Written Guidance For Preparation Of Emergency Action - Electric Power Failure Plans

I. INTRODUCTION:

NPDES Discharge Permits require that in the event the primary source of electric power to a wastewater treatment facility and/or pump station fails, any discharge into the receiving waters shall receive at least primary treatment plus disinfection (and dechlorination, if applicable). To comply with this requirement, it may be necessary that the treatment facility and/or pump station be provided with either an alternative source of power or the capacity to store the wastewater volume that would be generated over the duration of the longest failure that would have affected the facility in the last five years (See Section II.D.3. for further discussion on longest power failure).

To assure that the necessary infrastructure and equipment is provided for extended power outages, each facility needs to develop a detailed written power failure plan.

The following written guidance is provided for use when preparing a response to the permit condition. Periodic updating of the electric power failure plans will be necessary to account for new connections and increased loading to the treatment facility and pump stations. Such an update will be required each time the Discharge Permit for a facility is renewed. Electric power failure plans may be prepared by a facility chief operator, a municipality's public works director/engineer, or an engineering consultant. In cases where the wastewater treatment facility and collection system (including pump stations) are overseen by two different sections of a municipality's Public Works Department, it is essential that both sections be consulted and involved in the preparation of the power failure plan.

II. WASTEWATER TREATMENT FACILITIES:

A. Primary Treatment

Primary treatment during power outages will be maintained at most facilities by means of settling across existing septic tanks, lagoons, aeration tanks, and clarifiers. In the rare instance wherein primary treatment will not be maintained across the existing treatment facility, arrangements will need to be made to provide sufficient dedicated emergency storage volume to accommodate the sewage flow that would be received over the duration of the longest power outage, or an engine-driven emergency power generator needs to be provided for the treatment facility.

B. Influent and Intermediate Pumping

Facilities with influent pumps or an intermediate pumping system (such as primary effluent pumps) need to be equipped with an engine-driven emergency power generator, or sufficient emergency storage volume upstream to accommodate the sewage flow that would be received over the duration of the longest power outage.

Alternatively, arrangements could be made to provide portable emergency pumping equipment or an engine driven pump which would be operated in the event of a power outage. In this case an assessment would need to be made as to the "response time", that is, the time it normally takes the operators to:

1) be notified of the power outage,
2) arrive at the treatment facility,
3) set up the emergency pumping equipment, and
4) initiate the emergency pumping.

Sufficient emergency storage volume will need to be provided in dedicated tankage to accommodate the sewage flow that would be received during the response time. Dedicated tankage could consist of the available storage volume above the high water alarm level in the wetwell or the storage volume provided in an overflow tank. Assurance must be provided to the Wastewater Management Division that all necessary equipment is available at the facility and fully operational at all times.

C. Disinfection

1. Disinfection systems, utilizing chlorine gas (and sulfur dioxide gas for dechlorination) must be provided with a reliable carriage water supply during power outages. This may be achieved through the use of a municipal water supply system as long as the water supply remains fully operational during power outages or through use of a plant water system powered by an emergency generator at the treatment facility.

2. Disinfection systems utilizing liquid sodium hypochlorite (and liquid dechlorination chemical) must be equipped with a battery backup power supply for the chemical feed pumps or the feed pumps need to be connected to an emergency power generator for the treatment facility.

3. Treatment facilities utilizing ultraviolet (UV) light for disinfection need to be equipped with an engine-driven emergency power generator with sufficient capacity to provide power for the entire treatment process so that the Total Suspended Solids (TSS) concentration of the final effluent is maintained at a level which assures effective disinfection through the UV system.

   The ability of a UV disinfection system to provide effective disinfection is highly dependent on the TSS concentration of the final effluent being discharged. As a result, full secondary treatment, and in some cases tertiary treatment, will need to be maintained to assure effective disinfection. Effective disinfection cannot be maintained at primary treatment levels.

   The criteria for facilities with ultra-violet (UV) disinfection will be evaluated on a case by case basis, taking into consideration the original design of the treatment facility, the anticipated cost associated with conforming with the above criteria, and any other extenuating factors.

4. If the criteria established in items #C.1., C.2. or C.3. are not provided at the treatment facility and effective disinfection (and dechlorination, if applicable) cannot be maintained during a power outage, arrangements need to be made to provide sufficient emergency storage volume upstream of the disinfection system to accommodate the sewage flow that would be received over the duration of the longest power outage.

D. General

1. The wastewater treatment facility must be equipped with an alarm/dialer system or some other means of alerting the operators of a power outage, and the alarm/dialer system must remain operational during a power failure. This is typically accomplished by providing a battery powered back-up power supply for the system. It is recommended that the alarm system be routinely tested for proper operation.

2. Engine-driven emergency power generators at a wastewater treatment facility should be equipped with automatic start up and load transfer capabilities. Should a portable emergency generator be used, or if the generator is not equipped with automatic start up and load transfer capabilities, sufficient emergency storage volume would need to be provided to accommodate the sewage flow that would be received during the response time for the operators. The "response time" in this case consists of the time for the operators to:

   a) be notified of the power outage.
   b) arrive at the treatment facility, and
   c) set up and activate the portable generator.

   It is recommended that emergency power generating equipment be routinely exercised under load to assure proper operation.

3. The **longest power outage** for a particular treatment facility is defined as the longest power outage that would have affected the facility in the last five years, excluding catastrophic events such as wide spread winter ice storms (1998) or severe wind storms (Hurricane Floyd 1999). The duration of the longest power outage should be established based on information provided by the power company which serves the facility and a letter from the power company must be included with the submittal.

4. Complete design calculations need to be provided to substantiate the required and available emergency storage volumes for the various situations discussed above. Available storage volumes can be determined with some degree of accuracy from the record drawings for the facility. Required storage volumes can be estimated from the instantaneous flow rate (in gallons per minute (gpm)) to the treatment facility and the duration of the longest power outage or response time. The instantaneous flow rate can be established from influent and/or effluent flow metering records during spring time wet weather conditions.

5. In some cases, additional emergency storage volume may be gained by surcharging the sewage collection system, providing sewage does not back up into connected buildings or overtop sewer manholes, or go out system relief overflows.

6. Another alternative for maintaining treatment and disinfection during power outages would be to connect the treatment facility to two independent utility substations. The switchover between power grids shall be automatically activated when any phase of the power supply fails or upon any fluctuation in voltage.

III. SEWAGE PUMP STATIONS:

A. Dual Power Sources

Emergency pumping capability may be accomplished by connection of the pump station(s) to two independent utility substations. The switchover between power grids shall be automatically activated when any phase of the power supply fails or upon any fluctuation in voltage.

B. Emergency Storage Volume

Sufficient emergency storage volume must be provided above the high water alarm level in pump station wet well and below any overflow points, to accommodate the sewage flow that would be generated over the duration of the longest power outage. Additional emergency storage volume may be accounted for by surcharging the sewage collection system, providing sewage does not back up into connected buildings or over top sewer manholes, or go out system relief overflows.

C. Emergency Power Generators

Engine-driven emergency power generators at pump stations should be equipped with automatic startup and load transfer capabilities. Should a portable generator be provided, or if the generator is not equipped with automatic start up and load transfer capabilities, sufficient emergency storage volume must be provided above the high water alarm level in the pump station wet well to accommodate the sewage flow that would be received during the response time for the operators. This "response time" consists of the time for operators to:

1) be notified of the power outage,
2) arrive at the storage location for the generator,
3) retrieve the generator and transport it to the pump station, and
4) set up and activate the portable generator.

In the case of multiple pump stations, a detailed written standard operating procedure needs to be established to prioritize the dispatchment of the portable generator(s) to the pump stations. The prioritization should be based on a combination of the actual hydraulic loading to the stations and the emergency storage volume available above the alarm level in the stations.

Assurance must be provided to the Wastewater Management Division that all necessary equipment is available and fully operational at all times. It is recommended that emergency power generating equipment be routinely exercised under load to assure proper operation.

D. Pumping and Trucking

Where arrangements are being made to implement pumping and trucking of sewage from pump stations in the event of a power outage, a detailed written standard operating procedure needs to be established to prioritize the pumping of stations. In the case of multiple pump stations, the prioritization of station pumping should be based on a combination of the actual hydraulic loading to the stations, the emergency storage volume available above the high water alarm level in each station wet well, and the configuration of the power grids. Sufficient emergency storage volume must be provided above the alarm level in the wet wells to accommodate the sewage flow that would be received during the response time for the operators. The "response time" in this situation consists of the time for the operators to:

1) be notified of the power outage,
2) arrive at the storage location for the pumper truck (or to notify a contract hauler, if that is to be the case),
3) retrieve the pumper truck and travel to the first pump station to be pumped down (likewise for a contract hauler), and
4) set up and sequentially pump down the various pump stations, allowing for return trips to empty the pumper truck at the treatment facility.

Assurance must be provided to the Wastewater Management Division that all necessary equipment is available and fully operational at all times.

E. Portable Emergency Pumping

In cases where portable emergency pumping equipment is proposed or an engine driven pump is provided at sewage pump stations in the event of a power outage, sufficient emergency storage volume must be provided above the high water alarm level in the pump station wet well to accommodate the sewage flow that would be received during the response time for the operators. The "response time" consists of the time for the operators to:

1) be notified of the power outage,
2) arrive at the storage location for the portable pumping equipment, or at the pump station if an engine driven pump is provided,
3) retrieve the portable pumping equipment and transport it to the pump station, and
4) set up and activate the portable pumping equipment.

Assurance must be provided to the Wastewater Management Division that all necessary equipment is available and fully operational at all times.

In the case of multiple pump stations, a detailed standard operating procedure needs to be established to prioritize the dispatchment of the portable pumping equipment to the pump stations. The prioritization should be based on a combination of the actual hydraulic loading to the stations and the emergency storage volume available above the alarm level in the stations.

F. General

1. Pump stations need to be equipped with an alarm/dialer system or some other means of alerting the operators of a power outage, and the alarm/dialer system must remain operational during a power failure. It is recommended that the alarm system be routinely tested for proper operation.

2. The **longest power outage** for sewage pump stations is defined as the longest power outage that would have affected a station in the last five years, excluding catastrophic events such as wide spread winter ice storms or severe wind storms. The duration of the longest power outage shall be established based on information provided by the power company which serves the station, and a letter from the power company must be included with the submittal.

3. Complete design calculations must be provided to substantiate the required and available emergency storage volumes for each sewage pump station. Available storage volumes may be established from record drawings for the pump stations or from field measurements of the wetwell compartment. The required storage volumes can be established from the instantaneous flow rate (in gpm) to the pump stations during spring time wet weather conditions and the duration of the longest power outage or response time. The instantaneous flow rate to the pump station can be determined from daily pump hour meter readings and the discharge rating of the pumps, and should be based on the daily flow volume being delivered over a 16 hour period. The discharge rating of the pumps should be established based on the results of a drawdown test, and it is recommended that the pumps be calibrated annually.