PASMINCO
COCKLE CREEK
SMELTER

(Subject to Deed of
Company Arrangement)

lead abatement strategy implementation documentation

presented to

Ferrier Hodgson

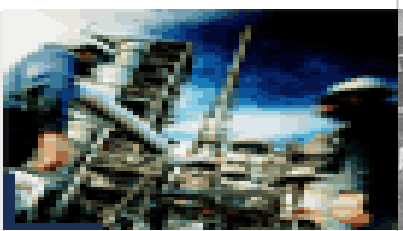
for the

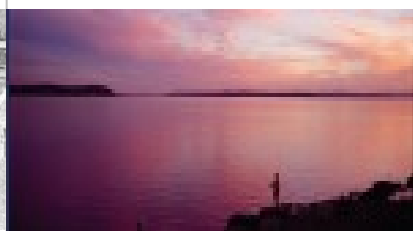
Pasminco Cockle Creek Smelter Site

Redevelopment Project

October 2007

PASMINCO





Document Control

Pasminco Cockle Creek Smelter
Lead Abatement Strategy

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Revision History:

Revision No.	Date Issued	Reason / Comments

Distribution:

Copy No.	Revision No.	Location



DISCLAIMER

This lead abatement strategy ("LAS") has been developed by Pasminco Cockle Creek Smelter Pty Limited (Subject to Deed of Company Arrangement) – ("PCCS") for the Deed Administrators of PCCS.

The LAS has been developed in conjunction with the lead specialist Graeme Waller to reduce the current potential exposure for residents of the "Nominated Properties" that could arise from previous lead dust deposition such that the exposure levels from lead dust deposition after the LAS are within acceptable limits during everyday living. The Nominated Properties are the residential properties in Boolaroo, Argenton and Speers Point which were specified as part of the development consent issued by the Minister for Urban Affairs and Planning in relation to PCCS's operations, dated 14 November 1995. Annexure 1 contains a figure describing the Nominated Properties.

Neither PCCS nor the PCCS Deed Administrators accept any liability in relation to any contamination of the Nominated Properties with lead dust, or accept any responsibility or liability for any investigations or remediation of the Nominated Properties beyond the requirements of the conditions noted in the 1995 Minister's Consent.

It is noted that in addition to any contamination of the Nominated Properties with lead dust, contamination may or may not be present as a consequence of the presence of lead slag or chips or dust from lead paint. Preparation of this strategy does not in any way indicate or imply any liability or responsibility on behalf of PCCS or the PCCS Deed Administrators for lead slag or lead paint contamination.

Neither PCCS nor the Deed Administrators accept any liability or responsibility for any investigation or remediation of any contamination of the Nominated Properties except as indicated in accordance with the roles and responsibilities identified in this LAS strategy.



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Annexures



[1.0] Introduction

[1.1] - **The Lead Abatement Strategy**

This lead abatement strategy ("LAS") has been developed by Pasminco Cockle Creek Smelter Pty Limited (Subject to Deed of Company Arrangement) – ("PCCS") for the Deed Administrators of PCCS.

LAS Objective

The objective of the LAS is to achieve a reduction in human exposure to lead dust contamination in surface soils. This is consistent with the general principles of contamination management as set out in Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites 1992 (ANZECC 1992).

The LAS has been developed in conjunction with the lead specialist Graeme Waller to reduce the current potential exposure for residents of the "Nominated Properties" that could arise from previous lead dust deposition such that the exposure levels from lead dust deposition after the LAS has been completed are within acceptable limits during everyday living.

The Nominated Properties are the residential properties in Boolaroo, Argenton and Speers Point which were specified as part of the development consent issued by the Minister for Urban Affairs and Planning in relation to PCCS's operations, dated 14 November 1995. Annexure 1 contains a figure describing the Nominated Properties.

A Commission of Inquiry (CoI) was held prior to the 1995 consent which identified the Nominated Properties as those being likely to be affected by lead dust from the smelter operations. This decision was based on a substantial number of submissions from many parties which contained extensive scientific data and references.

Since 1995, PCCS has been subject to specific consent conditions in relation to the Nominated Properties and considers that it is appropriate that the new application of the LAS should continue to rely on the properties specified by the CoI.

On 27 February 2007, the Minister for Planning granted approval for the remediation of the Pasminco Cockle Creek Smelter site at Boolaroo. Condition 1.6 of the approval made direct reference to the LAS as shown below:

1.6 Continuation of Lead Abatement at Nominated Properties

The Proponent shall develop and implement a **Lead Abatement Program** at nominated properties (as identified in conditions 42, 43 and 44 and Figure 1 of the 1995 consent (DA No. 29/94)) to the satisfaction of the DEC for an agreed period of time during the remediation of the site, and shall include, but not necessarily be limited to:

a) consideration of comments provided by the DEC, NSW Health, Council and the Department on the document titled "Lead Abatement Strategy Implementation Documentation" dated November 2006;
b) timeframes and detailed methods for the following general program components
   i) consultation;
   ii) soil analysis;
   iii) development and undertaking of lead abatement measures;
   iv) preparation of documentation for the property owners identifying the property status following the implementation of the program;
   v) the management of the strategy;
c) procedures and systems to manage and maintain information and records generated by the implementation of the program;
d) application, on a voluntary basis, to properties with lead levels in soil above 300 ppm, or as otherwise agreed by the DEC;
e) endorsement by technical advisers including, but not necessarily limited to, a Site Auditor and a lead specialist;
f) a goal to commence the program by 1 March 2007, including a plan for the successful agreement of the program arrangements by all relevant parties and for program approval prior to 1 March 2007;
g) definition of the role of the Environmental Health Centre (EHC) or an alternative method for fulfilling the role of the EHC should the EHC cease to exist; and
h) a long term community education program and management plan, and means for funding this program/plan in order to assist residents in nominated properties in managing any residual risk associated with lead contamination.

Remediation works on the site shall not commence until the terms of the program has been accepted in writing by the DEC and the Director-General. Implementation of the Program may be staged with the agreement of the DEC and the Director-General



This LAS has been prepared so as to meet the consent requirements. Notwithstanding that the date of 1 March 2007 as referenced in 1 (f) has passed, PCCS intends to undertake the commencement of preparatory activities required as a precursor to the actual public involvement in the LAS as soon as practical after receiving the government agreement to the LAS as required by the consent condition.

Endorsement as required under condition 1.6 (e) will among other things consider the efficacy of the LAS to meet its objective as identified above.

The term "authority stakeholders" used in this document refers to the Director-General of the Department of Planning (D-G) and/or the Department of Planning (DoP); the Department of Environment and Climate Change (DECC) – formerly the Department of Environment and Conservation (DEC), Department of Health (DoH) and Lake Macquarie City Council (LMCC or the Council).

[1.2] - **Strategy Components**

The components of the LAS can be summarised as follows:

A.	Management of the LAS over the defined time period.
B.	Consultation with property owners and property occupiers about the relevant issues, the LAS and voluntary participation.
C.	Analysis of lead concentrations in soil at each participating Nominated Property (as required) to identify and document any relevant lead dust contamination for the property owner(s) and the authorities and to identify an appropriate action.
D.	Development and undertaking of lead abatement measures, to a degree agreed by PCCS and the property owners consistent with the LAS and specific to the situation at each relevant Nominated Property. The lead abatement measures are based around the well accepted principle of providing a barrier over lead affected areas to reduce lead exposure pathways.
E.	Preparation of documentation for the property owner(s) and the authorities identifying the property status following implementation of the LAS. The nature of the documentation in respect of any particular property will depend on whether the owners of that property chose to participate in the LAS.

[1.3] - **Parameters of the LAS**

LAS Management - The process including consultation, implementation and documentation will be managed by PCCS. A qualified Certifier will participate in management procedures to provide external input to the process. Records of what has taken place will be provided to participant property owner(s) and reports of property owner participation, and of actions taken, will be provided to stakeholder authorities.

Consultation Period precedes Implementation - It will be necessary to present the LAS to the community via an initial consultation program before the strategy implementation commences. It is expected that this initial Consultation Period will not exceed 6 months. Further consultation will be undertaken over the Implementation Period which follows the initial Consultation Period.

Finite lifetime for the LAS - It is proposed that the strategy will be implemented during a finite lifetime of two years from a nominated implementation date which will be shortly after the conclusion of the initial Consultation Period as any material excavated from the Nominated Properties under the LAS program will need to be incorporated into the remediation program that is to take place on the PCCS Site.

The time frames for the LAS are seen to be generous and the need for owners to fit in with the LAS schedule will be fully explained during the initial consultation period. PCCS will provide sufficient staff and resources to ensure the work is finished within the program. In addition, PCCS has scheduled an extra 6 months to be available for minor "finish up" activities in particular circumstances beyond the final 2 year period in which soil may be removed from a property. These contingencies will ensure the completion of the LAS program within the specified time frames.

Voluntary Nature of LAS - PCCS will offer an ability to participate in the implementation of the LAS to the owners of the Nominated Properties on a voluntary basis. The offer process will be a formal written



process to individual property owners. If any particular property owner chooses not to participate, then PCCS will be under no further obligation with respect to that property. The offer and acceptance / refusal process is to take place during or no later than one month after the initial Consultation Period. The offer to allow the participation of individual owners in the implementation of the LAS will not be exchangeable for any other actions nominated by any of the property owners. Property owners who agree to participate in the implementation of the LAS can subsequently withdraw from the LAS at any stage.

Property owners who wish to participate in the LAS after the Implementation Period has commenced can only do so based on consideration by PCCS in dialogue with the authority stakeholders. Important considerations are that any potential late participation does not cause unreasonable delay to the overall implementation of the LAS nor adversely affect any remediation schedules or activities on the PCCS Site.

[2.0] Background to the LAS Program

[2.1] - **The LAS in the Context of PCCS Site Approvals**

The LAS is a voluntary program of works proposed to be undertaken by PCCS in conjunction with the start of the remediation of the PCCS site with the timing of the LAS Implementation being linked to the gazettal of the first phases of property rezoning on the PCCS Site. As indicated earlier, the PCCS site remediation has received approval from the Minister for Planning under Part 3A of the EP&A Act 1979. The Part 3A Project Approval specifically refers to the LAS and its links with the PCCS Site remediation (refer Section 1.1 above). The Part 3A approval also includes a condition (1.5) which calls for the surrender of the 1995 Approval when the LAS is accepted in writing by the Director-General and DECC.

The LAS only applies to the Nominated Properties as defined by Figure 1 of the 1995 Smelter Upgrade Consent Conditions (refer Annexure 1). In practice, the Nominated Properties were subsequently specifically defined by a list generated by Lake Macquarie City Council (LMCC) in the 1990s which includes a s.149 certificate notation on the relevant properties relating to them being lead (Pb) affected.

The original 1995 smelter upgrade approval recognised that the smelter operations would deposit lead containing dust on the Nominated Properties and set up certain conditions that required PCCS's response if the smelter operation increased and/or maintained the lead levels on the land above 600 ppm in any of the Nominated Properties.

Condition 42 required PCCS to undertake one lead survey per property per year, if requested by the owner. By virtue of the surrender of the 1995 consent this condition will lapse when the LAS is implemented as the LAS will make this ongoing condition redundant.

Condition 43 required that if a tested property had a lead concentration in excess of 300 ppm, then PCCS should monitor that property annually. PCCS interprets this condition to be specifically related to the period when the smelter was in operation and when the smelter closed in September 2003, this condition then lapsed and is no longer relevant.

Condition 44 related to the smelter operation and in PCCS's opinion has now lapsed.

[2.2] **Need for the LAS**

As noted in Section 2.3 below, dust is considered the main causative factor related to the elevated lead in blood levels in children in the Nominated Properties.

Since the smelter closure, the risk associated with lead in the community has diminished substantially as evidenced by.

1. A >90% reduction in dust levels in the community as shown by the monitoring that is carried out by PCCS under its Environmental Protection Licence issued by DECC and provided regularly to the community in the PCCS newsletters. While lead in dust issues will still be relevant until after the PCCS site is remediated, the Air Quality Impact Assessment in the PCCS Site Remediation Environmental Assessment indicates that the emissions from the site during the remediation will meet acceptable health standards. Lead emissions in dust after remediation are expected to be negligible.



2. The fall in blood lead levels in the community since the smelter has closed. The results from the most recent survey (made available to the community by the Environmental Health Centre (EHC) in 2006) indicate that lead in blood in the most vulnerable members of the community has decreased dramatically. This is as expected and is in line with the elimination of the smelter stack discharges and the actual measured lower lead in dust levels in the community.

However, through the records kept of the lead in soil sampling under the 1995 consent conditions supplemented by a pilot study commissioned in 2004 by PCCS, PCCS has firm evidence that there are varying levels of lead in soil in the Nominated Properties.

The LAS has been developed to reduce the potential exposure to the identified lead in soil in the Nominated Properties.

[2.3] - **The Focus on Lead Dust**

There is a considerable body of published literature relating to potential health effects of lead and management approaches to it. For the local area around the PCCS Site, the information assembled during the CoI leading to the 1995 Approval and the publications of the Environmental Health Centre (EHC) are relevant. More recently, the Department of Health of the Government of South Australia produced "The Port Pirie Lead Implementation Program – Future Focus and Directions", December 2005 (referred to here as Pt Pirie 2005). This paper deals with issues in relation to an operating smelter in Australia and is considered of direct relevance for the LAS.

It is reasonable to suggest that potential exposure pathways to the lead dust contamination in the soil in the noted areas that may affect human health are:

- Inhalation of air borne dust (usually only associated with infants from 0-6 months of age)
- Ingestion e.g. from home grown produce (e.g. fruit and vegetables and eggs sourced from backyard chicken runs) and from behavioural issues associated with young children.

In addition there are exposure paths to pets, particularly dogs, as they exhibit behaviour resulting in high intake (for example, digging, licking fur, foraging, consuming dirt encrusted bones).

It is unlikely that there would be many chicken runs in the Nominated Properties and accordingly, the LAS is principally directed towards ensuring an effective barrier is provided between the lead dust and human receptors. At the same time, the consultation part of the LAS program will produce advice to property owners about ways to manage the home produce issues should they arise.

Direct ingestion may arise, for example, from very young children playing in the backyard and putting soiled hands in their mouth. The LAS program is specifically targeted at reducing this risk pathway by effectively increasing the barrier between the child and the lead dust in the soil.

Another pathway is from dirt in the backyard being tracked into the household and children playing on the floor putting soiled hands in their mouth. The chance of ingestion via this pathway will be directly reduced by the LAS actions since less lead in soil will be available from the yards. This pathway can also be very effectively controlled by housekeeping procedures. The consultation part of the LAS program will continue to advise land owners about this issue.

The Pt Pirie 2005 report specifically notes:

"Airborne deposition of lead contaminated dust appears to be the primary pathway of contamination of Port Pirie children's living space".

This is one of the primary reasons that the LAS focuses only on lead dust deposition and not on the presence of lead slag used for fill in a number of properties. The other primary reason is that slag was used on a voluntary basis by property owners whereas the lead dust deposition was not a voluntary action.

The Pt Pirie 2005 report also specifically notes:

"Infants and toddlers are at greater risk due to increased exposure (mouthing behaviour), increased ability to absorb lead and the susceptibility of their rapidly developing central nervous systems. Older



children, adolescents and non-occupationally exposed adults exhibit near normal blood levels unless significantly exposed during early life."

This is one of the primary reasons why the LAS focuses on residential properties and not public open spaces.

[2.4] - **Property Activities outside of the LAS**

It is important to note that the LAS program (except in the cases where topsoil is removed) focuses on the provision of a lead barrier to lead bearing dust that may be present in the topsoil in the yard. The issues of potential lead in dust in roofs or cavity walls of buildings on the properties or in garden beds will become relevant to the property owners if they want to sell their property or if the property is to be renovated or re-built. The consultation part of the LAS program will provide advice to property owners about these issues and will offer constructive advice to the LMCC and the Department of Health (DoH) on how to address these problems during and after the duration of the LAS program.

[3.0] LAS Component A – Management Procedures

PCCS will manage the scope of work from offices located on the PCCS site. Full records will be kept which can be audited by DECC or LMCC, as per an agreement between the Deed Administrator and the stakeholder authorities. PCCS will likely sub-contract various services, but will be responsible throughout for ensuring all work is done to appropriate quality standards.

It is the aim of PCCS to complete the scope of work at the earliest possible time and within the periods nominated in the earlier sections. Property owners will be encouraged to participate as early as possible in both the Measurement of lead in soil and the Implementation stages. While the strategy is intended to be implemented over a period of 2 years after the initial 6 months Consultation Period, participating owners must allow any necessary activities by PCCS (after the initial measurement stage) to commence within 21 months of the start of the initial Consultation Period so as to enable the work to be completed within the two year program implementation period.

A qualified Certifier (with direct experience in contamination and community consultation) will be important in the role of reviewing that the Management Procedures are appropriate. The qualified Certifier will coordinate his role with the LAS Manager. The qualified Certifier will be an independent expert adviser to the LAS and is expected to provide comfort for participants that the LAS is being undertaken as specified. The qualified Certifier will require to be satisfied that the following tasks have been completed. There will be flexibility in the program to alter this scope to deal with any other relevant issues as they arise.

Tasks to be undertaken by the qualified Certifier

1. Liaise with PCCS Management Team, DECC, DoH and LMCC, as required, to ensure consensus for scope of work, quality control and nature of certification.
2. Review of Sampling, Analytical and Quality Plan prior to the Consultation Period.
3. Attend community consultation meetings as appropriate and be available for contact from the property owners on an as needs basis.
4. Review and certify the reports relating to each of the Nominated Properties.

[3.1] **Proposed Management Structure**

It is proposed that there be two levels of management for the project consisting of a Steering Committee Level and a Project Management Level as shown on **Figure 1** of this document.

[3.1.1] Steering Committee

The Steering Committee will monitor that the program is achieving its aims and also provide strategic direction where needed. In this way, it will serve as a direct control over the project and as a formal means of advising progress to the relevant authorities at appropriate times during the program.

It is proposed that the Steering Committee meet just prior to the start of the Initial Consultation Period, at the end of the Initial Consultation Period, then at intervals of 3 months thereafter until the program is



complete. The LAS Project Management Team will provide a report in advance for each Steering Committee meeting. The Steering Committee can call additional meetings at its discretion.

The Steering Committee will be the formal body for dealing with all media, authority and community inquiries beyond the day to day activities of the LAS program. The Steering Committee may at its discretion delegate some of or its entire role to the LAS Manager or the Fitzwalter PCCS Project Manager.

[3.1.2] LAS Program Management

An LAS Manager will be appointed to run the whole program with an additional role of attending Steering Committee meetings in an advisory and reporting role. In addition, the LAS Manager will be responsible for managing the liaison with the Certifier. As shown on Figure 1 of this document, it is anticipated that the LAS Manager will manage the program through the four separate support teams of:

- Data Management Team
  - Responsible for creating and maintaining various databases and managing the entire Program's central filing system. The databases will keep addresses, owners' contact details, correspondence and testing results etc for each nominated property. The databases will be established before data collection from properties commences.
- Consultation Team
  - Responsible for all consultation activities. Will be the main body for communicating with property owners and authority officers. Communication with media will only occur with the delegated authority of the Steering Committee.
- Field Data Collection Team
  - Responsible for collecting and analysing soil lead concentrations on Nominated Properties and preparing the associated reports. Will identify appropriate lead abatement strategy for each tested property and give results to the Data Management Team. Will be responsible for final reports on work undertaken by the Site LAS Implementation Team.
- Site LAS Implementation Team
  - Responsible for implementing appropriate lead abatement actions on Nominated Properties. This team will liaise with the owners, the sub-contractors, the Certifier and the Field Data Collection Team.

[3.1.3] Management Team Correspondence/Issues

The Management Team will be responsible for creating and maintaining a database of all communications received and sent to residents, the Certifier and the stakeholder authorities. It will regard all email addresses, phone number, fax numbers and postal addresses it receives as confidential except in respect of copies of various reports being sent to the Steering Committee, the Certifier and the relevant stakeholder authorities (DECC and LMCC).

Other correspondence/issues include:

- Reports and correspondence with the Steering Committee;
- Ongoing general correspondence with property owners, the Certifier and the stakeholder authorities;
- Correspondence with the media (whether through the LAS Team or through the Steering Committee);
- The distribution of the reports of the initial lead testing;
- Distribution of reports relating to the performance and outcomes of any LAS implementation works;
- Advice and support to LMCC and DoH relating to activities beyond the LAS program;
- Periodic updates for the authority stakeholders.

[3.1.4] Complaints Receipt and Resolution

Complaints about the LAS Program may be delivered to the Management Team via telephone, email, fax, mail or in person. Upon receipt, all complaints will be logged in a Complaints Register. The complaints will then be promptly brought to the attention of the LAS Manager who will assess each complaint and decide on an appropriate course of action.

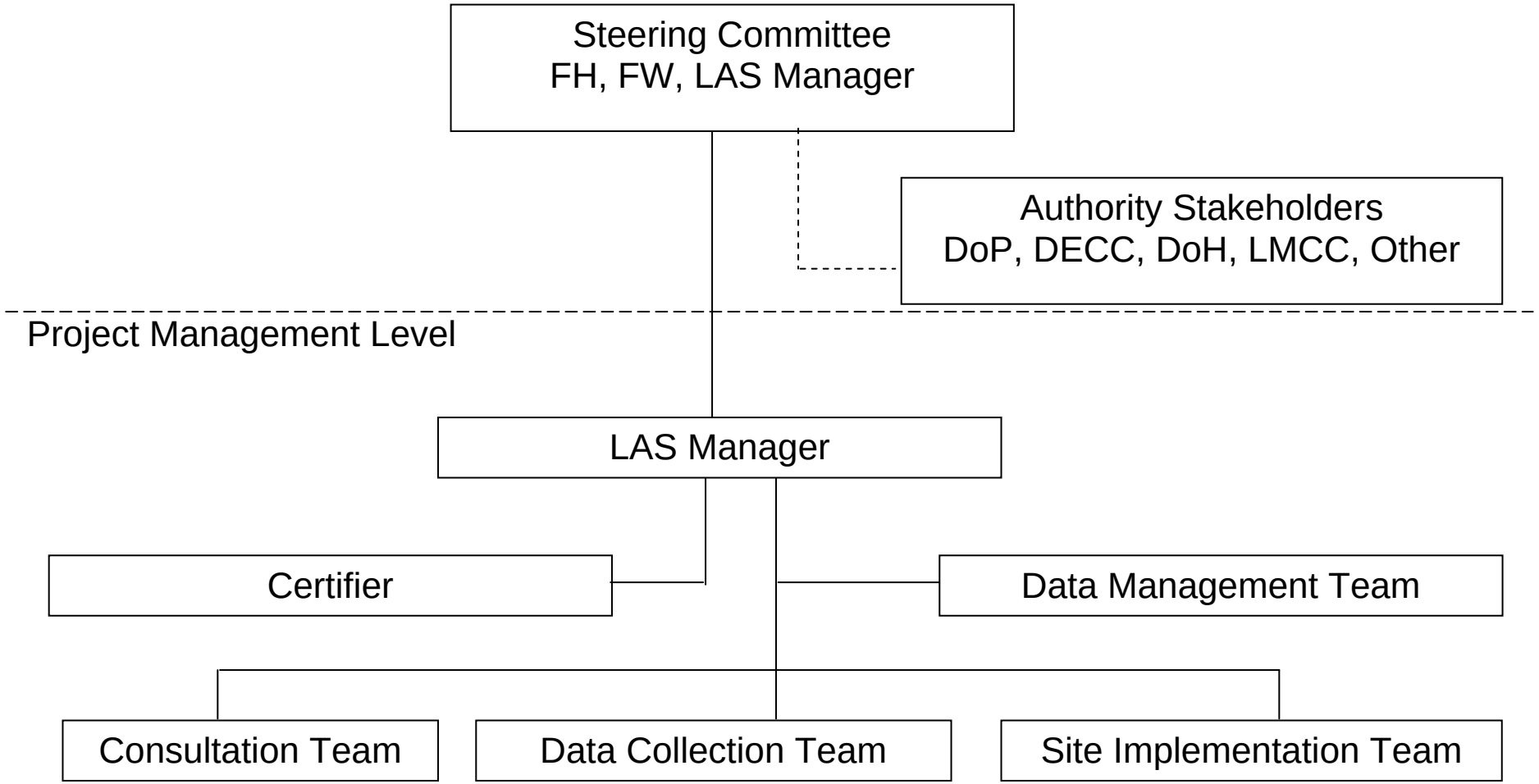


Generally, the LAS Manager will nominate the most appropriate project manager to address the complaint in the shortest possible time frame. In particular cases, it may be necessary to refer the complaint to the Steering Committee for their advice. All complaints of a legal nature will be directly referred to the Steering Committee.

In all cases, the response action taken and the method of response to the complainant will also be documented in the Complaints Register.



Figure 1 - Steering Committee Level



[4.0] LAS Component B – Consultation Steps in Implementing the LAS

There are two basic phases to the Consultation program. The initial period (estimated to last 6 months) will be targeted at:

- Introducing the LAS program to the owners of the Nominated Properties;
- Explaining what the program involves and its aims;
- Explaining obligations, rights and outcomes for the owners.

The desired outcome of this consultation phase is to provide sufficient information to the owners to allow them to make an informed decision about their participation in the LAS program within two weeks of the completion of this consultation phase. This timing is very important in respect of achieving the goals of the whole LAS program in the most effective way.

The second phase of the consultation extends over the remainder of the LAS program and is directed at keeping the community informed about the progress and being available to respond to owners' enquiries.

The consultation will be managed by the LAS Consultation Team supported as necessary by specialist consulting firms.

[4.1] Preparation of General Information

It is necessary to prepare suitable information to inform the public about the LAS. It is planned that a simple "plain English" version of the strategy plus supporting pamphlets will initially be distributed to the LAS participants. Information on the LAS will also be available on the PCCS website.

[4.1.1] Website

The PCCS website will detail the LAS strategy to owners. It will have information on which properties qualify as Nominated Properties (without specific addresses which will need to be discussed directly with the LAS Team), what options Nominated Properties have and the timeframe of the LAS. It will also have contact details of the LAS Manager and any other information which is of interest to the general public concerning the LAS. The website will inform owners of any minor changes to the LAS as well as the progress of the LAS.

[4.1.2] Plain English Version of LAS

A plain English version of the LAS will be sent to each of the nominated property owners. The purpose of this document is to inform the owner of the components of the strategy which will be relevant to them. The use of technical jargon will be avoided so as to provide the greatest number of owners with an understanding of the LAS strategy.

[4.1.3] General Advice on Living with Lead

A robust amount of advice and information already exists (from the former EHC, LMCC, DoH and other sources) which can provide advice to owners and residents as to how to safely manage risks of living with lead in soils. The LAS Consultation Team will direct enquiries from the community to the appropriate sources of this information. It is expected that LMCC and DoH will maintain various databases on this information in their offices.

PCCS will also advise property owners that the risk of contamination from lead dust from the PCCS site since the smelter closure in September 2003 is very low as evidenced by the low levels of lead in dust measured subsequent to the smelter closure.

[4.1.4] Advice to Council for the Post-LAS Period

The LAS Team will work with LMCC and DoH during the LAS Program to provide advice to assist the LMCC and DoH management in respect of the Nominated Properties for the period beyond the completion of the LAS Program.

[4.2] Consultation Steps

PCCS already has a formalised consultation strategy for the remediation and redevelopment of the PCCS Lands at Boolaroo (as required by the Remediation Order applying to the PCCS Site). Consultation for this project will be guided by the general principles of that strategy.



[4.2.1] Consultation with Authorities

The Steering Committee will make itself available to all authority stakeholders to address specific issues. In addition, the LAS Team will be available for consultation with officers of the authority stakeholders during the progress of the LAS program.

[4.2.2] Community Consultation

Consultation must involve the property owners. Formal consultation with residents who are not the property owner will only occur with the consent of the property owner, but the information available to the owners will also be available to the resident non-owners via the website and other public community information outlets (e.g. advertisements, newsletters).

Consultation will be achieved through a variety of media which will include:

a. Advertising coupled with advice on the PCCS project website.
b. Direct initial mail out with follow-up direct correspondence as appropriate to the owner's requirements.
c. Personal consultation (as agreed to by the owners) either on an individual basis or with small groups (such as those in a single street). Section 4.2.4 below expands on this method.
d. Correspondence by email or fax or via the Hotline.

Consultation described under items a. and b. will occur for all of the Nominated Properties. Consultation thereafter will be directly in response to the needs and requirements of the owners of the Nominated Properties.

Where data already exists for lead concentration in soil at a specific property, that data will be made available to the owner to help in the decision whether or not to participate in the various components of the LAS.

[4.2.3] Direct Initial Mail Out

The mail out will be the first direct step in communicating with the owners. A letter from the LAS Team containing a plain English version of the LAS will be sent to each owner of a nominated property. The letter will also contain contact details for the LAS Manager, instructions on how to volunteer for participation in the LAS program with the timeframe for participation. The mail out will be sent by the LAS team using the owners' contact details as supplied by LMCC and personally addressed to each owner and sent by registered post. In the cases where the occupants are non-owners, the residents will only be contacted with the permission of the property owner. The LAS Manager will provide the contents of the mail out to DEC and LMCC.

It will be important to demonstrate that the owners have received the initial advice informing them of the program. If the LAS Manager has not been contacted by the property owner within two weeks of the initial mail-out, the Manager will seek out other appropriate contact methods to try to ensure that all of the owners have received the relevant information. Such methods may include a second mail-out, door to door visits, telephone calls, speaking to non-owner residents, speaking to real estate agents handling tenancies, etc. The LAS Manager will be seeking some acknowledgement from the owners that they have received the information.

It is possible that despite best endeavours, owners may not respond to attempts to contact them. The LAS Manager will ensure that all efforts undertaken to try to establish that the information has been received by the owner will be fully documented. The LAS program cannot guarantee that owners will respond.

[4.2.4] Personal Consultation

Personal consultation may be required to assist owners in making a decision on their participation in the program. PCCS will establish an LAS location premises in Boolaroo which will be open on two days per week for a 2-3 hour period per day (or as needed) where face-to-face inquiries can be made without a prior appointment.

Personal consultation outside of visits to the Boolaroo offices will be arranged by the LAS Manager at a location in the local area only (Boolaroo, Speers Point and Argenton). Venues could include the PCCS site offices, at the specific property or at an owners' alternative local property or possibly at a location such as the LMCC offices. More distant owners will have to pay their own travel costs if they want face-to-face consultation.



It is also possible that personal consultation may be required to arrange a testing of the Nominated Property, deliver the results of property testing, informing the owners of the appropriate level of abatement, if any, and conducting any work required.

Following completion of the LAS program, the LAS Project Team will be disbanded and all questions or concerns regarding future activities at the Nominated Properties should be directed to LMCC or DoH.

[4.2.5] Owner's Decisions

Property owners must decide whether or not they want to participate in the LAS program. Owners may indicate to the LAS Manager that they want to be included during the personal consultation phase, but it will be necessary to complete a standard form, confirming that decision. The form will be logged and filed by the LAS Manager.

All owners will be made aware that it is possible to withdraw from the program at any time. It will be the responsibility of the owner to inform any non-owner resident of their participation and to ensure that access to the property is available for testing and implementation as appropriate.

Should an owner indicate that they are not interested in participating in the LAS, the LAS Manager will formally write to that owner confirming their decision. The LAS Manager will inform DEC and LMCC as to the decision made by each owner in respect of participation in the program. In these cases, the LAS Manager will include details of all that is known in respect of the particular property.

In cases where the LAS Manager does not get any response from an owner after the steps described in Section 4.2.3 above, then the LAS Manager will treat the non-response as a decision by the owner not to participate.

[5.0] LAS Component C – Measurement of Lead Dust Concentrations on Nominated Properties

[5.1] Previous Data

All available pre-existing data for each specific property will be assembled as part of the preparation phase. This will include any analyses and a history of any earlier remediation steps. It is noted that measurements taken earlier than September 2003 may have been affected by further fallout from the smelter operation.

This will be recorded only to provide a context to the LAS measurements. For example, if the LAS data is lower than would be expected in the street, then this may be explained by previous remediation / abatement activity. Alternatively if the LAS data is higher then the order of difference may be explained by further emissions from the smelter pre September 2003 or by the LAS sampling including slag. The Certifier will be required to endorse any response to a property owner in respect of a comparison between past data and data collected during the LAS program.

It is intended to sample all of the Nominated Properties if the owners wish to participate. Where properties have had the lead notation on the relevant s.149 certificate removed, this fact will be acknowledged in the original contact letter. The issue of possible re-contamination from the smelter operation will be mentioned.

Any decision by an owner to not participate at the sampling stage will be documented and reported in a similar manner to that for when sampling takes place (refer Sections 5.2, 5.3 and 7.1).

[5.2] Measurement Procedures

Every property that participates in the strategy will be sampled to determine concentrations of lead in surface soil. The exception to this would be in the situation where the property is completely covered with hardstand or buildings such that there is no bare soil or grassed areas. In these cases, no sampling would occur as effective barriers would already be in place. Where lead slag and lead paint are observed at the sampling site, this will be noted for the owner's benefit, but the strategy will not include any actions to address lead exposure from these sources. Note that the presence of lead slag is not always apparent for areas covered by grass or other materials.

The sampling techniques below outline the procedures to prevent reporting of potential lead paint contamination.



Sampling of soil will generally be undertaken at five locations located across accessible parts of each property and the lead concentration will be measured directly in the top 50 mm of the surface soil at each of the five locations (see below for procedures for obtaining the sample in each location) below the grass (if any).

Note: The sampling procedure outlined here is based on the procedure that has been in use by PCCS since the 1995 Smelter Upgrade Approval. The procedure was given the PCCS notation Method EP – 8 Community Lead in Soil Testing. A copy of this procedure is included in Annexure 2 of this document. Note that EP – 8 was developed based on the use of the in-house laboratory at PCCS as indicated in sections 7.1, 7.2, 7.3 and 7.4 of EP – 8. The PCCS laboratory was closed down in 2005 and since then analyses have been undertaken by external NATA accredited laboratories.

The EP - 8 procedure was endorsed by the EPA (copies of correspondence regarding this endorsement are also included in Annexure 2 of this document). The analytical procedures using the XRF have since been developed by PCCS.

A report in respect of each Nominated Property which participates in the implementation of the strategy will be provided to the owner(s) of each Nominated Property, to DECC and LMCC. The reports will also be available for inspection by other stakeholder authorities on request.

[5.2.1] Site Layout

All properties will have a site diagram outlining significant features such as houses, sheds, pools, driveways, gardens, slopes, different levels, etc. The boundary of the property which faces the road or any other feature (e.g. oval) will be indicated. The site diagram will also include locations that soil samples were taken from, and locations of slag and lead paint areas identified from visual assessment. General site observations such as yard appearance, grassed areas, type of house (weather board or brick), site history (from speaking with the owner) will be noted. The site diagram will clearly indicate the soil sampling areas in order to provide accurate information for future lead abatement actions (if required).

The typical content of the diagrams of tested sites are provided in the LAS Annexure 3 as an example of the recording to be made of each site.

Diagrams will be supplemented with GPS coordinates of each property and photographs.

[5.2.2] Sampling Technique

[5.2.2.1] Portions of Nominated Properties not to be Sampled

Only the property's lawns (including bare soil areas) are to be included in the sampling regime. The following areas will not be sampled for lead in soil:

- Garden beds (only to be noted on the site diagram), as they will have been turned and do not provide an accurate reflection of soil contamination levels as a result of atmospheric fallout. That is, sampling in a garden bed would be expected to produce a lower lead result than from un-remediated lawn areas.
- Council owned land at the front of the property (not part of the owner's property).
- Areas less than 2 m from a building or fence as there is a potential in these areas for lead to come from other sources (e.g. lead paint). Sampling in these areas would bias the lead in soil sampling that is specifically targeted for atmospheric fallout.
- Areas where car maintenance or car activity could have resulted in increased lead levels (fuel spills, exhaust emissions).
- Areas where slag is evident on the property. These areas will be noted but not included in the sampling as it does not reflect soil contamination levels as a result of atmospheric fallout.

A portable hand-held XRF analyser will be used to identify any potential lead hot spots (including slag and lead paint dust). Members of the Data Collection Team will be given guidance and training to ensure that this task is carried out thoroughly. Areas of slag identified in this way will be noted and excluded from the sampling sections as set out in Section 5.2.2.2. The XRF will also be used to identify the situations where roof guttering downpipes discharge rainwater directly into topsoil as this is a possible source of localised areas of elevated soil lead concentrations requiring separate abatement measures

from those to be applied across the remainder of the property (as described below). Records of the daily calibration of the XRF will be maintained in the database.

[5.2.2.2] Sampling the Selected Soil Areas

The total area of the property not covered by buildings or hardstand or affected as described in Section 5.2.2.1 will be divided up into 5 soil sampling **sections** (approximately equal areas where possible).

Once each soil sampling **section** has been identified and numbered on the site diagram, the following sampling procedure will occur:

1. A plastic bag will be marked with the property reference number and soil **section** number.
2. Five soil samples from one **section** will be collected and put into the pre-labelled plastic bag (composite sample). The five samples within each **section** will be selected to approximately represent equal areas within the **section**.
3. Soil samples will be collected using a hand auger or soil spear to a measured 50 mm from the soil surface. Samples with less than 50 mm will be re-collected. Samples with more than 50 mm will be reduced by measurement to the top 50 mm. Care will be taken to ensure that each sample is of a similar volume.
4. Removal of the soil from the auger will be done using the inside of the plastic bag or a screwdriver (previously decontaminated and clean)
5. Steps 1 to 4 will be repeated for each of the other **sections** in the property. This will mean that there are five composite samples for each property which will be used to determine the arithmetic mean (rounded to the nearest 10 ppm).

Upon completion of the soil sampling at each property, the hand auger and screwdriver are to be first scrubbed in potable water and then decontaminated with EXTRAN (a phosphate-free detergent) using a bristled brush, rinsed with potable water and then wiped dry with clean paper.

This sampling procedure is considered an appropriate method to measure the distribution of dust fall-out over the outside areas of each property for the following reasons:

- The Director-General's Environmental Assessment Report for the Part 3A Approval of the PCCS Remediation Project states on page 31 "The Department considers the LAS provides the vehicle to progress the lead abatement conditions of the 1995 consent". PCCS understands that this suggests that the Approval is seeking for PCCS to continue with the sampling protocol as has been used in accordance with the 1995 consent. PCCS believes that it is acting in accordance with the Part 3A Approval and believes that this is very appropriate since the endorsement provided by the EPA signed documentation in Annexure 2 of the LAS provides a definitive endorsement of the protocol proposed.
- Over the years since the 1995 Smelter Upgrade Approval, PCCS has carried out many analyses of lead in soil in backyards in the Nominated Properties. PCCS believes it is important to maintain the same protocol so as to be able to use both sets of data if relevant for a particular property. PCCS also does not want the possible adverse community perception that the previous data collected was using an unsatisfactory analytical sampling method.
- In accordance with the current Part 3A approval condition 1.6 (e), PCCS has sought the endorsement of the LAS by the lead specialist Graeme Waller who is satisfied that the procedures outlined in the LAS provide "a means of reliably determining the concentration of lead in the surface soil of nominated properties that has resulted either directly or indirectly from the deposition of airborne lead laden dust".
- In accordance with the current Part 3A approval condition 1.6 (e), PCCS has sought the endorsement of the LAS from a Site Auditor. Mr Bill Ryall who is a NSW approved Site Auditor undertook this endorsement role (HLA Envirosciences Pty Ltd – Review of Lead Abatement Strategy Report dated 14 Septmeber 2007). The recommendations of the endorsment report have been addressed to the extent possible by PCCS in this final LAS documentation. Note that Mr Ryall is not engaged as the Site Auditor for the LAS Program and that a Site Auditor will not be engaged to oversee or certify the suitability of land as part of the LAS program. Mr Ryall has also endorsed the use of the proposed sampling method to be used for the LAS Program and has also recommended an additional implementation procedure to respond to certain analytical results. This recommendation has been accepted by PCCS and is now described and included in Section 5.3 below.



A descriptive field log of the samples collected will be maintained. The log will contain such information as the property identification, the name of the sampler, the sample number and location, the depth of the sample, a description of the sample including its grain size, colour, homogeneity and any indicators of the presence of contamination, such as discolouration, staining, odours etc.

[5.2.2.3] Equipment

The following equipment will be used for the sampling:

- Hand held auger or sampling spear
- Self sealing plastic bags
- Screwdriver for removing soil from auger
- Bristled brush
- Buckets
- Potable water
- Phosphate-free detergent
- Paper towels
- Texta for labelling bags
- Sampling field sheet
- Sampling notes

[5.2.3] Sample Analysis

[5.2.3.1] Sample Preparation

Once samples have been taken, they will be transported back to the PCCS site for dispatch to a NATA registered laboratory for lead analysis with aqua regia as the extracting medium and using analytical procedures registered by NATA and in accordance with USEPA or APHA methods. Samples sent to the laboratories will be under an appropriate chain-of-custody documentation.

Before PCCS dispatches the samples to the laboratory, it will undertake the following sample preparation in a clean room dedicated to this task. The room will be protected from possible dust contamination from the site remediation works.

Sample jars of the size required for the laboratory procedures are pre-labelled with labels that correspond to the labels used on the field plastic bags.

Using clean gloves and equipment (to prevent cross-contamination), a PCCS officer removes the grass and any stones etc and thoroughly mixes the remaining soil portions together by hand and with a spatula in a clean tray. A sample jar is filled with sufficient soil for the required analysis. At this stage, the person undertaking this task will check the descriptions of the samples from the field log to ensure their accuracy.

Typically, this comprises of less than one third of the total soil collected. Except as indicated below for QA/QC samples, the remaining soil is replaced into its plastic bag used in the field collection and stored for the duration of the LAS. The jar is then sent to the laboratory with appropriate documentation.

For the purposes of QA/QC the following additional samples will be put into a jar and sent for analysis.

For each property tested, one composite sample from one **section** will be randomly selected. For intralaboratory quality control, the mixed soil (after grass etc removal) shall be used to fill a second jar. The pre-labelling of this jar will be such that PCCS but not the receiving laboratory can identify its origin. This jar will be sent to the same laboratory (the prime laboratory) that undertakes the normal sampling. That is, for each property the prime laboratory will receive six sample jars.

For each second property tested, for interlaboratory quality control, the same soil sample used for the intralaboratory sample will be used to fill a third sample jar. This jar will be sent to another laboratory (not the prime laboratory) for identical testing. In this case, the second laboratory will receive one sample from every second property tested.

[5.2.3.2] Sample Reporting and QA/QC Program

PCCS will design a QA/QC program that will allow its achievement to be assessed for both field and laboratory works using the methods listed in Appendix V of NSW DECC (2006) *Guidelines for the NSW*



Site Auditor Scheme (2nd Edition). The QA/QC program will be tailored to the order of accuracy required for the LAS program.

The prime Laboratory will provide an analysis of each of the six samples from each property.

The laboratory will highlight if any of the different sections have results that are significantly different from the other sections (see Section 5.3 below). Unusual results will be further investigated by PCCS to determine a likely cause of the data differences. Typical explanations of data variations include the following cases.

1. Previous sampling has shown that lead concentrations can in certain instances vary between front and back yards depending on the positioning of structures on the property and the prevailing wind directions.
2. An abnormally high lead result coupled with other low results typically indicates sampling of slag in the yard that has been used as fill.

If necessary, some further testing by XRF or re-sampling will be used to verify data results.

PCCS will calculate the arithmetic mean of the lead contamination using the first five samples from each property. PCCS will use the intralaboratory and interlaboratory samples from both laboratories for quality control purposes. None of the quality control samples will be used for determining the arithmetic mean.

The reliability of the of the results reported by the laboratories will be assessed by reference to the data quality indicators (precision, accuracy, reproducibility, completeness and comparability) referred to in NSW DECC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*. The reliability assessment will be undertaken by a suitably experienced person throughout the progress of the LAS program and will be documented in a stand-alone report which will be reviewed by the Certifier.

This information is not to be provided to the property owners because of the possibility that the assessment could be misunderstood. However, the reports that are supplied to the owners will include a statement similar to:

"The sample collection and handling methods and the laboratory analytical methods have been assessed by the qualified Certifier employed for the LAS program and have been found to be reliable for the purpose of the LAS program. Full details of the quality control measures employed for the LAS program and the assessment of these measures are maintained in the LAS database."

[5.3] Reporting and Property Categorisation

The results of the property testing will be summarised in a report. The typical report contents are provided in the LAS Annexure 4 as an example of the reporting to be prepared for each site.

Copies of the reports will be made available to the owner of the property and also to DEC and LMCC. Results of each measurement's location, its lead concentration, and the average lead concentration for the property and standard deviation on that average will be reported.

The arithmetic mean lead concentration from the five sample sections on the site will be used to determine the category of remediation appropriate to each property. Table 1 Abatement Strategies provides the level of remedial action which PCCS commits to undertake for each category of the average measured lead concentration.

In addition to the above procedures, the following procedure as recommended by Mr Bill Ryall is to be undertaken (refer Section 5.2.2.2).

In the event that the lead concentration for any sampled **section** exceeds the 95% UCL on the mean concentration for the property (i.e. all five **sections**), the classification for the level of remediation for that **section** is required to be determined by the concentration reported for that segment.

The relevant category(ies) of remediation will be presented in the report and discussed with the property owner, as required.

[5.4] Basis of the Lead Abatement Strategy Categorisation

It is noted that the ANZECC 1992 Guidelines for the Assessment and Management of Contaminated Sites states that "well maintained grass cover will cause a substantial reduction in exposure to



contaminants in surface soils and may therefore provide an effective barrier in particular situations. The reduction of exposure from well-maintained grass is at least 80%".

Consequently, the general strategy for reduction to lead exposure is to provide a barrier reducing the exposure pathway to residents. Barriers include grass cover (to root level), existing fixed improvements and existing hard stand areas.

The NSW Health and Environment Protection Authority and the South Australian Department of Human Services had funded the LEAD Group to run a community lead information and referral service until mid 2005 (www.lead.org.au). The LEAD Group advocates the use of barriers and provides USA EPA guidelines for lead contaminated soil. In simple terms, these guidelines suggest planting groundcover where the bare soil concentration is between 400 ppm – 5,000 ppm and abatement of soil where the bare soil concentration is between greater than 5,000 ppm.

The categories and specific actions in Table 1 are originally based on the criteria developed by the NSW Interdepartmental Lead Taskforce (NSW EPA 1994 NSW Lead Management Plan). It is noted that these criteria are similar to those developed in the USA (US EPA and the US Department of Housing and Urban Development – criteria in CFR Rule 403 of the 1976 Toxic Substances Control Act.

However, the categories in Table 1 are more conservative than those outlined by the NSW Lead Taskforce. The >300 to <1500 category was originally one category (not two) using the lower proposed abatement action of category 2.

Similarly the >1500 to <5000 category was originally one category (not two) using the lower proposed abatement action of category 4.

The categories were divided into two separate categories providing a greater degree of abatement for the upper concentrations in each category at the recommendation of the lead specialist Graeme Waller. This approach provides an added level of confidence for use of the arithmetic mean.

It is important to note that the categories in Table 1 specifically meet the LAS Objective as set out in Section 1.1 of this document.



Table 1 - Abatement Categories

Strategy Category	Measured Lead Concentration	Proposed Abatement Action
1	<300 ppm	no lead abatement action
2	>300 ppm but < 1000 ppm	Option a - if grass covered, then barrier exists and no further action necessary
		Option b - if not covered by grass but can be, then till and apply turf maintaining practical ground levels for particular site
		Option c – when in shady spot with low grass cover, add 25 mm topsoil and mulch cover
3	>1000 ppm but <1500 ppm	Option a – for already grassed areas, add additional 25 mm of top soil
		Option b – if not covered by grass but can be, add 25 mm of top soil and apply turf maintaining practical ground levels for particular site
		Option c – when in shady spot with low grass cover add 40 mm top soil and mulch cover
4	>1500 ppm but < 2500 ppm	Option a – for already grassed areas, add additional 50 mm of topsoil as barrier
		Option b - if not covered by grass but can be, then add 50 mm of topsoil and apply turf
		Option c – when in shady spot with low grass cover, add 50 mm topsoil and mulch cover
5	>2500 ppm but < 5000 ppm	Option a – for already grassed areas, excavate 50 mm of topsoil and replace with 50 mm of new topsoil as barrier – replace grass cover (if suitable lead content) or otherwise apply new turf:
		Option b - if not covered by grass but can be, then excavate 50 mm of topsoil and then replace with 50 mm of new topsoil and apply new turf.
		Option c – when in shady spot with low grass cover, excavate 50 mm of top soil, and then replace with 50 mm of new topsoil and mulch cover.
6	>5000 ppm	Investigate soil profile vertically to determine level of excavation required (expect 100 mm maximum) and then excavate, reinstate with new top soil and apply new turf, maintaining practical levels for particular site or mulch as above



[6.0] LAS Component D – Implementing Lead Abatement Measures

Owners will be expected to make a decision on their level of participation in the LAS program within two weeks of receiving the report presented to them by the LAS Team on the concentration of lead on their property. The LAS Team will be available for further consultation during this period to assist in the decision process (as required).

Owners have three options:

1. to elect to participate in the LAS
2. to elect to participate in the LAS and also undertake additional work at their own expense
3. to elect not to participate in the LAS.

Owners will be required to respond in writing on the appropriate form indicating their choice.

In an effort to ensure that owners are aware of the need to make a decision and of the consequences of participating or not participating, the LAS Team will contact the owner in advance of the due date. In the event that the owners have not responded by the due date, the LAS Team will make further contact shortly after the due date to ascertain the owner's wishes.

For those owners that do not respond within 1 week after the above contacts have been made, the LAS Team will interpret this action as a sign that the owner does not wish to participate in the ongoing phases of the LAS. A formal letter indicating this conclusion will then be sent to the owner.

After the letter has been sent to the owner, the LAS Team will no longer seek to make contact with the property owner.

Owners who withdraw from the program in this way forfeit their rights to subsequently re-enter the program.

[6.1] **Property owners who elect to participate in the LAS**

[6.1.1] Scheduling and Preparation

Once the formal acceptance has been received, the LAS Team will arrange a date to commence the implementation phase. The property owner and LAS Team will need to cooperate to arrange dates for the work to be undertaken and to allow for access to the property in a timely fashion.

A commitment of works will be drawn up by the LAS Site Implementation Team and will be relevant to the particular property in relation to special features (patios, pools, land slopes, types of grass, shade features, etc) as well as include the general implementation procedures. The commitment of works will be signed by both the Project Manager and the property owner.

[6.1.2] Implementation

The specific abatement actions on each property will be determined based on the lead concentration thresholds in Table 1. The following text is general in nature and only attempts to provide general guidance across all of the Table 1 categories.

There will be a range of landscape contractors or lawn and turf suppliers utilised to implement the required abatement actions. These contractors will be selected based on their expertise in landscaping/soil removal and will be supervised by the LAS Site Implementation Team as well as the Certifier (at a specified schedule). The abatement actions required are listed in more detail below.

[6.1.2.1] Topsoil addition

Topsoil (VENM material) will consist of a sandy loam soil or similar soil in order to provide proper drainage and promote grass growth. Samples of the soil to be used will have been analysed for compliance by the supplier to provide certification of the material quality. The range of analytes, the frequency of sampling and the acceptability of results obtained to be determined by the LAS Steering Committee. Topsoil layers will only be added in 12.5 mm (half inch) layers. This is the suggested allowable layer height in order for grass to grow through the topsoil layer. In cases where 50 mm of topsoil is required over existing grass, the topsoil will be required to be spread at four separate times with

appropriate time intervals in between to allow proper grass growth. There will be no marker between the existing grass and the topsoil.

Topsoil can only be added in the period from middle August to the middle of March of the following year. This factor will need to be taken into consideration when planning to provide abatement action to a property.

[6.1.2.2] Mulch Addition

The mulch to be used will consist of woodchips. The mulch will be used in areas of the property where grass will not grow (e.g. shaded areas). The mulch can be applied during any time of the year and is not reliant upon seasonal effects. However if the property requires more than mulching (i.e. topsoiling), and therefore is reliant on the seasons, it would be advantageous to complete the mulching when topsoiling is implemented so the property can be signed off all at once.

[6.1.2.3] Excavation and replacement with soil and turf

Where possible, excavation of high lead concentrated soil and clean soil and grass replacement will be planned to coincide together in order to minimise disruption to the property and to the property owner/s. An organic soil will be used for the underlay to the new turf. The underlay height will be 50 mm (Category 5) (or 100 mm for Category 6) and can be put down in one instance. It is not intended that a marker be used at the base of the excavation.

The turf to be used will be kikuyu grass. Kikuyu is readily available around the area, has a good wear tolerance, good drought resistance and has a medium shade tolerance.

Turf can be laid at any time of the year however spring is the most suitable time as this is the period of optimum growth conditions. During winter, grass growing is dormant or semi-dormant but can still be laid as long as it does not dry out excessively or get too wet and rot. Given that the property owners will be responsible for the care and maintenance of the lawn after it has been laid, laying the kikuyu in winter will be minimised in order for the maximum growing conditions to be achieved. Abatement actions will have to be planned around this seasonal effect in order for the grass to propagate properly.

Given that there are seasonal effects for the topsoiling and turfing, the abatement actions will be required to be staged so that during spring the majority of abatement actions should be completed. During winter it is envisioned that the majority of the lead in soil sampling at properties will be completed and planning for the lead abatement actions after winter to be underway.

For each of the above abatement actions, the property owner will be fully briefed on the steps required to maintain the grass or mulch cover. After the abatement actions have been completed it will be the property owners' responsibility to maintain the grass and/or mulch areas.

Notwithstanding, the LAS Site Implementation Team will make arrangements to return to the site within two weeks to ensure that there are no immediate problems with the abatement work and to check whether the occupier has understood what is required of them.

[6.1.3] Advice to Owners in respect of Ongoing Management

The briefing to the owners/occupiers will address the ongoing nature of any residual contamination and the need to recognise its presence on the properties as it relates to any future disturbance of those areas that have been the subject of abatement activities. Educative material will be supplied to owners/occupiers where abatement work has occurred on how to maintain their site once abatement has been undertaken, reminding them:

- not to disturb the grass
- to maintain the grass effectively (and how to do that)
- that the risk has been controlled but can come back if they remove the grass or disturb the surface
- how to go about disturbing the surface in the safest manner if they want to do renovations or dig new gardens; and
- where they can go to get good information on how to minimise exposure during such processes.

The education material will be specific to the abatement classifications.



[6.1.4] Satisfactory Completion

The LAS Site Implementation Team will make arrangements to ensure the inspection and certification process is undertaken.

[6.2] Property Owners who elect to do Additional Activities

Property owners who wish to do their own remedial activities will inform the Management Team in writing after receiving the report on their property. The Implementation Team will arrange a meeting with these property owners to determine the best cooperative strategy for implementing work by both parties.

The Implementation Team reserves the right to refuse strategies which will unnecessarily extend the remediation period, add cost to the PCCS process or which would cause unreasonable inconvenience to the implementation process or otherwise diminish its effectiveness. At the same time, the Implementation Team will make their best endeavours to try to reach a situation where the owner can receive the benefits from the LAS program while still achieving the owners' additional aims.

It is important to note the current PCCS policy in respect of receipt of contaminated soil from the Nominated Properties. PCCS's policy is that it will accept the top 100 mm of soil/grass (excluding other materials such as concrete, timber, steel etc) from the external area of a Nominated Property delivered to a nominated location on the PCCS Site. The total cost of this additional exercise (including excavation, transport, yard remediation etc) is to be borne by the property owner.

PCCS will continue this policy during the life of the LAS up until the point where the delivered soil will not affect the on-site containment cell construction/closure contract.

Procedures for a property owner to take advantage of this policy (irrespective of the property owner's participation in the LAS), are as follows:

- The owner will contact PCCS identifying the desire to return soil under this policy.
- PCCS will check if the owner is eligible (i.e. included in the list of Nominated Properties) and if the property is eligible will make arrangements for a site inspection.
- PCCS will agree with the owner as to the extent of the area included and an estimate of the volume to be returned.
- The owner is to advise PCCS of the excavation and transport arrangements (including the estimated number of truck loads and the truck company (if applicable)).
- PCCS will (at its discretion) supervise the excavation works to ensure that only agreed excavation material is to be included in the return materials.
- PCCS will not be obliged to accept any material in excess of the agreed amount and only from the agreed area. PCCS will monitor the number of truckloads and will (at its discretion) monitor the material on arrival at the PCCS Site.
- In the event that an owner seeks to include additional material beyond the agreed source and volume, PCCS retains the right to refuse to accept any such material and will not be liable for any additional cost incurred by the owner in this endeavour.

It is important to note that the LAS only includes one round of measurement of soil lead concentrations from each property. Thus if additional sampling beyond the LAS is required after the return of soil, this will also be at the owner's expense.

[6.3] Property Owners who elect not to participate in the LAS

Property owners who withdraw from the LAS program after the measurement phase (either by formal notification or by default on the notification to the Management Team – as discussed above) will be sent a letter formally recording the decision. A copy of the letter will be sent to DEC and LMCC. Withdrawal from the LAS does not affect any rights of owners to return soil under the policy described in Section 6.2.

[7.0] LAS Component E – Procedures following the Implementation Phase

[7.1] Reporting After Implementation Period

A report will be produced for every participating property identifying the soil lead concentrations existing prior to these actions, and the actions that have been taken which will be illustrated on a drawing. The reports will include a listing of methods for ensuring that the lead abatement measures are maintained



over time. These reports will also have an appendix which includes the certification that the on-site works have been performed to an acceptable standard.

The reports will be provided to the property owner(s), DECC and LMCC.

It is expected that LMCC will keep the report with its records for each Nominated Property. It is anticipated that according to the actions taken on each Nominated Property after the strategy implementation, LMCC will be able to modify or remove the current notations on the s.149 certificates issued in respect of the Nominated Properties concerning possible affectation by lead contamination. In all cases, LMCC may use the reports when assessing future development applications for the specific property, and when imposing appropriate conditions of development consent.

The LAS Management Team will liaise with LMCC in preparing advice to residents/owners regarding existing and future management of their properties during the LAS program.

Upon the despatch of the reports etc, PCCS will consider its LAS commitment for the particular property to be complete and will no longer provide any works on the nominated properties. Residents who have further requirements or concern will need to address those concerns to LMCC.



annexures

Annexures

01 Figure 1 from 1995 Consent

02 Soil Testing Protocol - Letters of Endorsement from EPA and PCCS Method EP - 8

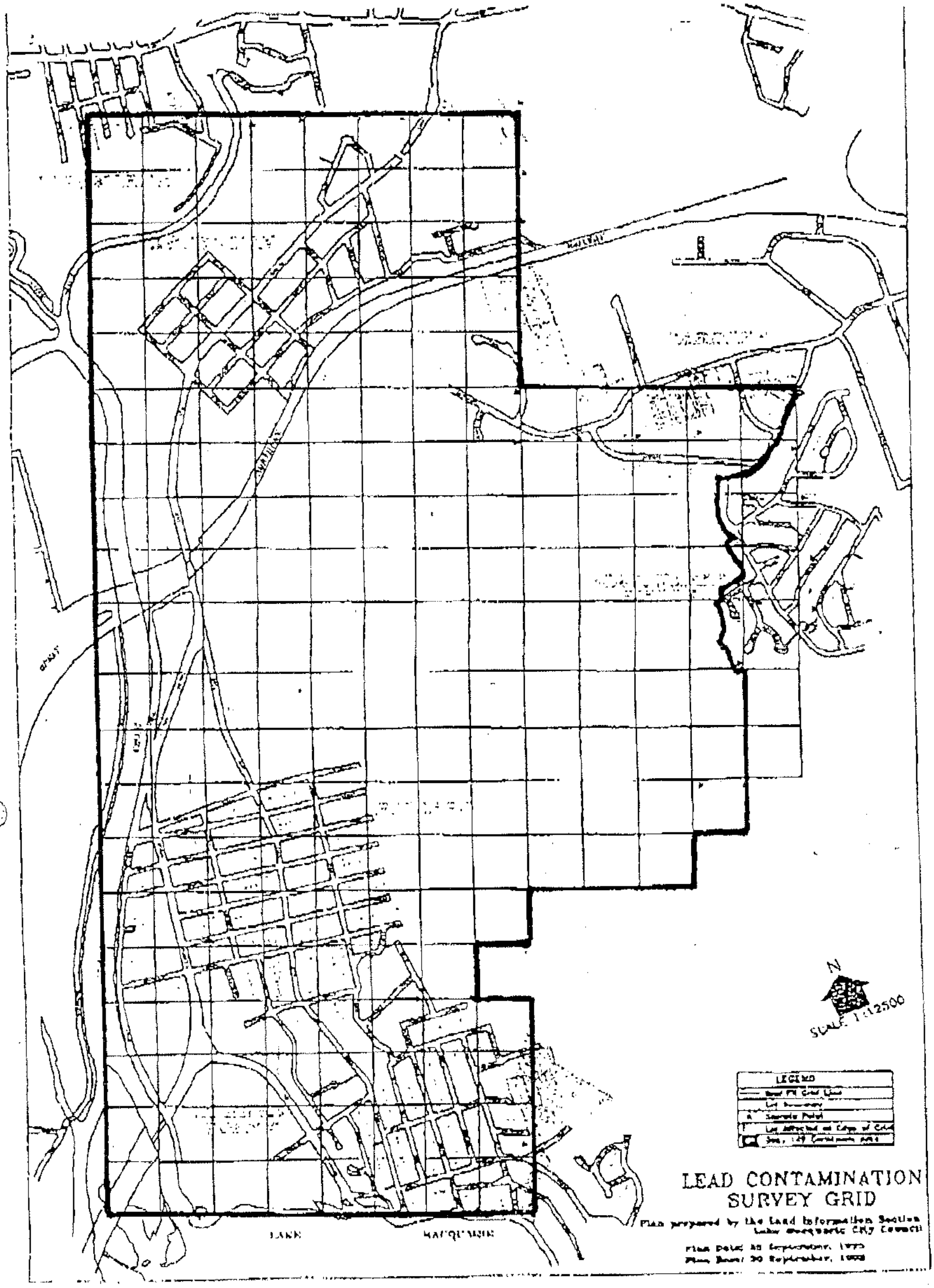
03 Typical Property Diagram Content for Each Tested Property

04 Typical Report Content for Each Tested Property

01

Figure 1 from 1995 Consent

Figure 1



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Contact : Joseph Kostiw 02 49269965

EPA

Northern Regions

Pasminco Cockle Creek Smelter Pty Ltd
PO Box 42
BOOLAROO NSW 2284

Attention: Mr Philip Brown (Superintendent - Environment)

24 NOV 2000

Dear Sir

RE: SOIL TESTING PROTOCOL: NORTH LAKE MACQUARIE AREA

I refer to your Email of 23 November 2000 and discussions between Mr Joe Kostiw of the Environment Protection Authority (EPA) and your Mr Phillip Brown concerning the EPA's letter of 22 November 2000 providing comments on the above mentioned soil testing protocol.

I confirm, that all references to "the EPA's protocol", "the EPA method" and "the EPA soil sampling protocol" in the EPA's letter of 22 November 2000 (Ref. 270001A47/NEF4882) refer specifically to the sampling protocol described in the document "EPA Soil Survey – North Lake Macquarie July 1994". It follows that Pasminco's Method EP-8 satisfies the requirements of the EPA soil sampling protocols as described in the document "EPA Soil Survey – North Lake Macquarie July 1994".

I trust this clarifies the matter, if you have any further inquiries in regard to this matter please contact Joseph Kostiw on (02) 4926 9965.

Yours sincerely

GRAHAME CLARKE
Head Regional Operations Unit
for Director-General

copy to :

Lake Macquarie City Council
Box 1906
Hunter Regional Mail Centre
Attention Mr Jim Sullivan

02 4958 0810

Your Reference :
Our Reference : 270001A47/NEF4882
Contact : Joseph Kostiw 02 49269965

EPA

Northern Regions

Pasminco Cockle Creek Smelter Pty Ltd
PO Box 42
BOOLAROO NSW 2284

Attention: Mr Philip Brown (Superintendent - Environment)

22 NOV 2000

Dear Sir

RE: SOIL TESTING PROTOCOL: NORTH LAKE MACQUARIE AREA

I refer to your letter of 20 November 2000 and the copy of the report by Mr Michael Ridgway of QCT, assessing the soil sampling protocols used by the Environment Protection Authority (EPA) and Pasminco (PCCS).

The EPA has reviewed Mr Ridgway's report and agree with his analysis and conclusions. The EPA acknowledges that the PCCS soil testing protocol (PCCS Method EP-8) differs from the EPA's protocol. However, the variation introduced by PCCS is a positive "non-compliance" and does not detract from the quality of the result.

The EPA confirms that the PCCS Method EP-8 satisfies the requirements of the EPA's soil sampling protocols used for assessing lead in soil in the North Lake Macquarie area.

If you would like to discuss or clarify the EPA's comments on the sampling protocol please contact Joseph Kostiw on (02) 4926 9965.

Yours sincerely

GRAHAME CLARKE
Head Regional Operations Unit
for Director-General

copy to:

Lake Macquarie City Council
Box 1906
Hunter Regional Mail Centre
Attention Mr Jim Sullivan

Received 22/11/00

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PO Box 488G Newcastle NSW 2300 Australia
Ground Floor NSW Government Offices 117 Bull Street Newcastle West NSW 2302
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Comparison of the Pasminco Cockle Creek Smelter Soil Sampling Method EP 8 and the EPA Section 149 Soil Survey Procedure

Mr Phillip Brown of Pasminco Cockle Creek Smelter provided me with the following documents on 9/11/2000:

Pasminco Cockle Creek Smelter Method EP - 8;
Procedure for Soil Sample Collection for Section 149 Certificates. (EPA);
EPA Soil Survey Procedure;
1994 correspondence between D F Sinclair Manager - Site Services (PCCS) and George Dodds - Regional Manager, Hunter (EPA). Regarding section 149 Soil Sampling.

Having reviewed all the relevant documents I came to the conclusion that the only difference between the EPA and PCCS procedures is that the PCCS procedure takes five increments from each section or grid area whereas the EPA procedure takes one. Apart from this difference the number of sections sampled, the sampling equipment used, the sample preparation and analysis procedures all appear to be the same, excluding obvious differences such as different personnel and equipment to perform the soil sampling. Discussions with Mr Brown and Mr Wilson of PCCS confirmed this conclusion.

The difference between the two protocols raises the issue whether the PCCS method EP-8 conforms to the EPA Section 149 procedure. While the documents may indicate a departure from the section 149 procedure, we need to consider the difference in terms of sampling theory which is the theory behind the EPA Section 149 procedure.

From sampling theory there are a number of sources of error that occur when taking a sample, and the most relevant in this situation are the fundamental error (FE) and the grouping and segregation error (GE). Other sources of error include the increment delimitation error (DE), the increment extraction error (EE), the sample preparation error (PE) and the analytical error (AE).

The fundamental error is caused by the variability of the pollutant from one fragment to the next. It is dependant on the maximum particle size of the sample and the amount of sample taken. As both protocols would be taking samples from the same property, hence the particle size is the same, and they use the same type of sampling equipment, giving the same sample weight the fundamental error will be the same.

The grouping and segregation error is caused by the variability of the pollutant from one increment to the next. The grouping and segregation error will always be less than or equal to the fundamental error. That is, the maximum the grouping and segregation error can be is the fundamental error. The most effective way to reduce this error is to increase the number of increments taken. Thus a reduction in sampling error potential is achieved by the PCCS protocol and can be shown in equation form as:

$$S^2_{(I\,Tot)} = S^2_{FE} + S^2_{GE}/\,N$$

Where:

$S^2_{(I\,Tot)}$ = the total variance (error) of the initial/first sampling step;
S^2_{FE} = the variance caused by the fundamental error;
S^2_{GE} = the variance caused by the grouping and segregation error;
N = the number of increments (ie 1 for the EPA protocol and 5 for the PCCS protocol)

From this it can be seen that:
For the EPA protocol

$$S^2_{(I\,Tot\,EPA)} = S^2_{FE} + S^2_{GE}/\,1$$

and for the PCCS protocol

$$S^2_{(I\,Tot\,PCCS)} = S^2_{FE} + S^2_{GE}/\,5$$

If we take the worst case where the grouping and segregation error equals the fundamental error we have:
For the EPA protocol

$$S^2_{(I\,Tot\,EPA)} = S^2_{FE} + S^2_{FE} = 2\,S^2_{FE}$$

and for the PCCS protocol

$$S^2_{(I\,Tot\,PCCS)} = S^2_{FE} + S^2_{FE}/\,5 = 6^*\,S^2_{FE}/5 = 1.2\,S^2_{FE}$$

As the fundamental error is the same for both protocols we can substitute S^2_{FE} giving:

$$S^2_{(I\,Tot\,PCCS)} = 1.2\,(S^2_{(I\,Tot\,EPA)}/2)$$

that is

$$S^2_{(I\,Tot\,PCCS)} = 0.6\,S^2_{(I\,Tot\,EPA)}$$

Taking square roots to give us the standard deviation we have

$$S_{(I\,Tot\,PCCS)} = 0.77\,S_{(I\,Tot\,EPA)}$$

Thus it can be seen that the standard deviation of the PCCS protocol is 0.77 of the standard deviation of the EPA protocol. As the errors from the PCCS protocol are less than those from the EPA protocol it can be said that the PCCS protocol conforms to the intent of EPA protocol.

Taking extra increments also provides a more representative sample when the pollutant is not evenly distributed through the section or grid area. This may occur on smaller properties where the effect of buildings or fences will influence the distribution of fugitive smelter emission fallout on the property.

So while both protocols will give the same average result over a number of properties, the PCCS protocol will give a better estimate of the pollution content for an individual property.

02 4958 0810

Again the PCCS protocol is working within the intent of the sampling theory behind the EPA protocol.

In conclusion, the extra increments taken by the PCCS procedure do not alter the intent of the EPA procedure and do not compromise the sample used for analysis.

M Ridgway (for)

Michael Ridgway
Statistician QCT.

COMMUNITY LEAD IN SOIL TESTING

1. SCOPE

This procedure describes a method for the sampling of soils for the determination of lead concentration. The procedure also describes the appropriate protocol for receiving requests and reporting of results.

2. REFERENCES

EPA	Contaminated Sites: Sampling Design Guidelines, 1995
AS 4479.1 - 1997	Analysis of soils: Pt 1: Pretreatment of potentially contaminated soil samples for heavy metal and metalloid analysis.

3. PRINCIPLE

Upon request from an owner of a residential property or public land located within the area known as the Lead Contamination Survey Grid (refer figure 1), samples are collected from the property in accordance with the sampling protocol described in the document "Contaminated Sites: Sampling Design Guidelines, 1995".

The samples are sent to Pasminco Cockle Creek Smelter's laboratory for analysis of lead concentration. The concentrations of the individual samples are used to calculate an arithmetic mean for the property. Results are then reported to the property owner and/or the request initiator. The results may also be directed to other parties nominated by the owner.

4. DEFINITIONS

Lead Contamination Survey Grid: An area defined by DUAP in the Conditions of Development Consent (COC # 42) as potentially being contaminated with lead from operations at Pasminco Cockle Creek Smelter. The boundaries of this area are set out in figure 1.

QC: Quality control - The operational techniques and activities that are used to fulfil the requirements for Quality.

QA: Quality Assurance - All the planned and systematic activities implemented within the Quality system and demonstrated as needed to provide adequate confidence that an entity will fulfil the requirements for quality.

DUAP: Department of Urban Affairs and Planning

EPA: Environment Protection Authority

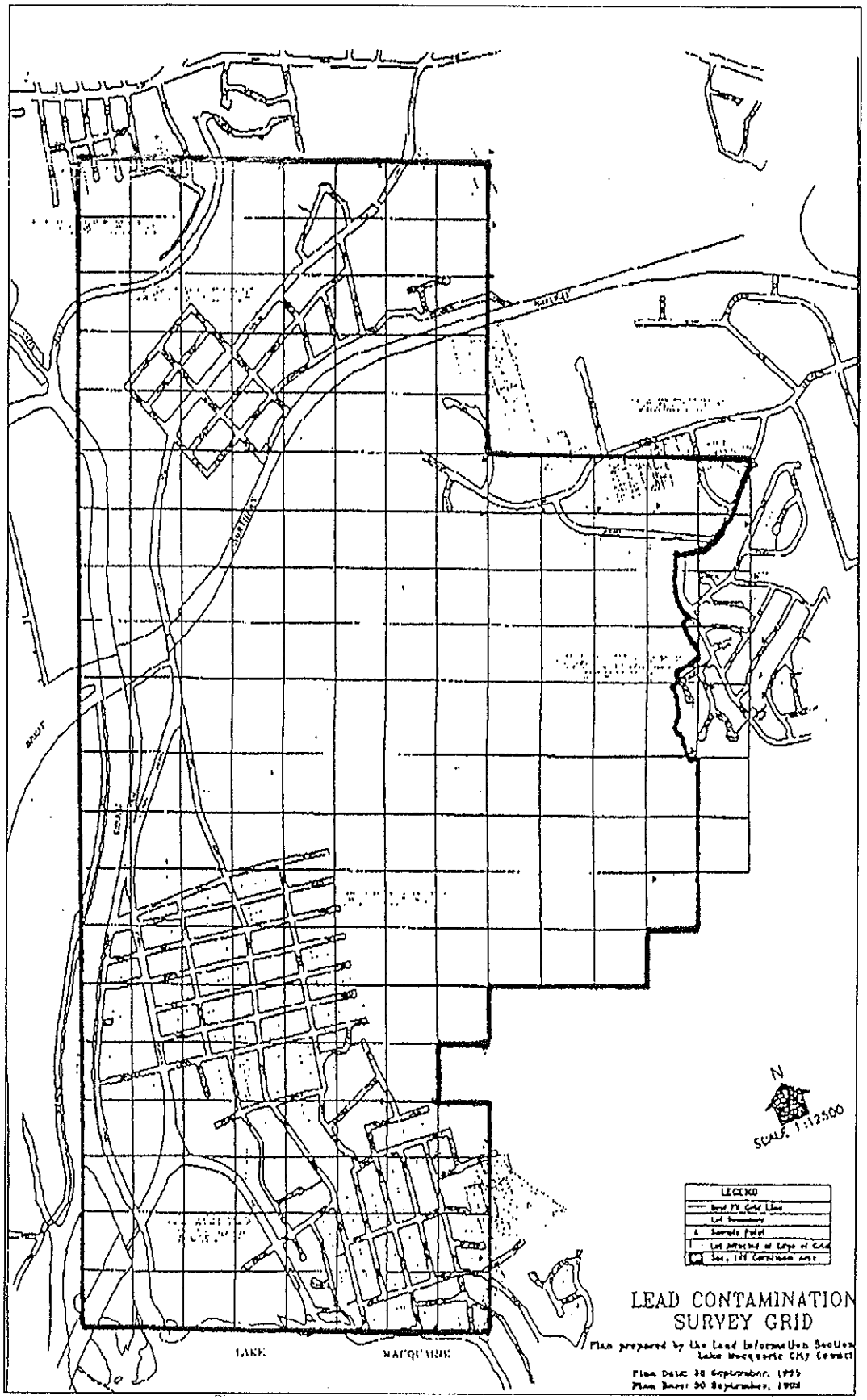


Figure 1 Lead Contamination Survey Grid

5. RECEIPT OF REQUESTS

5.1. Requests made by the property owner

1. Advise the owner that a written request should be directed to Superintendent - Environment, Pasminco Cockle Creek Smelter. Requests shall be acted upon on receipt of this notification. Acceptable forms of delivery include fax, hand delivery (via Reception) or normal mail.

2. Obtain the following information:
   - name of the owner
   - address of the property
   - address the results are to be sent to
   - telephone and/or fax numbers

3. Determine if the property is located in the Lead Contamination Survey Grid. Use the lead in soil database (**s:/health safety and environment/enviropc/soil/Pb in soil.mdb**) to search for properties in this area. If it is not, advise the owner that PCCS does not test outside of this area.
4. Determine the history of testing on the property. Ask if the property has been previously tested. Also use the lead in soil database to search for previous tests on the property. It may become apparent that it is unnecessary to conduct a new test.
5. Determine if the property has previously been remediated. If the property has been remediated, then the depth to which the property has been remediated **must** be recorded. Ask the owner to nominate the depth to which they would like the lead in soil test done. It should be pointed out at this stage that this information will be recorded by Council on the 149 certificate for the property
6. If it is a rental property, request that the owner, or person acting for the owner, contact the tenant to notify them that a soil test will be undertaken.
7. Determine the urgency of the request, eg. if the test is for a property sale the result may be urgently required. For an urgent request, state that the report will be available in approximately 1 week (absolute minimum is 3-4 days). If the request is not urgent, then state that it will be 3-4 weeks before a report will be available.
8. Agree on a date and/or time for the sampling to take place.
9. Enter data into the lead in soil database (pathway noted above). To do this, select "Sample Entry" from the main menu (refer figure 2).

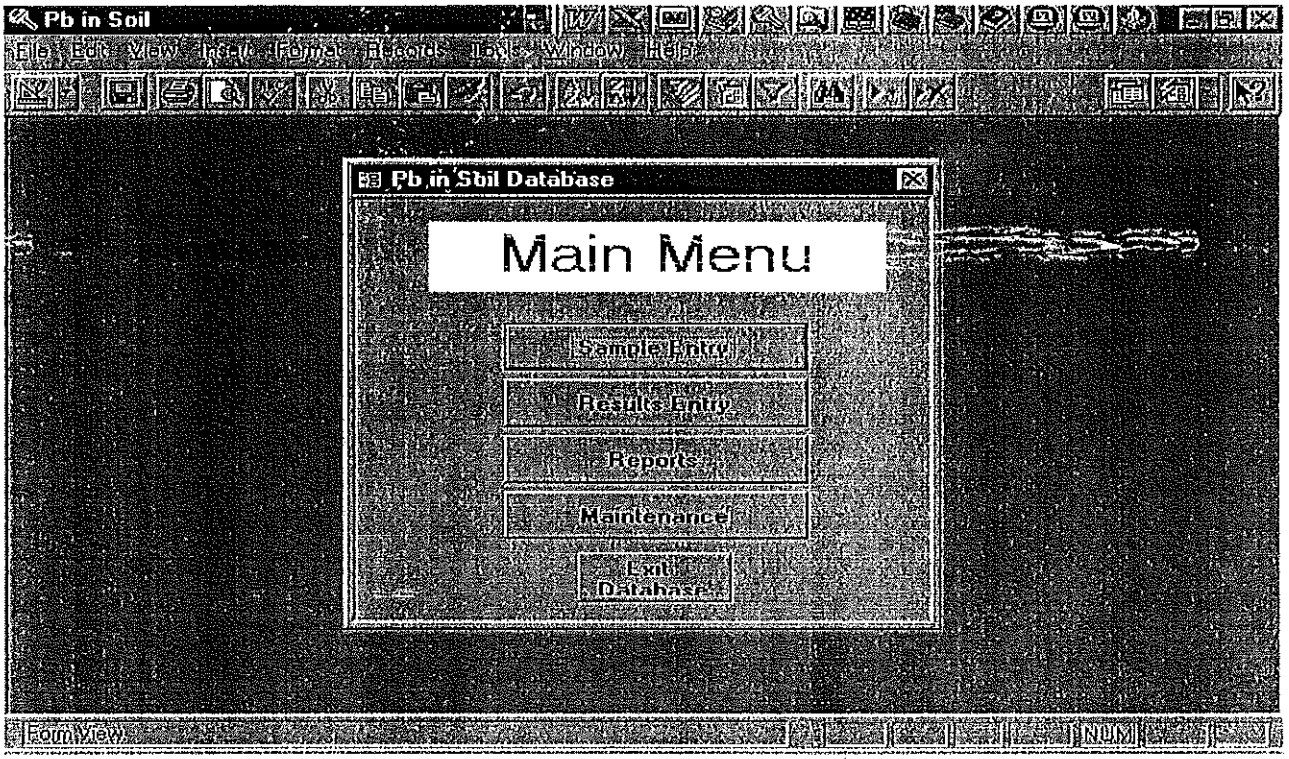


Figure 2 Lead in Soil Database "Main Menu"

10. Fill in the relevant fields in the "Sample Entry Form" (refer figure 3). Any additional information (eg dog - make sure gate shut properly on departure, etc) should be included in the "Comments" field.

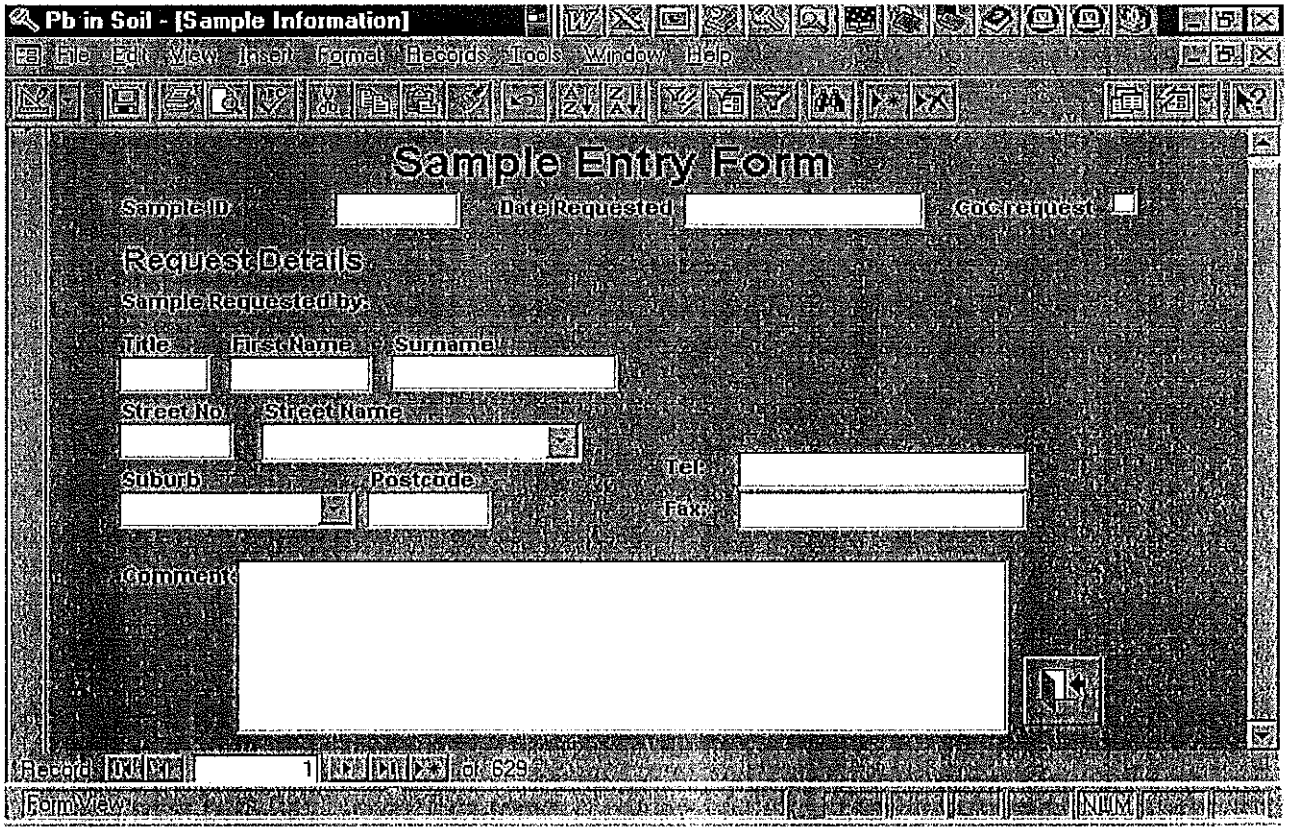


Figure 3 Lead in Soil Database "Sample Entry Form"

5.2. Requests made by other parties

1. Where a real estate agent, solicitor or other party requests a soil test they **must** notify PCCS in writing that they are acting for and/or have the written permission of the owner before the property can be sampled. The reason for the request should also be stipulated
2. Requests will be acted upon receipt of this notification. This notification may be faxed, posted or hand delivered.
3. Obtain the relevant information as described above.

5.3. Numbering of requests

1. A unique number is given to each request. This number is based on the calendar year and the request number, ie. the sixth request in 1996 has the number 96.006. Check for the next number in the sequence.

6. SAMPLING OF PROPERTY

6.1. Equipment

The following equipment should be taken to the site

- hand held auger (diameter 40mm)
- self sealing plastic bags
- screwdriver for removing soil from auger
- bristled brush
- texta for labelling bags
- street directory (to locate properties)
- sampling field sheet
- sampling notes

6.2. Prior to departure

1. Generate a "Field Sheet" from the lead in soil database. To do this select "Reports" from the main menu (see figure 2). Select "Field Sheet" from the reports menu (see figure 4). Follow the directions to obtain the field sheet for the property to be sampled. Make sure the blank grid page is attached.

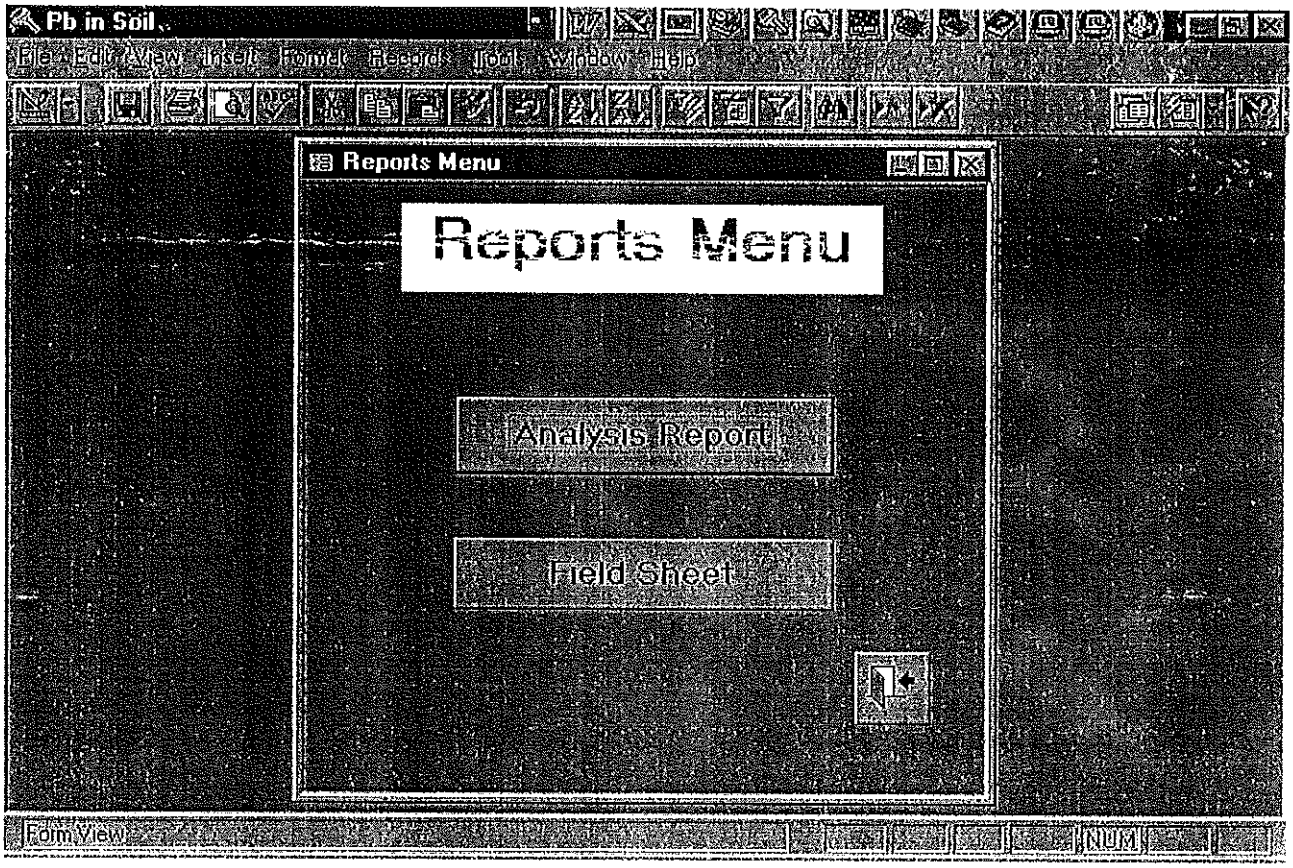


Figure 4 Lead in Soil Database "Reports Menu"

1. Generate a random number between 1 and 25 using either the random number generator in Excel or on a calculator. Record this number on the field sheet.
2. Clean auger and screwdriver. This involves washing with water and scrubbing with a bristled brush.

6.3. On arrival

1. Upon arrival at a property, identify yourself to anyone at home before sampling. Make sure you briefly explain what you are doing. Also hand out a sampling note with the appropriate details filled in. If no-one is home then leave the completed sampling note in the letter box.
2. On the field sheet blank grid (page 2 of field sheet) draw a map of the site, marking any significant features such as houses, sheds, pools, driveways etc. Also mark which boundary of the property faces the road. Observations on the property, yard appearance and whether the property has been remediated must also be recorded on the field sheet.
3. Divide the yard into areas of roughly equal areas, and geometry where possible. The number of areas required will be the same as the number of samples required (noted on the field sheet). **Note:** Only lawn areas are sampled as garden beds will have been turned, and will not provide an accurate reflection of soil contamination levels as a result of

deposition. When dividing up the yard remember to include the front section, but do not include council-owned land out the front of the property
4. Record the areas on the field sheet site map.
5. Identify each area with a number (eg section 1, section 2, etc).

6.4. Sampling the sections

6.4.1. Initial Screening Tests - no prior tests for site and/or no remediation

1. Mark a plastic bag with the request number and the section number, eg. for request number 96006, the sample from the section 1 will be labelled 96006/1, from section 2 it will be labelled 96006/2, etc.
2. Divide the section into 25 sub-sections. Select the sub-section which corresponds to the random number recorded on the field sheet. Mark the location of this area on the site map.
3. Collect a sample from this location. Samples are taken using the hand auger, with 50mm of **soil** collected from each sample point. The grass which is collected with the sample is placed into the plastic bag and is removed after drying.
4. To remove the soil from the auger use the screwdriver either to tap the outside of the auger, or to scrape out the soil.
5. Repeat above technique until the property is sampled.

Points to remember

- samples are only taken from lawn areas within the section
- samples must not be taken from areas less than 2m from a building or fence due to the potential for lead from other sources (eg, paint) to influence a technique aimed at identifying lead due to atmospheric fallout.
- samples must not be taken from areas where car maintenance or car activity could have resulted in increased lead levels (fuel spills, exhaust emissions).
- **Clean equipment before and after each property is tested. This involves washing with water and scrubbing with a bristled brush.**

6.4.2. Sampling of a remediated property

1. The procedure for a remediated property is exactly the same as for an initial screening test however the depth to which the soil is sampled will depend upon the depth nominated by the property owner. This depth and the depth of remediation must be recorded on the logsheet.

Note: Where only a certain area is to be re-sampled within a yard this must be detailed on the field sheet, with comments made outlining the history of the site. Also include the reasons for only certain sections being sampled.

7. SAMPLE PREPARATION AND ANALYSIS

7.1. Sample Preparation

1. Label the stainless steel trays which are reserved for soil sampling with the unique number for each sample. Each tray must be scrubbed and washed with water prior to use. **Note:** They are **not** to be used for any other applications
2. Place the samples into the stainless steel trays. Spread the sample to make as thin a layer as possible on the base of the tray
3. Place samples in the oven to dry overnight (ie approximately 24 hours) at 40 ± 3°C.
4. Advise the laboratory by telephone/email of number of samples taken
5. Remove samples from oven and allow to cool.
6. Place samples back into the correct sample bags. If bag is still wet, then use a new bag. Remember to label new bags with sample identification.
7. Fill in an analysis form for the following analytes: Pb, Zn, Cd, Cr, As, Se, Ni, Tl, Sb, Mn, Hg, Cu
8. Deliver all samples and the analysis form to the laboratory. Have the person taking receipt of the samples sign the sample delivery form.

7.2. Laboratory Sample Preparation

As per Laboratory Procedure #252

7.3. Analysis

As per Laboratory Procedure #138

7.4. QC/QA samples

QA: One sample in ten is sent to an independent laboratory for checking.

QC: One sample is run with every five samples by the PCCS lab.

7.5. Archiving of Samples

The laboratory will retain soil samples (or a fraction of each soil sample) in their archiving system for a minimum of two years.

8. REPORTING TO PROPERTY OWNER

8.1. Initial screening test

1. Upon receipt of the lead analysis, enter the results into the lead in soil database. Select "Results Entry" from the main menu (figure 2) and fill in the information as required (figure 5).

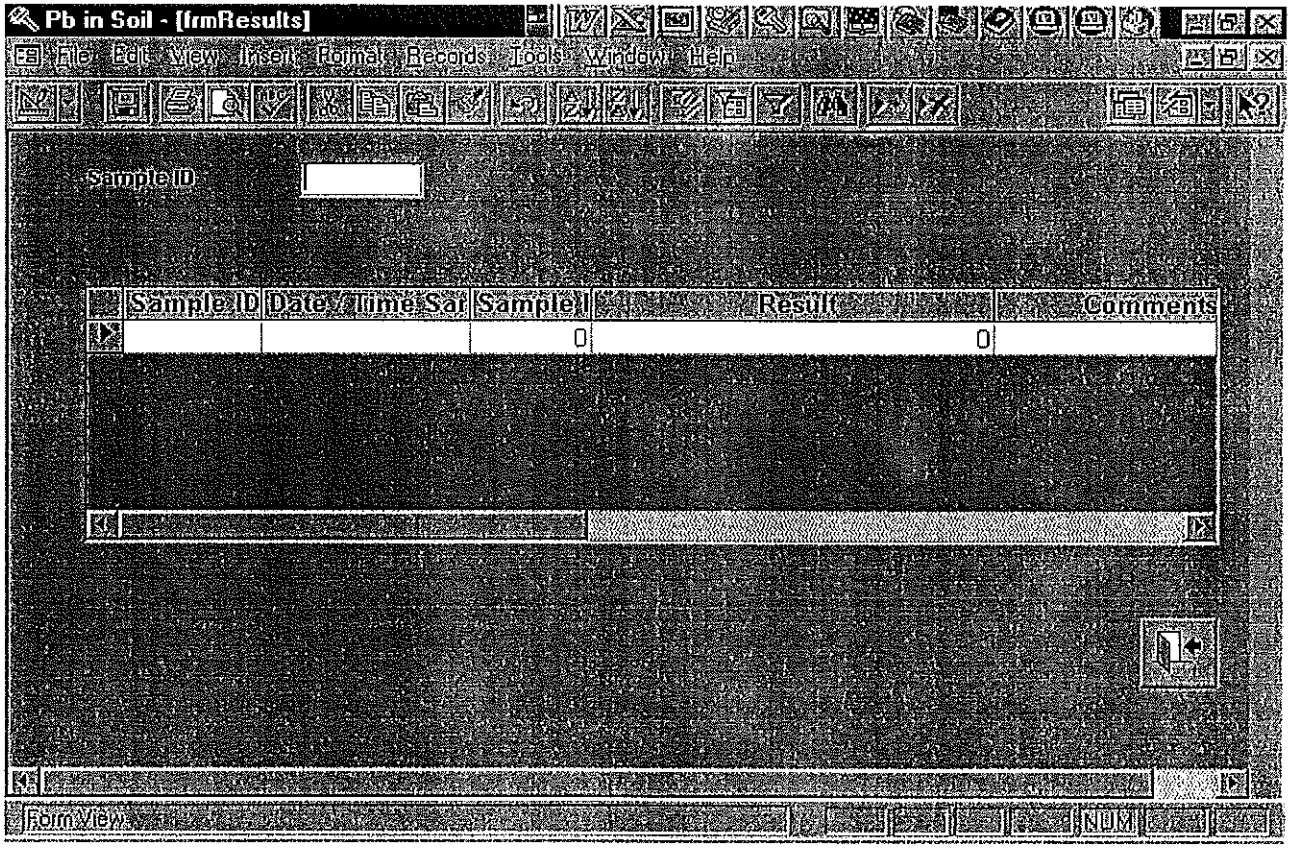


Figure 5 Lead in Soil Database "Results Entry Form"

2. Calculate an average lead level for the property. The average which is calculated is the arithmetic mean (ie add the individual samples and divide by the total number of samples) The average lead in soil level is rounded to the nearest 10ppm
3. Prepare a report for the property. The level of lead will determine which type of report the property owner is provided with. If the average is below 300ppm select the "Below 300 soil letter" template from the word templates folder. If above 300, select the "Above 300 soil letter" template. Fill in the appropriate fields. For properties with an average above 300 it will be necessary to include a site map showing the locations of each sample.
4. From the lead in soils database, select "Reports" from the main menu. Then select "Analysis Results". Fill in the information as requested to obtain an analysis sheet for the appropriate property.

5. Attach the analysis sheet to the report and send to the relevant parties; as noted when the request was taken. When faxing the report, fax the document and then mail the original.
6. A copy of the letter is forwarded to the owner where the owner is not the applicant.

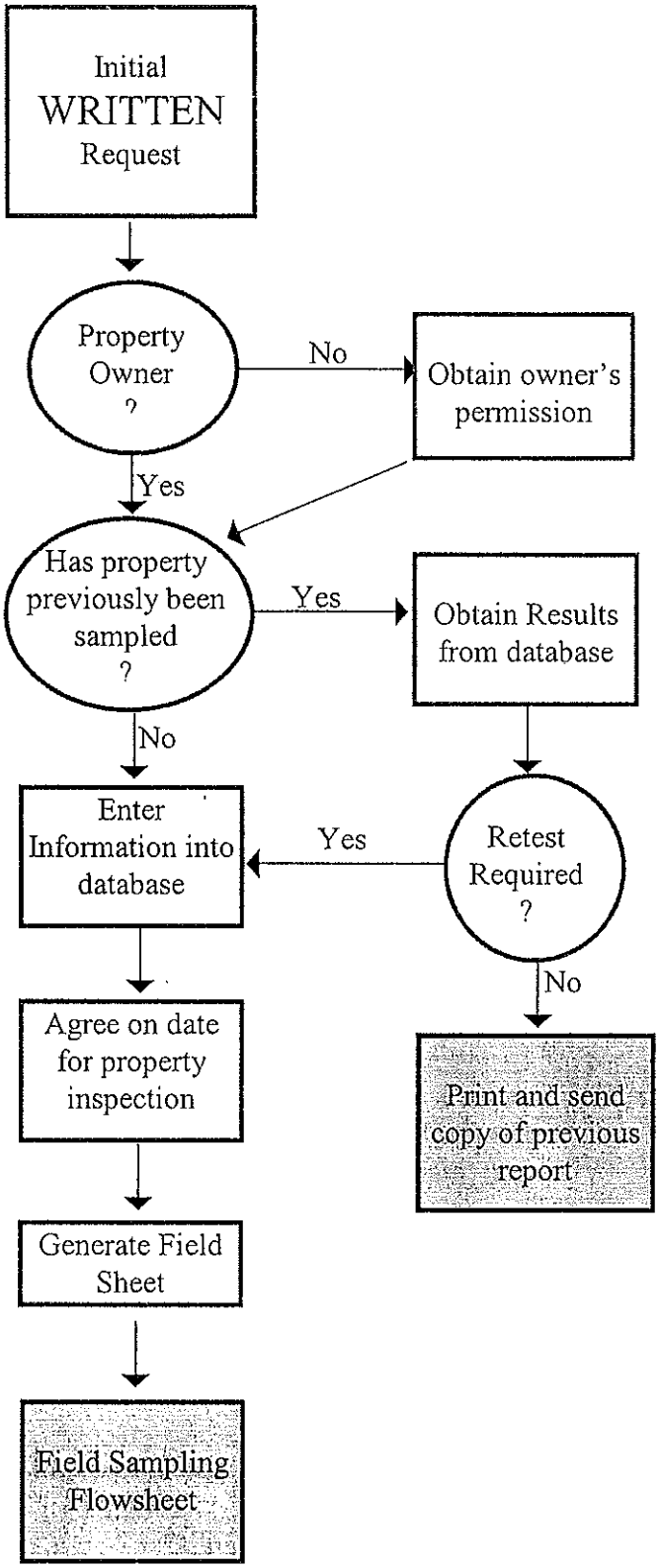
8.2. Remediated Property

1. Follow the procedure as above except choose the template titled "Remediated above soil letter" for properties where the average is above 300ppm. This report also requires a site map to be included showing the location of each sample. For those, below 300ppm select the template titled "Remediated below soil letter". These reports record the fact that the property has been remediated, and the depth to which it has been remediated.

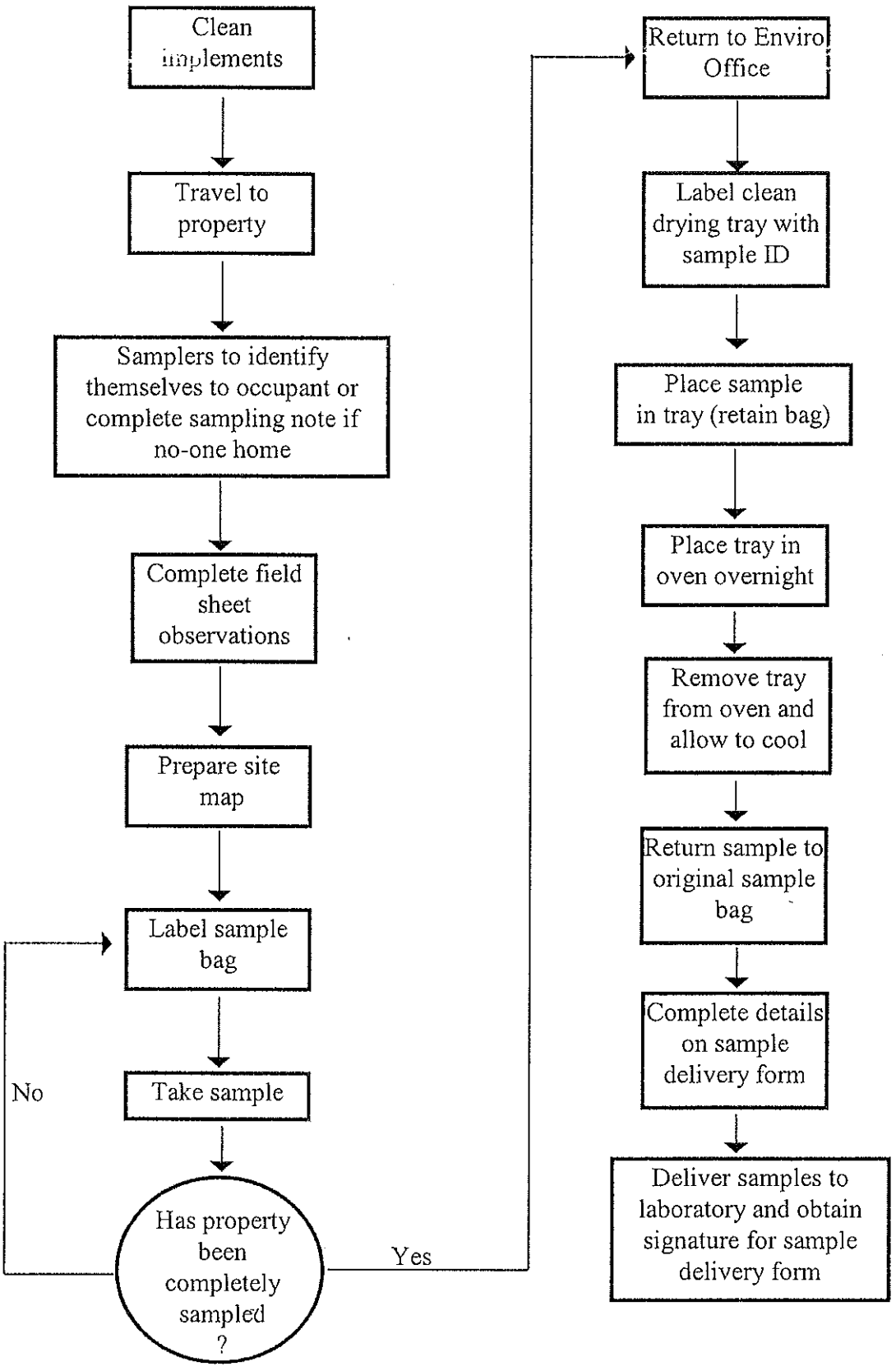
9. Follow-up sampling

Where results are greater than 300 ppm properties are flagged in the "Pb in soil" database for re-sampling in 12 months time. Procedures are as for 6.4.2 Sampling of Remediated Properties.

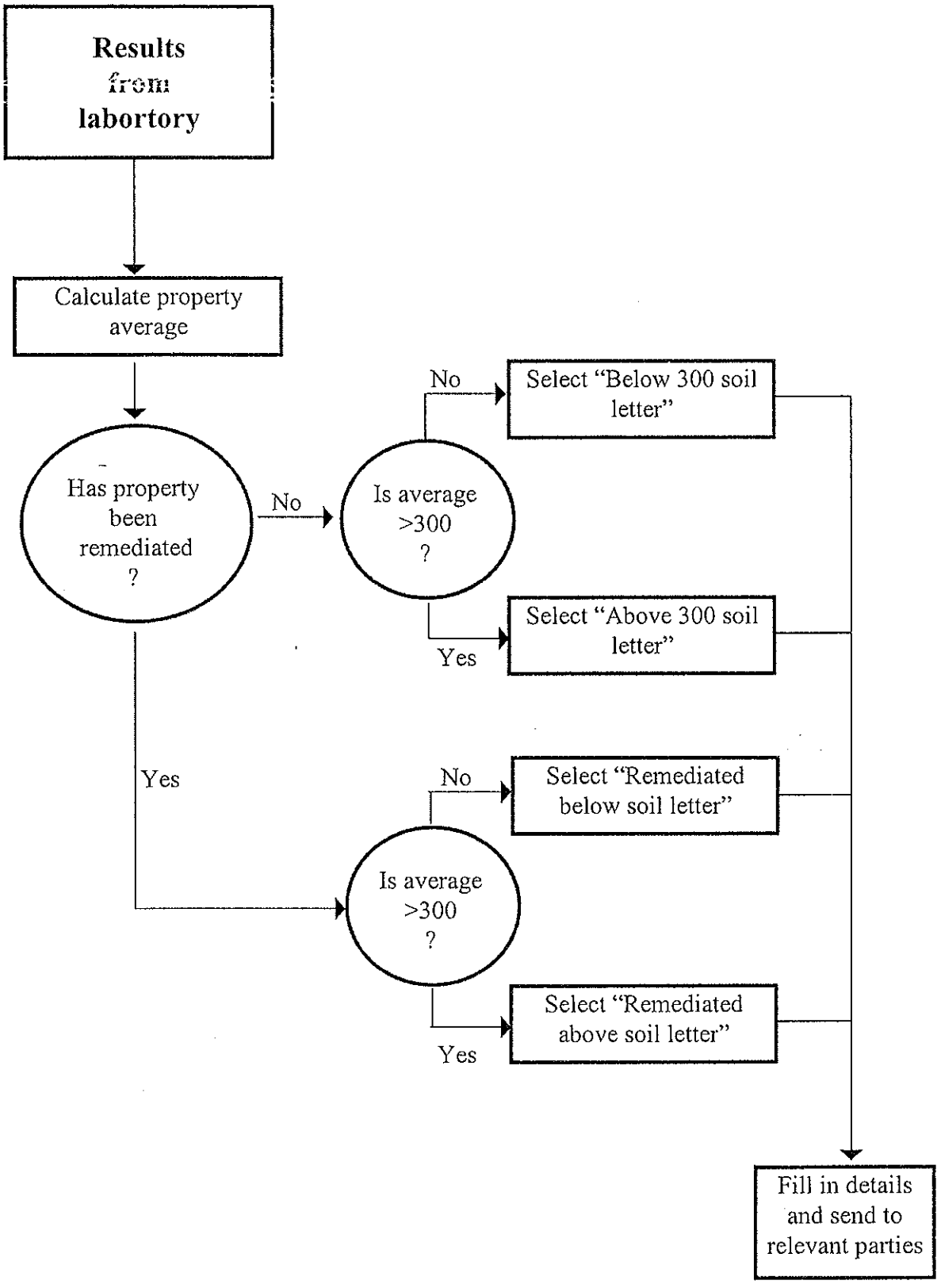
10. Appendix A - Receipt of Request Flowsheet



11. Appendix B - Sampling Flowsheet



12. Appendix C - Reporting Flowsheet



Annexure 3 – Typical Contents of Property Diagrams for Each Tested Property

- Street address and adjacent streets
- Lot and DP
- Property boundary
- One line description of immediately adjacent land uses (N, S, E, W) – e.g. street, vacant lot, residential property
- North sign
- Approximate scale of diagram
- Description of what major items exist on the property (e.g. fences, lawn, major trees, garden beds, paths, sheds, buildings, hard stand, unusual features, etc)
- Approximate slope of property
- Sample locations
- Photographic location
- Diagram identification for filing purposes

Annexure 4 – Typical Report Content for Each Tested Property

1. Site Identifier – Street address and any other filing identifier

1.1 Site Location
- Street Address
- Property Description
- Property size (m^2)
- Local Government Area
- Lot and DP
- Geographical Coordinates

1.2 Site condition
- shape (e.g. rectangular or otherwise;
- fencing
- grass coverage and vegetation
- areas with no vegetation or buildings
- other site features (as per Annexure listing)

1.3 Surrounding land use
- uses of immediately adjacent land in all directions
- any unusual features that could affect the property in question

1.4 Topography
- elevation, flat or sloping

1.5 Hydrology
- stormwater connections and overland surface water flow description

1.6 Analytical Results
- the results of lead analyses for each segment of the Nominated Property (tabulated and drawn)
- Drawing as per Annexure 3
- Certification by the qualified Certifier addressing the reliability of the lead results