SYNTHETIC FIBERS

AP-42 Section 5.19
Reference Number
48

Badische Corporation

P.O. Drawer D
Williamsburg, Virginia 23185

May 14, 1980

CERTIFIED RETURN RECEIPT REQUESTED

A-80-7
II-D-47

Don R. Goodwin, Director
Emissions Standards & Engineering Division
United States Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Dear Mr. Goodwin:

In reference to your request for background information on air pollutants and their emission control techniques for use in developing New Source Performance Standards (NSPS), the Badische Corporation has provided two sets of enclosures. The first enclosure marked "Badische Corp. Public Information", pages 1 to 16 provides information that can be released to the public. The second enclosure marked "Badische Corp. Confidential Information", pages 1 thru 21, contains information that would reveal trade secrets. Such information is clearly labeled "Badische Confidential" in the body of the second enclosure and must be protected from unauthorized disclosure in accordance with Section 114 of the Clean Air Act (42 USC 7414) and document 40 CFR, Chapter 1, Part 2, Subpart B - Confidentiality of Business Information.

Sincerely,

J. S. Lick
Senior Chemical Design Engineer

encl:

jc

Telephone: 804-887-6000. Telex: 82-3446

Badische Corporation
Member of the BASF Group

1. What fiber type do you produce?
   Acrylic fiber

2. What spinning method?
   Wet X
   Dry ____

3. What polymer is used?
   Confidentiality claimed.

4. What solvent is used?
   Confidentiality claimed.

5. If wet, what is composition of spinning bath?
   If dry, what is composition of quench gas?
   Confidentiality claimed.

6. What is polymer to solvent ratio. (lb solvent/lb dope)

Confidentiality claimed.

7. Do you manufacture only one fiber type per process line, or do you produce fibers with different characteristics on the same line?

Confidentiality claimed.

8. What are design and actual production rates? How much does production vary over time — day, week, month?

Confidentiality claimed.

9. How is the raw material feed rate and production rate measured? What is the accuracy of the measurements?

Confidentiality claimed.

10. See Figure 1 (Dry spin) or Figure 2 (wet spin). Please note on this diagram the processes used or excluded in your plant. Add any notations or sketches as appropriate. Note those points in the process where solvent or fiber testing is now performed.
Confidentiality claimed.

11. See Figure 1 (Dry Spin) or 2 (Wet Spin). Please note the amount of polymer introduced at PY. Note the amount of product shipment at PS. How do you account for any differences between these? (secondary product formation, still bottoms, heels, waste, etc.)

Confidentiality claimed.

12. Is fiber waste recycled? How? Which products?

Confidentiality claimed.

13. (Wet Spinning) Is the water from the spinning bath processed for recovery of dissolved solvent and/or unreacted monomer?

Yes

14. (Wet Spinning) What process is used to effect this recovery? What is the efficiency of this process? (Of the solvent or monomer dissolved in the water, how much is recovered, and/or how much is released in waste water or vented?)

Confidentiality claimed.

15. Do you perform dope testing after blending and prior to spinning to determine solvent concentration? If so, please describe this test.

Confidentiality claimed.

16. Is the solvent/polymer mixing batch or continuous?

Confidentiality claimed.

17. (See Figure 1 (Dry Spin) or Figure 2 (Wet Spin) Note at the left (Point MS) the amount of solvent makeup used. Also note the period in which this amount is used. (Pounds per hour, pounds per day, etc.)

Confidentiality claimed.

18. Is the polymer dope filtered prior to spinning? If so, is the filtering process open, enclosed, or vented? Where do the vents lead?

Confidentiality claimed.

19. Is the filter media reused? If so, is it processed, treated, or washed for reuse?

Confidentiality claimed.

20. What is the approximate solvent loss as vapor at the filtering stage?

Confidentiality claimed.

21. See Figure 3 (Wet spinning) or Figure 4 (Dry spinning). Is the fiber open to room air as it passes from one process to another following spinning? Does any solvent evaporate from the fiber at these points? Approximately how much? Are there any hoods or vents to capture this solvent?

Confidentiality claimed.

22. Are tests for solvent residuals made at any point in the fiber process (solvent remaining in/on the fiber)? If so, note on Figure 3 (Wet spin) or Figure 4 (Dry spin) the point(s) these samples are taken, with a brief indication of how this sample would be taken.

Confidentiality claimed.

23. Please briefly describe the fiber test method used for measuring solvent residual.

Confidentiality claimed.

24. What records are maintained, if any, with reference to the fiber tests? On what time basis are these records updated (continuous, hourly, shift, daily, etc.)?

Records of residual solvent should be available for the last three months. Records are normally updated on each shift.

25. Does residual solvent in any way affect fiber properties? For example, does a specific solvent residual content remain in the fiber end product to produce desired characteristics?

Confidentiality claimed.

26. (Wet Spinning) Is the spinning bath enclosed or covered? Are the vapors vented to a solvent recovery system? If not, where are any vapors released?

Confidentiality claimed.

27. Please provide a brief description of the solvent recovery systems utilized in connection with the fiber production facility. Please include design specifications and drawings if possible.

Confidentiality claimed.

28. Please provide the design and operating paramenters for each scrubber:
    a) pressure drop
    b) inlet liquid and gas pressure
    c) liquid and gas flow rate and temperature
    d) composition of scrubbing liquid
    e) inlet and outlet solvent concentration

    Confidentiality claimed.

29. When was the solvent recovery equipment installed? What guarantees were given by the manufacturer?

    Solvent recovery equipment was installed from 1958 to 1979. The process designs were provided by Badische personnel and guarantees cannot be provided by the manufacturers.

30. What problems have been encountered with the recovery system?

    Most of the problems have been mechanical, such as broken graphite and plastic parts, leakage, and general corrosion.

31. What are the maintenance practices and schedules associated with the recovery system?

    In general, maintenance practices and schedules are the same as for a small chemical plant.

32. What major modifications have been made to the recovery system in the past?

    Confidentiality claimed.

33. Are there any plans to upgrade the existing solvent recovery system?

Yes

34. If your firm were to build a new fiber spinning and processing line with associated solvent recovery systems, what solvent recovery efficiency would you desire and expect? By solvent recovery efficiency we refer to the amount of solvent recovered for reuse divided by the total amount of solvent introduced into the pre-spinning process (dissolving, blending).

Confidentiality claimed.

35. What measures would you incorporate into any new fiber spinning and processing line to maximize solvent capture and recovery efficiency.

Fiber and solvent losses in washing, due to wraps on rolls, should be minimized between the spinning baths and the drawing step.

36. When was the last time capacity of the spinning lines was increased? Did this increased capacity tie in to existing solvent recovery equipment, or was new recovery equipment added?

Confidentiality claimed.

37. Note the variations in percent solvent recovery that will occur under each of the following circumstances: (Qualitative response is adequate, i.e., greater, lesser, or same recovery)

Denier change	Confidentiality claimed.
Raw materials change	Confidentiality claimed.
Dyeability change	Confidentiality claimed.
Production rate	Confidentiality claimed.
Process line operating speed	Confidentiality claimed.
Process upset	Confidentiality claimed.
Season	Unknown
Other	None

38. What is the approximate efficiency of the recovery system (after vapors are captured)? This is the efficiency within the area outlined on Figure 1, not the entire plant makeup percent.

Confidentiality claimed.

39. What records are kept, if any on the efficiency of the solvent recovery system? (Efficiency of equipment associated with solvent recovery, i.e., carbon beds, distillation, columns, condensers, scrubbers, etc.)

Confidentiality claimed.

40. Are there any continuous monitors recording the efficiency of the recovery equipment?

No

41. If carbon beds are used, do you operate on a fixed-time to change, or a breakthrough concentration basis?

Confidentiality claimed.

42. Please provide the design and operating parameters for the carbon adsorption system:
    a) type and amount of carbon
    b) working capacity of carbon (degree of carbon regeneration)
    c) superficial velocity in bed
    d) VOC inlet concentration
    e) inlet gas flow rate and temperature
    f) cycle time
    g) regeneration cycle
        1) method of regeneration
        2) length of cycle
        3) pressure and temperature of regeneration medium
        4) condenser water outlet temperature
        5) method of solvent recovery
        6) How many pounds of steam are required to recover one pound of solvent? _____
        7) How is the condensed steam utilized or disposed?

Confidentiality claimed.

43. Please indicate on Figure 5 and 6 any vents emitting solvent vapor (vapor not otherwise recovered). What is the approximate concentration at these points? Vapor or air flow rate? Temperature?

Confidentiality claimed.

44. Are there any other solvent emission points not mentioned previously? What is the approximate composition at these points (percent solvent, water vapor, monomer, etc.)?

B Plant Fiber Lines: Average monomer loss is 66 tons/year (Range is 49 to 394 tons/year).

Z Plant Fiber Lines: Average monomer loss is 311 tons/year (Range is 208 to 415 tons/year).

45. If incineration of waste solvent is practical, please provide the following:
a) VOC inlet concentration
b) inlet gas flow rate and temperature
c) solvent type
d) residence time
e) preheat temperture
f) firebox or flame temperature
g) supplemental fuel rate
h) amount of excess air
i) burner types
j) What type of heat recovery system is employed? What efficiencies are achieved?

46. What levels of solvent concentration are permitted in work areas?

Confidentiality claimed.

47. Is the room air recirculated or vented to atmosphere? If recirculated, approximately what percent makeup air is introduced?

The room air is vented to the atmosphere.

48. How are rooms ventilated? What is the approximate flow rate out of the work area? Are records maintained on air flow or solvent concentration in the work area?

B Plant: Exhaust flow rate out of the work area is about 122,000 cubic feet per minute.

Z Plant: Exhaust flow rate out of the work area is about 72,000 cubic feet per minute.

49. See Figure 1 (Dry Spin) or 2 (Wet Spin). If solvent makeup (MS) equals total solvent loss (TSL) how do you account for the loss? Where do you feel most of this loss occurs?

Confidentiality claimed.

50. What are the applicable state and local regulations? Are stricter ones expected?

Confidentiality claimed.

51. Are there any solid waste disposal problems?

No

52. Are there any water pollution control problems?

Some minor problems have been reported to the State Water Control Board.

53. Are there any OSHA-related problems?

OSHA personnel have taken samples of the air around the spinning lines; we have not received the results. Continuous air monitors, however, indicate that ambient air is within regulations for operator exposure.

54. Does the plant have any plans for expansion or modification?

Confidentiality claimed.

55. Cost data:

a. Solvent recovery equipment (includes condensers, columns, carbon beds, fan, stack, ductwork, etc.)

i. Purchase cost, year purchased (control device only)

Confidentiality claimed.

ii. Installed cost (state if this is a retrofit or grass roots installation)

Confidentiality claimed.

(a) Recovery devices - give the materials of construction of the major components

Confidentiality claimed.

(b) Ductwork

Confidentiality claimed.

(c) Stacks or vents

Confidentiality claimed.

(d) Exhaust fans

Confidentiality claimed.

iii. Annual operating cost (include utilities, maintenance, and labor)

Confidentiality claimed.

iv. Expected life of the recovery equipment

Confidentiality claimed.

v. Depreciation method

Confidentiality claimed.

vi. Value of any product or by-product recovered by the emission control equipment

Confidentiality claimed.

b. Equipment or processes necessitated by installation of the emission control equipment (e.g., water treatment or solid waste disposal)?

Confidentiality claimed.

c. Process equipment:

i. Installed cost (give reference year)
Confidentiality claimed.

ii. Expected life
Confidentiality claimed.

iii. Depreciation method
Confidentiality claimed.

iv. Annual operating cost
Confidentiality claimed.

56. Please discuss the growth patterns of the (polyster, acrylic, acetate, etc.) industry over the last decade.

a) Identify those product lines which have experienced real growth.
b) Please estimate the annual average percentage increase.
c) Indicate any significant downward trends.
d) Please discuss any expansion of production capacity required by this growth.
e) Does your company have any plans for expansion, modernization, or major modifications during the next five years? _____?

1) Which product lines would be involved?
2) Estimate as to capital costs required would be helpful.

a) Acrylic fiber production in U.S. has increased from 533 million pounds per year during 1969 to 761 million pounds per year during 1979.

(February 1980 Textile Organon).

	1969	1979
Nylon staple + fiber fill	223,000,000 lbs	939,000,000 lbs
Polyester staple + fiber fill	939,000,000 lbs	2,460,000,000 lbs

56 (Continued)

b) Average annual percentage increases in USA fiber production:

Acrylic staple + tow + fiber fill = 3.62%

Nylon staple + tow + fiber fill = 15.5%

Polyester staple + tow + fiber fill = 10.1%

c) Significantly downward trends:

Acrylic fiber production in USA was 742 million pounds per year during 1973. This production was not exceeded until 1979.

d) Expansion of production capacity:

Acrylic and modacrylic capacity has increased from 824 million lbs/year in 1975 to 865 million lbs/year in 1979. This is an increase in USA capacity of only 1.22% per year.

e) Confidentiality claimed.

57. Please explain how imports and exports have affected your product prices and sales volume over the last five years.
Confidentiality claimed.

a) Are these trends expected to continue?
Confidentilaity claimed.

58. What are the annual costs associated with the equipment and processes previously described:

Confidentiality is claimed for all of the following information.

	Polymer Prep.*	Solu/Poly Mix,* Blend, Filter	Spinning, Processing*	Solvent Recovery* Equipment Including Ductwork
Installed cost Building Structural Equipment				
Maintenance Labor				
Materials				
Operating Labor Cost (direct payroll plus benefits				
Indirect costs Depreciation				
Administrative (est.)				
Year Major Items Began Operating				
Life in years				
Expected remaining Life in years				
Utilities - unit cost	Quantity used in each operation			
electric				
water				
gas				
oil				
Operating Labor	Indicate the number of people, itemized according to operating and supervisory labor in each operation.			

* If appropriate, combine one or more process phases.

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DOCKET NO. A-80-7

Category II-D

The following information is located in the confidential files of the Director, Emission Standards and Engineering Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. This information is confidential, pending final determination by the Administrator, and is not available for public inspection.

Corres: Badische background info. on air pollutants, emis. control techniques. re: dev. NSPS requested by EPA, Dated May 14, 1980.

Confidential information consists of the second enclosure marked "Badische Corporation Confidential Information", pages 1 thru 21, and is therefore deleted from inclusion in the public record