PRELIMINARY HEALTH ASSESSMENT

PRATT AND WHITNEY AIRCRAFT/UNITED TECHNOLOGIES

PALM BEACH COUNTY, FLORIDA

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Prepared by:

State Health Office

Florida Department of Health and Rehabilitative Services (HRS)

Prepared for:

Agency for Toxic Substances and Disease Registry (ATSDR)

Background

The Pratt and Whitney Government Engine Business Division has been in operation as a division of the United Technologies Corporation (UTC) plant since 1958. Pratt and Whitney (P&W) is the dominant operating unit on the site. P&W employs about 8,000 persons who are engaged in the design development testing of aerospace propulsion systems, including high-performance jet engines and rocket engines. This endeavor requires the operation of engine test stands throughout the facility. Prior to the end of 1977, polychlorinated biphenyls (PCBs) were used as dielectric hydrothermal heat exchangers at the test stands. Transformers that used these same compounds were in use at P&W until 1983-84.

Acidic and alkaline rinse wastewater and hazardous wastes are produced by the following on-site operations: hue metal finishing, metal plating, photo development, mirror production, painting, cleaning (solvents and degreasers), machining, and laboratory testing. In the past, waste containment and treatment at the facility included collection within percolation ponds; and on-site burial, storage or incineration. Previously contained and stored waste included waste oil, sodium cyanide, thorium-dispersed nickel material and other assorted waste lubricant and process materials.

In the past, materials disposed of in the landfill/incineration trenches at the plant included construction debris, discarded equipment, unknown solid waste from Air Force Plant #74, solvents and solvent sludges, asbestos, fuels, paints, pesticide and herbicide container residues, benzonitrite and solvent-contaminated soils, mercury (from bulbs and and thermometers), discarded equipment from metal fininshing operations, commercial and laboratory chemicals, garbage, and sewage sludge.

The following documents were reviewed by Florida HRS:

1. Pratt and Whitney, Palm Beach County, Florida. Remedial Investigation Summary: Volume I-III by Qualtec, Inc. - 2/88

2. Pratt and Whitney, Palm Beach County, Florida. Site Feasibility Study by Qualtec, Inc. - 2/88

3. Pratt and Whitney, Palm Beach County, Florida. Addendum to Remedial Investigation/Feasibility Study by Qualtec, Inc. - 2/7/88

4. RCRA Facility Assessment Report. Pratt and Whitney, West Palm Beach, Florida, EPA Work Assignment 19-40RR by Ebasco Services Incorporated - 3/23/87

5. The Treatability Studies for United Technologies Corporation, Pratt and Whitney, Inc.'s, Palm Beach County, Florida site by Wastes FLP/Qualtec, Inc. - 6/30/80

6 United Technologies, Pratt and Whitney Aircraft, Government Products Division, Remedial Action Plan for PCB contamination by Roy F. Weston, Inc., and Post, Buckley, Schuh and Jernigan, Inc. - 5/1/85

7. Pratt and Whitney Aircraft Removal of Hazardous Waste from Scrapyard, Volume 1 by O&H Materials - 7/23/87

8. Report, Landfill Assessment, Pratt and Whitney Plant Site, West Palm Beach County, Florida by Dames and Moore - 3/28/83

Environmental Contamination

See Table I for the contaminated media of concern and their corresponding maximum concentration levels. No contaminants have been reported off site.

References for Table 1

1. Proposed Soil Ingestion Values - ATSDR

2. Proposed Water Screening Values - ATSDR

3. EPA compilation of agency review health effect data for some of the 40 CFR 261 Appendix VIII "Hazardous Constituents".

4. HRS Toxicant Profile by Center for Biomedical and Toxilogical Research Preliminary Concentration Limits

5. EPA Health Advisories

6. Chapter 17-22, Florida Administrative Code

7. Federal Register - 50:46936

8. Carcinogen Assessment Group, EPA

Physical Hazards

Physical hazards of concern include deteriorated drums and a cluster of newer, undeteriorated drums at an abandoned dump site utilized by the Air Force Plant #74. This 1.5-acre area was used from sometime in the 1950's to 1966. It is not known if any hazardous materials were disposed of at this location (no sampling has been performed).

The entire UTC site is surrounded by chain-link and barbed-wire fence, and limited access is insured by armed guards at an identification check-point.

Potential Environmental and Human Exposure

Potential environmental pathways are ground water movement, surface water run-off, percolation pond or canal flooding, and wind-blown dust. Human exposure to contaminated ground water is of concern. All the potable water used by United Technology's employees comes from eight 55 to 60 foot wells that tap the Biscayne Aquifer. They are contaminated with trichloroethene and 1,1,1,-trichloroethane. The wells are screened in a sandstone within the Biscayne Aquifer and together are capable of pumping 1200 gallons per minute (gpm). P&W has installed a four stage aeration system at their potable water treatment plant to eliminate volatile organics from the water supply. Ground water movement off site is a possibility because some of the sources of contamination on the site have not been addressed in the current remedial action plans. These sources include contaminated percolation pond and canal sediments and the Air Force #14 property. The Air Force #14 property includes an abandoned solid waste dump and percolation ponds.

The site is within the 100-year flood plain. Surface water runoff and flooding may introduce contaminants to the wetlands and canals that drain the site. Uptake of contaminants by fauna exposed to surface water from the site is a possible route for human exposure since two-thirds of the site is surrounded by Corbett Wildlife Management area.

Wind-blown dust could originate at the Area C burn pit which exhibits a notable lack of vegetation.

Demographics

The triangular shaped P&W facility property is bordered on the northeast by a light industrial area which has been only slightly developed (and is hydrogeologically up-gradient). This area is separated from the site by the Beeline Highway and the Seaboard Coastline railroad track. J.W. Corbett State Wildlife Management area borders the other legs of the triangle. The facility is approximately 10 miles southeast of Indiantown, 18 miles west of Jupiter and 15 miles northeast of Palm Beach. It is

relatively isolated from any residential communities. Exact population of the area was not addressed in any of the reviewed documents.

Evaluation and Discussion

Because the area around the site would be only marginally developed and because restricted site access is assured, the population at risk is comprised of site workers and possibly people that eat fish and game from the wildlife management area. Future development northwest of the site is marginally at risk because the development would be hydrologically up-gradient of the site. P&W has a laboratory on site where tests are run periodically on the potable water from on site wells.

Many of the sources of ground water, surface water and wind blown contamination have been addressed by on-going remedial actions. Remediation of the landfill area and areas A-1, A-4 and 5, C and D are being performed under one consent agreement reached between P&W, FDER and the HRS Palm Beach County Public Health Unit (April, 1985).

The three-acre landfill was capped, covered, and vented in 1985. Contaminated ground water is recovered by five ground water/leachate well clusters around the perimeter of the landfill. Intercepted ground water is pumped to an air stripping tower to remove volatile materials (designed for 99.9% removal), and the residual ground water flows to a deep injection well.

PCB-contaminated jet fuel remediation involves fuel recovery from the ground water, soil and sediment removal and ground water treatment. The goal for PCB site remediation levels is less than 50 ppm in the soils. Jet fuel remediation (not contaminated with PCBs) involves free product recovery and ground water treatment (air stripping).

The removal of stored and buried contaminated hazardous wastes from the scrap dump was completed in 1987. The presence of gross alpha above the drinking water Maximum Contaminant Level (MCL) of 15 pci/l was mentioned in the RCRA Feasibility Assessment in conjunction with improper containment of thoriated nickel. This gross alpha level was not quantified or discussed in any of the reviewed documents.

The lack of vegetation at Test Area C Burn Pit and the lack of sampling there make this area a likely source for contaminated, wind-blown dust. A similar Burn Pit near area D exhibited large concentrations of volatile organic compounds and PCBs. RFA site investigation revealed HNU readings of 18 ppm. The lack of testing associated with Air Force #74 unlined carbon pits and abandoned dump site is also cause for concern.

Conclusions

Based on available information, this site is considered to be of potential public health concern because of the risk to human health caused by the possibility of exposure to hazardous substances via chemicals in the ground water and air (wind-blown) and possibly through ingestion of contaminated wildlife. Although many of the sources of contamination at

the P&W site have been addressed and are now being remediated, areas such as the Scrap Dump, Area C Burn Pit, and the Air Force #74 percolation ponds and abandoned dump have not been sampled. Together, these unsampled areas present physical hazards and possible sources for future environmental pathways of contamination. P&W workers are protected from consumption of contaminated ground water by on-site laboratory water tests. It is unlikely but possible that workers untrained in safety methods could handle the currently produced wastes or could enter the abandoned Air Force #74's percolation ponds or dumping area. The population of concern that is not addressed includes people or hunters who may ingest fauna from the Corbett Wildlife Management area bordering the site. In addition, the presence and use of potable wells off-site from the P&W site has not been addressed.

TABLE ONE:

	SURFACE WATER	SURFICIAL AQUIFER (shallow ground water)					SOIL				
	(micrograms/liter)						(milligrams/kilograms)				
ON-SITE CONTAMINANTS	Canal & Pond Waters	Area A-1	Area A-4&5	Area C	Area D	Landfill	Water MCLs	Concrete-Wipe	Soil	Canal & Pond Sediment	Soil MCLs
Arsenic										< 5.0	.039[1]
Benzene		54	54		288		.67[2]				
Bromodichloromethane					2,002,000		100[6]				
Carbon Tetrachloride					2,040,000		.27[2]				
Chlorobenzene					35,000		2.35[5]				
Chloroethane						2,856					
Chloroform					1,160,000		.5[3]				
2-Chloronaphthalene					100,000		none				
Dibenzo-p-dioxin					3.82						
Dibenzofuran					28.32						
1,2-Dichlorobenzene					43,900		620[7]				
1,3-Dichlorobenzene					33,400		620[7]				
1,4-Dichlorobenzene					4200		5[5]				
1,1-Dichloroethane					1,021,000	23,199	2300[4]				
Ethylbenzene					160,000		680[5]				
Hexachlorobenzene					15,500		.021[8]				
Iron						29,100	300[5]				
Jet fuel-free product measured		maximum > 2.5'	maximum > 2.5'	maximum > .5'	maximum > 1'		See Table #2				
Lead				260	160		50[5]				
Polychlorinated Biphenyls	37	4,448,000		2,164,000	5.1		.0081[2]	4,336	2,960	1,913	.135[1]
Tetrachloroethylene						23,199	3[6]				
1,1,2,2-Tetrachloroethane					3,481,000		0.8[4]				
t-1,2-Dichloroethylene						261,720	70[5]				
1,2-Dichloroethane					6,560,000		.95[5]				
1,1,1-Trichloroethane					1,497,000		200[5]				
Trichloroethylene					1,390,000	432,380	5[6]				
Toluene					207,000		2000[5]				

TABLE 4-2

COMPONENT ANALYSIS OF JET FUELS USING
EPA METHOD 624 GC/MS

Compound	Jet Fuels (mg/l)		
	JP-4	JP-5	JP-7
Acrolein	ND	ND	ND
Acrylonitrile	ND	ND	ND
Benzene	2,800	140	43
Carbon tetrachloride	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-dichloroethane	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND
1,1-dichlorethane	ND	ND	ND
1,1,2-trichloroethane	ND	ND	ND
1,1,2,2-tetrachloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
Bis(chloromethyl)ether	ND	ND	ND
2-chloroethylvinyl ether	ND	ND	ND
Chloroform	ND	ND	ND
1,1-dichloroethylene	ND	ND	ND
1,2-trans-dichloroethylene	ND	ND	ND
1,2-dichloropropane	ND	ND	ND
Cis-1,31-dichloropropylene	ND	ND	ND
Trans-1,3-dichloropropylene	ND	ND	ND
Ethyl benzene	6,000	1,300	ND
Methylene chloride	ND	ND	ND
Methyl chloride	ND	ND	ND
Methyl bromide	ND	ND	ND
Bromoform	ND	ND	ND
Dichlorobromomethane	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
Chlorodibromomethane	ND	ND	ND
Tetrachloroethylene	ND	330	ND
Toluene	9,500	900	180
Trichloroethylene	ND	ND	ND
Vinyl chloride	ND	ND	ND

ND = Not detected at EPA detection limit method 624 (Federal Register December 3, 1979)

Analytical testing performed by Radian Corporation on jet fuel samples supplied by Pratt & Whitney.

Source: Pratt & Whitney, February 3, 1987.

JET FUEL ADDITIVES

Additive Type	Name Product/Chemical/Synonyms	Manufacturer/ MIL Spec	QUANTITY AND LOCATION WHERE ADDED JP-4	JP-5	JP-7	Jet A
Section A						
Fuel System Anti-Icing Inhibitor	METHYL CELLOSOLVE/2-Methyoxy-ethanol/Ethylene Glycol Monomethyl Ether	Union Carbide/ (MIL-I-27686E)	0.10-0.15% by Volume-Refinery	---	0.10-0.15% by Volume-Refinery	0.1-0.15 Volume % (if necessary refinery)
	Diethylene Glycol Monomethyl Ether	(MIL-I-85470)	---	0.05-0.15% by Volume - Refinery	---	---
	LONG INHIBITOR Ethylene Glycol Monomethyl Ether; Methyoxyethanol Poly-solv EM	Olin Chemical/MIL-I-27686E	---	---	---	1-1-1/2 gals/1000 gals fuel - at P&W as fuel pumped into storage tank
Section B						
Corrosion Inhibitor	Corrosion Inhibitor No. 4A/ Organic Acids/DCI-4A (14 approved proprietary materials)	Dupont/ MIL-I-25017D)	31.5 grams/ M^3 max-refinery	31.5 grams M^3 max-refinery	None Permitted	---
	High Tech E515-Proprietary mixture will switch to E580 in 1987	Edwin Cooper Div. of Ethyl Corp.	---	---	---	41.8 ml/1000 gals of fuel - at P&W as fuel pumped into storage tank
Section C						
Metal Deactivator	Metal Deactivator No. 2/N,N-disalicylidene-1,2 propanediamine in aromatic solvents/ MD-2 OR: N,N'-disalicylidene-1,2 cyclohexane-diamine	Dupont	2 lbs/1000 bbls max-refinery	2 lbs/1000 bbls max-refinery	2 lbs/1000 bbls max-refinery	2 lbs./1000 bbls Not required
Section D						
Anti-Static/ Electrical Conductivity	STADIS 450 Antistatic Additive/Polymeric nitrogen and sulfur compounds Toluene 60%, Isopropyl Alchol 3%, Mixed Aromatic Solvents 8%	Dupont/	3 mg/liter max-refinery	None Allowed	None Allowed	Not Required
	ASA-3 Antistatic-Additive Solution of 50% xylene & 50% proprietary ingredients containing 0.7% Chromium and calcium organic salts stabilized with a polymer	Shell	1 mg/liter max-refinery	Not Allowed	Not Allowed	Not Required

JET FUEL ADDITIVES

Additive Type	Name Product/Chemical/Synonyms	Manufacturer/ MIL Spec	QUANTITY AND LOCATION WHERE ADDED JP-4	JP-5	JP-7	Jet A
Section E Lubricity Additive	FC-708 FLUORAD Brand Jet Fuel Additive Fluorchemical Surfactant/FC-708, FLUORAD (PWA 536). Ingredients Toluene-37.5%/Methyl Isobutyl Ketone (MIBK)-37.5%/Nonionic fluoroaliphatic Surfactant - 25%	3M Company	Not Required	Not Required	Range 200-250 mg/l by weight -refinery	Not Required
Section F Anti-Oxidant	Antioxidant No. 29/2, 6 diter-tiary-butyl-4-methylphenol/ AO-29.	Dupont	6-8.4 lbs/1000 bbl (17.2 to 24 mg/ liter	6.-8.4 lbs/ 1000 bbl 17.2 to 24 mg/liter	Not required	8.4 lbs/1000 bbl Not required

Notes:

(1) Jet A type fuel can contain all the above additives, upon agreement. None are required. Ref. ASTM D1655 Fuel

(2) Fuel additive requirements are covered in the MIL specifications listed above. Jet fuel specificatiions are contained in the following MIL specs:

JP-4	MIL-T-5624L
JP-5	MIL-T-5624L
JP-7	MIL-T382198
Jet A	ASTM D1655-81

(3) Section letters in the "Additive Type" column refers to sections in the Environmental Affairs Jet Fuel notebook.