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## APPENDIX 1 REPORTING REQUIREMENTS

### Site Assessment Reports [14]

The following is intended as a guide to the types of information contained in a comprehensive site assessment report.

1. **Site identification**  
including map showing relationship to streets and other properties and dimensions of site; certificate of title and plan/parcel information; and photographs showing topography, nature of surface and existing structures.  
  
A "north point" and scale must always be shown.
2. **Ownership**  
(as listed on title documents)
3. **Party responsible for assessment and management, if not owner.**
4. **Soil Consultant**
5. **Proposed use**  
- including map  
- nature: residential/recreational/industrial  
- density  
- occupant type: adults - children  
- local government approval for proposed use (and date).
6. **History of Site**
  - a) **History**
  - b) **Source of information**
  - c) **Validation of information**
  - d) **Map detailing historical uses.**
7. **Site Inspection**
  - a) **Topography**
  - b) **Local geological factors of relevance**
  - c) **Local soil types**
  - d) **Evidence of possible contamination.**
8. **Initial Testing**
  - a) **Sampling locations (map) and methods (e.g. number of boreholes, depths, pattern).  
Rationale for sampling (e.g. screening, knowledge of previous land use).**
  - b) **Laboratory used**
  - c) **Analytes and analytical techniques (including extraction methods).  
Quality assurance methods for specific analytes.  
Rationale for choice of analytes (e.g. general screening, historical factors)**
  - d) **Results**
    - Table of results, map
    - Borehole logs and soil profiles (including description of fill)
    - Ranges of analytes, most significant results, results by stratum (including mean, median, standard deviation, geometric mean, geometric standard deviation and range)

- e) Preliminary conclusions
  - Rationale for conclusions (e.g. most significant results; dispersion of contaminants; properties of contaminants that may affect health or environmental risk such as volatility or water solubility).
  - Uncertainties relating to conclusions (e.g. adequacy of site characterisation, likelihood of missing significant contamination).
- 9. Further Testing
  - As for 8.
- 10. Groundwater
  - If groundwater testing is not performed a reason be given e.g. "contamination was superficial and was at low levels. There was no evidence of leaching that could affect underlying groundwater".
  - a) Current and future use of local groundwater
  - b) Hydrogeology - including depth and distribution of aquifers
  - c) Potential for contamination
  - d) Past testing of site or nearby
  - e) Potability
  - f) Need for testing (including reason).

There should be adequate information in the consultants' reports to enable administering authorities to address the following in their conclusions:

- a) Hazard identification
  - Review of relevant test information
  - Critique of data quality
  - Specific toxicological issues (e.g. carcinogenicity, dermal absorption).
- b) Exposure assessment
  - Nature of site occupants
  - Potential sources and pathways of exposure identified (including possibilities of extreme exposure)
  - Biological monitoring where relevant.
- c) Uncertainties/Assumptions relating to
  - Data
  - Toxicological information
  - Pathways of exposure.
- d) Major components of risk (e.g. soil ingestion by children, inhalation of volatile carcinogen).

Consultants' reports should also have sufficient information to enable decisions on the following management issues:

- I) Short Term Management (consider these aspects from time of site notification)
  - a) Fencing
  - b) Signage
  - c) Dust Suppression
    - i) Reason - Toxicity/Nuisance
    - Nuisance
    - ii) Type of Suppression
  - d) Site drainage issues
  - e) Odour
  - f) Notification of owners, local council, local residents (including neighbours)

- II) Long Term Management
  - a) Remediation feasibility study
    - i) Consultant used
    - ii) Date
    - iii) Options, including cost
    - iv) Public consultation aspects
    - v) Legal aspects.
  - b) Possible site management requirements for accepted development
    - i) Inform occupants and local residents of results and appropriate actions
    - ii) Barrier requirements (e.g. clean soil, surfacing, impermeable clay layers, membranes)
    - iii) Soil treatment (including removal/replacement)
    - iv) Site monitoring (e.g. frequency, by whom)
    - v) Rehabilitation endpoints (soil criteria)
    - vi) Post rehabilitation testing or quality assurance
    - vii) Occupational health and safety requirements
    - viii) Community health and safety requirements during remediation (e.g. dust suppression)
  - c) Reasons for site management requirements
  - d) Requirements if there are variations in future from the land use plan currently proposed (e.g. need for re-evaluation/constraints)
  - e) Groundwater protection.

## APPENDIX 2 Risk Characterisation and Health Appraisal of Site Assessment Reports [14]

Risk characterisation and the health appraisal of site assessments are complex procedures. Rarely is it possible to offer an absolute guarantee that a site is "free" of contaminants. Rather, it is implied that the assessment ensures that there is an extremely low probability that contaminants, if present, will cause health effects.

Health authorities will consider the following in the appraisal of reports:

1. Proposed Land Use
  - (a) Residential? Recreational? Agricultural/horticultural? Commercial/Industrial?
  - (b) Is information (e.g. plans) available to assess the disposition of proposed land use(s) e.g. Will some areas be sealed by roadways or foundations? What areas will be used for vegetable growing or children's play activities?
  - (c) What earthworks will be undertaken during site development?
2. Site History
  - (a) Is the site history valid and sufficiently comprehensive?
  - (b) Does the site history demonstrate or imply the presence of potentially contaminating activities? Have the potentially contaminating activities ceased?
3. Data Collection
  - (a) Have appropriate analytes been selected? Are there significant omissions?
  - (b) What were the objectives of sampling? e.g. to exclude contamination? to quantify contamination?
  - (c) What was the rationale for the sampling plan? e.g. to investigate high risk areas according to site history (judgmental sampling)? stratified random sampling?
4. Exposure Assessment
  - (a) Has the potentially exposed population been defined?
  - (b) Will any segments of the population have increased exposures (toddlers for soil ingestion) or increased sensitivities to exposure (e.g. young children to the neurobehavioural effects of lead)?
  - (c) What are the significant exposure pathways (e.g. windborne dust, garden soil) and exposure routes (e.g. soil ingestion)?
  - (d) What are the magnitudes of the exposure pathways?
  - (e) What are the background exposures to the substance (e.g. from food and water)?
  - (f) Is groundwater contamination a current or potential exposure route?
  - (g) Is environmental bioaccumulation or biomagnification of health importance?
  - (h) What are the nature and extent of uncertainties of exposure assessment? e.g. are there segments of the population that may have extreme exposures?
5. Toxicological Assessment of Substances Detected
  - (a) How complete is the toxicological database? Does it apply to animal and/or human studies? Does it apply to acute or chronic exposures? To which exposure routes does it apply (e.g. ingestion, inhalation, dermal contact)? Do the data apply to the same compound, at similar concentrations, in the same vehicle (e.g. lead absorbed to soil at 0.1% rather than lead acetate dissolved in water at 1% concentration)?
  - (b) What are the toxicokinetics of the substance i.e. absorption, distribution, biotransformation and excretion behaviours?
  - (c) What is the nature of toxic effects? Target organ? Reversible/Irreversible effects? Carcinogenicity? (IARC/USEPA Assessments?) Reproductive effects? Teratogenicity?

- (d) Dose-response curve: what proportion of a population will be affected at specific doses?
  - (e) What are the nature and extent of uncertainties associated with data collection? Sufficient data? Adequate certainty? Applicability to exposed population for contaminated site?
6. Risk Characterisation
- (a) Is a quantitative (numerical) or qualitative (relative) risk assessment feasible for risk characterisation? A qualitative exposure assessment should be considered even if quantitative risk characterisation is not feasible.
  - (b) If a quantitative risk characterisation is attempted what are the sources of the quantitative toxicity assessment? What are the assumptions and safety factors used in the toxicity assessment? Is the toxicity assessment a 'best estimate' or 'worst case' estimate? (Ideally both 'best' and 'worst' case estimates should be used.)
  - (c) What are the background exposures (e.g. from food and water)? How do these compare to the potential exposures from soil? How closely do background exposures and exposures from soil approach Provisional Tolerable Weekly Intakes/Acceptable Daily Intakes/"tolerable risks"?
  - (d) What is the nature and extent of uncertainty of risk characterisation e.g. are there segments of the population with extreme exposures not covered by the risk characterisation?
7. Risk Management
- (a) What forms of remediation are feasible?
  - (b) To what extent will each type of remediation ameliorate risk?
  - (c) Are health risks associated with the remediation e.g. dust generation?

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