Honeywell

Honeywell Engines
111 South 34th Street
MS158
Phoenix, AZ 85034

August 6, 2008

Jamie Wilson
Title V Supervisor
Maricopa County Air Quality Department
Permit Division
1001 North Central Ave, Suite 400
Phoenix, AZ 85004-1942

Subject: Permit V97-008
Honeywell Engines
111 South 34th Street
Phoenix, AZ 85034

Dear Ms. Wilson:

Please find attached Significant Revision Application for the modification of the fuel feed system at Engine Test Cell 671 located in Building 226 and the expansion of the approved pH operating range for the ammonia scrubber 92415026 in Building 422.

Should you have any questions or concerns, please feel free to call Rick Loewen at 602-231-1272.

Sincerely,

Robert Wentlejewski
Senior Site Leader

Attachments

CC: HSE File

MARICOPA COUNTY
AIR QUALITY DEPARTMENT

1001 N. Central Ave., Ste 400
Phoenix, AZ 85004
(602) 506-6094

STANDARD PERMIT APPLICATION FORM

Internet Copy

(As required by A.R.S. § 49-480, and Chapter 3, Article 3, Arizona Administrative Code)

1. Permit to be issued to: (Business license name of organization that is to receive permit)
   Honeywell - Engines
2. Mailing Address: 111 South 34th Street
   City: Phoenix State: AZ ZIP: 85034
3. Plant Name (if different from item #1 above):
4. Name (or names) of Owner or Operator: Honeywell International
   Phone: Not Applicable
5. Name of Owner's Agent: Not Applicable
   Phone: Not Applicable
6. Plant/Site Manager or Contact Person:
   Phone:
7. Proposed Equipment/Plant Location Address: 111 South 34th Street
   City: Phoenix County: MARICOPA ZIP: 85034
   Indian Reservation (if applicable):
   Section/Township/Range: Not Applicable
   Latitude: 33 ° 26 ' 46 " Longitude: 112 ° 00 ' 23 " Elevation: 1,122 ft.
8. General Nature of Business: Turbine and turbofan engine manufacturing and testing.

   Standard Industrial Classification Code: 3724 NAICS Code 336412
9. Type of Organization: ☑ Corporation ☐ Individual Owner ☐ Partnership
   ☐ Government Entity (Government Facility Code:)
   ☐ Other:
10. Permit Application Basis: ☐ New Source ☑ Revision ☐ Renewal of Existing Permit
    ☐ Portable Source ☐ General Permit (Check all that apply)
    For renewal or modification, include existing permit number: V97008
    Date of Commencement of Construction or Modification: Nov. 2008
    Is **any** of the equipment to be leased to another individual or entity? ☐ Yes ☑ No
11. Signature of Responsible Official of Organization Robert J. Wentlewski
    Official Title of Signer: Senior Site Leader
12. Typed or Printed Name of Signer: Robert Wentlewski
    Date: 8/8/2008 Phone Number: 602-231-2475

COMPANY NAME & LOCATION Honeywell - Engines; Phoenix, AZ

EMISSION SOURCES

DATE July 2008

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA			LENGTH (ft.)	WIDTH (ft.)
										DIA. (ft.)	VEL. (fps.)	TEMP. (°F)		
#671	Compressor/Engine Test Cell	NOX	107.3	20.7				24.25	10	w-5.25	80	1200		
	(Post-Modificiation	CO	85.4	16.5						L - 12.5				
	Emission Rates for the	SO2	4.0	0.78										
	Existing Source)	VOC	0.05	0.0096										
		PM10	1.5	0.28										
		Total HAPs	0.15	0.03										
		(See App. A for												
		Detailed HAPs)												

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 1,122 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

TITLE V AIR QUALITY OPERATING PERMIT
SIGNIFICANT REVISION APPLICATION

Prepared For:

HONEYWELL – ENGINES
111 South 34th Street
Phoenix, Arizona

MCAQD Title V Permit No. V97-008

August 5, 2008

Prepared by:

ERM-West, Inc.
7272 East Indian School Road, Suite 100
Phoenix, Arizona 85251
(480) 998-2401

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1 INTRODUCTION

This document and supporting attachments are submitted as a Significant Revision application to the Maricopa County Air Quality Department (MCAQD) for the Title V Operating Permit held by the Honeywell Engines facility (the Facility). This revision application is organized to generally follow the guidance in the MCAQD Standard Permit Application Filing Instructions. Table 1 identifies the content requirements pertaining to this revision application, and where the listed information can be located.

Honeywell owns and operates an aircraft engine (turbine, turbofan and auxiliary power units) manufacturing facility located north of Sky Harbor Airport in Phoenix. The Facility's primary Standard Industrial Classification (SIC) code is 3724, which corresponds to NAICS code 336412. This revision application describes two equipment changes that potentially trigger Significant Revision/Pre-construction Review requirements, pursuant to the December 2006 Interim Guidance.

- Modification of the fuel feed system at Engine Test Cell 671 – This modification involves the changeout of a fuel feed pump and several other components to increase the maximum fuel flow to the cell. Although the maximum flow capability will be seldom utilized, the potential-to-emit for Cell 671 will increase compared to recent actual emission levels. An annual operating fuel input budget is proposed to limit the potential to emit for this source in a practically enforceable manner.

- Expand the approved pH operating range - For the Ammonia Scrubber serving the Nitriding Furnaces, the current facility permit specifies an operating range of pH 1 – 3. This very low range poses equipment corrosion and related problems, and under certain conditions may result in acid mist emissions. Moreover, it is too low at its upper end to accurately reflect normal operating conditions for the scrubber. The proposed modification is to revise the upper end of the range to pH $\leq$ 6, which provides equivalent emission control.

The business purpose of the test cell modification is to accommodate testing of larger (higher fuel requirement) engines. The test envelope for these engines must include periods of high engine output that could not be achieved with the existing fuel supply

system. Anticipated start date of the Cell 671 modification is during the third quarter of 2008, or as soon as practicable after pre-construction review this revision application.

It is proposed that the Facility be allowed to make the change in the scrubber operating parameter range after initial determination by MCAQD that this constitutes an equivalent operating mode for the scrubber.

Table 1

Completeness Checklist for Title V Revision Application
Honeywell – Engines Facility

Permit Requirement and Section Location in this Application	Information Required
End of Section 1	Completed Standard Application forms
Section 2.1 and 2.2	Description of processes affected by the modification, including Source Classification Code
N/A	Description of product(s) and raw materials
Section 2.1 and 2.2 Figures 2 and 3	Process Description and flow diagrams for the modified processes
N/A	Material balance for new/modified processes (optional, only if emission calculations are based on a material balance)
Section 3 and Appendix A	Emissions related information, including calculation methods for potential emissions of regulated air pollutants for all emission sources and identification of all points of emission
N/A	Citation and description of all applicable requirements, including a discussion of compliance methods
N/A	An explanation of any proposed exemptions from otherwise applicable requirements
Section 3	The following information to the extent it is needed to determine or regulate emissions: • maximum annual process rate for each new/modified emission unit(s), • maximum rated hourly process rate for the new/modified emission units(s), • information on new/modified fuel burning equipment, • description of additional raw materials along with usages, • anticipated operating schedules, • limitations on source operations;
Equipment List Form	Description of all new/modified process and control equipment for which permits are required including: • Equipment Name and ID number • Model number, • serial number (when available), • date of manufacture (when available), • size or capacity rating.

Table 1 (Continued)

Completeness Checklist for Title V Revision Application
Honeywell – Engines Facility

Permit Requirement and Section Location in this Application	Information Required
Emission Source Forms	Stack information for the new/modified units including: • Stack ID number, • Stack type, • Stack height and inside dimensions, • Nearby building dimensions, • Exit gas temperature, • Exit gas flow rate or velocity.
Figure 1 - Section 2	Site diagram which includes: • property boundaries, • adjacent streets, • directional arrow, • elevation, • closest distance between equipment and property boundary, • new/modified equipment layout, • relative location of emission sources/points, • location of emission points and non-point areas, • location of pollution control equipment;
Appendix B	Technical data and supporting vendor information on air pollution control devices for new/modified sources.
Appendix B	Equipment manufacturers bulletins and shop drawings, if appropriate
N/A	Description of compliance status of source, if applicable, include compliance schedule, schedule of progress reports for sources with a violation, and compliance plan requirements.
Certification Form,	Compliance Plan and Certification: • identification of applicable requirements, • statement of methods used for determining compliance, • schedule for submission of compliance certifications, • statement indicating the source's compliance status, • certification of truth, and compliance plan if applicable;
N/A	If applicable, information required necessary to show compliance with Article 4 pertaining to new major sources or major modifications
Emission Source Forms, Section 2, App. A	Emissions Summary – Referencing calculations on which all information requested is based

EQUIPMENT LIST

The following table should include all equipment utilized at the facility and be completed with all data requested. Be sure to notate the units (tons/hour, horsepower, etc.) when recording the Maximum Rated Capacity information. Be sure to notate the Serial Number and/or Equipment ID Number. The data of manufacture must be included in order to determine if portions of the facility are NSPS applicable. Make additional copies of this form if necessary.

LISTED EQUIPMENT IS INVOLVED IN THE PROPOSED MODIFICATION – BUT REPRESENTS EXISTING SOURCES AT THE FACILITY. NO NEW SOURCES ARE BEING CONSTRUCTED.

Type of Equipment	Maximum Rated Capacity	Make	Model	Serial Number	Date of Manufacture	Equipment ID Number
Engine Test Cell #671	970 gallon fuel firing rate	Custom Built Unit	Custom Built Unit	N/A	1956	#671 Compressor Cell
Nitriding Furnace Scrubber	755 acfm	Harrington	ECH 1 2-5 LB	S-020304-01	2005	Stack #1454

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by MCAQD as public record.

Typed or Printed Company Name: Honeywell Engines

Official Title of Signer: Senior Site Leader

Signature
Typed or Printed Name of Signer: Robert J Wentlejewski

Printed Name
Signature of Responsible Official: Robert Wentlejewski Date: 8/8/08

2 DESCRIPTION OF PROPOSED MODIFICATION

The Honeywell Engines facility just north of Sky Harbor Airport intends to modify the operation of two emissions sources:

- Engine Test Cell 671 – Modification of the cell fuel supply system will allow higher maximum peak fuel input.
- Nitride Furnace Ammonia Scrubber – No equipment change, but modify the allowable pH operating parameter range to extend from pH 1.0 – 6.0, compared to currently-permitted pH 1 – 3.

This application describes the nature of the modifications, and will demonstrate that, in total, these two modifications will not result in an increase in emissions above currently permitted levels. The changes will also not result in a net increase in emissions, during a 5-year contemporaneous period, in excess of the Significance levels for criteria pollutants.

2.1 FACILITY OVERVIEW

Honeywell owns and operates an aircraft engine (turbine, turbofan and auxiliary power units) manufacturing facility located north of Sky Harbor Airport in Phoenix. The facility's primary Standard Industrial Classification (SIC) code is 3724, which corresponds to NAICS code 336412. The production operations consist of metal part machining, heat and chemical treating furnaces, metal plating and coating, solvent cleaning, acid treating, and degreasing, painting, assembly and stationary testing of engine operation. Support equipment that are sources of air pollutant emissions include boilers, air heaters, storage tanks, emergency generators, and numerous other small pieces of equipment. In addition, there are pollution control devices, such as packed bed wet scrubbers and wet Rotocolones®, serving many of the emission sources.

A site diagram in Figure 1, shows the major existing structures and the location of the two sources that are the subject of this revision application.

2.2 TEST CELL 671 FUEL SYSTEM MODIFICATION

One of the proposed facility modifications is an increase in the fuel throughput capacity of Test Cell 671. This unit combusts Jet Fuel A (Jet A, aviation grade fuel) in the process of short and long term testing of jet engine prototypes and research projects. Test Cell 671 is an existing source, but is not listed separately on the Honeywell Engines permit (i.e, in Specific Condition #32 – Turbine Engine Test Cells). In the Title V Permit equipment list, the maximum Jet A fuel input rating for this cell is 224.3 gal/hour. The configuration of the Test Cell is straightforward, as illustrated in Figure 2. The engine under test is mounted in a testing stand within a test cell structure. The exhaust is routed through a vertical, rectangular stack via a set of baffles to reduce sound emissions. There have been no prior modifications to Test Cell 671.

The physical modifications are limited to replacement of the fuel feed pump (nominal specification is 11 gal/min). The function of the pump is to raise the fuel delivery pressure to approximately 40 psig at the input to the test cell fuel control system. Minimal changes to certain valving and supporting hardware may also be required to allow the fuel pump to safely supply the higher/pressure and flow rate.

The technical modifications to the fuel supply system itself will allow a maximum design flow of 1,315 gal/hour (8,812 lb/hour) for Test Cell 671. However, this maximum fuel delivery design fuel flow cannot be supported by other physical limitations of the engines and the test cell, primarily the coolant and combustion air injection systems. The revised potential hourly emissions are based on the maximum achievable fuel input rate of 970 gal/hr (6,500 lb/hour) of Jet A. The emission factors were obtained from EPA Document AP-42, Section 3.1 (distillate-fired combustion turbines).

The criteria pollutant emissions increase on a potential-to-emit basis would be relatively large, if the increased fuel flow could be sustained for longer term testing. However, the requested increase in fuel flow capacity will actually be utilized for a small number of hours per year. In practice, the increased rate can be sustained only in certain transient test scenarios, and represents a peak fuel

input rate during the engine test profile. These considerations lead the facility to request a limit on annual test cell heat input, in the form of gallons/year of Jet A fuel, which is equivalent to limiting the potential-to-emit limit in an enforceable permit condition.

To estimate maximum annual emissions, the Honeywell Engines utilized in this application a maximum hourly operating schedule for the modified test cell. Based on the maximum projected testing requirements, the highest achievable fuel input rate, 970 gal/hour, will be sustained no more than 100 hours/year. Given the anticipated maximum duration of engine testing, Test Cell 671 will be in continuous, normal flow rate operation no more than 1,460 hours per year. The fuel flow during the normal mode test hours ranges between 29 and 190 gal/hr. Consequently, the revised maximum potential to emit, considering the proposed annual fuel limit of 374,400 gallons/year for Test Cell 671 is presented in Table 2.

Table 2.
Estimated Net Emissions Increase for Modified Test Cell 671

Pollutant	Emission Factor[1] (lb/MMBtu)	Pre-Modification Emissions [2] (Ton/Yr)	Max. Fuel Flow Operation (100 hrs/yr)	Normal Fuel Flow Operation (1,460 hrs/yr)		Total Post-Modification Emissions (Ton/Yr) [3]
			Lbs/Hour	Lbs/Hour	Tons/Yr	
NO_X	0.88	0.33	107.3	21.0	15.3	20.71
CO	0.70	0.26	85.4	16.7	12.2	16.5
VOC	0.00041	0.00015	0.05	0.0098	0.0072	0.0096
SO_2	0.033	.012	4.0	0.79	0.58	0.78
PM_{10} (PM total)	0.12	.0045	1.46	0.29	.021	0.28
HAPs		<2 lbs	0.15	0.03	0.022	0.03

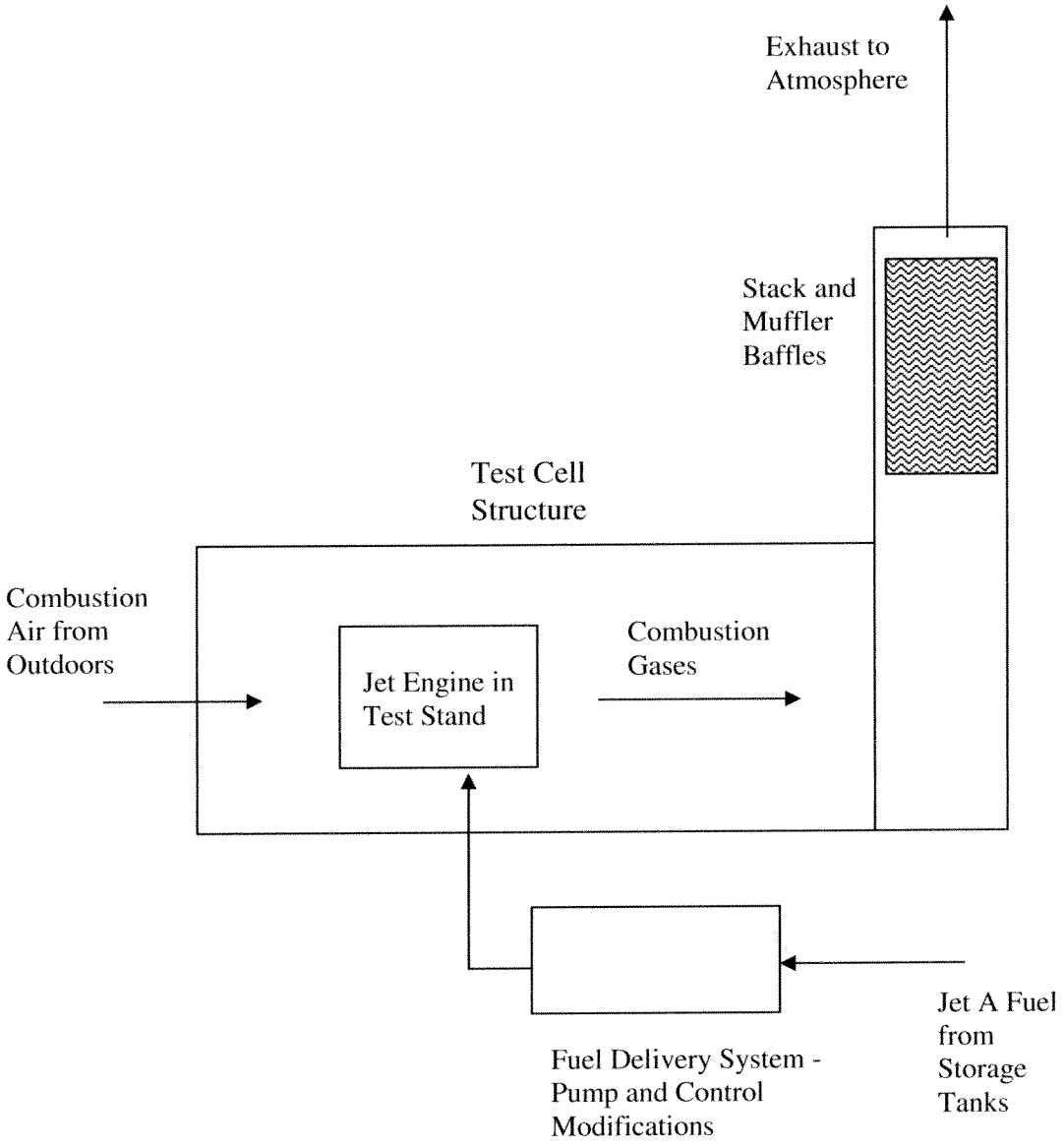
1 – Emission Factors for NO_X, CO and VOC from Table 32.1 in the facility Title V permit (No. V97-008). Emission factors for SO_2, PM (total) and HAPs from Tables 3.1-2a, 3.1-4 and 3.1-5 in EPA Document AP-42, Section 3.1 (April 2000).

2 – Pre-modification emissions are averages from annual emissions inventories for years 2002 and 2003 for Test Cell 671, combusting Jet A fuel.

3 - Total annul emissions based on proposed operational limit on annual Jet A fuel consumption in Test Cell 671, determined as follows:

(100 hrs/yr x 970 gal/jr) + (1,460 hrs/yr x 190 gal/hr) = 374,400 gal/yr

Figure 2
Flow Diagram for Test Cell 671



To realistically state highest anticipated emissions, Honeywell Engines has assumed that the modified Test Cell will be capable of essentially continuous test operation for a limited number of tests per year. In practice, it has been found that the engine test schedule does not approach full time operation, as there is not sufficient demand for the maximum feasible number of tests across an entire year. Consequently, the proposed annual fuel consumption limitation represents maximum operations. No add-on post combustion controls are proposed or feasible for this emission source.

The proposed process parameter monitoring to ensure compliance with the proposed emission changes involves tracking of the fuel input (in gallons of Jet A) supplied to Test Cell 671 on a rolling, 12-month basis. Test Cell operators will have a record of the tracking parameters. The Honeywell Engines facility will translate these records for each engine test to the rolling, 12-month total calculation on a monthly basis. Annual emissions from this modified source will be stated independently in the facility Annual Emission Inventory.

2.3 MODIFIED pH PARAMETER RANGE FOR AMMONIA SCRUBBER

2.3.1 Process Overview

At the Honeywell Engines facility the Nitriding Process is a heat-treating step used to case-harden steel alloys and stainless steel alloys. Anhydrous ammonia feed is utilized in two different chemical forms to perform this function. First, to provide a reducing atmosphere surrounding the alloy parts, some ammonia is processed through an Autoclave Disassociator. This unit converts molecular ammonia (NH_3) to its two atomic components: hydrogen (H_2) and nitrogen (N_2). These gases serve to dilute the ammonia in the case-hardening furnaces, to provide better control of the nitriding reaction. Second, a portion of the ammonia gas is fed to the furnaces in the anhydrous form. The anhydrous ammonia used in the nitriding furnaces is stored in a pressurized tank. This tank is filled by a Honeywell contractor.

Neither the nitriding process nor the ammonia filling or storage systems are to be modified. The requested modification concerns only the Ammonia Scrubber that controls emissions from the nitriding process. A process flow diagram of the nitriding process, showing the streams controlled by the scrubber, is provided for reference in Figure 3. For reference, technical information on the Harrington scrubber that serves the nitriding furnaces is provided in Appendix B.

In a typical process, the temperature of the parts and furnace will be increased to around 1000 °F. Ammonia and dissociated gases will be injected at a controlled ratio and the hardening process will begin. The bonds of the ammonia molecule

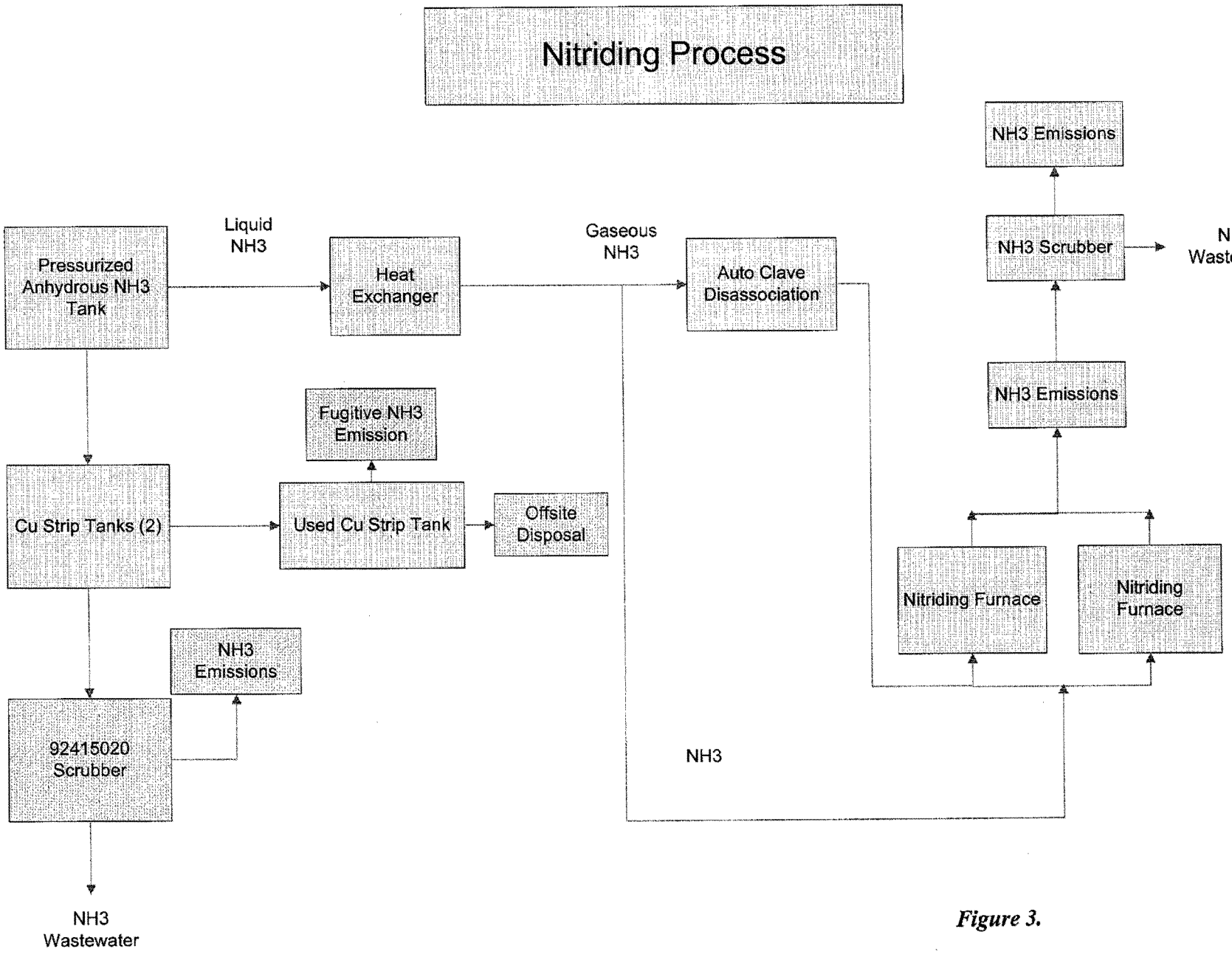


Figure 3.

Nitriding Furnaces and Ammonia Scrubber Process Flow Diagram

dissociate at the metal parts' surface and the diffusion of the nitrogen into the steel surface creates a nitride layer. During the nitriding cycle, the furnace temperature is increased further by approximately another 50 degrees to complete the process, and the temperature is then ramped down. This entire process requires extended periods of time which depend on multiple variables such as the size of the process part lot and configuration. Normal runs typically are processed in a three-day time period. Ammonia emissions can occur during the operation and unloading of the two nitriding furnaces at the facility.

2.3.2 Nature of the Requested Modification

A change in the operating parameter range for the ammonia scrubber pH is the only requested modification. Currently, the Honeywell Engines facility permit requires this scrubber to be operated in the range of pH 1 – 3. Operating experience indicates that this range causes several potential environmental and operating issues is not reflective of normal operating conditions.

As with all wet scrubber controls the driving force for contaminant absorption from the treated air stream depends on the solubility of the contaminant in the liquid stream. Once equilibrium considerations establish the "limit" for contaminant solubility, there is no additional driving force for absorption to be gained by altering the liquid chemistry. This is apparent in Figure 4, which is the aqueous equilibrium diagram for NH_4^+ (aq) and NH_3 (g) species at the normal operating temperature range of the scrubber (70 – 90 ^oF). The aqueous solubility of these species as a function of pH, and exhibits a strong dependence on pH in the range of 6.5 – 12. Below this range, the equilibrium distribution of the two species in water does not vary with pH. In short, this means that NH_3(g) is not measurably more soluble in water having pH=1 than it is in water at pH=6. There is no additional driving force for more efficient control at pH 1 – 3 than for pH 1.0 – 6.0.

Of equal importance, operating experience indicates there are several substantial problems with scrubber operation at the currently mandated very low pH, these include:

- Potential for acid mist emissions from the scrubber, even with properly operated and maintained mist eliminators;
- Risk of leaks of low-pH water caused by accelerated corrosion, with associated risks to personnel and equipment;
- Elevated acid usage and reagent costs, since maintaining pH=3 requires 1,000 times greater acid concentration than pH=6;
- Reduced equipment life due to harsh pH conditions; and,

The operation of the ammonia scrubber for the nitriding furnaces at pH 1-3 poses a risk of all of the listed potential problems, with no benefit in control efficiency. The equilibrium data shows that the absorption potential is not directly dependent on pH at a level below 6.5. Since the equilibrium solubility sets the maximum driving force for absorption, this physical relationship illustrated in Figure 4 for the ammonia/water/air system shows that there is no measurable difference in absorption efficiency at pH = 1 compared to pH = 6.

To correct this situation, the Honeywell Engines facility proposes to modify the operating range of the nitriding process ammonia scrubber to pH 1.0 – 6.0. This range will still offer a sufficient margin below the change in equilibrium that occurs at pH > 6.5. No change is proposed in the nature or frequency of pH monitoring and record keeping.

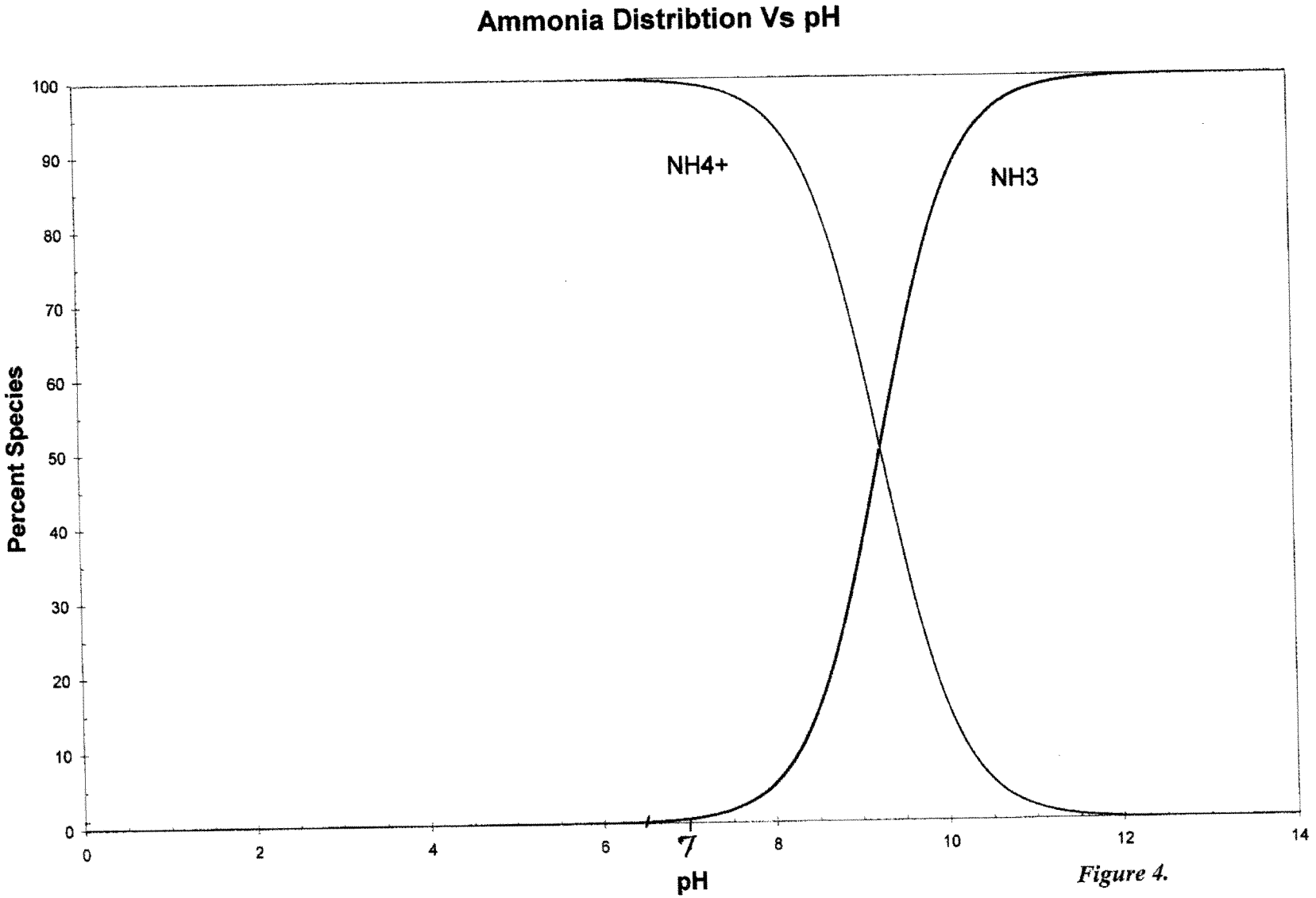


Figure 4.

Ammonia/ Water Solubility Diagram

(Source: Nalco Chemical Co.)

Table 3.
Title V Permit V97-008 Modification Application – Ammonia Scrubber
Nitriding Process Equipment List – Provided for Reference Only – No Changes Proposed

Equipment Name	Anhydrous Ammonia Tank	Nitriding Furnace 1	Nitriding Furnace 2	Ammonia Scrubber
Equipment Number	No number assigned	93007040	93007041	92415026
Make	Vendor Equipment	Unknown	Unknown	Harrington
Model	Custom Unit	Custom Unit	Custom Unit	ECH 1 2-5 LB
Serial Number	Unknown	Unknown	Unknown	S-020304-1
Date of Manufacture	Unknown	Unknown	Unknown	2005
Size/Capacity	Maximum = 1000 gallons Working = 870 gallons	Old Unit – Heat Input Rating Unknown	Old Unit – Heat Input Rating Unknown	755 CFM
Type	Pressurized, Horizontal, Steel	Electrically Heated	Electrically Heated	Horizontal Packed Bed Wet Scrubber

2.4 TREATMENT AS PRE-CONSTRUCTION REVIEW REVISION

Review of relevant sections of the MCAQD Interim Guidance (December 2006) for Title V sources indicates the proposed modification of Test Cell 671 qualifies for treatment under Pre-construction Review. The following analysis is based on regulatory criteria in the Interim Guidance published in December 2006 by MCAQD.

Determine the increase in PTE for the modification and determine whether it exceeds the Insignificant Emission Rate (0.5 ton/yr HAP, or 2.0 tpy other regulated pollutants).

The proposed modification will exceed the Insignificant Emission rate. Considering the proposed administrative controls on fuel feed rate, the proposed modification in fuel feed rate capacity for Test Cell 671 results in increases in PTE for criteria pollutants NO_X and CO that are above 2 tpy. Therefore, the proposed modification does not qualify as a Minor Revision.

Determine the net emissions increase for the modification, and determine whether the change will exceed the Significant Emissions Rate for any pollutant.

The described modifications to Test Cell 671 and pH range on the ammonia scrubber will not result in net emissions increases larger than the Significance thresholds. The total net emissions increases of criteria pollutants for the Test Cell 671 modification are presented in Table 2. These increases are below the Significance thresholds, even if the relatively small past-actual emissions data from years 2001 and 2003 are not taken into account (the most recent years the cell operated on Jet A fuel).

As described in Section 3.2 the net increase of each regulated pollutant was estimated using the proposed annual fuel consumption limit for Test Cell 671. It was found that the total NO_X emissions after the modification will be 20.7 tons

per year. The Significance level for NO_X emissions is 40 tons per year, after consideration of all increases during a contemporaneous 5-year period. Net emissions increases of CO and SO_2 are even smaller compared to the Significance thresholds, with small amounts of additional VOC and HAP emissions associated with increased fuel rate.

Does the emission unit have an Allowable Emission expressed as a permit limit? Does the source seek to increase the annual limit for a given pollutant?

There is no allowable emission limit for this Test Cell that must be modified or increased as part of the requested revision. The requested revision will seek to establish a voluntary operational limit on Test Cell 671 emission unit, to avoid otherwise applicable requirements.

Is a case-by-case determination of an emission limitation (e.g. BACT) or other standard required?

For the limited schedule of operation for the Test Cell 671 modification, as reflected in the proposed annual fuel consumption limit, the net emissions increase does not trigger a BACT determination or other emission limiting standard.

The existing Title V permit for the Honeywell Engines facility does not contain a limit on emissions, operating hours or rates of production for Test Cell 671. The described modification includes a proposed limit on total annual Jet A fuel consumption (product of test hours and fuel feed rate) that will require tracking the test duration and fuel input rate parameter. The annual, post-modification potential emissions are based on the maximum anticipated annual fuel heat input rate for the test cell. Detailed calculations are provided in Appendix A.

Does the change request a change in fuel not represented in the application or authorized by the permit?

The modification does not request use of a fuel other than that already permitted, namely, Jet A or similar liquid fuels in Test Cell 671. The fuel limitation in the

current facility permit to "only burn Jet A or similar liquid fuels" will remain in effect after the modification of the Test Cell fuel feed system.

Does the change involve substantive changes to existing monitoring, recordkeeping, or reporting already in the permit?

The change will not result in additional monitoring, record keeping, or reporting that is not already accomplished on other permitted Test Cells. Existing monitoring of annual fuel consumption for Test Cells, is performed by the facility for purposes of annual emissions tracking. The actual emissions increase can be readily calculated based on the emissions factors and methodology described in the Title V application and in this Modification Application. There is no proposed change or relaxation in the monitoring, record keeping or reporting requirements already in the Honeywell Engines facility permit.

2.5 INSIGNIFICANT AND EXEMPT ACTIVITIES

Several specific insignificant/exempt activities are potentially affected by the proposed modification. These are as follows:

- Jet A fuel piping for delivery to Test Cell 671;
- Incidental leakage of fuel or lubricants during the process of set up or change out of an engine in the cell;
- Storage and delivery of caustic solution reagent to the ammonia scrubber unit; and,
- Routine maintenance activities on the Test Cell fuel delivery system.

3 EMISSIONS RELATED INFORMATION

3.1 AMMONIA EMISSIONS FOR THE NITRIDING PROCESS

(Ref: Title V Permit V97-008 Modification Application – Ammonia Scrubber Replacement)

Possible Ammonia Emissions Sources for Nitriding Process:

- Captured emissions from two nitriding furnaces routed through the ammonia scrubber;
- Fugitive emissions from nitriding process; and,
- Fugitive emissions from liquid anhydrous ammonia storage tank,

Only the first of these emission sources are involved in the proposed operating parameter modification. The change in operating pH will not alter the ammonia emissions, based on the equilibrium relationship for the ammonia/water /air system (refer to Figure 4). For reference, the emission estimates for the ammonia scrubber are provided in the Title V permit modification application for this unit, submitted to MCAQD in September 2006.

3.2 ENGINE TESTING IN TEST CELL 671

The estimated emissions for the modified test cell are based on conservative assumptions for the operating schedule, and the fuel flow rate during maximum and normal engine test conditions. Emission factors for criteria and HAP pollutant emissions from combustion of Jet A fuel were either obtained from the facility Title V permit support document, or from AP-42, Section 3.1 (Tables 3.1-2a, 3.1-4, and 3.1-5) for distillate fired combustion turbines. References for each emission factor are provided in the calculation tables in Appendix A.

The design of the engine test identifies two "modes" of operation that can be used to estimate maximum hourly and annual emissions. A "maximum throttle" condition, for which this application assumes conservatively will correspond to the maximum fuel flow capability of the modified system. Given the schedule of anticipated tests, and the capability of engines to sustain this high throttle setting, this condition will occur for a maximum on 100 hours per year, at a fuel flow of 970 gallons/hr.

The second and more common mode is "normal throttle" tests, which for the modified test cell corresponds to flow rates between approximately 29 and 190 gallons/hr. Given the schedule of anticipated tests, and the capability of engines to sustain this throttle condition, it was assumed that a maximum of 190 gallons/hr will be used for a maximum on 1,460 hours per year (overall average of 28 hours per week).

The emission factor does not differ for the two operating modes, as it is based on the heat input rate to the engine under test. Heat input rate for the two modes was calculated from the heat content of Jet A:

Maximum: 970 gal/hr x 0.1257 MMBtu/gal = 121.93 MMBtu/hr

Normal: 190 gal/hr x 0.1257 MMBtu/gal = 23.88 MMBtu/hr

For each criteria pollutant and HAP, estimates of either a maximum hourly rate, or the annual total emissions can be calculated using a published emission factor. For the combination of maximum and normal throttle modes, the annual calculation also use the relationship that the normal mode heat input rate (190 gal/hr) is equal to 19.58% of the maximum heat input rate.

Annual emissions (example NO_X):

[(100 hrs/yr +(1460 hrs/yr x 0.1958)) x 121.93 MMBtu/hr x 0.88 lb NO_X/MMBtu] / 2000 lb/ton
= **20.7 tons NO_X/yr**

An identical methodology is used for each criteria pollutant and HAP listed in the AP-42 Section. Detailed calculations are provided in Appendix A (Tables A-1 and A-2). A summary of criteria pollutant emissions appears in Table 2, and emissions of speciated HAP are shown in Table 4 (refer to Appendix A, Tables A-1 and A-2). Emission calculations for the new equipment show that the total, net change in HAP emission rate is 59 pounds per year, supporting the determination that the proposed change does not trigger NSR for HAPs.

Table 4.
Summary of Maximum Annual Federal HAP Estimated Emissions for the Modification

HAP Constituent	Total Modification Emissions	
	Max. Lbs/Hour	Lbs/Year
Arsenic	0.0013	0.52
1,3 Butadiene	0.0019	0.75
Benzene	0.0067	2.59
Beryllium	0.000038	0.01
Cadmium	0.00059	0.23
Chromium	0.0013	0.52
Lead	0.0017	0.66
Formaldehyde	0.034	13.17
Manganese	0.096	37.17
Mercury	0.00015	0.06
Naphthalene	0.0043	1.65
Nickel	0.00056	0.22
Polycyclic Aromatic Hydrocarbons (PAH)	0.0049	1.88
Selenium	0.0031	1.18
TOTALS	**0.153**	**59.18**

APPENDIX A

EMISSION CALCULATIONS

Table A-1

PAST ACTUAL EMISSION ESTIMATION - TURBINE ENGINE TEST CELL OPERATION - CELL 671

SOURCE ID:	Honeywell Engines Facility - Test Cell 671						
#671 Compressor Cell	Test Cell Fuel Rating: 224.3 gal/hr gal/hr Max, Jet A Fuel Heat Content: 0.1257 MMBtu/gal						
	Type of Source: Combustion Turbine - Aircraft engine						
Pollutant	Nitrogen Oxides (NO_x)	Carbon Monoxide (CO)	Sulfur Dioxide (SO_2)	Vol. Organic Compounds (VOC)	Particulate Matter (PM_{10})		
Throughput or Other Emission Basis	28.19 MMBtu/hr (Max Condition) See Note A	28.19 MMBtu/hr (Max Condition) See Note A	28.19 MMBtu/hr (Max Condition) See Note A	28.19 MMBtu/hr (Max Condition) See Note A	28.19 MMBtu/hr (Max Condition) See Note A		
Number of Identical Emission Sources	1	1	1	1	1		
Emission Factor (Reference)	8.80E-01 lb/MMBtu Facility Value	7.00E-01 lb/MMBtu Facility Value	3.30E-02 lb/MMBtu Facility Value	4.10E-04 lb/MMBtu AP-42, Tbl.3.1.2a, 4/00	1.20E-02 lb/MMBtu AP-42, Tbl.3.1.2a, 4/00		
Max. Emission Rate	2.48E+01 lb/hr	1.97E+01 lb/hr	9.30E-01 lb/hr	1.16E-02 lb/hr	3.38E-01 lb/hr		
Control Device or System	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control		
Capture and Control Efficiency	0.00	0.00	0.00	0.00	0.00		
Admin. Control Measure.	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours		
Controlled Emission Rate	2.48E+01 lb/hr	1.97E+01 lb/hr	9.30E-01 lb/hr	1.16E-02 lb/hr	3.38E-01 lb/hr		
PTE Annual Hours of Operation (hr/yr)	26.5 hr/yr (Note C)	26.5 hr/yr (Note C)	26.5 hr/yr (Note C)	26.5 hr/yr (Note C)	26.5 hr/yr (Note C)		
Max. Hourly Emissions (lb/hr)	24.8	19.7	0.93	0.012	0.34		
Est. Annual Emissions (lbs./yr)	657.4 (Refer to Note B)	522.9 (Refer to Note B)	24.7 (Refer to Note B)	0.3 (Refer to Note B)	9.0 (Refer to Note B)		

Note A: The maximum fuel firing condition is based on rated short term flow in the Title V permit Equipment List = 224.3 gal/hr.

Note B: Annual emissions are based on average total fuel consumption for Cell 671 in years 2001 and 2003. These are the only prior years for which there was recorded fuel consumption.

Note C: The past-actual annual emissions are based on maximum hourly emissions, adjusted to the test cell equivalent hours maximum fuel flow:

Average fuel consumption (2001 - 2003) = 5,946 gal/yr. Equivalent full load hours = 5,946 gal/yr / 224.3 gal/hr = 26.5 hours/yr

Table A-1

EMISSION ESTIMATION - TURBINE ENGINE TEST CELL OPERATION - CELL 671

SOURCE ID:	Honeywell Engines Facility - Test Cell 671						
#671 Compressor Cell	Test Cell Fuel Rating: 970 gal/hr; Max, 190 gal/hr Avg.			Jet A Fuel Heat Content: 0.1257 MMBtu/gal			
	Type of Source: Combustion Turbine - Aircraft engine						
Pollutant	Nitrogen Oxides (NO_x)	Carbon Monoxide (CO)	Sulfur Dioxide (SO_2)	Nitrogen Oxides (NO_x)	Carbon Monoxide (CO)	Sulfur Dioxide (SO_2)	
Throughput or Other Emission Basis	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	23.880 MMBtu/hr (Avg. Condition) See Note A	23.880 MMBtu/hr (Avg. Condition) See Note A	23.880 MMBtu/hr (Avg. Condition) See Note A	
Number of Identical Emission Sources	1	1	1	1	1	1	
Emission Factor (Reference)	8.80E-01 lb/MMBtu Facility Value	7.00E-01 lb/MMBtu Facility Value	3.30E-02 lb/MMBtu Facility Value	8.80E-01 lb/MMBtu Facility Value	7.00E-01 lb/MMBtu Facility Value	3.30E-02 lb/MMBtu Facility Value	
Max. Emission Rate	1.07E+02 lb/hr	8.54E+01 lb/hr	4.02E+00 lb/hr	2.10E+01 lb/hr	1.67E+01 lb/hr	7.88E-01 lb/hr	
Control Device or System	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	
Capture and Control Efficiency	0.00	0.00	0.00	0.00	0.00	0.00	
Admin. Control Measure.	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	
Controlled Emission Rate	1.07E+02 lb/hr	8.54E+01 lb/hr	4.02E+00 lb/hr	2.10E+01 lb/hr	1.67E+01 lb/hr	7.88E-01 lb/hr	
Maximum Daily Hours of Operation (hr/day)	24 hr/day	24 hr/day	24 hr/day	24 hr/day	24 hr/day	24 hr/day	
PTE Annual Hours of Operation (hr/yr)	100 hr/yr	100 hr/yr	100 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	
Max. Hourly Emissions (lb/hr)	107.3	85.4	4.0	21.0	16.7	0.79	
Max. Daily Emissions (lb/day)	2575.2 (Refer to Note B)	2048.4 (Refer to Note B)	96.6 (Refer to Note B)	504.3 (Refer to Note B)	401.2 (Refer to Note B)	18.9 (Refer to Note B)	Total NOX (TPY)
Est. Annual Emissions (tpy)	5.36 (Refer to Note B)	4.27 (Refer to Note B)	0.20 (Refer to Note B)	15.34 (Refer to Note B)	12.20 (Refer to Note B)	0.58 (Refer to Note B)	20.71

Note A: The maximum fuel firing condition is based on anticipated short term flow, Average condition on the typical sustained test cell flow rate.

Note B: The maximum hourly results assume that the cell will use the maximum fuel flow for up to 100 hours per year, the average condition flow would be used up to 1,460 hours per year, or an average of 122 hours per month.

Table A-2

EMISSION ESTIMATION - TURBINE ENGINE TEST CELL OPERATION - CELL 671

SOURCE ID:	Honeywell Engines Facility						
#671 Compressor Cell	Test Cell Fuel Rating: 970 gal/hr; Max, 190 gal/hr Avg. Jet A Fuel Heat Content: 0.1257 MMBtu/gal						
	Type of Source: Combustion Turbine - Aircraft engine						
Pollutant	Vol. Organic Compounds (VOC)	Particulate Matter (PM_{10})	1,3 Butadiene	Benzene *	Formaldehyde *	Naphthalene *	PAH *
Throughput or Other Emission Basis	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A
Number of Identical Emission Sources	1	1	1	1	1	1	1
Emission Factor (Reference)	4.10E-04 lb/MMBtu AP-42, Tbl.3.1.2a, 4/00	1.20E-02 lb/MMBtu AP-42, Tbl.3.1.2a, 4/00	1.60E-05 lb/MMBtu AP-42, Tbl.3.1.4, 4/00	5.50E-05 lb/MMBtu AP-42, Tbl.3.1.4, 4/00	2.80E-04 lb/MMBtu AP-42, Tbl.3.1.4, 4/00	3.50E-05 lb/MMBtu AP-42, Tbl.3.1.4, 4/00	4.00E-05 lb/MMBtu AP-42, Tbl.3.1.4, 4/00
Max. Emission Rate	5.00E-02 lb/hr	1.46E+00 lb/hr	1.95E-03 lb/hr	6.71E-03 lb/hr	3.41E-02 lb/hr	4.27E-03 lb/hr	4.88E-03 lb/hr
Control Device or System	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control
Capture and Control Efficiency	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin. Control Measure.	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours
Controlled Emission Rate	5.00E-02 lb/hr	1.46E+00 lb/hr	1.95E-03 lb/hr	6.71E-03 lb/hr	3.41E-02 lb/hr	4.27E-03 lb/hr	4.88E-03 lb/hr
Annual Hours at Max Fuel Rate (hr/year)	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr
Annual Hours at Average Fuel Rate (19.6% of Max -hr/year)	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr
Max. Hourly Emissions (lb/hr)	5.00E-02 Max. lb/hr	1.46E+00 Max. lb/hr	1.95E-03 Max. lb/hr	6.71E-03 Max. lb/hr	3.41E-02 Max. lb/hr	4.27E-03 Max. lb/hr	4.88E-03 Max. lb/hr
Annual emissions at Normal Fuel flow (TPY)	7.15E-03	2.09E-01	2.79E-04	9.59E-04	4.88E-03	6.10E-04	6.97E-04
Hourly emissions at Normal Fuel flow (lb/hr)	9.79E-03	2.86E-01	3.82E-04	1.31E-03	6.68E-03	8.36E-04	9.55E-04
Est. Annual total Emissions (lbs./year)	19.29 (Refer to Note B)	564.59 (Refer to Note B)	0.75 (Refer to Note B)	2.59 (Refer to Note B)	13.17 (Refer to Note B)	1.65 (Refer to Note B)	1.88 (Refer to Note B)

* Hazardous Air Pollutant

Note A: The maximum fuel firing condition is based on anticipated short term flow, Average condition on the typical sustained test cell flow rate.

Note B: The maximum hourly rate is proposed to be limited to 100 hours per year. Additional operation at normal fuel throughput rate is 1460 hours/year.

Table A-2 Continued
EMISSION ESTIMATION - TURBINE ENGINE TEST CELL OPERATION - CELL 671

SOURCE ID:	Honeywell Engines Facility
#671 Compressor Cell	Test Cell Fuel Rating: 970 gal/hr; Max, 190 gal/hr Avg. Jet A Fuel Heat Content: 0.1257 MMBtu/gal

	Type of Source: Combustion Turbine - Aircraft engine						
Pollutant	Arsenic *	Beryllium *	Cadmium *	Chromium *	Lead	Manganese *	Mercury *
Throughput or Other Emission Basis	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A
Number of Identical Emission Sources	1	1	1	1	1	1	1
Emission Factor (Reference)	1.10E-05 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	3.10E-07 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	4.80E-06 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	1.10E-05 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	1.40E-05 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	7.90E-04 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	1.20E-06 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00
Max. Emission Rate	1.34E-03 lb/hr	3.78E-05 lb/hr	5.85E-04 lb/hr	1.34E-03 lb/hr	1.71E-03 lb/hr	9.63E-02 lb/hr	1.46E-04 lb/hr
Control Device or System	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control	No Add-on Control
Capture and Control Efficiency	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin. Control Measure.	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours
Controlled Emission Rate	1.34E-03 lb/hr	3.78E-05 lb/hr	5.85E-04 lb/hr	1.34E-03 lb/hr	1.71E-03 lb/hr	9.63E-02 lb/hr	1.46E-04 lb/hr
Annual Hours at Max Fuel Rate (hr/year)	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr	100 hr/yr
Annual Hours at Average Fuel Rate (19.6% of Max -hr/year)	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr	1,460 hr/yr
Max. Hourly Emissions (lb/hr)	1.34E-03 Max. lb/hr	3.78E-05 Max. lb/hr	5.85E-04 Max. lb/hr	1.34E-03 Max. lb/hr	1.71E-03 Max. lb/hr	9.63E-02 Max. lb/hr	1.46E-04 Max. lb/hr
Annual emissions at Normal Fuel flow (TPY)	1.92E-04	5.40E-06	8.37E-05	1.92E-04	2.44E-04	1.38E-02	2.09E-05
Hourly emissions at Normal Fuel flow (lb/hr)	2.63E-04	7.40E-06	1.15E-04	2.63E-04	3.34E-04	1.89E-02	2.86E-05
Est. Annual Emissions (lbs./year)	0.52 (Refer to Note B)	0.01 (Refer to Note B)	0.23 (Refer to Note B)	0.52 (Refer to Note B)	0.66 (Refer to Note B)	37.17 (Refer to Note B)	0.06 (Refer to Note B)

* Hazardous Air Pollutant

Note A: The maximum fuel firing condition is based on anticipated short term flow, Average condition on the typical sustained test cell flow rate.

Note B: The maximum hourly rate is proposed to be limited to 100 hours per year. Additional operation at normal fuel throughput rate is 1460 hours/year.

Table A-2 Continued
EMISSION ESTIMATION - TURBINE ENGINE TEST CELL OPERATION - CELL 671

SOURCE ID:
#671 Compressor Cell

Honeywell Engines Facility
Test Cell Fuel Rating: 970 gal/hr; Max, 190 gal/hr Avg. Jet A Fuel Heat Content: 0.1257 MMBtu/gal

Type of Source: Combustion Turbine - Aircraft engine

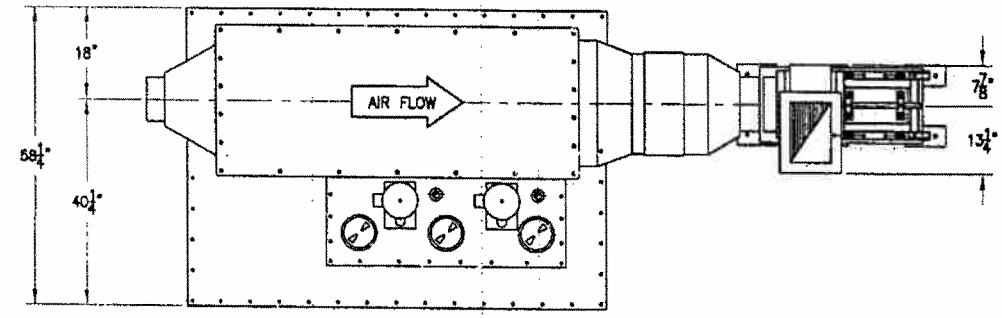
Pollutant	Nickel	Selenium	**TOTAL HAPS**				
Throughput or Other Emission Basis	121.930 MMBtu/hr (Max Condition) See Note A	121.930 MMBtu/hr (Max Condition) See Note A					
Number of Identical	1	1					
Emission Factor (Reference)	4.60E-06 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00	2.50E-05 lb/MMBtu AP-42, Tbl. 3.1.5, 4/00					
Max. Emission Rate	5.61E-04 lb/hr	3.05E-03 lb/hr					
Control Device or System	No Add-on Control	No Add-on Control					
Capture and Control Efficiency	0.00	0.00					
Admin. Control Measure.	Limit total Fuel Usage and Operating Hours	Limit total Fuel Usage and Operating Hours					
Controlled Emission Rate	5.61E-04 lb/hr	3.05E-03 lb/hr					
Annual Hours at Max Fuel Rate (hr/year)	100 hr/yr	100 hr/yr					
Annual Hours at Average Fuel Rate (19.6% of Max -hr/year)	1,460 hr/yr	1,460 hr/yr					
Max. Hourly Emissions (lb/hr)	5.61E-04 Max. lb/hr	3.05E-03 Max. lb/hr	**0.153 Max. lb/hr**				
Annual emissions at Normal Fuel flow (TPY)	8.02E-05	4.36E-04					
Hourly emissions at Normal Fuel flow (lb/hr)	1.10E-04	5.97E-04	0.030				
Est. Annual Emissions (lbs./year)	0.22 (Refer to Note B)	1.18 (Refer to Note B)	**59.18 Est. lbs/yr**				

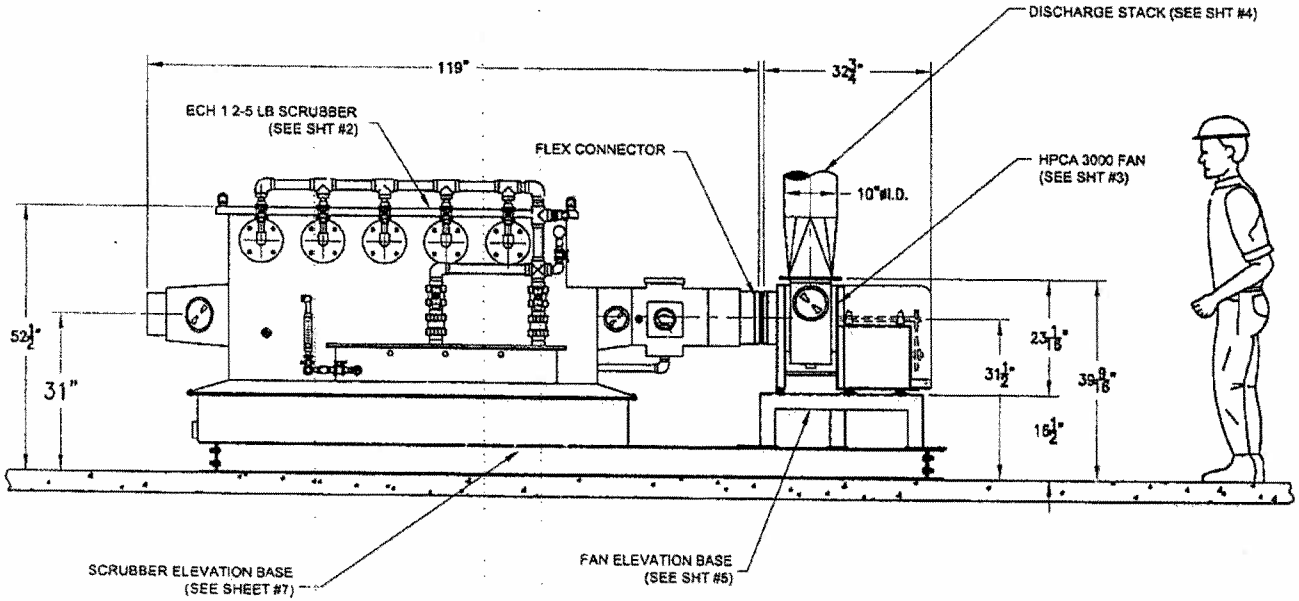
* Hazardous Air Pollutant

Note A: The maximum fuel firing condition is based on anticipated short term flow, Average condition on the typical sustained test cell flow rate.
Note B: The maximum hourly rate is proposed to be limited to 100 hours per year. Additional operation at normal fuel throughput rate is 1460 hours/year.

APPENDIX B

NITRIDING SCRUBBER TECHNICAL INFORMATION





DRAWING INDEX

SHEET	DESCRIPTION
1	SYSTEM LAYOUT
2	ECH 1 2-5 LB SCRUBBER
3	HPC 1050 FAN - CW
4	STACK DETAILS
5	STEEL BASE (SKID MOUNT)
6	CONTAINMENT PAN DETAIL
7	CHEM PUMP DETAIL
8	CONTROL PANEL LAYOUT
9	CONTROL PANEL SCHEMATIC

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MADE IN THE USA

REV.	DATE	BY	DESCRIPTION
△			
△			
△			
△			

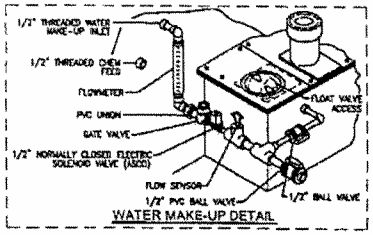
HARRINGTON
Industrial Plastics LLC
ENVIRONMENTAL ENGINEERING
14480 Yorba Avenue
Chino, California 91710
PH (909) 597-8641 FAX (909) 597-9940

SYSTEM LAYOUT

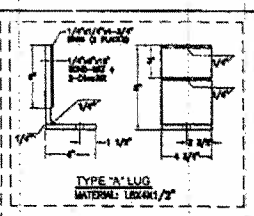
ENG:	DATE:	SALES:	DATE:
M.PARMENTAL	12/10/04	J. ELY	12/10/04

ENVIRO SAFE
PHOENIX HONEYWELL AIRLINE FACILITY

SCALE:	DRAWN BY:	DRAWING NUMBER	
3/4"=1'-0"	S. MENCHAVEZ	H04132-01 △	1/9
S.O. #: 1158			



WATER MAKE-UP DETAIL



NOTES:

1) PLUMBING CONNECTIONS:
   FRESH WATER: ITEM #15
   WASTE WATER: ITEMS #13 & 14
2) PRESSURE GUAGE (ITEM #4) TO HAVE GUARD & VALVE.
3) FLOW CONTROLLER: SIGNET (PANEL MOUNTED)
   3-8900 3-8900.402-1
   3-8900.401-7 3-8900.403-1
   3-8900.405-2

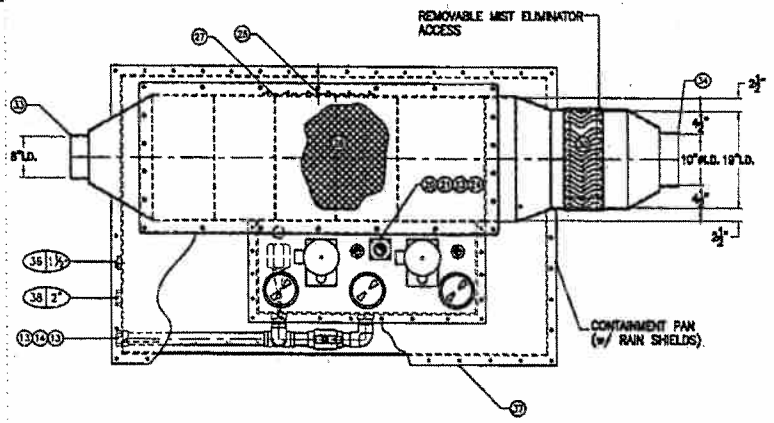
CONTROLLER CONFIGURATION:

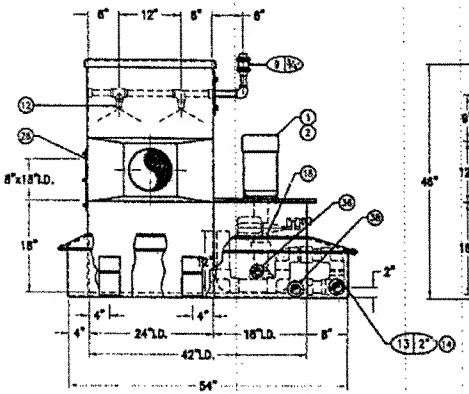
FLOW 1: K FACTOR= 58.560
RELAY 1 AS LOW
SP= 35
HYST= 5
FLOW 2: K FACTOR= 480.19

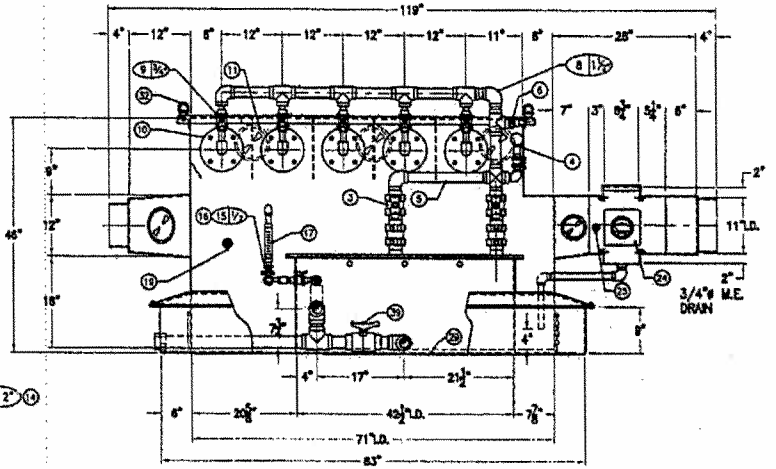
pH: RELAY 2 AS PULSE
MIN. VALUE = 2
MAX. VALUE = 5
MAX. PULSE = 120

SCALING:

RECIRC RATE: 4MA = 0GPM/20MA= 60 GPM
FEED RATE: 4MA = 0GPM/20MA=5GPM
pH: 4MA = 0 pH/20MA=14 pH







MATERIAL:

CORROSION LINER: NEXUS VEIL w/AOC FD10 VINYL ESTER RESIN.
INTERIOR: AOC FD10 VINYL ESTER RESIN.
EXTERIOR: AOC K022 VINYL ESTER RESIN w/1.5% ANTIMONY TRIOXIDE, TAN GEL COAT EXTERIOR w/UV INHIBITOR.

WALL THICKNESS: 1/4"

ITEM	DESCRIPTION	QTY
39	BALL VALVE: 2"ø TYPE 1 CPVC	1
38	CONTAINMENT DRAIN: 2"ø FRP, HALF-CPLG	1
37	SECONDARY CONTAINMENT PAN (w/ RAIN SHEILDS)	1
36	CONTAINMENT LEVEL SWITCH: HARWILL L40VCR-NO	1
35	CONTROL PANEL: (SHIPPED LOOSE)	1
34	OUTLET: 10"ø I.D.	1
33	INLET: 8"ø I.D.	1
32	LIFTING LUGS: 3" ANGLE w/EYE BOLTS	4
31	TIE DOWN: TYPE "A" LUGS	4
30	MIST ELIMINATOR: (MUNTERS) T-125, PPL 26"	1
29	REINFORCED SCRUBBER BOTTOM: 1" THK.	1
28	PACKING ACCESS DOOR: 8"H x 18"W I.D.	1
27	PACKING BAFFLE PLATE	5
26	PACKING: (LANPAC) 3.5" 30 cu.ft. PPL	5"
25	SP PORTS: 1/2"ø FIPT, FRP	2
24	DIFF. PRES. TRANS.: (DWYER) 3003SGT (0-3")	1
23	CHEM METER PUMP: (PULSATRON) LPE4EA-PHC1	1
22	pH CONTROLLER: SEE NOTE #3	1
21	pH PRE-AMPLIFIER: (SIGNET) 3-2750-3	1
20	pH PROBE: (SIGNET) 3-2754	1
19	CHEM FEED: 2"ø FIPT, FRP (PLUGGED)	1
18	FLOAT VALVE: 1/2"ø FIPT, POLYPRO	1
17	FLOWMETER: (BW) F40500LN-B (0.5 - 5.0) GPM	1
16	SOLENOID VALVE: (ASCO)1/2"ø #8210G2 480V/1P	1
15	INLET WATER MAKE-UP: 1/2"ø	1
14	OVERFLOW: 2"ø FIPT, FRP FULL-CPLG	1
13	DRAIN: 2"ø FIPT, FRP HALF-CPLG w/ BALL VALVE	1
12	SPRAY NOZZLES: (BETE) NCM 0703 WSO , PPL	10
11	ACCESS PORTS: 6"ø, POLYPRO	6
10	PLUMBING MOUNTING PORTS: 10"ø CPVC	5
9	BALL VAVE: 3/4"ø TYPE 1CPVC	5
8	HEADER: 1 1/2"ø SCH-80 CPVC	1
7	FLOW CONTROLLER: SEE NOTE# 3	2
6	FLOW SENSOR: (SIGNET) P51530-P3	2
5	DISCHARGE LINE: 1 1/2"ø SCH-80 CPVC	1
4	PRES. GUAGE: (SPAN) LFS212-SFB (0-30 PSI)	1
3	BALL VALVE: 1 1/2"ø	2
2	PUMP INLET FILTER: 2" P.E.	2
1	PUMP: (FPI) PENGUIN P-1-1/2A (1.5 HP)	2
	3450 RPM 230/460/3/60 TEFC (1 STANDBY)	

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Industrial Plastics LLC
ENVIRONMENTAL ENGINEERING
14480 Yorba Avenue
Chino, California 91710
PH (909) 597-8641 FAX (909) 597-9940

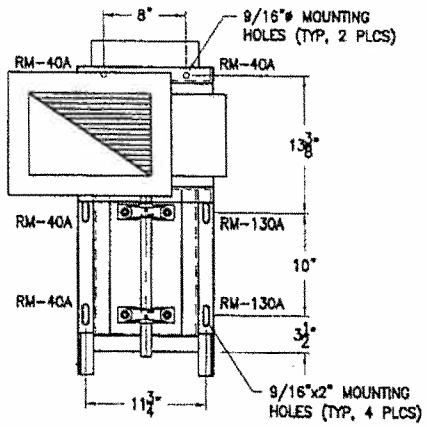
ECH 1 2-5 LB SCRUBBER

ENG: M. PARMENTAL	DATE: 12/08/04	SALES: J. BLY	DATE: 12/08/04

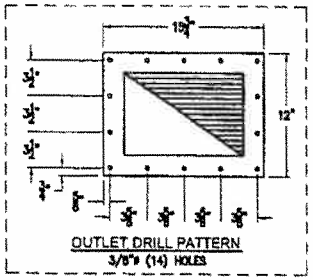
ENVIRO SAFE
PHOENIX HONEYWELL AIRLINE FACILITY

SCALE: 3/4"=1'-0"	DRAWN BY:	DRAWING NUMBER	2
S.O. #: 1158	S. MENCHAVEZ	H04132-02 △	9

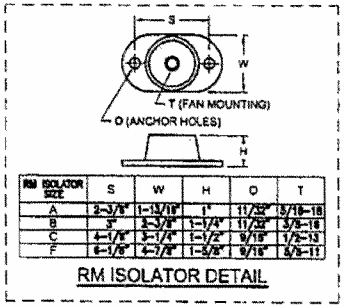
HIPCO APPROVED		CFM: 750	ΔP.: 1.47" W.C.	VEL.: 375 FPM	RECIR.: 40±5GPM
ENG.	DATE:	SERIAL NO.: S-020304-1		OPERATING WEIGHT: 1,634 LBS.	
SALES:	DATE:	TAG NO.:		DRY WT.: 580 LBS.	QTY. REQ'D.: 1



TOP VIEW
MOUNTING HOLE DIMENSIONS
(MOTOR & COVER NOT SHOWN)



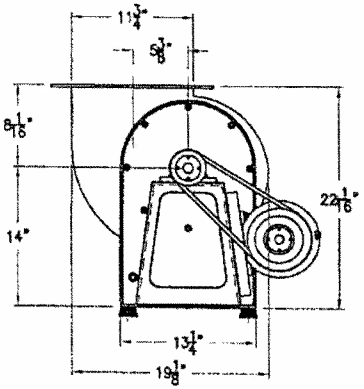
OUTLET DRILL PATTERN
3/8"ø (14) HOLES



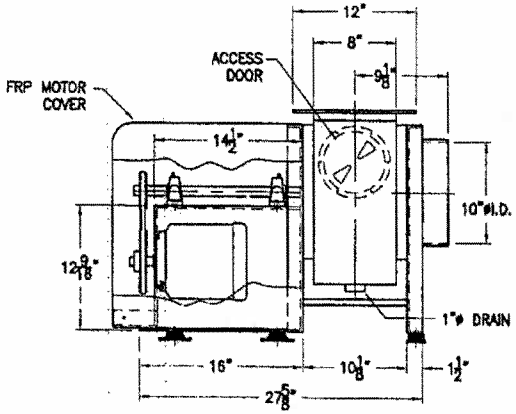
RM ISOLATOR SIZE	S	W	H	O	T
A	2-3/8"	1-13/16"	1"	11/32"	5/16-18
B	3"	2-3/8"	1-1/4"	11/32"	5/16-18
C	4-1/8"	3-1/4"	1-1/2"	9/16"	1/2-13
F	6-1/8"	4-7/8"	1-5/8"	9/16"	5/8-11

RM ISOLATOR DETAIL

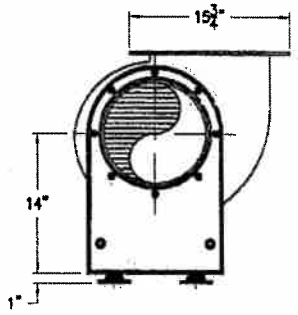
NOTES:
1) BEARING TO BE SEALMASTER NP-16(1"Ø).



REAR ELEVATION



SIDE ELEVATION



FRONT ELEVATION

TAG NO: HEF-1
HPC 1050
CW - UBD

	750	2.5"	2,813	0.66	AX30 x 7/8"	AX41 x 1"	1
AG NO.	CFM	SP	RPM	BHP	MOTOR SHEAVE	FAN SHEAVE	QTY
	PERFORMANCE				V-BELT DRIVES: CONSTANT		

NOTE: TO FACILITATE SHIPPING AND FIELD HANDLING OR ASSEMBLY, SOME COMPONENTS OF THIS EQUIPMENT MAY REQUIRE SOME FIELD ASSEMBLY. FOR SPECIFIC DETAILS, CONTACT HARRINGTON EES ENGINEERING DEPARTMENT, AND REFERENCE THIS DRAWING NUMBER.

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SPECIAL FEATURES

MOTOR COVER: YES	BELT/SHAFT GUARD: NO
SHAFT: CARBON STEEL	SHAFT SEAL: NEOPRENE
FLEX COLLAR: INLET	SCREENS (PVC): NO
ACCESS DOOR: YES	SCROLL DRAIN: 1" DIA. FIPT
INLET DAMPER: NO	INLET FLANGE: NO
GRAVITY DAMPER: NO	LIFTING LUGS (3): NO
VIBRATION ISO: MTR(RM-130A) Qty.2 ; FAN (RM-40A) Qty.4	
SPARE PARTS:	

MATERIALS OF CONSTRUCTION

FAN WHEEL: AOC F010-CNM VINYL ESTER RESIN

FAN HOUSING: AOC K022 VINYL ESTER RESIN w/1.5% AT w/TAN GEL COAT EXTERIOR

FAN PARTS (INLET CONE, ATTACHING RING, BACK PLATE, ETC): AOC K022 VINYL ESTER RESIN w/1.5% AT.

FAN DATA

ROTATION: CW	DISCHARGE: UBD
ARRANGEMENT: 9-R	WGT: 275 LBS.
CLASS: I	BEARING: (SEE NOTES)
ELEV: 0'	TEMP. (°F): 70°F

MOTOR DATA

FRAME: 145T	HP: 1.5	RPM: 3,600
VOLTS: 480	PH: 3	CYCL: 60 Hz
ENCLOSURE: TEFC		
FURNISHED BY: HEE		MOUNTED BY: HEE
MAKE: WEG		TYPE:
NOTES:		

SERIAL NO: 020304-1

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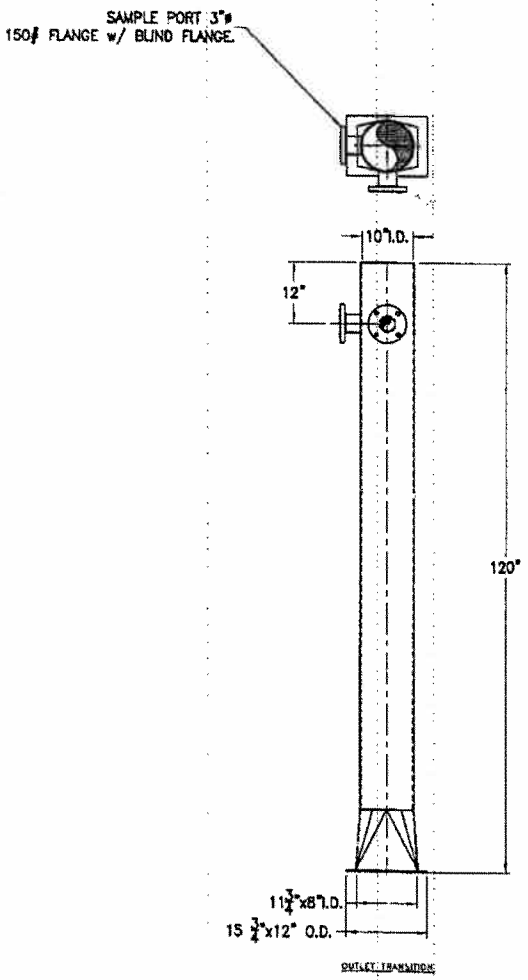
HPC 1050 FAN - CW

ENG:	DATE:	SALES:	DATE:
M. PARMENTAL	12/09/04	J.BLY	12/09/04

ENVIRO SAFE
PHOENIX HONEYWELL AIRLINE FACILITY

SCALE: 1.5"=1'-0"	DRAWN BY:	DRAWING NUMBER	
S.O. #: 1168	S. MENCHAVEZ	H04132-03 △	3/9



MATERIALS:
ADC K022 VINYL ESTER RESIN
w/ 1.5% ANTIMONY TRIOXIDE,
TAN GEL COAT EXTERIOR.

NOTES:
1) FLANGE TO BE MATCH DRILLED BY HARRINGTON.
2) HARRINGTON TO SUPPLY HARDWARE FOR FLANGE CONNECTION.

NOTE: TO FACILITATE SHIPPING AND FIELD HANDLING OR ASSEMBLY, SOME COMPONENTS OF THIS EQUIPMENT MAY REQUIRE SOME FIELD ASSEMBLY. FOR SPECIFIC DETAILS, CONTACT HARRINGTON EQS ENGINEERING DEPARTMENT, AND REFERENCE THIS DRAWING NUMBER.

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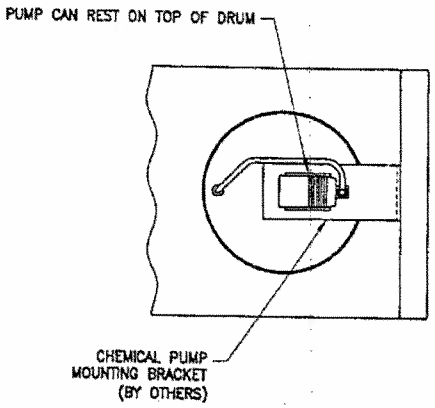
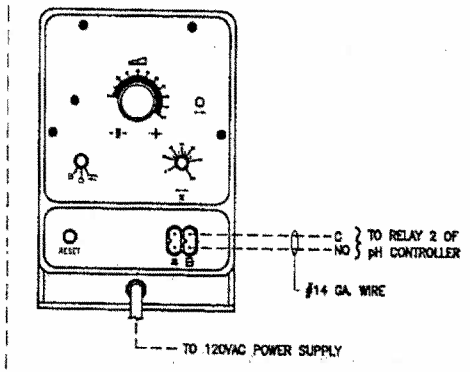
STACK DETAILS

ENG: M. PARMENTAL	DATE: 12/09/04	SALES: J. BLY	DATE: 12/09/04

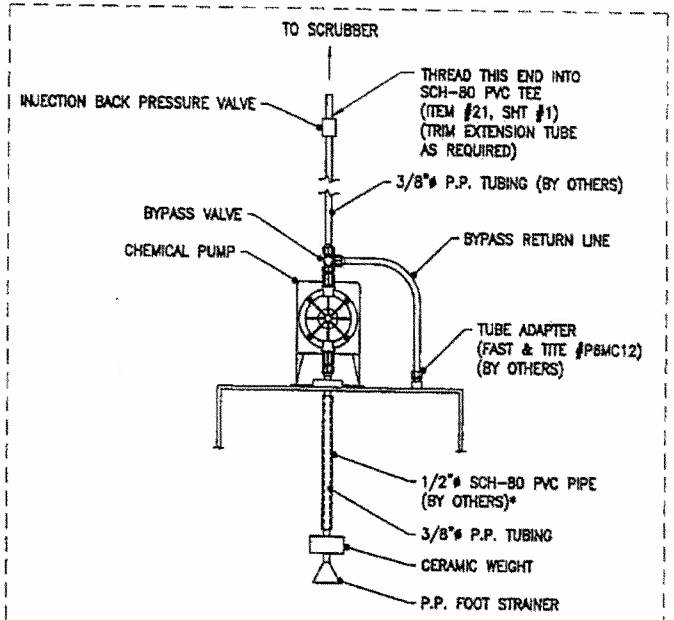
ENVIRO SAFE
PHOENIX HONEYWELL AIRLINE FACILITY

SCALE: 3/4"=1'-0"	DRAWN BY:	DRAWING NUMBER	
S.O. #: 1168	S. MENCHAVEZ	H04132-04 △	4/9





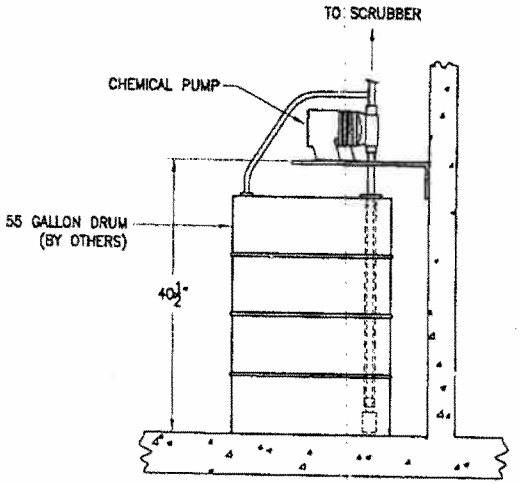
CHEMICAL PUMP WIRING



CHEMICAL PUMP CONNECTION DETAIL

NOTE: PUMP PRIMING – LIQUID LEVEL CANNOT BE LOWER THAN 24" FROM PUMP HEAD FOR INITIAL PRIME.

* ITEM IS RECOMMENDED BUT NOT REQUIRED.



(SUGGESTED CHEMICAL FEED SYSTEM ARRANGEMENT)

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CHEMICAL FEED SYSTEM

ENG: M. PARMENTAL	DATE: 12/13/04	SALES: J. BLY	DATE: 12/13/04

ENVIRO SAFE
PHOENIX HONEYWELL AIRLINE FACILITY

SCALE: 1"=1'-0"	DRAWN BY:	DRAWING NUMBER	
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