

ORIGINAL

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

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APR 30 2001

STATE OF ILLINOIS
Pollution Control Board

IN THE MATTER OF:)

Petition of RHODIA, INC. and THORN CREEK)
BASIN SANITARY DISTRICT for an Adjusted)
Standard from 35 Ill. Adm. Code)
302.208 and 304.105)

AS01- 9
(Adjusted Standard - Water)

NOTICE OF FILING

TO: Clerk, Illinois Pollution Control Board
State of Illinois Center
100 West Randolph Street
Suite 11-500
Chicago, IL 60601

Illinois Environmental
Protection Agency
1021 N. Grand Avenue East
Springfield, IL 62794-9276

Illinois Department of Natural Resources
524 South Second Street
Springfield, IL 62701-1787

PLEASE TAKE NOTICE that on Monday, April 30, 2001, we filed the attached
Petition for Adjusted Standard with the Clerk of the Illinois Pollution Control Board, a
copy of which is herewith served upon you.

Respectfully submitted,


**RHODIA, INC. AND THORN CREEK
BASIN SANITARY DISTRICT**

By: Sheila Deely / gmw
One of Its Attorneys

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CERTIFICATE OF SERVICE

The undersigned certifies that a copy of the foregoing **Notice of Filing and Petition for Adjusted Standard** was filed by hand delivery with the Clerk of the Illinois Pollution Control Board and served upon the parties to whom said Notice is directed by first class mail, postage prepaid, by depositing in the U.S. Mail at 321 North Clark Street, Chicago, Illinois on Monday, April 30, 2001.

A handwritten signature in black ink, appearing to read "A. W. Webb", is written over a horizontal line.

CH01/12149405.1

to Thorn Creek approximately 10.1 miles upstream of its confluence with the Little Calumet River.

The production of silica generates a waste stream that has elevated levels of total dissolved solids (TDS) and sulfates. The discharge to TCBSD is projected to contribute to excursions from the water quality standards for TDS and sulfates in Thorn Creek and the Little Calumet River as set forth in Section 302.208. Rhodia and TCBSD request an adjusted standard from Section 304.105 and Section 302.208. The specific information required to be set forth in a petition for adjusted standard pursuant to 35 Ill. Adm. Code 104 is set forth below.

Section 104.406(a): Standard from Which Relief is Sought

Rhodia and TCBSD request an adjusted standard from both 35 Ill. Adm. Code 304.105 and 302.208 as they apply to the water quality standards for TDS and sulfates applicable to effluent discharges from TCBSD's sewage treatment plant to Thorn Creek and from Thorn Creek into the Little Calumet River. While there are no specific effluent standards for TDS, Section 304.105 prohibits effluent discharges that cause or contribute to violations of applicable water quality standards. Section 302.208(e) requires that concentrations of 1000 mg/L of TDS and 500 mg/L of sulfates shall not be exceeded in Thorn Creek or the Little Calumet River¹. The effective date of this regulation is May 17, 1979. An adjusted standard was granted to Rhodia² and TCBSD in 1994 for the same stream reaches for which Rhodia and TCBSD request the current adjusted standard. Thus, with respect to Rhodia and TCBSD, the water quality standards applicable for TDS and sulfates for the subject stream reaches are as set forth in Exhibit 1 at 2-11. (In re

¹ The portion of Thorn Creek between its confluence with Deer Creek and the USGS Gaging Station located on Thorn Creek approximately 15 miles downstream of the discharge point from the Consumers Illinois Water Company in University Park, Illinois is subject to an adjusted standard granted to Consumers Illinois Water Company, which establishes a TDS standard of 2,100 mg/L (Board Proceeding, AS89-3)

² Then known as Rhone-Poulenc Basic Chemicals.

Petition of Rhone-Poulenc Basic Chemicals Co., AS No. 94-7 (Adjusted Standard), 1994 Ill.

ENV LEXIS 743 (June 23, 1994) and In re Petition of Rhone-Poulenc Basic Chemicals Co., AS No. 94-7 (Adjusted Standard), 1994 Ill. ENV LEXIS 1030 (August 11, 1994) (Supplemental Opinion and Order)

The water quality standards requested for Thorn Creek in this Petition are 2,650 mg/L of TDS for the stream reach between TCBSD's discharge point and the confluence with Deer Creek (Reach #1), 2,620 mg/L from the confluence with Deer Creek to the USGS Station 05536275 in Thornton (Reach #2), and 2,360 mg/L for the portion of Thorn Creek between the USGS Station 05536225 in Thornton and the confluence of Thorn Creek with the Little Calumet River (Reach #3). The requested water quality standard for Reach #1 and Reach #2 of Thorn Creek is 1,350 mg/L and 1,340 mg/L of sulfates, respectively. For Reach #3 it is 1,160 mg/L. For the Little Calumet River from its confluence with Thorn Creek to the Calumet-Sag Channel (Reach #4), less relief is required. Based upon projected maximum levels, a water quality TDS limit of 2,020 mg/L and a sulfate limit of 1,000 mg/L in Reach #4 would provide the relief needed for this plant addition, while still being protective of the environment.

The requested relief is shown below in table form:

<u>Parameter</u>	<u>Reach #1</u>	<u>Reach #2</u>	<u>Reach #3</u>	<u>Reach #4</u>
TDS	2,650 mg/L	2,620 mg/L	2,360 mg/L	2,020 mg/L
Sulfate	1,350 mg/L	1,340 mg/L	1,160 mg/L	1,000 mg/L

Section 104.406(b): Nature of Regulation of General Applicability

The primary purpose of the regulations involved in this Petition is to protect aquatic life and to safeguard the quality of waters of the state for crop irrigation and public water supply purposes. There are no effluent standards for TDS or sulfates. The Board once adopted an

effluent standard of 3,500 mg/L TDS, (R70-18, 3 PCB 419, January 7, 1972) which the Board repealed after recognizing that the treatment processes for TDS are very expensive, consume large amounts of energy, and produce dry salts, which still must be disposed of. (R76-21, September 24, 1981). Regulation of TDS discharges was left to the application of water quality standards for TDS, chlorides and sulfates. Id. These water quality standards were set in 1972, in part by reference to then-current studies of the toxicity of the contaminants to aquatic life.

The Board's water quality standards have been approved by U.S. EPA and are consistent with the requirements of the Clean Water Act. Thus, in a sense, these standards exist pursuant to Section 303(a) of the Clean Water Act. Petitioners do not believe that the water quality standards involved in this proceeding were adopted in whole or in part to implement the other laws specified in Section 106.705(b): the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Clean Air Act, or the state programs concerning the Resource Conservation and Recovery Act, Underground Injection Control, or the National Pollutant Discharge Elimination System (NPDES).

Section 104.406(c): Specified Level of Justification

The regulations of general applicability from which Rhodia and TCBSD seek an adjusted standard do not specify a level of justification for adjusted standards.

Section 104.406(d): Facility and Process Descriptions

The Rhodia Chicago Heights plant is located at 1101 Arnold Street. The facility has been in operation since 1902 when it was Victor Chemical Works. Stauffer Chemical Company bought Victor Chemical in 1959. Rhone-Poulenc Basic Chemicals, Inc. purchased the Basic Chemicals Division of Stauffer Chemical Company in December 1987. The name was officially changed to Rhone-Poulenc Basic Chemicals Co. in September 1989. In 1998, the name of the

company was changed again to Rhodia, Inc. The facility currently employs 320 people and manufactures inorganic phosphate chemicals and precipitated silica. Most of the inorganic phosphate manufacturing processes involve the chemical reaction of phosphoric acid with either soda ash or slaked lime. Wastewaters that fluctuate in pH and total suspended solids are generated in both processes. The precipitated silica manufacturing process involves reacting sodium silicate with sulfuric acid to produce silica. Wastewaters generated in this process contain total dissolved solids and sulfates. All process wastewaters are discharged to TCBSD.

The proposed expansion to Rhodia's facility is to its Silica Plant, which produces precipitated silica. Rhodia has proposed this expansion at its Chicago Heights plant because the plant is ideally located relative to both the raw materials necessary for the silica process and the receiving market. The proposed expansion to the silica plant will increase annual TDS discharges by 65% over the original design capacity. A block flow diagram for the proposed expansion is set forth at Figure 2-4 of Exhibit 1.

Multiple grades of silica are produced, and will continue to be produced at higher volumes in the expansion. The process begins neutralizing the sodium silicate solution with sulfuric acid in agitated reactors to produce precipitated silica. Once the reaction is complete, the silica is removed from the solution via filtration. Filtrate from the operation, which contains approximately 4% of dissolved sodium sulfate, is diverted to the mother liquor tank. The filter cake is then washed with water and squeezed to remove residual sodium sulfate, and the filtrate is directed to a 20,000 gallon equalization tank. The TDS concentration of these streams declines toward 0 percent sodium sulfate by the end of each filtration cycle.

Table 2-3 of Exhibit 1 sets forth the projected discharge loadings. On an annual average, the expanded process will discharge 0.84 million gallons per day containing 137,400 lbs/day of TDS. The peak daily TDS discharge is projected to be 151,700 pounds.

TCBSD operates a wastewater treatment plant (WWTP) with a design average flow of 15.9 mgd and design maximum flow of 40.25 mgd. The WWTP is located in Chicago Heights, Illinois, and provides wastewater treatment for approximately 100,000 people from the Chicago Heights, Park Forest, Homewood, South Chicago Heights, Steger, and Crete communities. The treatment plant was originally constructed in 1933 and has undergone a number of construction projects including an expansion to accept flows from the Homewood Regional Plant.

The TCBSD WWTP has been cited as an exemplary treatment plant based on its overall efficiency and environmental control by both an independent engineering team of the Agency and the Central States Water Pollution Control Association. The WWTP represents a \$40 million investment, including an on-site laboratory and computer monitoring and control. A schematic of the physical/biological WWTP is presented in Figure 2-3 of Exhibit 1. From the sewers, the influent passes through bar screens prior to being pumped to the surface through grit chambers followed by primary sedimentation. From primary treatment, the wastewater flows through a conventional plug-flow activated sludge process, followed by a second-stage biological aeration process and tertiary clarifiers for nitrification. The wastewater is then filtered, and seasonal chlorination added followed by post aeration and seasonal dechlorination. The fully treated effluent is then discharged to Thorn Creek. Excess flow is diverted through separate excess flow clarifiers, which is then recombined with the complete treatment effluent.

The current dry water flow through the WWTP is 11.6 mgd based upon the average of the lowest three months in 1998. This is 4.3 mgd below the design average flow of 15.9 mgd. Thus,

the treatment plant has available capacity for future growth. The TCBSD WWTP serves 861 industrial and commercial users in addition to the 31,000 residential connections. This industrial and commercial sector accounts for 2.7 percent of the users and 29 percent of the influent flowrate based upon 1999 values. The major industrial users are manufacturing facilities, including steel manufacturing and stamping facilities. Included in the industrial users besides Rhodia are Ford Motor Company, Calumet Industries, Chicago Heights Steel, Rohm & Haas, and Alparma.

There are three stream reaches on Thorn Creek and a fourth reach on the Little Calumet River that will be impacted by the proposed expansion, under peak loading and low flow conditions. Reach #1 is from the WWTP to the merger with Deer Creek. Reach #2 continues from the merger with Deer Creek to the USGS Station at Thornton, while Reach #3 is from the USGS Station to the merger with the Little Calumet River. The fourth reach is from the Thorn Creek confluence with the Little Calumet River to the Calumet-Sag Channel.

Section 104.406(e): Cost of Compliance and Compliance Alternatives

In order to comply with the regulation of general applicability and the existing adjusted standard, some form of pretreatment by Rhodia for TDS removal would be necessary. The expanded silica plant wastewater design characteristics lend themselves to selected demonstrated and proven TDS/sodium sulfate removal and disposal strategies. Although the sulfate removal processes discussed below are technically feasible, even the most economical solution for sodium sulfate removal to comply with water quality standards would result in significant cost penalties to Rhodia. For example, in the evaporation process the cost of steam alone required to dehydrate the sodium sulfate solution would result in a finished product cost above current market price for granular sodium sulfate. This cost, together with the cost of initial and working

capital and annual operating fixed costs would place Rhodia in a non-competitive price position for its silica finished product.

Taking into consideration the flow and variability of the wastewater stream, Rhodia considered the following technologies for pretreatment:

- (1) Electrodialysis;
- (2) Single/Multiple Effect Evaporation;
- (3) Evaporation with Mechanical Vapor Recompression (MVR);
- (4) Reverse Osmosis followed by Evaporation with MVR;
- (5) Calcium Chloride treatment followed by Evaporation with MVR; and
- (6) Biological Process Reduction of sulfates to elemental sulfur

Vendors informed Rhodia that Electrodialysis (in its various forms) has almost never been found to be practical in the United States industrial chemical industry, especially for as dilute a feed as Rhodia has. Any evaporation scheme would require multiple effects (increasing cost) or falling film technology, and much more steam than the plant is capable of providing. Biological sulfate ion reduction to elemental sulfur was not found to be practical because the process uses an organic compound and air to create carbonate ions that replace the sulfate ions. Although this reduces sulfates, it does not appreciably reduce the TDS going to the stream.

Rhodia, therefore, evaluated the remaining technologies:

- (1) Falling film evaporation with MVR;
- (2) Reverse Osmosis followed by Evaporation with MVR; and
- (3) Calcium Chloride Treatment with falling film evaporation with MVR.

A brief process description of the technologies evaluated follows.

Falling Film Evaporation with MVR (Alternative 1)

This technology produces dry sodium sulfate from a dilute aqueous solution. This is achieved by concentrating and subsequently crystallizing the sodium sulfate out of the process liquor. A single falling film evaporator is employed. The feed is pumped to the top of the

evaporator and falls through steam-heated tubes. The feed stream is thus concentrated to a point where it can be cooled to precipitate the sodium sulfate crystals in the forced feed crystallizer. The water vapor from the evaporator and crystallizer is compressed by a large compressor and routed to the shell side of the falling-film tubes to become the heating steam. This is an efficient use of energy and that would keep the plant from needing to provide a new boiler. The crystallization outlet stream is sent to a centrifuge and the cake is sent to a dryer. A simplified process flow diagram for Alternative 1 is presented in Attachment A.

Reverse Osmosis followed by Evaporation with MVR (Alternative 2)

This technology also produces dry sodium sulfate from a dilute aqueous solution by concentrating and subsequently crystallizing the sodium sulfate out of the process liquor. Again, for energy conservation reasons, both evaporator and crystallizer vessels are used. This process is even more energy efficient since it performs a four-fold concentration with a reverse osmosis (RO) unit, thus reducing the evaporation requirement. However, the RO unit has very strict inlet requirements concerning foreign material, which is residual silica in this case. Thus, magnesium/caustic pre-treatment and high-tech filtration are accomplished to remove the affects of foreign material before evaporation begins. Evaporation, crystallization, centrifugation and drying are accomplished much the same as in Alternative 1, with the first two steps being smaller because of the RO unit. A simplified process flow diagram for Alternative 2 is presented in Attachment B.

Calcium Chloride Treatment – Falling Film Evaporation – MVR (Alternative 3)

This technology employs a lime treatment of the feed stream to increase the effectiveness of crystallization/precipitation. The evaporation through drying steps are accomplished much the same as in Alternatives 1 and 2.

A simplified process flow diagram for Alternative 3 is presented in Attachment C.

Cost Summary of Compliance Alternatives

Each of the alternatives evaluated produces a dry sodium sulfate stream requiring ultimate disposition or possible disposal. For the purpose of this analysis, however, disposal costs were not included since sodium sulfate is a commodity chemical with some resale value. A summary comparison of the demonstrated sodium sulfate removal systems discussed above is presented in the following Table. It contains critical process and technical considerations and provides a summary including estimated capital and annualized capital and operating costs for the three alternatives studied.

COMPARISON OF SODIUM SULFATE REMOVAL SYSTEMS

	<u>Alternative 1</u>	<u>Alternative 2</u>	<u>Alternative 3</u>
Undesirable Constituents		Silica > 25 ppm	Silica > 25 ppm
Impact on Plant	-	Dispose Silica	Dispose Silica
Capital Cost	\$6 Million	\$4 Million	\$4.2 Million
Total Annual Cost	\$915k	\$600k	\$670k
Total Annual Cost/ ^{A/} Ton of Production	\$32	\$21	\$24
Treatment Cost as a Percentage Product Cost	6.2%	3.8%	4.4%
Cost/1000 gallon water treated	\$11.90	\$7.78	\$8.70
% of Cost of direct ^{B/} discharge to TCBSD	1190%	778%	870%

Alternative 1 = **Falling film evaporation with MVR**

Alternative 2 = **Reverse Osmosis followed by Evaporation with MVR**
Alternative 3 = **Calcium Chloride Treatment – Falling Film Evaporation**

A/ Based on New Production Capacity

B/ TCBSD charges the Chicago Heights plant \$1.00/1000 gallons treated.

As set forth in Attachment A, Alternative 1 would require more than 11 times the normal cost to discharge to the WWTP and would add 6 percent to the cost of the product silica.

Alternatives 2 & 3 are more economical, although they would still cost about 8 times the normal WWTP cost and would add approximately 4 percent to the cost of the product silica. See Attachments B and C.

Although technically feasible, even the most economical solution for sodium sulfate removal to comply with water quality standards would result in significant cost penalties to Rhodia. Such significant cost penalties would result in a non-competitive price for its silica in an increasingly competitive market.

Section 104.406(f): Proposed Adjusted Standard

As described earlier, Rhodia and TCBSD seek modification of the existing adjusted standard as an adjusted standard from the generally applicable water quality standards for TDS and sulfates for that portion of Thorn Creek downstream of TCBSD's discharge to the confluence of Thorn Creek with the Little Calumet River (Reaches #1, #2 and #3) and from that point to the confluence with the Little Calumet River with the Calumet-Sag Channel (Reach #4). The adjusted standards sought for TDS are: 2,650 mg/L in Reach #1, 2,620 mg/L in Reach #2 and 2,360 mg/L in Reach #3 of Thorn Creek and 2,020 mg/L in the Little Calumet River (Reach #4). The requested standards for sulfates are 1,350 mg/L in Reach #1, 1,340 mg/L in Reach #2, and 1,160 mg/L in Reach #3 of Thorn Creek, and 1,000 mg/L in the Little Calumet River (Reach #4).

Rhodia and TCBSD propose that the Board adopt the following language to effectuate the requested relief:

- (1) The water quality standard for TDS shall be 2,650 mg/L for that portion of Thorn Creek between TCBSD's discharge point and Thorn Creek's confluence with Deer Creek. The existing adjusted standard, which already exists for this portion of Thorn Creek of 2,100 mg/L TDS shall be modified to the new adjusted standard. The water quality standard for TDS found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.
- (2) The water quality standard for TDS shall be 2,620 mg/L for that portion of Thorn Creek between its merger with Deer Creek and the USGS Gaging Station 05536275 in Thornton. The existing adjusted standard, which already exists for this portion of Thorn Creek of 1900 mg/L TDS shall be modified to the new adjusted standard. The water quality standard for TDS found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.
- (3) The water quality standard for TDS shall be 2,360 mg/L for that portion of Thorn Creek between the USGS Gaging Station 05536275 in Thornton and Thorn Creek's confluence with the Little Calumet River. The existing adjusted standard, which already exists for this portion of Thorn Creek of 1,900 mg/L TDS shall be modified to the new adjusted standard. The water quality standard for TDS found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.
- (4) The water quality standard for TDS for that portion of the Little Calumet River from the confluence with Thorn Creek to the Calumet-Sag Channel shall be 2,020 mg/L. The existing adjusted standard, which already exists for this portion of the Little Calumet River of 1,700 mg/L TDS shall be modified to the new adjusted standard. The water quality standard for TDS found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of the Little Calumet River.
- (5) The water quality standard for sulfates shall be 1,350 mg/L for that portion of Thorn Creek between TCBSD's discharge point and Thorn Creek's confluence with Deer Creek. The existing adjusted standard, which already exists

for this portion of Thorn Creek of 1,000 mg/L sulfates shall be modified to the new adjusted standard. The water quality standard for sulfates found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.

- (6) The water quality standard for sulfates shall be 1,340 mg/L for that portion of Thorn Creek between Thorn Creek's confluence with Deer Creek and the USGS Gaging Station 05536275 in Thornton. The existing adjusted standard, which already exists for this portion of Thorn Creek of 1,000 mg/L sulfates shall be modified to the new adjusted standard. The water quality standard for sulfates found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.
- (7) The water quality standard for sulfates shall be 1,160 mg/L for that portion of Thorn Creek from the USGS Gaging Station 05536275 in Thornton to Thorn Creek's confluence with the Little Calumet River. The existing adjusted standard, which already exists for this portion of Thorn Creek of 850 mg/L sulfates shall be modified to the new adjusted standard. The water quality standard for sulfates found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of Thorn Creek.
- (8) The water quality standard for sulfates for that portion of the Little Calumet River from the confluence of Thorn Creek with the Calumet-Sag Channel shall be 1,000 mg/L. The existing adjusted standard, which already exists for this portion of the Little Calumet River of 750 mg/L sulfates shall be modified to the new adjusted standard. The water quality standard for sulfates found at 35 Ill. Adm. Code 302.208 shall not apply to this portion of the Little Calumet River.
- (9) The requirements of 35 Ill. Adm. Code 304.105, as that section relates to the water quality standards for TDS and sulfates of 35 Ill. Adm. Code 302.208, shall not apply to the effluent discharges from the facilities of Rhodia and the Thorn Creek Basin Sanitary District, provided that the water quality standards established in this adjusted standard are met.

In order to comply with the proposed adjusted standard, Rhodia would direct the wastewaters from the expanded silica plant to TCBSD for treatment. Since TCBSD has

adequate capacity to handle these wastewaters, there is no significant capital cost. The annual operating costs are the cost of treatment. TCBSD projected 2000 charges of \$1.00/1000 gallons of wastewater treated. Since Rhodia's annual average discharge is projected to be 75,000,000 gallons, the operating costs (and annual costs) would be approximately \$600,000 per year.

Section 104.406(g): Impact Comparison Between Compliance and Proposed Standard

Rhodia and TCBSD retained Huff & Huff, Inc. to perform an environmental assessment of the impact of the TDS and sulfates anticipated to be discharged from TCBSD. The results of Huff & Huff's study are presented in a report entitled "Environmental Assessment for the Proposed Increase in Total Dissolved Solids Discharge from the Thorn Creek Basin Sanitary District" (Exhibit 1). Huff & Huff's assessment included a review of Rhodia's proposed silica production processes as well as the existing treatment processes and influent and effluent flows at TCBSD's WWTP. Huff & Huff also reviewed the flows and water quality of Thorn Creek from its headwaters in Monee to its confluence with the Little Calumet River as well as the Little Calumet River from that point to its confluence with the Calumet-Sag Channel. With these data, Huff & Huff was able to model the projected water quality for TDS and sulfates in the various reaches of Thorn Creek and the Little Calumet River. Huff & Huff then reviewed available acute toxicity data to determine whether the projected water quality would be anticipated to result in any acute toxicity, and it retained SF Analytical to perform chronic toxicity testing using Thorn Creek stream water spiked with various levels of TDS and sulfates to determine whether any chronic toxicity would be anticipated. The TDS and sulfate sources included both synthetic sodium sulfate and Rhodia's silica plant wastewater.

Huff & Huff also performed a biological assessment of Thorn Creek. This included the sampling of macroinvertebrates and fish in Thorn Creek both upstream and downstream of

TCBSD outfall. Using these data along with other existing data on the stream quality, Huff & Huff was able to establish a Macroinvertebrate Biotic Index (MBI) as well as the Index of Biotic Integrity (IBI) for Thorn Creek.³ This information was then used to assess the existing and potential quality of Thorn Creek as an aquatic resource.

Based on these studies, Huff & Huff concluded that Thorn Creek, from upstream of the TCBSD's outfall to downstream of the Butterfield Creek confluence can be classified as a "fair" quality stream with classifications between a "limited" and a "moderate" aquatic resource, common classifications for urban streams. (Exhibit 1 at 91-92). The IBI and MBI values for the stream reaches did not change after the increase in TDS discharge that occurred when the existing Rhodia silica plant went on-line in October 1995.

Huff & Huff also concluded that given its proximity to urban areas, there is limited potential for future improvements in the aquatic community in Thorn Creek. Similar conclusions were drawn by Michael Ander of Dames & Moore (1990) during an environmental impact study of Deer Creek. (Exhibit 1 at 115). Deer Creek, a tributary of Thorn Creek, was stated as having limited potential uses due to the limited amount of water and habitat available. The Agency noted a similar water quality classification in its annual water quality report. (IEPA 1992). Id. The quality of the Little Calumet River was classified in that same report as a non-support waterway, a lower quality than in Thorn Creek.

³ MBI values are used by the Illinois Environmental Protection Agency to assess stream water quality. These values range from 0 to 11, with 0 representing the best water quality and 11 the worst. (Exhibit 1 at 62). IBI values are also used by the Illinois Environmental Protection Agency to assess stream quality and are based upon the fish assemblage at a given site. Values of this index range from 0 to 60, with 60 representing the best stream quality and 0 the worst. (Exhibit 1 at 62).

Huff & Huff determined that there would be an impact upon Thorn Creek and the Little Calumet River caused by Rhodia's proposed discharge, i.e. TDS and sulfate levels will increase.

A summary of the projected peak concentrations by Reach is set forth below:

Parameter	Reach #1	Reach #2	Reach #3	Reach #4
TDS	2,650	2,620	2,360	2,020
Sulfate	1,350	1,340	1,160	1,000

(See Table 7-3 of Exhibit 1 at 111).

While the concentrations of TDS and sulfates are projected to increase in certain areas of Thorn Creek and the Little Calumet River, those increases are not anticipated to have any adverse environmental impact and are within the historical variability of those waters for TDS. In adopting the water quality standards for TDS and sulfates, the Board focused on three potential areas of adverse impacts: aquatic life, crop irrigation, and public water supplies. The Huff & Huff report addresses each of these areas, and Huff & Huff concludes that crop irrigation and public water supply uses do not exist and that there will be no adverse impact upon aquatic life. Therefore, there should be no adverse environmental impact upon any of these uses from Rhodia's proposed discharge.

A TDS water quality limit of 2,100 mg/L was supported for Reach #2 in NutraSweet/CIWC's Adjusted Standard in part because of the Limited Aquatic Resource Classification of Thorn Creek, and in consideration of the low level of toxicity of TDS. A biological assessment performed in support of the NutraSweet/CIWC petition concluded a TDS water quality level of 3,000 mg/L would not cause any undue stress to the aquatic life (Dames & Moore, 1981). (Exhibit 1 at 115). This opinion was supported by the Agency (Studer, Hearing Testimony in AS89-3, 1990). Id.

Based upon the modeling work conducted by Huff & Huff, under worst case conditions the TDS level during operation of Rhodia's proposed expanded silica plant is projected to reach 2,650 mg/L and the sulfate level is projected to reach 1,350 mg/L in Thorn Creek. (Table 7-3 of Exhibit 1 at 111). No impact on the current aquatic community in Thorn Creek would be expected from these levels based upon Huff & Huff's review of available acute and chronic toxicity data and the bioassays conducted. (See, Chapter 5 of Exhibit 1). This conclusion with respect to TDS is also supported by the biological assessment in the Nutrasweet/CIWC adjusted standard proceeding (AS 89-3).

Due to lack of literature regarding chronic toxicity levels on sodium sulfate, a chronic toxicity bioassay was conducted. The bioassay used Thorn Creek water, downstream of the WWTP discharge, to evaluate the effects of increasing levels of sodium sulfate on the water flea (*Ceriodaphnia dubia*) and the fathead minnow (*Pimephales promelas*). The Thorn Creek water was initially analyzed for sulfate and then spiked with sodium sulfate to obtain seven targeted levels of sulfate. The targeted levels are percentages of the projected peak effluent sulfate concentration of 1,350 mg/L. The sulfate levels, based on the test conducted with Thorn Creek water spiked with Rhodia silica plant wastewater are as follows (see, Exhibit 1 at 59):

Measured Sulfate Level, mg/L	% of Projected Peak Effluent Sulfate	Measured TDS Level, mg/L
817	60%	1870
1079	80%	2180
1190	88%	2310
1332	99%	2530
1365	101%	2690

During the chronic toxicity bioassay tests, no chronic toxicity was observed in either the waterflea or fathead minnow up to the highest sulfate concentration tested; 1,365 mg/L (with an associated TDS value of 2,690 mg/L). The 1,365 mg/L sulfate level is 101% of the projected peak sulfate level anticipated. Based upon these results along with the literature regarding acute toxicity, there will be no acute or chronic toxicity impact upon aquatic life in Thorn Creek or the Little Calumet River from the proposed Rhodia expansion project. Furthermore, the request for an adjusted standard to allow Rhodia to expand its silica plant at its Chicago Heights facility is consistent with historical water quality levels and will not degrade the quality of the aquatic community in Thorn Creek.

Huff & Huff also concludes that there would be no adverse impacts upon crops. The areas surrounding Thorn Creek from TCBSD's outfall to the merger with the Little Calumet River are limited to forest preserves and developed areas. No known owners/operators conduct crop irrigation in the basin. No commercial crops are grown, and no evidence of water withdrawal from Thorn Creek for irrigation of crops was observed during the stream study performed by Huff & Huff. (Exhibit 1 at 109).

Huff & Huff further concludes that there would be no adverse impact upon public water supplies. Communities along Thorn Creek downstream of TCBSD's outfall all derive their water supply from Lake Michigan, including Chicago Heights, Flossmoor, Harvey, Glenwood, Homewood, South Holland, Thornton, Calumet City, Dolton, and Lansing. Most water supply wells have been capped and taken out of service in these communities. Based upon this investigation, Rhodia's proposed expansion project will not increase the TDS in any public water supply. (Exhibit 1 at 109-10).

Finally, in order to comply with the rule of general applicability, cross-media impacts would result. For example, pretreatment of TDS would produce dry sodium sulfate that would have to be disposed on land if it could not be sold, creating the potential for land pollution and for water pollution should it leach from a landfill to groundwater. Also, pretreatment would necessitate increased energy consumption, which not only would deplete energy resources, but also potentially would result in air pollution from the generation of the necessary energy. Thus, while TDS and sulfate levels in Thorn Creek and the Little Calumet River would increase under the proposed adjusted standard, no adverse environmental impact would result, whereas if compliance with the generally applicable standards were to be required, there might be some adverse cross-media impacts.

Section 104.406(h): Justification

As noted under Section 104.406(c) of this petition, the regulations of general applicability from which Rhodia and TCBSD seek adjusted standards do not specify levels of justification for adjusted standards. Section 28.1(c) of the Act allows the Board to grant adjusted standards in the absence of a specified level of justification if the Board determines, based upon adequate proof by the petitioner that:

- (1) factors relating to the petitioner are substantially different from the factors relied upon by the Board in adopting the general regulation applicable to that petitioner;
- (2) the existence of those factors justifies an adjusted standard;
- (3) the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and
- (4) the adjusted standard is consistent with any applicable federal law.

See also 35 Ill. Adm. Code 301.108(c).

The factors relating to Rhodia and TCBSD are substantially different from the factors relied upon by the Board in adopting the general regulation. As discussed above, in adopting the general regulations, the Board was concerned over potential adverse impacts upon aquatic life, crop irrigation and water supplies. Based upon the Huff & Huff report, no such adverse impacts are anticipated should the requested relief be granted. Further, the levels of TDS that already exist in some areas of Thorn Creek are higher than the water quality standard levels set in the general regulation and the projected levels of TDS are within the historical variability of TDS levels in Thorn Creek. The Board recognized in deciding to repeal the previously established effluent standard for TDS of 3,500 mg/L, that the treatment processes for TDS are very expensive, consume large amounts of energy, and may produce concentrated brines that must be disposed of. Those high costs have been documented in this petition. Finally, the regulation of general applicability was adopted based on the protection of aquatic life in a receiving stream that does not already contain high background levels of TDS. Thus, an adjusted standard for TDS and sulfates in Thorn Creek is justified.

The requested standard will not result in environmental or health effects substantially more adverse than the effects considered by the Board in adopting the rule of general applicability. That rule was adopted to protect aquatic life. Thorn Creek is classified as a Moderate to Limited Aquatic Resource. (Exhibit 1 at 91-92). A biological assessment of Thorn Creek done in support of the NutraSweet/CIWC petition concluded a TDS water quality level of 3,000 mg/L would not cause any undue stress to the aquatic life (Dames & Moore, 1981). Id. This opinion was supported by the Agency. (Studer testimony in AS89-3, 1990).

Based upon modeling conducted by Huff & Huff, under worst case conditions the TDS level is expected to reach 2,650 mg/L and sulfate to reach 1,350 mg/L in Thorn Creek and lower in the Little Calumet River. (Exhibit 1 at 111). Thus, based on the Moderate to Limited Aquatic Resource classification, the previous work by Dames & Moore (1990) and the stream surveys conducted by Huff & Huff, no impact on the current aquatic community in Thorn Creek or the Little Calumet River is expected. Id.

The adjusted standard is consistent with federal law in that under 40 C.F.R. 131.4, "states are responsible for reviewing, establishing and revising water quality standards." These standards are to be protective of the designated uses. 40 C.F.R. 131.5(b). As stated above, the adjusted standard would be protective of the present and potential uses, of Thorn Creek.

In addition, granting this adjusted standard is consistent with Section 27(a) of the Act, taking into account the existing physical conditions, the character of the area involved, including the character of surrounding land uses, which have been described herein, the zoning classification of the area as industrial, and the nature of the existing receiving body of water, and the technical infeasibility and economic unreasonableness of reducing TDS and sulfates.

In summary, Petitioners' justification for the proposed adjusted standards is that the granting of the requested adjusted standard will not result in any significant adverse environmental or health effects, while the cost of compliance is high and could be associated with adverse cross-media impacts. As noted above, the purpose of the regulation from which Petitioners seek adjusted standards is primarily to protect aquatic life. Such purpose will still be served if the requested adjusted standards are granted by the Board.

Section 104.406(i): Consistency with Federal Law and Federal Procedural Requirements

1. Consistency with Federal Law.

Rhodia and TCBSD believe that the granting of the requested adjusted standard would not be inconsistent with or violate any provisions of the Clean Water Act. As explained above, the requested relief is predicated solely upon potential exceedances of the TDS water quality standard and the standard for sulfates. There are no applicable federal or state TDS or sulfate effluent standards. Under Federal law:

A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act). "Serve the purposes of the Act" (as defined in sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.

40 C.F.R. 131.2. Under 40 C.F.R. 131.4 "states are responsible for reviewing, establishing and revising water quality standards." In turn, pursuant to 40 C.F.R. 131.5, "EPA is to review and to approve or disapprove the State-adopted water quality standards." These standards are to be protective of the designated uses (§131.5(b)) and, where those uses are not protected, this must be supported by "appropriate technical and scientific data and analyses." (§131.5(d)). A State is allowed to remove a designated use, which is not an existing use, if it "can demonstrate that attaining the designated use is not feasible" because of several enumerated causes. (§131.10(g)).

Rhodia and TCBSD believe that the granting of this adjusted standard will not impair any beneficial existing use of the receiving stream. This has been established by the Huff & Huff study which has been made part of this Petition.

Even if the Board were to find that some use is impaired, Petitioners believe that one or more of the requirements for federal approval have been met as set forth under §131.10(g) as follows:

- (1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
- (2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
- (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
- (4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
- (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
- (6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Most particularly, the portion of Thorn Creek referred to as Reach #2 is impacted by TDS discharges from Consumers Illinois Water Company at its University Park facility. Consumers

Illinois Water Company, which discharges to Deer Creek, is allowed, pursuant to an existing adjusted standard, to discharge TDS to a maximum of 2,100 mg/L. Elevated TDS levels exist downstream of Deer Creek's merger with Thorn Creek to the USGS Station 05536275 in Thornton. The Board established an adjusted standard for that portion of Thorn Creek in part because these levels of TDS could not be remedied.

2. Federal Procedural Requirements

Pursuant to U.S. EPA's current position on whether a hearing is required, Rhodia and TCBSD do not believe that a hearing is necessary where an authorized states follow approved state procedures, those procedures are federally acceptable.

Rhodia and TCBSD understand that U.S. EPA's present position is that the fulfillment of the state requirements for notice and hearing is all that is required and that if the state allows for waiver of the hearing requirement, hearing can be waived without conflict with federal laws. 35 Ill. Adm. Code 104.406(j) allows for waiver of hearing.

Section 104.406(j): Hearing Waived

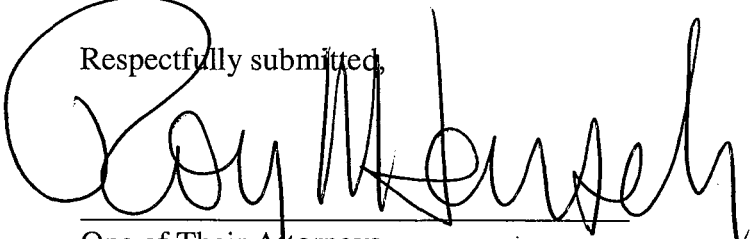
Rhodia and TCBSD hereby waive hearing in this matter pursuant to Section 104.406.

Section 104.406(k): Supporting Documents

Supporting documents cited in this Petition are appended hereto.

WHEREFORE, the Rhodia, Inc. and the Thorn Creek Basin Sanitary District request the Board to grant an adjusted standard from 35 Ill. Adm. Code 304.105 and 35 Ill. Adm.

Code 302.208 as they apply to proposed discharges of TDS and sulfate from Rhodia's proposed expansion of its silica plant to TCBSD's sewer system and from TCBSD's treatment plant to Thorn Creek.

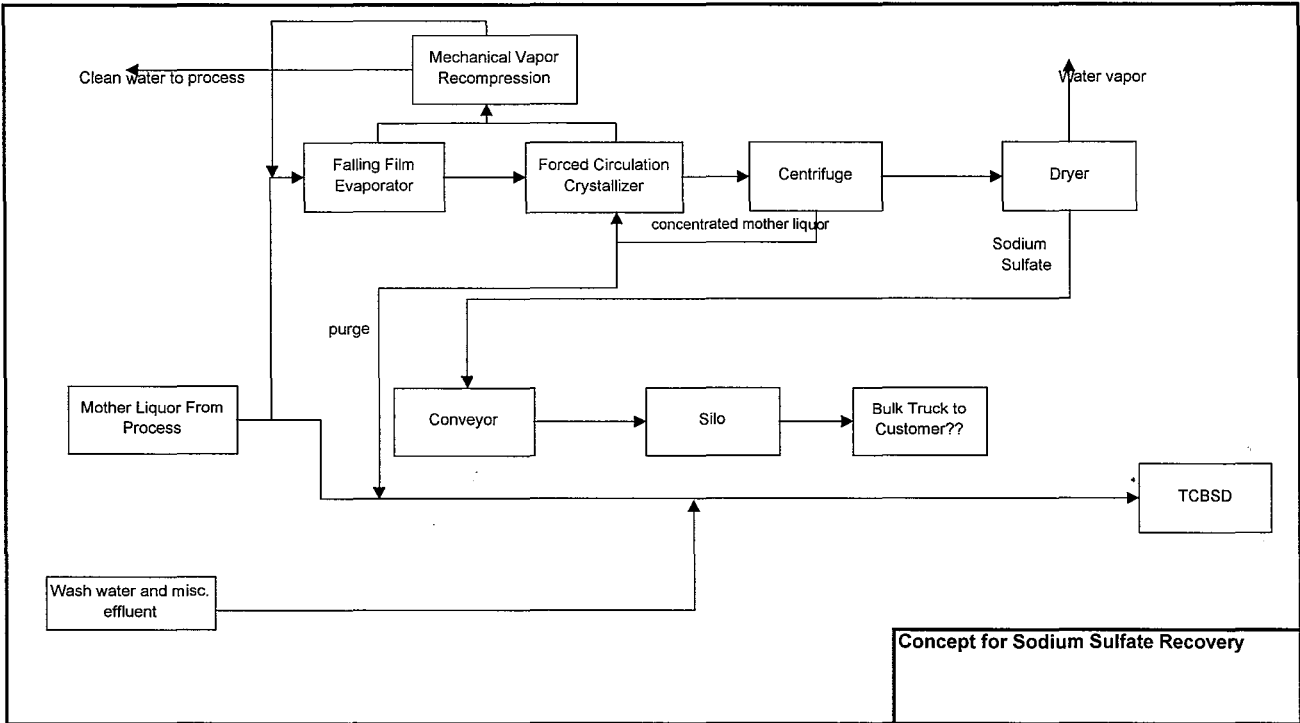
Respectfully submitted,

One of Their Attorneys

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CH01/12031427.5

Exhibit A

ALTERNATIVE 1



Sales 28500 ton/year

Configuration / Ref. Drawing	P-C Treatment - Alt. 1
Price - Installed US\$	\$6,000,000
Footprint L x W x H	
Power kW	750
Drier Duty MMBTU/h	0.35

Major Equipment

OOM Total Installed Cost

\$6,000,000 \$ 4,800,000 to \$8,400,000

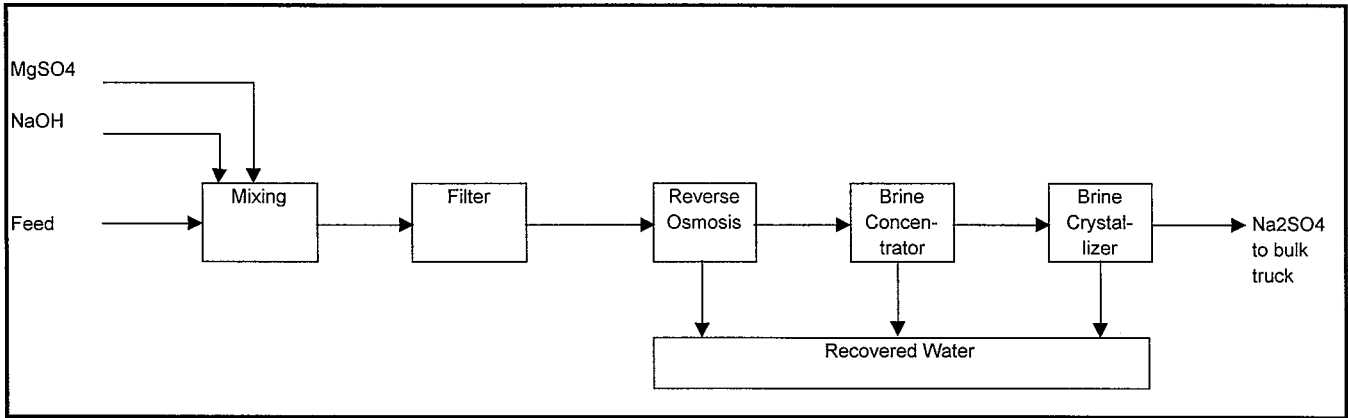
Annual Operating Costs

Falling Film Evaporator (Brine Conc)		\$k/year	
Forced Circulation Crystallizer (Brine XL)	Power	329	
MVR Compressor	Maint	180	
2 Condensate pumps	Depre.	400	
2 Evaporator feed pumps	Gas	7	
2 Evaporator discharge pumps	Sulf sales	-	
Purge pump	Total	915	
Conveyor	\$/mt	32	
Dryer	\$/mt above 23000	166	

Estimates are ODM based on evaporation rates above and similar units built previously

Exhibit B

ALTERNATIVE 2



Sales 28500 ton/year

Configuration / Ref. Drawing	P-C Treatment - Alt. 1
Price - Installed US\$	\$6,000,000
Footprint L x W x H	
Power kW	750
Drier Duty MMBTU/h	0.35

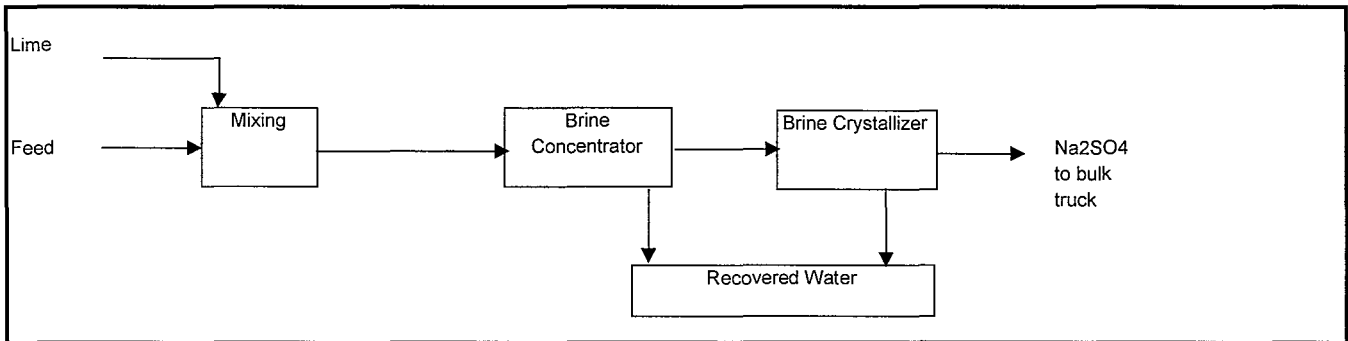
Major Equipment OOM Total Installed Cost
\$6,000,000 \$ 4,800,000 to \$8,400,000

		Annual Operating Costs	
		\$/year	
Falling Film Evaporator (Brine Conc)		Power	329
Forced Circulation Crystallizer (Brine XL)		Maint	180
MVR Compressor		Depre.	400
2 Condensate pumps		Gas	7
2 Evaporator feed pumps		Sulf sales	-
2 Evaporator discharge pumps		Total	915
Purge pump			
Conveyor		\$/mt	32
Dryer		\$/mt above 23000	166

Estimates are ODM based on evaporation rates above and similar units built previously

Exhibit C

ALTERNATIVE 3



Sales 28500 ton/year

Configuration / Ref. Drawing	P-C Treatment - Alt. 1
Price - Installed US\$	\$6,000,000
Footprint L x W x H	
Power kW	750
Drier Duty MMBTU/h	0.35

Major Equipment OOM Total Installed Cost
\$6,000,000 \$ 4,800,000 to \$8,400,000

		Annual Operating Costs	
		\$/year	
Falling Film Evaporator (Brine Conc)		Power	329
Forced Circulation Crystallizer (Brine XL)		Maint	180
MVR Compressor		Depre.	400
2 Condensate pumps		Gas	7
2 Evaporator feed pumps		Sulf sales	-
2 Evaporator discharge pumps		Total	915
Purge pump			
Conveyor		\$/mt	32
Dryer		\$/mt above 23000	166

Estimates are ODM based on evaporation rates above and similar units built previously