

GUIDANCE FOR DISTURBANCE AND USE
OF OLD CLOSED LANDFILLS OR WASTE
DISPOSAL AREAS IN FLORIDA

FINAL

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DISCLAIMER

The information contained in this document is intended for guidance only. It is not a rule and does not create any standards or criteria which must be followed by the regulated community. Furthermore, compliance with this document does not relieve the owner or operator from the responsibility for complying with the Department's rules nor from any liability for environmental damages caused by the disturbance of or activities near old landfills or waste disposal areas.

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LIST OF ACRONYMS

CompQAP	- Comprehensive Quality Assurance Plan
CAP	- Contamination Assessment Plan
CAR	- Contamination Assessment Report
EDP	- Excavation and Disposal Plan
EPA	- U. S. Environmental Protection Agency
EM	- Electromagnetic Conductivity
F.A.C.	- Florida Administrative Code
F.S.	- Florida Statutes
FS	- Feasibility Study
GWMP	- Ground Water Monitoring Plan
HRA	- Health Risk Assessment
IRA	- Initial Remedial Action
IRAP	- Initial Remedial Action Plan
MOP	- Monitoring Only Plan
NGVD	- National Geodetic Vertical Datum of 1929
NELAP	- National Environmental Laboratory Accreditation Program
NFA	- No Further Action
PCAP	- Preliminary Contamination Assessment Plan
PCAR	- Preliminary Contamination Assessment Report
QA/QC	- Quality Assurance/Quality Control
RAJ	- Risk Assessment/Justification
RCRA	- Resource Conservation and Recovery Act
RAP	- Remedial Action Plan
Rfd	- Reference Dose
RSM	- Recovered Screened Material
RTL	- Reuse Target Level
SRCR	- Site Rehabilitation Completion Report
SF	- Slope Factor
SPLP	- Synthetic Precipitation Leaching Procedure
SRL	- Site Rehabilitation Level
SSW	- Screened Solid Waste
WPF	- Waste Processing Facility
WTE	- Waste-to-Energy

1.0 BACKGROUND AND PURPOSE

In the past, the Florida Department of Environmental Protection (Department) has received notifications that old landfills or old disposal areas were unexpectedly discovered during various construction projects. The Department has also been contacted by property owners who were seeking to develop property which was known to contain areas where waste had been disposed. In both of these cases, the Department has usually been asked to provide guidance on how to properly manage the waste at the sites. Questions have typically been raised about relocating the wastes, where wastes can be properly disposed, permitting requirements, back-filling of excavated areas, use of screened material from the waste and ground water monitoring requirements.

There have also been cases where the Department discovered that construction projects, such as residential housing units, schools, recreational areas or retail businesses, have been completed either on top of or adjacent to old disposal areas. Some of these projects have resulted in considerable concern by the Department and the public for both the health and safety of individuals living or working near these disposal areas and for the integrity of the environmental protection measures that may be in place at the disposal sites.

The potential risks from old disposal sites may vary considerably and are usually not well understood. This can be due to a variety of factors such as a lack of records on the types of waste disposed at a site or a lack of data on the generation and fate of gases and leachate from these wastes. For example, some wastes contain more biodegradable material than others and as a result may generate more methane gas under anaerobic conditions. Or, due to the age of the wastes, they may have stabilized to the point that gas generation is no longer of concern. If gases are still being generated, they may or may not be migrating off-site depending on the specific geological and physical features of the site. Also, since these old disposal sites were unlined, impact to ground water from leachate generation may be a problem, but this can not be determined without a ground water investigation.

Due to the difficulties encountered in dealing with these old sites, the Department has been asked to develop recommendations for managing the problems arising from construction near or over them. Consequently, this document is intended to provide guidance to the regulated community on the

Department's requirements and recommendations for disturbing or using old, closed landfills or disposal areas. While owners of these old sites are encouraged to use this guidance, this document is not a rule and does not create any standards or criteria which must be followed by the regulated community.

2.0 APPLICABILITY

In general, this document only applies to old disposal sites that are inactive, i.e. no longer receiving wastes, and can normally be placed into one of three categories: (1) old permitted landfills that had a final cover¹ installed before July 1, 1985 without a closure permit; (2) old disposal sites, such as dumps, open dumps and promiscuous dumps, that were operated and closed without permits and which may have had few or no records available of their operations; and (3) construction and demolition (C&D) debris disposal areas which were operated and closed prior to August 2, 1989. The application of this document to any other sites will be determined on a case-by-case basis by the Department.

For the purposes of this document, a "landfill" means a Class I, II or III landfill as it is currently defined in the Department's Solid Waste Management Facilities rule, Chapter 62-701, Florida Administrative Code (F.A.C.). Also, C&D debris² in this document means the same as it is currently defined in Rule 62-701.200(27), F.A.C. which reads:

"Construction and demolition debris" means discarded materials generally considered to be not water soluble and non-hazardous in nature, including but not limited to steel, glass, brick, concrete, asphalt material, pipe, gypsum wallboard, and lumber, from the construction or destruction of a structure as part of a construction or demolition project or from the renovation of a structure, including such debris from construction of structures at a site remote from the construction or demolition project site. The term includes rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or land development operations for a construction project; clean

¹ In July 1, 1985, final cover was generally defined as a 24-inch thick soil layer placed over the wastes in the landfill.

² An additional explanation of how C&D debris wastes are defined is contained in Section 4.3.2 of this document.

cardboard, paper, plastic, wood, and metal scraps from a construction project; effective January 1, 1997, except as provided in Section 403.707(12)(j), F.S., unpainted, non-treated wood scraps from facilities manufacturing materials used for construction of structures or their components and unpainted, non-treated wood pallets provided the wood scraps and pallets are separated from other solid waste where generated and the generator of such wood scraps or pallets implements reasonable practices of the generating industry to minimize the commingling of wood scraps or pallets with other solid waste; and de minimis amounts of other non-hazardous wastes that are generated at construction or demolition projects, provided such amounts are consistent with best management practices of the construction and demolition industries. Mixing of construction and demolition debris with other types of solid waste will cause it to be classified as other than construction and demolition debris.

Dumps, open dumps and promiscuous dumps were defined in earlier rules by the Department. In 1974, dumps were defined in Rule 17-7.02(7), F.A.C. as:

"Dump" is a land disposal site at which solid waste is disposed of in a manner which does not protect the environment and is exposed to the elements, vectors and scavengers.

In 1979, open dumps and promiscuous dumps were defined in Rules 17-7.02(33) and (36), respectively, as:

"Open Dump" means a site for the disposal of solid waste which does not comply with the criteria of Chapter 17-7, F.A.C.; and

"Promiscuous Dump" means an unauthorized site where indiscriminate deposits of solid waste are made.

3.0 GOAL

If plans are made to disturb an old landfill, the owner is required to notify the Department before beginning this

activity. The basic regulatory requirements for the old, closed landfills are contained in Rule 62-701.610(7), F.A.C. and read as follows:

Use of closed landfill areas. Closed landfill areas, if disturbed, are a potential hazard to public health, ground water and the environment. The Department retains regulatory control over any activities which may affect the integrity of the environmental protection measures such as the landfill cover, drainage, liners, monitoring system, or leachate and stormwater controls. Consultation with the Department is required prior to conducting activities at the closed landfill areas.

The goal of this document is not to impose new regulatory burdens on owners of old landfills or disposal sites. Rather, the owners of these sites are strongly encouraged to consult with the Department prior to disturbing any of these areas or conducting any construction near or over them and to develop a plan of action that achieves the goals of the owner but is also protective of human health and the environment. To facilitate communication with the Department in these matters, a list of contacts and addresses for the Tallahassee and District offices is provided in APPENDIX A.

The remaining portions of this document describe the activities that should be conducted or considered when attempting development near or over these old sites. The Department encourages the owners of these sites to follow these recommendations.

4.0 WASTE DISTURBANCE

4.1 Waste Relocation On-site

There have been occasions when construction projects have included the on-site relocation of existing wastes which were either known to exist at the site before construction or discovered during construction. The owner may also desire to sort uncontaminated concrete from the waste before reburial³.

³ Sorting materials other than uncontaminated concrete will require written approval by the Department before the sorting begins in accordance with the requirements of Section 4.4 of this document.

In 2001, the Department revised its solid waste rule to address the relocation of these on-site wastes at closed landfills. Specifically, Rule 62-701.610(8) reads:

Relocation of waste. The owner of a closed landfill may request permission from the Department to move waste from one point to another within the footprint of the same solid waste disposal unit. If the landfill has a valid closure permit, the permittee shall seek a modification to reflect the relocation of waste. The Department shall approve such a request upon a demonstration that:

(a) The activity will not cause or contribute to any leachate leakage from the landfill, and will not adversely affect the closure design of the landfill;

(b) Any leachate, stormwater runoff, or gas which is generated by the activity is controlled on site;

(c) Any hazardous waste which is generated by the activity will be managed in accordance with Chapter 62-730, F.A.C.;

(d) Immediately after the activity is completed, the landfill will be covered, vegetated, and graded so as to comply with the closure requirements that apply to that landfill, which shall include a final cover of at least two feet of soil; and

(e) The appropriate District Office of the Department is notified at least seven days before the activity takes place in order to have the opportunity to inspect the site.

If the landfill has a valid closure permit, then a modification of that closure permit will be required to relocate on-site wastes. The owner of the landfill will have to demonstrate that the requirements of Rule 62-701.610(8), F.A.C. will be satisfied during the relocation activities. Uncontaminated concrete which is excavated from the disposal site and removed from the wastes may be used as a raw material or as fill material without a permit⁴, i.e. used as clean debris. But it must meet the definition of clean debris contained in Rule 62-701.200(15), F.A.C. before it can be used as fill or raw material.

⁴ For the Department's requirements on this use, see Rules 62-701.220(2)(f) and 62-701.730(15), F.A.C.

If the landfill was closed before closure permits were required, then waste relocation activities may still be allowed and the Department will not require a closure permit or long-term care requirements provided the following occur.

- (a) A Relocation Plan must be submitted for review and approval to the Department's District office in the District where the disposal site is located (see contacts and addresses in APPENDIX A). It should include the following:
 - a site map showing which waste will be removed and where they will be reburied;
 - an estimate of the total volume of wastes to be relocated and the time needed to complete the project;
 - a description of how the wastes will be excavated and relocated; and
 - a description of how odors will be minimized and how surface water and leachate resulting from the relocation activities will be controlled.
- (b) The waste must only be relocated within the original landfill or disposal site footprint⁵, and must be covered with two feet of soil, compacted and revegetated.
- (c) No off-site waste can be transported to the site and disposed of in the relocation areas.
- (d) Should any hazardous wastes be encountered, they will be managed as a hazardous waste according to Chapter 62-730, F.A.C.
- (e) The only wastes to be relocated are those which are necessary to implement the construction project.
- (f) If sorting of uncontaminated concrete from the waste is planned, a description of how the sorting will be accomplished shall be provided. Uncontaminated concrete may be used as a raw material or as fill without a permit provided it meets the requirements stated above for facilities having valid closure permits.
- (g) If it is determined that the waste at the site is causing ground water contamination, then some water quality

⁵ Relocation of wastes outside the original footprint is considered new disposal and may require a permit.

monitoring, and possibly corrective actions, will be required as described in Section 4.6.

4.2 Waste Left In-place

Waste left in-place and not disturbed, is generally subject only to the requirements that applied at the time the site was operated. If there are questions about these requirements, the summaries in APPENDICES B and C may provide some guidance.

Normally, no further action is required by the Department in the areas containing undisturbed waste. However, if the waste is not stabilized⁶ and the final cover is inadequate, the Department may require the soil cover be maintained. Also, if it is determined that the waste is causing ground water contamination, then some water quality monitoring, and possibly corrective action, will be required according to Section 4.6.

4.3 Waste Removal and Off-site Disposal

Removing the waste may be the best option to achieve unrestricted use of former disposal areas. This option may not be practical if a large area of land was used for disposal or if much of the waste was disposed of in the ground water and cannot be easily removed. In those cases, a partial removal may be appropriate. The Department must be notified prior to beginning these activities. However, a permit will not generally be required for these activities provided the work is conducted under a Department approved Excavation and Disposal Plan (see Section 4.3.1).

Uncontaminated concrete which is excavated from the disposal site and removed from the wastes may be used as a raw material or as fill material without a permit⁷, i.e. used as clean debris. But it must meet the definition of clean debris contained in Rule 62-701.200(15), F.A.C. before it can be used as fill or raw material.

⁶ Rule 62-701.200(120), F.A.C. defines stabilized to mean the "biological and chemical decomposition of the wastes has ceased or diminished to a level so that such decomposition no longer poses a pollution, health, or safety hazard."

⁷ For the Department's requirements on this use, see Rules 62-701.220(2)(f) and 62-701.730(15), F.A.C.

4.3.1 Excavation and Disposal Plan

Before beginning waste removal, an Excavation and Disposal Plan (EDP) should be submitted for review and approval to the Department's District office in the District where the disposal site is located. An EDP should include at least the following items.

- (a) Extent of Waste - The extent of the disposal area where the waste will be removed must be fully delineated as follows:
- The extent of the in-place waste disposal area must be fully delineated in both the vertical and horizontal directions. Normally this delineation can be conducted using soil borings or test pits. Other geophysical methods may also be used.
 - A site plan showing the location of the disposal area, and locations of the test pits or soil borings must be provided.
 - A description of the materials found in the test pits or borings and the depths where these materials were encountered must also be provided.
 - If ground water was encountered in the pits or borings, the depth to water should be described.
- (b) Gas Concerns - To ensure there are no potential adverse effects from waste gas, a combustible gas⁸ survey of ambient air conditions shall be conducted at the site before the wastes are removed and again within ninety days after removal. Combustible gases in confined spaces shall not exceed twenty-five percent of their lower explosive limit. Ambient air monitoring shall also be conducted periodically during excavation to ensure conditions for combustible gases are not being created. In addition, before wastes are removed, soil monitoring probes shall be installed where the wastes are located and sampled for combustible gases. Sampling shall be conducted in the headspace of the monitoring probe without purging the gas before collecting the sample.
- (c) Waste Removal - The EDP should describe the waste removal activities planned including a description of:
- the procedures for staging wastes prior to removal and an estimate of the length of time wastes will be staged;

⁸ Combustible gases shall be calibrated to methane.

- an estimate of the total volume of wastes to be removed and the time needed to complete the project;
- the methods(s) that will be used to characterize the various types of waste encountered according to the recommendations of Section 4.3.2;
- the procedures for handling any hazardous waste or hazardous materials should they be encountered;
- the procedures for handling any land clearing debris should it be generated and designated for off-site disposal or recycling;
- the intended permitted disposal facility(s) for wastes removed;
- how odors and dust will be minimized and the procedures for controlling leachate from disturbed or staged waste areas prior to removal of the wastes from the site;
- if sorting of uncontaminated concrete from the waste is planned, a description of how the sorting will be accomplished shall be provided; and
- the procedures that will be used to ensure the water quality monitoring, and possibly corrective action, requirements of Section 4.6 will be followed.

4.3.2 Waste Characterizations

Before excavated waste can be disposed of off-site, it will need to be characterized to determine which method of disposal is appropriate. The waste can usually be placed into one of four categories: (1) a hazardous waste; (2) a waste suitable for disposal in a permitted Class I or II landfill; (3) a waste suitable for disposal in a permitted Class III landfill; and (4) C&D debris waste (if it meets the definition of C&D debris waste as described below). In addition, some sites may involve a significant amount of land clearing operations prior to excavation of the waste. The vegetative waste generated from these land clearing operations may be suitable for disposal in a permitted Class III landfill, C&D debris facility or a land clearing debris disposal facility.

If the excavated waste is a hazardous waste, it will need to be managed in accordance with the requirements of Chapter 62-730, F.A.C. The generator is responsible for determining if the excavated material is a hazardous waste. The Department's Hazardous Waste Regulation Section can be contacted if there are any questions about the hazardous waste determination for this material.

If the excavated material is not a hazardous waste and if it is not considered a liquid waste according to Rule 62-701.200(72), F.A.C., then it may be disposed of in a permitted Class I or II landfill⁹. The landfill owner/operator, however, is not required to accept this material for disposal. The generator of the waste should contact the landfill owner/operator before transporting the material to ensure it can be received at the landfill for disposal.

Some wastes may qualify for disposal in a permitted Class III landfill, provided they are not putrescible household wastes, or other Class I wastes, and meet the definition of Rule 62-701.200(14), F.A.C. which reads as follows:

"Class III waste" means yard trash, construction and demolition debris, processed tires, asbestos, carpet, cardboard, paper, glass, plastic, furniture other than appliances, or other materials approved by the Department that are not expected to produce leachate which poses a threat to public health or the environment.

Some of the wastes removed from old disposal sites may meet the definitions of the specific items listed in the rule and may be suitable for disposal in a Class III landfill if they are not contaminated with other wastes. However, the definition of Class III wastes also allows the Department to approve "other materials" for disposal in Class III landfills if it is satisfied that they are "not expected to produce leachate which poses a threat to public health or the environment." Many of the wastes from these old disposal sites may also qualify for this "other materials" category at a Class III landfill. But the burden will be on the generator to show entitlement to this determination by the Department. These determinations will be made on a case-by-case basis.

Some waste may be considered C&D debris and qualify for disposal in a C&D debris facility or a Class III landfill, but this determination will probably be difficult. There are essentially three tests that must be satisfied. The first two deal with the definition of C&D debris contained in Section 403.707(17), F.S., and the third deals with the problem of mixing. First, the material must be "not water-soluble and

⁹ While not typically expected to be an option, the wastes could also be disposed of at a Waste-to-Energy (WTE) facility if the WTE facility is authorized by its permit to process it and the material is not a hazardous waste.

nonhazardous in nature" including a list of included materials¹⁰. In other words, it must be of a certain "type." Second, the material must be "from the construction or destruction of a structure as part of a construction or demolition project," meaning that it must also be from a certain "source." Third, the law says that mixing of C&D debris with other types of waste will cause it to be classified as other than C&D debris.

Thus, for wastes from an old disposal site to be classified as C&D debris, the generator will have the burden to demonstrate that the waste met the "type" and "source" requirements and also show that it had never been mixed with other types of solid waste. If these three criteria cannot be satisfied, then the waste may not be disposed of at a C&D debris facility. However, it may still be allowed for disposal at a Class III landfill if the Department approves it as an "other material" according to Rule 62-701.200(14), F.A.C.

Vegetative wastes which meet the definition of "yard trash" contained in Rule 62-701.200(143), F.A.C., may not be disposed of in a lined landfill (see Rule 62-701.300(8)(c), F.A.C.). However, they may be disposed of in a permitted Class III landfill¹¹. They may also be disposed of in a permitted C&D debris disposal facility or a permitted land clearing debris disposal facility if they also meet the definition of "land clearing debris" contained in Rule 62-701.200(62), F.A.C. The definition of yard trash reads as follows:

"Yard trash" means vegetative matter resulting from landscaping maintenance or land clearing operations and includes materials such as tree and shrub trimmings, grass clippings, palm fronds, trees and tree stumps.

¹⁰ These included materials are generally items such as: (1) steel, glass, brick, concrete, asphalt material, pipe, gypsum wallboard and lumber; (2) rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or land development operations for a construction project; and (3) clean cardboard, paper, plastic, wood, and metal scraps from a construction project.

¹¹ The Department considers the prohibition for disposing of yard trash in a lined landfill to apply to Class I landfills. While some Class III landfills may have liners, they generally do not meet the definition of "lined landfill" contained in Rule 62-701.200(69), F.A.C. and thus are not subject to the prohibition.

The definition of land clearing debris reads as follows:

"Land clearing debris" means rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or land development operations for a construction project. Land clearing debris does not include vegetative matter from lawn maintenance, commercial or residential landscape maintenance, right-of-way or easement maintenance, farming operations, nursery operations, or any other sources not related directly to a construction project.

4.4 Recycling Wastes or Vegetative Matter

In some cases, the owner of a site may wish to recycle some of the excavated waste or the vegetative matter generated during land clearing operations. This recycling might be on-site or the wastes may be sorted from non-recyclable wastes and transported off-site for recycling. If the only waste to be sorted and recycled is uncontaminated concrete, then, as has been stated earlier, this waste may be used as a raw material or as fill material without a permit¹², i.e. used as clean debris. But it must meet the definition of clean debris contained in Rule 62-701.200(15), F.A.C. before it can be used as fill or raw material. If other wastes are planned for sorting or recycling, then the requirements become more complicated.

If the waste is excavated and transported off-site for recycling, then it may be suitable for processing at a Waste Processing Facility¹³ (WPF). Likewise, the vegetative materials generated during the operation and transported off-site may be suitable for recycling at a yard trash mulching facility or a yard trash compost facility.

If the excavated wastes are sorted on-site for the purpose of recycling them either on-site or at a permitted or registered facility located off-site, then the owner of the landfill will be required to obtain written approval by the Department before beginning the sorting operations. The owner must contact the Department's District office in which the landfill is located to determine the exact requirements.

¹² For the Department's requirements on this use, see Rules 62-701.220(2)(f) and 62-701.730(15), F.A.C.

¹³ The requirements for Waste Processing Facilities are contained in Rule 62-701.710, F.A.C.

A WPF that recycles the waste must have a solid waste permit to operate according to the requirements of Rule 62-701.710, F.A.C. No excavated waste should be transported to a WPF unless it is authorized by its permit to receive this material, and the owner or operator of the WPF is willing to process it. The characterization of the waste in Section 4.3.2 of this document should help clarify if the waste can be processed by the WPF.

Yard trash¹⁴ from the site may be recycled at a yard trash mulching facility or a yard trash compost facility. These facilities will normally not need a solid waste permit provided they meet the criteria for a yard trash processing facility in Rule 62-709.320, F.A.C. and register with the Department in accordance with Rule 62-709.320(5), F.A.C.

The excavation, on-site sorting or recycling, transportation and off-site recycling of wastes or vegetative materials may be allowed, with prior written approval by the Department, provided the following occur.

- (a) A Recycling Plan must be submitted for review and approval to the Department's District office in the District where the disposal site is located. It should include the following:
- a site map showing where the waste staging, sorting and screening areas will be located and which areas of the disposal site will be excavated;
 - an estimate of the total volume of wastes to be sorted or recycled and the time needed to complete the project;
 - a description of how the excavation will occur;
 - a description of how the recyclable wastes will be sorted from the excavated wastes including operation of the staging areas;
 - a description of how the screened waste will be managed in accordance with the recommendations of Section 4.5;
 - a description of how odors will be minimized and how surface water and leachate resulting from the excavation, staging, sorting and screening activities will be controlled;

¹⁴ Yard trash is defined in Section 4.3.2 of this document.

- a description of how dust from the recycling operation will be controlled¹⁵;
 - a description of the permitted facilities where the recyclable wastes shall be transported to and processed; and
 - a description of how the excavated areas will be back-filled, covered, compacted and revegetated.
- (b) Should any hazardous wastes be encountered, they must be managed as a hazardous waste according to Chapter 62-730, F.A.C.
- (c) If it is determined that the waste at the site is causing ground water contamination, then some water quality monitoring, and possibly corrective actions, will be required according to Section 4.6.

4.5 Use of Screened Solid Waste

Screened solid waste (SSW) refers to the fines fraction of material that is produced by screening excavated wastes. This would normally occur during the on-site recycling operations. If the wastes that are screened meet the criteria for being C&D debris wastes in Section 4.3.2, then the fines fraction generated by this screening shall be considered Recovered Screen Material (RSM) and should be managed in accordance with the Department's RSM guidance dated September 28, 1998 (DEP, 1998). Screened material from any other wastes shall be designated as SSW rather than RSM. For the purposes of this document, most of the screened material from recycling wastes at old disposal sites will be treated as SSW rather than RSM¹⁶.

In order to use any SSW, the owner will have to provide reasonable assurances to the Department that the proposed use is protective of human health and that applicable Department standards and criteria will not be violated. The main goals that must be accomplished for owners to use the SSW are summarized as follows:

¹⁵ The owner should also be aware that the Department may regulate this dust as a fugitive particulate emission. The Department's Air Section, in the District where the landfill is located, can be contacted for further details.

¹⁶ The Department assumes that it will be difficult to classify old waste as C&D debris according to the three tests in Section 4.3.2. Therefore, the screened material from these wastes should be treated as SWD rather than RSM.

- (a) The SSW must be managed and used so that it will not cause violations of applicable Department air standards or ground water or surface water standards and criteria.
- (b) The use of the SSW must not pose a significant threat to human health, which, for the purposes of this document, means an incremental risk of no greater than 1×10^{-6} for carcinogens and a hazard index of no greater than one (1.0) for non-carcinogens.
- (c) The use of the SSW must not create a public nuisance.

In some cases, a satisfactory demonstration that the proposed use of the SSW is safe, will be easy to provide. In other cases, some chemical testing may be required and evaluations of the proposed uses may be more difficult. The following discussion attempts to clarify some of these issues for use in back-filling excavated areas and in off-site applications.

4.5.1 Back-filling Excavated Areas

Back-filling on-site excavated areas can be placed into two categories. The first, and easiest to address, occurs when the SSW is placed in the excavated areas of the original waste disposal footprint (above the water table), compacted and then covered with two feet of clean fill¹⁷ and revegetated. In this case, the Department considers the likelihood of direct human exposure with the SSW to be negligible. Also, since the SSW is placed within the boundaries of the original waste disposal footprint, the leachability concerns are probably similar to the waste before it was disturbed. Therefore, no further action will be required if this method of backfilling is used unless it is determined that the residual waste at the site is causing ground water contamination. Then some water quality monitoring, and possibly corrective actions, will be required according to Section 4.6.

The second category of backfilling occurs when SSW is placed on the ground surface or mixed within the top 24 inches of soil at the site (above the water table). In these cases, the owner needs to ensure that all the goals of Section 4.5 are achieved. When showing the risks from these uses will not

¹⁷ For the purposes of this document, "clean fill" means soil which has not become contaminated by human activity or soil which meets the "cleaned soil" criteria of Chapter 62-713, F.A.C. Soil may include other similar materials if approved by the Department.

exceed the human health risk goals of Section 4.5, Item (b), the owner may choose to conduct a separate human health risk assessment (HRA) to determine the potential risks from the proposed uses of SSW. The owner may also elect to use the Department's Reuse Target Levels (RTLs) contained in APPENDIX D as a guide for evaluating the potential risks. To use the Department's RTLs, the following testing will be required.

- (a) Representative discrete and composite samples shall be collected of the SSW as it will be used at the minimum frequency indicated in TABLE 1.
- (b) Total analysis shall be conducted on the composite samples for the eight Resource Conservation and Recovery Act (RCRA) metals¹⁸ using the approved EPA Methods and for semi-volatile organic compounds using EPA Method 8270C, and pesticides using EPA Method 8081A.
- (c) Total analysis shall be conducted on the discrete samples for volatile organic compounds using EPA Method 8260B.
- (d) The leaching potential for detected parameters in the total analyses of the samples can be estimated by comparing the total concentrations of those parameters to the Department's corresponding RTL leachability values contained in APPENDIX D. To further evaluate leaching potential, the samples can also be prepared using the Synthetic Precipitation Leaching Procedure (SPLP), EPA Method 1312. The extracts prepared from this procedure can then be analyzed¹⁹, using the approved EPA methods, for any parameters that may be above the Department's corresponding RTL leachability value²⁰.
- (e) Laboratories conducting the analyses must have a Department approved Comprehensive Quality Assurance Plan (CompQAP) in accordance with the requirements of Chapter 62-160, F.A.C. or be certified by an accrediting authority recognized by the National Environmental Laboratory Accreditation Program (NELAP). Analysis of the SPLP extracts must be conducted

¹⁸ These metals are: arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

¹⁹ When analyzing for parameters such as sulfates and TDS, it is likely that de-ionized water will need to be used as the extraction fluid in the SPLP test rather than the extraction fluid specified in the method itself.

²⁰ It should be noted that some chemicals do not have corresponding RTL leachability values. Also secondary ground water standards may be of concern at some sites. For these cases, the SPLP test may be necessary to evaluate leaching potential for these parameters.

using detection limits at or below the Department's ground water standards and criteria.

Based on the results of the above testing, possible uses for SSW can then be considered. SSW may be used as backfill on-site above the water table without further restrictions provided: (1) the total concentrations of detected chemicals are below the Department's corresponding residential RTLs for direct exposure contained in APPENDIX D; and (2) the detected chemicals are not expected to be a leaching concern. However, filling of jurisdictional surface waters or wetlands is not allowed unless a permit specifically authorizing this use of the SSW is issued by the Department. If these conditions cannot be met, then the Department should be contacted about appropriate uses of the SSW.

4.5.2 Off-site Uses

SSW should not be used as fill material in jurisdictional surface waters or wetland unless a permit specifically authorizing this use has been issued by the Department. SSW may be suitable for use as initial and intermediate cover at permitted Class I, II or III landfills provided it meets the criteria of Rules 62-701.200(59) and (61), F.A.C. These uses of SSW may require approval by the Department's District office in the District where the disposal site is located as part of its landfill permit.

Other potential uses of SSW will depend on the chemical nature of the material. Testing similar to that contained in Section 4.5.1, Items (a) through (e) must be conducted to evaluate total and leachable concentrations of chemicals in the SSW. The Department must be consulted before using any SSW off-site of the disposal area.

4.6 Water Quality Evaluations

When wastes are removed or left in-place, water quality monitoring will be needed to ensure there are no adverse affects to ground water from the wastes. The actual requirements for water quality evaluations will vary depending upon the site-specific circumstances.

4.6.1 Wastes Removed

If all the wastes are removed from the site, then limited water quality sampling (usually one to three sampling events)

will be required in the area where the wastes were previously disposed to determine if there are any violations of the Department's water quality standards or criteria. This will require preparing a Preliminary Contamination Assessment Plan (PCAP) and getting it approved by the Department. After conducting the activities in the PCAP, then a Preliminary Contamination Assessment Report (PCAR) must be prepared for review by the Department. If the PCAR demonstrates that no water quality violations are occurring, then no further testing will be required. A description of the tasks required for developing PCAPs and PCARs is included in APPENDIX E.

If the PCAR demonstrates that water quality violations are occurring at the site, then further work will be required. Depending on the level of the contamination and the nature of the site, the Department may allow the owner to continue with a Monitoring Only Plan (MOP) and simply monitor the level of the contamination. As an alternative, the Department may require the owner to prepare a Contamination Assessment Plan (CAP) to evaluate the extent of the contamination. The CAP is followed by a Contamination Assessment Report (CAR) which documents the findings from implementing the CAP. Both the CAP and CAR must be approved by the Department. Based on the results of the CAR, the owner will then be required to implement some form of remedial action. This may be simply to continue monitoring the site for some period of time, or it may require some ground water control and treatment. The actual requirements are determined on a case-by-case basis. A description of the tasks required to prepared CAPs and CARs is included in APPENDIX F.

4.6.2 Wastes Left In-place

If the wastes are left in place or only partially removed, then monitoring of the water quality at the site for some period of time will be required. The Department may allow monitoring wells to be installed according to the PCAP and PCAR requirements described in Section 4.6.1 and then require these wells be sampled for a period of time. As an alternative, the Department may require the installation of a Ground Water Monitoring Plan (GWMP) according to the requirements of Rule 62-522.600, F.A.C. and have the wells installed under this plan monitored for a period of time. In either case, the owner must contact the Department to determine which approach will be required. The duration of the monitoring will depend on the site-specific conditions and the results of the water quality testing. If it is determined by the Department that water

quality violations are not occurring at the site, then no further water quality evaluations will be required.

If sampling results from the PCAP or the GWMP show there are violations of the Department's water quality standards or criteria, then further work will be required. The owner must follow the CAP and CAR procedures described in Section 4.6.1 to evaluate the extent of the contamination. Based on the results of the CAR, the owner will then be required to implement some form of remedial action. This may be simply to continue monitoring the site for some period of time, or it may require some ground water control and treatment. The actual requirements are determined on a case-by-case basis.

5.0 CONSTRUCTION NEAR WASTE-FILLED AREAS

There have been occasions where construction projects were conducted near old disposal sites without actually disturbing the wastes. The Department encourages caution be used when planning and implementing these projects since their proximity to old disposal areas may result in unacceptable risks to human health and the environment. At a minimum, the Department encourages the following recommendations be implemented:

- (a) a combustible gas²¹ survey of ambient air conditions should be conducted at the project site to ensure combustible gases from the disposal area are not exceeding twenty-five percent of their lower explosive limit in structures;
- (b) soil monitoring probes should be installed between the proposed construction and the waste-filled areas to ensure combustible gases from the disposal area are not exceeding their lower explosive limit;
- (c) any structures located near the disposal areas which could be impacted by combustible gas should be designed with good ventilation and with explosion proof electrical wiring;
- (d) access to the disposal site should be restricted; and
- (e) shallow potable water wells and irrigation wells should not be installed downgradient of the disposal areas unless it is confirmed there are no adverse affects to ground water from the wastes in the disposal area.

²¹ Combustible gases shall be calibrated to methane.

6.0 CONSTRUCTION OVER WASTE-FILLED AREAS

The appropriate District office must be consulted before any construction activity is conducted over an old disposal site. The goals of this consultation are to ensure that the integrity of the environmental protection measures of the disposal area are not adversely impacted and to protect the health and safety of individuals who may be using the disposal area.

6.1 Cautions For Construction

When considering construction projects over old disposal sites, the Department recommends the following guidelines be used.

- (a) The Department strongly discourages the construction of residential structures over old waste-filled areas. Waste gas seeping into the structures and structural settlement problems are well documented difficulties with this use of old disposal sites.
- (b) Any construction projects should consider potential impacts from combustible gas. Combustible gases must not exceed twenty-five percent of their lower explosive limit in structures. Any structures located on the disposal areas must be designed with good ventilation and with explosion proof electrical wiring. Enclosed ground level and underground structures should be avoided unless designed with adequate protection against gas explosions.
- (c) If the construction project may cause combustible gas to migrate off-site, then gas monitoring on a quarterly basis will be required in soil monitoring probes according to Rule 62-701.530, F.A.C.
- (d) If any waste is disturbed because of the construction project, then the guidelines in Section 4.0 should be followed, as appropriate.
- (e) When planning the construction, concentrated weight loading should be avoided, if possible, to prevent uneven settlement of the underlying wastes. Also, disturbance of the landfill cover or barriers should be minimized or avoided when structures are built, particularly if pilings are used.

- (f) Irrigation systems, if installed, must be designed to minimize disturbance to the underlying waste-filled areas and must not withdraw water from areas where ground water may be contaminated.
- (g) Surface water management systems must not be designed over contaminated areas or over waste-filled areas unless they are lined. Also, an Environmental Resource Permit from the Department will be required prior to constructing a surface water system.
- (h) The disposal site must be maintained. For example, areas that have settled must be filled with clean fill to minimize leachate generation due to rainfall and irrigation and to protect individuals who may walk or play on the site.
- (i) The landfill cover must be maintained to prevent human contact with the underlying waste materials.
- (j) Care must be taken during any waste relocation, construction or recreational activities to prevent damage to ground water monitoring and gas monitoring systems.
- (k) Underground utilities and similar installations that are placed within 200 feet of, or across, any side of the filled areas should be avoided. If they cannot be avoided and if combustible gases are being generated, then a properly located gas barrier or ventilation system must be placed at each waste boundary which is crossed by the utility line to prevent the gas mixtures from migration along the utility line to off-site structures.

6.2 Alternate Uses of Disposal Areas

Some creative alternate uses of closed landfills and old disposal areas have been implemented in recent years. One very successful use is the creation of recreational facilities. Facilities such as ball parks, soccer fields, hiking trails, golf courses and golf driving ranges appear to be acceptable and successful land uses for these old sites. The Department prefers these types of uses be selected for an old site rather than the construction of residential housing or educational facilities.

Before beginning one of these projects, the owner must develop construction plans and a detailed description of the

project and present these for review to the Department's District office where the project is located. A list of contacts and addresses for these offices is provided in APPENDIX A.

In most cases, a permit will not be required, except for an Environmental Resource Permit addressing the surface water control system. The construction plans must show the major features of the project including locations of: on-site structures, waste disposal areas, the surface water management system, irrigation systems and planned utility lines. The description of the project must include how the recommendations for waste disturbance in Section 4.0 will be addressed. It must also address the recommendations of Sections 5.0 and 6.1.

REFERENCES

DEP (Florida Department of Environmental Protection), 1998, Guidelines For The Management Of Recovered Screen Material From C&D Debris Recycling Facilities in Florida, Department of Environmental Protection, Solid Waste Section, Tallahassee, Florida, September 28.

Table 1. Minimum Number of Soil Samples Required

Amount of Soil by Volume, yd ³	Amount of Soil by Weight, tons	Number of Discrete Samples Required for Volatile Organics	Number of Composite Samples Required for non-Volatile Organics
<100	<140	1	1
100 to <500	140 to <700	3	3
500 to <1000	700 to <1400	5	5
For each additional 500 yd ³	For each additional 700 tons	1	1

APPENDIX A

Department Solid Waste Contacts and Addresses

DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOLID WASTE CONTACTS
(Updated March 20, 2002)

Northwest District: Jack McNulty, P.E.
Department of Environmental Protection
160 Governmental Center
Pensacola, Florida 32501
850/595-8360
Jack.McNulty@dep.state.fl.us

Northeast District: Mary Nogas, P.E.
Department of Environmental Protection
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590
904/448-4300
Mary.Nogas@dep.state.fl.us

Central District: Jim Bradner, P.E.
Department of Environmental Protection
3319 Maguire Boulevard, Suite 323
Orlando, Florida 32803-3767
407/894-7555
James.Bradner@dep.state.fl.us

Southwest District: Bob Butera, P.E.
Department of Environmental Protection
3804 Coconut Palm Drive
Tampa, Florida 33619
813/744-6100
Robert.Butera@dep.state.fl.us

Southeast District: OJ Carlo, P.E.
Department of Environmental Protection
400 North Congress Avenue
West Palm Beach, Florida 33401
561/681-6600
OJ.Carlo@dep.state.fl.us

South District: Ghaus Minhaj, P.E.
Department of Environmental Protection
2295 Victoria Avenue
Fort Myers, Florida 33901-3881
941/332-6975
Ghousuddin.Minhaj@dep.state.fl.us

Tallahassee: Richard Tedder, P.E.
Department of Environmental Protection
2600 Blair Stone Road, MS# 4565
Tallahassee, Florida 32399-2400
850/488-0300
Richard.Tedder@dep.state.fl.us

APPENDIX B

**Partial Summary of Landfill Permit, Closure
and Long-term Care Requirements**

PARTIAL SUMMARY OF LANDFILL PERMIT, CLOSURE AND LONG-TERM CARE REQUIREMENTS

(June 30, 2000)

AGENCY "CHAPTER TITLE"	GENERAL DESCRIPTION OF REQUIREMENTS
<p>Dept. of Health and Rehabilitative Services Chapter 10D-12, "Garbage and Rubbish" October 20, 1964</p>	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • None, but an operational work plan approval by the Division of Health was required before receiving waste. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • None. <p><u>Closure Design:</u></p> <ul style="list-style-type: none"> • Final cover depth of 24 inches of compacted earth. • 2:1 slopes were allowed. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • Maintenance program required to assure prompt repair of cracks, depressions and erosion of the surface and side slopes until the site stabilized.
<p>Dept. of Pollution Control Chapter 17-7, "Resource Recovery and Management Part I: Solid Waste Facilities" October 1, 1974</p>	<p><u>Landfill Permit:</u></p> <ul style="list-style-type: none"> • Permit required after January 1, 1975 to operate, maintain, construct, expand or modify a landfill. • No permits required for closure. • Normal farming operations and persons who dispose of solid waste resulting from their own activities on their own property are specifically exempted from permitting provided no public nuisance or conditions adversely affecting public health is caused and provided the activity does not violate other rules, laws or ordinances. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Not required, but the Department had the option to require it at the time of design approval or if ground water contamination was suspected. <p><u>Landfill Closure Design:</u></p> <ul style="list-style-type: none"> • Two feet of earth compacted in 6 inch layers with the top 6 inch layer loosely compacted to promote plant growth. • Side slopes for landfills \geq five feet above grade to be covered with 3.5 feet of compacted earth cover. • Slopes no greater than 3:1 required (2:1 slopes no longer allowed). <p><u>Dump Closure:</u></p> <ul style="list-style-type: none"> • Dumps required to be eliminated or converted to "sanitary landfills" by July 1, 1977. • Dumps were closed by controlling access, taking steps to divert surface water around the site, removing wastes from the water table, and seeding or planting grass to minimize erosion. • No final cover requirement mentioned. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • None.

PARTIAL SUMMARY OF LANDFILL PERMIT, CLOSURE AND LONG-TERM CARE REQUIREMENTS

(June 30, 2000)

AGENCY "CHAPTER TITLE"	GENERAL DESCRIPTION OF REQUIREMENTS
Dept. of Environmental Regulation Chapter 17-7, "Resource Recovery and Management Part I: Solid Waste Facilities" May 25, 1979	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • No landfill to be operated, maintained, constructed, expanded, or modified without a valid Department permit. • No permits required for closure. <p><u>Ground Water Monitoring (by 9 months from eff. date, ~ 2/25/80):</u></p> <ul style="list-style-type: none"> • Class I landfills required to have a minimum of three monitoring wells. Class II landfills are required to have at least one. • Wells required to be sampled at least every six months for various indicator parameters. <p><u>Closure Design (for sanitary landfills and open dumps):</u></p> <ul style="list-style-type: none"> • Two feet of earth compacted in 6 inch layers with the top 6 inch layer loosely compacted to promote plant growth, slopes no greater than 3 to 1. • Site access controlled. • Site seeded or planted with grass or suitable vegetation. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • Site to be maintained until stabilized by controlling erosion, maintaining grass cover, prevention of ponding, and prevention of deposited wastes from becoming a hazard or nuisance. • Landfill to be monitored, including collection and treatment of leachates, until the site is stabilized.
Dept. of Environmental Regulation Chapter 17-4 January 1, 1983 (aka: Ground Water Rule)	<p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Landfills (domestic or industrial) which are "existing installations" required to submit a ground water monitoring plan by May 1983. • New landfills required to submit a ground water monitoring plan in conjunction with their permit applications.
Dept. of Environmental Regulation Chapter 17-7, "Resource Recovery and Management Part I: Solid Waste Facilities" July 1, 1985	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • No landfill to be operated, maintained, constructed, expanded, modified or closed without a valid Department permit. • For the first time, permits were required for closure of Class I, II or III landfills and applied to all landfills receiving waste, portions of landfills not having final cover and all future landfills requiring solid waste permits (but see exceptions in next bullet). • Closure permit requirements did not apply to: (1) a person disposing of their own waste on their own property; (2) any disposal of C&D debris; and (3) a Class I, II or III landfill which had a modification of an operation permit to close or a closure plan approved by the Department by July 1, 1985. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Monitoring to be in accordance with Rules 17-3.401, 17-4.245 and 17-4.246. <p><u>Closure Design:</u></p> <ul style="list-style-type: none"> • Barrier layer must be a geomembrane, soils or chemically/physically amended soils. Minimum final cover thickness must be two feet of soils or one foot of soils plus a geomembrane or soil admixture. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • 20 year long-term care period. • Landfill to be monitored and maintained after closure in accordance with approved closure plan. • Language on "use of closed landfill areas" added to rule. Consultation with the Department required before conducting activities at a closed landfill. • Language providing guidance for "construction on closed landfill" areas added to rule.

PARTIAL SUMMARY OF LANDFILL PERMIT, CLOSURE AND LONG-TERM CARE REQUIREMENTS

(June 30, 2000)

AGENCY "CHAPTER TITLE"	GENERAL DESCRIPTION OF REQUIREMENTS
Dept. of Environmental Regulation Chapter 17-701, "Solid Waste Management Facilities" July 19, 1990	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • The on-site exemption from permitting by persons disposing of their own waste on their own property is modified. It applies only if: (1) the waste is from their residential property; or (2) is rocks, soils trees, tree remains and other vegetative matter which normally results from land clearing operations; or (3) the environmental effects of the disposal on ground water and surface water are addressed in a permit, site certification or ground water monitoring plan approved by the Department.
Dept. of Environmental Regulation Chapter 17-701, "Solid Waste Management Facilities" January 6, 1993	<p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Downgradient well spacing no greater than 500 feet. Upgradient well spacing no greater than 1500 feet. • Specific leachate and surface water sampling added. • Monitoring parameters detailed including addition of EPA Method 601/602 parameters. • Added language for consistency with Federal Subtitle D requirements including detection wells and assessment monitoring with corrective action. <p><u>Closure Design:</u></p> <ul style="list-style-type: none"> • If a soil barrier layer is used, it must be 18 inches thick and covered by another 18 inches of soil. The soil barrier layer must have a minimum hydraulic conductivity of 1×10^{-5} cm/sec for Class III landfills or 1×10^{-7} cm/sec for Class I landfills. If a geomembrane is used, it must be covered by a 24-inch thick soil layer. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • 30 year long-term care period, per Subtitle D requirements. • Landfill to be monitored and maintained after closure in accordance with approved closure plan. • Language providing guidance for "construction on closed landfill" areas removed from the rule. Language on "use of closed landfill areas" remained in the rule.
Dept. of Environmental Regulation Chapter 17-701, "Solid Waste Management Facilities" January 2, 1994	<p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Added requirements for APPENDIX I and II analyses in accordance with Subtitle D requirements. <p><u>Closure Design:</u></p> <ul style="list-style-type: none"> • Added language for consistency with Federal Subtitle D requirements. This included requiring a geomembrane in the cap if it was also used in the bottom liner system (bathtub effect), and allowed for alternate closure designs if the applicant could show a substantially equivalent rate of storm water infiltration with the alternate design.
Dept. of Environmental Protection Chapter 62-701, "Solid Waste Management Facilities"	Current rule. No additional changes to closure requirements. Earlier, the chapter title was changed because of the DER/DNR merger to form DEP. The current rule also included the "rule reduction" exercise.

APPENDIX C

**Partial Summary of Construction and Demolition (C&D) Debris
Permit, Closure and Long-term Care Requirements**

PARTIAL SUMMARY OF CONSTRUCTION AND DEMOLITION (C&D) DEBRIS FACILITY PERMIT, CLOSURE AND LONG-TERM CARE REQUIREMENTS

(June 30, 2000)

AGENCY "CHAPTER TITLE"	GENERAL DESCRIPTION OF REQUIREMENTS
<p>Dept. of Environmental Regulation Chapter 17-7, "Resource Recovery and Management Part I: Solid Waste Facilities" May 25, 1979</p>	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • First time the definition of C&D Debris appears in the rule. • All C&D disposal sites are specifically exempted from permitting provided no public nuisance or conditions adversely affecting public health is caused and provided the activity does not violate other rules, laws or ordinances. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • None. <p><u>Closure Design:</u></p> <ul style="list-style-type: none"> • None. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • None.
<p>Dept. of Environmental Regulation Chapter 17-701, "Solid Waste Management Facilities" August 2, 1989</p>	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • General permits now required for off-site disposal of C&D debris, but on-site disposal is still exempt from permitting. • New C&D facilities have to comply by the effective date of rule. • Existing C&D facilities have to comply within 90 days of the effective date or ~November 2, 1989. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • None. <p><u>Closure Design (both on-site and off-site disposal areas):</u></p> <ul style="list-style-type: none"> • Final cover with a 24-inch thick soil layer required with upper six inches capable of supporting vegetation and graded to eliminate ponding, promote drainage and minimize erosion. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • None.
<p>Dept. of Environmental Protection Chapter 62-701, "Solid Waste Management Facilities" April 23, 1997</p>	<p><u>Permit:</u></p> <ul style="list-style-type: none"> • Regular permits now required for construction or operation (but not for closure) of an off-site C&D disposal facility. • General permits still allowed for off-site disposal of land clearing debris. • On-site disposal is still exempt from permitting provided the site is properly closed. <p><u>Ground Water Monitoring:</u></p> <ul style="list-style-type: none"> • Limited ground water monitoring required for off-site C&D disposal facilities but not for land clearing debris sites. • C&D disposal facilities required to have ground water monitoring plans in place by July 1, 1998. <p><u>Long-term Care:</u></p> <ul style="list-style-type: none"> • C&D disposal facilities to be maintained and monitored (ground water) for five years from the date of closing.

APPENDIX D

Reuse Target Levels

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Acenaphthene	83-32-9	1900	18000	2.1	0.7	0.7	21	-Liver
Acenaphthylene	208-96-8	1100	11000	27	0.7	0.7	270	-Body Weight -Liver
Acephate	30560-19-1	64	130	0.03	0.8	0.8	0.3	-Carcinogen -Neurological
Acetone	67-64-1	780	5500	2.8	6.8	6.8	28	-Kidney -Liver -Neurological
Acetonitrile	75-05-8	120	960	2	80	44	20	-Blood -Liver
Acetophenone	98-86-2	2700	24000	3.9	44	44	39	-None Specified
Acrolein	107-02-8	0.04	0.3	0.06	0.002	0.002	0.6	-Nasal
Acrylamide	79-06-1	0.1	0.3	0.004	0.02	0.02	0.04	-Carcinogen -Neurological
Acrylonitrile	107-13-1	0.3	0.5	0.004	0.2	0.2	0.04	-Carcinogen -Nasal -Reproductive
Alachlor	15972-60-8	12	36	0.02	0.006	0.006	0.2	-Blood -Carcinogen
Aldicarb [or Temik]	116-06-3	56	760	0.03	0.004	0.004	0.3	-Neurological
Aldrin	309-00-2	0.07	0.3	0.5	0.01	0.01	5	-Carcinogen -Liver
Allyl alcohol	107-18-6	62	460	1	0.02	0.02	10	-Kidney -Liver
Aluminum	7429-90-5	72000	*	***	***	***	***	-Body Weight
Aluminum phosphide	20859-73-8	31	730	***	***	***	***	-Body Weight
Ametryn	834-12-8	590	9300	0.8	0.08	0.08	8	-Liver
Ammonia	7664-41-7	550	3700	570	4	NA	5700	-Respiratory
Aniline	62-53-3	14	100	0.03	0.02	0.02	0.3	-Blood -Carcinogen
Anthracene	120-12-7	18000	260000	2500	0.7	0.7	25000	-None Specified
Antimony	7440-36-0	26	240	5	***	***	50	-Blood -Mortality
Arsenic	7440-38-2	0.8	3.7	29	***	***	290	-Carcinogen -Cardiovascular -Skin
Atrazine	1912-24-9	4	12	0.06	0.04	0.04	0.6	-Body Weight -Carcinogen
Azobenzene	103-33-3	8.2	24	0.4	0.06	0.06	4	-Carcinogen
Barium	7440-39-3	110**	87000	1600	***	***	16000	-Cardiovascular
Bayleton	43121-43-3	2000	29000	4.8	11	11	48	-Blood -Body Weight
Benomyl	17804-35-2	3600	64000	3.1	0.03	0.03	31	-Developmental
Bentazon	25057-89-0	1500	18000	1.2	NA	NA	12	-Blood
Benzaldehyde	100-52-7	2200	18000	4.8	0.4	0.4	48	-Gastrointestinal -Kidney
Benzene	71-43-2	1.1	1.6	0.007	0.5	0.5	0.07	-Carcinogen
Benzenethiol	108-98-5	0.1	1	0.3	NA	NA	3	-Liver
Benzo(a)anthracene	56-55-3	1.4	5	3.2	0.7	0.7	32	-Carcinogen
Benzo(a)pyrene	50-32-8	0.1	0.5	8	1.2	1.2	80	-Carcinogen
Benzo(b)fluoranthene	205-99-2	1.4	4.8	10	1.6	1.6	100	-Carcinogen
Benzo(g,h,i)perylene	191-24-2	2300	41000	32000	4.8	4.8	320000	-Neurological
Benzo(k)fluoranthene	207-08-9	15	52	25	1.6	1.6	250	-Carcinogen
Benzoic acid	65-85-0	150000	*	110	36	36	1100	-None Specified
Benzo(trichloride	98-08-7	0.04	0.07	0.003	0.0002	0.0002	0.03	-Carcinogen
Benzyl alcohol	100-51-6	23000	610000	9.5	2.3	2.3	95	-Gastrointestinal
Benzyl chloride	100-44-7	0.8	1.2	0.006	0.03	0.03	0.06	-Carcinogen

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Beryllium	7440-41-7	120	800	63	***	***	630	-Carcinogen -Gastrointestinal -Respiratory
Bidrin [or Dicrotophos]	141-66-2	5.5	67	0.005	0.1	0.1	0.05	-Developmental
Biphenyl, 1,1- [or Diphenyl]	92-52-4	2300	26000	0.2	5.8	5.8	2	-Kidney
Bis(2-chloroethyl)ether	111-44-4	0.3	0.4	0.02	0.05	0.05	0.2	-Carcinogen
Bis(2-chloroisopropyl)ether	108-60-1	4.4	7.3	0.07	0.003	0.003	0.7	-Blood -Carcinogen
Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7	76	280	3600	12	12	36000	-Carcinogen -Liver
Bisphenol A	80-05-7	3300	51000	11	1.7	1.7	110	-Body Weight
Boron	7440-42-8	7000	160000	***	NA	NA	***	-Reproductive -Respiratory
Bromacil	314-40-9	5700	72000	0.6	0.6	0.6	6	-Body Weight
Bromochloromethane	74-97-5	57	390	0.6	NA	NA	6	-None Specified
Bromodichloromethane	75-27-4	1.4	2	0.004	0.1	0.1	0.04	-Carcinogen -Kidney
Bromoforn	75-25-2	48	84	0.03	2.7	2.7	0.3	-Carcinogen -Liver
Bromomethane [or Methyl bromide]	74-83-9	2.2	15	0.05	0.2	0.2	0.5	-Gastrointestinal
Butanol, 1-	71-36-3	1300	10000	3	110	110	30	-Neurological
Butanone, 2- [or MEK]	78-93-3	3100	21000	17	490	490	170	-Developmental
Butyl benzyl phthalate, n-	85-68-7	15000	320000	310	56	56	3100	-Liver
Butylate	2008-41-5	2100	22000	5.2	0.2	0.2	52	-Liver
Butylphthalyl butylglycolate	85-70-1	74000	*	4200	NA	NA	42000	-None Specified
Cadmium	7440-43-9	75**	1300	8	***	***	80	-Carcinogen -Kidney
Calcium cyanide	592-01-8	3100	73000	***	NA	NA	***	-Body Weight -Neurological -Thyroid
Captan	133-06-2	190	410	3.6	0.03	0.03	36	-Body Weight -Carcinogen
Carbaryl [or Sevin]	63-25-2	6800	120000	8.7	0.0007	0.0007	87	-Kidney -Liver
Carbazole	86-74-8	53	190	0.6	6.5	6.5	6	-Carcinogen
Carbofuran	1563-66-2	58	430	0.2	0.0006	0.0006	2	-Neurological -Reproductive
Carbon disulfide	75-15-0	200	1400	5.6	0.8	0.8	56	-Developmental -Neurological
Carbon tetrachloride	56-23-5	0.4	0.6	0.04	0.06	0.06	0.4	-Carcinogen -Liver
Carbophenothion [or Trithion]	786-19-6	9.8	180	13	1.5	1.5	130	-Neurological
Chlordane	57-74-9	3.1	12	9.6	0.003	0.003	96	-Carcinogen -Liver
Chlorine	7782-50-5	7800	200000	***	***	***	***	-Body Weight
Chlorine cyanide [or Cyanogen chloride]	506-77-4	910	7200	71	0.3	0.3	710	-Body Weight -Neurological -Thyroid
Chloro-1,3-butadiene [or Chloroprene]	126-99-8	2.6	17	1.5	NA	NA	15	-Body Weight -Hair Loss -Nasal
Chloroacetic acid	79-11-8	87	920	0.07	NA	NA	0.7	-Cardiovascular
Chloroaniline, 4-	106-47-8	190	2000	0.2	0.02	0.02	2	-Spleen
Chlorobenzene	108-90-7	30	200	1.3	0.2	0.2	13	-Liver
Chlorobenzilate	510-15-6	3.9	14	0.08	0.07	0.07	0.8	-Body Weight -Carcinogen
Chloroform	67-66-3	0.4	0.5	0.03	2.8	2.8	0.3	-Carcinogen -Liver
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	59-50-7	410	4400	0.4	0.6	0.6	4	-Body Weight
Chloromethane	74-87-3	1.7	2.3	0.01	2.3	2.3	0.1	-Carcinogen

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Chloronaphthalene, beta-	91-58-7	4000	49000	260	NA	NA	2600	-Liver -Respiratory
Chloronitrobenzene, p-	100-00-5	28	55	3.7	1.6	1.6	37	-Carcinogen
Chlorophenol, 2-	95-57-8	82	640	0.7	2.5	2.5	7	-Reproductive
Chlorophenol, 3-	108-43-0	280	3400	0.2	3.1	3.1	2	-None Specified
Chlorophenol, 4-	106-48-9	220	2400	0.04	1.2	1.2	0.4	-None Specified
Chlorothalonil [or Bravo]	1897-45-6	88	280	0.2	0.06	0.06	2	-Carcinogen -Kidney
Chlorotoluene, o-	95-49-8	120	850	2.8	7.7	7.7	28	-Body Weight
Chlorotoluene, p-	106-43-4	100	730	2.5	NA	NA	25	-None Specified
Chlorpropylam	101-21-3	13000	200000	51	7	7	510	-Bone Marrow -Kidney -Liver -Spleen
Chlorpyrifos	2921-88-2	220	4200	15	0.001	0.001	150	-Neurological
Chromium (hexavalent)	18540-29-9	210	420	38	***	***	380	-Carcinogen -Respiratory
Chrysene	218-01-9	140	450	77	0.7	0.7	770	-Carcinogen
Cobalt	7440-48-4	4700	110000	***	NA	NA	***	-Cardiovascular -Immunological -Neurological -Reproductive
Copper	7440-50-8	110**	76000	***	***	***	***	-Gastrointestinal
Coumaphos	56-72-4	18	300	0.3	0.0007	0.0007	3	-Neurological
Crotonaldehyde	123-73-9	0.07	0.1	17	NA	NA	170	-Carcinogen
Cumene [or Isopropyl benzene]	98-82-8	160	1100	0.2	56	56	2	-Adrenals -Kidney
Cyanide (potassium salt)	57-12-5	30**	39000	40	***	***	400	-Body Weight -Neurological -Thyroid
Cyanogen	460-19-5	340	2500	2000	NA	NA	20000	-None Specified
Cycloate	1134-23-2	240	2600	0.7	2.5	2.5	7	-Neurological
Cyclohexanone	108-94-1	68000	510000	150	110	110	1500	-Body Weight
Cypermethrin	52315-07-8	750	14000	70	0.005	0.005	700	-Gastrointestinal
DDD, 4,4'-	72-54-8	4.6	18	4	0.1	0.1	40	-Carcinogen
DDE, 4,4'-	72-55-9	3.3	13	18	0.1	0.1	180	-Carcinogen
DDT, 4,4'-	50-29-3	3.3	13	11	0.06	0.06	110	-Carcinogen -Liver
Diallate	2303-16-4	17	56	0.6	NA	NA	6	-Carcinogen
Diazinon	333-41-5	55	760	0.02	0.00005	0.00005	0.2	-Neurological
Dibenz(a,h)anthracene	53-70-3	0.1	0.5	30	4.7	4.7	300	-Carcinogen
Dibenzofuran	132-64-9	280	5000	15	36	36	150	-None Specified
Dibromo-3-chloropropane, 1,2- [or DBCP]	96-12-8	0.8	2.7	0.001	NA	NA	0.01	-Carcinogen -Reproductive
Dibromochloromethane	124-48-1	1.4	2.1	0.003	0.2	0.2	0.03	-Carcinogen -Liver
Dibromoethane, 1,2- [or EDB]	106-93-4	0.01	0.04	0.0001	0.07	0.07	0.001	-Carcinogen -Reproductive
Dicamba	1918-00-9	1800	24000	2.6	2.4	2.4	26	-Developmental
Dichloroacetic acid	79-43-6	200	2300	0.2	8.1	8.1	2	-None Specified
Dichloroacetone	3018-12-0	170	1400	0.03	NA	NA	0.3	-None Specified
Dichlorobenzene, 1,2-	95-50-1	650	4600	17	2.8	2.8	170	-Body Weight
Dichlorobenzene, 1,3-	541-73-1	27	180	0.3	2.8	2.8	3	-None Specified
Dichlorobenzene, 1,4-	106-46-7	6	9	2.2	2.9	2.9	22	-Carcinogen -Liver

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Dichlorobenzidine, 3,3'-	91-94-1	2.1	6.3	0.4	0.002	0.002	4	-Carcinogen
Dichlorodifluoromethane	75-71-8	56	370	44	NA	NA	440	-Body Weight -Liver
Dichloroethane, 1,1-	75-34-3	290	2000	0.4	NA	NA	4	-Kidney
Dichloroethane, 1,2- [or EDC]	107-06-2	0.5	0.7	0.01	0.02	0.02	0.1	-Carcinogen
Dichloroethene, 1,1-	75-35-4	0.09	0.1	0.06	0.03	0.03	0.6	-Carcinogen -Liver
Dichloroethene, cis-1,2-	156-59-2	19	130	0.4	NA	NA	4	-Blood
Dichloroethene, trans-1,2-	156-60-5	31	210	0.7	75	75	7	-Blood -Liver
Dichlorophenol, 2,3-	576-24-9	180	2500	0.2	1.2	1.2	2	-None Specified
Dichlorophenol, 2,4-	120-83-2	130	1300	0.005	0.1	0.1	0.05	-Immunological
Dichlorophenol, 2,5-	583-78-8	200	3000	0.5	4.3	4.3	5	-None Specified
Dichlorophenol, 2,6-	87-65-0	170	2200	0.1	2.5	2.5	1	-None Specified
Dichlorophenol, 3,4-	95-77-2	200	3100	0.03	3.9	3.9	0.3	-None Specified
Dichlorophenoxy acetic acid, 2,4-	94-75-7	670	11000	0.7	0.9	0.9	7	-Kidney -Liver
Dichloropropane, 1,2-	78-87-5	0.6	0.8	0.03	15	15	0.3	-Carcinogen -Nasal
Dichloropropene, 1,3-	542-75-6	0.2	0.2	0.001	0.09	0.09	0.01	-Carcinogen -Kidney -Nasal
Dichloroprop	120-36-5	270	3300	0.3	0.3	0.3	3	-None Specified
Dichlorvos	62-73-7	0.2	0.3	0.0005	0.0002	0.0002	0.005	-Carcinogen -Neurological
Dicofol [or Kelthane]	115-32-2	2.3	7.6	0.05	0.0004	0.0004	0.5	-Adrenals -Carcinogen
Dieldrin	60-57-1	0.07	0.3	0.004	0.0001	0.0001	0.04	-Carcinogen -Liver
Diethylphthalate	84-66-2	54000	920000	86	5.9	5.9	860	-Body Weight
Dimethoate	60-51-5	8.4	86	0.0004	0.0004	0.0004	0.004	-Neurological
Dimethrin	70-38-2	19000	270000	2500	1.3	1.3	25000	-Liver
Dimethylformamide, N,N-	68-12-2	1100	7800	3	210	210	30	-Gastrointestinal -Liver
Dimethylphenol, 2,4-	105-67-9	910	9800	1.7	3.2	3.2	17	-Blood -Neurological
Dimethylphthalate	131-11-3	590000	*	380	7.8	7.8	3800	-Kidney
Di-n-butylphthalate	84-74-2	7300	140000	47	1.5	1.5	470	-Mortality
Dinitrobenzene, 1,2- (o)	528-29-0	13	130	1	0.2	0.2	10	-Spleen
Dinitrobenzene, 1,3- (m)	99-65-0	3.5	33	0.04	0.4	0.4	0.4	-Spleen
Dinitrophenol, 2,4-	51-28-5	66	620	0.06	0.01	0.01	0.6	-Eye
Dinitrotoluene, 2,4-	121-14-2	1.3	3.7	0.0008	0.07	0.07	0.008	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	606-20-2	1	2.1	0.0007	0.03	0.03	0.007	-Blood -Carcinogen -Kidney -Mortality -Neurological
Di-n-octylphthalate	117-84-0	1500	27000	480000	NA	NA	4800000	-Kidney -Liver
Dinoseb	88-85-7	55	740	0.03	0.03	0.03	0.3	-Developmental
Dioxane, 1,4-	123-91-1	12	18	0.02	1	1	0.2	-Carcinogen
Dioxin [or 2,3,7,8-TCDD]	1746-01-6	0.000007	0.00003	0.003	0.000001	0.000001	0.03	-Carcinogen
Diphenamid	957-51-7	1800	25000	2.6	20	20	26	-Liver
Diphenylhydrazine, 1,2-	122-66-7	1.2	3.7	0.4	0.01	0.01	4	-Carcinogen
Disulfoton	298-04-4	2.9	56	0.1	0.1	0.1	1	-Neurological
Diuron	330-54-1	130	2000	0.3	0.2	0.2	3	-Blood
Endosulfan	115-29-7	410	6700	3.8	0.005	0.0008	38	-Body Weight -Cardiovascular -Kidney

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Endothall	145-73-3	780	7800	0.4	0.4	0.4	4	-Gastrointestinal
Endrin	72-20-8	21	340	1	0.001	0.001	10	-Liver
Epichlorohydrin	106-89-8	11	74	0.03	2.4	2.4	0.3	-Carcinogen -Kidney -Nasal
Ethion	563-12-2	38	780	1.7	0.003	0.003	17	-Neurological
Ethoprop	13194-48-4	5.5	69	0.005	0.002	0.002	0.05	-Neurological
Ethoxyethanol, 2-	110-80-5	8100	65000	120	NA	NA	1200	-Body Weight -Reproductive
Ethyl acetate	141-78-6	5500	39000	26	26	26	260	-Body Weight -Mortality
Ethyl acrylate	140-88-5	1.6	2.2	25	0.6	0.6	250	-Carcinogen
Ethyl chloride [or Chloroethane]	75-00-3	2.9	4	0.06	NA	NA	0.6	-Carcinogen -Developmental
Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	1100	13000	11	15	15	110	-Cardiovascular
Ethyl ether	60-29-7	150	1000	5	850	850	50	-Body Weight
Ethyl methacrylate	97-63-2	380	2600	3.5	NA	NA	35	-Kidney
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	0.7	15	0.04	0.003	0.003	0.4	-Neurological
Ethylbenzene	100-41-4	1100	8400	0.6	12	12	6	-Developmental -Kidney -Liver
Ethylene diamine	107-15-3	610	5500	40	3.2	3.2	400	-Blood -Cardiovascular
Ethylene glycol	107-21-1	24000	180000	56	65	65	560	-Kidney
Ethylene oxide	75-21-8	0.3	0.4	0.05	20	20	0.5	-Carcinogen
Fenamiphos	22224-92-6	15	210	0.02	0.003	0.003	0.2	-Neurological
Fensulfotion	115-90-2	14	180	0.01	0.004	0.004	0.1	-Neurological
Fluometuron	2164-17-2	750	9700	0.9	1.8	1.8	9	-None Specified
Fluoranthene	206-44-0	2900	48000	1200	1.3	1.3	12000	-Blood -Kidney -Liver
Fluorene	86-73-7	2200	28000	160	17	17	1600	-Blood
Fluoride	7782-41-4	500**	120000	***	***	***	***	-Teeth
Fonofos	944-22-9	120	1800	0.4	0.003	0.003	4	-Liver -Neurological
Formaldehyde	50-00-0	21	29	2.4	0.4	0.4	24	-Body Weight -Carcinogen -Gastrointestinal
Furfural	98-01-1	160	2000	1	2.7	2.7	10	-Liver -Nasal
Guthion [or Azinphos, methyl]	86-50-0	110	2000	0.2	0.0002	0.0002	2	-Neurological
Heptachlor	76-44-8	0.2	0.9	23	0.1	0.1	230	-Carcinogen -Liver
Heptachlor epoxide	1024-57-3	0.1	0.4	0.6	0.006	0.006	6	-Carcinogen -Liver
Hexachloro-1,3-butadiene	87-68-3	6.3	12	1.1	110	110	11	-Carcinogen -Kidney
Hexachlorobenzene	118-74-1	0.5	1.1	2.2	0.0008	0.0008	22	-Carcinogen -Liver
Hexachlorocyclohexane, alpha-	319-84-6	0.2	0.5	0.0003	0.0006	0.0006	0.003	-Carcinogen
Hexachlorocyclohexane, beta-	319-85-7	0.6	2.1	0.001	0.003	0.003	0.01	-Carcinogen
Hexachlorocyclohexane, delta-	319-86-8	22	420	0.2	NA	NA	2	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	58-89-9	0.7	2.2	0.009	0.003	0.003	0.09	-Carcinogen -Kidney -Liver
Hexachlorocyclopentadiene	77-47-4	2.4	16	400	24	24	4000	-Gastrointestinal
Hexachloroethane	67-72-1	34	78	0.2	0.08	0.08	2	-Carcinogen -Kidney

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential (mg/kg)	Direct Exposure Industrial (mg/kg)	Leachability Based on Groundwater Criteria (mg/kg)	Leachability Based on Freshwater Surface Water Criteria (mg/kg)	Leachability Based on Marine Surface Water Criteria (mg/kg)	Leachability Based on Groundwater Yield/Poor Quality (mg/kg)	Target Organ/System or Effect
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	6.7	16	0.007	1.3	1.3	0.07	-Carcinogen -Reproductive
Hexane, n-	110-54-3	500	3600	3.5	1200	1200	35	-Neurological
Hexanone, 2- [or Methyl butyl ketone]	591-78-6	5.1	34	1.4	NA	NA	14	-None Specified
Hexazinone	51235-04-2	1600	18000	1.1	5	5	11	-Body Weight
Hydroquinone	123-31-9	1800	19000	1.4	0.02	0.02	14	-Blood
Indeno(1,2,3-cd)pyrene	193-39-5	1.5	5.3	28	4.3	4.3	280	-Carcinogen
Iron	7439-89-6	23000	480000	***	***	***	***	-Blood -Gastrointestinal
Isobutyl alcohol	78-83-1	4100	31000	8.9	200	200	89	-Neurological
Isophorone	78-59-1	340	580	0.2	3.8	3.8	2	-Carcinogen
Lead	7439-92-1	400	920	***	***	***	***	-Neurological
Linuron	330-55-2	130	2000	0.04	1.4	1.4	0.4	-Blood
Lithium	7439-93-32	1600	40000	***	NA	NA	***	-None Specified
Malathion	121-75-5	350	20000	4.2	0.003	0.003	42	-Neurological
Maneb	12427-38-2	350	5500	6.3	0.5	0.5	63	-Thyroid
Manganese	7439-96-5	1600	22000	***	NA	NA	***	-Neurological
Mercury	7439-97-6	3.4	26	2.1	0.01	0.01	21	-Neurological
Mercury, methyl	22967-92-6	0.8	5.4	0.002	NA	NA	0.02	-Body Weight -Neurological
Merphos	150-50-5	2.2	41	0.5	NA	NA	5	-Liver
Methacrylonitrile	126-98-7	0.8	5.4	0.02	NA	NA	0.2	-Neurological
Methamidophos	10265-92-6	1.9	19	0.02	0	0	200	-Liver -Neurological
Methanol	67-56-1	5800	43000	20	180	180	200	-Liver -Neurological
Methidathion	950-37-8	47	530	0.003	0.0001	0.0001	0.03	-Liver
Methomyl	16752-77-5	22	150	1.2	0.007	0.007	12	-Kidney -Spleen
Methoxy-5-nitroaniline, 2-	99-59-2	17	41	0.4	NA	NA	4	-Carcinogen
Methoxychlor	72-43-5	370	7500	160	0.1	0.1	1600	-Developmental -Reproductive
Methyl acetate	79-20-9	4100	28000	26	NA	NA	260	-Liver
Methyl acrylate	96-33-3	99	680	0.9	NA	NA	9	-None Specified
Methyl isobutyl ketone [or MIBK]	108-10-1	220	1500	2.6	110	110	26	-Kidney -Liver
Methyl methacrylate	80-62-6	1400	9400	0.1	32	32	1	-Nasal
Methyl parathion [or Parathion, methyl]	298-00-0	18	310	0.06	0.0003	0.0003	0.6	-Blood -Neurological
Methyl tert-butyl ether [or MTBE]	1634-04-4	3200	22000	0.2	150	150	2	-Eye -Kidney -Liver
Methyl-4-chlorophenoxy acetic acid, 2-	94-74-6	30	440	0.02	0.4	0.4	0.2	-Kidney -Liver
Methylaniline, 2-	95-53-4	1.8	3.3	0.3	0.2	0.2	3	-Carcinogen
Methylene bis(2-chloroaniline), 4,4-	101-14-4	6.4	17	0.2	NA	NA	2	-Carcinogen -Liver -Bladder
Methylene bromide	74-95-3	58	400	0.3	NA	NA	3	-Blood
Methylene chloride	75-09-2	16	23	0.02	7.3	7.3	0.2	-Carcinogen -Liver
Methylnaphthalene, 1-	90-12-0	68	470	2.2	10	10	22	-Body Weight -Nasal
Methylnaphthalene, 2-	91-57-6	80	560	6.1	9.1	9.1	61	-Body Weight -Nasal
Methylphenol, 2- [or o-Cresol]	95-48-7	2400	28000	0.3	1.9	1.9	3	-Body Weight -Neurological

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Methylphenol, 3- [or m-Cresol]	108-39-4	2500	29000	0.3	3.3	3.3	3	-Body Weight -Neurological
Methylphenol, 4- [or p-Cresol]	106-44-5	250	3000	0.03	0.5	0.5	0.3	-Maternal Death -Neurological -Respiratory
Metolachlor	51218-45-2	9100	120000	1.2	0.01	0.01	12	-Body Weight
Metribuzin	21087-64-9	32	210	2.2	0.8	0.8	22	-Body Weight -Kidney -Liver -Mortality
Mevinphos	7786-34-7	16	240	0.01	0.0003	0.0003	0.1	-Neurological
Molinate	2212-67-1	100	1200	0.1	0.1	0.1	1	-Reproductive
Molybdenum	7439-98-7	390	9700	***	NA	NA	***	-Gout
Naled	300-76-5	130	2100	0.1	0.0002	0.0002	1	-Neurological
Naphthalene	91-20-3	40	270	1.7	2.2	2.2	17	-Body Weight -Nasal
Nickel	7440-02-0	110**	28000	1.30	***	***	1300	-Body Weight
Nitrate	14797-55-8	120000	*	***	***	***	***	-Blood
Nitrite	14797-65-0	7800	180000	***	***	***	***	-Blood
Nitroaniline, o-	88-74-4	5.7	66	0.3	NA	NA	3	-Blood
Nitroaniline, p-	100-01-6	5.2	56	0.1	5.9	5.9	1	-None Specified
Nitrobenzene	98-95-3	14	120	0.03	0.6	0.6	0.3	-Adrenals -Blood -Kidney -Liver
Nitrophenol, 4-	100-02-7	390	4400	0.3	0.3	0.3	3	-None Specified
Nitroso-di-ethylamine, N-	55-18-5	0.003	0.005	0.02	0.0007	0.0007	0.2	-Carcinogen
Nitroso-dimethylamine, N-	62-75-9	0.009	0.02	0.008	0.002	0.002	0.08	-Carcinogen
Nitroso-di-n-butylamine, N-	924-16-3	0.05	0.07	0.05	0.002	0.002	0.5	-Carcinogen
Nitroso-di-n-propylamine, N-	621-64-7	0.09	0.2	0.04	0.008	0.008	0.4	-Carcinogen
Nitroso-diphenylamine, N-	86-30-6	170	440	0.4	2.5	2.5	4	-Carcinogen
Nitroso-N-methylethylamine, N-	10595-95-6	0.01	0.02	0.03	0.005	0.005	0.3	-Carcinogen
Nitrotoluene, m-	99-08-1	210	1800	2.4	3.6	3.6	24	-Spleen
Nitrotoluene, o-	88-72-2	280	2500	3.3	7.3	7.3	33	-Spleen
Nitrotoluene, p-	99-99-0	640	9700	3.3	7.3	7.3	33	-Spleen
Octamethylphosphoramide	152-16-9	83	860	4	NA	NA	40	-Neurological
Oxamyl	23135-22-0	1100	12000	0.9	0.04	0.04	9	-Body Weight
Paraquat	1910-42-5	310	4000	160	230	230	1600	-Respiratory
Parathion	56-38-2	450	9100	10	0.01	0.01	100	-Neurological
PCBs [Aroclor mixture]	1336-36-3	0.5	2.1	17	0.002	0.002	170	-Carcinogen -Immunological
Pebulate	1114-71-2	1600	15000	8.5	7.4	7.4	85	-Blood
Pendimethalin	40487-42-1	2500	36000	28	1	1	280	-Liver
Pentachlorobenzene	608-93-5	27	250	3.9	1.2	1.2	39	-Kidney -Liver
Pentachloronitrobenzene	82-68-8	3	7.7	0.7	0.06	0.06	7	-Carcinogen -Liver
Pentachlorophenol	87-86-5	7.7	23	0.03	0.2	0.2	0.3	-Carcinogen -Kidney -Liver
Permethrin	52645-53-1	3700	67000	880	0.003	0.003	8800	-Liver
Phenanthrene	85-01-8	2000	30000	250	0.7	0.7	2500	-Kidney
Phenol	108-95-2	900**	390000	0.05	0.03	0.03	0.5	-Developmental
Phenylenediamine, p-	106-50-3	8000	83000	6.2	NA	NA	62	-Whole Body
Phenylphenol, 2-	90-43-7	460	1300	0.4	0.8	0.8	4	-Carcinogen

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Phorate	298-02-2	14	280	0.3	0.001	0.001	3	-Neurological
Phosmet	732-11-6	1400	21000	5	0.004	0.004	50	-Body Weight -Liver -Neurological
Phthalic anhydride	85-44-9	8300	57000	76	NA	NA	760	-Kidney -Nasal -Respiratory
Prometon	1610-18-0	980	14000	2.4	14	14	24	-None Specified
Promethyn	7287-19-6	260	3900	0.7	0.5	0.5	7	-Bone Marrow -Kidney -Liver
Propachlor	1918-16-7	770	10000	1.1	0.1	0.1	11	-Body Weight -Liver
Propanil	709-98-8	300	4100	0.4	0.2	0.2	4	-Spleen
Propazine	139-40-2	1200	17000	0.2	2.7	2.7	2	-Body Weight
Propylene glycol	57-55-6	710000	*	560	140	140	5600	-Blood -Bone Marrow
Propylene oxide	75-56-9	3.2	8.1	22	NA	NA	220	-Carcinogen -Nasal -Respiratory
Pyridin [or Fenvalerate]	51630-58-1	1800	32000	700	0.0001	0.0001	7000	-Neurological
Pyrene	129-00-0	2200	37000	880	1.3	1.3	8800	-Kidney
Pyridine	110-86-1	13	95	0.03	5.4	5.4	0.3	-Liver
Resmethrin	10453-86-8	2200	39000	1200	0.01	0.01	12000	-Reproductive
Ronnel	299-84-3	3600	59000	1300	0.2	0.2	13000	-Liver
Selenium	7782-49-2	390	10000	5	***	***	50	-Hair Loss -Neurological -Skin
Silver	7440-22-4	390	9100	17	***	***	170	-Skin
Simazine	122-34-9	7.4	21	0.08	0.1	0.1	0.8	-Blood -Body Weight -Carcinogen
Stromitum	7440-24-6	47000	*	***	NA	NA	***	-Bone
Strychnine	57-24-9	17	210	0.7	0.3	0.3	7	-Mortality
Styrene	100-42-5	2700	21000	3.6	16	16	36	-Blood -Liver -Neurological
Terbacil	5902-51-2	660	7700	0.5	14	14	5	-Liver -Thyroid
Terbufos	13071-79-9	1.4	17	0.02	0.001	0.001	0.2	-Neurological
Tetrachlorobenzene, 1,2,4,5-	95-94-3	6.3	51	0.5	0.5	0.5	5	-Kidney
Tetrachloroethane, 1,1,1,2-	630-20-6	4	5.7	0.01	NA	NA	0.1	-Carcinogen -Kidney -Liver
Tetrachloroethane, 1,1,2,2-	79-34-5	0.7	1.1	0.002	0.08	0.08	0.02	-Carcinogen
Tetrachloroethene [or PCE]	127-18-4	8.9	17	0.03	0.1	0.1	0.3	-Body Weight -Carcinogen -Liver
Tetrachlorophenol, 2,3,4,6-	58-90-2	1500	17000	3.2	0.07	0.07	32	-Liver
Tetraethyl dithiopyrophosphate	3689-24-5	31	420	0.1	0.0004	0.0004	1	-Bone Marrow -Neurological
Thiram	137-26-8	330	4900	1.1	0.005	0.005	11	-Neurological
Tin	7440-31-5	44000	660000	***	NA	NA	***	-Kidney -Liver
Toluene	108-88-3	380	2600	0.5	5.6	5.6	5	-Kidney -Liver -Neurological
Toluidine, p-	106-49-0	1.4	2.2	0.7	NA	NA	7	-Carcinogen
Toxaphene	8001-35-2	1	3.7	31	0.002	0.002	310	-Carcinogen -Developmental
Triallate	2303-17-5	740	9500	8.4	6	6	84	-Liver -Spleen
Tributyltin oxide	56-35-9	22	400	36	0.2	0.2	360	-Immunological
Trichloro-1,2,2-trifluoroethane, 1,1,2-[or CFC 113]	76-13-1	13000	88000	27000	NA	NA	270000	-Body Weight -Neurological
Trichloroacetic acid	76-03-9	480	4600	1.2	400	400	12	-None Specified
Trichlorobenzene, 1,2,3-	87-61-6	560	7400	4.6	5.6	5.6	46	-Adrenals -Body Weight

APPENDIX D – REUSE TARGET LEVELS

Contaminant Name	CAS#	Direct Exposure Residential	Direct Exposure Industrial	Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater Yield/Poor Quality	Target Organ/System or Effect
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Trichlorobenzene, 1,2,4-	120-82-1	560	7500	5.3	1.7	1.7	53	-Adrenals -Body Weight
Trichlorobenzene, 1,3,5-	108-70-3	190	1800	16	NA	NA	160	-None Specified
Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6	400	3300	1.9	2.6	2.6	19	-None Specified
Trichloroethane, 1,1,2-	79-00-5	1.3	1.8	0.03	0.2	0.2	0.3	-Carcinogen -Liver
Trichloroethene [or TCE]	79-01-6	6	8.5	0.03	0.9	0.9	0.3	-Carcinogen
Trichlorofluoromethane	75-69-4	200	1300	33	NA	NA	330	-Cardiovascular -Kidney -Mortality -Respiratory
Trichlorophenol, 2,4,5-	95-95-4	6000	82000	0.3	1.5	1.5	3	-Kidney -Liver
Trichlorophenol, 2,4,6-	88-06-2	72	180	0.06	0.1	0.1	0.6	-Carcinogen
Trichlorophenoxy acetic acid, 2,4,5-	93-76-5	590	8300	0.4	0.8	0.8	4	-Kidney
Trichlorophenoxy propionic acid [or Silvex]	93-72-1	590	12000	5.4	NA	NA	54	-Liver
Trichloropropane, 1,2,3-	96-18-4	0.01	0.02	0.001	0.002	0.002	0.01	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Trifluralin	1582-09-8	94	220	3.5	0.6	0.6	35	-Blood -Carcinogen -Liver
Trimethyl phosphate	512-56-1	15	30	0.2	NA	NA	2	-Carcinogen
Trimethylbenzene, 1,2,3-	526-73-8	13	89	0.3	NA	NA	3	-None Specified
Trimethylbenzene, 1,2,4-	95-63-6	13	88	0.3	7.2	7.2	3	-None Specified
Trimethylbenzene, 1,3,5-	108-67-8	11	74	0.3	6.7	6.7	3	-None Specified
Trinitrobenzene, 1,3,5-	99-35-4	1300	14000	1	0.09	0.09	10	-Blood -Spleen
Trinitrotoluene, 2,4,6-	118-96-7	24	55	0.06	0.3	0.3	0.6	-Carcinogen -Liver
TRPH	NOCAS#	340	2500	340	340	340	3400	-Multiple Endpoints Mixed Contaminants
Uranium, natural	7440-61-1	120	470	***	NA	NA	***	-None Specified
Vanadium	7440-62-2	15**	7400	980	NA	NA	9800	-None Specified
Vernam	1929-77-7	29	260	0.1	0.2	0.2	1	-Body Weight
Vinyl acetate	108-05-4	230	1600	0.4	3	3	4	-Body Weight -Kidney -Nasal
Vinyl chloride	75-01-4	0.03	0.04	0.007	NA	NA	0.07	-Carcinogen
Xylenes, total	1330-20-7	5900	40000	0.2	3.9	3.9	2	-Body Weight -Mortality -Neurological
Zinc	7440-66-6	23000	560000	6000	***	***	60000	-Blood
Zinc phosphide	1314-84-7	23	550	***	NA	NA	***	-Body Weight
Zineb	12122-67-7	3400	53000	19	0.7	0.7	190	-Thyroid

APPENDIX E

Preliminary Contamination Assessment Actions

PRELIMINARY CONTAMINATION ASSESSMENT ACTIONS

1. Within 20 days of entry to this Order, Respondent shall submit to the Department documents certifying that the organization(s) and laboratory(s) performing the sampling and analysis have a DEPARTMENT APPROVED Comprehensive Quality Assurance Plan (Comp QAP) in which they are approved for the sampling and analysis intended to be used for the assessment of the site. The documentation shall, at a minimum, contain the TITLE PAGE and TABLE OF CONTENTS of the approved Comp QAP meeting the requirements of Rule 62-160, F.A.C. If the organization(s) or laboratory(s) performing the sampling and analysis change at any time during the assessment, documentation of their DEPARTMENT APPROVED Comp QAP will be required. If at any time sampling and analysis are to be conducted which are not in the Approved Comp QAP, documentation of amendments and approvals pursuant to Rule 62-160.210, F.A.C., shall be required.

2. Within 30 days of the effective date of the Order incorporating these Preliminary Contamination Assessment Actions, Respondent shall submit a Preliminary Contamination Assessment Plan ("PCAP") to the Department. Applicable portions of the PCAP shall be signed and sealed by an appropriate professional. The PCAP shall describe the tasks that Respondent proposes to perform in order to determine whether the soil, sediment, surface water or ground water are contaminated at Respondent's facility; and, if so, whether such contamination has resulted in a violation of the water quality standards and minimum criteria established in Florida Administrative Code Chapter 62-520 and 62-302 or constitutes a risk to the public health, the environment or the public welfare. The PCAP shall include a time schedule for each task so that all tasks can be completed and a Preliminary Contamination Assessment Report ("PCAR") can be submitted to the Department within 90 days of approval of the PCAP by the Department.

3. The PCAP shall include provisions for the installation and sampling of, in most cases, a minimum of four monitor wells to determine the groundwater quality and flow direction at the site. Proposal of fewer wells or an alternate well configuration is subject to Department approval. Provision to sample surface waters, sediments and soils shall be included as necessary.

A. One of the wells shall be located in the area suspected of greatest contamination and two wells shall be located downgradient of the area suspected of highest contamination.

B. One of the wells shall be an unaffected background well.

C. The wells, surface waters, sediments and soils, as applicable, shall be sampled and analyzed for the following parameters with the listed method;

(1) priority pollutant metals using DEP approved Methods;

- (2) priority pollutant organic chemicals using EPA methods 624/8240 and 625/8250 or 8270;
- (3) all non-priority pollutant organic chemicals with peaks greater than 10 micrograms per liter (ug/l) using EPA methods 624/8240 and 625/8250 or 8270;
- (4) pesticides and herbicides using EPA methods 8080, 8140, 8150 or 625/8250 or 8270, if applicable, or other Department approved methods for pesticides and herbicides for which the listed methods are not applicable; and
- (5) others, as applicable.

Proposal of alternate analytical methods is subject to Department approval. The number of contaminants to be analyzed may be reduced if Respondent can demonstrate to the Department's satisfaction that the contaminants proposed to be deleted from the list cannot be attributed to any activities that have taken place at Respondent's facility. The Department shall submit written notification to the Respondent if the number can be reduced.

4. The PCAP shall include provisions for investigation of the following conditions, as applicable, at the contamination site and the area surrounding the contamination site:

- A. The presence and thickness of any free product at the site;
- B. The presence of soil contamination at the site;
- C. The aquifers present beneath the site and their Chapter 62-502, F.A.C, groundwater classification;
- D. The number and locations of all public and private potable supply wells within a 1/2 mile radius of the site;
- E. The presence of surface waters of the State within a 1/2 mile radius of the site and, if applicable, their Rule 62-302, F.A.C., classification; and
- F. The geology and hydrogeology of the site focusing on aquifers and confining units which are present, the potential for movement of contaminants both horizontally and vertically, zones that are likely to be affected, and actual and potential uses of the groundwater as a resource.

5. The PCAP shall contain the following site specific information;

- A. Proposed well construction details including methods and materials, well installation depths and screened intervals and well development procedures;
- B. A description of methods and equipment to be used to quantify soil and sediment contamination;
- C. A description of water sampling methods, including names of sampling personnel, procedures and equipment;
- D. Name of laboratory to be used for analytical work;
- E. The parameters to be analyzed for, the analytical methods to be used and the detection limits of these analytical methods;
- F. Site map depicting monitoring well locations and other proposed sampling sites and justification for their selection; and
- G. A detailed site history including: a description of past and present property and/or facility owners; a description of past and present operations including those which involve the storage, use, processing or manufacture of materials which may be potential pollution sources; a description of all products used or manufactured and of all by-products and wastes (including waste constituents) generated during the life of the facility; a summary of

current and past environmental permits and enforcement actions; a summary of known spills or releases of materials which may be potential pollution sources; and an inventory of potential pollution sources within 0.25 (one quarter) mile.

6. The Department shall review the PCAP and provide Respondent with a written response to the proposal. In the event that additional information is necessary for the Department to evaluate the PCAP, the Department shall make a written request to Respondent for the information and Respondent shall provide the requested information within 20 days from receipt of said request. The PCAP shall incorporate all required modifications to the PCAP identified by the Department. Any action taken by Respondent with regard to the implementation of the PCAP prior to the Respondent receiving written notification from the Department that the PCAP has been approved shall be at Respondent's risk.

7. Within (60) days of the Department's approval of the PCAP (unless a written time extension is granted by the Department), Respondent shall submit a written Preliminary Contamination Assessment Report ("PCAR") to the Department. Applicable portions of the PCAR shall be signed and sealed by an appropriate professional. The PCAR shall:

- A. Summarize and analyze all "PCAP" tasks;
- B. Include, but not be limited to, the following tables and figures:
 - (1) A table with well construction details, top of casing elevation, depth to water measurements, and water elevations;
 - (2) A site map showing water elevations, water table contours and the groundwater flow direction for each aquifer monitored for each sampling period;
 - (3) A table with water quality information for all monitor wells;
 - (4) Site maps showing contaminant concentrations and contours of the contaminants; and
 - (5) Cross sections depicting the geology of the site at least to the top of the confining unit. In general there should be at least one north to south cross section and one east to west cross section.
- C. Include copies of field notes pertaining to field procedures, particularly of data collection procedures; and
- D. Specify results and conclusions regarding the objectives of the Preliminary Contamination Assessment;
- E. Provide the following quality assurance data along with the analytical data from all media;
 - (1) dates of sample collection, sample preparation including extraction and sample analysis;
 - (2) the detection limits for these analyses;
 - (3) the results from the analyses of field quality control samples; including field equipments, trip blanks and duplicates;
 - (4) the results from reagent water blanks run on that day (5% of samples run, minimum);
 - (5) the spike and surrogate percent recoveries for the data set;
 - (6) the actual chromatograms, if requested by the Department.

(7) any other QA/QC information Department deems necessary to evaluate validity of the submitted data.

F. Identify, to the extent possible, the source(s), extent, and concentrations of contaminants, and the existence of any imminent hazards.

8. The Department shall review the PCAR and determine whether it is adequate to meet the objectives of the PCAP. In the event that additional information is necessary to evaluate the PCAR, the Department shall make a written request and Respondent shall provide all requested information within 20 days of receipt of said request.

9. Respondent shall provide notification to the Department at least twenty (20) days prior to the installation or sampling of any monitoring wells, and shall allow Department personnel the opportunity to observe installation and sampling and to take split samples. All necessary approvals must be obtained from the appropriate water management district before any wells are installed. Raw data shall be exchanged between Respondent and the Department as soon as the data is available.

10. The Respondent is required to comply with all local, state and federal regulations and to obtain any necessary approvals from local, state and federal authorities in carrying out these assessment actions.

11. If the Department's review of the PCAR indicates that the soil, sediments, surface water or ground water is contaminated, or constitutes a risk to the public health, the environment or the public welfare, or if the Department rejects the PCAP or PCAR for not meeting the objectives of analyzing or reporting on the analysis of the contaminants that are the subject of the assessment, the Department reserves the right to do any or all of the following:

A. Seek further administrative relief through the filing of a Notice of Violation or entry of a Consent Order which requires Respondent to conduct further assessment and clean-up at its facility;

B. File suit for injunctive relief, civil penalties, damages and expenses; or

C. Perform the necessary corrective actions at Respondent's facility and recover the costs of such actions from Respondent.

12. If the Department's review of the PCAR indicates that the site is not contaminated and does not constitute a risk to the public health, the environment or the public welfare, the Department will so notify the Respondent in writing.

APPENDIX F

Corrective Actions for Contaminated Site Cases

CORRECTIVE ACTIONS FOR CONTAMINATION SITE CASES

[Note: The "Corrective Actions for Contamination Site Cases" is to be used for sites where contamination of the groundwater, surface water, soils or sediments is known or documented by data or where the probability of finding such contamination is so high that implementation of the Preliminary Contamination Assessment Actions is an unnecessary action.]

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Part 1 Quality Assurance Certification

[Note: The purpose of Quality Assurance is to ensure that the data will be reliable, accurate and defensible. It includes confirmation that the selected consultant and lab are capable of doing the work, that appropriate analytical methods with appropriate detection limits are selected, and that sampling equipment/procedures do not alter the sample properties.]

1. Within 30 days of the effective date of the Order, the Respondent shall submit to the Department documents certifying that the organization(s) and laboratory(s) performing the sampling and analysis have a Department-approved Comprehensive Quality Assurance Plan (Comp QAP) in which each is approved for the sampling and analysis activities each will perform as part of the assessment and corrective actions at the site. The documentation shall, at a minimum, contain either the most recent TITLE PAGE (signed by the FDEP QA Officer) and TABLE OF CONTENTS of the Department-approved CompQAP (if the CompQAP is a 15-section document) or the most current CompQAP letter of approval signed by the FDEP QA Officer. All identified organizations and laboratories must follow the protocols outlined in their respective CompQAP(s) in order for the data to be reliable. At this time, the FDEP QA Officer will issue a letter which summarizes the activities each organization is qualified to perform. These activities must be consistent with the activities proposed in the IRAP, CAP, MOP, pilot tests/bench tests and RAP.

A. If at any time sampling and/or analysis activities are anticipated which are not in the Department-approved CompQAP, and the Respondent wishes to maintain the services of the affected organization(s), the organization(s) shall submit amendments to add the capabilities to the CompQAP(s). Such amendments shall be approved before the proposed activity(s) may

be conducted. The letter approving such amendments, and signed by the FDEP QA Officer, shall be submitted to the Department.

B. If the organization(s) or laboratory(s) performing the sampling and analysis change at any time during the assessment and corrective actions, documentation of their Department-approved CompQAP (as outlined in 1. above) shall be required.

C. If the approval of the CompQAP for a specified organization expires during the course of the investigation or corrective actions, the Respondent shall discontinue using the organization until 1) the organization obtains CompQAP approval or 2) another organization with a Department approved CompQAP is selected and documentation outlined in 1. above is submitted.

D. The Department reserves the right to reject any results generated by the Respondent if any organization performs an activity that is not specifically approved in its CompQAP, if there is reasonable doubt as to the quality of the data or method used, if the sampling and analysis were not performed in accordance with the approved CompQAPs or if the CompQAP of any organization expires.

Part 2 Interim Remedial Actions

[Note: The Interim Remedial Action can include the removal of grossly contaminated soil, free product, or sources of contamination (drums, impoundments, tanks, etc.). It may also include specific well head treatment such as granulated activated carbon filters placed on affected private wells.]

2. If at any time the Department determines or the Respondent proposes that an Interim Remedial Action (IRA) is appropriate to achieve the objectives set forth below, the Respondent shall submit to the Department a detailed written Interim Remedial Action Plan (IRAP). The IRAP shall be submitted within sixty (60) days following Department determination that an IRA is appropriate. Applicable portions of the IRAP shall be signed and sealed by the appropriate professional. The objectives of the IRA shall be to remove specific known contaminant source(s), and/or provide temporary controls to prevent or minimize contaminant migration or protect human health. The IRA shall not spread contaminants into uncontaminated or less contaminated areas through untreated or undertreated discharges or improper treatment. The IRAP may include the following, as appropriate:

A. Rationale for the IRA and the cleanup criteria proposed, incorporating engineering and hydrogeological considerations including, as applicable, technical feasibility, long-term and short-term environmental effects, implementability (including any permits or approvals from federal, state, and local agencies), and reliability;

B. Design and construction details and specifications for IRA;

C. Operational details of the IRA including the disposition of any effluent, expected contaminant concentrations in the effluent, an effluent sampling schedule if treated ground water is being discharged to ground water, surface water, or to the ground; and the expected concentrations and approximate quantities of any contaminants discharged into the air as a result of remedial action;

D. Operation and maintenance plan for the IRA including, but not necessarily limited to daily, weekly, and monthly operations under routine conditions; a contingency plan for nonroutine conditions;

E. Details of the treatment or disposition of any contaminated soils or sediments;

F. Proposed methodology including post-IRA soil, sediment, surface water, and ground water monitoring, as applicable, to confirm the effectiveness of the interim remedial action; and

G. Schedule for the completion of the IRA;

3. The Department shall review the proposed IRAP and provide Respondent with a written response to the proposal. Any action taken by the Respondent with regard to the implementation of the IRAP before the IRAP has been approved shall be at Respondent's risk and Paragraph 44 applies.

4. In the event that additional information is necessary for the Department to evaluate the IRAP, or if the IRAP does not adequately address the objectives set forth in Paragraph 2, the Department will make a written request to Respondent for the information, and Respondent shall provide all requested revisions in writing to the Department within thirty (30) days from receipt of said request. If the requested information requires additional time for a response, the Respondent shall submit in writing to the Department within thirty (30) days of the Department's request, a reasonable schedule for completing the work needed to provide the requested information.

5. If the Department determines upon review of the resubmitted IRAP that the IRAP adequately addresses the objectives set forth in paragraph 2, then the Department shall approve the IRAP. If the Department determines that the IRAP still does not adequately address the objectives of the IRAP, the Department may choose one of the options listed in Paragraph 43.

6. Once an IRAP has been approved by the Department, it shall become effective and made a part of the Order and shall be initiated within thirty (30) days from receipt of the Department's notification to the Respondent that the IRAP has been approved. The approved IRAP shall incorporate all required modifications to the IRAP identified by the Department. All reporting and notification requirements spelled out in Part 6 shall be complied with during the IRAP implementation.

Part 3 Contamination Assessment and Risk Assessment

[Note: A Contamination Assessment Plan (CAP) is required for all sites where contamination of the groundwater, surface water, soils or sediments is known or documented or highly probable. The CAP proposes work to generate the information needed to clean up the contamination. This information includes establishment of the source areas, specific chemicals present, lateral and vertical extent, and contaminant migration. The details of the contamination from completed assessment must be known before cost effective and

environmentally safe remediation can be performed. A meeting prior to CAP development is encouraged especially for organizations having no prior experience with Florida rules and statutes to discuss the CAP objectives and Department expectations in detail.]

7. Within sixty (60) days of the effective date of the Order incorporating these contamination assessment actions, Respondent shall submit to the Department a detailed written Contamination Assessment Plan (CAP). Applicable portions of the CAP shall be signed and sealed by an appropriate professional. If the Respondent has previously conducted a Preliminary Contamination Assessment, the Respondent shall submit to the Department a detailed written CAP within sixty (60) days of receipt of notice from the Department that a CAP is required. The purpose of the CAP shall be to propose methods for collection of information necessary to meet the objectives of the Contamination Assessment.

A. The objectives of the Contamination Assessment shall be to:

- (1) Establish the horizontal and vertical extent of soil, sediment, surface water and ground water contamination;
- (2) Determine or confirm the contaminant source(s); mechanisms of contaminant transport; rate and direction of contaminant movement in the air, soils, surface water and ground water; and rate and direction of ground water flow;
- (3) Provide a complete characterization, both onsite and offsite, of any and all contaminated media;
- (4) Determine the amount of product lost, and the time period over which it was lost (if applicable);
- (5) If leaking storage tanks may be the source of the contamination, determine the structural integrity of all aboveground and underground storage systems (including integral piping) which exist at the site (if applicable);
- (6) Establish the vertical and horizontal extent of free product (if applicable);
- (7) Describe pertinent geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones;
- (8) Describe geologic and hydrogeologic characteristics of the site which influence migration and transport of contaminants; and
- (9) Provide a site history as specified in Paragraph 7.C. (1).

B. The CAP shall specify the tasks necessary to achieve the applicable objectives described in Paragraph 7.A. above. The tasks may include, but are not limited to, the following:

- (1) Use of piezometers or wells to determine the horizontal and vertical directions of the ground water flow;
- (2) Use of Electromagnetic Conductivity (EM) and other geophysical methods or vapor analyzers to trace extent of ground water contamination;
- (3) Use of fracture trace analysis to discover linear zones in which discrete flow could take place;
- (4) Use of permanent monitoring wells to sample ground water in affected areas and to determine the vertical and horizontal extent of the ground water plume;

- (5) Sampling of public and private wells;
- (6) Sampling of surface water and sediments;
- (7) Sampling of air for airborne contaminants;
- (8) Analysis of soils, drum and tank residues, or any other media for hazardous waste determination and contaminant characterization;
- (9) Use of organic vapor analyzers or geophysical equipment such as magnetometers, ground penetrating radar, or metal detectors to detect tanks, lines, etc.;
- (10) Determination of the horizontal and vertical extent of soil and sediment contamination;
- (11) Use of soil and well borings to determine pertinent site-specific geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones such as aquifers, confining beds, and unsaturated zones;
- (12) Use of geophysical methods, aquifer pump tests and representative slug tests to determine geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones; and
- (13) As a mandatory task, preparation and submittal of a written Contamination Assessment Report ("CAR") to the Department.

C. The CAP shall provide a detailed technical approach and description of proposed methodologies describing how proposed tasks are to be carried out. The CAP shall include, as applicable, the following information:

- (1) A detailed site history including: a description of past and present property and/or facility owners; a description of past and present operations including those which involve the storage, use, processing or manufacture of materials which may be potential pollution sources; a description of all products used or manufactured and of all by-products and wastes (including waste constituents) generated during the life of the facility; a summary of current and past environmental permits and enforcement actions; a summary of known spills or releases of materials which may be potential pollution sources; and an inventory of potential pollution sources within 0.25 (one quarter) mile;
- (2) Details of any previous site investigations including results of any preliminary ground water flow evaluation and/or stratigraphy investigation. If no reliable information exists, consider following a phased approach or conducting a limited pre-CAP investigation to determine groundwater flow direction and stratigraphy.
- (3) Proposed sampling locations and rationale for their placement;
- (4) A description of methods and equipment to be used to identify and quantify soil or sediment contamination, including dry bulk density, soil porosity, soil moisture and total organic carbon (for site specific leachability cleanup goals);
- (5) A description of water and air sampling methods;
- (6) Parameters to be analyzed for, analytical methods to be used, and detection limits of these methods with justification for their selection;
- (7) Proposed piezometer and well construction details including methods and materials, well installation depths and screened intervals, well development procedures;
- (8) A description of methods proposed to determine aquifer properties (e.g., aquifer pump tests, representative slug tests, permeability tests, computer modeling);

- (9) A description of geophysical methods proposed for the project;
- (10) Details of any other assessment methodology including innovative assessment technologies proposed for the site;
- (11) A description of any survey to identify and sample public or private wells which are or may be affected by the contaminant plume; Surveys should include Water Management District, local and county health department files, utility companies and detailed door-to-door reconnaissance for a minimum distance of a quarter mile.
- (12) A description of the regional geology and hydrogeology of the area surrounding the site;
- (13) A description of site features (both natural and man-made) pertinent to the assessment;
- (14) A description of methods and equipment to be used to determine the site specific geology and hydrogeology; and
- (15) Details of how drill cuttings, development and purge water from installation of monitoring wells will be collected, managed and disposed of.
- (16) Tables which summarize the proposed samples, analyses, and method detection limits for each medium compared to state standards/criteria or generic cleanup goals. Include the appropriate number and type of quality assurance samples.
- (17) Provide information regarding state listed endangered and threatened flora and fauna species within and near the site.
- (18) Provide a reasonable time schedule for completing each task, preparing the CAR and submitting the CAR.

8. The Department shall review the CAP and provide the Respondent with written responses to the plan and the quality assurance certification status of Part 1. Any action taken by the Respondent with regard to the implementation of the CAP prior to the Respondent receiving written notification from the Department that the CAP has been approved shall be at Respondent's risk and Paragraph 44 applies.

9. In the event that additional information is necessary for the Department to evaluate the CAP, or if the CAP does not adequately address the CAP objectives set forth in Paragraph 7.A, the Department will make a written request to the Respondent for the information. The Respondent shall provide all requested revisions in writing to the Department within thirty (30) days from receipt of said request. If the requested information requires additional time for a response, the Respondent shall submit a written reasonable schedule for completing the work needed to provide the requested information.

10. If the Department determines upon review of the resubmitted CAP that the CAP adequately addresses the objectives set forth in paragraph 7, then the Department shall approve the CAP. If the Department determines that the CAP still does not adequately address the objectives and/or requirements in Paragraph 7.A, the Department may choose one of the options listed in Paragraph 43.

11. Once a CAP has been approved by the Department, it shall become effective and made a part of the Order and shall be initiated within thirty (30) days of the Department's written notification to the Respondent that the CAP has been approved. The approved CAP shall incorporate all required modifications to the proposed CAP identified by the Department.

All reporting and notification requirements spelled out in Part 6 shall be complied with during the implementation of the CAP tasks.

[Note: The Contamination Assessment Report (CAR) compiles the results of the assessment, evaluates and draws conclusions from those results, and includes recommendations from the Respondent/Consultant regarding the next appropriate phase of work. A No Further Action (NFA) recommendation is appropriate for sites with no free product, no contaminated soil, and no groundwater contamination above standards or minimum criteria. A Monitoring Only Plan (MOP) applies to sites with minor violations of groundwater standards and criteria that do not extend offsite, will not migrate offsite, and the contaminants of concern are expected to attenuate via natural processes. A Remedial Action Plan (RAP) for contaminated soil may include a MOP for groundwater. The Department provides the target cleanup levels for most sites and requires a Risk Assessment only when toxicity data are not readily available to the Department. In most instances the Department will not approve the use of a Risk Assessment/Justification (RAJ) to develop alternative Site Rehabilitation levels (SRLs) for water if a standard exists or a numerical interpretation of the minimum criteria has been developed by the Department for the constituent for a particular class of water or in all waters. A Feasibility Study (FS) recommendation would be appropriate if detailed evaluation of cleanup technologies and remedial actions is needed. A RAP recommendation would be appropriate for sites where the remedial alternative(s) are obvious and include large volumes and/or extensive work.]

12. The Respondent shall submit a written Contamination Assessment Report (CAR) to the Department in accordance with the CAP schedule approved by the Department. Applicable portions of the CAR shall be signed and sealed by an appropriate professional. The CAR shall:

- A. Summarize all tasks which were implemented pursuant to the CAP;
- B. Provide the results, discussion and conclusions regarding the Contamination Assessment objectives outlined in Paragraph 7.A;
- C. Include, the following tables and figures as appropriate:
 - (1) A table with well construction details, top of casing elevation, depth to water measurements, and water elevations (The top of casing elevations should be referenced to the National Geodetic Vertical Datum (NGVD) of 1929 if at all possible.);
 - (2) A site map showing water elevations, water table contours and the groundwater flow direction for each aquifer monitored for each sampling period;
 - (3) A table with water quality information for all monitor wells and surface water sampling locations;
 - (4) Site maps showing contaminant concentrations and contours of the contaminants for all contaminated media;
 - (5) Cross sections depicting the geology of the site at least to the top of the first confining unit. In general there should be at least one north to south cross section and one east to west cross section;
 - (6) A table with soil and sediment quality information;

(7) A map showing the locations of all monitor wells, soil, surface water, and sediment samples; and

(8) If applicable, a map showing the locations of all potable wells located within a quarter mile of the site. A table with the names and addresses of private and public potable wells should be included.

D. Include copies of field notes pertaining to field procedures, particularly of data collection procedures; laboratory results to support data summary tables, and soil boring logs, well construction logs, and lithologic logs, and

E. Summarize conclusions regarding the CAP objectives and include a recommendation for either No Further Action (NFA), a Monitoring Only Plan (MOP), a Risk Assessment/Justification proposal (RAJ), a Feasibility Study (FS) or remedial actions requiring a Remedial Action Plan (RAP). If the recommendation is for a MOP (see Paragraphs 20 to 25) or a RAJ (see Paragraphs 17 to 19), the MOP or the RAJ proposal shall be attached to the CAR for review.

[Note: The following justification is optional and applies only to those sites with mitigating circumstances such as technology or engineering limitations, lithology limitations or documented natural attenuation.]

F. Justification for a "monitoring only" or "no further action" proposal if the results of the contamination assessment alone do not support a No Further Action or Monitoring Only Alternative. If the Respondent plans to develop alternative Site Rehabilitation Levels (SRLs) for the site, the proposal for a Risk Assessment/Justification (RAJ) shall be included in the CAR for review. In most instances the Department will not approve alternative SRLs for water if a standard exists or a numerical interpretation of the minimum criteria has been developed by the Department for the constituent for a particular class of water or in all waters. Factors to be evaluated shall be, at a minimum:

(1) The present and future uses of the affected aquifer and adjacent surface waters with particular consideration of the probability that the contamination is substantially affecting or will migrate to and substantially affect a public or private source of potable water or a viable wildlife habitat;

(2) Potential for further degradation of the affected aquifer or degradation of other connected aquifers;

(3) The technical feasibility of achieving the SRLs based on a review of reasonably available technology; and

(4) Individual site characteristics, including natural rehabilitative processes.

13. The Department shall review the CAR and determine whether it has adequately met the objectives specified in Paragraph 7.A. In the event that additional information is necessary for the Department to evaluate the CAR or if the CAR does not adequately address the CAP objectives set forth in Paragraph 7.A, the Department will make a written request to the Respondent for the information. The Respondent shall provide all requested revisions in writing to the Department within thirty (30) days from receipt of said request, unless the

requested information requires additional time for a response, in which case the Respondent shall submit in writing to the Department, within thirty (30) days of the Department's request, a reasonable schedule for completing the work needed to provide the requested information.

14. If the Department determines upon review of the CAR or the CAR Addendum that all of the CAP objectives and tasks have been satisfactorily completed and that the recommended next action proposed is reasonable and justified by the results of the contamination assessment, the Department will provide written approval of the CAR, MOP, or NFA as applicable to the Respondent. If the Department approves a "no further action" proposal, this approval shall terminate Respondent's actions under the Order unless previously unavailable information becomes known and connects other contamination to the site.

15. If the Department determines upon review of the CAR or the CAR Addendum that the CAR still does not adequately address the objectives in Paragraph 7.A, or that the next proposed action is not acceptable, the Department may choose one of the options listed in Paragraph 43.

[Note: The Department has the option to provide the Respondent with the cleanup target levels (SRLs) or to require the Respondent to develop the SRLs via a Risk Assessment. In most cases, the Department provides the cleanup target levels which saves time and eliminates a significant expense for the Respondent. The Department requires the Respondent to prepare a Risk Assessment only when toxicity data are not readily available to the Department.]

16. The Department, at its option, may establish from review of the CAR and other relevant information the Site Rehabilitation Levels (SRLs) to which the contamination shall be remediated or may require the Respondent to implement the risk assessment process to develop such SRLs for the site. The SRLs for ground water as determined by the Department shall be the Chapter 62-520, (which references Chapter 62-550) F.A.C. standards and the Department's numerical interpretation of the Rule 62-520.400, F.A.C. minimum criteria. The SRLs for surface waters shall be the standards specified in Chapter 62-302, F.A.C., the minimum criteria and the toxicity criteria per Rule 62-302.530(62) F.A.C. The Department, at its option, may define the SRLs for soils and sediments or may require the Respondent to complete a risk assessment to define SRLs for soils or sediments that are sufficiently contaminated to present a risk to the public health, the environment or the public welfare. The cleanup goals for soils will be risk based and if ground water contamination is present, may also be based on potential leachate generation. If the Department does choose to provide SRLs to the Respondent and does not choose to require a risk assessment and requires the Respondent to remediate the site to those SRLs, the Respondent shall implement the FS, if required by the Department as set forth in Paragraph 26, or submit the RAP as set forth in Paragraph 31. The Respondent may choose to develop site specific soil cleanup goals utilizing site specific parameters such as total organic carbon, soil porosity, soil moisture content, and dry bulk density in combination with Department acceptable exposure assumptions.

17. After Department approval of the CAR and the RAJ proposal, the Respondent shall prepare and submit a RAJ. . In most instances the Department will not approve the use of a RAJ to develop alternative SRLs for water if a standard exists or a numerical interpretation of the minimum criteria has been developed by the Department for the

constituent for a particular class of water or in all waters. The RAJ which includes a risk assessment and a detailed justification of any alternative SRLs or "monitoring only" or "no further action" proposals shall be submitted within ninety (90) days of the Department's written approval of the CAR and notice that a RAJ is required, or within ninety (90) days of the Department's written approval of the CAR and the RAJ recommendation. Unless otherwise approved by the Department, the subject document shall address the following task elements, divided into the following five major headings:

A. Exposure Assessment - The purpose of the Exposure Assessment is to identify routes by which receptors may be exposed to contaminants and to determine contaminant levels to which receptors may be exposed. The Exposure Assessment should:

- (1) Identify the contaminants found at the site and their concentrations as well as their extent and locations;
- (2) Identify possible transport pathways;
- (3) Identify actual and potential exposure routes;
- (4) Identify actual and potential receptors for each exposure route; and
- (5) Calculate expected contaminant levels to which actual or potential receptors may be exposed.

B. Toxicity Assessment - The purpose of the Toxicity Assessment is to define the applicable human health and environmental criteria for contaminants found at the site. The criteria should be defined for all potential exposure routes identified in the Exposure Assessment. DEP standards shall be the criteria for constituents and exposure routes to which the standards apply. Criteria for constituents and exposure routes for which specific DEP standards are not established shall be based upon criteria such as Carcinogenic Slope Factor (SF), Reference Doses (Rfds), organoleptic threshold levels, Ambient Water Quality Criteria for Protection of Human Health and for Protection of Aquatic Life, and other relevant criteria as applicable in combination with Department approved exposure assumptions. If there are no appropriate criteria available for the contaminants and exposure routes of concern, or the criteria are in an inappropriate format, the Respondent shall develop the criteria using Department approved equations and current scientific literature acceptable to toxicological experts. Criteria for the following exposure routes shall be defined or developed as applicable:

(1) Potable water exposure route - develop criteria for ingestion, dermal contact, and inhalation of vapors and mists, utilizing applicable health criteria such as SF, Rfds, organoleptic threshold levels, and other relevant criteria as applicable.

(2) Non-potable ground water and surface water usage exposure route - develop criteria for incidental ingestion, dermal contact, and inhalation of vapors and mists, such as through the ingestion of food crops irrigated with such water, lawn watering, ingestion by pets and livestock, and other related exposure.

(3) Soil exposure route - develop criteria for ingestion, dermal contact, inhalation, and ingestion by humans or animals of food crops grown in contaminated soils.

(4) Non-potable surface water and sediment exposure - develop criteria for prevention of adverse effects on human health (e.g. incidental ingestion and dermal contact effects on humans utilizing the resource for recreational purposes and ingesting fish, shellfish, etc.) or the environment (e.g. toxic effects of the contaminants on aquatic or marine biota,

bio-accumulative effects in the food chain, other adverse effects that may affect the designated use of the resource as well as the associated biota).

(5) Air exposure route - develop criteria for exposure to the contaminants.

C. Risk Characterization - The purpose of the Risk Characterization is to utilize the results of the Exposure Assessment and the Toxicity Assessment to characterize cumulative risks to the

affected population and the environment from contaminants found at the site. Based on contaminant levels presently found at the site, a risk and impact evaluation will be performed which considers, but is not limited to:

(1) Risks to human health and safety from the contamination including,
(a) carcinogenic risk (FDEP's acceptable risk level is $10E-6$.), and
(b) non-carcinogenic risk (FDEP considers a hazard index of one as acceptable).

(2) Effects on the public welfare of exposure to the contamination which may include but not be limited to soils and to adverse affects on actually and potentially used water resources; and

(3) Environmental risks in areas which are or will be ultimately affected by the contamination including,

(a) other aquifers,
(b) surface waters, including wetlands,
(c) sediments,
(d) sensitive wildlife habitats, and
(e) sensitive areas including, but not limited to, National Parks, National Wildlife Refuges, National Forests, State Parks, State Recreation Areas, State Preserves.

[Note: The following "justification" is not applicable to a Risk Assessment prepared to develop SRLs for the site where the toxicity data are not readily available to the Department. This justification is required for a Risk Assessment prepared to develop alternative SRLs.]

D. Justification for the alternative Site Rehabilitation Levels (SRLs) - The purpose of this section is to provide justification on a case-by-case basis for alternative SRLs at which remedial action shall be deemed completed. Factors to be evaluated shall be, at a minimum:

(1) The present and future uses of the affected aquifer and adjacent surface waters with particular consideration of the probability that the contamination is substantially affecting or will migrate to and substantially affect a public or private source of potable water;

(2) Potential for further degradation of the affected aquifer or degradation of other connected aquifers;

(3) The technical feasibility of achieving the SRLs based on a review of reasonably available technology;

(4) Individual site characteristics, including natural rehabilitative processes; and

(5) The results of the risk assessment.

18. The Department shall review the RAJ document and determine whether it has adequately addressed the risk assessment task elements and justification. In the event that additional information is necessary to evaluate any portion of the RAJ document, the Department shall make a written request and Respondent shall provide all requested information within twenty (20) days of receipt of said request.

19. The Department shall approve or disapprove the RAJ. If the Department does not approve the alternative SRLs, the Respondent shall use the SRLs as determined by the Department. The Respondent shall implement the Feasibility Study, if required by the Department as set forth in Paragraph 26, or submit the Remedial Action Plan (RAP) as set forth in Paragraph 31.

Part 4 Remedial Planning and Remedial Actions

[Note: The Monitoring Only Plan applies to sites with minor violations of the groundwater standards and minimum criteria, where groundwater contamination does not extend offsite, will not migrate offsite, and the contaminants of concern are expected to attenuate via natural processes.]

20. If at any time following assessment or ground water remediation, it is determined that a MOP is an acceptable alternative for the site, the Respondent shall submit a MOP to the Department either with the CAR or within sixty (60) days of receipt of written Department concurrence. Applicable portions of the MOP shall be signed and sealed by an appropriate professional. The MOP shall provide a technical approach and description of proposed monitoring methodologies. The MOP shall include, but may not be limited to, the following:

A. Environmental media for which monitoring is proposed, monitoring locations and rationale for the selection of each location, and proposed monitoring frequency;

B. Parameters to be analyzed, analytical methods to be used, and detection limits of these methods;

C. Methodology for evaluating contamination trends based on data obtained through the MOP and a proposed format including a time table for submittal of monitoring data and data analysis to the Department; and

D. A detailed contingency plan describing proposed actions to be taken if trends indicate that contaminant concentrations are increasing, ground water standards or criteria are exceeded for monitoring locations at which exceedances did not occur during the previous monitoring period, or monitoring data appear questionable.

21. The Department shall review the MOP, and provide the Respondent with a written response to the proposal. Any action taken by the Respondent with regard to the

implementation of the MOP before the MOP has been approved shall be at the Respondent's risk and Paragraph 44 shall apply.

22. In the event that additional information is necessary for the Department to evaluate the MOP or if the MOP does not adequately address the MOP requirements set forth in Paragraph 20, the Department will make a written request to the Respondent for the information. The Respondent shall provide all requested revisions in writing to the Department within thirty (30) days from receipt of said request, unless the requested information requires additional time for a response, in which case the Respondent shall submit in writing to the Department within 30 days of the Department's request, a reasonable schedule for completing the field work needed to provide the requested information.

23. If the Department determines upon review of the resubmitted MOP that the MOP still does not adequately address the requirements in Paragraph 20, the Department may choose one of the options listed in Paragraph 43.

24. Once a MOP has been approved by the Department, it shall become effective and made a part of the Order, and shall be initiated within thirty (30) days of the Department's written notification to the Respondent that the MOP has been approved. The approved MOP shall incorporate all required modifications to the MOP identified by the Department.

25. The Respondent shall submit the required monitoring data and data analysis products to the Department according to the time table in the approved MOP. If at any time trends are discovered by the Respondent that require any action proposed in the approved contingency plan, the Respondent shall notify the Department and initiate the Contingency Plan in a timely manner. Paragraph 43 applies to any exceptions to this paragraph.

[Note: The Department may require or the Respondent may request the option to prepare a Feasibility Study. It probably is not necessary except for very complex sites where multiple contaminant classes are present or multiple media are contaminated. It may be necessary where the Respondent recommends a cleanup technology that the Department thinks is unable to achieve an adequate remediation or it may be necessary where a previously implemented technology has failed on the site and a different technology needs to be evaluated for an alternative remedial action.]

26. The Department, at its option, shall also determine from review of the CAR and other relevant information whether the Respondent should prepare and submit a FS to the Department. The Respondent may request the option to prepare a FS. Applicable portions of the FS shall be signed and sealed by an appropriate professional. The FS may be required in complex cases to evaluate technologies and remedial alternatives, particularly if multiple contaminant classes are represented or multiple media are contaminated. The FS evaluates remedial technologies and remedial alternatives with the objective of identifying the most environmentally sound and effective remedial action to achieve clean up of the site to SRLs or alternative SRLs (if approved). The FS shall be completed and a report submitted within sixty (60) days of receipt of written notice that a FS is required or within the time frame approved by the Department, unless the Respondent has approval to submit a RAJ pursuant to Paragraphs 16 or 17. The FS shall include the following tasks:

A. Identify and review pertinent treatment, containment, removal and disposal technologies;
B. Screen technologies to determine the most appropriate technologies;
C. Review and select potential remedial alternatives using the following criteria:

(1) long and short term environmental effects;

(2) implementability;

(3) capital costs;

(4) operation and maintenance costs;

(5) operation and maintenance requirements;

(6) reliability;

(7) feasibility;

(8) time required to achieve clean-up; and

(9) potential legal barriers to implementation of any of the alternatives;

D. Identify the need for and conduct pilot tests or bench tests to evaluate alternatives, if necessary;

E. Select the most appropriate remedial alternative that meets the objective of the FS and the criteria under paragraph C; and

F. (If applicable and not previously addressed) Develop soil cleanup criteria such that any remaining contaminated soils will not cause groundwater contamination in excess of the SRLs or alternative SRLs referenced in paragraphs 16 or 17, 18 and 19 (if approved).

27. The FS Report shall:

A. Summarize all FS task results; and

B. Propose a conceptual remedial action plan based on the selection process carried out in the FS.

28. The Department shall review the FS Report for adequacy and shall determine whether the Department agrees with the proposed remedial action based upon the objective and the criteria specified under paragraph 26.C. In the event that additional information is necessary to evaluate the FS report, the Department shall make a written request and Respondent shall provide all requested information within thirty (30) days of receipt of said request.

29. If the Department does not approve of the proposed remedial action, the Department will notify the Respondent in writing of the determination. The Respondent shall then have forty-five (45) days from the Department's notification to resubmit a proposed alternate remedial action.

30. If the Department determines upon review of the resubmitted remedial action proposal that it does not agree with the proposal, the Department may choose one of the options listed in paragraph 43.

[Note: The Remedial Action Plan describes the activities to be performed to clean up media that are contaminated above safe levels for public health and the environment. Leachate generation from contaminated materials also needs to be evaluated to prevent continued groundwater and surface water impacts.]

31. Within sixty (60) days of receipt of written notice from the Department, Respondent shall submit to the Department a detailed RAP. Applicable portions of the RAP shall be signed and sealed by an appropriate professional. The objective of the remedial action shall be to achieve the clean up of the contaminated media to the SRLs or the approved alternative SRLs referenced in paragraphs 16 or 17, 18, and 19. The RAP shall summarize the CAR findings and conclusions and state the approved SRLs for all media. The RAP shall include as applicable:

A. Rationale for the remedial action proposed which shall include at a minimum:

(1) Results from any pilot studies or bench tests;
(2) Evaluation of results for the proposed remedial alternative based on the following criteria:

- a. long and short term environmental impacts;
- b. implementability, which may include, but not be limited to, ease of construction, site access, and necessity for permits;
- c. operation and maintenance requirements;
- d. estimates of reliability;
- e. feasibility; and
- f. estimates of costs.

(3) (If applicable and not previously addressed) Soil cleanup criteria such that any remaining contaminated soils will not cause groundwater contamination in excess of the SRLs or alternative SRLs referenced in paragraphs 16 or 17, 18, and 19.

B. Design and construction details and specifications for the remedial alternative selected;

C. Operational details of the remedial action including the disposition of any effluent, expected contaminant concentrations in the effluent, an effluent sampling schedule if treated ground water is being discharged to soils, to ground water or to surface waters, and the expected concentrations and approximate quantities of any contaminants which are reasonably expected to be discharged into the air as a result of remedial action;

D. Tables which summarize the proposed samples and analyses for each pertinent medium and include the appropriate number and type of quality assurance samples consistent with the requirements of Part 1;

E. Details of the treatment or disposition of any contaminated soils or sediments;

F. Proposed methodology including post remedial action soil sampling and ground water monitoring as applicable for evaluation of the site status after the remedial action is complete to verify accomplishment of the objective of the RAP; and

G. Schedule for the completion of the remedial action.

32. The Department shall review the proposed RAP and provide Respondent with a written response to the proposal. Any action taken by the Respondent with regard to the implementation of the RAP before the RAP has been approved shall be at Respondent's risk and Paragraph 44 shall apply.

33. In the event that additional information is necessary for the Department to evaluate the RAP, or if the RAP does not adequately address the objectives and requirements set forth in Paragraph 31, the Department will make a written request to the Respondent for the information. The Respondent shall provide all requested revisions in writing to the Department within forty five (45) days from receipt of said request, unless the requested information requires additional time for a response, in which case the Respondent shall submit in writing to the Department, within forty five (45) days of the Department's request, a reasonable schedule for completing the work needed to provide the requested information.

34. If the Department determines upon review of the resubmitted RAP that the RAP adequately addresses the objectives set forth in paragraph 31, then the Department shall approve the RAP. If the Department determines that the RAP still does not adequately address the requirements of the RAP, the Department may choose one of the options listed in Paragraph 43.

35. Once a RAP has been approved by the Department, it shall become effective and made a part of the Order and shall be initiated within thirty (30) days from receipt of the Department's notification to the Respondent that the RAP has been approved. The approved RAP shall incorporate all required modifications to the RAP identified by the Department. All reporting and notification requirements spelled out in Part 6 below shall be complied with during the implementation of the RAP tasks.

36. If at any time during RAP implementation, it becomes apparent that the selected remedial alternative or treatment technology will be unable to achieve the SRLs, the Respondent may conduct a FS pursuant to Paragraph 26 to evaluate other alternatives and technologies to improve site remediation.

Part 5 Termination of Remedial Actions

37. Following termination of remedial action (clean up of contaminated media to the approved SRLs), designated monitoring wells shall be sampled on a schedule approved by the Department.

38. Following completion of monitoring requirements pursuant to the approved MOP or of the remedial action and post-remedial action monitoring, the Respondent shall submit a Site Rehabilitation Completion Report (SRCR) to the Department for approval. The SRCR shall contain documentation that site cleanup objectives have been achieved. Applicable portions of the SRCR shall be signed and sealed by an appropriate professional.

39. Within sixty (60) days of receipt of the SRCR, the Department shall approve the SRCR or make a determination that the SRCR does not contain reasonable assurances that site clean-up objectives have been achieved. If the Department determines that the SRCR is not adequate based upon information provided, the Department will notify the Respondent in writing. Site rehabilitation activities shall not be deemed completed until such time as the Department provides the Respondent with written notice that the SRCR is approved.

Part 6 Progress Reporting and Notifications

40. On the first working day of each month, or on another schedule approved by the Department after initiating an IRAP, CAP or RAP, Respondent shall submit written progress reports to the Department. These progress reports shall evaluate progress, describe the status of each required IRAP, CAP and RAP task, and discuss any new data. The effectiveness of the IRAP and RAP shall be evaluated. The Progress Reports shall propose modifications and additional work as needed. The reports shall be submitted until planned tasks have been completed in accordance with the approved IRAP, CAP, or RAP. Each final report shall be signed and sealed by the appropriate professional. The final report shall include all data, manifests, and a detailed summary of the completed work.

41. The Respondent shall notify the Department at least ten days prior to installing monitoring or recovery wells, and shall allow Department personnel the opportunity to observe the location and installation of the wells. All necessary approvals must be obtained from the water management district before the Respondent installs the wells.

42. The Respondent shall notify the Department at least ten (10) days prior to any sampling, and shall allow Department personnel the opportunity to observe sampling or to take split samples. When the Department chooses to split samples, the raw data shall be exchanged between the Respondent and the Department as soon as the data are available.

Part 7 Conflict Resolution and Other Requirements

43. In the event that the Department determines a document to be inadequate or if there are disagreements, the Department, at its option, may choose to do any of the following:

A. Draft specific modifications to the document and notify the Respondent in writing that approval of the document is being granted contingent upon those modifications being incorporated into the document.

B. Resolve the issues through repeated correspondence, telephone discussions, and/or meetings.

C. Notify the Respondent that Respondent has failed to meet the stated objectives for the document, in which case the Department may do any or all of the following: take legal action to enforce compliance with the Order; file suit to recover damages and civil penalties; or complete the corrective actions outlined herein and recover the costs of completion from the Respondent.

44. The Respondent is required to comply with all applicable local, state and federal regulations and to obtain any necessary approvals/permits from local, state and federal authorities in carrying out these corrective actions.

45. The Respondent shall immediately notify the Department of any circumstances encountered by the Respondent which require modification of any task in the approved IRAP, CAP or RAP, and obtain Department approval prior to implementing any such modified tasks.

46. With regard to any agency action or determination made or taken by the Department under any of the provisions of this document "Corrective Actions for Contamination Site Cases", that portion of the Order containing dispute resolution procedures and remedies shall apply.