



CITY OF KALAMAZOO

PERFORMANCE STANDARDS

FOR

GROUNDWATER PROTECTION WITHIN

WELLHEAD PROTECTION CAPTURE ZONES

AND

STORMWATER QUALITY MANAGEMENT

PREPARED BY:
FISHBECK, THOMPSON, CARR & HUBER, INC.
AND THE CITY OF KALAMAZOO, MICHIGAN

MAY 2007

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	GROUNDWATER CONTAMINATION RISK ASSESSMENT.....	4
3.0	GENERAL SITE PLAN REVIEW STANDARDS.....	7
3.1	Site Design and Development or Redevelopment.....	7
3.1.1	Construction Activities.....	7
3.1.2	Soil Erosion and Sedimentation Control.....	7
3.1.3	Dewatering.....	8
3.1.4	Fill Material.....	8
3.1.5	Contaminated Sites.....	9
3.1.6	Parking Areas.....	9
3.1.7	Floor Drains and Dry Wells.....	10
3.1.8	Wells.....	10
3.1.9	Well Isolation Distance Requirements.....	11
3.1.10	Septic Systems.....	11
3.2	Process Activities.....	122
3.2.1	Regulated Substance Use Areas.....	122
3.2.2	Loading/Unloading Areas.....	12
3.2.3	Spill Response Equipment.....	13
3.2.4	Agricultural Uses.....	13
3.2.5	Vehicle Washing.....	13
3.2.6	Pressure Washing/Steam Cleaning.....	14
3.2.7	Cooling Water.....	155
3.2.8	Road Salt Storage.....	15
3.2.9	Material Substitution/Pollution Prevention.....	15
3.3	Regulated Substance Storage Units.....	15
3.3.1	General Provisions.....	166
3.3.2	Secondary Containment (for regulated substances other than fuel).....	17
3.3.3	ASTs.....	18
3.3.4	USTs.....	19
3.4	Fueling Establishments.....	19
3.4.1	Holding Tanks.....	20
3.4.2	Trucks, Trailers, Tankers, Rail Cars, and Tool Cribs.....	211
3.5	Waste.....	21
3.5.1	Solid Waste.....	21
3.5.2	Scrap Metal.....	21
3.5.3	Hazardous Wastes.....	21
3.5.4	Liquid Waste Ponds.....	22
3.6	References.....	22
4.0	LAND USE SPECIFIC SITE PLAN REVIEW STANDARDS.....	244
4.1	Bulk Mixing of Fertilizers and Pesticides.....	244
4.2	Dry Cleaning Facilities.....	255
4.3	Fueling Establishments.....	266
4.4	Furniture Stripping or Refinishing.....	277
4.5	Scrap and Salvage Operations.....	277
4.6	Motor Vehicle Repair/Service Shops and/or Body Repair.....	299
4.7	Plating and Anodizing.....	30
4.8	Trucking and Bus Terminals.....	311
4.9	References.....	322
5.0	STORMWATER QUALITY MANAGEMENT CRITERIA.....	333
5.1	Uniform Stormwater Standards.....	355
5.2	Stormwater Discharge Standards.....	377

TABLE OF CONTENTS

6.0	TREATMENT AND SPILL CONTAINMENT	40
6.1	Spill-Containment Cell	42
6.2	Water Quality Swales	43
6.3	Proprietary Stormwater Treatment Systems	45
7.0	NONCONFORMING LAND USES	48
7.1	Conformance with Standards	48
7.2	Spill Contingency Plan.....	48
7.2.1	Regulated Substance Inventory.....	48
7.2.2	Release Potential Analysis	49
7.2.3	Release Prevention Measures.....	49
7.2.4	Release Response Procedures	49
7.2.5	Use of Other Emergency Response Plans	50
8.0	POTENTIALLY APPLICABLE ENVIRONMENTAL REGULATIONS.....	51
8.1	Storage Tanks	51
8.1.1	ASTs	51
8.1.2	USTs	52
8.2	Material Storage	53
8.2.1	SPCC Plan.....	53
8.2.2	Michigan Part 5 Rules and PIPP	54
8.3	Wastes and Discharges.....	54
8.3.1	Liquid Industrial Waste.....	54
8.3.2	Hazardous Waste	55
8.3.3	Groundwater Discharge	57
8.3.4	Surface Water Discharge.....	57
8.3.5	Stormwater Discharge	57
9.0	CONTAMINATED PROPERTIES	59
9.1	Part 201	59
9.2	Part 213	60
9.2.1	Initial Response Actions.....	60
9.2.2	Classification System.....	61

LIST OF TABLES

Table 1	Zoning Risk Designations (Page 4)
Table 2	High-Risk Land-Use Activities that Pose Potential Threats to Groundwater (Page 5)
Table 3	Stormwater Discharge Summary (Page 38)
Table 4	Stormwater Treatment Strategy (Page 39)

LIST OF FIGURES

Figure 1	Wellhead Protection Zoning Overlay
Figure 2	Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Quality
Figure 3	Spill-Containment Cell
Figure 4	Water Quality Swale

LIST OF ATTACHMENTS

Attachment 1	Minimum Isolation Distances
Attachment 2	Spill Contingency Plan Template

1.0 INTRODUCTION

This document provides Performance Standards (Standards) for groundwater protection within Wellhead Protection Time-of-Travel (Capture Zones) and for stormwater quality management throughout the City of Kalamazoo (City), Michigan. The objectives of this document are to define technical standards for site development that facilities located within the Capture Zones are required to attain for drinking water source protection, and to protect surface water quality by establishing acceptable stormwater quality management strategies throughout the City. The Standards are designed to be consistent with the objectives of the Wellhead Protection Program and maintain compliance with the City's Phase II Stormwater National Pollutant Discharge Elimination System (NPDES) Permit Certificate of Coverage and the federally mandated Total Maximum Daily Load for phosphorus reduction within the Kalamazoo River Watershed.

These Standards were developed primarily for use of the Site Plan Review Committee and to supplement the City's Wellhead Protection Zoning Overlay Ordinance (Appendix A of the Kalamazoo Code of Ordinances, Chapter 3, Section 3.5) and the Stormwater System Ordinance (Chapter 29 of the City of Kalamazoo Code of Ordinances). The intent/purpose of the Wellhead Protection Zoning Overlay (WHP Overlay) Ordinance is to protect the groundwater supplies that serve as drinking water by defining noncompatible land uses within Capture Zones and to prevent their creation or establishment, including those that would prevent/limit the City's ability to obtain necessary well permits to replace or add new wells, and to minimize the risk to drinking water sources posed by both approved and non-conforming land uses by requiring compliance with the Standards established in this document. The objectives of the Stormwater System Ordinance are to provide environmental protection to surface waters, regulate discharges into the City's stormwater system, and provide the City with specific legal authority to find and eliminate illicit stormwater connections and discharges.

For the purposes of these Standards regarding Wellhead Protection, the City's Capture Zones have been divided into two groundwater contamination risk areas based on Time-of-Travel (Capture Zones) to a municipal well field: 1-Year Capture Zone = Area located within a 1-Year Capture Zone to a municipal wellfield; and 10-Year Capture Zone = Area located within a 10-Year, but outside the 1-Year, Capture Zone to a municipal wellfield.

In certain cases, more stringent standards have been developed for sites located closer to city wellheads. Consequently, proposed development of sites within the 1-Year Capture Zones is expected to implement greater controls than that within the 10-Year Capture Zones.

Section 5.0 “Stormwater Quality Management Criteria” also uses a 5-Year Capture Zone for purposes of stormwater discharge quality.

This document includes a variety of Best Management Practices (BMPs) related to groundwater and surface water protection. These BMPs were derived from a variety of sources, some of which are provided in this document. The BMPs used in this document are considered commonly-accepted practices associated with groundwater and/or surface water protection. Other commonly accepted BMPs are presented in the “BMP Guidebook for Michigan’s Watersheds,” Michigan Department of Environmental Quality (MDEQ), 1998.

Maps showing the Capture Zones are maintained by the Environmental Services Superintendent and the City Planner or their designee(s) and are available for viewing at the Department of Public Services, Environmental Services Division, 1415 North Harrison Street, and at the Community Development Center, 445 West Michigan Avenue. Figure 1 “Wellhead Protection Zoning Overlay Map” is the official map reference of the WHP Overlay and includes the 1-Year and 10-Year Time-of-Travel Capture Zones and 2,000-foot State of Michigan Well Permit Isolation Boundaries from existing wells. Figure 2 “Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Quality Management Reference Map” is the same as Figure 1, but also indicates the 5-Year Capture Zones.

The Standards are divided into seven sections, which follow this Introduction. Section 2.0 “Groundwater Contamination Risk Assessment” discusses what risk category to groundwater (i.e., higher or lower risk) the Zoning Districts and various land uses were designated. Also, supporting rationale for the designations is provided.

Section 3.0 “General Site Plan Review Standards” details standard practices expected of any site within the Capture Zones, particularly those sites in possession of regulated substances (defined in the WHP Overlay Ordinance).

Section 4.0 “Land-Use Specific Site Plan Review Standards” includes more specific standards for several particular higher-risk land uses that are prohibited in one or both of the Capture Zones.

Section 5.0 “Stormwater Quality Management Criteria” establishes technical standards that apply both inside and outside the Capture Zones for stormwater management. These standards are intended to address groundwater vulnerability and land-use risks; prevent or minimize pollutant loadings to ensure compliance with the City’s Stormwater NPDES Permit; and minimize potential adverse impacts to general surface water quality from stormwater runoff.

Section 6.0 “Treatment and Spill Containment” provides guidance regarding BMPs that can meet treatment requirements for stormwater quality, and provides required specifications, including spill containment cells and volumes, water quality swales, and proprietary systems.

Section 7.0 “Non-Conforming Land Uses” specifically addresses sites within the Capture Zones with existing non-conforming land uses pursuant to the WHP Overlay Ordinance, including the requirement for the implementation of BMPs and/or Spill Contingency Plans (SCPs) at those sites.

Section 8.0 “Potentially Applicable Environmental Regulations” details several state and federal environmental regulations to which facilities using, storing, or generating regulated substances are often subject. A summary of these regulations is provided for two reasons. First, sites regulated by one or more of the listed programs may be required to incorporate certain site features such as secondary containment to comply with the regulation. Second, a summary of regulations is included to identify existing applicability thresholds or exemptions, which may exclude certain sites from regulation by state and federal programs, despite the use of regulated substances.

Section 9.0 “Contaminated Properties” describes specific State of Michigan regulations, conditions, and considerations when addressing contaminated properties, including Part 201 (property owner and operator due care obligations) and Part 213 (underground storage tank [UST] releases, initial response actions, and release classification system).

2.0 GROUNDWATER CONTAMINATION RISK ASSESSMENT

Land-use zoning districts, as defined in the City's WHP Overlay Ordinance, are designated as either higher-risk or lower-risk for potential groundwater contamination, as shown in Table 1. Generally, higher-risk designations were assigned to zoning districts that allow land use activities that are either prohibited or restricted with conditions within Capture Zones. These zoning districts typically allow activities involving the storage and/or use of regulated substances.

Table 1
Zoning Risk Designations

<p style="text-align: center;"><u>Higher-Risk Zoning Districts</u></p> <p>Commercial, Mixed Use (CMU) Commercial, Neighborhood (CN-2) Commercial, Community (CC) Commercial, Central Business District (CCBD) Commercial, Business, Technology, and Research (CBTR) Manufacturing, Limited (M-1) Manufacturing, General (M-2) Public (P) Institutional Campus (IC)</p> <p style="text-align: center;"><u>Lower-Risk Zoning Districts</u></p> <p>Residential, Single-Dwelling (RS-4, RS-5, RS-7) Residential, Duplex (RD-8, RD-19) Residential, Multi-Dwelling (RM-15, RM-15C, RM-24, RM-36) Residential, Mobile Home Park (RMHP) Residential, Mixed Use (RMU) Commercial, Neighborhood Office (CNO) Commercial, (Local) Neighborhood (CN-1) Commercial, Office (CO)</p>

Next, land use activities were categorized as either higher-risk or lower-risk to groundwater after considering prohibitions and conditions within the WHP Overlay Ordinance and reviewing various documentation, including the "Guidance for Applications for State Wellhead Protection Assistance Funds Under the Safe Drinking Water Act" by the U. S. Environmental Protection Agency (EPA) Office of Groundwater Protection published in June 1987, the "Standard Industrial Classification" (SIC) code list, also published by the EPA, "Community Planning & Zoning for Groundwater Protection: A Guidebook for Local Officials" by Lillian Dean and Mark Wyckoff, 1991, and various ordinances and standards. Table 2 provides a list of high-risk land-use activities that pose potential threats to groundwater.

Table 2
High-Risk Land-Use Activities that Pose Potential Threats to Groundwater

Commercial
Analytical and clinical laboratories
Animal feedlots
Auto washes
Boat builders/refinishers
Car rental and service stations/automotive repair
Commercial establishments with fleets of trucks and cars
Concrete/asphalt/coal/tar companies
Drum recycling and cleaning
Dry cleaners and laundries
Equipment repair
Food processors/meat packers/slaughter houses
Fuel oil distributors/stores
Furniture stripping or refinishing
Gas stations
Junk and salvage yards
Motor vehicle repair/service shops
Pesticide application services/pesticide stores/retailers
Petroleum bulk storage (wholesale)
Photographic development
Printing
Salvage yards/impoundment lots
Truck or rail tanker cleaning
Wood preserving and treatment
Manufacturing
Chemical, paint, and plastics manufacturing
Furniture manufacturing
Metal manufacturing (including metal plating)
Mining operations/injection wells
Other manufacturing (textiles, rubber, glass, etc.)
Pulp and paper industry
Transportation
Airport maintenance/fueling areas
Governmental agencies with fleets of trucks and cars
Salt piles/sand-salt piles
Trucking/bus terminals
Vehicle maintenance operations (transportation/trucking, contractors/construction, auto dealers)
Utilities
Aboveground oil pipelines
Electric power generation substations
Waste Disposal
Landfills/dumps/transfer stations

Other higher-risk land-use activities are identified on the MDEQ document "Minimum Isolation Distances (From Contamination Sources and Buildings), Part 127, Act 368, P.A. 1978 And Act 399, P.A. 1976" (Attachment 1). This document specifies well isolation distances considered for the issuance of Type I well permits.

Generally, groundwater risk designations are used to help determine what land use Standards should be applied to protect groundwater as a condition for site plan approval. In addition, these Standards were designed for those land-use activities permitted within the 10-Year Capture Zones pursuant to the Wellhead Protection Capture Zones Ordinance that involve possession of a Regulated Substance exceeding 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

3.0 GENERAL SITE PLAN REVIEW STANDARDS

The site plan review Standards detailed in this section apply to those facilities within Capture Zones in the City. This section is divided into five subsections: Site Design and Development or Redevelopment, Process Activities, Regulated Substance Storage Units, Fueling Establishments, and Waste.

3.1 SITE DESIGN AND DEVELOPMENT OR REDEVELOPMENT

3.1.1 CONSTRUCTION ACTIVITIES

An appropriate material and equipment maintenance and storage area should be identified on the site plan. If construction equipment is to be temporarily stored in an open area:

- The storage site should not be located within the drip line of trees.
- The storage site should not be within 100 feet of a watercourse, wetland, or stormwater sewer inlet(s), unless approved by the City. Runoff should be diverted away from watercourses and wetlands.
- The construction site should be designed and operated to prevent excess solids from being discharged into wetlands and surface waters, whether directly or via a municipal stormwater collection system.
- Secondary containment is required for regulated substances stored in containers larger than typical household quantities during site construction activities. These substances include, but are not limited to, fuels, oils, and lubricants. All regulated substances must be stored in a manner that diminishes the possibility of a release to soils and groundwater.

3.1.2 SOIL EROSION AND SEDIMENTATION CONTROL

Refer to Chapter 30 of the Kalamazoo Code of Ordinances “Soil Erosion and Sedimentation Control” regarding requirements to control soil erosion and sedimentation with respect to earth change activities within the City. Proper provision for water disposal and protection of soil surfaces is required during and after construction in order to promote the safety, public health, and general welfare of the City, as well as to limit the exposed area of any disturbed land for the shortest possible period of time.

3.1.3 DEWATERING

If dewatering (the temporary discharge of groundwater associated with a construction project requiring the need to maintain below grade excavation free from surface or subsurface infiltration of water) is necessary, a dewatering plan must be submitted to and approved by both the City's Environmental Services Division for water quality issues and the Engineering Division for sanitary and storm sewer capacity and condition issues. Conditional approval from the Director of Public Services must be obtained prior to discharge. The plan will include items such as a map detailing pertinent dewatering activities, the proposed dewatering (pumping) rate, proposed period of dewatering activity, discharge entry point, discharge outfall location, dewatering contingency plan and emergency contact information, known historic parameters of concern (e.g., hydrocarbons, metals, volatile organic compounds, etc.), identification of known contaminated sites and any associated plumes within a radius of 1,000 feet of the dewatering points, dewatering sampling plan (frequency of sampling, parameters to be analyzed, etc.). At a minimum, Total Suspended Solids will be required to be monitored and reported to the City as an indicator of effective sediment control. Other requirements may be applicable, dependent upon site conditions and characteristics.

Sediment basins, filters, or other BMPs may be required to filter the dewatered water before it is discharged to surface water directly or via a stormwater collection system. Dewatering must be performed so that the velocity of the discharged water does not cause scouring of the receiving area. If the receiving area is a structural BMP (i.e., basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area. Sediment-laden water from cofferdams, trenches, and other areas that need to be dewatered shall be pumped through a geotextile material before the water is discharged to a watercourse. If the dewatered water is discharged through a filter to a county drain, permission must be obtained from the drain commissioner.

The dewatering site should be inspected and its condition documented at least twice daily to ensure the pumping procedure is adequately controlling the excess water and that any filtering/sediment-reducing BMP is functioning properly (e.g., not clogged). If the BMP is not functioning properly, appropriate maintenance procedures for the specific BMP(s) must be performed immediately and/or the BMPs replaced with the appropriate new one(s).

3.1.4 FILL MATERIAL

Use of fill material containing regulated substances above any state and/or federal cleanup criteria for soils is prohibited in the 1-Year Capture Zones and the 10-Year Capture Zones. Throughout the Capture Zones where filling is required, efforts should be made to ensure the fill originates from a clean source

(i.e., not contaminated with regulated substances). The fill source should be from a non-industrial area and not from sites of known or suspected contamination (i.e., MDEQ Part 201 facilities, Part 213 sites, or federal Resource Conservation and Recovery Act or Comprehensive Environmental Response, Compensation and Liability Act sites). If the source is from an agricultural area, care should be taken to ensure the fill does not include pesticides or former agricultural waste process byproducts, such as manure or decomposed organic material. Fill material should not be used from industrial and/or commercial sites where hazardous materials were used, handled, or stored or from unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that these materials are also uncontaminated.

3.1.5 CONTAMINATED SITES

Site plans must take into consideration the location and extent of any contaminated soils and/or groundwater on the site and the need to protect public health and the environment. A depiction of the location and extent of contamination shall be submitted on or with the site plan. See Section 9.0 for discussion regarding contaminated properties.

Any site used to temporarily store contaminated soils (such as during removal of an UST) must do so in a designated area indicated on the site plan. This area should be located indoors. Alternatively, the soils/material shall be containerized in Michigan Department of Transportation (MDOT)-approved drums or covered with tarp or plastic and placed on a paved/impermeable material contained by a curb, dike, or berm. The storage area must be designed to prevent or minimize stormwater run-on to the area.

3.1.6 PARKING AREAS

Parking areas within the 1-Year Capture Zone that are designed to accommodate 20 or more vehicles or exceed 6,000 square feet shall be paved with concrete, asphalt, or an equivalent smooth, impervious surface with a minimum of a 2% cross slope to prevent ponding of water. These areas should be served by an appropriate and approved stormwater treatment system. Surface areas where regulated materials are to be stored, transferred, or otherwise have a potential use should be served with an approved treatment system. These parking areas shall be controlled so that all runoff is directed to the collection system, prohibiting the potential migration offsite or into groundwater. Parking sites having limited or short-term use (i.e., churches or similar), with limited potential for contamination, may be granted exceptions or modifications to the above requirements where other controls or solutions will be incorporated. See Table 3 "Stormwater Discharge Summary" for other applicable Standards.

3.1.7 FLOOR DRAINS AND DRY WELLS

General purpose floor drains must be connected to a public sanitary sewer system or an onsite holding tank (not a septic system) in accordance with state, county, and municipal requirements, unless a groundwater discharge permit has been obtained from the MDEQ. General purpose floor drains that discharge to groundwater or a stormwater collection system are not permitted. In addition, dry wells are prohibited within 200 feet of a Type I Public Water Supply well.

Dry wells are a type of drainage well used for the underground disposal of stormwater runoff from paved areas, which include parking lots, streets, highways, residential subdivisions, building rooftops, agricultural areas, and industrial areas. Dry wells must be located only in areas that receive clean water discharges and are required to be managed in accordance with Section 5 "Stormwater Quality Management Criteria" (BMP, CDEP). Dry wells may also require a groundwater discharge permit from the MDEQ. The site plan must show the proposed location of any dry well(s).

3.1.8 WELLS

All currently functioning, proposed, and abandoned wells, including potable water wells and monitoring wells, should be indicated on the site plan.

The WHP Overlay Ordinance prohibits within any Capture Zone:

- Installation of a private water well for the purpose of drinking water or irrigation if, in the determination of the City's Department of Public Services, the Kalamazoo County Health and Community Services Department, or the Environmental Health Bureau, public water service is reasonably available.
- Use of a private well, if said well is likely to cause an adverse impact to the public water supply.
- Installation or use of a water well not installed for the purpose of drinking water or irrigation, unless it is determined by the Department of Public Services that the well owner (or representative) has scientifically demonstrated that the well will not cause an adverse impact to the public water supply.
- Drilling for natural gas or petroleum, whether for exploration, production, or otherwise.
- Presence of an abandoned well, which is defined as any well that has either been discontinued for more than one year, is in such disrepair that its continued use for obtaining groundwater is

impractical, has been left uncompleted, is a threat to groundwater resources, or is a health or safety hazard. A well shall not be considered abandoned if it has been properly plugged pursuant to the Groundwater Quality Control Act, Part 127, 1978 PA 368. When a well is plugged, formal well abandonment logs must be completed and provided to the City's Environmental Services Division, except in cases where wells were abandoned in the past and no well abandonment logs are available.

3.1.9 WELL ISOLATION DISTANCE REQUIREMENTS

Per the WHP Overlay Ordinance, "Within a capture zone, no person shall cause or allow uses or activities that would violate the terms and conditions set forth in the document 'Minimum Well Isolation Distances (From Contamination Sources and Buildings), Part 127, Act 368, P.A. 1978 and Act 399, P.A.1976' as prepared by the MDEQ, Water Division, as it may be amended." This document is presented as Attachment 1. These land use restrictions directly relate to the City's ability to replace or add new wells to its Public Water Supply System, since they are part of the permit criteria used by the MDEQ.

The drilling of gas or oil exploration or production wells is prohibited within any Capture Zone.

3.1.10 SEPTIC SYSTEMS

The construction or replacement of any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of domestic or non-domestic wastewater is prohibited within the 1-Year Capture Zones. Sites within the 10-Year Capture Zones must connect to the municipal sanitary sewer, where it is available. For sites where the municipal sanitary sewer is not available, all septic systems must comply with Kalamazoo County sewage disposal system requirements, including the acquisition of necessary permits. Flow restrictors and low-flow faucets for sinks and spray nozzles should be installed to minimize hydraulic loading to subsurface disposal systems. Floor drains may not be connected to septic systems. The locations of existing and proposed septic tanks and drain fields should be indicated on the site plan. Refer to Chapter 28 of the Kalamazoo Code of Ordinances "Wastewater Discharge Regulations and Enforcement Procedures" for other specific issues regarding wastewater.

3.2 PROCESS ACTIVITIES

3.2.1 REGULATED SUBSTANCE USE AREAS

The possession of regulated substances, including fuel in quantities that exceed 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights, unless prepackaged and intended for retail sale or for commercial or household use (such as salt used in water softeners, fertilizers, pesticides, herbicides) is prohibited in the 1-Year Capture Zones and are only allowed in the 10-Year Capture Zones if engineering controls are designed and implemented consistent with the BMPs contained herein, the City's Fire Code, and applicable State of Michigan laws and regulations. Where otherwise permitted, sites where regulated substances are stored, used, or generated shall be designed to prevent spills and discharges of such materials to the environment. The storage or presence of a regulated substance in a manner in which the substance could reasonably enter the soils or groundwater is prohibited.

Floor surfaces in work areas should be impervious to the types of materials that may be used or generated at the facility and, if necessary, should be sealed with an impermeable material. The work area floor should be pitched to an appropriate floor drain or collection area (e.g., holding tank). Alternatively, if floor drains are not used, or if they are located close to entrances, then entrances should be designed to prevent stormwater runoff from entering the building and prevent spills from leaving the building. Curbing and internal floor berms should be used to isolate floor drains from spill-prone areas, where necessary.

Whenever possible, manufacturing and processing activities involving the possession or control of regulated substances should be conducted indoors. If indoor manufacturing/processing is not feasible, the potentially pollutant-generating activities should be segregated from nonpolluting activities and conducted on an impervious surface. The area should be covered, if possible and as appropriate. The surface should be graded to minimize run-on of stormwater and runoff of spills. The area must be adequately designed to prevent spilled regulated materials from escaping the area. Drains in these areas can be connected to the sanitary sewer, with approval and appropriate pretreatment, or to a holding tank meeting the specifications of this Standard. If potentially polluting activities cannot be covered, discharge of low-volume, high-frequency storms to the sanitary sewer should be considered.

3.2.2 LOADING/UNLOADING AREAS

Loading/unloading areas used to transfer regulated substances should be indicated on the site plan. The areas should be paved with concrete or another material sufficiently impervious to the materials loaded

and unloaded in that area. Loading/unloading docks must be isolated from storm drains and dry wells to prevent potential spills from contaminating stormwater or discharging to the ground (California [CA] BMP Handbook, 2003). If stormwater runoff is a concern in the loading/unloading dock, and the site is located within the 1-Year Capture Zone, the area should be covered or enclosed and should be designed to reduce stormwater run-on. If the loading/unloading dock is uncovered, grading and/or berms should direct drainage to a dead-end sump or another appropriate collection device. A positive control valve should be installed on the drain. Alternatively, at the discretion of the Site Plan Review Committee, a precipitation valve may be installed in the curb, which may be left open to drain precipitation, except during loading/unloading. If tanker trucks are used to load/unload aboveground storage tanks (ASTs) or USTs containing regulated substances, full containment of the loading/unloading area should be considered and may be required.

The storage of spill response equipment should be indicated on the site plan. Storage should be in an area accessible to loading/unloading areas where regulated substances are transferred.

3.2.3 SPILL RESPONSE EQUIPMENT

Sites intending to use, store, or generate regulated substances in quantities meeting or exceeding 55 gallons for liquids or 440 pounds for solids are required to have emergency spill response equipment and must indicate on the site plan the locations for it and other similar equipment. Spill response equipment should be located throughout the site so that spills may be contained in storage areas, loading/unloading areas, dispensing areas, and work areas, as appropriate. The specific types of spill response equipment to be stored shall reflect the types of chemicals and petroleum products stored onsite, other engineering controls present, the potential threat to site soils/groundwater, and the location of the site within the Capture Zones.

3.2.4 AGRICULTURAL USES

Only the application of agricultural chemicals, fertilizers, mineral acids, organic sulfur compounds, etc., as used in routine agricultural operations and applied under the "Generally Accepted Agricultural Management Practices" (GAAMPs) and consistent with label directions approved by the EPA or the Michigan Department of Agriculture are allowed.

3.2.5 VEHICLE WASHING

Commercial vehicle washing must be conducted on a wash pad. Wash areas must be paved with an impervious surface and bermed or curbed to prevent stormwater run-on and wash water runoff. The wash area should be sloped for wash water collection, which may be discharged to a wash water recycling system, directly to the sanitary sewer (with approval and appropriate pretreatment), or to a dead-end sump (from which the material may be pumped to the sanitary sewer or to an offsite treatment facility). Because wastewaters from vehicle washing represent significant flows that can hydraulically overload an oil/grit separator, any such treatment device must be sufficiently sized to accept these volumes. The wash pad areas should be covered, if possible.

The cleaning of semi-trailer and tanker truck interiors may be approved in Capture Zones, if the following standards are met (CA BMP Handbook, 2003):

The interior of the semi-trailer should be swept, and all debris should be collected and properly disposed.

Dry cleaning methods should be used whenever possible. If rinsing the inside of the trailer is necessary, cleaning shall be conducted over an impervious surface. Wash water must not be discharged to the storm sewer or the ground. With approval and appropriate pretreatment, rinse water may be disposed to the sanitary sewer.

Wash water from the interior of tanker trucks or rail tankers shall be pumped directly into containers for appropriate offsite disposal or, with approval and appropriate pretreatment, must be pumped directly to a sanitary sewer drain. Rail tankers may not be cleaned in the 1-Year Capture Zones, unless the wash water can be completely contained and appropriately disposed.

3.2.6 PRESSURE WASHING/STEAM CLEANING

Pressure washing and steam cleaning activities may be permitted within covered, completely contained areas, particularly where these methods replace cleaning/degreasing operations that would otherwise use solvents. However, due to the possibility of generating runoff with high concentrations of pollutants, exterior pressure washing or steam cleaning of parts, vehicles, and other materials is not permitted in the 1-Year Capture Zones. Pressure washing and steam cleaning may be conducted in the 10-Year Capture Zone, if either is conducted on a sealed impervious surface that is completely contained and graded toward a drain that discharges either to the sanitary sewer (with approval and appropriate pretreatment) or a holding tank (not into the storm sewer or directly to site soils or groundwater). Alternatively, steam cleaning or pressure washing facilities may have zero-discharge recycling systems equipped with oil/water separators or other treatment devices.

The MDEQ has prepared a Guidance Document on Mobile Power Washing. This document contains further details regarding BMPs for these systems. The guidance document can be obtained at: <http://www.deq.state.mi.us/documents/deq-ead-tas-powrwash.pdf>.

3.2.7 COOLING WATER

Closed-loop cooling systems should be considered to eliminate cooling water discharges in Capture Zones (Connecticut BMP Guide). Alternatively, cooling water may be discharged to a storm sewer, sanitary sewer, or stream provided all federal, state, and local discharge requirements are met. Discharge of cooling water to site soils/groundwater is not permitted without City approval.

3.2.8 ROAD SALT STORAGE

All salt and associated sand mix piles must be stored on an impermeable surface and covered with a waterproof material (Source Protection). Inside the 1-Year Capture Zone, salt should be stored in indoor sheds surrounded by impervious paving. Stockpiles should not be located near surface waters, in flood plains, or areas with steep slopes, and should be designed to prevent surface water runoff. Snow containing road salt should not be brought to sites inside the 1-Year Capture Zone for disposal. Environmentally friendly snow and ice removal products and procedures are encouraged.

3.2.9 MATERIAL SUBSTITUTION/POLLUTION PREVENTION

Whenever possible, sites should select non-hazardous or less-hazardous chemicals for processes such as degreasing, cleaning, and plating that have historically used toxic materials. In addition, when possible, materials such as oils should be standardized throughout a site to reduce the quantity of leftover material and mixed waste. Practices that minimize waste generation, such as countercurrent solvent cleaning, are encouraged.

3.3 REGULATED SUBSTANCE STORAGE UNITS

A regulated substance storage unit is considered to be any UST, AST, drum, carboy, or other container used for the storage of one or more regulated substance(s) including silo, bag, tank wagon, box, glass, cylinder, total bin, truck body, rail car, tanker, or tool crib when used for permanent or temporary storage of regulated substances (Butler Co., 1999). The following standards apply to specific types of regulated substance storage units.

3.3.1 GENERAL PROVISIONS

Regulated substance storage units containing greater than 55 gallons for liquids or 440 pounds for solids are prohibited within the 1-Year Capture Zones.

Within the 10-Year Capture Zones, regulated substance storage units containing greater than 55 gallons for liquids or 440 pounds for solids shall be indicated on the site plan and are allowed if the following standards are applied.

- Unless other sufficient measures have been implemented at the site, these regulated substance storage units shall be completely contained, isolated from floor and storm drains, have sealed surfaces, comply with fire safety regulations, and should not be accessible to unauthorized personnel. Whenever possible, regulated substance storage units should be consolidated into one location for better control of material and waste inventory. All storage units shall be properly labeled as to contents and periodically inspected for evidence of leaks, improper storage, or potential hazards that may result in a release of regulated substances being stored in or transferred into or out of the storage unit. All doors, valves, or other openings through which a release could occur must be locked or otherwise secured when not in use.
- Regulated substances should be stored inside, whenever feasible. If it is not feasible, it is required that outside storage areas be covered, preferably with a roof. A curb or berm may be required along the perimeter of outdoor storage areas to prevent the run-on of uncontaminated stormwater from adjacent areas, as well as runoff of stormwater from the storage area. The area inside the curb should slope to a drain, then to a holding tank or sanitary sewer (if approved) with a positive control such as a lock, valve, or plug.
- Regulated substances stored outdoors must be in product-tight containers that are protected from weather, leakage, accidental damage, and vandalism. Sites storing regulated substances outdoors must implement security measures that are appropriate for the material stored and the nature of the site. Measures to be implemented, as appropriate, include:
 - Fencing the regulated substance storage unit or the entire site and locking or guarding entrance gates when the storage unit/facility is not in production or is unattended.
 - Ensuring that valves permitting direct outward flow of a container's contents have adequate security measures so they remain in the closed position when in non-operating or standby status.

- Preventing unauthorized access to starter controls of pumps.
- Providing facility lighting that will assist in the discovery of releases during hours of darkness and prevention of discharges occurring through acts of vandalism.

In addition, see Appendix A of the Kalamazoo Code of Ordinances (Zoning Ordinance) 6.6F for the section “Fire and Explosive Materials.”

3.3.2 SECONDARY CONTAINMENT (FOR REGULATED SUBSTANCES OTHER THAN FUEL)

Secondary containment must be provided for regulated substance storage units. Secondary-containment facilities shall be designed and constructed so that potential polluting material cannot escape from the unit by gravity through sewers, drains, or other means directly or indirectly into a sewer or stormwater collection system or to the waters of the state, including groundwater. Secondary containment shall include protective measures, such as double walls, dikes, vaults, or impervious liners (both natural and synthetic).

Exterior secondary containment provided by dikes shall be constructed of poured concrete or a pre-manufactured containment tub. Concrete-block containment is prohibited in outdoor areas because it can easily crack and does not weather well. Exterior secondary-containment areas should be capable of containing 100% of the largest vessel or 10% of the total volume of tanks in containment, whichever is larger, plus freeboard to contain precipitation from a 25-Year storm. Alternatively, the vessel may be an Underwriters Laboratories, Inc.-approved, double-walled tank. If containment is provided by a dike, the containment must be higher than the 100-year flood level. When possible and as appropriate, exterior storage of regulated substances and their containment structures should be covered to protect the containers from exposure to precipitation. If this is not possible, the base of the dike should be sloped to a collection point or sump to allow for controlled removal of accumulated stormwater or spilled regulated substances. If the dike is penetrated by a drainage or conveyance pipe, the opening must be sealed on both sides to ensure a liquid-tight penetration. Drainage pipes must have a lockable valve. This valve must be kept closed and locked under normal conditions, until a determination is made by a trained individual that the discharge of the stormwater is acceptable (this may require a Stormwater Permit with Required Monitoring; see Section 8.3.5). Discharge of accumulated stormwater from a secondary-containment structure containing petroleum products shall be pre-treated, as necessary, to meet all applicable water quality standards prior to discharge to soils, surface water, or a stormwater collection system.

Secondary containment for indoor ASTs may be provided by the building, as long as discharge from the AST cannot escape the building via floor drains, entrances, or any other means, and no specific containment is required by other regulations. Although not permitted for outdoor containment structures, concrete-block containment may be used indoors with the City's approval.

For other specific requirements, refer to the Appendix A – Zoning Ordinance of the Kalamazoo Code of Ordinances, including 6.6G (Hazardous Materials) and H (Materials and Waste Handling), and 8.3.H.7.v requiring that any utilizing, storing, or handling of hazardous material must provide secondary containment facilities and documentation of compliance with all appropriate state and federal regulations.

3.3.3 ASTs

ASTs shall be certified, installed, operated, maintained, closed, or removed in accordance with MDEQ regulations and the local fire code (see Section 8.0). All ASTs must be indicated on the site plan. A copy of any required local or state AST registration document should be provided to the City's Environmental Services Division.

All ASTs containing flammable or combustible materials must meet the requirements of the MDEQ Proposed Rules for the Storage of Flammable and Combustible Materials <http://www.deq.state.mi.us/documents/deq-std-rules-fl-cl.pdf>.

No ASTs should be located in direct contact with site soils. The tank should have sufficient ground clearance for visual inspection of the bottom of the AST for deterioration, unless the size of the AST prevents raising the tank, as required, or if the AST is a concrete-vaulted tank.

Any AST that is open to vehicle damage must be protected against impact with physical barriers. Any impervious dike utilized as secondary containment meets the requirements for a physical barrier. Objects used as physical barriers should be included in the site plan.

For ASTs not subject to the MDEQ Rules for the Storage of Flammable and Combustible Materials, the following conditions apply:

- Regulated substances must have secondary containment meeting the standards of Section 3.3.
- Tank piping should be located within secondary containment whenever possible and must be located below the product level.

- Piping must be designed so that liquid will not continue to flow by gravity or siphoning from the storage tank if the piping or fittings break.
- Tanks should be equipped with a shut-off valve, preferably an automatic shear valve, with the shut-off located inside the tank.
- For flood control, all exterior ASTs should have a monitoring system and secondary standpipe above the 100-year flood-control level for monitoring and recovery.
- Fill-pipe inlets should be above the elevation of the top of the storage tank.
- ASTs must have overfill protection, such as a visual liquid-level-indicator gauge or alarms.

3.3.4 USTs

USTs are prohibited within the 1-Year Capture Zones, if 55 gallons aggregate for liquid material or 440 pounds aggregate for dry weights are exceeded and shall not be used in the 10-Year Capture Zones unless the use of ASTs is impractical. The USTs must conform to EPA, MDEQ, and local fire code requirements. The minimum requirements are outlined in the Proposed Rules for the Storage and Handling of Flammable and Combustible Liquids (<http://www.deq.state.mi.us/documents/deq-std-rules-fl-cl.pdf>) and Michigan Underground Storage Tank Rules (<http://www.deq.state.mi.us/documents/deq-std-MUSTR.pdf>). MDEQ requirements include such protective measures as secondary containment within Wellhead Protection Areas.

If new tanks are to be installed, a copy of all registration documents should be provided to the City's Environmental Services Division. If existing USTs are to be closed, all MDEQ closure procedures must be followed, and a copy of the closure documents should be submitted to the City's Environmental Services Division. All current and proposed USTs must be indicated on the site plan.

3.4 FUELING ESTABLISHMENTS

Fueling establishments where storage, handling, or use of fuels exceed 55 gallons aggregate including, but not limited to, gasoline, diesel, kerosene, and jet fuel are prohibited in the 1-Year Capture Zones. ASTs and USTs are prohibited in the 10-Year Capture Zones, unless such tanks meet the minimum requirements outlined in the Proposed Rules for the Storage and Handling of Flammable and Combustible Liquids (<http://www.deq.state.mi.us/documents/deq-std-rules-fl-cl.pdf>) and Michigan Underground Storage Tank Rules (<http://www.deq.state.mi.us/documents/deq-std-MUSTR.pdf>). These

rules require the use of secondary containment for storage tank systems within wellhead protection areas.

The fuel dispensing area must be paved with concrete or an equivalent smooth impervious surface (not asphalt) with a suggested 2 to 4% slope to prevent ponding of stormwater. The fuel dispensing area must be covered at least as far as the length that the hose and nozzle assembly may be operated, plus one foot. The cover must not drain onto the fuel dispensing area. The covered fuel dispensing area must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. Drains at the site should be labeled to indicate whether they flow directly to the sanitary sewer or storm sewer or if they flow through an oil/water separator. All stormwater shall be managed in accordance with Section 5.0.

All fuel dispensing nozzles should have automatic shut-off mechanisms to help prevent overfilling. Spill response equipment should be stored in the fuel dispensing area. The proposed location of this equipment should be indicated on the site plan.

ASTs and USTs at fueling areas must be in compliance with local, state, and federal regulations and comply with the Standards detailed in other portions of this document. In addition, when fueling is not the primary land use, whenever possible, fueling should be conducted at an offsite location better equipped to handle fuel and spills properly. If equipment/vehicle fueling is conducted onsite, fueling should be conducted in properly designed, designated areas, as indicated on the site plan.

The Standards detailed in this section also apply to existing, nonconforming fueling establishments in Capture Zones.

In addition, Appendix A of the Kalamazoo Code (Zoning Ordinance), Sections 4.2 N and O provide general use-specific standards for gasoline and fuel sales, with and without vehicle service or repair.

3.4.1 HOLDING TANKS

Floor drains should discharge to holding tanks, if they are located where municipal sanitary sewers are not available, subsurface disposal systems are failing, or they are higher-risk facilities located in Capture Zones (BMP, CDEP). Holding tanks should adhere to the Standards listed for ASTs and USTs, including secondary containment, unless otherwise approved by the City.

3.4.2 TRUCKS, TRAILERS, TANKERS, RAIL CARS, AND TOOL CRIBS

The possession of regulated substances in trucks, trailers, tanker trucks, rail cars, tool cribs, or similar vehicles is prohibited in the 1-Year Capture Zones where possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights, unless allowed pursuant to the WHP Overlay Ordinance.

In the 10-Year Capture Zones, the possession of a regulated substance stored in trucks, trailers, tanker trucks, rail cars, tool cribs, or similar vehicles is prohibited, unless secondary containment is provided that is sufficient to contain the entire contents of the largest distinct compartment of the container. Sites must also implement appropriate security measures, such as those detailed in Section 3.3.1.

3.5 WASTE

3.5.1 SOLID WASTE

Solid-waste dumpsters must have lids and be stored on a paved surface, unless otherwise approved by the City. All dumpsters must be indicated on the site plan (BMP, CDEP). Refer to the Code of the City of Kalamazoo, including Chapters 15A and 31, for other specific requirements.

3.5.2 SCRAP METAL

Dumpsters and drums containing scrap metal that may contain residual chemicals or oils shall be stored on an impervious surface in an enclosed area or covered with an impervious liner to prevent accumulation of stormwater, whenever possible. Where stormwater may otherwise accumulate in the scrap metal collection units, drain plugs should be left in place to prevent discharge onto the ground. If necessary, such collection units should be located on an impervious surface with a separate collection catch basin containing an oil/grit separator that discharges to the municipal sanitary sewer (with prior approval and pretreatment) or a holding tank.

3.5.3 HAZARDOUS WASTES

Regulated Substances exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for solids are prohibited within the 1-Year Capture Zones, and only allowed in the 10-Year Capture Zones if the site meets all applicable performance Standards contained herein.

If the site will generate, transport, recycle, or treat hazardous waste, the applicant shall indicate in the Water Resources and Environmental Protection Questionnaire the site's expected waste management status (e.g., small-quantity generator). Proposed hazardous waste accumulation areas should be indicated on the site plan. Hazardous waste management techniques must comply with all applicable federal, state, and local requirements.

When possible, hazardous-waste-generating operations at the site should be physically segregated from other operations. Work areas and all storage areas containing hazardous waste should be located within a containment area with appropriately sealed floors and no direct access outside the facility.

Refer to the City of Kalamazoo Code of Ordinances, including Chapter 6, Sections 6.6G and 6.6H, for other specific requirements.

3.5.4 LIQUID WASTE PONDS

Open liquid-waste ponds are not permitted in Capture Zones without City approval. Any such ponds must be engineered to be protective of the site environment, particularly site groundwater, and comply with all applicable state and federal rules and regulations.

3.6 REFERENCES

Best Management Practices for the Protection of Ground Water: A Local Official's Guide to Managing Class V UIC Wells by Connecticut Department of Environmental Protection (Not viewable online).

Butler County Zoning Resolution No. 99-3-371 – Wellhead Protection Overlay District. 1999. The Groundwater Consortium. www.gwconsortium.org/Butler_Ord.pdf.

California Stormwater Best Management Practice Handbook. 2003 California Stormwater Quality Association. www.cabmphandbooks.com.

Michigan Department of Environmental Quality. 1992. "Equipment Maintenance and Storage Areas." Web site. www.deq.state.mi.us/documents/deq-swg-nps-ems.pdf.

[Source Protection: A National Guidance Manual for Surface Water Supplies. Road Salt Storage Facilities. http://www.neiwpsc.org/Index.htm?spmanual.htm~mainFrame.](http://www.neiwpsc.org/Index.htm?spmanual.htm~mainFrame)

[Warren County Ohio Building and Zoning Department. Frequently updated. "Aquifer Protection and Wellhead Protection Overlay Areas"](#) Warren Co. Rural Zoning Code "A" – Chapter 5.50.

4.0 LAND USE SPECIFIC SITE PLAN REVIEW STANDARDS

This section highlights specific standards for certain land-use types identified in the Ordinance as being prohibited in specific Capture Zones or requiring site-specific review. All land uses should incorporate the general standards detailed in Section 3.0. Other use-specific standards not contained herein may be required and subsequently adopted, if determined to be a generally accepted industry standard.

4.1 BULK MIXING OF FERTILIZERS AND PESTICIDES

Lawn, garden, pesticide, and agricultural services with onsite bulk mixing or blending of fertilizers, pesticides, and other industry-related chemicals for commercial application are prohibited in the 1-Year Capture Zones when onsite quantities of these chemicals exceed 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

The following standards apply to all facilities conducting bulk mixing of fertilizers, pesticides, and related materials within Capture Zones, including existing nonconforming sites in the 1-Year Capture Zones:

- Storage areas must be designed to protect these chemicals from possible theft, unauthorized use by untrained personnel, and temperature extremes. Outdoor storage areas shall be located within a permanently fenced area and should have a permanent roof to prevent precipitation and sunlight from entering the storage area. All storage areas shall have an impervious surface and secondary containment. Floor drains shall not be located in storage areas without City approval (BMP, CDEP).
- Pesticides, fertilizers, and similar chemicals should be stored separately to minimize the possibility of cross-contamination in case of fire or other disaster. Smaller facilities may choose to construct a containment area with multiple storage compartments for pesticides and fertilizers (BMP, CDEP).
- Mixing areas for pesticides should be located indoors or mixing should be done at the application site. Onsite mixing and loading areas shall have a spill-containment surface. For liquids, this surface shall be curbed, bermed, or sloped to contain spillage and drain into an impermeable liquid-tight containment structure. For nonliquid materials, this surface should be constructed to prevent water from flowing into the containment system (BMP, CDEP).
- Facility piping from bulk storage tanks shall be installed aboveground to facilitate inspection for leaks (BMP, CDEP).

- Truck rinse/cleaning areas shall be conducted within a containment area. The floor must be sealed with a suitable impermeable material. Washing areas shall drain into a watertight containment structure (BMP, CDEP).

The application of agricultural chemicals, fertilizers, mineral acids, organic sulfur compounds, etc., as used in routine agricultural operations are not allowed unless consistent with existing GAAMPs (Michigan Department of Agriculture, 2001 to 2006), and consistent with label directions approved by the EPA or Michigan Department of Agriculture.

4.2 DRY CLEANING FACILITIES

Dry-cleaning facilities are prohibited in the 1-Year Capture Zones where possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

The following standards apply to all dry-cleaning facilities within the Capture Zones, including existing non-conforming sites in the 1-Year Capture Zones:

- Documentation of compliance with MDEQ dry-cleaning regulations must be provided to the City upon request (BMP, CDEP).
- The dry-cleaning area should be isolated from other site operations (BMP, CDEP).
- Dry cleaners must provide secondary containment for machines containing solvents. The containment area should be impermeable and capable of holding 110% of the largest possible spill and should prevent the spill from reaching the sanitary sewer, storm drains, or soil (BMP, CDEP).

The following BMPs should be considered and implemented whenever possible:

- Traditional dry-cleaning solvents may be replaced by petroleum solvents with a flash point greater than 140 degrees and with a specific gravity less than 1.0. These solvents present a lower fire hazard and are less mobile if released to the environment (BMP, CDEP).
- Dry-to-dry machines are preferred to transfer machines because of the elimination of the need to transfer solvent-laden garments from a washer unit to a dryer unit, which reduces solvent vapor loss (BMP, CDEP).

- A hamper enclosure or a room enclosure of impermeable construction may be installed to reduce solvent release during transfer (BMP, CDEP).
- Distillation equipment designed to allow still bottoms to be removed without opening the still is preferred (BMP, CDEP).

4.3 FUELING ESTABLISHMENTS

Fueling establishments where storage, handling, or use of fuels exceed 55 gallons aggregate including, but not limited to, gasoline, diesel, kerosene, and jet fuel are prohibited in the 1-Year Capture Zones. ASTs and USTs are prohibited in the 10-Year Capture Zones, unless such tanks meet the minimum requirements outlined in the Proposed Rules for the Storage and Handling of Flammable and Combustible Liquids (<http://www.deq.state.mi.us/documents/deq-std-rules-fl-cl.pdf>) and Michigan Underground Storage Tank Rules (<http://www.deq.state.mi.us/documents/deq-std-MUSTR.pdf>). These rules require the use of secondary containment for storage tank systems within wellhead protection areas. Required standards include, but may not be limited to, the following.

- The fuel dispensing area must be paved with concrete or an equivalent smooth impervious surface (not asphalt) with a suggested 2 to 4% slope to prevent ponding of stormwater (CA BMP Handbook, 2003). The fuel dispensing area must be covered at least as far as the length that the hose and nozzle assembly may be operated, plus one foot. The cover must not drain onto the fuel dispensing area. The covered fuel dispensing area must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. Drains at the site should be labeled to indicate whether they flow directly to the sanitary sewer or storm sewer or if they flow through an oil/water separator. All stormwater shall be managed in accordance with Section 5.0.
- All fuel dispensing nozzles shall have automatic shut-off mechanisms to help prevent overfilling (CA BMP Handbook, 2003). Spill response equipment should be stored in the fuel dispensing area. The proposed location of this equipment shall be indicated on the site plan.
- ASTs and USTs at fueling areas must be in compliance with local, state, and federal regulations and comply with the Standards detailed in other portions of this document. In addition, when fueling is not the primary land use, whenever possible, fueling should be conducted at an offsite location better equipped to handle fuel and spills properly. If equipment/vehicle fueling is conducted onsite, fueling should be conducted in properly designed, designated areas, as indicated on the site plan.

The Standards detailed in this section also apply to existing, nonconforming fueling establishments in Capture Zones.

4.4 FURNITURE STRIPPING OR REFINISHING

The use of a site for furniture stripping or refinishing is prohibited in a 1-Year Capture Zone, if the site possesses a regulated substance exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for solids. If the use is allowed as consistent with the WHP Overlay Ordinance, the use may be allowed within the 10-Year Capture Zones, if it meets all applicable standards contained in this document. In addition, the following minimum standards should be attained to gain this approval:

- Chlorinated hydrocarbons, such as methylene chloride and tetrachloroethylene, which have a specific gravity greater than 1.0, should be avoided whenever possible. Replacements can include solutions containing either dimethylformamide and xylene or dimethyl adipate, dimethyl glutarate, and hydrated aluminum silicate. Other stripping agents are available that use a methylene chloride/phenol solution diluted with water, which reduces the quantity of methylene chloride used (BMP, CDEP).

4.5 SCRAP AND SALVAGE OPERATIONS

Scrap and salvage operations including, but not limited to, those related to auto, appliance, and machine parts are prohibited in the 1-Year and 10-Year Capture Zones.

The WHP Overlay Ordinance, Section 4.2Y contains Use-Specific Standards related to scrap and salvage operations. The following Standards apply to all scrap and salvage operations located within Capture Zones including existing non-conforming sites in the 1- and 10-Year Capture Zones:

- The site plan shall be designed to consolidate, contain, and collect differing sources of hazardous substances into manageable point sources. For efficiency, and to prevent contamination of areas not specifically designed for certain activities, the site should be segregated into specific areas especially equipped for receiving, holding, dismantling, cleaning, inventory flow, parts storage, core storage, fuel storage, special waste storage, crushing, sales, shipping, receiving, and the office (as applicable to the proposed use). There should be a logical relationship between these areas so that salvaged materials flow smoothly from area to area and eventually offsite.
- The receiving area shall be designed for temporary storage prior to any dismantling or transfer to a longer-term storage area. This area shall have an impervious surface and be able to sufficiently

contain damaged, leaking items. Fluid-containing items, including vehicles, should be inspected for leaks or unwanted contents at the time of receiving.

- Any fluid removal from salvaged items shall be conducted, as soon as possible after receiving the item, in an area equipped to drain fluids into appropriate collection containers.
- Any dismantling of fluid-containing items shall be conducted in an area equipped to drain fluids into appropriate collection vessels. The area must be able to contain spills from these vessels and from the work area (ARA, website).
- Steam cleaning of parts shall be conducted only when absolutely necessary and only in an area capable of fully containing associated wastewater for appropriate disposal.
- The site must have an established secure area to store certain components of vehicles and other materials that pose special hazards, such as mercury switches, air-bags containing sodium azide propellants, lead-acid batteries, tires, and oily rags. The site also must be able to accommodate storage of various fluids, which, depending on items received and processed, could include gasoline, diesel fuel, motor oil, transmission oil, power steering fluid, brake fluid, hydraulic fluid, differential fluid, antifreeze, windshield washer fluid, refrigerants, battery acid, cleaning solvents, and contaminated water. Waste fluid storage areas must conform with the Standards established in earlier portions of this document.
- Once all fluids have been drained and there is no more possibility of regulated substances reaching the ground, salvaged items may be stored in a long-term storage area until the item is sold or otherwise disposed.
- Scrap vehicles or other units brought into a commercial junk yard located within the Capture Zone must have all fluids removed in accordance with current federal, state, and local regulations before onsite crushing. However, the crushing area must be adequately contained to capture any residual fluids (Butler Co., 1999).
- Certain parts that can be remanufactured or rebuilt have intrinsic value, unless seriously damaged. These parts are removed and stored prior to being sold and will usually contain fluids and lubricants. Such parts should be stored on an impervious, contained surface.

- Concrete or asphalt surfaces at junk and salvage yards must be properly designed to minimize cracking as they age. These surfaces are required to be sealed with epoxy or another chemical resistant material, as necessary.

4.6 MOTOR VEHICLE REPAIR/SERVICE SHOPS AND/OR BODY REPAIR

Motor vehicle repair/service shops and body repair shops are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights. See the WHP Overlay Ordinance for relevant Use-Specific Standards and other conditions of use.

The following Standards apply to all motor vehicle repair/service shops and/or body repair shops operating within the Capture Zones, and the existing non-conforming sites in the 1-Year Capture Zones:

- Floor drains in service bays and vehicle washing areas must either be connected to a holding tank with a gravity discharge pipe, to a sump that pumps to a holding tank, or to an appropriately designed oil/grit separator that discharges to a municipal sanitary sewer (BMP, CDEP). Also see Section 3.1.6.
- Vehicle washing is encouraged to be conducted at a commercial car wash, especially when cars only need to be washed occasionally. If vehicle washing is conducted regularly, it should be done either in a wash bay or on a wash pad, in accordance with the Standards detailed in Section 3.2.5.
- Service bay floors and service pits must be constructed of concrete and sealed with an impervious material to facilitate clean-up without using solvents (BMP, CDEP). Also see Section 3.2 and 3.3 for other relevant standards.
- Areas where vehicles are stored or repaired must have provisions for containment of vehicle leaks and shall be paved with an impervious material, particularly in the 1-Year Capture Zones (BMP, CDEP). Also see Sections 3.2 and 3.3 for other relevant standards.
- Parts cleaning and degreasing should be isolated from other operations, preferably located within a containment area with no direct access outside the facility, and the floor must be sealed with a suitable impermeable material (BMP, CDEP). Also see Sections 3.2 and 3.3 for other relevant standards.
- Auto body painting shall be done in a separate, secure area with no floor drains (BMP, CDEP). Also see Sections 3.2 and 3.3.

4.7 PLATING AND ANODIZING

Metal plating, polishing, etching, engraving, anodizing, and similar processes are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights. Also see Sections 3.2 and 3.3 for other relevant standards.

The following Standards apply to all plating, polishing, etching, engraving, anodizing, and similar facilities within the Capture Zones, and the existing non-conforming sites in the 1-Year Capture Zones.

Facilities shall minimize or eliminate the use of particularly hazardous plating chemicals in accordance with prevailing industry BMPs. For example, the following chemical replacements should be implemented whenever possible:

- Replace hexavalent chromium solutions with trivalent chromium solutions (UME, website).
- Replace cadmium plating with zinc-nickel plating (UME, website).
- Substitute persulfate with sulfuric peroxide for copper etching where technically feasible (UME, website).
- Eliminate terpene usage by implementing a "no-clean" technology and glycol ethers usage by implementing a water-based process.
- Substitute cyanide plating solutions with alkaline zinc, acid zinc, acid sulfate copper, pyrophosphate copper, alkaline copper, copper fluoborate, electroless nickel, ammonium silver, halide silver, methanesulfonate-potassium iodide silver, amino or thio complex silver, no free cyanide silver, cadmium chloride, cadmium sulfate, cadmium fluoborate, cadmium perchlorate, gold sulfite, and cobalt-hardened gold (UME, website).
- Ion vapor deposition of aluminum may be used for corrosion protection in place of cadmium plating.
- Replace vapor degreasers, typically using trichloroethylene or 1,1,1-trichloroethane, with aqueous or semi-aqueous based cleaning systems.

The following process-related practices should be considered for implementation:

- Use deionized water in place of tap water to facilitate recycling and to minimize the generation of sludges.
- Reduce drag-out by one or more of the following methods: use wetting agents to decrease surface tension in the tank; lower the concentration of plating bath to the minimum possible; reduce the plating bath viscosity with higher bath temperature; proper rack and barrel design; use drip bars; increase drain time over the process tanks; decrease withdrawal rate of parts from the plating bath; shake, vibrate, or pass the parts through an air knife; angle drain boards between tanks; and/or install drainage boards between tanks (UME, website).
- Install overflow systems on process baths for make-up water and flow restrictors on rinse tanks to control the flow rate of water.
- Reduce the frequency of bath dump by using filtration to remove suspended solids.
- Recover metals from solution using an electrowinning process.
- Regenerate the plating bath by activated carbon filtration to remove built-up organic contaminants.
- Conserve water by methods such as: using countercurrent or cascade rinse tank arrangements, installing a closed-loop system for rinse water, using spray rinsing, or rinse water agitation.

4.8 TRUCKING AND BUS TERMINALS

Trucking and bus terminals are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights (Butler Co., 1999).

The following standards apply to all trucking and bus terminals within the Capture Zones, including existing non-conforming sites in the 1-Year Capture Zones:

- All truck and bus parking at terminals must take place on an impermeable surface, except where otherwise approved by the City. In particularly high-risk areas, grading to a containment area (holding tank, curbing, etc.) may be required to reduce impact of potential leaks or spills in the area.

- If fueling takes place at the terminal, all requirements in Section 3.2 must be followed, in addition to those Standards described for ASTs and USTs in Sections 3.3 and 3.4.
- Vehicle maintenance must be conducted indoors in a contained area or offsite (EPA, website). Also see Sections 3.2 and 3.3.
- If onsite cleaning of trucks or buses is proposed to be conducted, full containment of wash water is required. Also see Sections 3.2 and 3.3.
- Onsite painting of trucks/buses is not permitted without City approval. Also see Sections 3.2 and 3.3.
- If regulated substances will be loaded on/off trucks or other vehicles, it is required that this activity be conducted on an impervious surface. Spill response equipment must be readily accessible to the loading/unloading area. Also see Sections 3.2 and 3.3.

4.9 REFERENCES

Automotive Recyclers Association: Storm Water Legislation/Regulation.

www.a-r-a.org/g_legislation_stormwater.htm.

Best Management Practices for the Protection of Ground Water: A Local Official's Guide to Managing Class V UIC Wells by Connecticut Department of Environmental Protection (not viewable online).

Butler County Zoning Resolution No. 99-3-371 – Wellhead Protection Overlay District. 1999. The Groundwater Consortium. www.gwconsortium.org/Butler_Ord.pdf.

California Stormwater Best Management Practice Handbook. 2003 California Stormwater Quality Association. www.cabmphandbooks.com.

Environmental Protection Agency document: Sample Stormwater Pollution Prevention Plan. <http://www.epa.gov/reg3wapd/stormwater/pdfs/auto.txt>.

Michigan Department of Agriculture. "Generally Accepted Agricultural Management Practices." 2001-2006. http://www.michigan.gov/mda/0,1607,7-125-1567_1599_1605---,00.html.

University of Missouri Extension: Pollution Solutions: Waste Reduction Assistance for Business. <http://muextension.missouri.edu/polsol/metal.htm>.

5.0 STORMWATER QUALITY MANAGEMENT CRITERIA

The general objectives of stormwater management in the City are to achieve predevelopment conditions with respect to stormwater runoff rates and volume to control flooding, protect surface water and groundwater resources, and maintain compliance with its Stormwater NPDES Permit. The quality and sustainability of the City's drinking water resources can depend to some extent on the management of stormwater runoff.

Some general strategies for stormwater quality management that should be included wherever possible are listed below:

- Accommodate stormwater that complements the natural drainage patterns and wetlands.
- Reduce impervious cover.
- Prevent erosion and sedimentation.
- Provide naturalized stormwater treatment for parking lot runoff using bioretention basins, rain gardens, filter strips, and/or other practices that can be integrated into landscaped areas and traffic islands.
- Direct rooftop runoff to pervious areas such as yards, open areas, or vegetated areas (e.g., rain gardens), thus avoiding rooftop runoff to the roadway and stormwater collection system.
- Use native vegetation, where practical, to reduce the need for chemical applications and to enhance plant root absorption of infiltrated stormwater. See the document "Recommended Landscaping Standards in the City of Kalamazoo" for additional information regarding plant selection criteria. Nonvegetative stormwater treatments will be incorporated, if naturalized treatment systems are not practical or consistent with the Standards discussed below.

KEY DEFINITIONS

Best Management Practice (BMP): A structural or non-structural practice or combination of practices that are designed to prevent or reduce stormwater runoff and/or associated pollutants.

Buffer Strip: A defined zone of selected plantings along a surface water feature capable of filtering stormwater.

Catch Basin: A solid-walled stormwater inlet to the stormwater collection system that includes a sump to capture coarse sediments.

Detention: The temporary storage of stormwater runoff to control peak discharge rates and provide gravity settling of sediments.

Detention Basin: A constructed basin that temporarily stores water before discharging into a surface water feature (e.g., dry basin: <24 hour drain-time; extended dry basin: 24-40 hours drain-time; and wet detention basin: permanent pool of water).

First Flush: The delivery of a highly concentrated pollutant loading during the early stages of a storm due to the washing effect of runoff on pollutants that accumulated on the land.

Flood Control Volume: The stormwater volume detained or infiltrated to protect downstream areas from flooding.

Impervious Surface: Those surfaces of the landscape that cannot infiltrate rainfall consisting of building rooftops, and paved parking lots, sidewalks, driveways, etc.

Infiltration/Retention Basin: A facility without a positive outlet in which stormwater runoff is collected and allowed to infiltrate into the ground.

Pretreatment: The additional measures taken to protect groundwater and/or surface water quality by removing pollutants from collected stormwater beyond those required to adequately collect and remove stormwater. Typically, pretreatment is accomplished by a BMP designed to provide controlled removal of oils and grease, coarse to fine sediments, and may provide for a containment area in the case of an accidental spill or other release.

Proprietary Treatment System: An engineered structure used to separate sediments, trash and oils from stormwater runoff using enhanced gravitational separation through rotational hydraulic flow and/or filter media, and that provides an impermeable chamber for the collection of pollutants.

Runoff: That portion of precipitation that does not infiltrate or evaporate but runs off to a surface water feature or stormwater collection system.

Sediment Basin: A man-made depression in the ground surface where runoff is collected and stored to allow suspended solids to settle out. Sediment basins may be wet or dry.

Sediment Forebay: A small, separate storage area located upstream to the inlet to a stormwater facility used to trap and settle incoming sediments.

Sediment Sump: A constructed sump or surface depression used to trap and settle incoming sediments. Generally smaller than a sediment basin or forebay.

Spill Containment Cell: A BMP designed to provide controlled removal of oils and grease, coarse to fine sediments, and other subject pollutants to protect groundwater and surface water resources, and to provide for a containment area in the case of a spill or other pollutant release.

Spill Containment Volume: The volume of stormwater required to protect groundwater and surface water from a release of regulated substances.

Stormwater Facility: A BMP usually located at the downstream end of the site conveyance system (end-of-pipe) designed to provide the uniform treatment volumes required for the site (e.g., detention basins, man-made stormwater wetlands, infiltration basins).

Stormwater Filter: An open drainage channel or depression, explicitly designed to filter runoff through a self-contained bed of sand to provide water quality treatment and spill containment.

Stream Protection Volume: A stormwater treatment volume that controls stormwater runoff from more frequent events that have an impact on the stability of headwater streams.

Water Quality Swale: An open drainage channel or depression with an impermeable liner, explicitly designed to filter runoff through a self-contained bed of sand to provide water quality treatment and spill containment.

Water Quality Volume: A specific stormwater treatment volume that is intended to provide reasonable protection from pollution impacts associated with urban runoff.

5.1 UNIFORM STORMWATER STANDARDS

For the purposes of Sections 5 and 6: a site < ½ acre (21,780 square feet) is considered a “small site” and one ≥ ½ acre is a “large or larger site.” A parking lot with ≥ 20 parking places and/or exceeding a 6,000-square-foot area is considered a “large or larger parking area.”

Standard 1: A water quality volume of 1,815 cubic feet per impervious acre is required for large sites, provided as permanent pool, extended detention, or infiltration (equivalent to 0.5 inch of runoff per impervious acre) to treat the first flush of stormwater runoff that typically contains the highest concentration of pollutants.

Standard 2: Pretreatment is required at all large sites for all stormwater retention and detention BMPs to preserve the longevity and function of the BMP. Pretreatment shall provide for the removal of fine sediments, trash, and debris and shall be defined as: 30% of the water quality volume for settling sumps and basins using gravity, manufacturer’s guidelines for proprietary treatment systems, and minimum 25-foot sheet-flow width at no greater than 5% slope for vegetated buffer strips. For small sites where the water quality volume cannot be achieved, pretreatment is still required prior to discharge into the City’s storm sewer system.

Standard 3: A Stream Protection Volume is required if a site discharges to a perennial stream – directly or via the City’s stormwater system - and the rational runoff coefficient (C) times the area of the site in acres (A) is greater than 1 acre ($C \times A > 1$), stream protection is required. The site design shall have sufficient storage and release controls to provide a stream protection volume equal to the 1.5-year, 24-hour, Soil Conservation Service Type II rainfall event (2.06 inches) for post-development conditions. The minimum required stream protection volume shall be 5,000 cubic feet per impervious acre. The maximum release rate to detain this volume for at least 24-hours is 0.05 cubic feet per square inch per impervious acre. This Standard is required to control urban stormwater runoff for the smaller, more frequent rainfall events that have a significant impact on the stability of headwater streams. Stream protection volume is not required for small sites.

Standard 4: Flood control volumes are required at large sites for infiltration and detention basins to control the larger, less frequent rainfall events that typically cause flooding. The flood control volume for infiltration shall be equivalent to a 25-year, 24-hour rainfall with a design infiltration rate of 0.52 inch per hour and maximum 72-hour drain time, or 3,630 cubic feet per acre (whichever is greater). The flood control volume for detention shall be equivalent to a 25-year storage volume released at 0.15 cubic foot per second per contributing catchment acre. Flood control volumes are not required for small sites.

Standard 5: A minimum **25-foot naturally vegetated buffer** system shall be incorporated along all perennial streams, wetlands, and other surface water features to protect water quality, reduce erosion and sedimentation, reduce the potential for flooding, and enhance aesthetics and wildlife habitat.

Standard 6: All reasonable efforts will be made to **maintain and protect wetlands**. If loss cannot be avoided, wetland mitigation (including ratios of new wetlands to former wetlands) must be accomplished on the same site, be pre-approved by the City, and must adhere to the standards as described in the Wetland Mitigation Section under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Standard 7: All reasonable efforts will be made to **maintain and protect the floodplain** area. If a loss cannot be avoided, a floodplain mitigation of a 2:1 ratio of new floodplain area to former floodplain area must be accomplished within the same stormwater system sub-drainage basin (the land area that drains to a single city outfall), and pre-approved by the City.

Standard 8: In all areas, the maximum design flow rate or volume of **stormwater discharged from the site shall not impair or exceed the capacity of the downstream stormwater collection system**, open channel, watercourse, wetland, or overland flow path.

Standard 9: In all areas, the management strategy for **rainfall events exceeding the design storm shall be conveyance** through floodplain preservation, provision for secondary-conveyance routes, and, where available, storage of flood discharges through wetland preservation and enhancement.

5.2 STORMWATER DISCHARGE STANDARDS

The following additional requirements address stormwater discharge strategies as related to the proposed land use and associated groundwater contamination risk assessment, the site's location in regard to Wellhead Protection Capture Zones, the zoning district (as defined in the City Code of Ordinances), potential to impact surface water features, and physical characteristics of the site. Stormwater discharge strategies have been incorporated into the following City-adopted stormwater discharge Standards that must be met at development and re-development sites that require site plan review. The Standards apply to the areas as described below.

Standard A: Within the 1-Year Capture Zones, sites with higher-risk land uses (Tables 1 and 2) and/or those exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for dry weights, must discharge to surface water with pretreatment and a spill containment

volume. This can be accomplished by solid-wall pipes that discharge to a defined stormwater collection system, surface water feature, or detention area.

Standard B: Within the 1-Year Capture Zones associated with lower-risk land uses, surface water discharge with pretreatment is preferred, but groundwater infiltration is allowed, if pretreatment is provided. Certain larger parking areas (see below) and regulated substance areas are required to have pretreatment with a spill containment volume.

Standard C: Within the 5-Year Capture Zones associated with higher-risk land uses (Tables 1 and 2), and/or those exceeding the 55-gallon/440-pound aggregate thresholds for regulated substances, stormwater infiltration is allowed only with pretreatment and a spill containment volume. Certain larger parking areas and regulated substance areas require pretreatment and a spill containment volume, regardless of discharge strategy.

Standard D: In lower-risk land use areas within the 5-Year Capture Zones, infiltration is allowed, but may require pretreatment depending upon site-specific analysis, regarding items such as larger parking areas (discussed below) and regulated substance areas.

Standard E: Parking areas that are designed to accommodate 20 or more vehicles or exceed 6,000 square feet (larger parking areas) should be paved with concrete, asphalt, or an equivalent smooth impervious surface with a minimum 2% cross slope to prevent ponding of water, if within a 1-Year or 5-Year Capture Zone. These parking areas shall be controlled so that all runoff is directed to the collection system with pretreatment, thus minimizing the potential of flows with pollutants to migrate offsite or into groundwater. Parking sites having limited or short-term use (i.e., churches or similar) with limited potential for releases of regulated substances inside the 5-Year Capture Zones, but outside the 1-Year Capture Zones, may be granted exceptions or modifications to the above requirements.

Standard F: Within the 10-Year Capture Zones, stormwater infiltration is preferred with lower-risk land uses, but larger parking areas and regulated substance storage areas on larger sites may require pretreatment. In the higher-risk land use areas, infiltration may be allowed, depending upon site-specific analysis. However, pretreatment and spill containment volume are required for larger parking areas and if land uses exceed the 55-gallon/440-pound aggregate thresholds for regulated substances. Parking sites having limited or short-term use (i.e., churches or similar) with limited potential for releases of

regulated substances may be granted exceptions or modifications to the above requirements.

Standard G: In areas outside the Capture Zones, infiltration of stormwater shall be maximized to promote groundwater recharge. All lots or parcels should retain and infiltrate stormwater onsite, unless drainage agreements between adjacent property owners are obtained or the site is limited to only surface water discharge. Certain large sites with higher-risk land uses and/or exceeding the 55 gallons for liquids and 440 pounds for dry weights or with larger parking lots may require pretreatment. In lower-risk land use sites, pretreatment may be required for certain large sites with larger parking areas.

Table 3 summarizes the discharge strategy in different land-use risk types.

**Table 3
Stormwater Discharge Summary**

Capture Zone	Applicable Standards	Higher-Risk Land Use ¹ and/or Above Quantity Thresholds ¹	Lower-Risk Land Use
1-Year Capture Zones	A, B, E	<ul style="list-style-type: none"> No stormwater infiltration. Pretreatment with spill containment volume³ is required. 	<ul style="list-style-type: none"> Pretreatment is required for stormwater infiltration. Certain parking areas² and regulated substance areas require pretreatment with spill containment volume³.
5-Year Capture Zones	C, D, E	<ul style="list-style-type: none"> Pretreatment with spill containment volume is required for stormwater infiltration³. Certain parking areas² and regulated substance areas require pretreatment with spill containment volume³. 	<ul style="list-style-type: none"> Pretreatment may be required for stormwater infiltration, pending site-specific evaluation. Certain parking areas² and regulated substance areas require pretreatment³.
10-Year Capture Zones	E, F	<ul style="list-style-type: none"> Stormwater infiltration allowed pending site-specific evaluation. Certain parking areas² and regulated substance areas require pretreatment with spill containment volume³. 	<ul style="list-style-type: none"> Stormwater infiltration preferred. Certain parking areas² and regulated substance areas for large sites require pretreatment.
Outside Capture Zones	E, G	<ul style="list-style-type: none"> Stormwater infiltration preferred. Certain parking areas² and regulated substance areas for large sites may require pretreatment³. 	<ul style="list-style-type: none"> Stormwater infiltration preferred. Certain parking areas² for large sites may require pretreatment³.

¹See Tables 1 and 2 for Higher-Risk Land Use designations.

Regulated Substance Thresholds: 55 gallons aggregate for liquids and 440 pounds aggregate for dry weights.

²20 or more parking spaces or >6,000-square-foot paved area.

³See Section 6 for requirements.

6.0 TREATMENT AND SPILL CONTAINMENT

The following table provides guidance on the types of BMPs that can meet treatment requirements for stormwater quality.

**Table 4
Stormwater Treatment Strategy**

BMP	Surface Water Quality Volume	Pretreatment	Spill Containment Volume
Sediment Sump		X	
Sediment Basin		X	
Sediment Forebay		X	
Vegetated Buffer Strip		X	
Proprietary Treatment System		X	X
Extended Detention	X		
Permanent Pool (pond)	X		
Infiltration BMP*	X		
Stormwater Filter	X		
Water Quality Swale	X		X [a specialized filter]
Spill-Containment Cell	X		X [a specialized pond]

* bioretention/raingarden, infiltration trench, infiltration/retention basin

Treatment for Surface Water Discharges

A Water Quality Volume is specified in Standard 1 to treat stormwater runoff prior to its release to surface waters.

Treatment for Groundwater Discharges

Surface water quality volume requirements are allowed to be met through infiltration, without regard for treatment of the stormwater, before it is discharged into the ground. The assumption is that the soil itself will provide treatment before the stormwater reaches the groundwater table.

Pretreatment

A Pretreatment Volume is specified in Standard 2 to protect the integrity of retention and detention BMPs and provide for a minimum level of water quality treatment for small sites.

Pretreatment also helps to protect groundwater from the accumulated impacts of pollutants in storm water runoff when infiltration BMPs are used to meet the water quality volume requirements. (It should be noted that porous pavement has no pretreatment ability prior to infiltration.)

A spill containment volume may be required as an additional component of pretreatment for both surface and groundwater discharges for certain higher risk land uses and within certain Capture Zones as specified below:

Spill Containment Volume

Spill Containment Volume is required to protect both groundwater and surface water from pollutant spills in: all of the 1-Year Capture Zone Higher-Risk Land Use and/or for sites above regulated substance thresholds; certain 1-Year Capture Zone Lower-Risk Land Use areas; certain 5-Year Capture Zones and 10-Year Capture Zones with Higher-Risk Land Use, and/or for sites above regulated substance thresholds. In higher-risk land use areas, spill containment may also be required regardless of proximity to capture zones, if it is deemed appropriate to safeguard environmentally sensitive areas.

The Spill Containment Volume is equivalent to 30% of 0.5 inch of runoff per impervious acre (30% of 1,815 cubic feet). The volume is given by the following equation:

$$\begin{aligned} V &= \text{Spill Containment Volume} \\ &= 30\% \text{ of } 1,815 \text{ cubic feet per impervious acre} \\ &= 30\% \text{ of } 13,577 \text{ gallons per impervious acre} \\ &= 4,073 \text{ gallons per impervious acre} \end{aligned}$$

A minimum spill containment volume of 400 gallons shall be provided. The minimum volume is allowable only on small sites where proprietary treatment systems are used.

In general, measures meeting Spill Containment standards must have an impermeable barrier between the treated material and the groundwater; have provisions for the capture of oil, grease, and sediments; and meet the volume requirements. Spill containment may be provided by one of the following BMPs:

- Spill-containment cell
- Water quality swale
- Proprietary stormwater treatment system

These measures are described in the following sections.

6.1 SPILL-CONTAINMENT CELL

A spill-containment cell may be used to trap and localize incoming sediments and to capture slug pollutant loads from accidental spills of regulated substances (spill containment volume). A spill-containment cell, which is depicted in Figure 3, must have the following characteristics:

General Specifications

- The spill-containment cell shall be a wet basin with an impermeable bottom and sides to the design high-water level.
- The minimum surface area shall be 25% of the required volume.
- The length-to-width ratio shall be a minimum of 3:1 and a maximum of 4:1 to allow for adequate hydraulic length, yet minimize scour velocities.
- The minimum hydraulic length shall be equal to the length specified in the length-to-width ratio.
- The minimum diameter of the transfer pipe, between the spill containment cell and the infiltration basin, shall be 12 inches.
- The overflow structure from the spill containment cell shall be sized for the peak inflow from a 10-year rainfall event.
- The top-of-berm elevation between the spill-containment cell and the basin shall be a minimum of one foot below the outer berm elevation.
- The spill-containment cell shall have a minimum one-foot-deep sump below the inlet pipe for sediment accumulation.
- The outlet structure from the spill-containment cell shall be designed to draw water from the central portion of the water column within the cell, to trap floatables, and to contain sediments. The crown of the inlet end of the transfer structure pipe shall be located vertically, a minimum of 1 foot below the normal water level and a minimum of 1.5 feet from the bottom of the spill-containment cell (minimum depth of the permanent pool is 2.5 feet).

Material Specifications

- The spill-containment cell shall be lined with impermeable materials extending up to the design high-water elevation. A minimum 18-inch-thick clay layer or an impermeable liner protected with a minimum 12 inches of soil cover are acceptable alternatives.
- Maximum allowable permeability shall be 1×10^{-7} centimeter per second (cm/sec), as determined by the geotechnical consultant for clay placement or manufacturer's certificate for liner products.
- A 40-millimeter polyvinyl chloride liner is an acceptable impermeable material.
- Maintenance.
- Maintenance responsibility shall be vested with the owner or authorized operator.

6.2 WATER QUALITY SWALES

Water quality swales may be used for spill containment on smaller sites of less than 1/2 acre, or larger sites where space is limited and/or a permanent pool of water is not desirable. Figure 4 depicts a dimensioned water quality swale. The water quality swale shall be sized to contain the spill-containment volume without release. Following is a summary of required characteristics of a water quality swale:

Pretreatment Criteria

- A minimum 25-foot vegetated buffer is required between directly contributing impervious surfaces and the water quality swale.

Controls

- Inlet pipes shall not be fully submerged at normal pool elevations.
- All inlet pipes must enter this swale for pretreatment.
- A manhole or catch basin shall be required immediately downstream of the water quality swale.
- The swale and outlet shall be sized to pass the 10-year design flood.

- A 4-inch perforated-pipe underdrain shall be placed along the center length of the swale and bedded in coarse aggregate.
- Upland construction areas shall be completely stabilized prior to final swale construction. The detention basin may be constructed first, as a temporary erosion control measure during construction.
- Inlets and outlets require energy dissipation and transition from outlet to open channel.
- Inlets shall have a riprap apron to dissipate the velocity of incoming stormwater runoff. The following minimum square yards of riprap shall be provided based on pipe diameter.

<u>Pipe Diameter (inches)</u>	<u>Riprap (square yards)</u>
12 to 18	4
21 to 36	12
42 to 60	24

Geometry

- The swale shall have a minimum bottom width of two feet.
- Side slopes shall be 3:1 (horizontal:vertical) or flatter.
- The sand filter shall be placed to a depth of 24 inches below the swale invert.
- The sand filter media shall meet at least MDOT Class II requirements for granular materials.
- Six inches of coarse aggregate shall be placed below the sand filter.
- The filter fabric shall be a nonwoven geotextile with a minimum weight of 3.5 ounces per square yard, a minimum coefficient of permeability of 0.02 cm/sec, and apparent opening size ranging between 70 to 120 U.S. standard sieve size.
- The coarse aggregate shall be washed, rounded-stone aggregate, 1.5 to 3 inches in diameter, or other City-approved aggregate with void ratio adjusted accordingly (i.e., MDOT 6A, $V_e = 0.33$).
- The bottom and sides of the swale shall be lined with an impermeable liner.

Public Safety

- The swale shall be designed for a maximum depth of 2 feet of water.
- If the water quality swale receives runoff from a higher-risk land use or zoning district, as indicated in Section 2.1 Groundwater Contamination Risk Assessment, the owner/operator shall indicate in the site's SCP actions to be taken to contain the spill prior to leaving the downstream manhole/catch basin.

Maintenance

Maintenance responsibility shall be vested with the owner or authorized operator. At a minimum, a maintenance plan shall include the following components:

- Sediment shall be removed when it reaches a depth equal to 50% of the water-quality depth. A visual inspection shall be conducted at least once per year.
- The sand filter shall be replaced, if the swale fails to infiltrate.
- If a pollutant spill occurs, permeable soil shall be removed and disposed in accordance with applicable regulations. Clean permeable fill shall replace it.
- Eroded and barren areas shall be re-vegetated as soon as possible. Trash and debris shall be removed on a regular schedule. Outlets and underdrain outlets shall be inspected annually.

6.3 PROPRIETARY STORMWATER TREATMENT SYSTEMS

General information regarding stormwater treatment systems are contained within the Site Plan Review Application packet, including examples of "vertical flow" (e.g., catch basin inserts) and "horizontal flow" (swirl concentrator) systems, general maintenance overview, Stormwater Treatment Unit Inspection Report, and limited vendor contact information for stormwater treatment products and treatment unit cleaning/vacuuming.

Catch Basin/Inlet Inserts

Only small sites are allowed to use catch basin/inlet inserts that provide treatment through vertical (gravity-based) flow only. These systems require a suitable treatment media (filter) for the subject

pollutants at the site. Typically, these systems are used on small higher-risk sites (e.g., gasoline stations or larger parking lots) where the larger hydrodynamic separators are not practical. Detailed hydraulic calculations shall be provided to demonstrate that the system will treat the first flush and have the capacity to allow flows from the 10-year storm to pass without causing surface ponding.

Hydrodynamic Separators

Many proprietary stormwater systems may not achieve full spill containment volumes as a stand-alone practice. Proprietary stormwater treatment systems can be used alone or in combination with other BMPs to meet the treatment criteria. Septic tanks and other proprietary systems that do not prevent re-suspension of solids or oils are not allowed. Acceptable proprietary stormwater treatment systems must have the following characteristics:

Controls

- The bypass overflow shall be designed to convey, at a minimum, the 10-year storm. The outlet from the device shall not be submerged under normal conditions.

Geometry

- The geometry of the proprietary stormwater treatment system shall promote the trapping of sediments and capture slug pollutant loads from accidental spills of regulated substances.
- The portion of the device used for spill containment shall be a wet basin with waterproof bottom and sides to the design volume elevation.
- The overflow control for the proprietary stormwater treatment system shall be sized to pass the 10-year rainfall event without releasing trapped sediments and captured pollutants.
- The proprietary stormwater treatment system shall be designed to prevent surcharging in pipes upstream from the system.

Public Safety

- Proprietary stormwater treatment systems may be reviewed by the City for public safety.

Maintenance

Maintenance responsibilities shall be vested with the owner or authorized operator. At a minimum, the maintenance program shall include the following components:

- The device shall be inspected quarterly for sediment buildup and spill accumulations.
- Semi-annual cleaning shall be conducted by an approved vacuum truck service or in accordance with manufacturer's recommendations.
- Documentation of inspections and maintenance of the device shall be submitted to the Environmental Services Division annually and after spill events.

7.0 NONCONFORMING LAND USES

A nonconforming use is defined as any existing use that, as of the effective date of the WHP Overlay Ordinance, would otherwise be prohibited within a designated Capture Zone.

7.1 CONFORMANCE WITH STANDARDS

Existing nonconformities will be allowed within a capture zone only if in accordance with Chapter 9 “Nonconformities” of Appendix A (Zoning Ordinance) of the City of Kalamazoo’s Code of Ordinances.

In addition, nonconforming land uses pursuant to the WHP Overlay Ordinance must meet the requirements of the Standards established in this document and/or shall prepare an Environmental Services Division-approved SPC within two years from the adoption date of the WHP Overlay Ordinance or one year from the date of contact from the City regarding recognition of nonconforming status, whichever is sooner. The City reserves the right to approve/determine which option(s) is to be implemented for the specific circumstance.

7.2 SPILL CONTINGENCY PLAN

Proposed land uses that are allowed within the 10-Year Capture Zones that have in possession regulated substances in quantities exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for solids are required to conform to the specific land use standards within this document and/or have a SCP for the site. In addition, nonconforming land uses within any Capture Zone are also required to conform to these standards and/or have a SCP within two years of the adoption of the WHP Overlay Ordinance. An example template of a SCP is provided in Attachment 2. Any existing SCPs for the site may be submitted to the Environmental Services Division for review and approval to meet these requirements, as discussed in Section 7.2.5.

Finally, a SCP may be required if the proposed land use poses a direct or potential significant adverse impact to a surface water feature, such as a river, stream, pond, lake, or wetland.

7.2.1 REGULATED SUBSTANCE INVENTORY

It is recommended that a business keep an inventory that identifies all regulated substances stored at the site in containers exceeding either 10 pounds for liquids or 100 pounds for solids. For each regulated substance, the inventory should identify the type of storage container, storage location(s), and typical and

maximum storage quantities in each storage location. The site should maintain a file of current Material Safety Data Sheets (MSDS) that includes the hazardous components and percentage by weight of each regulated substance on the inventory. This MSDS file should be readily accessible in the event of an emergency. Section 3.0 of the SCP template (Attachment 2) provides an example table that can be used for a Regulated Substance Inventory.

7.2.2 RELEASE POTENTIAL ANALYSIS

The site should develop a written analysis of the potential for a release of each regulated substance stored at the site. This analysis should consider the potential for release during transfer of the regulated substance to and from the storage area, during storage of the regulated substance, and during use of the regulated substance. In addition, the site should evaluate the likely size of a release for each scenario, as well as the likely destination of the release (e.g., to a floor drain, sump, storm drain, etc.). The information may be compiled in table form for ease of data compilation and use. An example table is found in Section 4.0 of the SPC (Attachment 2).

7.2.3 RELEASE PREVENTION MEASURES

Considering each potential release identified as part of Section 7.2, the site should identify in writing release prevention measures that will minimize the likelihood and/or reduce the impact of such a release at the site. These measures could include work practices, housekeeping practices, inspection practices, and/or structural controls (e.g., secondary containment). These prevention measures may be included in the example table found in Section 4.0 of the SCP (Attachment 2).

7.2.4 RELEASE RESPONSE PROCEDURES

The SCP should identify procedures to be followed in the event of a release of a regulated substance. Written procedures should be established both for minor releases, which pose no danger to health or the environment and can be handled by trained employees in the immediate vicinity of the release, and for significant releases that have one or more of the following characteristics:

- The spill cannot be contained safely by site personnel.
- Sufficient resources are not available at the site to contain the spill.
- The spilled material has entered the site's drain system (sanitary or storm) and cannot be contained.
- The spilled material has entered site soils or a vegetated area.

In addition, the SCP should include the following:

- Identification of responsibilities of various site personnel in the event of an emergency.
- Internal site emergency notification procedures (chain-of-command reporting).
- Emergency contact information, including, at a minimum:
 - Key site personnel/emergency coordinators.
 - At least one 24-hour emergency contact.
 - Local emergency response agencies (e.g., police department, fire department, ambulance).
 - Local, state, and federal environmental agencies.
 - At least one spill response contractor able to respond to the site in the event of a significant spill.
- An inventory of onsite spill response equipment.

The SCP should also address methods to determine proper disposal of waste generated by a release of regulated substances. Section 5.0 of the template SCP (Attachment 2) provides an example format to document release response procedures.

7.2.5 USE OF OTHER EMERGENCY RESPONSE PLANS

Many sites using or storing regulated substances are required under state or federal environmental laws to develop a written spill response plan, such as a Pollution Incident Prevention Plan (PIPP) or a Spill Prevention Control and Countermeasure (SPCC) Plan. Sites may also be required to prepare a Hazardous Waste Contingency Plan or Stormwater Pollution Prevention Plan (SWP3). Provided that all of the elements described above are included in one or more existing emergency response plans, the site may substitute the existing plan(s) for the SCP. If the existing plan(s) addresses part, but not all, of the requirements detailed in Sections 7.1 to 7.2.4, the site may prepare an addendum to the existing plan(s) so that all requirements are met.

8.0 POTENTIALLY APPLICABLE ENVIRONMENTAL REGULATIONS

Facility operators subject to regulation under the WHP Overlay Ordinance must comply fully with all existing applicable federal, state, and local regulations in addition to any of the requirements established in this WHP Overlay Ordinance. These requirements include, but are not limited to, material storage, spill prevention, recordkeeping, emergency response, transport, and disposal of hazardous substances, hazardous wastes, liquid industrial waste, or other potentially polluting materials. No discharge to surface water or groundwater, including direct and indirect discharges of waste, waste effluent, wastewater, pollutants, or cooling water, shall be allowed without approval from federal, state, county, and local agencies. The project and related improvements shall be designed to protect land and water resources from pollution, including pollution of soils, groundwater, rivers, streams, lakes, ponds, and wetlands.

The following regulations mandate storage specifications or planning practices that could affect site plan design. This is not an exhaustive list of environmental regulations that might apply to a particular industry or site, but these regulations are likely to affect a broad range of commercial and industrial sites seeking site plan review.

8.1 STORAGE TANKS

8.1.1 ASTs

The MDEQ regulates ASTs containing flammable or combustible liquids (flash point less than 200 degrees Fahrenheit). ASTs that meet one or more of the following conditions must undergo site plan review by the MDEQ Storage Tank Division:

- Any location used for dispensing flammable compressed natural gas or liquefied petroleum gas (LPG) into other containers or vehicles.
- Any facility with a LPG tank capable of holding 2,000 gallons of water or two or more tanks with an aggregate water capacity of 4,000 gallons.
- Any single tank storing 1,100 gallons or more of a flammable or combustible liquid.

At least 30 days prior to installation of a regulated AST, the facility must submit to the MDEQ an Application to Install an AST, which provides details to the MDEQ such as the AST's location, secondary

containment, construction, corrosion protection, piping, vents, pumps, overfill protection, dispenser, emergency break-away device, and physical protection. A site plan also must be submitted that depicts information including building locations, roads, property lines, storm sewers, sanitary sewers, surface waters, wetlands, and nearby existing ASTs and USTs.

ASTs containing less than 1,100 gallons of a flammable or combustible liquid are required to comply with the technical requirements of the rule, but are not required to undergo site plan review by the MDEQ. All regulated ASTs located in the Capture Zones must have secondary containment.

Regulated ASTs that have not been in service for greater than 12 months are required to be closed. The MDEQ must be notified at least 30 days before closure. To permanently close the AST, the tank must be emptied and cleaned of all liquid and sludge, must be rendered vapor-free, and must be safeguarded from trespassing. Piping that is permanently removed from service is required to be emptied of all liquids and sludge, be purged and capped, or removed from the ground.

ASTs must also meet all local fire code requirements.

8.1.2 USTs

USTs are regulated in Michigan by Part 211 Rules. A regulated UST is defined as a UST or combination of USTs and underground connected piping that have at least 10% of their volume underground and are, were, or may have been used to contain a Comprehensive Environmental Response Compensation and Liability Act hazardous substance or a liquid petroleum product. USTs that are not regulated include USTs storing heating oil for consumptive use on the premises where the tank is located, USTs holding a regulated hazardous waste, and USTs with a capacity of 1,100 gallons or less used for noncommercial purposes.

Major requirements for new regulated USTs include:

- Registration with the MDEQ.
- Review of installation plans by the MDEQ.
- USTs installed in a Capture Zone must have secondary containment.
- USTs must have provisions for spill protection, overfill prevention, corrosion protection, and release detection.

Major requirements for UST closures include:

- Notifying the MDEQ of the closure.
- Removing all permanently closed UST systems from the ground, unless prohibited by the proximity of buildings or other structures. In cases where a permanent structure is above or near the UST, the UST system may be closed in place by filling it with an inert material, such as concrete.
- Conducting a site assessment incorporating environmental sampling upon tank closure.
- Implementing closure procedures when a material in the UST is changed from a regulated substance to a non-regulated substance.

USTs are required to be secondarily contained within the City's Capture Zones.

8.2 MATERIAL STORAGE

8.2.1 SPCC PLAN

As detailed in 40 CFR Part 112, sites are subject to the SPCC rules if (1) they store either more than 1,320 gallons of petroleum products aboveground or greater than 42,000 gallons of petroleum products underground and (2) they present a reasonable risk to a navigable water of the United States (including via stormwater and groundwater).

Major requirements for sites subject to the SPCC rules include the following:

- Preparation of a SPCC Plan that details site oil storage, spill potential, and emergency response and notification procedures. The SPCC Plan must be in place before the facility begins operations and is required to be certified by a registered Professional Engineer.
- Secondary containment of all oil storage containers.
- Secondary containment of bulk loading/unloading areas.
- Fully fencing the site or providing equivalent security through other means.
- Training oil-handling staff regarding applicable regulations and the contents of the SPCC Plan.

- Conducting periodic inspections of oil storage containers.

8.2.2 MICHIGAN PART 5 RULES AND PIPP

The Michigan Part 5 Rules govern the storage of oils and other polluting materials, including chemicals and salt. Sites are subject to the Part 5 Rules if they store polluting materials above established threshold management quantities (TMQs), which are:

- Salt in solid form at quantities of five tons (10,000 pounds) or more.
- Salt in liquid form at 1,000 gallons or more.
- Petroleum products in an AST or container with a capacity of 660 gallons or greater or an aggregate aboveground storage capacity of 1,320 gallons.
- All other polluting materials specified in Part 5 that are used, stored, or otherwise managed in a discrete outdoor location, with a total storage quantity of 200 kilograms (kg) (440 pounds) or more.
- All other polluting materials specified in Part 5 that are used, stored, or otherwise maintained at a discrete indoor location, with a total storage quantity of 1,000 kg (2,200 pounds) or more.

Major requirements for sites subject to the Part 5 Rules include the following:

- Preparation of a PIPP, which includes a polluting material inventory, a site diagram depicting the locations of polluting materials, emergency response procedures, and secondary-containment details.
- Providing secondary containment for any area where the TMQ is exceeded.

8.3 WASTES AND DISCHARGES

8.3.1 LIQUID INDUSTRIAL WASTE

Nonhazardous liquid wastes, such as certain off-specification or obsolete chemical products, industrial wastewater, used oil that will be recycled, sewer clean-out residue, and grease trap clean-out residue are

considered liquid industrial waste. There are no time limits or specific container requirements for the accumulation of liquid industrial waste. However, facilities that manage liquid industrial waste must:

- Label containers with its contents.
- Manage the material in a manner that protects the environment.
- Protect containers from weather, fire, damage, and vandalism.
- Keep the container's exterior free from residue.
- Obtain an identification number.
- Use a manifest for shipping the material offsite and hire a permitted and registered transporter.

8.3.2 HAZARDOUS WASTE

Wastes are considered to be hazardous if they are listed waste types or if they exhibit specific hazardous characteristics. A facility's hazardous waste generator status is determined by the total quantity of hazardous waste generated and accumulated at the site during any month. Following is a summary of the three generator statuses and some of their major requirements:

- A conditionally-exempt, small-quantity generator generates less than 220 pounds of nonacute hazardous waste per month. There is no time limit for how long hazardous waste can accumulate, but the site cannot accumulate more than 2,200 pounds or more at one time.
- A small-quantity generator generates at least 220 pounds, but less than 2,200 pounds of nonacute hazardous waste per month, or less than 2.2 pounds of acute hazardous waste per month. A small-quantity generator may accumulate waste for up to 180 days (or 270 days if the waste must be transported more than 200 miles), but no more than 13,200 pounds of hazardous waste can be accumulated at one time. Secondary containment is required for liquid storage volumes exceeding 2,200 pounds, as well as for certain listed wastes (F020, F021, F022, F023, F026, and F027).
- A large-quantity generator generates more than 2,200 pounds of nonacute hazardous waste per month, or greater than 1 kg of acutely hazardous waste per month. Large-quantity generators may accumulate waste for up to 90 days. Secondary containment is required for any amount of liquid hazardous waste, as well as for the above-mentioned "F" wastes. Large-quantity generators must prepare a written Waste Containment Plan.

All hazardous waste generators must store hazardous waste in a manner that prohibits a release to soil, surface water, groundwater, or into drains or sewers. Sites must also meet the City Fire Marshal's isolation distances from property lines for flammable and combustible wastes.

8.3.3 GROUNDWATER DISCHARGE

Groundwater discharge in the State of Michigan, which includes most discharges of wastewater to the ground or groundwater, is regulated by the Part 22 Rules of Part 31 of Act 451. Groundwater discharge permitting obligations vary from situation to situation. Certain discharges, such as discharge of sanitary sewage at a rate of less than 1,000 gallons per day, are completely exempt from MDEQ authorization. Other discharges, such as the discharge of noncontact cooling water without additives, require notification to the MDEQ by completing a Groundwater Discharge Authorization Application. The applicant is authorized to discharge upon the MDEQ's receipt of an adequate and complete application. Other specific types of discharges, such as the discharge of less than 10,000 gallons per day of noncontact cooling water containing additives, are required to notify the MDEQ, as well as certify the site is authorized to discharge. Other discharges, such as sand and gravel wash water, are required to obtain a general permit by completing the groundwater discharge authorization application. Most other groundwater discharges, which are generally more complex or higher volume, require a site-specific permit. Information required to obtain this permit may require a site to complete a hydrogeological investigation.

8.3.4 SURFACE WATER DISCHARGE

Discharges of surface water are regulated by the federal Clean Water Act and, in Michigan, Part 31 of Act 451. A regulated surface water discharge requires a NPDES permit, which is issued by the MDEQ-Water Division. Certain common discharges to surface water, such as stormwater (discussed separately below) and noncontact cooling water, must acquire a Certificate of Coverage under a general permit. Discharges that do not meet criteria for the general permit must obtain individualized permits based on the type of wastewater, type of treatment, and the receiving water.

8.3.5 STORMWATER DISCHARGE

Facilities are required to obtain a stormwater discharge permit for industrial activity, if the site has a SIC code with the first two digits 20 through 39 (manufacturers), the facility stores finished waste or raw materials outdoors, and there is a point source discharge of stormwater runoff from the property to a surface water feature. Sites meeting these conditions must obtain a stormwater permit by submitting a Notice of Intent to the MDEQ. To obtain a stormwater permit, the site must have a Certified Stormwater Operator, eliminate any unauthorized non-stormwater discharges, and develop and implement a SWP3. The SWP3 details the site's potential sources of stormwater pollution and the nonstructural and structural

controls used at the site to help prevent stormwater pollution. The general permit must be obtained before the site begins operating.

Sites that discharge stormwater from a secondary-containment structure that is required by state or federal law, sites on the State of Michigan List of Sites of Environmental Contamination, or from other sites the MDEQ deems a particular risk to stormwater quality are required to obtain a General Stormwater Permit With Required Monitoring for pollutants.

Construction activities that disturb five or more acres of land and have a point source discharge of stormwater to waters of the state are required to obtain permit coverage via the MDEQ's Permit-By-Rule Program. Once a soil erosion and sedimentation control permit is obtained from the Kalamazoo County Drain Commissioner, sites must submit a completed Notice of Coverage form and a location map to the MDEQ. As a requirement of permit coverage, each construction activity is required to have its soil erosion and sedimentation control measures inspected on a regular basis by a Certified Stormwater Operator.

9.0 CONTAMINATED PROPERTIES

9.1 PART 201

Part 201 of Michigan Act 451 regulates sites of environmental contamination in Michigan. Under Part 201, a person who owns or operates a contaminated property is responsible for taking certain actions to address the contamination, if they have caused said contamination. Additionally, Part 201 requires persons who own or operate contaminated property to exercise “due care” with respect to the property’s contamination. These due care obligations ensure that a property is used in a way that protects public health and safety and does not exacerbate the contamination. In most situations, due care obligations apply even if the owner/operator is not responsible for the site’s contamination. Due care obligations for owners and operators of contaminated properties include:

- Preventing exacerbation of the contamination by causing the contamination to migrate beyond the boundaries of the property or increasing response costs at the property.
- Preventing human exposure to hazardous substances, if existing conditions at the property will result in unacceptable exposure levels.
- Notifying the fire department of fire and explosion hazards, as well as mitigating these hazards.
- Taking reasonable precautions against the foreseeable actions of other people that could exacerbate the contamination or cause them to be exposed to contamination.
- Reporting discarded or abandoned containers to the MDEQ.
- Providing Notice of Offsite Migration of the contamination to downgradient property owners and the MDEQ.
- Providing notice to utility holders at the property of the presence of the contamination.
- Preparing documentation of compliance with due care obligations, such as a Due Care Plan.

Part 201 also establishes liability protection for buyers of contaminated property by a Baseline Environmental Assessment (BEA). A BEA is an evaluation of environmental conditions at the property at the time of purchase, occupancy, or foreclosure. BEAs are used to gather enough information about the

property so that a new release at the property can be distinguished from an old release. A buyer is required to conduct a BEA prior to or within 45 days after becoming the owner or operator of a contaminated facility.

9.2 PART 213

The discovery of a release from a UST triggers several critical reporting requirements. The owner/operator of the offending tank must:

- Notify the MDEQ of the release within 24 hours.
- Submit an initial assessment report to the MDEQ, within 90 days, which describes all initial abatement steps taken at the site.
- Submit to the MDEQ, within 365 days, a Final Assessment Report and Corrective Action Plan, which must describe the extent of contamination and action that will be undertaken to remediate the site, including a schedule for the remediation.

9.2.1 INITIAL RESPONSE ACTIONS

After a release has been reported under the 24-hour notice requirement, the UST owner or operator must "immediately and expeditiously" perform certain initial abatement activities. Specifically, UST owner/operators are expressly required to:

- Identify and mitigate fire, explosion, and vapor hazards.
- Prevent further releases, including removal of product from the leaking UST system.
- Identify and recover free product. If free product is first discovered after the initial 24-hour release report, the discovery of free product must be reported to the MDEQ within 24 hours of its discovery.
- Excavate and either contain, treat, or dispose any visibly contaminated soil that is likely to cause a fire hazard or spread or increase the cost of corrective action.
- Take any other action necessary to abate any immediate threat.

9.2.2 CLASSIFICATION SYSTEM

The MDEQ has established a classification system for UST site releases that evaluates their impact on the environment. Owners/operators are required to comply with the corrective action measures and reporting requirements specified earlier, regardless of how a specific site is classified. However, for anything less imminent than a Class 1 or 2 site, the owner/operator may delay corrective action with prior approval of the UST Division.

Class 1 Site. A UST with this classification represents an immediate threat to human health, safety, or sensitive environmental receptors. The following situations represent potential Class 1 Sites:

- Explosive levels or concentrations of vapors that could cause adverse health effects are present in a residence or other building.
- Explosive levels of vapors are present in subsurface utility system.
- Free product is present.
- An active public or private water supply, public water supply line, or public surface water intake is impacted or immediately threatened.
- A sensitive habitat or sensitive resource (sport fish, surface water, endangered species) is impacted and affected.

Class 2 Site. A UST with this classification represents a short-term (0 to 2 years) threat to human health, safety, or sensitive environmental receptors. The following situations represent potential Class 2 Sites:

- Potential for explosive levels or concentrations of vapors that could cause adverse health effects are present in a residence or other building.
- Shallow contaminated surface soils are open to public access and dwellings, parks, playgrounds, schools, or similar facilities that are within 500 feet.
- A nonpotable water supply well is impacted or immediately threatened.
- Impacted surface water, stormwater, or groundwater discharges within 500 feet of a sensitive habitat, resource, or surface water body.

Class 3 Site. A UST with this classification represents a long-term (>2 years) threat to human health, safety, or sensitive environmental receptors. The following situations represent potential Class 3 Sites:

- Subsurface soils are significantly impacted and depth between impacted soils and the first potable aquifer is less than 50 feet.
- Groundwater is impacted and potable water supply wells producing from the impacted interval are located more than two years groundwater travel time from the dissolved plume.
- Impacted surface water, stormwater, or groundwater discharges within 1,500 feet of a sensitive habitat, surface water body, or wetlands.

Class 4 Site. A UST with this classification represents no demonstrable long-term threat to human health, safety, or sensitive environmental receptors. Class 4 scenarios represent all other conditions that are not described in the previous three. Some examples are:

- Nonpotable aquifer with no existing local use impacted.
- Impacted soils located more that 3 feet below the ground surface and greater than 50 feet above the nearest aquifer.
- Groundwater is impacted, and non-potable wells are located downgradient, outside the known extent of the chemical of concern, and the wells produce from a nonimpacted zone.