Interim Guidelines for the Decommissioning of a Warehouse

Used For The Storage Of Crop Protection Chemicals

The intent of these guidelines is to assist the owner of an agricultural chemical warehouse to anticipate and understand the requirements of Saskatchewan Environment for proper assessment and decommissioning, demolition or restoration of the facility.

Prior to decommissioning Section 17 of *The Hazardous Substances and Waste Dangerous Goods Regulations* requires the owner or operator of a chemical storage facility used for the storage of agricultural chemicals to:

- notify the director at least 30 days in advance and submit a decommissioning proposal, for the approval of the minister, describing how the decommissioning is to take place and what the plans for the disposal of any remaining equipment, hazardous substances, waste dangerous goods and contaminated material are; and
- within 12 months of the date of approval under this section of the decommissioning plan complete the decommissioning of the storage facility and affected area in accordance with the approval.

A comprehensive environmental property assessment of the warehouse and property will generally provide information regarding the level of contamination of the site, and will in turn help determine the requirements for remediation. The main purpose of an assessment is to examine the structure and property for the presence of hazardous materials or chemicals. This can be achieved using a systematic and phased approach in the gathering of information and samples. The following information should be gathered and considered with respect to site assessments:

Phase 1 - Preliminary Assessment

Historical Information:

- obtain information from Land Titles, regarding past owners and use of property, building permits and information on year of construction of the facility; and
- obtain a list of herbicides, insecticides or other chemicals stored on the premises both during current times and in the past.

Visual Assessment - Warehouse:

- determine the overall condition (cleanliness) of floors, walls and ceiling by visual examination and photographs;
- determine if significant chemical odours are present in the warehouse after products have been removed; and
- look for the presence of sumps, floor drains or other devices indicative of liquid storage or handling.

Visual Assessment - Site/Property:

- determine the general condition of the property immediately surrounding the building;
- examine the ground surface for staining indicative of chemical or petroleum product spillage;
- look for evidence of storage of empty chemical containers;
- obtain any evidence of past or recent disposal of chemicals on the property;
- determine the general condition in the vicinity of the loading dock indicative of spills; and
- obtain any evidence of any activity detrimental to nearby properties.

The decommissioning proposal should reflect the history of the storage facility as noted above. The decommissioning proposal should also include information regarding the presence of any chemical contamination of the structure or surrounding property as noted below. This part of the assessment should include trace analysis of the present or most recent chemicals stored, as well as persistent agricultural chemicals stored in the past.

Phase 2 - Sample Collection

Sample Collection - General Requirements

The visual assessment of the warehouse and associated property will be valuable in determining the extent of sampling necessary. The following discussion generally focuses on the minimum required samples. If the visual assessment of the structure and surrounding property revealed any stained areas, additional sampling of these areas is required. All sample locations are to be identified in a drawing of the facility and site location.

Sample Collection - Warehouse:

Floors: Composite samples should be collected from the floor by means of a sampling grid to determine the locations of aliquots comprising the composite. Generally one sample from each 10 square metres of floor area based on a randomly selected location within that quadrant will suffice. Areas with obvious staining should also be sampled as separate samples and an estimation of the floor area which is stained shall be provided. All samples shall be representative and collected from the upper one-half of the floor thickness if the building is to remain in use. If the building is to be demolished, samples of the floor shall be representative and collected from the entire thickness. Stained areas should be sampled only to the depth of penetration of chemical, where this can be determined visually. Samples of wooden floors may most easily be obtained using an electric drill and auger bit. Samples from concrete floors may be collected using a hammer drill and carbide tipped bit. The size of the bit used to obtain the sample as well as the final weight of the composite sample shall be recorded. Persons performing sampling of this nature must ensure that sample containers and sampling tools have been adequately cleaned and rinsed with spectroscopic grade solvents before sample collection commences and between samples.

It is reasonable to assume that spills or leaks may have resulted in contamination of the floor over the history of the facility. It is therefore prudent to clean the floor to remove surficial contamination (concrete floors) before samples are collected for analysis. Experience in this area has shown proper cleaning of concrete floors can reduce the level of surface contaminants by a factor of 50 to 90%.

Walls and Other Areas: It may also be necessary to collect samples from side walls, doors or other fixtures that bear visual evidence of contamination. Persons performing sampling should use their best judgement and error on the side of caution if the state of other components of the building are in question. Components showing evidence of staining must be sampled if they are not otherwise to be removed, packaged, transported and disposed of as a Waste Dangerous Good.

Sample Collection - Site Property:

Loading Areas: A composite sample of the soil underlying the loading dock area should be collected from low spots where any spills would normally accumulate. This sample may be collected using a soil coring device or alternatively from the clean face of an exposed hand dug shovel cut using a point trowel or similar device. Persons performing sampling of this nature must ensure that sample containers and sampling tools have been adequately cleaned and rinsed with spectroscopic grade solvents both before and between samples. Two samples should be collected, the first over 0 to 10 cm (0-4") and the second from the 10 cm to 60 cm (4-24') depths. Any locations of obvious or suspected spillage should also be sampled on an individual basis. In situations where the warehouse was constructed on an elevated wooden floor, it may also be necessary to sample the soils underlying the structure if it appears through the examination of the structure that spills have penetrated the floor.

Phase 3 - Sample Analysis, Evaluation And Facility Remdeiation

Parameters of interest include those chemicals known or reasonably expected to have been stored at the facility including present day herbicides as well as persistent organochlorine insecticides and mercury seed treatments used within the province in the past. Once representative samples have been collected analysis should be performed for the following criteria to determine the degree of contamination:

> Organochlorine, 2,4-D, 2,4,5-T and Mercury Scan (EPA-Leachate): Aldrin, Dieldrin, Endrin, Chlordane, DDT, Heptachlor/Heptachlor Epoxide, Parathion, Methyl Parathion, Lindane (Gamma BHC), 2,4-D, 2,4,5-T, Methoxychlor and Mercury.
>
> Phenoxy/Neutral Herbicides (Total): 2,4-D, MCPA, Dicamba, Diclofop-methyl, Picloram, Bromoxynil, Trifluralin and Triallate.

In situations where specific samples have been collected from stained areas, analysis should be performed for the specific chemical of concern if it is known. Otherwise, analysis should be performed for the parameters listed above.

Building Materials

The results of analysis of floor materials, and other components of the building where necessary, are to be compared to values provided in Table 1 and Table 2 which are derived from the provincial *Dangerous Goods Transportation Regulations*. If the building is to be demolished and if any results exceed the applicable values in Tables 1 and 2, the building materials shall be removed, packaged, transported and disposed of as Waste Dangerous Goods.

If the building is to remain in service, cleanup to meet these levels is still required. Although it is not absolutely necessary to perform these procedures if the structure is to remain in use as an agricultural chemical warehouse, it is a good practice, since the former owner will wish to limit future liability associated with the building and property. The purchaser of the building and property will often wish to establish to a reasonable degree of certainty that the site is not contaminated and would therefore

not present an unexpected liability at some future date when the building is ultimately to be decommissioned. Former agricultural chemical warehouses may not be reused for storage of food, feed, food ingredients, feed ingredients, pharmaceutical or similar materials.

Soils

The objective of sampling soils from around and possibly beneath the warehouse is to determine if spills have occurred and if so whether the soil will be acceptable to remain in place considering the intended use of the site. If soil is to remain in place, the results of sample analysis will initially gauge the soil against the most sensitive use, that being for agricultural production or residential areas. Positive results from soil samples collected in proximity to warehouses (0-10 cm) as noted above, also likely indicates that past spills have affected the area, since these products are generally not used in immediate proximity to the storage buildings. If spills are indicated by detection of chemical in the upper strata, further analysis of samples from the 10-60 cm depths is required.

In terms of acceptable levels for phenoxy/neutral herbicides, the resultant concentrations from typical agricultural-use applications (Table 3) are to be employed to assess the acceptability of soils for agricultural and residential situations. For the phenoxy/neutral herbicides, total extractable values (dry weight basis) are to be compared against values resulting from typical agricultural applications within the upper 10 cm as a relative measure of acceptability. The upper range of typical agricultural- use values have been selected for agricultural or residential situations since there are no established values for agricultural chemicals which are presently registered for crop protection use.

In terms of acceptability for commercial or industrial uses, phenoxy/neutral herbicide concentrations in soils must not exceed 10 times the values listed for agricultural/residential uses (Table 3). This approach is similar to that for chlorinated hydrocarbons in soils employed by the CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (September 1991). If concentrations of phenoxy/neutral herbicides exceed the values for commercial/industrial sites (Table 3), but are less than values in Table 2 (100 ppm individual or total), the soils would be considered acceptable for commercial or industrial uses, provided adequate monitoring is in place to track the natural breakdown in the contaminants. If values exceed the 100 ppm (individual or total) values in Table 2, the contaminated soil shall be removed, packaged, transported and disposed of as a Waste Dangerous Good.

Organochlorine pesticides and mercury results for soil analysis are to be compared only against values in Table 1 as a measure of acceptability, since these persistent. materials are generally no longer in use and therefore should not be present in soils in proximity to the warehouse. If concentrations of organochlorine chemicals (excluding 2,4-D) and mercury exceed the values in Table 1, the contaminated soil shall be removed, packaged, transported and disposed of as a Waste Dangerous Good.

Table 1: Interim Criteria for Oganochlorine, 2,4-D or 2,4,5-T Contaminated Building Materials or Soils

Contaminant	**Concentration Leachate mg/L**
2,4,5-TP / Silvex	1.0
2,4-D	10.0
Aldrin + Dieldrin	0.07
Chlordane	0.7
DDT	3.0
Endrin	0.02
Heptachlor + Heptachlor epoxide	0.3
Lindane	0.4
Mercury	0.1
Methoxychlor	10.0
Methyl Parathion	0.7
Parathion	3.5

Table 2: Interim Criteria for Contemporary Agricultural Chemical Contaminated Building Materials

Contaminant	**Concentration Total - ppm**
Bromoxynil	100.0
2,4-D	100.0
Dicamba	100.0
Diclofop-methyl	100.0
MCPA	100.0
Picloram	100.0
Triallate	100.0
Trifluralin	100.0
Total of all Phenoxy/Neutral and other present day Herbicides	100.00

Table 3: Summary of agricultural herbicide use details and resulant concentrations in soils

Herbicide	Application Rate	Conc. Active** Ingredients	Incorporation Depth (cm)	Concentration* in Soil (ppm)	Res/Agri Soil Concentration	Comm/Ind Soil Concentration
Bromoxynil						
Pardner	1.0 - 1.2 L/ha	280 g/L	5 - 10	0.23 - 0.56	1.0	10.0
Torch DS	0.625 - 0.875 L/ha	450 g/L	5 - 10	0.23 - 0.66		
2,4-D and MCPA						
Various Brands	0.56 - 4.4 L/ha	500 g/L	5 - 10	0.23 - 3.67	4.0	40.0
Dicamba						
Banvel	0.230 - 0.290 L/ha	480 g/L	5 - 10	0.09 - 0.23	0.5	5.0
Diclofop-methyl						
Hoe-Grass	2.5 - 2.8 L/ha	284 g/L	5 - 10	0.59 - 1.33	2.0	20.0
Picloram						
Tordon 202C	2.0 L/ha	13.25 g/L	5 - 10	0.02 - 0.04	0.1	1.0
Triallate						
Avadex BW	3.0 - 5.5 L/ha	400 g/L	6	1.67 - 3.06	4.0	40.0
Avadex BW	11 - 22 kg/ha	10% Granular	6	1.53 - 3.06		
Trifluralin						
Heritage	11 - 22 kg/ha	5% Granular	8	0.57 - 1.15		
Rival	1.2 - 3.4 L/ha	500 g/L	5 - 10	0.5 - 2.83		
Rival	8.5 - 17.0 kg/ha	10% Granular	10	0.71 - 1.42	3.0	30.0
Triflurex	1.4 - 4.25 L/ha	400 g/L	5 - 10	0.47 - 2.83		
Treflan	17 - 34 kg/ha	5% Granular	5 - 10	0.71 - 2.83		

* Calculations assume that the entire amount of herbicide enters the soil over either the specified incorporation depth or an assumed range of 5 - 10 centimetres. Concentrations in the soil were calculated using the following range of application rates and incorporation depths:

- Lowest application rate and greatest incorporation depth = lower calculated concentration in soil.

- Highest application rate and shallowest incorporation depth = higher calculated concentration in soil.

** Data Source: Saskatchewan Agriculture and Food, 1992, Weed Control in Field and Forage Crops.

More info?

Contact the Saskatchewan Ministry of Environment
Client Service Office at
Tel: 1-800-567-4224
(toll-free in North America)
or 306-787-2584.
Email: centre.inquiry@gov.sk.ca