ANNEXURE 17.0

SCHEMATIC REPRESENTATION OF EMISSIONS FLOW AND DESCRIPTION

Process Description (see attached flow diagram):

The Four Arrows Ethanol facility will receive corn by truck or rail. The corn will be mechanically conveyed from receiving pits to grain storage. From storage the grain will be conveyed mechanically to a day storage bin. The grain will then be dry milled into a powder where it is mechanically conveyed to a mixer. Emission control is by high efficiency baghouse.

In the mixer, the corn powder is mixed with recycled process water from the cook water tank to form a slurry. This slurry is then cooked in order to liquefy and breakdown the starch into sugars. After cooking, the slurry is then cooled with non contact water and conveyed to fermenter process vessels where the fermentation process, along with added yeast, converts the sugars to ethanol and carbon dioxide. The fermentation process produces a fermented mash called beer. The fermented slurry (or beer) is pumped from the fermenters to the beer well. The beer well is a process vessel that provides a continuous flow of beer slurry to the distillation column. The carbon dioxide from the fermenters and beer well passes through a high efficiency water scrubber in order to remove residual amounts of ethanol and other volatile organic compounds (VOCs). The scrubbed CO2 from the Fermentation Scrubber may be either discharged to atmosphere or piped to an adjacent CO2 recovery plant. Should the CO2 plant go down, the CO2 would be entirely discharged to atmosphere. The water from the CO2 scrubber is pumped to the cook water tank to be recycled into the process.

The beer contains approximately 10% ethanol in addition to non-fermentable corn solids. The ethanol is separated from the beer by distillation and subsequently leaves the distillation section as 190 proof ethanol where it is stored in an internal floating roof tank. The 190 proof ethanol at this point contains residual water. Therefore, the 190 proof ethanol then passes through a molecular sieve in order to remove any remaining water, thereby producing 200 proof ethanol to be stored in an internal floating roof tank. The 200 proof ethanol is then mixed with a denaturant (natural gasoline or unleaded gasoline) and stored in an internal floating roof tank for truck or rail loadout. Emission control from truck and rail loadout is by a high efficiency flare system. The VOC vapors from distillation equipment (mixer, slurry tank, cook water tank, yeast tank, condensers) are ventilated to a Regenerative Thermal Oxidizer.

The distillation process removes the ethanol from the beer, non-fermentable corn solids, and water. The residue mash (whole stillage) leaving distillation is transferred from the base of the distillation column to the stillage processing area. The whole stillage then passes through a centrifuge process to remove the majority of water. The underflow from the centrifuge is called wet distillers grains (WDGS). Since the plant will not have drying capability, the WDGS can be handled in only one way as follows:

- The WDGS commonly called wet cake (approximately 65% water) can be loaded directly to customer trucks as high quality feed. It can also be stored on a pad (typically for 2 to 3 days) until final sale.

The overflow from the centrifuge, called thin stillage, enters an evaporator to reduce water content. The concentrated stream from the evaporator is mixed with the centrifuge underflow stream (or added later). The water stream from the evaporators goes to the methanator. The methanator is an anerobic biological water treatment system that converts organic material into fuel gas (primarily methane) which supplements the fuel gas for the boiler(s). When the boiler is not in operation, the methane is routed to the methanator flare system. The water from the methanator is recycled to the cook water tank for reuse in the process.

The plant also has a water cooling tower constructed in modules that serves the various fermentation process cooling needs.

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TRUCK/RAIL FUEL LOADOUT
FLARE
S50
190 PROOF STORAGE
190 PROOF CONDENSER
CORN UNLOADING
RECTIFIER COLUMN
DENATURED ALCOHOL STORAGE
MOLECULAR SIEVE
ELEVATOR LEG
SIDE STRIPPER
CORN STORAGE BIN #1
STORAGE BIN FILL CONVEYOR
BEER COLUMN
DENATURED ALCOHOL STORAGE
CORN STORAGE BIN #2
200 PROOF CONDENSER
STORAGE BIN EMPTYING CONVEYOR
WATER
CORN STORAGE BIN #3
200 PROOF STORAGE
EVAPORATORS
CO2 SCRUBBER
S40
CORN STORAGE BIN #4
WATER
GASOLINE DENATURANT
SYRUP
CENTRIFUGES 3 TOTAL
CENTRIFUGES 3 TOTAL
BEER WELL
PURGE SCRUBBER
S41
ONLY IN USE WHEN CO2 RECOVERY EXISTS
FLARE
S60
FERM #7
ELEVATOR LEG
METHANATOR #4
FERM #6
MILL #1
CORN DAY BIN
METHANATOR #3
FERM #5
MILL #2
METHANATOR #2
FERM #4
HAMMERMILL FEED
WET PAD
FERM #3
MILL #3
METHANATOR #1
FERM #2
MILL #4
REGENERATIVE THERMAL OXIDIZER (RTO)
STACK
S10
FERM #1
UNLOADING BAGHOUSE
S20
MILLING BAGHOUSE
YEAST TANK
YEAST TANK
BOILER 1
S11
LIC.#1 TANK
COOK WATER TANK
BOILER 2
S12
LIC.#2 TANK
COOK TUBE
STEAM
LIC.#3 TANK
S30
LIC.#4 TANK
MIXER
SLURRY TANK #2
FLASH TANK
300 HP I.C. ENGINE
S100
SLURRY TANK #1
COOLING TOWER
F80

General Plant
Process Flow Diagram
Plant Emissions
(Preliminary)

DRAWING NUMBER: H4008-1111-001 SHT. OF | REV: A | DRAWN BY: V. White | DATE: 4/11/07

CLIENT: Four Arrows Ethanol
Coleambally, New South Wales

LAST UPDATE (DATE): 04/11/07 TIME: 8:24
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REV.	DATE	DESCRIPTION
A	04/11/07	PRELIMINARY

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ANNEXURE 18.0

TESTING PROCESS AND KEY TESTING METHODOLOGIES FOR ETHANOL EMISSIONS

Four Arrows Ethanol Plant
Air Emission Approval

Business Name:	Four Arrows Ethanol Plant
Email Address:	williamr@icminc.com (technical questions)
Contact Person:	Simon Lee, Booth Associates, Ph: +61 2 6964 9911 (questions)
Type of Use:	Owner on Owned Property
Facility Status:	New
Operating Schedule:	All processes operate continuously, 24 hrs/day, 365 days/yr, except for one day/month of scheduled maintenance.

Description of Activity Subject to Air Pollution Control Regulations

Four Arrows Ethanol requests approval to install and operate a 110 million gallon per year fuel grade ethanol (ethyl alcohol) manufacturing facility. Corn is to be the primary raw material. The plant will produce wet distiller's grains and solubles (wet cake) for animal feed as a by-product of the alcohol manufacturing process. The project will be constructed in 1 phase capable of producing 110 MMgpy denatured ethanol. It is anticipated that construction will commence immediately upon issuance of required approvals.

This application will propose enforceable conditions that limit emissions of criteria air pollutants to below100 tons per year. The emission approval will require use of control equipment that will limit the emission of hazardous air pollutants (HAP) to less ten (10) tons per year for a single HAP and twenty-five tons (25) per year for any combination of HAPs.

Emissions estimates of particulate matter (PM), PM with an aerodynamic diameter less than or equal to ten microns (PM_{10}), oxides of nitrogen (NO_x), carbon monoxide (CO), oxides of sulfur (SO_x) and volatile organic compounds (VOCs) are provided.

This permit application includes use of best management practices in the event a malodorous odor from the facility is detected off-site by the public. Any potential for off-site odor is recognized to be dependent on the intensity, frequency and duration of the odor, as well as atmospheric stability conditions to include wind speed and direction. In the event that a malodorous odor is detected off-site, there will be an immediate "validation" process performed by facility personnel. For example, an odor complaint determined to be valid would be one in which the odor would match an alcohol, grain drying, or other decaying organic smell associated with a dry mill fuel ethanol facility and that the wind direction would lead a reasonable person to conclude that the odor originated from the facility at the time of the complaint. All odor complaints made directly or indirectly to the facility will be investigated and validated immediately upon receipt. This will include an off-site investigation by facility personnel (car or foot). If the complaint is validated,

foot). If the complaint is validated, immediate remedial action will be taken by plant personnel to correct the abnormal operation that results in off-site odor.

Air Emission Unit Technical Specifications

The following equipment, or equivalent, is proposed:

1. Grain Receiving, Storing & Processing Facilities:

   a. Grain storage bins or silos with capacity of approximately 1.053 million bushels.

   b. Receiving equipment truck and rail (50,000 bushels/hr maximum rail, 25,000 bushels/hr/truck), one (1) day storage bin with a storage capacity of 50,000 bushels and four (4) hammermills (15,000 bushels/hr).

2. One (1) Ethanol Manufacturing Plant: storage tanks, various pumps, piping and valves, fermentation process vessels, carbon dioxide scrubber, distillation units, molecular sieves, condensers, centrifuges, evaporators, methanator and product loadout.

   Specific plant equipment:

   a. Two (2) Tanks -1,500,000 Gallons for the purpose of storing product grade denatured ethanol. Each tank will be equipped with an interior floating roof and seal system that meets the applicable requirements of US EPA 40 CFR Part 60, Subpart Kb.

   b. One (1) Tank - 200,000 Gallons for the purpose of storing 200 proof (100%) ethanol. The tank is equipped with an interior floating roof and seal system that meets the applicable requirements of US EPA 40 CFR Part 60, Subpart Kb.

   c. One (1) Tank - 200,000 Gallons for the purpose of storing 190 proof (95%) ethanol. The tank is equipped with an interior floating roof and seal system that meets the applicable requirements of US EPA 40 CFR Part 60, Subpart Kb.

   d. One (1) Tank - 200,000 Gallons for the purpose of storing denaturant (natural gasoline). The tank is equipped with an interior floating roof and seal system that meets the applicable requirements of US EPA 40 CFR Part 60, Subpart Kb.

   e. One (1) Tank - 3000 Gallons for the purpose of storing low vapor pressure corrosion inhibitor (proprietary ingredients of low vapor pressure with less than 10% xylene). Due to the tank's small size, low vapor pressure and insignificant emissions, this tank meets the regulatory requirements of IEPA.

   f. Piping, Pumps and Valves: pumps, valves and flanges in light liquid service. See emission inventory for equipment counts based on a similar sized facility. All piping, pumps and valves are constructed, operated and maintained in accordance

with the applicable requirements of US EPA 40 CFR Part 60, Subpart VV.

g. One (1) Truck/Railcar Loading Terminal for the purpose of transferring denatured ethanol to trucks and railcar for shipment offsite. Truck and railcar loading will be equipped with a shared flare in order to reduce VOC emissions during truck and railcar loadout.

h. One (1) cooling tower with a design water circulation rate of 3,000,000 gallons per hour. The cooling tower will be constructed with approximately 4 cells at 750,000 gallons per hour per cell.

i. One Biomethanator with four (4) bottles, to include a flare. The flare will operate only when the boiler(s) is down, i.e., when the produced fuel gas (primarily methane) will not be supplementing (or offsetting) fuel demand to the boiler(s).

j. Plant roads. All roads on plant property are paved.

k. Two (2) 120 MMBTUH Package Boilers to provide steam for plant fermentation processes.

l. One (1) Anhydrous Ammonia Storage Tank (18,000 gallon pressure vessel). This tank has no specific air regulatory requirements.

m. Grain Receiving area (truck/rail) with pits ventilated to a 48,000 cfm baghouse.

n. One (1) Day Storage Bin (50,000 bushels capacity total) and four (4) Hammermills ventilated to a 28,000 cfm baghouse that receive and mill corn from grain storage.

Air Pollution Control Equipment

All air pollution control equipment will be properly installed, operated and maintained at all times whenever the emissions source that it is designated to control is operating.

1. One (1) Regenerative Thermal Oxidizer: The regenerative thermal oxidizer is fired with natural gas and designed for a maximum heat input rate of 8 MM Btu per hour (operates at approximately 4.3 MMbtuh). The exhaust emissions from the cook water tank, process mixer vent, slurry tanks, centrate tank, yeast tanks, 190 and 200 proof condensers and CIP screen are to be directed to the thermal oxidizer whenever the ethanol plant is operating. The TO will minimize potential for nuisance odor from the process vents.

2. One (1) Hammermilling Fabric Filter Baghouse for the purpose of controlling particulate emissions from operation of the hammermills. The unit is designed for a 28,000 cubic foot per minute flow rate while operating at ambient temperature.

3. One (1) Grain Unloading Fabric Filter Baghouse for the purpose of controlling particulate matter from grain unloading truck and rail pits, transfer, and the day bin. The unit is designed for a 48,000 cubic foot per minute flow rate while operating at ambient temperature.

4. One (1) flare for the purpose of controlling methane emissions from the biomethanator. The biomethanator natural gas is directed to the boiler(s) whenever the plant is operational. The flare will only operate when the boiler(s) is down.

5. One (1) flare for the purpose of controlling VOC emissions from truck and railcar loadout.

6. One (1) Fermentation CO2 Scrubber for the purpose of removing VOCs from the carbon dioxide by-product stream. The packed bed water scrubber is designed to eliminate HAPs and VOCs from the CO2 stream.

7. Two (2) 120 MMbuth package boilers to be equipped with standard burners.

Air Emissions Estimates from the Proposed Activity

The following are "Requested Limits" for the Air Emission Approval for the 110 MMgpy plant. Estimated Operating is based on 24 hours/day 365 days/year. It is important to note that the plant plans to shut down 1 day/month for maintenance, therefore "Estimated Operating" is a conservative estimate that will not be reached under normal operating conditions.

POLLUTANT	Emissions (tons per year for 110 MMgpy)		
	Potential-to-Emit[1]		Estimated Operating[2]
	Pre-Permit	Requested Limits	
PM	0	< 100	59.07
PM_{10}	0	< 100	44.81
NO_x	0	< 100	99.05
CO	0	< 100	99.51
SO_x	0	< 100	0.66
VOC	0	< 100	96.80
HAPs	0	< 25	15.16

1 **Potential-to-emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, is treated as part of its design if the limitation or the effect it would hav e on emissions is federally enforceable.**

2 **Estimated operating emissions are those emissions from a stationary source based on proposed conditions and hours of operation.**

Air Emission Limitations

1. Visible emissions are expected to be less than 20% for all emission units, except for the flares that are used to control emissions from the methanator or truck loadout. The flares are expected to operate at 0% opacity. Based upon experience in the United States and Canada, all emission units are expected to operate in compliance with applicable rules.

2. The flares used to control emissions from the biomethanator and truck loadout will be designed and properly operated to emit no visible emissions in accordance with US EPA 40 CFR 60.18 design standards.

3. The thermal oxidizer is anticipated to reduce VOC/HAPs by at least 98% (average).

4. NOx from the 2 package boilers is expected to be emitted at less than the manufacturer's guaranteed rate of 0.09 lb/MMBTU. CO emissions from the 2 package boilers is anticipated at no more than 0.084 lb/MMBTU.

5. PM/PM10 emissions from baghouses for control of the grain unloading, transfer, processing (day bin) and hammermilling will not exceed emission rates presented within this application package (0.005 grains/scf). Compliance may be determined by measuring the PM/PM10 emissions averaged over the period specified in the performance test protocol to be approved before testing.

6. Exhaust emissions from Fermentation CO2 scrubber will not exceed emission rates presented within this application package. Compliance may be determined by measuring the VOC/HAP emissions averaged over the period specified in the performance test protocol to be submitted for approval prior to testing. The fermentation scrubber is expected to reduce VOC emissions from the fermenters by at least 98% (average).

Source Testing Protocol

The facility will prepare and submit a source testing protocol in advance of a pre-performance test meeting or a conference call. The protocol will be prepared in accordance with the Australian test protocol. The source test protocol will be approved by before any performance testing will commence.

Source Testing

The facility proposes the following source test methods (**or equivalent**) to be performed within 180 days of startup.

Proposed Test Methods

1. Performance testing for the **Package Boilers** stack will include the following tests:

Test Method	Parameter/Pollutant
USEPA Method 1:	Sampling Location and Cyclonic Flow Determination
USEPA Method 2:	Velocity and Volumetric Flow Rate
USEPA Method 3:	Stack Gas Molecular Weight
USEPA Method 4:	Stack Gas Moisture Content
USEPA Method 5:	Particulate Matter Emission Rate
USEPA Method 7:	NOx Emission Rate
USEPA Method 9:	Opacity
USEPA Method 10	Carbon Monoxide Emission Rate

2. Performance testing for **Grain Unloading and Hammermilling Baghouses (2 stacks)**:

Test Method	Parameter/Pollutant
USEPA Method 1:	Sampling Location and Cyclonic Flow Determination
USEPA Method 2:	Determination of Stack Gas Velocity and Volumetric Flow Rate
USEPA Method 3:	Determination of Stack Gas Molecular Weight
USEPA Method 4:	Determination of Stack Gas Moisture Content
USEPA Method 5:	Determination of Particulate Matter Emission Rate

Method 9 (opacity only) may be performed in lieu of Methods 1 through 5.

3. Performance tests for the **Fermentation CO2 Scrubber**:

Test Method	Parameter/Pollutant
USEPA Method 18	GC/FID analysis with on site testing required (acetaldehyde, acetic acid, acrolein, ethanol, formaldehyde, formic acid, lactic acid and methanol).
USEPA Method 25A	Determination of Total VOC Emissions

Calibration procedures will be identified and the information provided for each measurement device, including coefficients, multipliers, by reference to a standard method or by providing a written description. The frequency planned for recalibration during the test will be provided in addition to a list of all calibration standards, including their source and traceability. Equipment to be calibrated includes: dry gas meters, orifice meters, pitot-tubes, thermometers/thermocouples, nozzles, flow meters and may include various process parameter monitors.

Pre-Performance Test Meeting

The facility will arrange for a pre-performance test meeting or conference call with the state in advance of the date of conducting any emission source performance tests required by the air emission approval. The purpose of this meeting or conference call will be to outline and discuss the schedule and implementation plans for conducting any required performance test(s). The state may elect to have an observer(s) on-site at the facility during any or all emission source performance testing required by the air permit.

Performance Test Requirements

1. All performance testing, notifications, reporting of results and performance test compliance time-frames will be conducted/deadlines met in accordance with the terms of the air emission approval.

2. For the purpose of the air emission approval, a *successful performance test* means an emission test conducted in accordance with a performance test protocol approved by the state, during which all of the emission limitations for the emission unit(s) required to be tested in the permit are met.

3. Performance testing will be conducted in accordance with the performance test protocol approved by the state to verify compliance with the requirements of the air emission approval (permit).

4. Tanks: After installing a permanently fixed roof and internal floating roof on the IFR tanks, the facility will:

   a. Visually inspect the internal floating roof and the primary seal prior to filling the storage vessel with any volatile organic liquid (VOL). If there are holes, tears, or other openings in the primary seal, secondary seal, or the seal fabric or defects in the internal floating roof, or both, the facility will repair the items before filling the storage vessel.

   b. If the vessel is equipped with a double wiper, liquid-mounted or mechanical shoe seal, the facility will visually inspect the internal floating roof and the primary seal through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the facility will repair the items or empty and remove the storage vessel from service within 45 days.

   c. Visually inspect the internal floating roof, the primary seal, gaskets, slotted membranes, and sleeve seals (if any) each time the storage vessel is emptied and degassed. If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or seal fabric, or the gaskets no longer close off the

the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the facility will repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with VOL. In no event shall inspections conducted in accordance with this paragraph occur at intervals greater than 10 years in the case of vessels conducting annual visual inspections.

4. Piping and Equipment: Performance testing as required by the facility, by reference, US EPA 40 CFR 60.485. Performance testing shall be conducted within 60 days after achieving the maximum production rate at which the subject equipment will be operated but no later than 180 days after initial startup.

5. Package Boilers: NOx compliance testing will consist of three (3) 1 hour sampling runs and CO compliance testing will consist of three (3) 1 hour sampling runs.

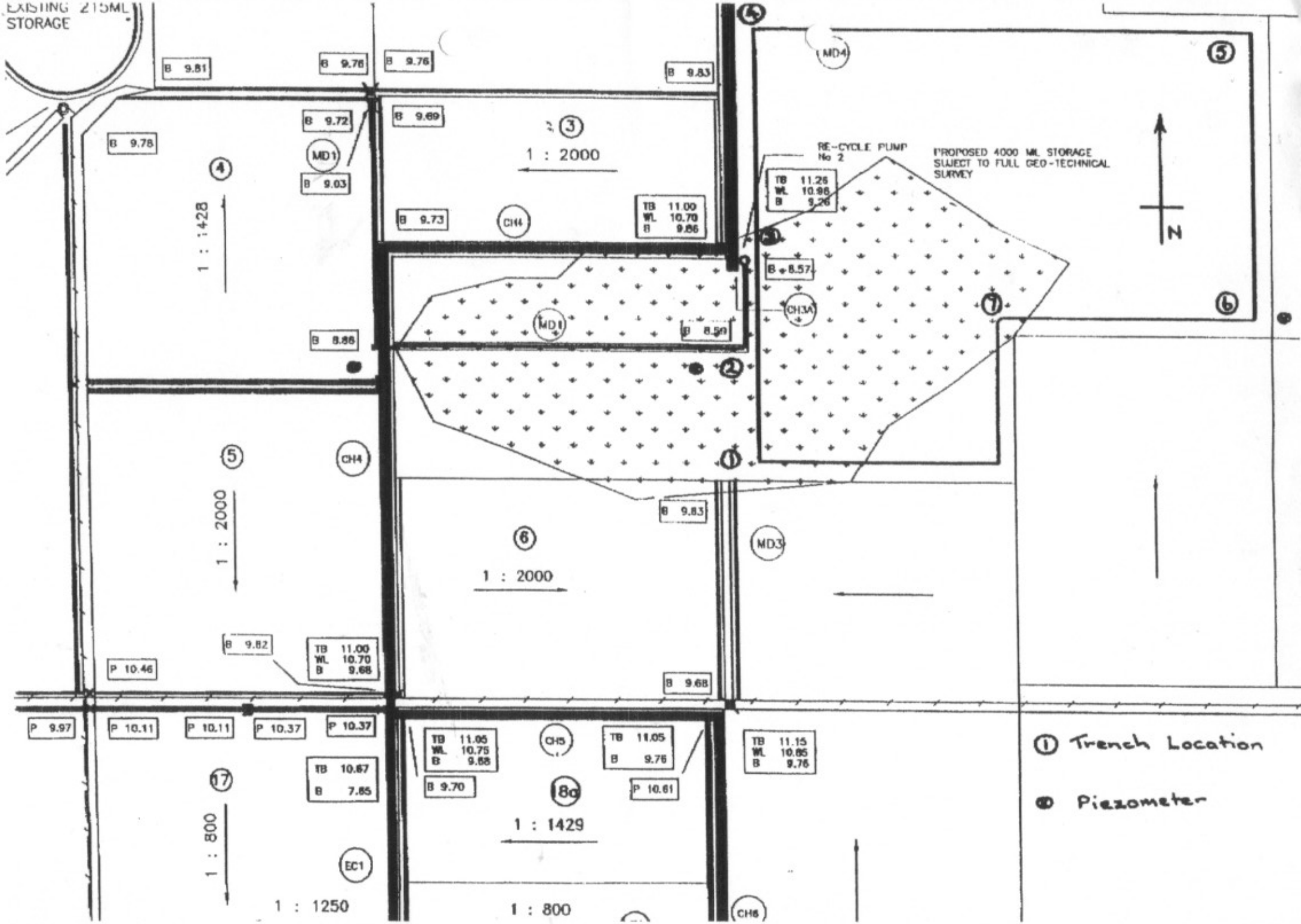
Record Keeping Requirements

1. The facility will monitor and record the quantity of grain processed and fuel grade ethanol produced during each consecutive 12 month periods in order to demonstrate compliance with *Approval Conditions* of this air emission application.

2. The facility will maintain a log showing the date of all routine or other maintenance, malfunction or repair of the Regenerative Thermal Oxidizer(s), Fermentation CO2 Scrubber and Baghouses, the nature of the action taken on such date and any corrective action or preventive measures taken.

ANNEXURE 19.0

SOILS PROFILES AT "TUBBO" RECORDED DURING WATER STORAGE INVESTIGATIONS


EXISTING 215ML STORAGE
PROPOSED 4000 ML STORAGE SUBJECT TO FULL GEO-TECHNICAL SURVEY
RE-CYCLE PUMP No 2
1 : 2000
1 : 1428
1 : 2000
1 : 2000
1 : 1429
1 : 800
1 : 1250
1 : 800
N
① Trench Location
⊕ Piezometer

SOIL PROFILE NO. 1

Location: Edge of swamp
Classification: Ug (vertisol)
Depth of Excavation: 3.5 m

Depth	Horizon	Description
0-200 mm	A_1	dark grey brown self mulching angular blocky silty cracking clay, containing lime and minor sand particles CH-OH
200 - 700 mm	A_2	grey brown silty calcareous cracking clay (angular blocky structure) CH
700-1000 mm	A_3	grey brown silty clay (massive structure) CH
1000-3500	B_1	yellowish grey brown silty clay (calcareous and massive) mangans at 3.0 m CH-CL

Comments

- hard dense profile
- no water table encountered
- pronounced gilgai microrelief
- lignum roots penetrate to 1.0 m
- B horizon is fissured and contains slickensides
- B_1 horizon is dispersive.

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SOIL PROFILE NO. 2

Location: Edge of swamp – Levee
Classification: Transitional red-brown earth
Depth of Excavation: 6.0 m

Depth	Horizon	Description
0-300 mm	A_1	light grey brown clay loam CL-CH (some OH)
300 – 1300 mm	A_2	grey brown cracking clay loam (angular blocky structure) CH
1300 – 3500 mm	B_1	brown calcareous clay, friable, increasing sand content, and mangans CL-CH
3500 – 4500	B_2	yellowish brown sandy clay CL-SC
4500 – 6000	B_3	layers of sand and sandy clay SC

Comments

- hard dense profile
- no water table encountered
- increasing sand content in subsoil
- free draining sand at 4.5 m
- B_1 horizon is dispersive

SOIL PROFILE NO. 3

Location: Edge of swamp
Classsification: Transitional Red Brown Earth
Depth of Excavation: 4.1 m

Depth	Horizon	Description
0-300 mm	A_1	red brown calcareous clay loam containing fine and coarse sand CL-CH
300 – 3400 mm	B_1	red brown calcareous clay and mangans CL-CH
3400 - 4100 mm	B_2	red brown sandy clay with grey inclusions CL-CH

Comments

- hard dense profile
- no water table encountered
- increasing sand content in subsoil
- B_2 horizon contains slickensides and is fissured
- pronounced calcareous layer @ 1.0 m
- B_1 horizon is dispersive.

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SOIL PROFILE NO. 4

Location: Edge of swamp
Classification: Transitional red brown earth
Depth of Excavation: 4.8 m

Depth	Horizon	Description
0-600 mm	A_1	red brown sandy clay loam, angular blocky structure, hard setting OH-CH
600 – 1000 mm	B_1	red brown sandy calcareous clay
1000 – 2400 mm	B_2	red brown calcareous clay loam, angular blocky structure, hard setting, pronounced root channels and mangans OH-CH
2400-4800 mm	B_3	light grey brown calcareous sandy clay with gypsum inclusions massive structure CH

Comments

- no water table encountered
- no sand encountered
- hard dense profile
- B_1 horizon is dispersive

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SOIL PROFILE NO. 5

Location: Side of swamp–North East Corner
Classification: Ug (vertisol)
Depth of Excavation: 4.5 m

Depth	Horizon	Description
0-900 mm	A_1	dark grey brown clay loam, angular blocky structure, hard setting and calcareous CH - OH
900 – 2000 mm	B_1	red brown calcareous clay loam, angular blocky structure, hard setting, prounced root channels, contains mangans CH
2000-4500 mm	B_1	orange grey brown calcareous sandy clay with gypsum inclusions massive structure and fissured CH

Comments

- no water table encountered
- no sand encountered
- hard dense profile
- B_1 horizon is dispersive.

SOIL PROFILE NO. 6

Classification: Transitional red brown earth

Depth of Excavation: 4.6 m

Depth	Horizon	Description
0-700 mm	A_1	red brown sandy clay loam, angular blocky structure, hard setting CH-OH
700 – 900 mm	B_1	brown clay loam, angular blocky structure, hard setting, calcareous layer adjacent to B_2 CH
900-2100 mm	B_2	red brown calcareous clay with gypsum inclusions, massive structure and fissured – contains mangans CH
2100-2700 mm	B_3	Orange grey sand lens CL
2700 – 4600 mm	B_3	grey brown mottled calcareous clayey sand CL-SC
2700-4600	B_3	grey brown mottled calcareous clayey sand SC-CL

Comments

- no water table encountered
- sand encountered @ 2.1 m, lens 0.7 m thick
- hard dense profile
- core should extend to 2.7 m
- B_1 horizon is dispersive.

SOIL PROFILE NO. 7

Location: Edge of swamp
Classification: Ug (vertisol)
Depth of Excavation: 4.4 m

Depth	Horizon	Description
0-200 mm	A_1	dark grey brown self mulching angular block silty cracking clay, columnar peds extending to 1m, calcareous CH-OH
1000 - 2500 mm	B_1	grey brown calcareous cracking clay – massive and fissured (contains mangans) CH
2500 - 4400 mm	B_2	grey brown calcareous clay and mangans (fissuring evident) significant lime in hard gravel sized particles slight sandy inclusions CH

Comments

- significant cracks to 1 m
- hard dense profile
- no water table encountered
- no sand lenses encountered
- layers of clayey sand and sandy clay from 2.5 m to 4.4 m
- B_1 horizon is dispersive.