

WRF Emission Reduction Study

Offsite odor impact around a wastewater reclamation facility must be reduced.

By Scott A. Aurit

The 97-mgd Des Moines Regional Wastewater Reclamation facility (WRF) services most of the greater Des Moines metropolitan area. The WRF is located in Southeast Des Moines and was built in the mid-1980s. In addition to wastewater delivered through the collection system, it treats a significant volume of hauled liquid wastes delivered by truck.

There is a future need to reduce offsite odor impacts around the WRF. Current plans for the surrounding area include the development of a business park to accommodate new value-added agribusiness research and production facilities, major roadway improvements making the MLK/SE Connector a primary corridor into the downtown area, and extension of the Des Moines River trail system past the reclamation facility.

The emission reduction study presents a plan to strategically abate WRF

emissions to economically avoid future issues. The plan, under development for nearly a year, is based on:

- Field screening
- Long term air quality monitoring
- Short term intensive sampling of WRF emission sources
- Dispersion modeling of emissions to assess offsite odor impacts
- Development, screening, and evaluation of control alternatives
- Site visits with WRF staff to similar operating facilities

A broad range of source, preventive, and “contain and treat” emission control strategies were considered in developing and evaluating the most cost-effective solution. Among these strategies were: activated carbon and other sorbent scrubbers, thermal oxidation, combustion turbine, air ionization, chemical

scrubbers, organic biofilters, and inorganic biofilters. These various strategies were evaluated based on multiple cost and non-monetary factors. Site visits to observe similar operating emissions control facilities in Fort Worth, Denver, and Chicago were also a part of the decision making process.

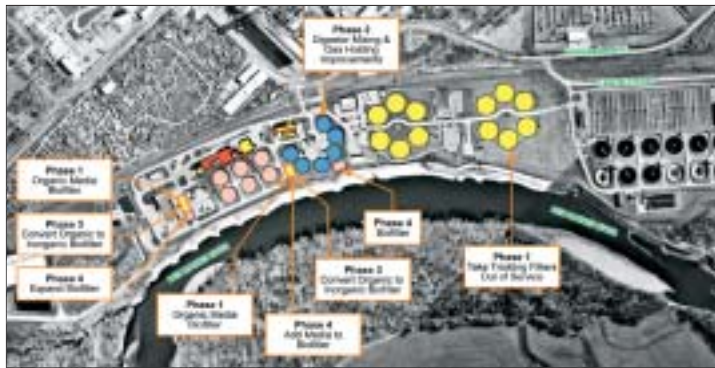
A phased approach was recommended to systematically reduce emissions to achieve offsite odor levels consistent with short- and then long-term objectives as the area around the WRF develops. To minimize costs, the phased implementation plan focused on the highest emitting, currently contained sources, and deferred attention from lower emitting, large uncontained area sources. The recommended plan consists of four phases:

PHASE 1, currently under construction and expected to be completed this summer, will control emissions from hauled waste, belt filter press, and preliminary treatment sources. WRF staff has already taken the trickling filters out of service during normal dry weather operation as the first element in implementing Phase 1. Two organic media biofilters using composted wood chips from the Metropolitan Waste Authority’s Harriet Street Compost Facility will be constructed, one west of the future primary clarifiers and the second just west of the digesters. The associated capital and operations and maintenance costs are estimated at \$3 million and \$66,000 per year, respectively.

PHASE 2, scheduled for completion in 2009, will control emissions associated with digester roof and pressure relief valves. It is a component of the previously planned and budgeted digester mixing and gas holding improvements



Development around the Des Moines Regional Wastewater Reclamation Facility mandates the reduction of offsite odor impacts.



Four phases of odor reduction at the Des Moines Regional Wastewater Reclamation Facility.

project. As such, no additional capital or operations and maintenance costs have been attributed to Phase 2.

PHASE 3, not yet scheduled, will control emissions from residuals processing, grit conveying, pump discharge, and solids processing sources. The two biofilters constructed in Phase 1 will be converted from organic to inorganic media to provide the additional capacity. Because additional structures are not required, Phase 3 can be implemented quickly in response to the need to do so. The associated capital and operations and maintenance costs are estimated at \$3.5 million and \$78,000 per year, respectively.

PHASE 4, also not yet scheduled, anticipates the need to further control off site odor levels and/or further reduce onsite odor levels. It will control emissions from the primary clarifiers. Phase 1 biofilters will be expanded and a new biofilter will be constructed east of the digesters. The associated capital and operations and maintenance costs are estimated at \$10 million and \$98,000 per year, respectively.

The plan also includes recommendations that WRF consider 1) including temporary facilities in Phase 1 to enable assessment of the potential to control primary clarifier emissions through seasonal addition of iron salts, thereby avoiding the need for Phase 4, and 2) a full scale trial of chemical addition in the Southside Interceptor and Four Mile Sewers to seasonally control sulfide generation, thereby reducing hydrogen sulfide related corrosion and odors in those sewer systems. The latter will become increasingly important as the collection system is extended to the west and

northwest.

No specific implementation timeline has been established. However, WRF should proceed with implementation of Phases 1 and 2 and defer

implementation of Phases 3 and 4 depending on the timing and nature of development in the surrounding area.

Working with WRF staff, a short term goal for offsite odor levels was set at 100 Detection Threshold (DT), ten hours per year, meaning that offsite odor levels should not exceed 100 times the detection threshold more than ten hours

per year. Similarly, a long term goal for offsite odor levels was set at 20 DT, ten hours per year, meaning that offsite odor levels should not exceed 20 times the detection threshold more than ten hours per year. The short-term goal is felt to be consistent with current development in the surrounding area; whereas, the long-term goal is felt to be consistent with potential future development in the surrounding area.

Dispersion modeling indicates that Phase 1 will achieve WRF's short-

term goal, eliminating offsite odor levels above 100 DT, ten hours per year. Taking the trickling filters out of service during normal operations has already reduced offsite odor levels, effectively reducing the offsite area impacted by odor levels at the short-term goal from about 78 to about 20 acres.

Dispersion modeling also indicates that Phases 1 and 2 will nearly achieve WRF's long-term goal, reducing the offsite area impacted by odors above the long-term goal from about 944 to about ten acres. Phases 3 and 4 will further reduce offsite impacts and/or reduce onsite odor levels as well. GE

Mr. Aurit, P.E., is with HDR Engineering, Inc. and can be reached at scott.aurit@hdrinc.com.

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Reducing impact area of offsite emissions: short term goal.



Reducing impact area of offsite emissions: long term goal.