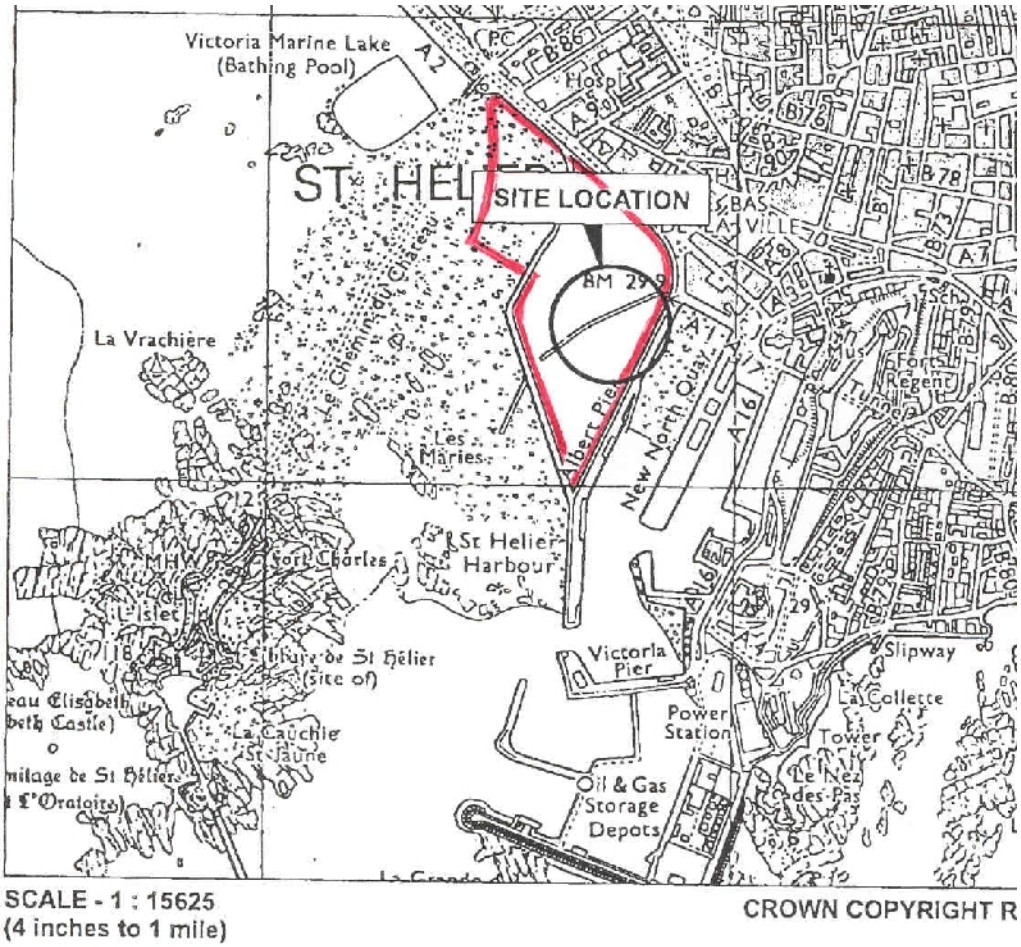
St. Helier waterfront Land Reclamation Site – See Figure 1

(Postcodes are available in Jersey)

6. How big is the site (acres/hectares)? **14 hectares**

7. is the area predominantly rural or urban? Urban waterfront

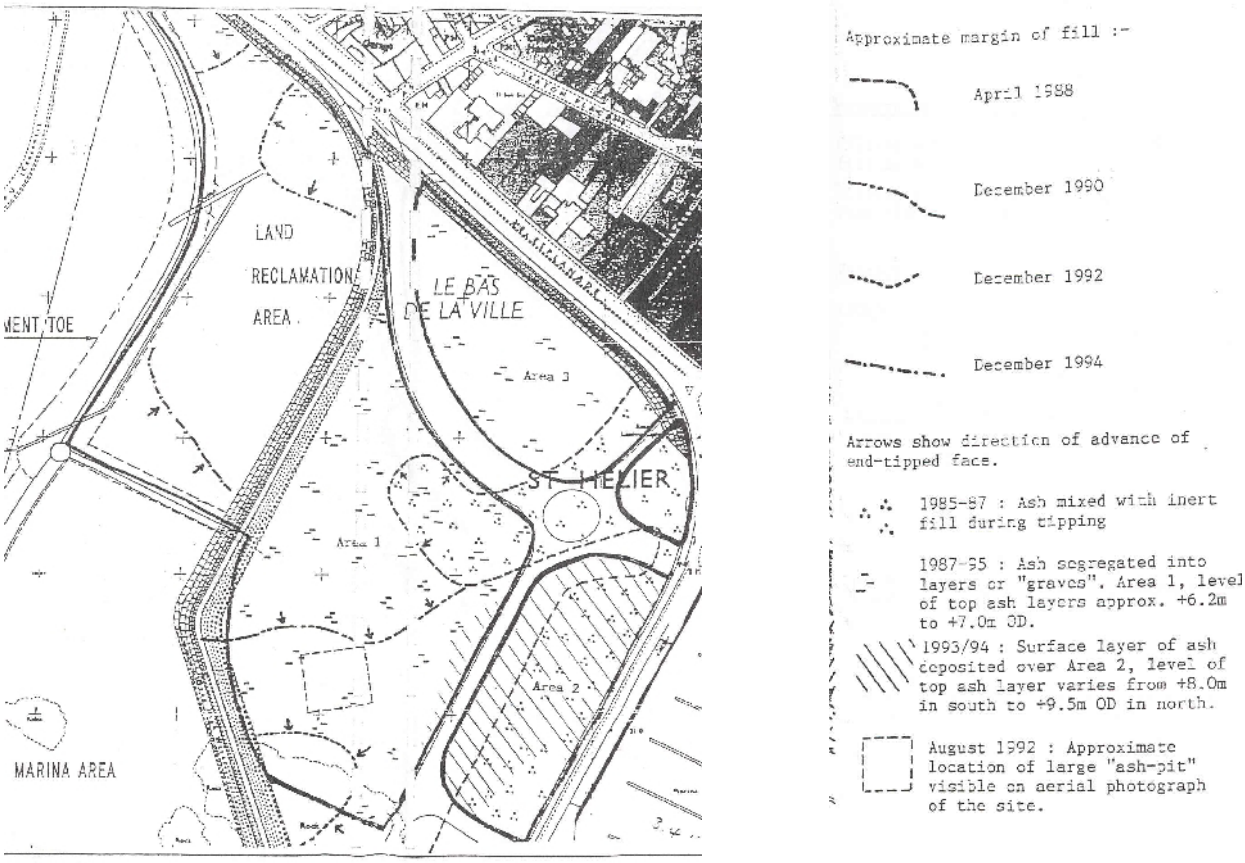
Figure 1. Location of contaminated land near waterfront at St Helier, Jersey (adapted from Arup Rothwell Consulting Engineers report of Jan 2000)



8. What is known about the history of the site and the adjacent land?

History of the site was studied on old historical maps, construction plans, etc. by Arup & Partners. A harbour plan in 1838 shows the site to be offshore. A plan of St. Helier in 1848 shows the location of a large sewer outfall at the end of the esplanade. Albert Pier was constructed between 1847 and 1856. A plan dated 1878 shows the western side of Albert Pier to be protected by what appear to be boulders. In 1896 the two outer berths of Albert Pier were reconstructed on rock and the berth dredged to 2.60 m Aerial photographs in 1944, 1979, 1980 at low tide show no changes to the site, which was underlain by sand. The marina to the East of the site was constructed in 1981 (the "old marina"). The site was reclaimed from the sea in the 1980s and 1990s as part of the "West of Albert Pier Reclamation Works". As part of this development, an area west of Albert Pier was enclosed in the early 1980s by the construction of a rockfill bund some 10m high. Filling of the enclosed area began in May 1985 with completion in late 1995. The principal source of fill material was demolition debris and surplus soil arising from nearby building excavations. The annual filling totals increased from about 90,000 m^3 in 1985 to nearly 170,000 m^3 in 1993/94. By 1993 the site was substantially filled, and a new rockfill bund was built to the west of the first one, to extend the area of the filling. Figure 2 shows the reclaimed sites with "land reclamation area" being the new site between the first bund (east) and the second bund (west). This new reclaimed site was closed by a new vertical wall, which forms the northern limit of a "new marina" development. (From Arup Rothwell Report)

Figure 2. Location of incinerator ash disposal sites near waterfront at St. Helier, Jersey. (from WRc Environmental Management report of Nov. 1995)



The average height of the fill at the site is 9 to 10.5 m AOD[1].

The Bellozanne municipal waste incinerator was built in 1972. Ash from incineration in the period from 1972 to mid 1980s was stockpiled near the site of the incinerator. From May 1985, ash from the incinerator was disposed at Albert Pier Reclamation Site. Initially, ash was tipped together with inert fill material in the area behind the Albert Pier wall. From September 1987, the method of ash disposal was changed, in order to restrict it to pits above mean high tide level (see Figure 2). Senator Syvret, President of the Health and Social Services Committee, is in possession of photographs documenting tipping of incinerator ash on several locations within the site, with no apparent restriction of the tipping to any specific location or pit even later than 1987, however only some of the photographs' year is documented.

When the reclaimed site was filled, incinerator ash from Bellozanne incinerator started being disposed at the La Collette landfill outside St. Helier. The Waterfront Enterprise Board was established to develop the reclaimed site on the waterfront at St. Helier, and they commissioned an assessment of the reclaimed land to WRc Environmental Management in November 1995. Several waterfront developments were planned, including housing and a leisure centre. The Waterfront Enterprise Board then commissioned a geotechnical report on the Albert Pier Housing to Arup Rothwell Consulting Engineers, this was published in December 2000, and construction work started the following year. A public health opinion on the possible health hazards of incinerator ash on the site was requested to the Health and Social Service Committee in mid-2000.

9. What is the site currently used for?

Parkland		**Light Commercial**		**Allotments**		**Derelict & abandoned site**	
Housing	√	**Heavy Industry**		**Farming**		**Other:**	√

A housing development is currently nearing completion on the site marked "area 2" in Figure 2. A leisure centre including a swimming pool, park area and other facilities is in advanced stages of completion.

10. What is the soil type?

Sand		**Silt**		**Clay**		**Loam**		**Mixed**		**Other:** **Mixed waste material**	√

Yes	**No**

What is the underlying logy/hydrology?		
Is the site on/near an ıifer?	**From the WRc report:** **A.** Perched groundwater. **Groundwater was encountered in 26 of 32+16=48 trial pits (page 50 for denominator, page 69 for numerator). These seepages were generally encountered at levels well above mean sea levels and had low chloride contents, indicating the presence of "perched" groundwater deriving from infiltration of rainwater (page 69).** **B.** Other groundwater. **Boreholes also found groundwater, with moderate to high chloride content, indicating significant influx of sea water beneath the site. As groundwater was carried out at the end of a long, dry summer period, it is expected that groundwater levels may rise in winter in response to winter rainfall (page 69)** **C.** Groundwater flows. **Though an earlier report suggested overall limited permeability of the fill material, this initial interpretation was significantly modified by the 1995 report. This concluded that "the effects of flushing by sea water extend beneath the major part of the fill area" (page 83). At high tide the external sea level charges the ground with sea water; at low tide seaward gradients are developed, with important flows to the sea (page 83). Existing data provide a clear indication that interchange of groundwater between the fill, the marine sediments, and the bedrock takes place (page 83).**	
Is there an abstraction nt on or near to the site?		**Not on the site**
Do any (plastic) water es run through the und?	**Sewage conducts discharging St. Helier's waste water to sea**	
Other	**Bedrock: mostly granite, with some metamorphosed sands, silts and mudstones of the Jersey Shale Formation under the northern part (area 3 in Fig. 2 in the present report), and some volcanic, pyroclastic and associated sedimentary rocks of the St. Saviour's Andesite Complex in the North East part of the site (From the WRc report, page 8 and Figure 2)**	

12. Does a stream/river flow through or near to the site?

The Grand Vaux stream comes through the middle of St. Helier, and discharges near the site.

13. What is the topography?

Water permeable fill material

14. What is the prevailing wind direction?

North Westerly and South Westerly

15. How close is the nearest property to the site?

There is property on the site

CONTAMINANTS IN THE SOIL

Three sets of results were made available to CIRS:

1. Analysis of dioxins and metals concentration of incinerator ash that were requested by the Jersey States Public Services Department to the Warren Spring Laboratory in 1992.

2. Analyses of metals in ash, inert waste, stockpiled inert waste, and leachate as part of the "Assessment of reclaimed land at St. Helier" by WRc Environmental Management, in 1995.

3. Analyses of metals and other chemicals, but not dioxins in ash, general fill, and rubble, by Amplus Ltd. under supervision by Arup Rothwell Consulting Engineers in July-August 1999, reported in 2000.

16. What chemical(s) is present?

1. Warren Spring Laboratory. That investigation looked at several emissions and outputs of the incinerator, including dioxins and metals in combined and fly ash samples. Samples were collected of precipitator fly ash, and combined grate residue ash. Concentration were estimated for mercury, vanadium, chromium, manganese, cobalt, nickel, copper, zinc, arsenic, selenium, cadmium, tin, antimony, thallium, and lead (Hg, V, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Cd, Sn, Sb, Tl, and Pb). Results for dioxins and dibenzofurans in combined and fly ash were also obtained.

2. WRc Environmental Management. Ash and inert samples were examined for content in arsenic, mercury, copper, zinc, cadmium, lead, and chromium twice, first in March-April 1995, the second time in September 1995. Chlorine, SO4, pH, and organic carbon were only measured the first time; nickel only the second time.

3. Arup Rothwell Consulting Engineers. Soil from eight boreholes was examined for content in arsenic, cadmium, chromium total and hexavalent, mercury, lead, selenium, boron copper, nickel, zinc , sulphur, sulphide, cyanide, thiocyanate, phenol, PAH screen, and toluene.

17. What form is the chemical(s) in?

1. Warren Spring Laboratory. Analyses were carried out using ICP-MS (therefore providing estimates of total mass for the metals, not the chemical form present in the ash).

2. **WRc Environmental Management. Analytical procedures are described in Appendix (not included in copy available to CIRS).**

3. **Arup Rothwell Consulting Engineers. Chemical tests are described in the Contractor's Factual Report (not available to CIRS).**

The form of the chemicals present at the site is likely to have been influenced by the presence and movement of water, and predominantly sea water, across the site. This impression is confirmed by reports from the builders that the workers were awash with slurry during the construction work. However, the effect of sea water on the chemicals present on site has not been described in the reports available to CIRS.

18. What levels of chemicals have been detected in the soil?

1. **Warren Spring Laboratory (1992). Results for metals are presented in Table 9 of their report for combined residue ash and Table 10 for fly ash. Results for dioxins and dibenzofurans in combined and fly ash are presented in Tables 11A+B and 12A+ B respectively. Incinerator ash metal content was typical of UK incinerator residues, expect copper in combined ash that reached the value of 18,000 microgram/g, considerably higher than the value expected in UK plants of 1,500 microgram/g, and lead in fly ash with a concentration of 26,000 microgram/g, higher than the typical UK value of 5,000 microgram/g (Warren Spring report, page 10-11). At that time, dioxins concentrations were high in the Jersey ash compared with similar UK incinerators (Warren Spring report, page 11).**

2. **WRc Environmental Management (1995). Results are presented for total excavated material in Tables 6 and 7 of their report (pages 28 and 29). Leaching test results are presented in Table 8, 9 10 and 11, and Figures 6 and 7 (pages 32-39). A comparative analysis over time is presented in Table 12 (page 40), whereas Tables 13 and 14 compare th Jersey ash with guidance by the Interdepartmental Committee on Redevelopment of Contaminated Land (ICRCL) and Dutch trigger values (pages 42-43). Arsenic, cadmium, copper, lead and zinc in stockpiled or fresh combined ash from the site, as well as quenched bottom ash, are considerably higher than the threshold values considered acceptable by ICRCL guidance for domestic gardens and allotments, parks, playing fields, open spaces, hard cover and built up areas. Mercury concentration in the same samples is at the ICRCL threshold value for domestic gardens and allotments. Ash arsenic, cadmium, lead, copper and zinc content exceeds the Dutch action level for contaminated land, whereas chromium content exceeds the Dutch trigger level.**

3. **Arup Rothwell Consulting Engineers (1999). Results are presented in Table 1-4 of their report. Similar results as for number (2): arsenic, cadmium, lead, copper, and zinc concentrations of the ash material exceed the ICRCL levels for domestic gardens and allotments. Cyanide, phenols and PAHs are below the ICRCL thresholds.**

Overall, it appears that the concentration of several contaminants including arsenic, cadmium, lead, and chromium at the St Helier waterfront site exceed the Soil Guideline Values set by the UK Environment Agency (EA) for residential use of contaminated land, based on results of the CLEA model (see http://www.defra.gov.uk/environment/landliability/pubs.htm). Mercury does not appear to exceed the Soil Guideline Value for residential use. Not all contaminants potentially hazardous to human health present in the St Helier contaminated site may have been evaluated by the surveys conducted so far, and the comparison with EA soil guideline values has been reported here only for the chemicals included in the available surveys.

19. How many samples have been taken?

1. **Warren Spring Laboratory (1992). Only incinerator ash.**

2. **WRc Environmental Management (1995). Ash-like material (probably combined bottom and fly ash) was found in 15 out of 32 trials pits on site**

3. **Arup Rothwell Consulting Engineers (1999). 8 boreholes on site**

20. Who has taken the samples?

See above

21. How were the samples taken? (Sampling strategy?)

1. **Warren Spring Laboratory (1992). Not applicable, as they only tested incinerator ash.**

2. **WRc Environmental Management (1995). Complex strategy (see their report, page 19).**

3. **Arup Rothwell Consulting Engineers (1999).**

22. Where have the samples been sent for analysis? (UKAS accredited laboratory?)

No details on UKAS accreditation available, though it is likely that (1) was accredited

INITIAL HAZARD & RISK ASSESSMENT

23. Have there been any complaints of health problems that may be associated with exposure to the chemical (s)?

No complaints have been received by the Health and Social Service Committee either from workers on the site or residents nearby.

24. Is there a pathway between the source of the contamination and any potential targets (human, animal etc.)?

There are four potential pathways:

- direct contact between humans and contaminated soil on the site
- bioaccumulation of dioxins and mercury in the foodchain, and possible human exposure via the food chain
- Migration of dioxins and metals to the sea and impact on sea life. This is the major potential effect of groundwater flows described in section 11
- Migration of dioxins and metals to fresh water and possible human exposure via water. It is unclear how much this pathway can in fact be confirmed, but the potential is implicit in the groundwater flows described in section 11.

25. Is further sampling, environmental or biological, required?

The concentration of dioxins and furans, arsenic, lead, cadmium, lead, copper, zinc, chromium and mercury in much of the ash at the site is of concern for human, animal, and ecosystem health. Further sampling is considered in section 28 as part of the overall steps suggested to prevent further contamination.

26. What (if any) immediate action is required? (Evacuation etc.)

The site is not inhabited at present. Concerns have been expressed about possible exposure of workers at the building sites in this area. In meetings with two of the building sites management teams, it was reported that the workers at the site are aware of the potential risk to their health, and a programme of education of the workforce to prevent exposure to contaminated ash has been implemented by the contractors (Cameron's Building Contractors). There are no residents on the site at present. It is difficult to estimate the health hazards to residents near the site in the absence of a survey assessing the fate of the leachate and its content; however such potential hazard ought not be ignored. The suggested actions are listed in the previous section.

27. Can the chemical be controlled/contained immediately?

The basement of the building developments appears to have been constructed to minimise potential exposure to future residents via direct contact with contaminated soil. However, all this 14 hectares area still contains large amounts of incinerator ash, much of which is heavily contaminated. The ground surrounding the building site, and the remaining of the 14 hectares of the area

Grounds immediately surrounding the building development. It is reported that about 1 m of uncontaminated fill material separates contaminated ash from the surface of the site. This will need to be checked and documented as part of the survey suggested as short-term action in section 28. A fresh clear top soil cover of 60 cm has been suggested by Arup Engineering Consultants as additional protection above that (please refer to correspondence between S. Smith of the Health and Social Service Committee and Arup Engineering Consultants). The adequacy of such intervention for human health protection is questionable in the light of recommendations by experts, for example, the International Ash Working Group describes 4 types of disposal practice of municipal solid waste incinerator ash:

1. total containment,
2. leachate containment and collection,
3. controlled contaminant release, and
4. unrestricted contaminants release.

This working group does not recommend the last of these options as adequate for optimal hazard containment (see attached copy of chapter describing this). It would appear that the past practice at the St. Helier site may be classified as unrestricted contaminants release. It would seem desirable that the future management of ash remaining there would match the requirements of the International Ash Working Group or similar recommendations of best practice by qualified technical experts.

28. What steps need to be taken to prevent further contamination? (Short and long term considerations)

An intervention is needed to manage the dispersion of contaminants from the site towards the surface (built and landscape areas developed on the marina), the sea, the foodchain, and the freshwater.

As CIRS is a service providing health and not engineering advice, CIRS is not qualified to suggest specific technical (engineering) details of such intervention, and our suggestions in this section have to be seen in the light of any specific further findings describing the location of the hazardous materials contained in incinerator ash at the site, their fate as content of leachate from the site, and

interventions planned for containment of the mentioned chemicals. This is because all of the above would affect the extent of the potential public health implications. Within these limitations, CIRS suggests that a survey is desirable to assess the actual extent of the protection afforded by interventions so far, and the need for further intervention (see "in the short term" below). CIRS also suggests that a monitoring programme would be necessary to evaluate the effectiveness of any planned interventions (see "in the medium-long term" below). Therefore CIRS recommends:

1. In the short term: **A survey to describe the hydrogeology at and nearby the site and the distribution and chemical forms of the contaminants in the soil and the water leaching from it at the present time. This seems justified as the amount of ash left in site after the currently ongoing building work is likely to be considerable, and the chemical form of the contaminants and the distribution of the leachate have not been clearly characterised so far. In addition, a fresh survey could document changes in contaminant concentrations compared to the 1995 survey as a consequence of the both the recent building work and the effect of water exchanges in and under the site. Dioxins and furans as well as metals should be considered for such survey.**

2. In the medium and long term: **a programme to monitor the concentrations of several key chemicals in terms of potential impact on human health at and near the site. At the site visit on 22 May 2002, CIRS recommended a programme of testing for dioxins, arsenic, cadmium and lead. In the light of the evidence presented in the published reports summarised here, it may be relevant to add copper, zinc, chromium and mercury to that list. However, a strategy for further sampling should be defined only after sampling phase (1) has been conducted, so that a monitoring programme may be informed by the findings of a more complete and current survey.**

ACTIONS

REFER TO ABOVE SECTION 28.

SITE VISIT REPORT WRITTEN BY **Giovanni Leonardi**

DATE **10 June 2002, revised 7 August 2002**

---

[1] *AOD (Above Ordnance datum) – Land levels are measured relative to the average sea level at Newlyn Cornwall. This average level is referred to 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights above Ordnance Datum.*