AECOM Environment

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Alpena, Michigan

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April 30, 2012

Odor Management Plan

American Process, Inc.

Alpena, Michigan

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List of Acronyms

API	American Process, Inc.
ASB	Aerated Stabilization Basin
DAF	Dissolved Air Floatation
DPI	Decorative Panels, Inc.
DO	Dissolved Oxygen
MDEQ	Michigan Department of Environmental Quality
OMP	Odor Management Plan
ORP	Oxygen Reduction Potential
RAS	Return Activated Sludge
SDM	Sludge Dewatering Machines
VOC	Volatile Organic Compounds
WAS	Waste Activated Sludge
WWTP	Wastewater Treatment Plant

1.0 Odor Management Plan

1.1 Overview

The purpose of this Odor Management Plan (OMP) is a guidance document that describes the site-specific provisions established to manage and minimize potential odors from the Alpena Biorefinery and on-site wastewater treatment plant (WWTP) operated by American Process, Inc. The biorefinery produces cellulosic ethanol and potassium acetate deicer from a waste steam of the co-located hardboard plant operated by Decorative Panels International (DPI). The WWTP treats wastewater from both DPI's manufacturing facility and the biorefinery.

The OMP describes the measures and system controls that manage potential sources of odors. Not all operational conditions can be predicted; therefore, these recommended courses of action may vary in some situations. This OMP taken in conjunction with Table 1 discusses processes that may have potential to generate excessive odors. The section and table also describe conditions of the aerated stabilization basin (ASB) that may develop at infrequent periods that could lead to excessive odors. These conditions are identified and are associated with a corrective action.

The Alpena Biorefinery and WWTP are located within the city limits of Alpena, adjacent to residential homes, a public marina, and is near the downtown commercial district. The WWTP and biorefinery utilize materials and processes that may, under upset conditions, release odors.

As the previous operator of the WWTP, DPI originally implemented and API will continue to implement the odor abatement practices contained in this OMP to minimize and manage the release of excessive odors from the wastewater treatment plant system and the biofuel processing facility.

1.2 Odor Sources and Minimization Practices

1.2.1 Wet Filter Cake Storage

Dewatered solids, or "filter cake", composed of lignin and gypsum that is removed from the biorefinery's process stream is staged in a bunker located inside the biorefinery building prior to being transported offsite. Because the cake solids are organic solids, the pile may release an earthy smell.

The filter cake may become septic if not managed in the proper way. To minimize the generation of odors from the cake bunker, efforts are made to minimize cake storage by frequently hauling solids to the landfill or for land application. Lime can be added to the pile, as needed, to stabilize the solids and prevent septicity.

1.2.2 Primary Clarifier

The primary clarifier receives untreated process and storm water from DPI. During normal operations, wastewater flows through the basin quickly, does not become septic, and does not generate or release odors.

Odors could occur during periods of operational downtime. If wastewater would be allowed to stagnate in the clarifier for days, septic water and sludge could be formed, and, as a result, excessive odors potentially could be generated.

To minimize the generation of odors during periods of operational downtime, efforts are taken to prevent water from being held in the clarifier for extended periods. Corrective measures could include flushing the clarifier (reduce the retention time) with water from DPI's wet end, and/or removing the water and solids from the clarifier.

1.2.3 Aerated Stabilization Basin

The purpose of the ASB is to provide a vessel in which microorganisms can consume organic materials in wastewater. These microorganisms, called mixed liquor, are live single-celled organisms typically found in aquatic and moist environments. They normally smell earthy. Oxygen is added to this basin to support the growth of these organisms and prevent the basin from becoming septic.

Excessive odors could occur during periods of low dissolved oxygen (DO) and/or low oxygen reduction potential (ORP) values. Low oxygen and/or low ORP values can occur during periods of high oxygen demand, caused by peak organic loading, high mixed liquor concentration, low sludge age, and/or high temperatures. Not all odor-generating conditions can be predicted; other operating conditions may occur in the future which could contribute to excessive odor generation.

To minimize the generation of excessive odors from the ASB, efforts are taken to manage the causes of the low DO and/or ORP. Corrective measures may include the following: turn on all aerators that are available; slow down the return activated sludge (RAS) and/or recycled effluent; increase waste activated sludge (WAS); add calcium or sodium nitrate or hydrogen peroxide. If these measures do not result in measurable improvement, DPI's wet end will be shut down (cease production).

1.2.4 Sludge Storage

Holding Chest

The holding chest stores thickened mixed liquor from the dissolved air floatation (DAF) units to either be returned to the ASB or wasted by allowing it to overflow to the mixing chest. Because the chest is storing biological solids, during normal operations, the unit may release an earthy smell.

If the sludge is held in the chest for days, it may become septic and, as a result, excessive odors potentially could be generated.

Odors from the holding chest are minimized by frequently transferring solids throughout the day to the aeration basin or to the mixing chest.

Mixing Chest

The mixing chest stores thickened primary clarifier solids from the hydrosieve and thickened mixed liquor from the DAF units prior to dewatering by the sludge dewatering machines (SDM). Because the chest is storing biological solids and other organic solids, during normal operations, the unit may release an earthy smell.

If the sludge is held in the chest for days, it may become septic, and as a result, excessive odors could potentially be generated.

Odors from the mixing chest are minimized by frequently transferring solids throughout the day to the SDMs. The chest is mixed to prevent any dead spots in the tank. In addition, hydrogen peroxide or aeration of the chest can be added to provide a source of oxygen to the chest, if needed.

Wet Sludge Storage

The dewatered solids from the SDM that will be disposed by landfilling or land application may be staged on the wet sludge storage area prior to being transported. Because the cake solids are biological solids and other organic solids, during normal operations, the pile may release an earthy smell.

The sludge may become septic if not managed in the proper way. Prolonged storage, high rainfall, and warming temperatures all may combine to potentially generate excessive odors.

To minimize the generation of odors from the sludge management area, efforts are made to minimize wet sludge storage by processing solids through the sludge dryer and/or by frequently hauling sludge to the landfill or for land application. Lime can be added to the pile, as needed, to stabilize the solids and prevent septicity.

Dried Sludge Storage

The dried solids from the sludge dryer may be stored on site prior to being landfilled or burned for energy recovery in the No. 3 boiler. Because the dried solids are warm, and very low in moisture, there is a potential for them to catch fire and smolder or smoke. If the dried solids are held on the pad for an extended period, combustion may occur.

The dried solids can be removed, as needed, to minimize the opportunity for combustion to occur. In addition, the pile can be wetted, as needed, to reduce the opportunity for combustion.

1.2.5 Sludge Drying

The dewatered solids from the SDM that will be used for fuel are first dried by the sludge dryer. Off gases from this drying process are routed to the No. 1 or No. 2 boiler. The sludge dryer will not be operated unless the No. 1 or No. 2 boiler is operating and the sludge dryer exhaust can be routed to the No. 1 or No. 2 boiler, except as described below. When the No. 1 or No. 2 boiler has an unplanned outage in which the flame cannot be re-ignited within 2 hours, dryer shutdown shall be initiated. This action should be coordinated with provisions of the Preventative Maintenance and Malfunction Abatement Plan for the dryer and boiler. Conditions may also

occur where the dryer must be vented to atmosphere to clear unexpected pluggage in the control equipment piping or to address other unexpected situations. In the event such conditions may last longer than 2 hours to correct, dryer shutdown will be initiated. This action will also be coordinated with provisions of the Preventative Maintenance and Malfunction Abatement Plan for the dryer and boiler. In the event of a planned boiler outage, or other planned condition that would prevent the sludge dryer from exhausting to the No. 1 or No. 2 boiler, the sludge dryer will be shut down prior to such planned outage or condition.

1.2.6 Yard Ditches

The yard ditches collect storm water from a portion of the property including the woodyard. Storm water contains dissolved biological matter, which can be biologically reduced while being retained in the yard ditches. Biological reduction is mostly anaerobic within the ditch system and can produce odors. To prevent odors the ditches can be flushed with process water, which will divert the organic load to the primary clarifier outfall box. The load is then transferred from the clarifier outfall box to the ASB.

The odors can also be controlled chemically by adding either lime or hydrogen peroxide to the yard ditches. Lime would prevent anaerobic activity from occurring within the yard ditch system, hence eliminating the odor source. Hydrogen peroxide would be used as both an oxygen source and a biocide. This would ensure the treatment that would occur within the yard ditch system is aerobic in nature and reduce odors.

1.2.7 Fermentation and Distillation

The API and Cobalt fermentation systems generate carbon dioxide (CO_2) that contains some volatile organic compounds (VOC) which can have a sweet fermented smell. Non-condensable gases from the facility distillation system contain some ethanol and other VOCs which can have a slightly astringent alcohol odor. Reduction of the VOCs in the exhaust streams effectively reduces odor.

The exhaust from the fermentation system and distillation system are vented to a wet scrubber to reduce the concentration of VOC. The west scrubber will be in service at all times when the fermentation or distillation system is operating.

In the event of scrubber failure or shutdown, the preventive measures detailed in the API Malfunction Abatement Plan for the wet scrubber will be implemented as necessary.

1.3 Odor Management and Controls

Early detection and response is a key consideration in the management of potential odors. The facility actively monitors areas of potential odors at the wastewater treatment plant and the surrounding areas. Table 1 includes a summary of the areas monitored, the potential sources of odor within these areas, measures taken to prevent odors, measures taken to minimize odors, and the response actions to be taken if excessive odors are detected.

1.4 Notification and Reporting

1.4.1 Internal Reporting Requirements

API has developed internal reporting procedures and has developed communication protocols with DPI to ensure that excessive odors from the wastewater treatment plant are properly investigated and appropriately managed.

In the event an excessive odor is detected during normal working hours, API personnel should contact the API facility manager or designated employee immediately. The excessive odor shall be investigated to determine its probable cause and take appropriate corrective action. The incident should be recorded in a logbook and/or incident sheet.

In the event that an excessive odor occurs in evening hours or over the weekend, the facility personnel shall contact the appropriate supervisory personnel.

1.4.2 Complaint Handling Process

API has developed a process to ensure that third-party complaints relating to excessive odors from the wastewater treatment plant are properly investigated and appropriately managed.

Facility Phone Numbers

Main: 989-340-1190

Fax: 989-340-1194

Primary Contact:

Mark Szczepanik
Operations Manager
Alpena Biorefinery
PO Box 337
412 Ford Ave
Alpena, MI 49707
Alternate Contact:

Jacey Radel
Lab/Procurement Leader
Alpena Biorefinery
PO Box 337
412 Ford Ave
Alpena, MI 49707

The API facility manager or designated employee shall investigate third-party odor complaints associated with the wastewater treatment plant. The facility manager or designated employee shall contact complainant (citizen or MDNRE) to obtain a description of the event, and to determine its date and time. The facility manager or designated employee will determine if any abnormal operating conditions occurred in the wastewater treatment plant operations during the time of the event. Meteorological data will be reviewed to determine wind direction/speed and be

included in the evaluation. Corrective action for the incident will be recommended and implemented when appropriate. The investigation will be summarized and an Environmental Incident Form will be completed; and prompt follow up with the complainant will be completed, as appropriate.

Table 1 – Odor Management and Controls

Location	Source	Preventive Measures	Corrective Measures	Actions to Be Taken
Primary Clarifier	Wastewater held in basin for days	Ensure clarifier is drained and empty if DPI production is down for more than a few days Discharge "clean water" from wet end during long DPI production downtimes	Decrease retention time Flush the tank Remove solids from the bottom of clarifier	Coordinate with DPI to increase flow from the wet end Increase sludge pump speed
ASB	High oxygen demand in the basin	Ensure that all aerators are fully operational Monitor basin DO and ORP on daily basis	Increase oxygen to the basin Increase the retention time in the basin to increase the oxygen contact	Turn on additional aerators, if available Slow down RAS and/or stop recycling effluent Increase WAS Initiate chemical aeration using sodium or calcium nitrate[1] Coordinate with DPI to shut down wet end
Mixing Chest	Primary and secondary solids held in chest for days	Frequently transfer solids to the SDM Empty chest completely every day	Inject source of oxygen into the chest	Add hydrogen peroxide Or aeration of chest
Wet Sludge Storage	Primary and secondary solids held in a pile for days	Frequently transfer solids to the landfill Process all solids through the sludge dryer Empty the pile completely every day	Stabilize solids to prevent odor	Increase hauling frequency to the landfill Add lime to the pile
Sludge Dryer	Vapors released from the organic sludge	Collect and burn off gases in the No. 1 or #2 boiler The dryer is not operated unless the No. 1 or #2 boiler are operating	Collect and burn off gases in the No. 1 or #2 boiler	If boiler goes down for 2 hours or more, shut down sludge dryer