

State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

E. J. De
Koppers Co. Notif. File
Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

October 1, 1987

IN REPLY REFER TO: 4430

Mr. James R. Batchelder, Vice President & Manager
Technical and Environmental Services
Tar and Wood Products Sector
Koppers Co., Inc.
Pittsburg, PA 15219

SUBJECT: Hazardous Waste Closure and Long-Term Care Plan
Conditional Approval
Koppers Co., Inc. - Surface Impoundment
EPA ID: WID006179493

Dear Mr. Batchelder:

The Department of Natural Resources has completed its review of your report entitled "Closure and Post-Closure Plan for the Koppers Co., Inc. Hazardous Waste Management Facility, Superior, Wisconsin - Surface Impoundments, EPA ID. No. WID006179493". This report was prepared by Keystone Environmental Resources, Inc. of Monroeville, Pennsylvania and submitted on June 1, 1987 with revisions received on August 28, 1987. We are informing you that your closure and long-term care plan is conditionally approved. Based on our review, we have determined that the closure and long-term care plan requirements found in ch. 181, Wis. Adm. Code will be adequately addressed, provided the conditions set forth in the attached approval report are met.

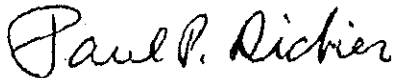
The conditions of approval are necessary to insure that the construction, closure and long-term care activities called for in the closure plan are properly designed and implemented. Prior to any construction activities being initiated on any of the items discussed in the closure plan, all conditions associated with that construction activity shall be addressed to the Department's satisfaction. All contractors at the site shall be provided with a copy of this conditional approval as part of their contract document. Please review this approval report carefully.

Mr. James Batchelder

2.

If you have any questions regarding the conditional approval, please contact Ed Lynch at (608) 266-3084.

Sincerely,



Paul P. Didier, P.E., Director
Bureau of Solid Waste Management

RK:ED:jm
Attachment

cc: North West District - Gary LeRoy
Brule Area Office - Director
Hazardous Waste - Ed Lynch - SW/3
Residuals Management - Jim Brownell - SW/3
Industrial Wastewater Section - Greg Hill - WW/2
RCRA Permitting - EPA Region V - Chuck Slaustas - 5HS/13
RCRA Enforcement - EPA Region V - SHE/12
Systems Management Section - SW/3
Dave Shaw - Koppers Co., Inc. - Superior
Robert Anderson - Keystone Env. Res.
Ron Morosky - Keystone Env. Res.
Ron O'Toole - Keystone Env. Res.
Terry Kirchner - Keystone Env. Res.

8673W

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

CONDITIONAL APPROVAL
CLOSURE AND LONG-TERM CARE PLAN
KOPPERS CO., INC. - SURFACE IMPOUNDMENTS
WID006179493

GENERAL INFORMATION

Authorized Contacts:

Mr. Dave Shaw - Plant Manager
Mr. Warren Dolson - Assistant Plant Manager
Koppers Company, Inc.
P.O. Box 397
Superior, WI 54880
(715) 392-2221

Property Owner and Operator:

Koppers Company, Inc.
436 7th Avenue
Koppers Building
Pittsburg, PA 15219

Location of Site:

The Koppers facility is located approximately 2 miles southeast of Superior, Wisconsin in sections 12 and 13, T48N, R13W, Town of Superior, Douglas County. The site is located adjacent to the intersection of Hwys. A and Z.

Report Prepared by:

Robert J. Anderson, Environmental Program Manager
Ronald M. Morosky, Project Manager
Keystone Environmental Resources
440 College Park Drive
Monroeville, PA

Site Description:

Koppers Company, Inc. began operation at its Superior facility in 1928. The entire site occupies approximately 112 acres. The wood treating facility and waste handling facility are located on a smaller portion near the northern end. The majority of the site is used for storage of treated and untreated wood. Currently, the plant uses creosote for the pressure treatment of railroad cross ties. The use of pentachlorophenol (PCP) preservative was

discontinued in the early part of 1982. Other wood products, such as coals and pillings may also be produced.

The surface impoundments were constructed in the mid-1970's. The only hazardous waste generated is K001 waste (bottom sediment sludge from the treatment of wastewaters from wood preserving processes using creosote or pentachlorophenol). The surface impoundments are preceded by oil/water separation and flow equalization. Hydrocarbon material removed prior to the surface impoundments is reused in the wood treating process. As such, the amount of contaminants that flow into the surface impoundment is minimized.

Each impoundment is a regular shaped rectangle which measures approximately 127 feet by 170 feet on the inside top of the dike measurement. The bottom of the impoundments are about 7 feet below the top of the dike with side slopes of about 3 horizontal to 1 vertical (3:1). The total bottom area of each lagoon is roughly 40,672 square feet and the maximum hydraulic volume is 294,550 cubic feet (2,203,234 gallons). The facility is located in an area generally designated for agricultural use.

Site Geology

The geologic materials beneath the Superior site vicinity consists of a thick section of Pleistocene with some Holocene age sediments overlaying Precambrian bedrock. The top of the bedrock underlying the Superior, Wisconsin area is reported in local water well logs to be between 170 to 210 feet below the land surface. The bedrock consist of flat-lying quartz sandstone.

The Pleistocene section consist of the Copper Falls and Miller Creek formations (Mickelson, et al., 1984). The Copper Falls formation is found approximately 100 feet to 140 feet below the land surface with an average thickness of 40 feet. The Miller Creek formation overlies the Copper Falls and consist of those materials from the ground surface to a depth of approximately 100 feet to 140 feet.

The Copper Falls formation consists of reddish to brownish sandy sediment. The majority of the Copper Falls consist of sandy till. However, a large amount of sand and gravel deposited by glacial meltwater streams occur interbedded with in the till deposits.

The Miller Creek formation consists predominantly of red clay till. However, up to approximately one-quarter of the formation probably consists of bedded reddish silt and clay deposited in glacial lakes. It occurs interbedded within the till. Small amounts of interbedded sand and gravel also occur. The Miller Creek formation consists of two members; the Hanson Creek Member (lower) and the Douglas Member (upper).

Both are composed predominantly of clay till. However, the Hanson Creek till is siltier and browner than the Douglas till. The blue green clay unit identified in the local water supply well logs may be the upper most portion of Hanson Creek Member. It may be a lake bed deposit that was exposed when lake levels decreased and clay was subject to drying.

On-site geologic investigations of the site conducted by GAI Consultants in 1985 describe the subsurface geology as lake bed deposits composed of unlaminated red-brown clay containing discontinuous layers of silt and sand. Ten soil borings were drilled to variable depths, each terminating in red-brown clay. The borings ranged in depth from 30 to 60 feet. The clay was probably deposited by glacial ice rather than within a lake because it is unlaminated.

The following characteristics were observed in the underlying deposits. The upper (0 to 5 feet) consist of fill material deposits and topsoil. Underlying the fill is red-brown highly plastic, unlaminated clay, with thin vertical, hairline fractures in-filled with a greenish-gray clay-like material. The fractured clay continued to a maximum depth of 18 feet, but generally was less than 15 feet.

Below the fractured clay, a similar red-brown highly plastic, unlaminated clay was present ranging from 15 feet to further than 60 feet below the surface. Fractures and the gray clay in-fillings were absent. Very little organic matter was detected. Where sand, silt or gravel layers were not detected the clay continued to the bottom of all borings.

Eight of the soil borings encountered variable amounts of sand, silt and gravel deposits within the unfractured clay. The sand was multicolored, subangular and generally poorly sorted with samples exhibiting layers or bedding. The sand found between 35 feet and 45 feet depths exhibited fining up sequence with gravel on the bottom grading to a coarse to medium sand with fine sand and silt on top. The sandy units had a variable range in thickness of 1 inch to 10 feet. Two soil borings encountered only trace amounts of these deposits.

Below and between the sandy units the red-brown highly plastic, unlaminated, unfractured clay was observed. The bottom of the clay unit was not detected by these soil borings.

A recent regional study of the area by Clayton (1984) reported the clay sequence to be part of the Douglas till. The till was described as red-brown clay deposited during the end of the Wisconsin glacial stage.

Site Construction:

The goal of this closure activity is to remove all hazardous wastes and contaminated soils from the area where the surface impoundments are located and thereby achieve clean closure (Section V). In the event all wastes or contaminated soils cannot be removed, then the site will be closed in accordance with the requirements for a hazardous waste landfill and the site will be capped. Closure activities will begin in April 1988 and be completed by October 1989 (Attachment 5.1-1; Section VI).

Closure of the surface impoundments at the site include removal of all free liquids from them, removal of all K001 bottom sediment (sludge) and as much contaminated soil as feasible. It is anticipated that approximately 300 cubic yards of sludge is present and that approximately 1,900 cubic yards of

contaminated soil will be removed. This hazardous waste will be shipped to an engineered, secured hazardous waste landfill.

Once the hazardous waste and contaminated soils have been removed, a preliminary soil investigation (Section VII) will be conducted to determine the extent and existence of any residual hazardous contaminants. The results of the preliminary investigation will be used to decide whether to pursue a clean closure. If a decision is made to pursue clean closure additional soil sampling will take place. If clean closure is achieved, then existing perimeter fencing will be removed, and the surrounding berms will be excavated. The impoundment excavation will be backfilled with unclassified soil fill paced in 8 inch lifts and compacted to 95% density. Following fill placement, an 18 inch thick topsoil material will be placed above the soil fill. The site will then be raked, seeded and mulched to minimize erosion. Plan sheet A103034 shows final grades for a clean closure.

If clean closure cannot be achieved, then the contingent closure plan must be implemented. The contingent closure (Section VIII) calls for backfill of the surface impoundment excavation with unclassified soil material (predominantly cohesive soils) to a specified grade. A non-woven geotextile will be placed above the soil fill. A composite cap will then be laced over the site. This cap will consist of a clay barrier with a minimum thickness of 24 inches, a synthetic flexible membrane liner (FML), a non-woven geotextile, a drainage layer with a minimum thickness of 12 inches, a non-woven geotextile, suitable unclassified cohesive fill with a minimum thickness of 30 inches, and a topsoil layer with a minimum thickness of 18 inches. The cap will be graded to a minimum 3% slope and be raked, seeded, and mulched to minimize erosion. Total cap thickness will be at least seven feet thick. Plan sheet A103032 shows final grades for closure using the contingent closure plan.

Long Term Care:

The long term care period for this facility is 30 years commencing from the date of Department approval of the construction documentation submittal. The post closure activities include inspections and maintenance of the site, inspection and maintenance of the groundwater monitoring system and implementing the groundwater monitoring plan. Requirements of the groundwater monitoring plan may be reduced in the future.

FINDINGS OF FACT

The Department finds that:

1. Koppers Co., Inc. owns and operates a hazardous waste facility in Section 12 of T48N, R14W, Town of Superior, Douglas County, Wisconsin. The current surface impoundments and spray irrigation field has been used since the mid 1970's.
2. Koppers Co., Inc. submitted to the U.S. EPA a Resource Conservation and Recovery Act (RCRA) notification form informing EPA of hazardous waste generation, transportation and storage activities at their Superior,

Wisconsin facility on August 18, 1980. Koppers submitted a RCRA Part A application on November 18, 1980 and was subsequently granted interim status to store hazardous waste by U.S. EPA.

3. The Department reviewed the Koppers Co. RCRA Part A application and accompanying material that compromised the ch. NR 181, Wis. Adm. Code, interim license application and granted Koppers an interim license on April 1, 1985.
4. On April 1, 1985 the Department "called in" the Koppers Co. Feasibility Report for the surface impoundments and container storage area. The Feasibility Report was due on December 31, 1985.
5. The hazardous waste surface impoundments are subject to the Landfill and Surface Impoundment Standards found in s. NR 181.44, Wisconsin Administrative Code and Groundwater and Leachate Monitoring Standards found in s. NR 181.49, Wisconsin Administrative Code.
6. On January 2, 1986, Koppers Co. submitted a feasibility report for the hazardous waste surface impoundments and container storage facility. Numerous revisions to report were made in response to Department notices of the completeness.
7. On September 5, 1986, Koppers Co. withdrew the feasibility report for the surface impoundments and on September 23, 1986 notified of their intent to close the surface impoundments.
8. The information submitted in connection with the closure and long-term care plan review includes the following:
 - a. The "Closure and Post Closure Plan for the Koppers Co., Inc. Hazardous Waste Management Facility - Superior Wisconsin" submitted on June 1, 1987 with revisions received on August 28, 1987. Prepared by Keystone Environmental Resources, Monroeville, Pennsylvania.
 - b. The "Koppers Co., Inc. Closure Plan - Surface Impoundments - Spray Field - Superior, Wisconsin" submitted on December 18, 1986. Prepared by Koppers Co., - Pittsburgh, Pennsylvania.
 - c. The "Feasibility Report - Koppers Co., Inc. - Superior, Wisconsin" covering the surface impoundments and container storage submitted on January 2, 1986. Prepared by Woodward-Clyde Consultants, Chicago, Illinois.
 - d. The " Geology and Groundwater Hydrogeology Investigation for Koppers Co., Inc., Wood Treating Plant, Superior, Wisconsin" submitted on January 3, 1986. Prepared by Woodward-Clyde Consultants, Chicago, Illinois.
9. Department and related correspondences/documents considered in review of the closure and post-closure plant.
 - a. The Department's July 28, 1987 closure plan notice of incompleteness.

- b. The Department's April 1, 1987 closure plan notice of noncompliance.
- c. Other Department correspondence to Koppers dated January 26, 1986, August 4, 1986, and April 11, 1986, Department memorandums dated March 26, 1987 and July 24, 1986, and related file material.
- d. Chapter NR 181, Wisconsin Administrative Code

CONCLUSIONS OF LAW

1. The closure and long-term care plan has been prepared in accordance with applicable Wisconsin Statutes and Administrative Codes. The Department has the authority to determine closure, long-term, and termination standards for hazardous waste facilities pursuant to ss. 144.44(1m) and 144.62(8)(e), Stats. These requirements are listed in ss. NR 180.42(8) and (9) and 181.44(12) and (14) and 181.49, Wis. Adm. Code.
2. Koppers Co., Inc. is an existing hazardous waste facility as defined in s. 144.61(5m), Stats., and operates a hazardous waste surface impoundment as defined in s. NR 181.04(94), Wis. Adm. Code.
3. Listed hazardous wastes as defined in s. NR 181.16, Wis. Adm. Code are stored in the Koppers Co., Inc. surface impoundment. Hazardous waste means any solid waste as defined by the Department as hazardous under s. 144.62(2), Stats., and is defined in s. NR 181.12, Wis. Adm. Code.
4. Section 144.64(2)(c), Stats., allows the Department to issue an interim license to the owner or operator of the hazardous waste facility in existence on November 19, 1980 if the person applies for a license and complies with the restrictions prescribed by rule or special order by the Department pending the decision on the issuance of a final operating license. Koppers Co., Inc. was granted an interim license by the Department on April 1, 1985.
5. Section NR 181.42(8)(d), Wis. Adm. Code, requires the Department to approve, deny or modify a closure plan. The Koppers Co., Inc. Closure and Long-Term Care Plan, as modified by the conditions of this approval, meets the requirements of ss. NR 181.42(8) and (9) and ss. NR 181.44(12) and (14), Wis. Adm. Code. The closure and long-term care plan as conditionally approved will comply with those sections.
6. The environmental monitoring program as conditionally approved in the closure and long-term care plan will comply with the groundwater monitoring requirements of s. NR 181.49, Wis. Adm. Code.

CONDITIONS OF APPROVAL

General

1. All site construction, documentation and closure and post closure activities of the Koppers Co., Inc. surface impoundments shall be in accordance with the Revised Closure and Post-Closure Plan and accompanying plan sheets of engineering drawings as prepared by Keystone Environmental

Resources, ch. NR 181, Wisconsin Administrative Code and the Conditions of Approval contained in this Conditional Approval Report. In the event of any discrepancies, the Conditions of Approval contained herein shall take precedence. Any proposed changes to the closure and post-closure plan or this approval shall be presented to the Department in writing. If the Department feels these changes are compatible with the proper closure and long-term care of the site, an addendum will be added to this approval indicating acceptance of those changes. Department approval is necessary prior to implementation of any changes.

2. A copy of the Modified Closure and Long-term Care Plan and a set of engineering drawings and this modified approval shall be retained at the facility's office at all times and shall be used by the individuals responsible for proper closure and long-term care of the surface impoundments. Individuals responsible for construction, closure and long-term care shall be informed of the conditions required in this approval. A copy of this conditional approval and report shall be included with all contractor construction documents.
3. The Department reserves the right to require changes to any conditions of this approval should an evaluation of the groundwater monitoring results, construction documentations or site inspections by District or Bureau staff reveal that changes are necessary.
4. All reports and investigations called for in this approval shall be prepared by a Professional Engineer registered in the state of Wisconsin. Koppers Co., Inc. shall submit all these reports and investigations called for in this approval in a timely fashion on the dates stated herein.
5. The schedule of events leading to closure of the surface impoundments are included in this condition. If for any reason Koppers Co., Inc. cannot meet the dates of this schedule, the Department shall be notified in writing why the action has not been completed.

Schedule For Closure of Surface Impoundments

<u>Task</u>	<u>Duration</u>
<u>1988</u>	
Preliminary removal standing liquid	April 1 - Aug. 15,
Wastewater treatment system start-up and final receipt of waste in surface impoundments	Aug. 15 - Aug. 25,
Final removal of standing liquid	Aug. 25 - Sept. 15,
Accumulate and remove K001 sludge	Sept. 15 - Oct. 15,
Remove visibly contaminated subgrade soil	Oct. 15 - Nov. 15,

Impoundment subgrade preliminary soil sampling/analysis	Oct. 15 - Nov. 15,
Background soil sampling/analysis	Oct. 15 - Nov. 15,
<u>1989</u>	
Evaluate data and decide to pursue clean or contingent closure	Nov. 15 - Feb. 15,
If clean closure, sample and analyze for Table 1.0 parameters	Feb. 15 - May 15,
Regulatory response	May 15 - June 15,
If clean closure: Remove additional subgrade (if if necessary), backfill, cover, seed and decontaminate equipment	June 15 - Sept. 15,
If contingent closure: Backfill, cover (RCRA cap) seed and decontaminate equipment	June 15 - Sept. 15,
Completion of Closure Certification	Sept. - Oct. 15,
<p>6. Any well that is abandoned as a result of closure shall be abandoned in accordance this condition. Proper abandonment of monitoring devices shall seal the well completely in order to prevent future contamination of groundwater. The sealing materials used shall be continuous, physically and chemically stable and have a hydraulic conductivity of less than 1×10^{-7} cm/sec. The exact location of abandoned wells and borings and the date and the method of abandonment shall be documented in writing. The abandonment method shall also be documented by photographs. All monitoring wells shall be abandoned and documented in accordance with ss. NR 141.25, Wis. Adm. Code. A report documenting that the monitoring devices have been properly abandoned shall be submitted with the construction documentation report.</p>	
<p>7. Koppers Co., Inc. shall have a competent resident inspector on site during the entire closure period.</p>	
<p>8. Koppers Co., Inc. shall inform the Department of any hazardous waste treatment activities that occur on site during closure. This includes the treatment of any K001 sludge by mixing with flyash or kiln dust. The Department shall be provided with a specific treatment plan which covers treatment location, treatment type, treatment structure and mixing ratio between the sludge and absorbant material.</p>	
<p>9. Koppers Co., Inc. shall provide the Department with all sampling and analytical results from the soil investigations done to determine if clean closure is feasible.</p>	

10. Koppers Co., Inc. shall contact the Department for approval of the location of the background soil borings.

Groundwater Monitoring and Long-term Care Conditions

11. Koppers Co., Inc. shall submit the results of the annual analysis report required by s. NR 181.49(6)(j)6., Wis. Adm. Code, for its entire groundwater monitoring system as soon as they become available.
12. Koppers Co., Inc. shall maintain a groundwater monitoring plan as required by s. NR 181.49, Wis. Adm. Code. The following wells will be the ch. NR 181, Wis. Adm. Code, monitoring wells.

Upgradient (Background)

W-4A
W-4B
W-4C

Downgradient

L-15
L-2S
L-4S
W-5
R-5D
R-6D
L-4D
R-7D
R-8D (W-6)
R-9D

A well information form is needed for well R-5D, when that well is constructed.

13. Wells W-5, R-5D, R6-D, R-7D and R-9D must be sampled for the entire s. NR 181.16 Table VI (40 CFR Appendix IX is acceptable), hazardous constituents list.

To determine the existing level of Table VI (Appendix IX) constituents present in the groundwater, all wells will then be monitored an additional three times (on a monthly basis for all detected Table VI (Appendix IX) constituents, hazardous constituents listed under EPA hazardous waste number K001, indicator parameters, and several welfare parameters. This shall include the following:

Parameters

<u>Indicator and Welfare Drinking Water Standards</u>	<u>Hazardous Constituents For Which K001 is Listed</u>	<u>Detected Table VI Hazardous Constituents</u>
pH	Pentachlorophenol	Methylene Chloride
Conductivity	Phenol	Acetone
Temperature	2-Chlorophenol	Bis (2-Ethylhexyl)-phthalate
Total Dissolved Solids	P-Chloro-M-Cresol	Aluminum
Hardness	2,4-Dimethylphenyl	Arsenic
Nitrate	2,4-Dinitrophenol	Cadmium
Chloride	Trichlorophenol	Calcium
Ammonia	Tetrachlorophenol	Chromium
Total Organic	Creosote	Chromium
	Chrysene	Cobalt
		Copper

Carbon
Chemical Oxygen
Demand

Naphthalene
Fluoranthene
Benzo (b) Fluoranthene
Benzo (a) Pyrene
Indeno (1,2,3-cd) Pyrene
Benz (a) Anthracene
Dibenz (a) Anthracene
Acenciphthalene

Iron
Lead
Manganese
Nickel
Potassium
Selenium
Sodium
Vanadium
Zinc

- In addition, there have been Table VI (Appendix IX) detects upgradient in the background wells. Koppers Co., Inc. must determine the source of the constituents in these wells as it is unlikely these wells are influenced by the surface impoundments.
14. All samples collected for laboratory analysis shall be filtered in the field using a 0.45 micron inline filter unless otherwise approved by the Department. It appears that the analyses for inorganic Appendix IX parameters were performed on unfiltered samples, because the concentrations were extremely high (for example, iron averaged approximately 94 mg/l). If subsequent sampling rounds show that the actual concentrations of any of these metals at the facility are within the limits that can reasonably be expected in this clay environment, upon the request of Kopper's, the Department will drop those metals from the required list of parameters in Condition 13.
 15. Once Koppers Co., Inc. has completed the analysis, a background value for each constituent detected must be established. This information must be submitted to the Department for review and concurrence. Once background has been established, the Department will establish groundwater protection standards for each detected constituent.
 16. Background values for the parameters listed in Condition 13 shall be calculated by using 4 rounds of dated collected from wells unaffected by the site. In the past it appeared that wells W-4A, W-4B, and W-4C would be suitable background wells. However, hazardous constituents have been detected in these wells. Though they may not have been impacted by the surface impoundments, they probably do not represent background conditions.
 17. Once site background has been established, samples shall be collected quarterly from each upgradient and each downgradient well analyzed for the parameters listed in Condition 13, the background data to determine whether any statistically significant different exists. The data and the test calculations shall be submitted to the Department quarterly. As proposed by Koppers, the Cochran's approximation to the Behrens - Fisher student's t-test shall be used to perform the statistical comparisons. The procedures described in NR 181.49(6)(h)1.a., Wis. Adm. Code. Upon written request from Koppers Company, the Department will consider approving a statistical test which requires 1 lab analysis per well per quarter rather than 4 analyses as required by the Cochran's approximation to the Behrens - Fisher student's t-test.

18. Groundwater elevations shall be measured in all monitoring wells on a quarterly basis. The measurements shall be made before the wells are purged or sampled.
19. Koppers Co. Inc. shall monitor all ch. NR 181, Wis. Adm. Code, compliance monitoring wells listed in Condition 12 for detected parameters on a quarterly basis and compare them to background. If a groundwater protection standard is exceeded, then Koppers Co., Inc. shall notify the Department and propose a corrective action program as outlined in s. NR 181.49(6)(j), Wis. Adm. Code.
20. Koppers Co., Inc. shall submit a revised ch. NR 181, Wis. Adm. Code groundwater monitoring plan reflecting these conditions and the requirements of s. NR 181.49(b) must be submitted within 45 days of the date of this approval. Koppers Co., Inc. may suggest minor revisions to these conditions in that plan submittal.

Financial Responsibilities

21. If clean closure cannot be attained and the contingent closure plan is implemented, Koppers Co., Inc. shall submit a long-term care plan specifying the inspection, maintenance and care of the facility during its 30 year post-closure care period.
22. Closure and Long-Term Care (NR 181.42(10), WAC).

The closure costs presented are underestimated due to conditions of this closure plan. Revised cost estimates based upon the cost of closing the surface impoundments in accordance with the conditions of this closure and long-term care plan must be submitted. These costs must assume the most expensive closure will take place. The long-term care cost estimate must be covered in the proof mechanism. The revised cost estimates and proof mechanism shall be submitted within 45 days of the date of this approval.

23. Liability Requirement (NR 181.42(11), WAC)

Koppers Co., Inc. must obtain liability insurance coverage for non-sudden accidental occurrences in the amount of \$3 million per occurrence with an annual aggregate of at least \$6 million, exclusive of legal defense costs. As part of the revisions to ch. NR 181, Wis. Adm. Code, a financial net worth test may be used. Koppers Co. is responsible for having this coverage now and proof of coverage must be submitted within 45 days of the date of this letter.

Construction Documentation

24. A Construction Documentation Report verifying and documenting all aspects of site construction shall be prepared following completion of construction. The report shall include the following information at a minimum:

- a. Plan sheets documenting: the extent of excavation and fill, all groundwater monitoring devices; grade and sidewall elevations of the cap including spot elevations; the location and types of testing performed; the locations of drainage ditches, access roads, berms; and any other pertinent information. In addition, invert elevations shall be provided on all gradient control and collection pipes.
- b. Cross-sections shall be constructed to document the certified area. The drawings shall consist of a minimum of one north-south cross-section and one east-west cross-section. The cross-sections shall include base grades and final grades.
- c. A comprehensive narrative explaining how construction of the project was accomplished along with an analysis of the data obtained during the soil investigation program. This report shall also include an appendix containing all the raw data from the field and laboratory soil testing performed.
- d. A series of 35 mm color prints documenting all major aspects of site construction.
- e. A letter under the seal of a registered professional engineer certifying that the site has been constructed in substantial compliance with the approved plans. Any deviations from the approved plans shall be noted.

Contingent Cap

25. The cap shall be constructed in accordance with the design specified in the closure and long-term care plan and the engineering plan sheets and as modified by the conditions of this approval. The cap shall consist of non-woven geotextile, a minimum 2 foot thick recompacted clay layer, a non-woven geotextile, a flexible membrane liner consisting of 40 mil high density polyethylene (HDPE), a minimum 1 foot thick granular drainage layer, a non-woven geotextile, a minimum of 2.5 foot thick soil fill layer and a minimum 1.5 foot thick layer of topsoil. The final cover will be seeded, fertilized and mulched.
26. The flexible membrane line (FML) shall be at a minimum 40 mil high density polyethylene (HDPE) and not polyvinyl chloride (PVC). The FML shall be designed, tested and installed as specified in conditions.
27. Documentation Testing for The Clay Cap Shall be as Follows:
 - a. Density testing shall be performed on a 100-foot grid pattern for each lift with the grid pattern offset on each subsequent lift. A lift shall not exceed eight inches in thickness after compaction. At least ~~five~~ densities shall be conducted per lift for each acre of clay placed. The testing locations shall be offset on each successive lift.

Three

- b. A minimum of one undisturbed soil sample per 1,000 cubic yards shall be retrieved and analyzed for Atterberg limits, grain size (to the two micron particle size), moisture content, and dry density. Laboratory hydraulic conductivity tests shall be performed on at least one undisturbed sample.
- c. A Modified Proctor curve shall be developed for the clay and again if visible changes in soil quality are observed in order that density testing can be correlated to the appropriate soil type.
- d. The clay component, drainage blanket, cover material and topsoil thickness shall be verified on a 100 foot grid pattern. This may be satisfied with a survey after each increment of construction.

Material Specifications

28. Clay

The clay cap shall meet the following specifications:

Classification:	CL or CH under the Unified Soil Classification System
Thickness:	Minimum of 2 feet for the cap
Permeability:	Less than or equal to 1×10^{-7} cm/sec.
Liquid Limit:	30% or greater
Plasticity Index:	15% or greater
Compaction:	95% standard Proctor
Grain Size:	P200 Content of 50% by weight or greater

Documentation testing of the final clay capping material shall be as follows:

- a. Three density tests per acre per lift.
- b. One undisturbed soil sample per acre shall be retrieved and analyzed for grain size, Atterberg limits, moisture content, dry density and permeability.
- c. Verification of clay cap thickness on a 100-foot grid pattern.
- d. A standard Proctor curve shall be developed for each major soil type in order that density testing can be correlated to the appropriate soil type.

29. Drainage Layer

A minimum 1 foot thick granular drainage blanket shall be placed over the membrane. The drainage materials shall meet the following specifications:

- a. Grain size; P200 content of 5% or less,
- b. Permeability: 1×10^{-3} cm/sec or greater,

- c. Verification of drainage layer thickness on a 100 foot grid pattern,
- d. Two permeability tests to document the permeability, and
- e. Uniformity Coefficient: 6 or less.

30. Topsoil and Seed Mixture

Documentation testing of topsoil, seed, fertilizer and mulch placement shall consist of the following:

- a. One grab sample of topsoil per acre shall be analyzed for soil pH and classified under the USDA soil classification system.
- b. Verification of thickness on a 100-foot grid pattern.
- c. The amount and type of fertilizer, seed and mulch used per acre.
- d. A short narrative which explains how the seed bed was prepared and a summary of how placement of the seed, fertilizer and mulch were accomplished.
- e. A series of 35 mm slides or color prints which document the work.

HDPE Membrane Requirements

31. The Department shall be notified in writing of the identities and qualifications of the geomembrane supplier, membrane installation contractor, and any other contractors involved in the project as soon as they are selected. The geomembrane information must be approved by the Department prior to implementing any membrane-related work. The following minimum information shall be included:
- a. Identification of polymers and admixtures, quality control for the raw materials, fabrication methods, and quality control of geomembrane panels prior to shipment. Include sources of resins, all compounding materials, panel fabricators, and specific factory testing and seaming methods, as applicable, with detailed description of the processes.
 - b. Quality control for transporting and storing the membrane panels.
 - c. An experience record of the installer including contacts for projects previously completed within the last five years, including name, address, and phone number of contacts, type of application, and acreage completed.
 - d. The proposed equipment to be used in membrane installation, including machinery used in panel layout, sand drainage blanket placement, membrane seaming and testing, and soil processing.

- e. Quality control for seams, including identification of the destructive and nondestructive testing equipment with standards which define seam failure.
32. Koppers Co., Inc. shall provide for Departmental review a fabrication plan prior to commencing installation of the membrane liner. The fabrication plan shall include the following:
- a. Size and configuration of all panels to be assembled with a panel identification scheme.
 - b. General location and type of all seams.
 - c. Construction details for all membrane related work, including:
 - i. Minimum panel overlap,
 - ii. Penetration and attachment details for any points of membrane puncture, and
 - iii. Panel anchoring methods.
33. Upon receipt of all HDPE membrane, Koppers Co., Inc. shall obtain samples as specified and test the samples for the following chemical and physical properties as specified to verify that the correct material has been delivered. Representative samples shall be taken from each membrane thickness. Data should be recorded and reported to the Department with the site construction documentation report.
- a. Thickness: 1 per 50,000 ft²
 - b. Density: 1 per 50,000 ft²
 - c. Melt Index: 1 per 50,000 ft²
 - d. Tensile and Elongation Properties (include copies of stress-strain diagrams from lab) ASTM D638
2 per lot
(for each thickness)
 - e. Modulus of Elasticity (include copies of stress-strain diagrams from lab) ASTM D882
2 per lot
(for each thickness)
 - f. Environmental Stress Crack ASTM D1693
(Five samples from the polymer used to fabricate the geomembrane)

HDPE Site Construction

34. Installation of the HDPE membrane shall not proceed at temperatures below 40°. There shall be no seaming of the HDPE during rainy weather.

35. Field seaming shall be performed by qualified seamers under the director supervision of a master seamer. The master seamer shall have experience seaming or performing quality control on a minimum of 1,000,000 square feet of HDPE membranes of 40 mil or greater thickness using the proposed field seaming method.
36. All geofabric installed in the site which will be exposed to sunlight for more than five days shall be UV resistant. Documentation of the fabric's UV resistance shall be included in the construction documentation report.

HDPE Quality Control

37. Destructive and nondestructive seam testing on all HDPE membrane installation shall be performed on the seams as follows:
 - a. Nondestructive seam testing shall be performed on all seams over their full length and on all areas that have been repaired or where the membrane has been penetrated.
 - b. Nondestructive same testing shall be performed using the vacuum test method or other method approved by the Department.
 - c. Test seams for each seaming machine shall be made once each day at a minimum. Each seamer shall perform at least one test seam each day. A portion of each test seam shall be tested in the field for shear and peel and the other portion sent to a laboratory for testing.
 - d. Field tests shall be performed using standardized specimen sizes in tensile testing machines with quantitative recording of test results.
 - e. The test seam sample sent to the laboratory shall be labeled with a date, ambient temperature, seamer, and whether the test seam passed the field test.
 - f. The test seam samples sent to the laboratory shall be tested for:

Peal Adhesion	ASTM D413
Bonded Seam Strength	ASTM D3083
38. Daily inspector's summary reports shall be prepared for each day that significant construction is either attempted or accomplished at the site. The reports shall described construction practices employed for membrane installation, collection piping placement, sand blanket placement and revegetation work accomplished. Outline drawings on 8 1/2" by 11" paper shall be prepared as necessary to record construction progress. The reports shall contain the following information:
 - a. Amount and location of membrane placed. Changes from the fabrication plan should be noted.
 - b. Identification of the panel numbers for the panels installed.

- c. Location of field seams completed.
 - d. Results of test seams.
 - e. Location and results of nondestructive seam testing.
 - f. Location of repairs made and results of the nondestructive testing of these repairs.
 - g. Location of samples taken for destructive testing.
39. A construction documentation report shall be submitted to the Department for review and approval. This shall be submitted with other construction documents. The site construction documentation report must be signed and stamped by a professional engineer registered in Wisconsin and an opinion given as to whether the site has been constructed in substantial compliance with the approved plans. The report shall include:
- a. Plan view(s) utilizing a one foot contour interval and showing the location of all items constructed with spot elevations shown for the actual grades implemented on approximate 100 foot intervals.
 - b. Plan view(s) of piping layout used with spot elevations provided.
 - c. Results of the chemical and physical testing performed on the membrane as designated in Condition 33.
 - d. Location, type, manufacturer, trade name, quantity and installation methods for any geotextiles used. A sample of each geotextile used shall be included in the construction documentation report.
 - e. Copies of the daily field installation reports kept throughout construction.
 - f. A series of 35 millimeter photographs documenting all aspects of site construction and membrane placement with photos of all points of membrane penetration.
 - g. Cross-section drawings, one lengthwise and one crosswise through the cap showing membrane placement, drainage layers, collection system, anchor trenches, and other pertinent site features.
 - h. A statement from the geomembrane inspector giving an opinion the geomembrane integrity at the end of geomembrane placement.

Spray Irrigation Field

40. Koppers Co., Inc. shall implement the closure plan for its spray irrigation field as discussed in the closure plan report. The results of that closure and all actions taken shall be incorporated into the construction documentation report covering covering closure of the surface impoundments.

CONDITIONAL APPROVAL

Based on the foregoing findings of fact and conclusions of law, the Department hereby conditionally approves the closure and long-term care plan for the Koppers Co., Inc. surface impoundment. This is based on the premise that all conditions required by this approval are met.

NOTIFICATION OF APPEALS RIGHTS

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

This notice is provided pursuant to section 227.48(2), Wis. Stats.

Dated: 9/30/87

DEPARTMENT OF NATURAL RESOURCES

For the Secretary

Paul P. Didier
Paul P. Didier, P.E., Director
Bureau of Solid Waste Management

Edward K. Lynch
Edward K. Lynch, P.E.
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