



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

203/566-2110

May 19, 1982

SARAH



SP 6/14/82

Honorable Lester A. Sutton
Regional Administrator
U. S. ENVIRONMENTAL PROTECTION
AGENCY/REGION I
JFK Federal Building
Boston, Massachusetts 02203

JUN 09 1982

RECEIVED
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REGIONAL ADMINISTRATOR
OFFICE OF THE DIRECTOR

Dear Administrator Sutton:

The enclosed material represents a revision to the sulfur dioxide portion of our State Implementation Plan (SIP) for air quality which will allow the Sikorsky Aircraft Division of United Technologies Corporation; Stratford, Connecticut to use one percent (1%) sulfur content oil. Also enclosed is material which revises State Order No. 7007 to allow Allegheny Ludlum Steel Corporation of Wallingford, Connecticut to continue the use of one percent (1%) sulfur content oil.

I have also enclosed an updated table which briefly describes the reasons that one percent (1%) sulfur fuel can be used by the sources which were originally prohibited from using such fuel. This subject table replaces the version that was sent to you on February 9, 1982 as Attachment "D".

The material enclosed supplements our October 23, 1981, and November 16, 1981 submittals as referenced in the Federal Register at 46 FR No. 222 and 46 FR No. 245, respectively. The enclosed revision and the associated support material, along with the material enclosed in my letter of February 9, 1982, should allow you to issue a Final Notice of Rulemaking to permit Dow Chemical, Sikorsky, and Allegheny Ludlum to use one percent (1%) sulfur content oil.

Enclosed you will find the following material:

- Attachment "A" -- State Order No. 7007A for Allegheny Ludlum;
- Attachment "B" -- State Order No. 7003A for Sikorsky Aircraft;
- Attachment "C" -- Staff memo regarding Sikorsky Aircraft;
- Attachment "D" -- Sikorsky Aircraft's consultant's modeling report; and

Phone:

State Office Building, Hartford, Connecticut 06115

An Equal Opportunity Employer

Lester A. Sutton
Stanley J. Pac

May 19, 1982
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Attachment "E" -- Modifications to the tables in the February 9, 1982 submittal, which briefly described the reasons why one percent (1%) sulfur fuel can be used.

Please process this material into a Notice of Final Rulemaking as soon as possible. Your staff may contact Leonard Bruckman, Director of the Air Compliance Unit should questions arise.

Sincerely yours,


Stanley J. Pac
Commissioner

B/bgm

Enclosures



ATTACHMENT "B"
(5/19/82)

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



STATE OF CONNECTICUT)	
DEPARTMENT OF ENVIRONMENTAL PROTECTION)	
)	<u>STATE ORDER NO. 7003A</u>
VS.)	
)	March 2, 1982
SIKORSKY AIR DIV. OF UNITED TECHNOLOGIES CORP.)	
STRATFORD, CONNECTICUT)	

In the matter of an Order of the Commissioner of Environmental Protection, State Order No. 7003A, concerning the utilization of fuel containing 1% sulfur by weight (dry basis).

WHEREAS, Sikorsky Air Div. of United Technologies Corp., North Main Street, Stratford (hereinafter the Company) operates fuel burning equipment utilizing fuel subject to the limitations of Section 19-508-19 of the Administrative Regulations for the Abatement of Air Pollution (hereinafter, Regulations), and;

WHEREAS, in accordance with the revisions to Connecticut's State Implementation Plan for Control of Sulfur Compound Emissions submitted on July 7, 1981 and the Federal Environmental Protection Agency's Federal Register notice approving these new rules, the Company and this Department have reviewed certain data and conducted air quality modeling to determine that compliance with the applicable National Ambient Air Quality Standards (NAAQS) utilizing 1% sulfur fuel has been demonstrated under certain operating conditions, and;

WHEREAS, this State Order constitutes an amendment to State Order No. 7003. All the terms and conditions of State Order No. 7003 are hereby superceded by the terms and conditions of State Order No. 7003A set forth herein.

NOW, THEREFORE, by authority of Section 19-514 et. seq. of the Connecticut General Statutes and Section 113(d) of the Clean Air Act as amended, 42 U.S.C. Sec. 7413(d), the Commissioner hereby approves Sikorsky Air Div. to utilize fuel oil with a sulfur content no greater than one percent (1%) by weight (dry basis) pursuant to Sec. 19-508-19 (a)(3) of the Regulations, subject to the following terms and conditions;

1. Final approval to utilize 1% sulfur fuel is contingent upon approval by the United States Environmental Protection Agency.
2. Submit agreement to operate no more than two (2) boilers at any one time from the months of March through November, inclusive. The two boilers shall each be operated at no greater than seventy-five percent (75%) of maximum design capacity.

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Sikorsky Air Div. of
United Technologies Corp.
Stratford, Connecticut

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STATE ORDER NO. 7003A
March 2, 1982

3. Submit agreement to revert to the use of fuel oil containing no greater than one half of one percent (.5%) sulfur during the months of December through February (inclusive) for all fuel-burning equipment.
4. Submit revised registration forms for any equipment for which operating parameters were adjusted as a result of air quality modeling conducted by this Department.
5. Submit progress report containing all agreements and information referenced above upon receipt of final approval by the U. S. Environmental Protection Agency.
6. Maintain appropriate records, fuel consumption, operating hours, etc. to be available for inspection by the Department upon request.

Failure to comply with the terms of this order shall be a violation of an order of the Commissioner and shall subject Sikorsky Air Div. of United Technologies Corp. to liability for civil assessments up to \$25,000 plus \$1,000 per day pursuant to Section 22a-6b(a) (3) of the General Statutes of Connecticut and Section 22a-6b-603 of the Department's Regulations. Departmental action under this authority in no way prevents the Commissioner from seeking, in addition or separately, an injunction enforcing this State Order together with penalties of up to five thousand dollars (\$5,000) per week in court proceedings under Section 19-516 of the General Statutes.

Questions concerning the terms of this Order should be addressed to Mr. Gudmun Lovvoll, Assistant Director Enforcement, Air Compliance Unit. Any future correspondence should make reference to the State Order No. cited above.

Signed this 9th day of March 1982.



Stanley J. Pac
Commissioner
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SJP

Encs.

COMPLIAN TIMETABLE

Site: Sikorsky Air Div. of U.T.C

Prime Contact: Ralph C. Weiss

Director

Premise #: 178-005

Title: Facilities and Services

Order #: 7003A

Date: 3/4/82

Source Address: North Main St., Stratford, Ct. 06602

N.V. #: 90241

Date: ----

Equip.: Wickes Boilers

Tel. No.: 386-4000

Violation: 19-508-19

Reg. #: 178-0016 thru 0019

Inspector & #: ----

Step	Events Leading To Compliance	Timetable	Completed (Ver)
1.	Submit agreement concerning the following operating limitations pursuant to this State Order. a) operation during the months of March through November, inclusive, shall be limited to only two boilers each operating at no greater than 75% of maximum design capacity when utilizing 1% sulfur fuel oil b) operation during the months of December through February shall be limited to the use of .5% sulfur fuel oil	As required	
2.	Submit revised registration for any equipment for which operating parameters have been modified pursuant to this approval.	As required	
3.	Submit progress report noting compliance with Step Nos. 1 and 2 above upon receipt of final approval by the U. S. Environmental Protection Agency.	As required	

**Interdepartment Message**STO-201 REV. 5/81 STATE OF CONNECTICUT
(Stock No. 6938-051-01)SAVE TIME: *Handwritten messages are acceptable.**Use carbon if you really need a copy. If typewritten, ignore faint lines.*

<i>To</i>	NAME David Nash	TITLE PAPCE	DATE March 1, 1982
	AGENCY DEP	ADDRESS Air Enforcement	
<i>From</i>	NAME William Menz <i>WM</i>	TITLE SAPCE	TELEPHONE 2690
	AGENCY DEP	ADDRESS Air Technical Services	
SUBJECT	1% SULFUR SIP REVISION: SIKORSKY AIRCRAFT		

In a letter to Commissioner Pac dated January 28, 1982, Sikorsky Aircraft, in order to burn 1% sulfur fuel, agreed to operate no more than 2 boilers at any one time, each operating at a maximum load of 75%, from March through November.

From December through February, they agreed to burn 1/2% sulfur oil with no operating restrictions. I have reviewed the accompanying modeling analysis done by TRC in Sikorsky's behalf using the VALLEY model. The analysis was done according to DEP modeling guidelines and the results support Sikorsky's claim that they will not cause the exceedance of any NAAQS burning 1% sulfur oil under the above conditions.

WM:emw
Attachment

★

AIR QUALITY MODELING ANALYSIS
IN SUPPORT OF THE USE OF HIGHER
SULFUR FUEL OIL AT SIKORSKY
AIRCRAFT'S STRATFORD PLANT

STRATFORD, CONNECTICUT



Environmental
Consultants, Inc.

Mitchell M. Wurmbrand
Program Manager

Joseph Cugnini

TRC Project
No. 1814-T51

December 1981

800 Connecticut Boulevard
East Hartford, Connecticut 06108

(203) 289-8631

1.0 INTRODUCTION

Sikorsky Aircraft has requested that TRC-Environmental Consultants perform an air quality impact analysis of air emissions from their Stratford, Connecticut, facility. This analysis is in support of a request by Sikorsky to amend a Connecticut Department of Environmental Protection (CTDEP) Consent Order which limits the use of fuel oil to a sulfur content no greater than 0.5 percent at the Sikorsky facility. This restriction was based on the results of an air quality analysis performed by the Department's Air Compliance Unit which predicted violations of the National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO₂) if Sikorsky was permitted to burn one percent sulfur oil.

TABLE 1

Sikorsky Emissions Data (Per Boiler)

Data for all four boilers are identical

<u>Heat Input</u> (mBTU/hr)	<u>Burn Rate</u> (gal/hr)	<u>Emission</u> (g/s)	<u>Stack Ht</u> (ft)	<u>Temperature</u> (°K)	<u>Flow Rate</u> (m ³ /s)	<u>Load</u> (%)
48	320	6.33	77	555	5.3	100
41	272	5.38	77	544	4.5	85
36	240	4.75	77	533	4.0	75
24	160	3.17	77	516	2.7	50

VALLEY model actually places the height of the plume centerline no closer than ten meters from a receptor, the point closest to the stack with an elevation of ten meters below plume height was used for concentration estimates.

and can be calculated using the following formula:

$$\Delta h_N = E_N \Delta h_1$$

where Δh_1 is the single stack plume rise and Δh_N is the enhanced plume rise.

E_N is an enhancement factor calculated as follows:

$$E_N = [(N+S) / (1+S)]^{1/3}$$

where N is the number of stacks and S is a spacing factor calculated as follows:

$$S = 6 [(N-1) d_c / (N^{1/3} \Delta h_1)]^{3/2}$$

where d_c is the stack center spacing.

Using these enhancement equations results in an increase in the plume rise of approximately 30% for the Sikorsky facility. Increasing plume rise has a significant effect on concentrations estimates but does not eliminate violations of the NAAQS since even with enhancement the plume centerline is still below the elevation of nearby hilltops. The maximum concentration predicted with all boilers at 100% load with plume rise enhancement is reduced to 450 $\mu\text{g}/\text{m}^3$. Maximum concentrations at 75% and 50% loads are 420 $\mu\text{g}/\text{m}^3$ and 306 $\mu\text{g}/\text{m}^3$, respectively.

TRC has also modeled the Sikorsky facility with emissions approximately equal to those produced by a 16,000 gallon daily burn operation. This scenario includes operating one boiler at 85% load and two others at 50% load, for a total burn of 14,208 gallons. The maximum predicted concentration for this case is 310 $\mu\text{g}/\text{m}^3$. Adding this 310 $\mu\text{g}/\text{m}^3$ value to a 100 $\mu\text{g}/\text{m}^3$ background value would still produce a violation of the 365 $\mu\text{g}/\text{m}^3$ standard.

4.2 VALLEY Results - 3-Hour Impacts

Three-hour SO_2 impacts were calculated by multiplying the 24-hour impacts from the VALLEY model by four. These values are displayed in Table 3 on a per boiler basis. The CTDEP has developed a 3-hour background SO_2 value for this

TABLE 2

Sikorsky Facility 24-Hour SO₂ Impacts Using
the Valley Model (1% Sulfur Fuel) Per Boiler

Standard Plume Rise Equation

		<u>Receptors</u>					
Distance (m)	100	200	300	400	500	600	700
Height MSL (ft)	30	80	140	180	200	210	230
Load Factor (%)	<u>Impacts (µg/m³)</u>						
100	0	0	.1	114	155	134	114
85	0	0	.3	145	132	114	97
75	0	0	.9	128	116	100	85
50	0	0	7.6	86	77	66	56

Enhanced Plume Rise Equation

		<u>Receptors</u>					
Distance (m)	143	286	429	571	714	857	1000
Height MSL (ft)	50	140	180	210	240	260	296
Load Factor (%)	<u>Impacts (µg/m³)</u>						
100	0	0	6	102	113	91	73
75	0	0	26	105	84	67	54
50	0	0	76	70	55	44	35

5.0 OPTIONS FOR FUTURE CONSIDERATION

All of the cases analyzed previously produce violations of NAAQS and thus could not be used as a basis for a sulfur-in-fuel regulation revision for the Stratford plant. TRC is proposing several other strategies which may be pursued by Sikorsky in its regulatory strategy.

1) Model other operating load/boiler scenarios:

Modeling the Sikorsky plant with load spread in a different fashion among the four stacks may produce lower concentrations than those already analyzed, although producing a concentration lower than $265 \mu\text{g}/\text{m}^3$ will be difficult. In addition, such an operating configuration of boilers may be impractical for Sikorsky operations and may not be acceptable to CTDEP as an emission limitation.

2) Developing a lower background value:

The background value for rural Stratford is $100 \mu\text{g}/\text{m}^3$; however, it is unlikely that such a value would be recorded during the easterly winds that produce highest modeled concentrations. The monitoring record of a nearby SO_2 analyzer could be searched for the highest value occurring under easterly winds, and this value (rather than $100 \mu\text{g}/\text{m}^3$) could be used as background and added to maximum modeled concentrations. Use of such a background value would require approval by CTDEP and possibly EPA.

3) Fuel switching according to load:

This scenario would require Sikorsky to use lower sulfur oil when operating at high loads and higher sulfur oil during low load conditions. The actual conditions of switching would be based on a modeling analysis. Separate storage facilities for higher and lower sulfur oil would be necessary.

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May 1, 1982

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NOTICE
STATE OF CONNECTICUT
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION
AIR COMPLIANCE UNIT
PUBLIC NOTICE
By a notice in the June 30, 1981, Connecticut Law Journal, the Department of Environmental Protection (DEP) commenced a rulemaking action to amend certain regulations to allow the use of fuel containing one percent (1%) sulfur. As part of this process the DEP developed a technical support document which identified seventeen facilities which would not be allowed to use 1% sulfur oil without further review by the DEP. Since that time fifteen facilities have been evaluated and may use 1% sulfur oil. The purpose of this notice is to inform the public that the facilities listed below have also been reviewed and will be allowed to use 1% sulfur oil following the completion of this action. The following facilities will receive state orders which will allow the use of 1% sulfur oil: Sikorsky Aircraft Division of United Technologies Corporation, Stratford, Connecticut; Allegheny-Ludlum Steel Corporation, Watlingford. This is a modification to an existing order. The Company has been burning 1% sulfur in fuel. Anyone interested in the above matter may receive additional information by contacting: Air Compliance Unit, Office of the Director, Room 144, State Office Building, Hartford, Connecticut 06115 (203) 366-4030. After reviewing the DEP's information any person aggrieved in this matter may request a public hearing. Comments must be received on or before June 1, 1982.
STANLEY J. PAC
Commissioner

Dated: 4/27/82

Air Compliance Unit-Sikorsky Aircraft Div.

*NO INVOICE FORM RECEIVED W/
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PER Phil -

There were no comments

7.15.82