PROPOSED

Significant Modification to a Covered Source
Permit Review Summary

Application File No.: 0216-09 (Significant Modification)

Permit No.: 0216-06-C

Applicant: City and County of Honolulu
Department of Environmental Services

Facility Title: Sand Island Wastewater Treatment Plant
Located at 1350 Sand Island Parkway, Honolulu, Oahu
UTM: 615,900 m E; 2,356,500 m N / NAD 83

Mailing Address: City and County of Honolulu
Department of Environmental Services
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Responsible Official: Dr. Eric S. Takamura
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Plant Manager: Mr. John Poe Tyler
In-Vessel Bioconversion Facility Plant Superintendent
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Point of Contact: Mr. Jim Morrow
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Application Dates: December 5, 2006; additional information dated March 5, 2007 and March 14, 2007

Proposed Project:

SICC 4952

The applicant is proposing to modify the existing permit for the In-Vessel Bioconversion Facility (Covered Source Permit No. 0216-06-C) by adding a new alternate operating scenario to allow the foul air from the Wet Sludge Storage Tanks (WSST), which is a part of the Sand Island Wastewater Treatment Plant, to be processed by the In-Vessel Bioconversion Facility's Building Air Chemical Odor Control Scrubber. This alternate operating scenario is temporary until the new Solids Odor Control System specified in Noncovered Source Permit No. 0216-05-N (permit application no. 0216-10) is built. After the new Solids Odor Control System is built, the WSST

foul air will be rerouted to it and the routing to the Building Air Chemical Odor Control Scrubber terminated. The proposed modification consists of additional foul air ducting and an additional fan.

An application fee for a significant modification to a covered source of $500.00 was submitted and processed.

Equipment Description:

Additional piping and a fan would be installed to route air from the existing Wet Sludge Storage Tanks (WSST) to the existing In-Vessel Bioconversion Facility's Building Air Chemical Odor Control Scrubber and exhaust stack no. 1.

Process Description:

The In-Vessel Bioconversion Facility's Building Air Chemical Odor Control Scrubber is described below:

The facility building is kept at slightly negative pressure. The building is ventilated, and the exhaust is treated by a dedicated chemical scrubbing system. There is one chemical scrubber with two fans (one primary and one as backup). The scrubbing system is currently used to remove ammonia and hydrogen sulfide from the building air and is proposed to temporarily remove hydrogen sulfide from the Wet Sludge Storage Tanks (WSST). The scrubber exhaust is vented to the atmosphere along with the Andritz DDS-40 Drying System exhaust through a combined exhaust stack (ES#1).

Insignificant Activities:

None proposed.

Alternate Operating Scenarios:

Allow the foul air from the Wet Sludge Storage Tanks (WSST) to be processed by the In-Vessel Bioconversion Facility's Building Air Chemical Odor Control Scrubber until the new Solids Odor Control System specified in Noncovered Source Permit No. 0216-05-N is built. After the Solids Odor Control System is built, the WSST foul air will be rerouted to it and the routing to the Building Air Chemical Odor Control Scrubber terminated.

Applicable Requirements:

<u>Hawaii Administrative Rules (HAR)</u>

- Title 11, Chapter 59 Ambient Air Quality Standards
- Title 11, Chapter 60.1 Air Pollution Control
  - Subchapter 1 General Requirements
  - Subchapter 2 General Prohibitions
    - HAR 11-60.1-31 Applicability
    - HAR 11-60.1-32 Visible Emissions
  - Subchapter 5 Covered Sources
  - Subchapter 6 Fees for Covered Sources, Noncovered Sources, and Agricultural Burning

HAR 11-60.1-111	Definitions
HAR 11-60.1-112	General Fee Provisions for Covered Sources
HAR 11-60.1-113	Application Fees for Covered Sources
HAR 11-60.1-114	Annual Fees for Covered Sources
HAR 11-60.1-115	Basis of Annual Fees for Covered Sources

Non-applicable Requirements:

Hawaii Administrative Rules

Title 11, Chapter 60.1	Air Pollution Control
Subchapter 7	Prevention of Significant Deterioration
Subchapter 8	Standards of Performance for Stationary Sources

Federal Requirements

40 CFR Part 52.21 - Prevention of Significant Deterioration of Air Quality
40 CFR Part 60 - New Source Performance Standards (NSPS)
40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants
40 CFR Part 63 - National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards)

Prevention of Significant Deterioration (PSD):

This source is not a major stationary source nor are there modifications proposed that constitute a major stationary source that is subject to PSD review, as defined in HAR §11-60.1-131, definition of a major stationary source. Therefore, PSD is not applicable.

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is required for new covered sources or significant modifications to covered sources that have the potential to cause a net increase in air pollutant emissions above significant levels as defined in HAR §11-60.1-1. The potential emissions of H_2S from the Wet Sludge Storage Tanks (WSST) are shown below. The emissions were insignificant to trigger a BACT analysis.

Pollutant	Potential Emissions (tpy)	Significant Level (tpy)
H_2S	1.75	10

Consolidated Emissions Reporting Rule (CERR):

40 CFR Part 51, Subpart A - Emission Inventory Reporting Requirements, determines CER based on the emissions of criteria air pollutants from Type B point sources (as defined in 40 CFR Part 51, Subpart A), that emit at the CER triggering levels as shown in the table below.

Pollutant	Type B CER Triggering Levels [1] (tpy)	Pollutant	In-house Total Facility Triggering Levels [2] (tpy)	Total Facility Emissions (tpy)
NO_x	≥100	NO_x	≥25	55.12
SO_2	≥100	SO_2	≥25	77.38
CO	≥1000	CO	≥250	27.78
PM_{10} /$PM_{2.5}$	≥100/100	PM/PM_{10}	≥25/25	3.76
VOC	≥100	VOC	≥25	8.64
		HAPS	≥5	0.36

[1] Based on actual emissions
[2] Based on potential emissions

This facility does not emit at the CER triggering levels. Therefore, CER requirements are not applicable.

Although CER for the facility is not triggered, the Clean Air Branch requests annual emissions reporting from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels. Since the total emissions of NO_x and SO_2 within the facility are each greater than 25 tons per year, annual emissions reporting for the facility will be required for in-house recordkeeping purposes.

Compliance Data System (CDS):

Applicable since this is a covered source.

Compliance Assurance Monitoring (CAM):

40 CFR Part 64

Applicability of the CAM rule is determined on a pollutant specific basis for each affected emission unit. Each determination is based upon a series of evaluation criteria. In order for a source to be subject to CAM, each source must:

- Be located at a major source per Title V of the Clean Air Act Amendments of 1990;
- Be subject to federally enforceable applicable requirements;
- Be fitted with an “active” air pollution control device;
- Have pre-control device potential emissions that exceed applicable major source thresholds; and
- Not be subject to certain regulations that specifically exempt it from CAM.

Emission units are any part or activity of a stationary source that emits or has the potential to emit any air pollutant.

This source is not subject to CAM because it is not a major source.

Synthetic Minor Source:

This source is a synthetic minor source as NO_x emissions are above major source levels without the operating restrictions on the Cleaver Brooks boilers and 2,000 hp diesel engine effluent pumps (Noncovered Source Permit no. 0216-05-N) and the emissions from the In-Vessel Bioconversion Facility (Covered Source Permit no. 0216-06-C).

Pollutant	Cleaver Brooks Boilers (tpy)	2000 hp Effluent Diesel Engine Pumps (tpy)	In-Vessel Bioconversion Facility (tpy)	Total Emissions (tpy)
NO_X	5.26	158.84	25.32	189.42

Project Emissions:

Wet Sludge Storage Tanks (WSST) Emissions
Exhaust air volume = 1.35 E+05 scf/hr
H_2S concentration = 600 ppm
Scrubber efficiency = 95%
H_2S emission rate: (1.35 E+05 x 600/1 E+06 x (1-0.95) = 4 scf/hr
4 scf/hr x 34 lb/lb-mole / 380 scf/lb-mole = 0.3632 lb/hr
10% contingency factor (lb/hr x 1.1) = 0.3995 lb/hr
Tons/yr = 0.3995 lb/hr x 8760 hrs/yr / 2000 lb/ton = **1.75 tons/yr**

Building Air Chemical Odor Control Scrubber Emissions
Exhaust air volume = 1.36 E+06 scf/hr
H_2S concentration = 10 ppm
Scrubber efficiency = 95%
H_2S emission rate: (1.36 E+06 x 10/1 E+06 x (1-0.95) = 0.682 scf/hr
0.682 scf/hr x 34 lb/lb-mole / 380 scf/lb-mole = 0.0611 lb/hr
10% contingency factor (lb/hr x 1.1) = 0.0672 lb/hr
Tons/yr = 0.0672 lb/hr x 8760 hrs/yr / 2000 lb/ton = **0.29 tons/yr**

Andritz DDS-40 Drying System (Digester Gas Fired) Emissions
17.8 MMBtu/hr / 550 Btu/scf x 500 ppm H_2S / 1 E+06 = 16.18 scf/hr H_2S
16.18 scf/hr / 380 scf/lb-mo;e x 34 lb/lb-mole = 1.45 lb/hr
98% H_2S to SO_2 oxidation efficiency (lb/hr x 0.02) = 0.029 lb/hr
Tons/yr = 0.029 lb/hr x 8760 hrs/yr / 2000 lb/ton = **0.13 tons/yr**

Total Emissions
Total lb/hr = WSST + Building + DDS-40 = 0.3995 + 0.0672 + 0.029 = 0.4956 lb/hr
Tons/yr = 0.4956 lb/hr x 8760 hrs/yr / 2000 lb/ton = **2.17 tons/yr**
0.4956 lb/hr / 34 lb/lb-mole x 380 scf/lb-mole / 60 min/hr = 0.0923 scfm
Exhaust volume = 31502 scfm
H_2S (scfm) / Exhaust volume (scfm) x 1 E+06 = **2.93 ppm H_2S**

In-Vessel Bioconversion Facility Emissions (H_2S)

Pollutant	WSST, Building, DDS-40 [1] (tpy)	Hot Water Boiler [1] (tpy)	Waste Gas Burner [1] (Flare) (tpy)	Total (tpy)
H_2S	2.17	0	0.35	2.52

[1] Based on annual operations of 8760 hrs/yr

Sand Island Wastewater Treatment Plant - Total Emissions

Pollutant	Application No. 0216-09 [1] (tpy)	NSP No. 0216-05-N (Existing) (tpy)	NSP No. 0216-05-N (Future) Application No. 0216-10 [2] (tpy)	Total (tpy)	Comments
H_2S	2.52	5.3		7.82	WSST connected to Building Air Chemical Odor Control Scrubber
H_2S	2.52		8.2	10.72	WSST connected to new Solids Odor Control System

[1] Application No. 0216-09 is a Significant Modification to Covered Source Permit (CSP) No. 0216-06-C.
[2] Application No. 0216-10 is a Modification to Noncovered Source Permit (NSP) No. 0216-05-N.

Air Quality Assessment:

The applicant conducted an ambient air quality impact analysis (AAQIA) for H_2S for the proposed addition of the Wet Sludge Storage Tanks (WSST) to the In-Vessel Bioconversion Facility's Building Air Chemical Odor Control Scrubber. The wet sludge storage tanks (WSST) will be only temporarily connected to the Building Air Chemical Odor Control Scrubber until the new Solids Odor Control System is built, after which it will be connected to the new Solids Odor Control System and disconnected from the Building Air Chemical Odor Control Scrubber. Since the worst case scenario was based on digester gas firing in the In-Vessel Bioconversion Facility, only this scenario was modeled with the existing units and the outlet H_2S concentration being raised.

The applicant used the ISCST3 model as implemented in Bee-Line Software's BEEST System Ver. 7.10. to determine source compliance with the National and State Ambient Air Quality Standards (NAAQS/SAAQS). Existing sources as well as proposed sources of H_2S were included in the modeling analysis. This methodology was deemed acceptable to compensate for the lack of sufficient background H_2S data.

The modeling, as well as the methodology and assumptions employed by the applicant, has been determined to be acceptable and is discussed below.

The assumptions used in the ISCST3 modeling include the following:

a. Rural land use parameter
b. Ambient temperature of 298 K
c. Meteorological data
   5 years meteorological data from Honolulu Airport (1990-1991, 1993-1995). The 1992 data set was not utilized by the applicant due to excessive missing data.

d. Terrain
The applicant utilized actual terrain heights at the selected receptor points from Hawaii USGS Digital Elevation Model (DEM) data, 7.5 minute maps.

e. Receptor locations
Receptors were located in areas considered ambient air. Receptors were placed every 30 meters along the fenceline surrounding the property, with a fine receptor grid of 30 meter spacing. There were 1033 receptor locations in total.

f. Downwash
The building downwash option was activated. The EPA Building Profile Input Program (BPIP) was used to derive the direction specific building dimensions for importing into the ISCST3 model. The program was used to determine the GEP stack height, analyze potential structure-induced downwash effects and calculate the building downwash parameters for ISCST3. All structures near the stacks that could cause downwash were assessed for downwash effects.

Modeling Stack Parameters - Digester Gas Fired

Source	Pollutant	Emission Rates	Stack Parameters				
Equipment		**(g/s)**	**Height (m)**	**Temp. (K)**	**Velocity (m/s)**	**Flow Rate (m^3/s)**	**Diameter (m)**
WSST, Building, DDS-40	H_2S	6.244 E-02	22.25	317	20.55	16.33	1.01
Hot Water Boiler	H_2S	5.141E-04	12.50	477	6.99	0.51	0.305
Headworks OCS #10	H_2S	0.18371	15.24	298.15	28.75	18.8779	0.9144
Lo-Cat OCS #11	H_2S	4.5234 E-02	18.29	298.15	16.53	10.85385	0.9144
Primary Clarifier OCS #9	H_2S	2.9484 E-02	17.37	298.15	17.82	7.07921	0.7112

Modeling Impacts - Digester Gas Fired

Pollutant	Avg. Period	Meteorological Year	Maximum Concentration [1] ($\mu g/m^3$)
H_2S	1-hr	1990	29.4
H_2S	1-hr	1991	33.7
H_2S	1-hr	1993	32.6
H_2S	1-hr	1994	26.4
H_2S	1-hr	1995	32.4

[1] Results shown are the Highest 2nd High

Predicted Ambient Air Impacts

Pollutant	Avg. Period	Maximum Concentration [1] ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	SAAQS [2] ($\mu g/m^3$)	% of Std
H_2S	1-hr	33.7	0	33.7	35	96.3

[1] Based on meteorological year 1991.
[2] Only the State Ambient Air Quality Standards (SAAQS) are shown as they are the same as or more restrictive than the National Ambient Air Quality Standards (NAAQS).

Significant Permit Conditions:

The following significant permit condition was added to Attachment II, Section C of CSP No. 0216-06-C issued on September 16, 2004:

11. Alternate Operating Scenario

    a. The foul air from the Wet Sludge Storage Tanks (WSST) shall be routed to the Building Air Chemical Odor Control Scrubber until the new Solids Odor Control System specified in Noncovered Source Permit No. 0216-05-N is constructed.

    b. During this period when the foul air from the Wet Sludge Storage Tanks (WSST) is routed to the Building Air Chemical Odor Control Scrubber, the maximum outlet concentration of H_2S from the exhaust stack of the Andritz DDS-40 Drying System (Exhaust Stack No. 1) shall be 2.93 ppmv.

    c. After the new Solids Odor Control System is constructed and the foul air from the Wet Sludge Storage Tanks (WSST) is rerouted to it, the maximum outlet concentration of H_2S from the exhaust stack of the Andritz DDS-40 Drying System shall be as specified in Attachment II, Special Condition No. C.5.

Reason:

The Wet Sludge Storage Tanks (WSST) will be only temporarily connected to the Building Air Chemical Odor Control Scrubber until the new Solids Odor Control System is built, after which it will be connected to it and disconnected from the Building Air Chemical Odor Control Scrubber.

Conclusion and Recommendations:
Recommend issuing the applicant a significant modification to covered source permit, CSP No. 0216-06-C, subject to the significant permit conditions noted above. A 30-day public comment period and 45-day EPA review period is also required.

Reviewer: Darin Lum
Date: 5/07