PREPRODUCTION INITIATIVE-NELP
ENGINE GAS PATH EFFLUENT PRETREATMENT SYSTEM
(AIRCRAFT)
TEST PLAN

SITE: NAS JACKSONVILLE

1.0 OBJECTIVE

When high levels of heavy metals were discovered in the wash effluent from certain engine cleaning operations, it was determined that a wastewater pretreatment system needed to be tested and implemented. In particular, T56 engine effluent used in four airframes—the P-3, C-2, E-2, and C-130—contained high concentrations of cadmium

This test plan describes the data collection procedure for evaluating the aircraft engine effluent pretreatment system at NAS Jacksonville. The data will be used to determine the efficiency, effectiveness, and overall success of the system in pretreating the effluent before it is discharged to the local Navy-owned treatment works (NOTW). The pretreatment process removes heavy metals, oils, and grease to levels accepted by the treatment works. It is also possible that the wash water can be recycled for use in the next wash cycle; however, because this is outside the scope of this test, the alternative will be assessed later.

2.0 EQUIPMENT DESCRIPTION

As part of its support of P-3 operations, NAS Jacksonville currently collects engine effluent and disposes of it as hazardous waste. Typically per week, two 55-gallon drums are disposed of as hazardous waste. The aircraft engine effluent pretreatment system will process up to 500 gallons per batch of engine effluent, which will contain free oils and fuels, chemically and mechanically emulsified oils, grease, solvents, lubricants, and heavy metals. The wastewater will be produced throughout the month and periodically treated as described in this test plan.

The chosen system is the ContamAway II, which is manufactured by WaterSmart Environmental, Inc. Engine wastewater will be emptied from drums via a drum pump into the system's wastewater collection tank, which will render the drum empty as defined by the Resource Conservation and Recovery Act (RCRA). Before treatment, the wastewater collection tank will feed the treatment system and allow free oils to accumulate. A suction pump will transfer the wastewater from the wastewater collection tank through a five-micron filter, which will remove particulates. The wastewater will be filtered through an oversized coalescing filter that will remove free and mechanically emulsified oils and suspended solids as low as one micron in size. Wastewater will then flow to the dual media adsorber of Organosorb™ and acid-washed granular activated carbon (GAC), which will remove chemically emulsified oils and heavy metals.

The treated water holding tank will contain the treated wastewater while laboratory analysis is performed. A faxed laboratory report is expected approximately two weeks after shipment of the sample. The faxed report will indicate whether the wastewater is acceptable for discharge to the NOTW.

3.0 SAMPLING PLAN

The following procedures will ensure proper treatment and handling of the engine effluent from P-3 engine wash operations.

3.1 Wastewater Storage and Transportation

Wastewater will be collected from the engine wash of each aircraft, placed into drums, and stored at the hangar where the washing occurs. Up to eight drums will be taken to the treatment site for processing. These drums will be emptied into the wastewater collection tank, and the system will be started. However, as the treatment cycle begins and the pump starts drawing wastewater into the system, a "before" sample should be taken from the port closest to the pump; this port is located under the control panel. This sample will provide baseline information.

NOTE: Once the pretreatment system has been started, no new waste should be added to the wastewater collection tank until the system is ready to perform the next batch treatment cycle (*i.e.,* the treated water holding tank has been emptied pursuant to acceptable laboratory results).

As the last step of the treatment cycle, the system will empty treated water into the treated water holding tank. As wastewater flows into the tank, an "after" sample should be taken from the final port to ensure that pretreatment standards are met. The "final port" is the outflow of the second adsorber in series flow—not necessarily the second adsorber on the skid. The sampling port will change depending on the order of the adsorbers (lead versus lag).

NOTE: The "after" sample should always be taken from the outflow of the second adsorber in series flow.

The wastewater will remain in the Treated Water Holding Tank until the laboratory sample results are returned to the site. If the results are acceptable according to the preset standards contained within the NOTW agreement (see Section 3.3), the wastewater will be discharged to the sanitary sewer to be treated by the NOTW. After the treated water is discharged, the system will be ready for a new batch of wastewater.

The process for transferring wastewater that is stored at the hangar where the washing occurs will follow the first in, first out (FIFO) methodology. In other words, the "oldest" wastewater will be transferred and treated first. This will ensure compliance with the 75-day maximum time limit for a NAS Jacksonville generator to accumulate hazardous waste without a permit.

All samples shall be labeled according to Section 3.2 and delivered or shipped in the containers provided to:

Columbia Analytical Services, Inc.
8540 Baycenter Road
Jacksonville, FL 32256
Telephone: 904-739-2277
Fax: 904-739-2011

3.2 Tracking System

To track the wastewater from the engine wash area to the sanitary sewer, a unique drum identifier, a unique batch identifier, and a sample label will be assigned to the wastewater from each aircraft according to bureau number, reason for wash, date of wash, date of treatment, and sample origin. The drum identifiers will be marked on each drum of wastewater, and batch identifiers will be assigned to each batch of drums (*i.e.,* up to eight drums). The sample label will combine the sample origin with the batch identifier to track the "before" and "after" test results. These identifiers will be used throughout the treatment process.

3.2.1 At the Wash Site

The labels at the wash site will provide tracking information for the drums of wastewater. This label will be *in addition* to the labels mandated by state and federal regulations for identification, storage, and handling of hazardous waste. The following information must be included on the wash site labels.

- **Bureau Number:** Indicate the bureau number of the aircraft housing the engines that are being washed.
- **Reason for Engine Wash:** Identify the reason for the maintenance action (*e.g.,* routine maintenance, poor performance).
- **Wash Date:** Indicate the date of the engine wash.
- **Squadron Identification:** Identify the squadron that generated the wash water, if known.

3.2.2 At the Treatment Site

The **unique drum identifier** will be determined from the label provided at the wash site (described in Section 3.2.1). The **unique drum identifier** will contain the following information in the following order:

1. The *bureau number* of the aircraft housing the engines
2. *"R" or "P"*—indicating the reason for the wash (routine = "R," poor performance = "P")

3. The *date of the wash* (mm/dd/yy).

A **unique batch identifier** will be assigned to a batch of up to eight drums. A master list (Appendix A) will associate the identifiers for the eight drums with the single batch identifier for the combined effluent.

The **unique batch identifier** will simply be the *date of treatment* (mm/dd/yy). This number will be unique because only one batch will be treated on any given day. (Note: A batch is defined as all wastewater treated in a given cycle.)

Two samples will be taken from each batch of wastewater—one before treatment and one after (see Section 3.1). These samples will be labeled according to the sample origin (*i.e.,* before or after treatment) and the unique batch identifier. The sample label will track both the before and after samples, which will support discharge of the treated effluent pursuant to acceptable laboratory results.

The **sample label** will contain the following components in the following order:

1. *"Before" or "after"*—to indicate the sample origin and whether the initial port (*i.e.,* under the control panel) or the final port (*i.e.,* one of two ports near the adsorbers) was used.

2. The *date of treatment* (mm/dd/yy).

3.3 NOTW Standards

According to the agreement between NAS Jacksonville and the NOTW, only certain maximum concentrations of contaminants may enter the NOTW. These maximum concentrations are the parameters that will be tested by the laboratory, Columbia Analytical Services. (NAWC Lakehurst will handle all testing parameters and other arrangements. Any changes to the laboratory analysis requirements must be approved by NAWC Lakehurst.)

The following levels must be obtained before the treated water can be discharged to the NOTW.

Parameter	Limit
Oil and grease	$\leq$ 30 mg/L
pH	$6.5 \leq$ pH ≤ 8.5
Cadmium	$\leq$ 0.1 mg/L
Chromium	$\leq$ 1.0 mg/L
Copper	$\leq$2.0 mg/L
Lead	$\leq$ 0.4 mg/L
Mercury	$\leq$ 0.01 mg/L
Nickel	$\leq$ 2.0 mg/L
Silver	$\leq$ 0.2 mg/L
Zinc	$\leq$ 0.4 mg/L

4.0 TEST PROCEDURES

To provide the data needed to evaluate the aircraft engine effluent pretreatment system from a cost-benefit perspective, the following information will be collected.

4.1 Approach

Quantitative and qualitative data will be acquired through the completion of Tables 1 and 2. Initially, each batch of wastewater from the washing operations will be segregated and sampled to track the contaminant levels and evaluate the effectiveness of the pretreatment equipment.

4.1.1 Instructions for Completing Table 1

a. Batch Data

- **Unique Drum Identifiers:** Indicate the unique drum identifiers on the drums of waste to be treated (*i.e.,* up to eight per batch).

b. Treatment Data

- **Treatment Date (also known as the Batch Identifier):** Indicate the date on which the wash water was treated (month, day, year).
- **Time/Task:** Record the time per unit task (*i.e.,* the time required to run each treatment cycle or associated task).
- **Volume Treated:** Indicate the total volume (in gallons) of effluent *treated* on a given date (as indicated by the flowmeter).
- **Waste Disposal Date:** Record the date of *hazardous* waste disposal.
- **Waste Type:** Specify the type of hazardous waste being disposed of (*e.g.,* sludge, filters, spent media).
- **Waste Volume:** Indicate how many pounds of hazardous waste are being disposed of.
- **Disposal Cost:** Indicate the cost of waste disposal per pound.

c. Sample Data

- **Sample Label:** Indicate whether the sample was taken before or after the treatment cycle. Indicate the unique batch identifier (also found on the sample label).

- **Parameters:** This section indicates the parameters being tested by the laboratory.

- **"Before" Treatment Sample Results:** Indicate the laboratory results for the sample taken before treatment.

- **"After" Treatment Sample Results:** Indicate the laboratory results for the sample taken after treatment.

d. Comments

- Indicate any comments relevant to the operation.

4.1.2 Instructions for Completing Table 2

a. Data Type

- Check the box indicating what data type is being computed for this sheet.

b. Consumables

- **Date Ordered:** Indicate the date the consumables were ordered.

- **Date Received:** Indicate the date the consumables were received.

- **NSN:** If known, indicate the National Stock Number of the consumables ordered/received.

- **Description:** Record the specific consumable requiring replacement (*e.g.,* adsorptive media and filters).

- **Quantity:** Record the amount of each consumable that needs replacement.

- **Cost:** Record the unit and total cost of each consumable.

c. Downtime

- **Begin/End:** Record any periods longer than the expected one month interim between cycles when the unit was not in use. Specifically, indicate the first date after a treatment cycle was performed and the last date before a treatment cycle was performed.

- **Reason:** Explain whether the downtime was caused by repairs, maintenance, workload, or other factors.

d. Repairs

- **Part Number:** List the repair parts required. Include the specific part number or a brief description of the part.
- **Description:** Briefly describe the repair required.
- **Time:** Indicate the time (in man-hours) required to repair the system.
- **Cost:** Indicate the cost of parts and labor required for repair.

e. Qualitative Assessment:

Evaluate the capabilities of the treatment system. Briefly discuss:

- the efficiency and cost-effectiveness of the system
- the system's ease of use and ability to successfully interface with site operations.

5.0 REPORTING

The data entry forms are a concise method of data collection. Forms should be completed on an ongoing basis. As they are completed, data sheets should be faxed to UTRS. Original data sheets should be mailed to UTRS, Inc., 950 North Kings Highway, Suite 208, Cherry Hill, NJ 08034.

Data will be collected for one year. During this time, periodic status reports on the testing will be submitted to NAWCADLKE. The final report will include detailed results and observations, assess the efficiency and cost-effectiveness of the unit, and evaluate its ability to interface with site operations.

Appendix A

Unique Batch Identifier (Treatment Date)	**Unique Drum Identifiers** (Eight Individual Drum Labels)			
________________ (mm/dd/yy)	1 _________	2 _________	3 _________	4 _________
	5 _________	6 _________	7 _________	8 _________

Unique Batch Identifier (Treatment Date)	**Unique Drum Identifiers** (Eight Individual Drum Labels)			
________________ (mm/dd/yy)	1 _________	2 _________	3 _________	4 _________
	5 _________	6 _________	7 _________	8 _________

Unique Batch Identifier (Treatment Date)	**Unique Drum Identifiers** (Eight Individual Drum Labels)			
________________ (mm/dd/yy)	1 _________	2 _________	3 _________	4 _________
	5 _________	6 _________	7 _________	8 _________

Unique Batch Identifier (Treatment Date)	**Unique Drum Identifiers** (Eight Individual Drum Labels)			
________________ (mm/dd/yy)	1 _________	2 _________	3 _________	4 _________
	5 _________	6 _________	7 _________	8 _________

Unique Batch Identifier (Treatment Date)	**Unique Drum Identifiers** (Eight Individual Drum Labels)			
________________ (mm/dd/yy)	1 _________	2 _________	3 _________	4 _________
	5 _________	6 _________	7 _________	8 _________

Table 1
Operational Data Collection Sheet

Instructions: Complete one sheet for each treatment batch.

a. Batch Data

Unique Drum Identifiers
(up to eight per batch)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

b. Treatment Data

Treatment Date: / / Batch Identifier

Time/Task: _____ (man-hours)

Volume Treated: _____ (gallons)

Waste Disposal Date: _____

Waste Type: _____

Waste Volume: _____ (pounds)

Disposal Cost: $ _____ (cost per pound)

c. Sample Data

	Results	
Parameters	**Sample Label: Before _____**	**Sample Label: After _____**
Oil and Grease		
pH		
Cadmium		
Chromium		
Copper		
Lead		
Mercury		
Nickel		
Silver		
Zinc		

d. Comments:

_____

_____

_____

Table 2
Consumables, Downtime, and Repairs

Instructions: Complete one sheet for each data type.

a. Indicate data type by checking the appropriate box below.

❑ Consumables ❑ Downtime ❑ Repairs

b. Consumables

Date Ordered: _____ Date Received: _____

NSN: _____

Description: _____

_____

Quantity: _____ Unit Cost: _____

Total Cost: _____

c. Downtime

Begin: _____ End: _____

Reason: _____

_____

d. Repairs

Part Number: _____ Description: _____

Time: _____ _____

Cost: _____ _____

e. Qualitative Assessment

Describe the efficiency and cost-effectiveness of the system, ease of use, and the system's ability to successfully interface with site requirements.

_____

_____