ILLINOIS POLLUTION CONTROL BOARD

In the matter of:	)	
	)	**AS** 02-1
Material Service Corporation	)	**(Adjusted Standards-Water)**
Petition for Adjusted Standards From	)	
35 Ill. ADM. CODE 302.208, 406.202	)	
and 304.105	)	

NOTICE OF FILING

Division of Legal Counsel
Illinois Environmental Protection Agency
P.O. Box 19276
Springfield, IL 62794-9276
Attn: Deborah J. Williams, Esq.

Office of Legal Services
Illinois Department of Natural Resources
524 S. Second Street
Springfield, IL 62701-1789

PLEASE TAKE NOTICE that on November 29, 2001 we have filed with the Office of the Clerk of the Illinois Pollution Control Board the attached **PETITION FOR ADJUSTED STANDARDS** of Material Service Corporation, a copy of which is attached.

Dated: November 29, 2001

Richard R. Elledge,
as attorney for Material Service Corporation

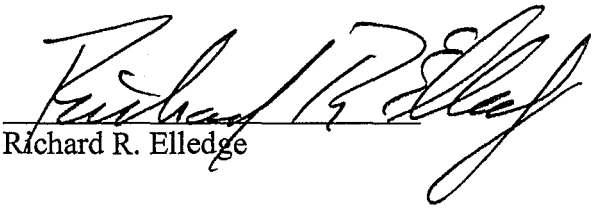
Richard R. Elledge
Gould & Ratner
222 North LaSalle Street
Chicago, IL 60601
(312) 236-3003
(312) 236-3241 Facsimile

CERTIFICATE OF SERVICE

I certify that on this 29th day of November, 2001 I served the attached **Notice of Filing** and **Petition for Adjusted Standards** of Material Service Corporation by mailing copies thereof first class mail, postage prepaid to:

Division of Legal Counsel
Illinois Environmental Protection Agency
P.O. Box 19276
Springfield, IL 62794-9276
Attn: Deborah J. Williams, Esq.

Office of Legal Services
Illinois Department of Natural Resources
524 S. Second Street
Springfield, IL 62701-1789



Richard R. Elledge

ILLINOIS POLLUTION CONTROL BOARD

In the matter of:	)	
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Material Service Corporation	)	**(Adjusted Standards-Water)**
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and 304.105	)	

PETITION FOR ADJUSTED STANDARDS

Material Service Corporation ("Material Service"), by its attorneys, petitions the Illinois Pollution Control Board, pursuant to §28.1 of the Illinois Environmental Protection Act (the "Act") and 35 Ill. Adm. Code 104.400, *et seq.*, for Adjusted Standards from the Water Quality Standards set out in 35 Ill. Adm. Code 302.208 and for relief from the provisions of 35 Ill. Adm. Code 406.202 and 304.105.

Petitioner's Request

Federal Quarry is a 300 foot deep quarry located in the Village of McCook, Illinois, from which Material Service quarries the dolomite bedrock to produce crushed stone products. To operate, Federal Quarry must be de-watered of groundwater seepage and storm water at an estimated average rate of 3,600,000 gallons per day. This water is discharged into the McCook Drainage Ditch, a three mile long ditch with an estimated average flow, including the Federal Quarry discharge, of 5,800,000 gallons per day. The drainage ditch collects and transports waste water from the storm sewer system of the Village of Brookfield, then receives the water pumped from Federal Quarry plus several other industrial discharges downstream of Federal Quarry, and directs those waters to the Summit Conduit. The Summit Conduit then transports those waters

under the Des Plaines River and discharges them into the Sanitary and Ship Canal approximately 500 yards west of Harlem Avenue.

The discharge from the quarry is covered by NPDES Permit ILG 840029, which sets no effluent limits for either sulfate or total dissolved solids. That permit expires on May 31, 2002. Illinois EPA has concluded that the waters of the McCook Drainage Ditch are general use waters of the State of Illinois, subject to the water quality standards for general use waters of the state as set out in §302.208, 35 Ill. Adm. Code 302.208. The groundwater that Material Service pumps from Federal Quarry tends to exceed the sulfate and total dissolved solids limits established by that regulation.

Material Service requests that the water quality standards applicable to the McCook Drainage Ditch be adjusted by increasing the limits set out in §302.208(g) for sulfate from 500 mg/L to 850 mg/L and increasing the limits for total dissolved solids from 1,000 mg/L to 1,900 mg/L. Material Service also requests relief from §406.202 and §304.105 which prohibit any "mine discharge" (406.202) or any "effluent" (304.105) from causing a violation of any applicable water quality standard.

In support of this Petition a technical evaluation prepared by DAI Environmental titled "Technical Evaluation for an Adjusted Standard Petition, Material Service Corporation – Federal Quarry, McCook, Illinois", dated November 28, 2001, referred to hereafter as DAI Report, is attached hereto as Exhibit 3.

Standards From Which Petitioner's Seeks Adjustment

Subpart B of Part 302, 35 Ill. Adm. Code 302.100, *et seq.*, establishes general use water quality standards to be met in waters of the state for which there is no specific designation. The regulation at issue here, §302.208(g), establishes limits for sulfate at 500 mg/L and limits for

total dissolved solids at 1,000 mg/L. There are no applicable general effluent standards for sulfate and total dissolved solids. Please see §406.106, Effluent Standards for Mine Discharges, 35 Ill. Adm. Code 406.106.

§302.208 is consistent with the mandate of §303(c) of the Clean Water Act and might be described as implementing that provision of federal law. However, §302.208 does not appear to implement any provision of CERCLA, the Clean Air Act, 33 U.S.C. 1313(c), or the state programs concerning RCRA, UIC or NPDES.

Level of Justification

The regulation of general applicability, §302.208, does not specify a level of justification required to qualify for an adjusted standard. Therefore, the level of justification required in this proceeding would be the justification set out in §28.1(c) of the Act, 45 ILCS 5/28.1(c):

1. "Factors relating to . . .petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulations applicable to. . . 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."

Description of Plaintiff's Activity

Federal Quarry is located on a 176 acre parcel, Material Service's Yard 19, in the northwest corner of the Village of McCook. The Village of Brookfield is to the north and the Village of LaGrange is to the west of the quarry. The lands to the south and east of the quarry are zoned heavy manufacturing and include the former Reynolds Aluminum Plant and the site of

the former GM Electro Motive Division Plant. Figure 1, attached to the DAI report, depicts the site location and the general area.

The origins of Federal Quarry appear to date back to the 19th century. Material Service has operated the quarry for over 60 years. The quarrying process has not changed significantly over those years. After removing the overburden from the bedrock, benches of rock are blasted from the quarry face. The shot rock is collected on the quarry floor, approximately 300 feet below surface grade. The shot rock is fed through a primary and secondary crusher on the quarry floor and onto conveyor belts that transport the material up to surface grade and the plant. In the plant, the stone is crushed, screened and sorted into a variety of size combinations to meet different commercial specifications. From the plant, the finished product is transported to the stockpile area where the different products are stored pending pickup by the customers' cartage trucks for delivery to the customers' work sites. A daily average of 325 loaded cartage trucks pass through the gates of Yard 19 during the construction season. Material Service employs approximately 60 professional, technical, clerical and skilled people to run this operation.

The quarry floor is below the local water table and groundwater seeps from the quarry face. The groundwater seepage and storm water are drained to a pair of settling ponds on the quarry floor. From there, the water is pumped up to another pond on an intermediate grade and then up to a tank at grade and led through culverts to the McCook Drainage Ditch.The estimated average volume of the discharge from Federal Quarry into the McCook Drainage Ditch is approximately 3,600,000 gallons per day. DAI Report, Table 2, p.11. After a storm event, the volume approaches 6,000,000 gallons per day. *id.*

Sampling of the groundwater seeping into Federal Quarry at points on the quarry floor near the base of the wall indicates an average TDS level of 1,345 mg/L, with TDS levels

regularly exceeding 1,400 mg/L. The indicated average level of sulfate is 425 mg/L, with occasional incursions above 500 mg/L. DAI Report, p.15, Appendix G. The source of the groundwater seeping into Federal Quarry has been identified as a shallow aquifer flowing through dolomite formations of the Silurian Age. This is the formation being quarried at Federal Quarry. Review of the technical literature by DAI Environmental has both confirmed and explained the sampling results. There are several independent studies of the groundwater quality in this aquifer in the west and southwest portions of Cook County and the collar counties that report levels of TDS and sulfate that exceed the levels set for TDS and sulfate in §302,208(g) for general use water quality standards. DAI Report, pp. 7, 8. Levels of TDS in the shallow dolomite aquifer in the vicinity of Federal Quarry are indicated in the range of 1,200 mg/L to 1,600 mg/L as shown in Figure 2 attached to the DAI Report. Levels of sulfate are indicated in the range of 500 mg/L to 700 mg/L, as shown in Figure 3 attached to the DAI Report.

An estimated 68,493 gallons per day are pumped from the system to the plant for use in washing the product. That water is then returned to the settling ponds. This is a relatively small volume of water compared to the estimated average of 3,600,000 gallons per day that Material Service pumps out of the quarry. The use of this water in the plant does not have a significant impact on either the sulfate or the total dissolved solids content of the water discharged to the McCook Drainage Ditch. DAI Report, pp. 12, 13. Other than the settling ponds, the groundwater and storm water receive no treatment prior to discharge. Periodically, storm water acts to dilute the concentrations of sulfate and TDS in the groundwater before it is discharged into McCook Drainage Ditch.

Historically, for purposes of NPDES permits, Material Service has considered the waters pumped from Federal Quarry to be discharged into the waters of the Sanitary and Ship Canal.

The average flow of the Sanitary and Ship Canal at the point where the Summit Conduit discharges is reported to be 603,000,000 gallons per day. DAI Report, p. 17. The concentrations of sulfate and TDS found in the Federal Quarry discharge would have little impact on the sulfate and TDS concentrations in the 603,000,000 gallons per day flow of the Sanitary and Ship Canal. DAI computes the waters from Federal Quarry to contribute a 6 mg/L increase in TDS and a 3 mg/L increase in sulfate in the Sanitary and Ship Canal. DAI Report, p. 17.

For the purposes of current NPDES permits, Material Service must now consider the receiving waters for the Federal Quarry discharge to be the waters of the McCook Drainage Ditch, deemed to be general use waters, rather than the waters of the Sanitary and Ship Canal, designated as secondary use waters. Sec. 303.401. Material Service's flow measurements indicate that, on average, the Federal Quarry discharge represents approximately 61% of the total flow of the McCook Drainage Ditch at the Summit Conduit, DAI Report, p. 11, Appendix D. Monitoring of the Federal Quarry discharge into the McCook Drainage Ditch indicates an average TDS level of 1,299 mg/L in the effluent , with a range from 1,070 mg/L up to 1,400 mg/L, and an indicated average sulfates level of 427 mg/L in the effluent, with a range from 351 mg/L up to 524 mg/L. DAI Report p. 15, Appendix H.

Recently, Material Service wished to expand the quarrying operations southerly into new stone reserves adjacent to the faces then being quarried. However, these reserves did not lie within the boundaries of the permit area specified in the existing NPDES permit, Permit No. ILG 840029. Therefore, Material Service applied for a new NPDES permit to cover storm water collected in and discharged from the proposed expansion area. Illinois EPA issued NPDES Permit No. IL 0001945 as of September 25, 2000. This permit sets effluent limits of 1,000 mg/L for TDS and 500 mg/L for sulfate, reflecting the impact of the Federal Quarry discharge on the

waters of the McCook Drainage Ditch and the mandate of §406.202. Quarrying in the permit area for NPDES Permit No. IL 00001945 will not encounter groundwater for several years and, therefore, there will be no discharges of groundwater from this permit area for several years.

Compliance Alternative

In theory, there appear to be four treatment options for lowering TDS and sulfate levels in the Federal Quarry discharge to meet §302.208 standards.

Dilution: Material Service could, in theory, purchase Lake Michigan water from the City of Chicago to dilute the Federal Quarry discharge before sending it into the McCook Drainage Ditch. DAI estimates that 2,000,000 gallons per day of Lake Michigan water would be needed, on average, to provide sufficient dilution. DAI Report, pp. 20, 21. Assuming that the City of Chicago were free to supply this much water and assuming that the Summit Conduit could contain this additional flow, the potential impact of so large an additional flow on both the ditch itself and the several bridge structures over the ditch, especially during storm events, would render this option unacceptable, regardless of cost.

Deep Well Injection: A second option would be to inject the groundwater seeping from the shallow aquifer into a deeper stratum. Based on the volume of flow, DAI calculates that this would require 8 to 10 wells, each with a minimum 8 inch diameter. In addition, each well would need to be located several hundred feet away from its nearest neighbor. DAI Report, p. 21. DAI further reports that deep well injection does not typically work well for water with high dissolved solids and low suspended solids. Assuming that such a system could be made to operate reliably and assuming that Material Service could obtain land for such an array of wells, DAI estimates that capital costs from $19,000,000 to $26,000,000 with annual operating costs as high as $16,000,000 to $20,000,000. DAI Report, p. 21, Appendix J.

Reverse Osmosis and De-ionization. Using either of these technologies, one would treat to remove the dissolved minerals from a portion of the total flow and, after treatment, reinsert the treated flow into the system. To achieve sufficient dilution to meet the TDS and sulfate limits, one would treat approximately 40% of the Federal Quarry discharge and return the treated water to the system. The brine would then need to be disposed of, probably using injection wells. DAI computes the capital costs of either treatment method from $2.3 to $3.2 million with annual and operating costs ranging from $2.3 to $5.6 million per annum. DAI Report, p. 22, Appendix J. To these costs, however, must be added the costs of disposing of the brine, a cost that DAI estimates at $1.6 to $2.2 million in capital costs with annual and operating costs ranging from $1.4 to $1.9 million. DAI estimates the twenty year operating costs using reverse osmosis (the less expensive option) from $81 to $113 million. DAI Report, p. 20, Appendix J.

Conclusion. The Board's January 6, 1972 Opinion, *In The Matter of Effluent Criteria, et. al.*, Nos. R70-8; 71-14; 71-20, explains the Board's decision to adopt no effluent standard for chloride or for sulfate and to rely instead on an effluent standard of 3,600 mg/L for TDS. The Opinion states:

> "It is clear that such a standard [for chloride or sulfate] would impose the highest treatment costs of any under consideration in order to do the least good. While such techniques as distillation, reverse osmosis and electro-dialysis are certainly feasible, Weston gives their cost at five to ten times that of the precipitation and filtration that are adequate to remove most of the contaminants in the table.
>
> Moreover, all of these methods produce a brine residue that is itself a serious disposal problem. On the other side of the coin, these contaminants are by far the most innocuous on the list." Slip opinion, p. 10.

Clearly, the circumstances presented in this proceeding validate that analysis. The treatment options that are technically possible are extraordinarily costly, prohibitively costly. It would not

be economically feasible or reasonable to treat the flow of groundwater that collects in Federal Quarry to meet the water quality standards set out in Sec. 302.208(g) for sulfate and TDS.

Proposed Adjusted Standards

Material Service requests that the water quality standards specified in 35 Ill. Adm. Code 302.208(g) for concentrations of sulfate and TDS be increased to reflect the background concentrations of sulfate and TDS in the groundwater that enters the quarry. The highest concentration of sulfate found in the Material Service samples was 660 mg/L whereas the acquifer studies reported concentrations of sulfate ranging up to 2,515 and 864 mg/L. DAI Report p. 27. The highest concentrations of TDS found in the Material Service samples was 2,450 mg/L and the highest concentrations found in the acquifer studies were 2,500, 2,100 and 1,832 mg/L. DAI Report p. 26 Therefore, Material Service requests that the limit for concentrations of sulfate be increased to 850 mg/L and the limit for concentrations of TDS be increased to 1,900 mg/L, as applicable to the waters of the McCook Drainage Ditch for its entire length from the 47th Street culvert to the Summit Conduit.

Material Service petitions the Board to adopt the following language to establish the proposed adjusted standards:

1. The concentrations of sulfates (STORET No. 00945) shall not exceed 850 mg/L in the waters of the McCook Drainage Ditch for its entire length from the 47th Street culvert to the Summit Conduit. The water quality standards for sulfate as set out in 35 Ill. Adm. Code 302.208(g) shall not apply to the waters of the McCook Drainage Ditch.

2. The concentrations of TDS (STORET No. 70300) shall not exceed 1,900 mg/L in the waters of the McCook Drainage Ditch for its entire length from the 47th Street culvert to the Summit Conduit. The water quality standards for TDS as set out in 35 Ill. Adm. Code 302.208(g) shall not apply to the waters of the McCook Drainage Ditch.

3. The requirements of 35 Ill. Adm. Code 406.202 and 35 Ill. Adm. Code 304.105, to the extent those requirements address mine discharges or effluent

discharges into the waters of the McCook Drainage Ditch, shall not be applicable to the water quality standards for sulfates or TDS set out in 35 Ill. Adm. Code 302.208(g), but rather shall be applicable to the adjusted water standards for sulfate and TDS set out in this Order.

Impact of Proposed Adjusted Standard

Material Service does not seek adjusted standards in order to accommodate any change in the operations of Federal Quarry or any expansion of Federal Quarry. Rather, Material Service seeks adjusted standards to accommodate the characterization of waters of the McCook Drainage Ditch as general use waters of the state and to permit the continued operation of Federal Quarry.

As far as volume of flow in the McCook Drainage Ditch is concerned, the Federal Quarry discharge is a significant, if not a dominant, contributor to regular flow in the ditch. During periods of low precipitation, the Federal Quarry discharge may be the only flow component that fosters any permanent aquatic ecosystem in the McCook Drainage Ditch. DAI Report, p. 15.

DAI has evaluated the impact of the sulfate and TDS levels in the Federal Quarry discharge on the McCook Drainage Ditch under a variety of flow and concentration scenarios. Based on these scenarios, DAI predicts average sulfate concentrations in the waters of the ditch in a range from 215 to 512 mg/L, and average TDS concentrations in the waters of the ditch in a much broader range, from 865 to 1,787 mg/L. During the winter when substantial volumes of road salt runoff enter the ditch, contributing high TDS-CL values, the Federal Quarry discharge would tend to stabilize those peak winter concentrations of TDS. DAI Report, p. 19. DAI concludes that under normal conditions with average flow and average concentrations the Federal Quarry discharge appears to increase sulfate and TDS concentrations in the McCook Drainage Ditch by approximately 169 mg/L and 346mg/L, respectively, over average background concentrations. DAI Report, p. 20, Appendix I.

The DAI Report evaluates the impact of the sulfate and TDS levels downstream of the Federal Quarry discharge (which the proposed adjusted standard would authorize) on indigenous organisms of the waters of the McCook Drainage Ditch. Due to the nature of the ditch and due to the difficulties of obtaining adequate access to the ditch, DAI based its evaluations on a literature review covering typical fresh water fish. DAI notes, however, that it is very unlikely that there is any significant population of blue gill, large mouth bass or channel catfish in this ditch. DAI notes that the LC_{50} mortality rate for those species in concentrations of sulfate based TDS is reported to range from 14,000 to 17,500 mg/L and for sulfate is reported to range from 10,000 to 11,000 mg/L.

DAI supplemented their literature investigation by reviewing the recent study by Huff and Huff for Rhodia, Inc. filed with the Board in connection with Rhodia's Petition for Adjusted Standards for TDS and sulfate in Thorn Creek, *In the Matter of Petition of Rhodia, Inc., et al.,* No. AS-01-9. The Huff and Huff study reported on chronic toxicity tests for TDS and sulfate on a species of water flea and on the flathead minnow. The Huff and Huff study concluded that the "no observed effect concentration" was 2,790 mg/L for TDS and 1388 mg/L for sodium sulfate.

DAI concludes that the TDS and sulfate concentrations in the Federal Quarry discharge does not have any significant deleterious effect on existing aquatic life in the McCook Drainage Ditch. DAI further concludes that the proposed adjusted standards of 1,900 mg/L for TDS and 580 mg/L for sulfate is less than those shown to be protective of aquatic life. DAI Report, pp. 25, 26.

Justification for Proposed Adjusted Standards

Material Service finds itself in a regulatory cleft stick. A substantial flow of groundwater seeps continuously into Federal Quarry. This water must be pumped from the quarry. If the pumping stops, the quarry fills and Federal Quarry closes.

On the one hand, §406.103 of Part 406, Mine Waste Effluent and Water Quality Standards, 25 Ill Admin Code 406.103 states:

> "Because the effluent standards in this part are based upon concentrations achievable with conventional treatment technology that is largely unaffected by ordinary levels of contaminants in intake water, they are absolute standards that must be met without subtracting background concentrations. However, it is not the intent of these regulations to require users to clean up contamination caused essentially by upstream sources or to require treatment when only traces of contaminants are added to the background. Compliance with the numerical effluent standards is therefore not required when effluent concentrations in excess of the standards result entirely from the contamination of influent before it enters the affected land. Background concentrations or discharges upstream from affected land are rebuttably presumed not to have caused a violation of this part."

On the other hand, §406.201 of the same Part, 35 Ill. Adm. Code 406.201 provides:

> "In addition to the other requirements of this Part, no mine discharge or non-point source mine discharge shall, alone or in combination with other sources, cause a violation of any water quality standards of 35 Ill. Adm. 302 or 303."

And §309.141 of Part 309, Permits, 35 Ill.Adm. Code 309.141 states:

> "In establishing the terms and conditions of each issued NPDES Permit, the Agency shall apply and ensure compliance with all of the following, whenever applicable:
>
> . . . d) Any more stringent limitations, including those: 1) necessary to meet water quality standards . . . "

The area of the quarry into which the groundwater seeps and the point at which these waters are pumped from the quarry into McCook Drainage Ditch (discharge 001) are covered by NPDES Permit No. ILG 840029, which is expiring. The most recent expansion area of the quarry and the two potential point sources for that area (discharges 002 and 003) are covered by

NPDES Permit No. IL 0001945, issued last year with effluent limits for sulfate at 500 mg/L and for TDS at 1,000 mg/L. Material Service proposes to modify the later permit to include the area of NPDES Permit No. ILG 840029, including discharge 001, under NPDES Permit No. IL 0001945.

In this proceeding, Material Service petitions the Board for Adjusted Standards for the waters of McCook Drainage Ditch so that the Agency will be in a position to increase the effluent limits in Permit No. IL 0001945 to 850 mg/L for sulfate and 1,900 mg/L for TDS and to modify that permit to include the full area of quarry and the discharge point for the groundwater discharge into the McCook Drainage Ditch.

Generally, we have found nothing in the Board's opinions in the Water Quality Standards proceedings, Nos. R70-8, R71-114 and R71-20 to suggest that the Board necessarily intended that the general use water quality standards would cover the waters of a 3 mile drainage ditch, tributary to the Sanitary and Ship Canal, running through an urban industrial area, with limited public access, "constructed and operated for the purpose of collecting and transporting waste water or land run off, or both." 35 Ill. Adm. Code 301.390, 301.440.

Specifically, the Board's March 7, 1972 Opinion in the matter of *Effluent Criteria, et. al.*, Nos. R70-8; R71-114 and R71-20 based the 500 mg/L water quality standard for sulfate on levels desirable to protect stock watering and fish, as well as the protection of the public water supply, Slip Opinion, p. 4. The lands through which the McCook Drainage Ditch runs is zoned "heavy manufacturing". There is no stock watering in the vicinity of this ditch and none is permitted under the McCook zoning ordinance. The waters of this ditch, flowing into the Sanitary and Ship Canal, have no obvious impact on any public water supply. The factors

present here, therefore, would seem to be far different than the factors relied on by the Board in its March 7, 1972 Opinion.

The same opinion based the 1,000 mg/L for TDS on the protection of aquatic life, Slip Opinion, p. 11. As far as we can determine, the testimony does not seem to have addressed aquatic life in a ditch such as the McCook Drainage Ditch.

There are elevated concentrations of sulfate and TDS in the groundwater flowing into the Federal Quarry. This water is discharged from Federal Quarry at or below background levels. DAI's evaluation demonstrates that adjusting the standards for sulfate and TDS, to reflect background concentrations of sulfate and TDS found in the Federal Quarry discharge, does not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in its March 7, 1972 Opinion.

It is not be economically reasonable to reduce the background levels of sulfate and TDS contained in the Federal Quarry discharge to 500 mg/L for sulfate and 1,000 mg/l for TDS. Taking into account the existing physical conditions, the character of the area involved including the character of surrounding land uses and zoning classification of the area as well as the nature of the receiving body of water, and taking into account that the alternative would be to shut down Federal Quarry, adjusting the water quality standards applicable to the waters of the McCook Drainage Ditch to the levels requested by Material Service is fully justified.

Consistency with Federal Law and Federal Procedural Requirements

The Board, acting for the State, has the primary authority and responsibility to establish water quality standards for the waters of the McCook Drainage ditch. 33 U.S.C 1251, 40 CFR 131.4(a). The Clean Water Act gives the Board the authority and responsibility to designate appropriate uses (including industrial uses) for the waters of the state and the criteria to foster

those uses. 33 U.S.C. 1313(c)(2)(A), 40 CFR 131.2(a). The waters of the McCook Drainage Ditch are not suitable for recreation or for animal husbandry. The waters of the McCook Drainage Ditch do not have a significant adverse impact on the waters of the Sanitary and Ship Canal into which they flow. The adjusted standard requested by Material Service for concentrations of sulfate and TDS will reflect the existing conditions and will continue to be protective of the public health and welfare. The adjusted standards requested by Material Service comply with the Federal requirements.

Procedurally, the provisions of Sec. 104.420 of the Board's regulations give any person the right to request public hearing in this proceeding. The provisions of Sec. 104.408 regarding the publication of notice, require public notice that advises that any person has the right to request public hearing. These provisions appear to fully satisfy the mandate of the Clean Water Act regarding public participation. 33 U.S.C. 1251(e).

Waiver of Hearing

Material Service hereby waives hearing in this matter as permitted by §104.406.

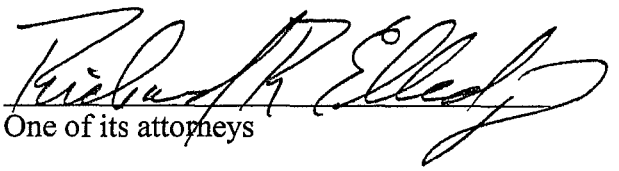
Supporting Documents

The supporting documents are collected as part of the DAI Report, which is attached hereto as Exhibit 3.

WHEREFORE, Material Service petitions the Board to grant adjusted standards from the water quality standards of 35 Ill. Adm. Code 302.208(g) for concentrations of sulfate and TDS, as those standards apply to the McCook Drainage Ditch and to grant relief from the provisions of 35 Ill. Adm. Code 406.206 and 403.105 with regard to the Federal Quarry discharge.

Respectfully submitted,

MATERIAL SERVICE CORPORATION



One of its attorneys

Richard R. Elledge
Gould & Ratner
222 North LaSalle Street
Chicago, IL 60601
(312) 236-3003

AFFIDAVIT OF MICHAEL D. MELTON

I, Michael D. Melton, being first duly sworn on oath, depose and say:

1. I have been employed by Material Service Corporation for over six years and currently I am Project Manager in the Environmental Services Department of Material Service Corporation. As such, I am familiar with the operation of the Federal Quarry in McCook, Illinois, and with the matters set out in the foregoing Petition for Adjusted Standards.
2. I have read the foregoing Petition for Adjusted Standards and the facts asserted therein are, to the best of my knowledge and belief, true and correct.

Michael D. Melton,
Project Manager

Subscribed and Sworn to before
me this 29th day of November, 2001

Notary Public

OFFICIAL SEAL
GAYLE A. COSENTINO
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 4-25-2004

EXHIBIT 1

AFFIDAVIT OF JEFFREY S. WOELFER

I, Jeffrey S. Woelfer, being first duly sworn on oath, depose and say:

1. I am employed by DAI Environmental Inc., as Senior Project Manager. My educational background and professional experience are presented in my Curriculum Vitae, attached hereto.
2. During the course of the past year, I have conducted an investigation and technical evaluation on behalf of Material Service Corporation concerning the matters covered in the Petition for Adjusted Standards by Material Service Corporation regarding its Federal Quarry and the McCook Drainage Ditch.
3. The results of that technical evaluation are set out in the document titled "Technical Evaluation for an Adjusted Standard Petition, Material Service Corporation – Federal Quarry, McCook, Illinois", dated November 28, 2001, to be filed in this proceeding. The information and conclusions presented in that document are true and accurate to the best of my knowledge, and the opinions presented therein are mine.

Jeffrey S. Woelfer, P.G.

Subscribed and Sworn to before
me this 29th day of November, 2001

Notary Public

OFFICIAL SEAL
GAYLE A. COSENTINO
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 4-25-2004

ENVIRONMENTAL

Environmental Engineers, Geologists and Scientists

Tel 847.573.8900
Fax 847.573.8953

Polo Park Business Center
27834 N. Irma Lee Circle
Lake Forest, Illinois 60045-5130

TECHNICAL EVALUATION FOR AN ADJUSTED STANDARD PETITION

MATERIAL SERVICE CORPORATION YARD 19 QUARRY MCCOOK, COOK COUNY, ILLINOIS

November 28, 2001

Prepared for:

Material Service Corporation

Corporate Office
222 N. LaSalle Street, 12th Floor
Chicago, IL 60601-1090

Environmental Services Department
4226 South Lawndale Avenue
Lyons, Illinois 60534-1199

Prepared by:

DAI Environmental, Inc.
Polo Park Business Center
27834 N. Irma Lee Circle
Lake Forest, IL 60045-5130

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

TECHNICAL EVALUATION
FOR AN NPDES ADJUSTED STANDARD
MATERIAL SERVICE CORPORATION – YARD 19
McCOOK, ILLINOIS

November 28, 2001

1.0 INTRODUCTION

1.1 Purpose

DAI Environmental, Inc. (DAI) has been retained by Material Service Corporation (MSC) to complete a technical evaluation to support an adjusted standard petition for water discharges from their Yard 19 stone quarry. Currently, water discharges consisting of groundwater seepage, storm water runoff, storm water run-on, and minor amounts of water used to wash aggregate products are discharged from the Yard 19 quarry into the McCook Drainage Ditch under a National Pollutant Discharge Elimination System (NPDES) Permit. Analysis of water samples from MSC's discharge, for the most recent NPDES Permit modification application, were found to contain concentrations of total dissolved solids (TDS) and sulfate above the standards required for general use waters in State of Illinois.

The following report represents the technical information collected in support of the petition to seek a TDS and sulfate adjusted standard for MSC's water discharges into the McCook Drainage Ditch. The purpose of this study is to demonstrate that: (1) the TDS and sulfate concentrations found in MSC's discharge are naturally occurring, and are not significantly increased by the quarry operation; (2) though treatment alternatives theoretically exist to reduce the concentrations of TDS and sulfate to compliant levels, that treatment is economically overly burdensome; and (3) there are no significant adverse or detrimental impacts associated with MSC's water discharge to the McCook Ditch.

1.2 Facility Location

MSC's Yard 19 quarry is located in the northwest corner of McCook, Cook County, Illinois. The facility can be further defined as being found in Section 10, Township 38 North, Range 10 East. Figure 1 is a topographic map that shows the location of the MSC facility

1.3 Facility Description

MSC's Yard 19 facility in McCook is an operating quarry producing a variety of aggregate products derived from the Silurian dolomite bedrock. Historically, it is believed that the area occupied by MSC's Yard 19 facility originally consisted of three smaller quarries, which were in production as early as the late 1800's. In the late 1930s, MSC purchased two of the quarries and consolidated them into what is now known as the Yard 19 facility. Aggregate reserve land was later acquired and added to the facility, which currently consists of approximately 176 acres.

The facility obtains the aggregate from mining and processing a local near surface deposit of bedrock. The bedrock is prepared for mining by first removing the unconsolidated glacial overburden. Then the bedrock is mined, and processed into a saleable aggregate product via crushing, sizing (i.e. screening), along with some washing when required by customer specification. The finished aggregate products are stockpiled and shipped via cartage trucks to local and regional users. The Yard 19 office, scale, stone processing plant and aggregate stockpiles are located at surface grade. The mining operations are located within the open stone pit quarry. The stone quarry penetrates as deep as 300' into the bedrock deposit. In order to operate, the quarry needs to be dewatered of ground and storm water accumulations.

Presently, MSC's Yard 19 facility is a major producer of construction aggregate products in the region with an annual production of over 2 million tons per year. The facility is an important employer in the area with a sizable payroll of the approximately 60 professional, technical, clerical, and skilled workers required to maintain operations. The facility also utilizes local and regional suppliers of materials and services as needed to support onsite operations.

1.4 Regulatory Setting

IEPA regulations (Title 35, Subtitle A, Chapter I, Subpart D, Section 104.4) provide guidance as to the technical information needed to apply for an adjusted standard, which is summarized as follows:

- Existing physical conditions of site and surrounding area;
- Character of the area involved, including
    - Surrounding land uses,
    - Zoning classifications,
    - Nature of the existing receiving body of water,
    - Technical feasibility and economic reasonableness of reducing the pollution, and
    - The universe of affected sources and facilities and the economic impact of the proposed change.

2.0 BACKGROUND

2.1 Local Setting

The northwest corner of Village of McCook is situated south of Lyons and Brookfield, and east of LaGrange and Countryside. Land usage in McCook is almost entirely industrial/commercial with a small residential population of approximately 300 located near the center of the village. The Village of McCook utilizes Lake Michigan exclusively as a potable water source. The Village of McCook does not utilize groundwater as a potable water source. According to Mr. Pete Lacoursio of the McCook Water Department, there are no groundwater supply wells in McCook.

The McCook Drainage Ditch originates from storm drains located along the south side of 47th Street near the intersection of Plainfield Road. Based on information provided by Mr. Wally Callahan of the Village of Brookfield, sanitary sewers along the 47th Street corridor are routed to the Stickney water treatment plant operated by the Metropolitan Water Reclamation District of Greater Chicago (MWRD). Therefore, the drains feeding the ditch appear to carry only storm water from the areas of Brookfield near the intersection of 47th Street and Plainfield Road.

2.2 NPDES Permit History

MSC's Yard 19 quarry has been dewatered of storm and groundwater seepage flows since the late 1930s with discharge into the McCook Drainage Ditch. More recently, MSC began washing fine-grained stone particles from some aggregate products to meet certain product specifications. The water used for this washing is obtained from the quarry dewatering system. The water containing stone fines after aggregate washing is routed to on-site basins to settle out the solids prior to returning the water to the dewatering system.

Prior to 1975, MSC received a permit from the Illinois Environmental Protection Agency (IEPA) to discharge quarry water under Illinois Pollution Control Board (IPCB) Rules and Regulations, Chapter 4, Mine Related Pollution. Chapter 4 was later replaced by Title 35 Illinois Administrative Code, Subtitle D, Mine Related Waste Water. Authorization to discharge under IPCB Chapter 4 and later 35 IAC, Subtitle D, was incorporated into subsequent permits by the IEPA.

In 1975, MSC obtained the first NPDES discharge permit from the United States Environmental Protection Agency (USEPA) under No. IL0001945. The application for the initial permit noted that the water discharge contained concentrations of TDS at 1015 mg/L and sulfate at 350 mg/L. The USEPA issued the initial permit as discharging into the Chicago Sanitary and Ship Canal via the LaGrange and McCook Storm Sewer Systems.

The IEPA was delegated NPDES program authority in 1977. The IEPA processed MSC's subsequent permit renewal application for Yard 19 as a discharge into the Secondary Contact Waters of the Chicago Sanitary and Ship Canal. In 1987, the IEPA issued a permit renewal as MSC discharging into the McCook Drainage Ditch. In 1992, the IEPA determined that the facility falls under a NPDES General Permit for non-coal mines and issued the General Permit No. ILG840029 for the facility. MSC renewed the General NPDES Permit in 1997.

In 2000, MSC submitted a permit modification application, which contained updated discharge analysis. This application contained concentrations of TDS at 1360 mg/L and sulfate at 514 mg/L. The IEPA considered the receiving waters to be the McCook Drainage Ditch rather than the Chicago Sanitary and Ship Canal and considered the McCook Drainage Ditch to be general use waters of the State of Illinois. Therefore, the IEPA declined to process this application for the

entire facility without MSC first acquiring an adjusted standard for TDS and Sulfate concentrations reported in the water discharge.

MSC determined that the TDS and sulfate concentrations in the discharge were attributed to the background quality of groundwater seeping into lower horizons of the quarry. This was communicated to the IEPA. The IEPA then processed the application for a portion of the facility where mining would occur above the local water table aquifer. This new permit was issued with the original NPDES permit identification (No. IL001945) and allows MSC to discharge storm water from the portion of the quarry where mining is above the aquifer.

Therefore, MSC currently has two NPDES permits for the facility. Permit No. ILG840029 was last issued in June 1997, will expire in May 2002, and calls for monthly monitoring of discharge flow, pH, and Total Suspended Solids (TSS). Permit No IL001945 was issued in September 2000, will expire in August 2005, and calls for monthly monitoring of discharge flow, pH, TSS, TDS, and sulfate.

As general use water, the McCook Drainage Ditch would be subject to applicable discharge standards found in 35 IAC, Subtitle C and D. These discharge standards limit total dissolved solids (TDS) to 1000 milligrams per liter (mg/l) and sulfate to 500 mg/l. The groundwater seeping into the Yard 19 quarry has been found to have naturally occurring concentrations of TDS and sulfate that are often greater than the discharge concentrations allowable under the new permit. The mineralized nature of the aquifer contributing groundwater flow into Yard 19 is also reported in several regional studies completed by the Illinois State Water Survey. It is MSC's intent to obtain an adjusted standard for the naturally occurring background concentrations of TDS and sulfate found in the groundwater seeping into the quarry, and then submit a permit renewal application to capture both permits into a single permit (Permit No. IL001945). Copies of the MSC's NPDES permits are included in Appendix A.

2.3 Description of the McCook Drainage Ditch

The McCook Drainage Ditch flows in a south-southeasterly direction across privately owned industrial and commercial properties for its entire 3-mile length. Consequently, public access to the ditch for any detailed scientific purposes is restricted to only several short reaches located where public roadways cross over the ditch. The closest residential areas to the McCook Drainage Ditch are found in Brookfield, north of 47th Street. It is our estimation that access to the

McCook Drainage Ditch can only be gained by trespass on private property and that the Ditch does not appear to be either accessible or suitable for recreational use. Photographs of the McCook Drainage Ditch are included in Appendix B.

The size of the ditch channel typically ranges from only 1 to just over 10 feet across with a depth that varies from a few inches up to approximately two feet. Just as with the ditch origin, the McCook Drainage Ditch terminates where the water enters a culvert. A 1929 plat by the then Sanitary District of Chicago identifies this culvert as the Summit Conduit. The ditch water that flows into the Summit Conduit is routed under the Des Plaines River and then discharges into the Chicago Sanitary and Ship Canal approximately five hundred yards west of Harlem Avenue. Figure 1 is topographic map that shows the location of the McCook Drainage Ditch.

3.0 GROUNDWATER AND SURFACE WATER QUALITY

3.1 Literature Review

DAI and MSC have conducted a review of groundwater and surface water quality in the vicinity of the MSC's Yard 19 in McCook. Several references were identified regarding naturally elevated concentrations of TDS and sulfate in the groundwater from the regional shallow dolomite aquifer also present in the McCook area. DAI also completed a Freedom of Information Act (FOIA) request to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) in an effort to review available surface water quality for the Chicago Sanitary and Ship Canal and Des Plaines River. A summary of this information is provided below.

3.2 Groundwater Sources

The shallow dolomite aquifer is one of four significant aquifer systems commonly utilized in Northeastern Illinois (Willman, 1971). Groundwater resources in the Northeastern Illinois are as follows:

1) Unconsolidated sand and gravel deposits in the glacial drift (when present),
2) Shallow dolomite formations, mainly of Silurian Age,
3) The Cambrian-Ordovician aquifer, known as the deep sandstone aquifer, of which the Ironton-Galesville and Glenwood-St. Peter sandstones are the most productive formations, and

4) The Mt. Simon aquifer consisting of sandstones of the Mt. Simon and lower Eau Claire Formations of Cambrian age.

Silurian rocks form the bedrock surface in the entire Chicago region outside of several void areas located in the far western and southwestern portions of the collar counties (McHenry, Kane, Kendal, and Will). The shallow Silurian dolomite has been mined in the region for over 150 years at locations where the bedrock is at or very near the surface (Mikulic, 1990). The shallow dolomite aquifer consists of Silurian-aged units known as the Niagaran Formation. The thickness of the Silurian dolomites ranges from less than 50 feet in McHenry County to over 450 feet in eastern Will County. Due to the presence of only a thin glacial drift deposit on the near surface Silurian bedrock, the unconsolidated glacial drift aquifer is absent in the McCook area where Yard 19 is located.

Groundwater in the shallow dolomite aquifer occurs in joints, fissures, and solution cavities. The upper zones of the formation tend to be more permeable than the lower zones. Recharge to the shallow dolomite aquifers is derived locally from vertical leakage through unconsolidated glacial drift deposits that are in turn recharged by precipitation. Loosing reaches from rivers and streams as well as leakage from the unconsolidated aquifer (where present) could also recharge this aquifer. Shallow dolomite wells in northeastern Illinois range from 15 to 450 feet deep, and yields from these wells may exceed 500 gallons per minute (gpm) in some areas (Brower et al, 1989).

3.3 Groundwater Quality

Most of the villages in the vicinity of McCook rely on Lake Michigan water for potable supply; however, a few villages in the area have co-mingled water produced from shallow dolomite wells with Lake Michigan water to augment supply. For example, a well at Riverside located within 2 miles from the facility has water that contains 825 mg/l TDS and is co-mingled with Lake Michigan water that typically contains 165 mg/l TDS.

Groundwater quality from the shallow dolomite aquifer in the McCook area has been reported (Sasman et al, 1981; Schicht et al, 1976) as containing elevated concentrations of TDS, sulfate and other related compounds. Additionally, the shallow dolomite aquifer was found to have areas of high TDS and sulfate concentrations in a study (Roadcap et al, 1993) conducted in Will and southern Cook Counties.

Schicht et al reported 129 water samples from wells in the vicinity of McCook were found to contain a median value for TDS of 1,431.5 mg/l with a range from 875 mg/l to 2,100 mg/l. As will be shown later in the report, this value is similar, if not slightly higher, than TDS concentrations observed in groundwater seeps from the floor and walls of the MSC Yard 19 quarry in McCook.

Sasman et al reported TDS concentrations from shallow dolomite wells in DuPage County and western Cook County ranged from 259 mg/l up to 1,832 mg/l with a median value of 625 mg/l. The highest concentrations of TDS were noted from a well in LaGrange Park, located approximately 1.5 miles northwest of McCook. Figure 2 shows the spatial distribution of TDS in groundwater in the vicinity of the MSC facility in McCook.

Sasman et al reported sulfate concentrations from the dolomite aquifer in the DuPage and western Cook County was found to range from 0.1 mg/l to 864 mg/l with a median value of 166 mg/l. The highest concentration of sulfate was also found in the well located in LaGrange Park. Figure 3 is a map that shows the spatial distribution of sulfate in groundwater in the vicinity of the MSC facility in McCook.

Roadcap et al reported that 186 samples from shallow dolomite aquifer wells in Will and southern Cook Counties were found to contain a median value of TDS of 670 mg/l with a range from 227 to 2,515 mg/l. In the same 186-sample set, sulfate was found to contain a median value of 167.5 mg/l with a range from less than 0.9 to 1,543 mg/l. Though the boundaries of this study were no closer than 7 miles from Yard 19, it did overlap some of the areas covered in both the Schicht et al and Sasman et al studies.

Based on the background groundwater information reviewed by DAI, it is our professional opinion that sulfate and TDS exist at naturally elevated concentrations within the shallow dolomite aquifer in the vicinity of the MSC's Yard 19 quarry. The mineralized condition of the shallow dolomite aquifer appears to be of a regional nature.

3.4 Surface Water Quality

In response to a FOIA request to the MWRD, DAI received TDS and sulfate data for the past several years from several locations along the Chicago Sanitary and Ship Canal and the Des Plaines River.

DAI received TDS and sulfate concentrations covering a five-year period (1996-2000) from three monitoring stations on the Chicago Sanitary and Ship Canal. The monitoring stations are located at Cicero Avenue (furthest east), Harlem Avenue (approximately 500 yards up-gradient of the confluence with the McCook Drainage Ditch), and Highway 83 (down-gradient of the McCook Drainage Ditch confluence and approximately 10 miles west of Harlem Avenue).

TDS concentrations over this period from the three monitoring stations ranged from a low of 240 mg/l up to 1,463 mg/l. TDS peaks were consistently noted in the winter months, which is likely a reflection of salt application on the roads in the vicinity of the canal. Average TDS concentrations in the Chicago Sanitary and Ship Canal from the two stations that bracket the McCook Drainage Ditch confluence were 581 mg/l and 578 mg/l.

The average TDS concentration in the Des Plaines River at Ogden Avenue was reported at 713 mg/l, which is about 30% higher than the average concentration of TDS in the Chicago Sanitary and Ship Canal.

Sulfate concentrations from the monitoring stations on the Chicago Sanitary and Ship Canal ranged from a low of 25.7 mg/l up to 111 mg/l. The average concentration of sulfate in the Chicago Sanitary and Ship Canal is 63.1 mg/l. The average sulfate concentrations from the two monitoring stations that bracket the McCook Drainage Ditch confluence are 72.4 mg/l and 70.4 mg/l.

The average sulfate concentration (81.9 mg/l) in the Des Plaines River was also 30% higher than the values found in the Chicago Sanitary and Ship Canal.

Elevated concentrations of dissolved minerals in the Des Plaines River may be related to several factors. The Des Plaines River receives water from tributary streams, storm flows, groundwater discharge and point source discharges. The Des Plaines River does not receive Lake Michigan waters. The elevated TDS and sulfate concentrations in the Des Plaines River may be attributed

to receiving a significant flow component from groundwater discharge, including the Silurian dolomite aquifer. In comparison, the Chicago Sanitary and Ship Canal receives water from Lake Michigan, storm flows, tributary streams, groundwater discharge, and point source discharges. Lake Michigan water is known to contain low concentrations of dissolved minerals.

The average concentrations of TDS and sulfate in the Chicago Sanitary and Ship Canal, based on approximately 60 readings over a five-year period, are summarized in the table below. The surface water data provided by the MWRD and associated concentration vs. time plots are included in Appendix C.

TABLE 1
AVERAGE TDS AND SULFATE CONCENTRATIONS IN SURFACE WATER

PARAMETER	CSSC @ Harlem Ave.	CSSC @ Hwy 83	CSSC @ Cicero Ave.	Des Plaines R. @ Ogden Ave.
TDS (mg/l)	581.0	578.2	484.3	712.6
Sulfate (mg/l)	72.4	70.4	46.6	81.9

CSSC = Chicago Sanitary & Ship Canal

4.0 CHARACTERISTICS OF THE McCOOK DRAINAGE DITCH

4.1 Source of the McCook Drainage Ditch

The McCook Drainage Ditch originates at a culvert beneath 47th Street that appears to discharge storm water runoff. The McCook Drainage Ditch then follows a south-southeasterly course for approximately 3 miles to its discharge point into the Chicago Sanitary and Ship Canal located approximately 500 yards west of Harlem Avenue. Figure 1 shows the flow path of the McCook Drainage Ditch. Select photographs of the McCook Drainage Ditch are shown in Appendix B.

The McCook Drainage Ditch appears to be fed from storm water run-off, groundwater seepage, and industrial discharges. According to Wally Callahan with the Village of Brookfield, the sanitary and storm sewers in Brookfield are separate. Sanitary sewers are routed through a 15-inch main line to the east along 47th Street to the Metropolitan Water Reclamation District water treatment plant in Stickney. Storm water drains for several blocks along 47th Street feed into the McCook Drainage Ditch at the headwaters. Storm drains as far north as Gerritsen Avenue (two blocks north of 47th Street) appear to flow south toward the McCook Drainage Ditch. Drainage north of Gerritsen Avenue appears to be routed to the north and apparently toward Salt Creek.

The McCook Drainage Ditch provides drainage for an area that covers approximately two square miles. The drainage area is depicted on Figure 1.

4.2 Storm Water Runoff

Several other industrial properties utilize the McCook Drainage Ditch for storm water discharges, including McCook Metals, Vulcan Materials, and Universal Oil Products. DAI completed a FOIA request to the IEPA to review the NPDES permits of these facilities. Each of these facilities currently discharges storm water to the McCook Drainage Ditch in accordance with their NPDES permits.

Rainfall in the McCook area is estimated to average approximately 36 inches per year. Based on this volume of rain and inferred low infiltration rates in the area, it is estimated that the average flow of the McCook Drainage Ditch where it flows into the pipe under the Des Plaines River would be approximately 2,320 gallons per minute (gpm). With the addition of groundwater seepage and other industrial discharges, the actual flow is expected to be significantly greater than this amount.

4.3 Flow Measurements

MSC personnel took flow measurements from the McCook Ditch at two locations over a five-month period from March to July 2001. The flow measurements were taken at the head of the McCook Drainage Ditch near 47th Street and near the end of the McCook Drainage Ditch where the flow enters the Summit Conduit that extends beneath the Des Plaines River. The flow at the head of the McCook Ditch, consisting of storm water runoff from areas near Plainfield Road and 47th Street, averages approximately 129 gpm. The flow near the end of the McCook Ditch, approximately 2 miles down gradient of MSC's discharge, averages approximately 4,031 gpm. Flow volume within the ditch varies considerably and is largely a function of precipitation run-off, the rate of groundwater recharge in loosing reaches of the ditch, the rate of groundwater discharge in gaining reaches of the ditch, and the contribution of industrial discharges. Table 2 shows the McCook Ditch flow data and rainfall amounts on the days when the flow was measured. Discharge flow measurements and calculations are included in Appendix D.

TABLE 2
FLOW MEASUREMENTS FROM THE MC COOK DRAINAGE DITCH

Date	Mc Cook Drainage Ditch at 47th Street	MSC's discharge into Mc Cook Drainage Ditch	McCook Drainage Ditch at Summit Conduit	Rainfall Data
	Discharge (GPM)	Discharge (GPM)	Discharge (GPM)	Discharge (inches)
3/13/01	N/A	1,722	1,966	0.005
3/20/01	N/A	4,082	4,774	0
3/26/01	N/A	2,052	2,593	0
4/3/01	N/A	3,172	3,189	0
4/6/01	52	157	2,130	0.26
6/1/01	284	3,282	9,095	0.93
6/8/01	152	2,218	10,132	0
6/12/01	210	3,913	5,050	0.2
6/18/01	271	2,753	2,970	0.06
6/26/01	10	1,477	2,288	0
7/6/01	25	3,277	1,723	0
7/13/01	25	1,498	2,467	0
Average	**129**	**2,467**	**4,031**	**NA**

Flow rates measured by MSC.

Rainfall data source is the Illinois State Climatologist Office.

5.0 CHARACTERISTICS OF MSC's DISCHARGE TO McCOOK DRAINAGE DITCH

5.1 Source of the Discharge

The source of MSC's discharge is groundwater seepage and storm water with a minor fraction of aggregate wash water that is pulled out and then added back to the quarry dewatering system. Groundwater seeps into MSC's Yard 19 quarry from numerous fissures and prominent joints at multiple locations along the walls and floor of the quarry. Portions of the quarry have penetrated approximately 300 feet into the dolomite bedrock. Most of the groundwater flow into the quarry is found to occur along the quarry walls within 25 feet of the quarry floor.

As the groundwater seeps into the quarry, it follows several established drainage pathways that feed into two drainage basins that are aligned in series and located on the floor of the quarry.

These basins provide retention to allow solids to settle out of suspension. From these settling basins, the water is pumped to another holding sump located approximately halfway up the 300-foot wall of the quarry. From there two pumps are utilized to lift the water out of the quarry. Once out of the quarry, the water is piped approximately 2,000 feet until it discharges into the McCook Drainage Ditch at a point approximately 0.5 miles south of 47th Street. Water collection and flow within the quarry are depicted on Figure 4. Photographs of groundwater seepage and water collection are included in Appendix B.

A small portion of MSC's water discharge is utilized in an aggregate washing operation prior to being returned to the quarry dewatering and discharge system. The volume of water used for aggregate washing has been conservatively estimated to average less than 25,000,000 gallons per year or 68,493 gallons per day (gpd). The water estimated to be used to wash aggregate products is approximately 1.4% to 1.9% of MSC's total estimated quarry discharge flow.

MSC has collected water samples directly from the aggregate washing operation and found that the aggregate washing does not significantly increase TDS and sulfate concentrations. On two separate occasions (6/1/01 and 7/13/01), three (3) samples of aggregate wash water were collected and analyzed after hold times ranging between 4 and 21 days. The samples collect on 6/1/01 were found to contain an average of 1,283 mg/l of TDS and 514 mg/l sulfate, while the samples collected on 7/13/01 were found to contain an average of 1,387 mg/l of TDS and 445 mg/l of sulfate. The TDS concentration in aggregate wash samples collected on 6/1/01 were only slightly higher (73 mg/l) than TDS concentrations (1,210 mg/l) reported that same day for a water sample collected upstream of the aggregate wash station. Additionally, the sulfate average of 514 mg/l was slightly less (10 mg/l) than what was found that day (524 mg/l) in the sample collected upstream of the aggregate wash station. The aggregate wash samples collected on 7/13/01 were actually found to contain lower concentrations of TDS and sulfate than was reported in the water upstream of the aggregate washing operation. The results of the two sampling events indicate the average increase in TDS associated with the aggregate washing operation is 5 mg/l, while the average decrease in sulfate concentrations was determined to be 12.5 mg/l.

With an average of nearly 18,500 mg/l, the water coming out of the aggregate washing operation is high in Total Suspended Solids. The aggretage wash water is routed to the retention ponds in the quarry to allow settling of the solids from suspension. After suspended solids are settled out, the wash water is returned to the quarry dewatering and discharge system.

The aggregate washing operation uses a small amount of water (<2%) relative to MSC's total discharge flows. This water already has naturally elevated concentrations of TDS and sulfate prior to being used for aggregate washing. Contact between the wash water with fine-grained stone particles during washing operations and in the settling basins does not contribute appreciable amounts of TDS and sulfate. If 2% of MSC's total quarry discharge flow is first used for aggregate washing operations and aggregate wash water returning into the system contains an average 5 mg/l higher TDS that that found in the input water, then aggregate washing operations would theoretically only increase MSC's final discharge by 0.1 mg/l TDS. Since sulfate was found in lower concentrations after aggregate washing operations, this operation would not increase sulfate concentrations in MSC's quarry discharge.

Therefore, the aggregate washing operation does not have a significant affect on concentrations of TDS and sulfate in MSC's final discharge. This would hold true if MSC were to increase future aggregate washing operation significantly based on future market demands. If future demands require 50% increase in washed aggregate from the facility, this would theoretically only increase MSC's discharge by an additional 0.15 mg/l TDS above current levels. Aggregate washing data and calculations are included in Appendix E.

5.2 Volume of the Discharge

Water discharges from the quarry of groundwater seepage and storm flows into the McCook Drainage Ditch have been a routine component of mine operations for approximately a hundred years. Groundwater, with naturally elevated concentrations of TDS and sulfate, seeps into the mine pit continuously through fissures in the dolomite. During rain events, storm water runoff from precipitation is added to the discharge.

Based on information provided by MSC, Yard 19 discharges an average of 3.6 to 5.03 million gallons per day (mgd) into the McCook Ditch under NPDES Permit No. ILG840029.

The 5.03 mgd flow rate is derived from the total hours of operation of the two pumps installed in the mid-level quarry sump and used to discharge to the McCook Drainage Ditch. The meter readings during 1,508 days from 1997 to 2001 were used along with rated pump capacities to calculate this discharge rate. This flow rate has not been adjusted down to account for any of the known losses to the system. These losses include pump wear and system leaks, as well as water

pulled out of system for use by MSC. Presently, MSC does not have any means to accurately quantify these losses.

Flow monitoring of the quarry discharge, conducted by MSC from March through July 2001, produced an estimated average flow of 3.6 mgd into the McCook Drainage Ditch. This is based on 12 instantaneous flow measurements. The flow measurements along with cross-sectional areas provided a discharge that ranged from 0.35 to 9.09 cubic feet per second. This equates to a theoretical discharge of 0.2 to 5.9 million gallons per day (mgd) if the measured flow rate remains constant for a 24-hour period. However, the pumps do not operate constantly (i.e. activated by high-level floats in the sump) and there are periods when the pumps cycle off resulting in a short-term discharge that may approach zero. MSC's average discharge rate to the McCook Drainage Ditch for the twelve instantaneous measurement events was determined to be 2,467 gpm or 3.6 mgd (see Table 2).

The daily MSC discharge volumes vary and are linked to groundwater seepage and storm flows. The pumps at the Yard 19 facility have the capacity to pump up to an estimated rate of 7.2 mgd, if both pumps installed in the mid-quarry sump operate continuously for a 24 hour-period at their rated capacity. The maximum pumping capacity would typically be needed only on a short-term basis following excessive precipitation events. Pumping calculations are included in Appendix F.

The McCook Drainage Ditch also receives run-off and industrial discharges at various points from other facilities in the area that contribute significantly to the total flow within the ditch.

As part of the gauging of the McCook Drainage Ditch at the point of where it flows into the Summit Conduit under the Des Plaines River, MSC has also recorded 12 discharge estimates over the past five months (March to July 2001). Over this period the discharge rate varied from a low of 1,966 gpm up to 10,132 gpm, which equates to a flow ranging from 2.8 up to 14.6 mgd. The average discharge rate into the Chicago Sanitary and Ship Canal over the monitoring period was approximately 4,031 gpm or 5.8 mgd (see Table 2).

During the flow monitoring period, MSC's discharge accounted for approximately 61% of the flow within the McCook Drainage Ditch, as measured at the end of the ditch where water flows into the culvert installed under the Des Plaines River. MSC appears to be a significant or dominant contributor of the regular flow within the McCook Ditch. Since the only other

permitted discharges are of storm water, MSC's discharge may be the only flow component that fosters any permanent aquatic ecosystem in the McCook ditch during periods of low or absent precipitation.

5.3 Quality of Groundwater Seepage

Starting in February 2000, MSC began monitoring the quality of the quarry groundwater seepage and discharge. Groundwater seepage samples were initially collected directly from the wall at several locations, but this practice has since been discontinued for safety reasons.

The concentrations of TDS in groundwater seepage samples collect from the wall or at the base of the wall were found to be 1,345 ppm (average of 58 samples). MSC also collected samples from the drainage ways and settling ponds prior to discharge and found the concentrations of TDS to be 1,272 mg/l (average of 75 samples). Dilution by precipitation is likely the reason that the concentration of TDS decreases as the water travels away from the seepage point. Sulfate concentrations exhibit a similar trend: averaging 425 mg/l at or near the wall and 405 mg/l from the drainage ways and settling ponds. These data indicate that MSC's operation and water handling process does not contribute to the naturally elevated concentrations of TDS and sulfate. A summary table of groundwater seepage data is included in Appendix G.

Comparison of groundwater seepage analytical results to the new permit limits indicates the concentrations of TDS consistently exceed the permitted value of 1,000 mg/l, while only a few groundwater samples were found to contain sulfate at a concentration greater than 500 mg/l.

5.4 Comparison of Groundwater Seepage Data to Local Groundwater Conditions

Comparison of MSC's groundwater seepage data to known groundwater concentrations indicates that the average TDS concentrations are similar or slightly lower than the average TDS concentrations reported from wells drawing from the shallow dolomite aquifer that were documented in various ISWS studies. Table 3 below illustrates this comparison.

Table 3

Comparison of Average TDS Concentrations in Groundwater

SOURCE	TDS, mg/l	# of samples
Groundwater from Wells set in Shallow Dolomite	1,431.5	129
Groundwater seepage in MSC's Yard 19 Quarry	1,345	58

This comparison indicates that the TDS concentrations found in the groundwater seepage of MSC's Yard 19 Quarry are consistent with background concentrations of TDS documented from wells set into shallow dolomite aquifers.

5.5 Quality of MSC's Discharge

MSC has collected samples from the discharge pipe prior to entering the McCook Drainage Ditch. The concentrations of TDS and sulfate from these samples have been reported at relatively consistent concentrations. TDS has been reported to range from 1,070 up to 1,400 mg/l with an average of 1,299 mg/l, while sulfate concentrations have ranged from 351 up to 524 mg/l with an average of 427 mg/l. The pH of the discharge has averaged 7.8, and concentration of Total Suspended Solids (TSS) in the discharge has averaged 17 mg/l. A summary table of water quality data for the MSC's discharge and the McCook Drainage Ditch is included in Appendix H.

Comparison of concentration of TDS and sulfate in MSC's discharge to the new permit limits indicates the concentrations of TDS consistently exceed the permitted value of 1,000 mg/l, while only 20% of the samples were found to contain sulfate at a concentration greater than the permitted value of 500 mg/l.

6.0 IMPACT TO RECEIVING WATERS

Based on the known concentrations of TDS and sulfate in MSC's discharge, a comparison can be made to the concentrations of those constituents found in the McCook Drainage Ditch and Chicago Sanitary and Ship Canal.

6.1 Impact to the Chicago Sanitary and Ship Canal

The McCook Drainage Ditch discharges into the Chicago Sanitary and Ship Canal at a location approximately 500 yards west of Harlem Avenue, after being piped beneath the Des Plaines River. DAI calculated the potential impact to the Chicago Sanitary and Ship Canal assuming MSC's discharge is direct to the Chicago Sanitary and Ship Canal. Actual water samples collected at the end of the McCook Drainage Ditch indicate that TDS and sulfate concentrations in MSC's discharge are diluted by 20-25 % prior to discharge to Chicago Sanitary and Ship Canal. The following table compares average concentrations of TDS and sulfate in surface water.

TABLE 4

AVERAGE SURFACE WATER CONCENTRATIONS

PARAMETER	MSC DISCHARGE	McCook Ditch Prior to Discharge into CSSC	CSSC @ Harlem: up-gradient of McCook Drainage Ditch discharge	CSSC @ Hwy 83: down-gradient of McCook Drainage Ditch discharge
TDS	1,299 mg/l	1,018 mg/l	581 mg/l	578 mg/l
SULFATE	427 mg/l	329 mg/l	72 mg/l	70 mg/l

Based on flow rates for the Chicago Sanitary and Ship Canal (603 mgd) provided by the MWRD, it is estimated that the MSC's discharge (estimated at approximately 5 mgd) is limited to less than 1% of the total flow within the canal. Based on this information, the impact to the Chicago Sanitary and Ship Canal can be calculated. Based on these volumes and concentrations it is estimated that MSC discharge contributes a 6-mg/l increase in TDS and 3-mg/l increase in sulfate in the Chicago Sanitary and Ship Canal. This calculation is included in Appendix I.

6.2 Impact to the McCook Drainage Ditch

To evaluate the impact to the McCook Drainage Ditch, DAI calculated the average background concentration of TDS and sulfate in surface water from the McCook Drainage Ditch (up-gradient of MSC's Discharge) and that found in the nearby Des Plaines River. Data from the Chicago Sanitary and Ship Canal was not used in the background calculation because the contribution of low TDS water from Lake Michigan is not representative of surface water in the McCook area.

MSC collected two surface water samples from the head of the McCook Drainage Ditch during February 2001. The TDS concentration in these two samples averaged 1,810 mg/l. The elevated concentration in the winter months is likely related to the application of road salt along 47th Street and adjoining side streets. During the same sampling events, the TDS concentration in MSC's discharge averaged 1,300 mg/l. Sulfate concentrations in surface water remained consistent through the winter months. The table below provides the basis for determining the average background concentrations of TDS and sulfate in surface water. Appendix H provides a summary table of McCook Drainage Ditch sampling results.

TABLE 5

SUMMARY OF BACKGROUND SURFACE WATER CONCENTRATIONS

BACKGROUND CONCENTRATIONS	TDS, mg/l	SULFATE, mg/l
McCook Drainage Ditch Calculated Average (less MSC's discharge)	703	183
McCook Drainage Ditch Concentration Up-gradient of MSC's Discharge (non-winter months only)	745	167
Des Plaines River @ Ogden Avenue	713	82
AVERAGE BACKGROUND CONCENTRATION	**720**	**144**

Based on these average background concentrations, concentrations in MSC's discharge, and flow data collected by MSC from the McCook Drainage Ditch, DAI evaluated the impact to the McCook Drainage Ditch under a variety of flow and concentration scenarios. Extreme scenarios were evaluated to assess impact to the McCook Drainage Ditch during specific events, such as periods of draught, heavy rain, and peak discharge concentrations. The various scenarios can also be used to predict seasonal fluctuations in flow and concentration.

The flow/concentration scenarios evaluated by DAI included the following predictable events:

- Spring Rain Events,
- Summer Draught,
- Summer Rain,
- Winter Run-Off, and
- Normal Conditions.

For the Spring Rain and Winter Run-Off scenarios, background concentrations of TDS within the McCook Drainage Ditch are assumed to be elevated due to contributions from road salt as was documented by MSC sampling data at the head of the McCook Drainage Ditch. Summer Draught and Summer Rain scenarios were constructed using "low flow/peak concentrations" and "high flow/average concentrations", respectively, to evaluate impacts from these events. The Normal Conditions scenario utilizes average flow rates and average concentrations of TDS and sulfate. The results of the predicted TDS and sulfate concentrations in the McCook Drainage Ditch are summarized in the following table.

TABLE 6

PREDICTED TDS AND SULFATE CONCENTRATIONS

MODEL SCENARIO	TDS, mg/l	SULFATE, mg/l
Winter Run-Off	1,562	339
Spring Rains	1,787	263
Summer Draught	1,393	520
Summer Rains	865	215
Normal Conditions	1,066	313

The above concentrations indicate that TDS concentrations vary over a relatively wide range as a result of seasonal fluctuations, while the sulfate values are relatively consistent throughout the year. During the Winter Run-Off and Spring Rain scenarios, the TDS values are elevated due primarily due to the contribution of road salt run-off into the McCook Drainage Ditch, which may exceed 2,000 mg/l TDS (primarily chloride). Under these conditions, MSC discharge actually

helps stabilize these periods of peak winter concentrations of TDS. MSC's discharge may dominate the flow within the McCook Drainage Ditch during Summer Draught conditions since groundwater continues to seep regardless of precipitation and concentrations in the discharge may be elevated due to evaporation.

Under normal conditions (average flows/average concentrations), it appears that TDS and sulfate concentrations in the McCook Drainage Ditch are increased by approximately 346 mg/l and 169 mg/l, respectively, over the average background concentrations. Based on this evaluation, the impact of MSC's discharge to the dissolved chemical constituents found in the McCook Drainage Ditch water is minimal, and well below documented concentrations that may result in biological impairment. The toxicity of the TDS and sulfate is discussed in Section 8 of this report. A summary table for the above calculations is included in Appendix I.

7.0 TREATMENT OPTIONS

DAI completed a review of available treatment technologies that could be utilized to maintain compliance with NPDES permit limitations of 1,000 mg/l TDS and 500 mg/l sulfate. In developing the treatment technologies and associated cost estimates, DAI utilized average flow rate that is assumed to range between 3.6 and 5.0 mgd. This volume range was selected because it is representative of recent flow measurements and long-term pumping volumes as measured by MSC. Consequently, the treatment costs outlined in this section would be increased substantially during periods of heavy rainfall when the MSC's discharge may reach 7.2 mgd.

7.1 Available Technologies

As part of the requirement of the applying for an adjusted standard, it is necessary to evaluate available treatment options. The evaluation is designed to identify technically feasible and economically reasonable approaches to treat the discharge. DAI has identified several possible remedial solutions which are as follows:

- Dilution;
- Deep well injection;
- Reverse Osmosis; and
- De-ionization.

7.1.1 Dilution

The Village of McCook purchases Lake Michigan water from the City of Chicago. Lake Michigan water typically exhibits low concentrations of TDS (less than 200 mg/l). To lower TDS and sulfate concentrations in MSC's discharge below permitted limits, approximately 2 mgd (1,500 gpm) of Lake Michigan water would need to be purchased from the City of Chicago.

Dilution would substantially increase the flow, and consequently the erosive power, of the McCook Drainage Ditch. This could also adversely impact the man-made structures at various road and rail crossings as well as the capacity of the ditch to carry water during storm events. Based on the volume of water required, dilution does not appear to represent a reasonable technological or aesthetically pleasing approach. Consequently, DAI will not further pursue an economic evaluation of this option.

7.1.2 Deep Well Injection

The maximum flow that a deep well typically can accept from injection is 500 gpm (Brower et al, 1989). Based on the volume of discharge from the MSC facility, a series of laterally spaced injection wells (8-10 wells) would be required. The wells would need to be large diameter (minimum 8-inch diameter) and likely would need to be completed several hundred feet below the floor of the quarry to avoid re-circulation of the injected water.

A significant problem with this strategy is that deep well injection does not typically work well with water that contains high dissolved solids and low suspended solids. It is quite possible that the water would need to be pre-treated or diluted prior to injection. Without pre-treatment, the injection wells would likely require frequent cleaning and re-development to maintain acceptable injection rates. Several back-up wells would be necessary when wells are shutdown for cleaning, repairs, and re-development. To avoid over-injection of the reservoir, the injection wells would have to be widely spaced (several hundred feet apart). MSC does not own sufficient property at this location to accommodate a large array of injection wells.

DAI reviewed the cost associated with is technology and found that the capital investment for well injection would range from 19 to 26 million dollars, with annual and operating costs running as high as 18 to 26 million dollars (Brower et al, 1989). Given the large flow rate requirement, incompatible chemistry, and space limitations, deep well injection does not appear to be a viable treatment option. Although, deep well injection can be economically feasible at lower flow rates,

and could be used in conjunction with other technologies that may reduce the volume requiring injection.

7.1.3 On-site Treatment

DAI contacted several water treatment vendors to assist in an evaluation of on-site treatment options. Available technologies that have been used successfully to treat TDS and sulfate include reverse osmosis and de-ionization. Using these technologies, the entire discharge stream would not require treatment. A split that represents approximately 1,000 to 1,400 gpm, or about 40% of the total flow, would need to be treated and re-introduced to the main flow in order to dilute the concentrations in the discharge to below permit levels.

U.S. Filter provided DAI with pricing based on the above scenario, and additional independent references were checked to verify the approximate costs associated with the above technologies. The capital expenditure for these options would range from 2.3 to 3.2 million dollars, which includes engineering design, equipment, and construction costs. Operating and annual costs would range from 2.3 to 5.6 million dollars. Operating and annual costs include the cost of labor to operate and maintain the equipment, materials, fuel, chemicals, and power, while annual costs include overhead, taxes, insurance, administrative costs, depreciation, and interest.

The most significant problem with these technologies is that they generate a new waste stream that would require treatment or disposal. The waste stream would consist of brine that would require on-site treatment or disposal. Treatment options vary from solidification and disposal to deep-well injection. The most economic way to treat the brine would likely involve deep well injection. A low-flow rate brine (less than 100 gpm) effluent could be diluted and injected into a deep well. Capital cost associated with establishing a deep well brine disposal unit would be approximately 1.6 to 2.2 million dollars, with annual and operating costs ranging from 1.4 to 1.9 million dollars.

Due to lower operating and annual costs, reverse osmosis in conjunction with deep well injection of the brine effluent would be the most economic approach to treating MSC's discharge; however, the 20-year operating cost of this approach is estimated to range from 81 to 113 million dollars. A cost summary table of treatment options analyzed by DAI is included in Appendix J.

Based on our review the available technologies to treat MSC's discharge, it is DAI's professional opinion that direct treatment of the discharge is not economically feasible at current and projected future cost considerations.

8.0 TOXICITY IMPACT OF TDS AND SULFATE TO RECEIVING WATERS

An important part of the Adjusted Standard assessment is an evaluation of the impact the proposed standard will have on indigenous organisms in the receiving water. Due to the nature of the receiving water along with nearly non-existent access locations, a biological survey of the McCook Drainage Ditch has not been conducted. Alternatively, the IEPA recommended that the impact or toxicity of TDS and sulfate could be evaluated based on a literature review relative to typical freshwater fish species, such as bluegill, large-mouth bass, and channel catfish and other species likely to be present. It is important to note that due to the size and nature of the McCook Drainage Ditch, it is unlikely that abundant or large populations of these common fish species are supported. Therefore, the toxic response by these species to elevated concentrations of TDS and sulfate is reviewed and presented here as an indicator response for these and other related fish species and macro-invertebrates.

Additionally, a similar Adjusted Standard Petition has been submitted for elevated TDS and sulfate discharges planned for Thorn Creek (Illinois Pollution Control Board Case No. AS-01-9). This petitioner submitted a report that addressed the issue of TDS and sulfate toxicity to small vertebrate and macro-invertebrate species that would be expected to be present in the McCook Drainage Ditch.

8.1 Toxicity of TDS

TDS consists of a summation of cations and anions; therefore the toxicity of TDS may vary depending on the concentration of specific cations and anions present in solution. TDS comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonate, chlorides and sulfates) and small amounts of organic matter that are dissolved in the water. TDS in drinking water originate from natural geological sources, sewage, urban run-off, and industrial wastewater. Salts used for road de-icing also contribute to the TDS content of surface water and groundwater.

Concentrations of TDS in water vary considerably in different geological regions owing to differences in the solubilities of minerals. As discussed previously in this report, the TDS concentrations in MSC's discharge are naturally occurring concentrations that are characteristic of groundwater produced from the shallow Silurian dolomite aquifers in the region. Based on prior laboratory analysis conducted by MSC, the TDS in their discharge appears to consist primarily of sulfate (TDS-SO^4) with lower concentrations of chloride (TDS-Cl).

Reed and Evans (1981) conducted a series of acute toxicity tests for TDS-SO^4 and TDS-Cl using three common freshwater fish species: bluegill fry (Lepomis macrochirus), large-mouth bass fingerlings (Micropterus salmoides), and the channel catfish fingerlings (Ictalurus punctatus). Bioassays were conducted for a period of 14 days with various combinations of fish sizes and water temperatures. The dilution water for these tests consisted of well water with relatively high alkalinity and the salts of calcium and magnesium. From this data, acute toxicity curves were developed for each fish. The acute toxicity curve shows the time at a given concentration at which the population experiences a 50 % mortality rate (LC_{50}).

The reactions of catfish, bass, and bluegill to concentrations of TDS-SO^4 indicate all three species are similarly sensitive to the toxicant. The LC_{50} concentration at 14 days was found to range from 14,000 to 17,500 mg/l. Of the three species, the channel catfish is the most sensitive to TDS-SO^4.

The reactions of catfish, bass, and bluegill to concentrations of TDS-Cl indicate all three species are similarly sensitive to the toxicant. The LC_{50} concentration at 14 days was found to range from 13,000 to 15,000 mg/l, which indicates TDS-Cl is slightly more toxic to fish than TDS-SO^4. Of the three species, the channel catfish is the most sensitive (14 day LC_{50} = 13,000 mg/l) and the large-mouth bass is the least sensitive (14-day LC_{50} = 15,000 mg/l) to TDS-Cl.

Reed and Evans (1981) concluded that TDS is not a sensitive indicator of acute toxicity for fishes. The tolerance to TDS varies by species and is dependent upon the principal anion, either chloride or sulfate, comprising the TDS.

The USEPA "Red Book" of water quality criteria (USEPA, 1976) reported results from an earlier study conducted by Rawson and Moore (1944) that found several common freshwater fish

survived 10,000 mg/l TDS. Rawson and Moore also concluded that TDS concentrations in excess of 15,000 mg/l were unsuitable for freshwater fish.

8.2 Toxicity of Sulfate

Sulfates occur naturally in numerous minerals and are used commercially, principally in the chemical industry. They are discharged into water in industrial wastes and through atmospheric deposition; however, the highest concentrations usually occur in groundwater and are from natural sources. Sulfate is one of the least toxic anions; however, catharsis, dehydration, and gastrointestinal irritation have been observed at relatively high concentrations.

The reactions of catfish, bass, and bluegill to concentrations of SO^4 indicate all three species are similarly sensitive to the toxicant. The LC_{50} concentration at 14 days was found to range from 10,000 to 11,000 mg/l. Of the three species, the channel catfish and bluegill are the most sensitive to TDS-SO^4 and the large-mouth bass is the least sensitive. Based on these results, Reed and Evans (1981) concluded that concentrations of sulfate at 1,000 mg/l would be a reasonable water quality standard for protection of aquatic life.

In a similar study, Dowden and Bennet (1965) conducted acute toxicity tests with sodium sulfate using two species of fish: bluegill and goldfish (Carassius auratus). The bluegill (24-hr LC_{50}=17,500 mg/l) was determined to be more sensitive to sodium sulfate concentrations than the goldfish (24-hr LC_{50}=20,040 mg/l).

A parallel study of TDS and sulfate in the area has been completed for Rhodia, Inc. by Huff & Huff (*Environmental Assessment for the Proposed Increase in Total Dissolved Solids Discharge*, 2000) for an Adjusted Standard petition for Thorn Creek (Illinois Pollution Control Board Case No. AS-01-9). Thorn Creek is located approximately 18 miles southeast of the subject property. Huff & Huff (2000) conducted a chronic toxicity test for TDS and sodium sulfate using a water flea (Cheriodaphnia dubia) and the flathead minnow (Pimephales promelas). Chronic toxicity was not observed at any of the TDS or sulfate concentrations evaluated for either organism. Therefore, the "No Observed Effect Concentration (NOEC)" was assumed to be the maximum measured concentration of sulfate and TDS used in the test, which was reported at 1,381 mg/l and 2,790 mg/l, respectively. Based on these results, Huff & Huff concluded there should be no acute or chronic effects experienced in Thorn Creek associated with effluent introduced at or below the test values.

Based on the toxicity data reviewed by DAI for TDS and sulfate, it appears unlikely that the TDS and sulfate concentrations in MSC's discharge would have any significant deleterious effect on aquatic life in the McCook Drainage Ditch. Since MSC's discharge appears to be the dominant flow component to the McCook Ditch and said discharge is into the upper reaches of the ditch, the aquatic organisms that are established in the ditch are likely tolerant to the TDS and sulfate concentrations found in MSC's discharge. Furthermore, MSC's discharge is the only regular flow component that could likely foster a permanent aquatic ecosystem in the McCook Ditch. In conclusion, the adjusted standard values requested by MSC for TDS and sulfate are less than those shown to be protective of aquatic life in prior related studies.

9.0 PROPOSED ADJUSTED STANDARD CONCENTRATIONS

MSC's quarry discharge consists primarily of groundwater seepage from the dolomite aquifer at the site. Additional discharge flow components consist of contributions from precipitation events along with minor amounts of recycled aggregate wash waters. The dolomite aquifer is documented to naturally contain elevated concentrations of TDS and sulfate in the vicinity of the facility. Analysis of groundwater seeping into the quarry has verified the mineralized condition of the aquifer. MSC's aggregate washing operations is not contributing to an increase of TDS or sulfate concentrations in the facility discharge.

Though MSC could treat the naturally occurring elevated TDS and sulfate concentrations found in the quarry discharge, this alternative to compliance is demonstrated to be overly economically burdensome to the company. In fact, the economic impact indicates that the facility could not maintain a viable operation if treatment of the discharge to achieve general use water quality standards is required. This would be true for current as well as projected future economic conditions.

Finally, MSC's quarry discharge contains naturally occurring concentrations of TDS and sulfate that would not have an adverse impact to the aquatic ecosystem of the McCook Drainage Ditch.

Therefore, MSC has a justifiable position to petition the Illinois Pollution Control Board for an adjusted standard of water quality standards as they relate to the concentration of TDS and Sulfate in their discharge. The adjusted standard request should consider two factors.

1 The concentrations of the TDS and sulfate found at Yard 19 during this study should be evaluated against the potential concentration of TDS and sulfate documented to occur in the shallow dolomite aquifer. The maximum TDS from quarry sampling was 2,400 mg/l. The maximum aquifer TDS concentration was 2,500, 2,100, and 1,832 mg/l from the three referenced studies. The maximum sulfate from the quarry sampling was 660 mg/l. The maximum sulfate found to occur from the aquifer was 2,515 and 864 mg/l in two of the three studies.

Though these studies are regional and some of the high concentrations are from wells some distance from MSC's facility, the highest TDS and sulfate aquifer concentrations documented in one of the studies (Sasman et al) was from a well in LaGrange Park. LaGrange Park is located about 1.5 miles northwest of the quarry.

2 The proposed adjusted standard should not exceed the TDS and sulfate concentrations that would be protective of the aquatic environment in the receiving water.

The USEPA "Red Book" of water quality criteria (USEPA, 1976) reported results from an earlier study conducted by Rawson and Moore (1944) that found several common freshwater fish survived 10,000 mg/l TDS. Rawson and Moore also concluded that TDS concentrations in excess of 15,000 mg/l were unsuitable for freshwater fish.

The Huff and Huff study determined that there was no adverse impact related to the maximum TDS and sulfate concentrations proposed for an Adjusted Standard Petition for Rhodia, Inc. and the Thorn Creek Sanitary District. The maximum concentrations for this petition include 2,790 mg/l for TDS and 1,381 mg/l for sulfate.

The Reed and Evans study indicated that TDS is a poor water standard for protecting certain aquatic ecosystems. The study focused upon the dominant ionic component in the water and found that for sulfate dominant waters an appropriate sulfate standard would be 1,000 mg/l.

It is DAI's professional opinion that, though lower TDS and sulfate concentrations are found in the groundwater currently flowing into the quarry, MSC should request adjusted standards that

are reflective of the conditions documented from the aquifer. This would ensure compliance should more mineralized waters flow into the quarry or if evaporation of the groundwater once captured in the quarry also elevates these constituents.

Therefore, DAI recommends that MSC request an adjusted standard for TDS and sulfate concentrations of 1,900 mg/l for TDS and 850 mg/l for sulfate. These concentrations for TDS and sulfate would attain compliance for the facility at concentrations that are reportedly protective of the aquatic environment of the McCook Drainage Ditch. The discharge concentrations are summarized below:

TABLE 7

PROPOSED NPDES ADJUSTED STANDARD CONCENTRATIONS

PARAMETER	CURRENT NPDES DISCHARGE LIMITATIONS (mg/l)	MAXIMUM CONC. OBSERVED AT THE YARD 19 QUARRY (mg/l)	MAXIMUM CONC. OBSERVED FROM THE SILURIAN AQUIFER (mg/l)	MAXIMUM CONC. OBSERVED IN MSC's DISCHARGE TO DATE (mg/l)	CONC. THAT ARE PROTECTIVE OF AQUATIC ECOSYSTEMS (from Huff and Huff), (mg/l)	PROPOSED NPDES ADJUSTED STANDARD, (mg/l)
TDS	1,000	2,450	2,515	1,400	2,790	**1,900**
SULFATE	500	660	1,543	524	1,381	**850**

10.0 REFERENCES

Brower, Ross D., and Visocky, Adrian, *Evaluation of Underground Injection of Industrial Waste in Illinois*, Illinois State Geological Survey, Illinois Scientific Surveys Joint Report 2, 1989.

Huff & Huff, Incorporated, *Environmental Assessment of the Proposed Increase in Total Dissolved Solids Discharge from the Thorn Creek Basin Sanitary District*, November 2000.

Mikulic, Donald G., *Cross Section of the Paleozoic Rocks of Northeastern Illinois: Implications for Subsurface Aggregate Mining*, Illinois State Geological Survey, Illinois Minerals 106, 1990.

Rawson, D.S. and J.E. Moore, *The Saline Lakes of Canada*, Canadian Journal of Research 22:141, 1944.

Reed, Paula and Evans, Ralph, Acute Toxicity of Chlorides, Sulfates, and Total Dissolved Solids to Some Fishes in Illinois, State Water Survey Division, State Water Survey Report 283, 1981.

Roadcap, George S., Cravens, Stuart J., and Smith, Edward C.; *Meeting the Growing Demand for Water: An Evaluation of the Shallow Ground-Water Resources in Will and Southern Cook Counties, Illinois*, Research Report 123, Illinois State Water Survey, Urbana, 1993.

Sasman, Robert, T., Schicht, Richard J., Gibb, James P., O'Hearn, Michael, Benson, Curtis R., Ludwigs, R. Scott; *Verification of the Potential Yield and Chemical Quality of the Shallow Dolomite Aquifer in DuPage County, Illinois*; Circular 149, Illinois State Water Survey, Champaign, 1981.

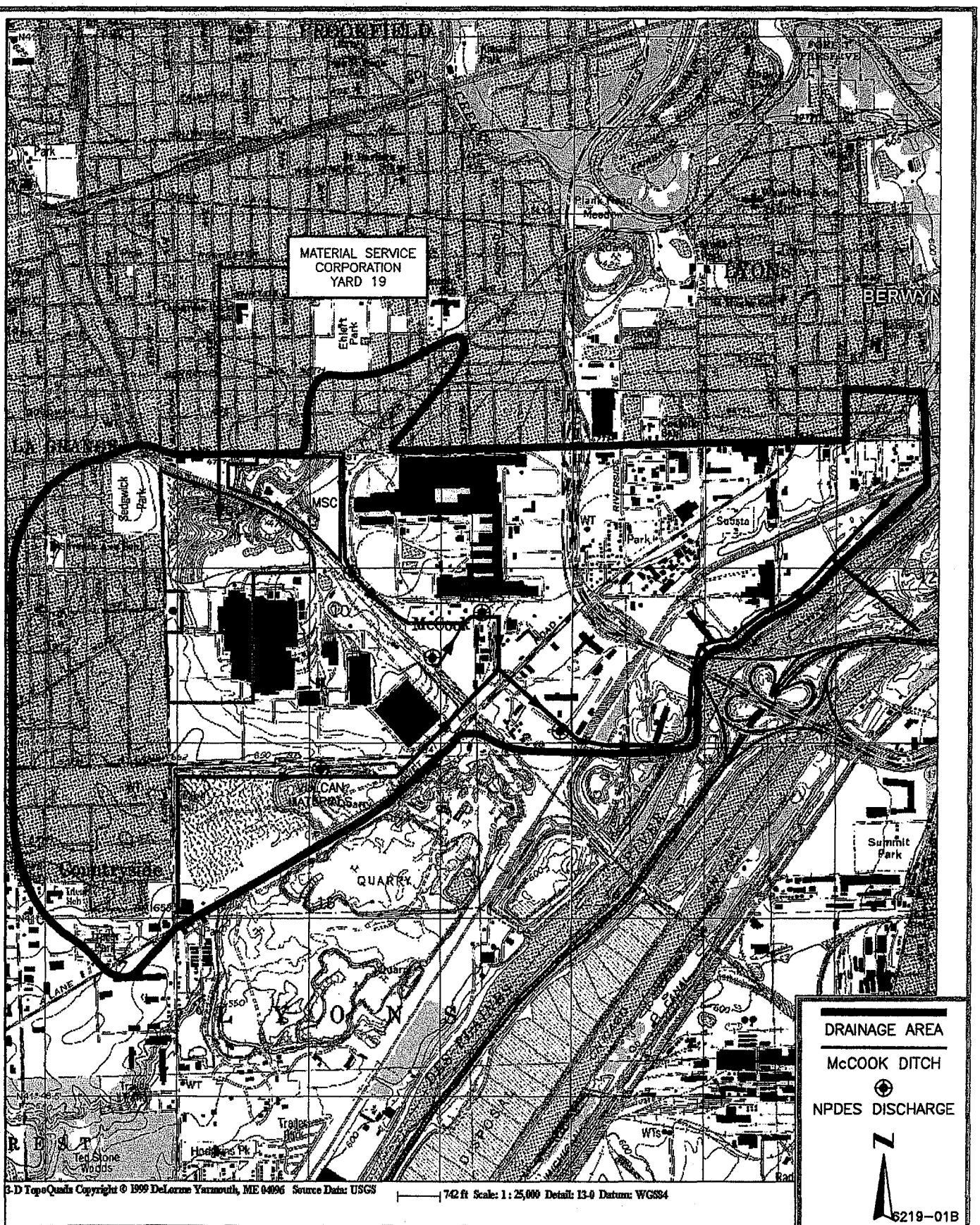
Schicht, Richard J., Adams, J. Rodger, and Stall, John B.; *Water Resources Availability, Quality, and Cost in Northeastern Illinois*, Report of Investigation 83, Illinois State Water Survey, Urbana, 1976.

United States Environmental Protection Agency, *Quality Criteria for Water*, USEPA, Washington, D.C., 1976.

Willman, H.B., *Summary of the Geology of the Chicago Area*, Illinois State Geological Survey, Circular 460, 1971.

TABLE OF CONTENTS

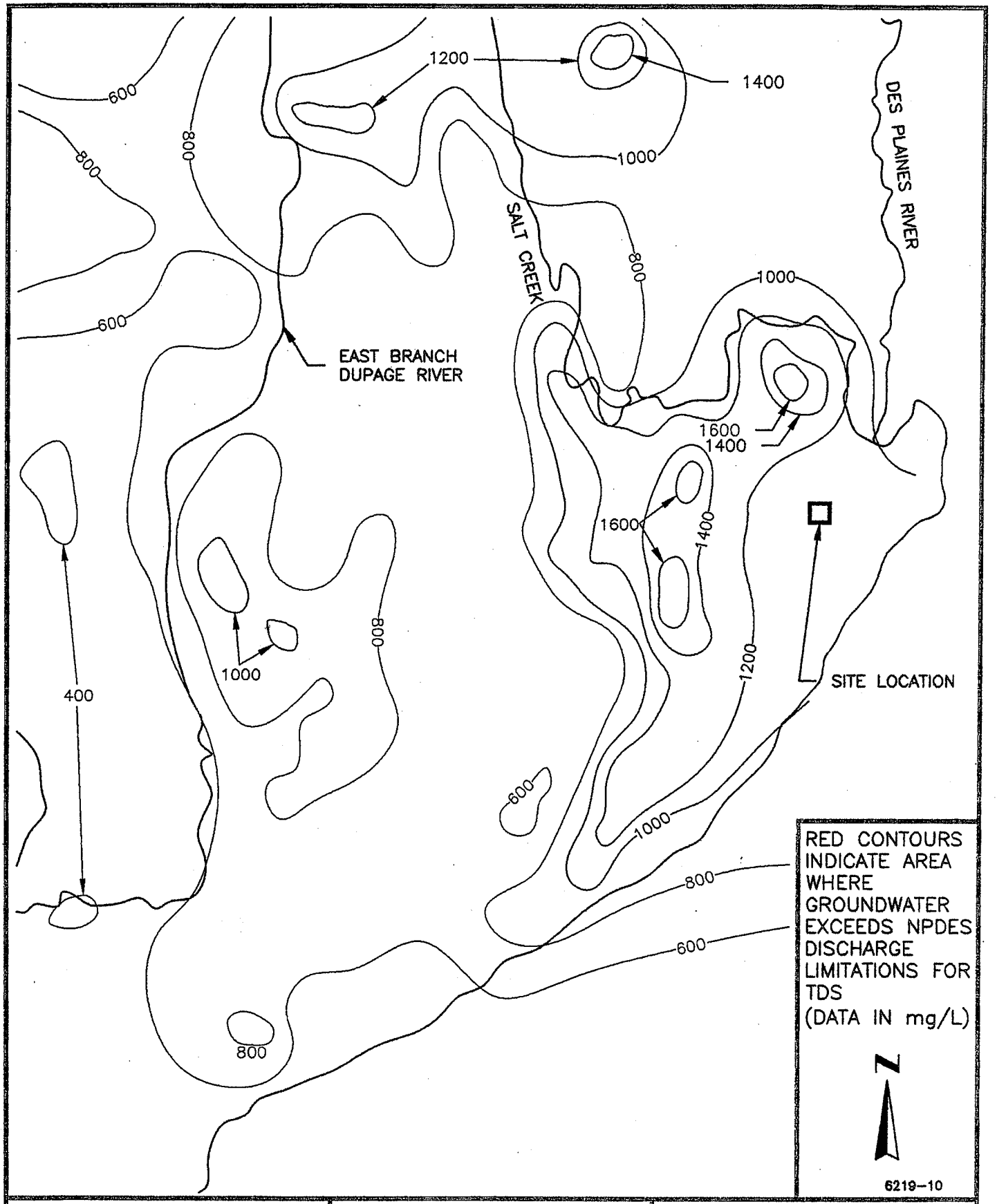
FIGURES



ENVIRONMENTAL DAI

NPDES ADJUSTED STANDARD
MATERIAL SERVICE CORPORATION
YARD 19
McCOOK, ILLINOIS

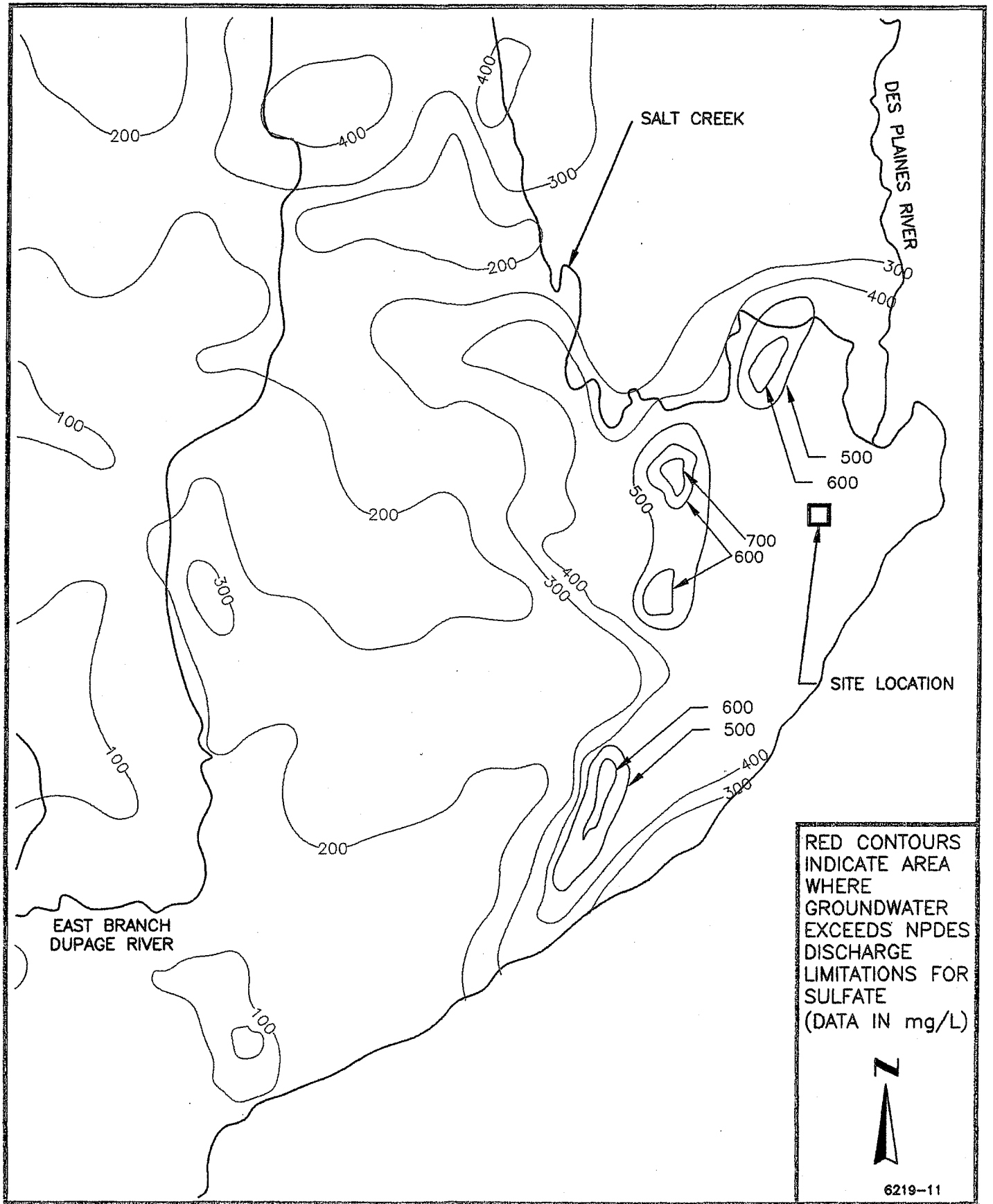
FIGURE 1
SITE LOCATION



ENVIRONMENTAL DAI

MATERIAL SERVICE CORPORATION
NPDES ADJUSTED STANDARD
McCOOK, ILLINOIS

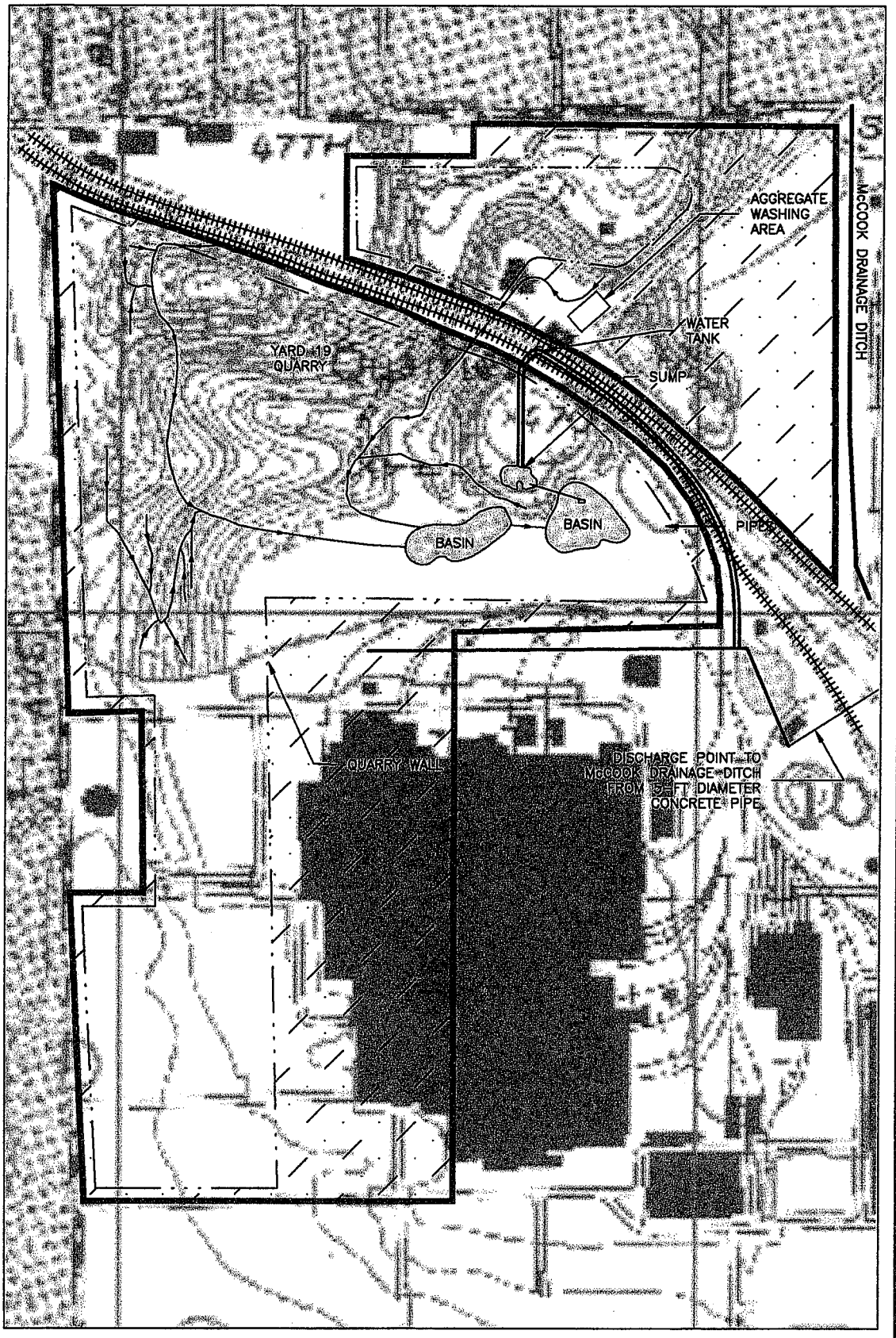
FIGURE 2
AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS (TDS) IN THE SHALLOW DOLOMITE AQUIFER
(SASMAN ET AL, 1981)



ENVIRONMENTAL

MATERIAL SERVICE CORPORATION
NPDES ADJUSTED STANDARD
McCOOK, ILLINOIS

FIGURE 3
AREAL DISTRIBUTION OF SULFATE IN THE SHALLOW DOLOMITE AQUIFER
(SASMAN ET AL, 1981)



LEGEND

- YARD 19 BOUNDARY
- RAIL ROAD TRACKS
- QUARRY WALL
- 54" DIAMETER STORM SEWER
- PROPERTY AT GRADE

N

0' 750'

SCALE

6219-01D

ENVIRONMENTAL

NPDES ADJUSTED STANDARD
MSC – YARD 19
McCOOK, ILLINOIS

FIGURE 4
WATER COLLECTION SYSTEM

APPENDIX A
NPDES PERMITS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276

THOMAS V. SKINNER, DIRECTOR

217/782-0610

September 25, 2000

Material Service Corporation
222 N. LaSalle Street
Chicago, Illinois 60601

Re: Material Service Corporation-Yard 19-MLR Quarry
NPDES Permit No. IL0001945
Final Permit

Gentlemen:

Attached is the final NPDES Permit for your discharge. The Permit as issued covers discharge limitations, monitoring, and reporting requirements. The failure of you to meet any portion of the Permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the Permit as they relate specifically to your discharge.

The Permit as issued is effective as of the date indicated on the first page of the Permit. You have the right to appeal any condition of the Permit to the Illinois Pollution Control Board within a 35 day period following the issuance date.

To assist you in meeting the self-monitoring and reporting requirements of your reissued NPDES permit, a supply of preprinted Discharge Monitoring Report (DMR) forms for your facility is being prepared. These forms will be sent to you prior to the initiation of DMR reporting under the reissued permit. Additional information and instructions will accompany the preprinted DMRs upon their arrival.

Should you have questions concerning the Permit, please contact David Ginder at the telephone number indicated above.

Very truly yours,

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:DLH:DPG:00040601.dlk

Attachment: Final Permit

cc: Records
Compliance Assurance Section
Maywood Region (Des Plaines Region)
Facility

NPDES Permit No. IL0001945

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

New (NPDES) Permit

Expiration Date: August 31, 2005

Issue Date: September 25, 2000
Effective Date: September 25, 2000

Name and Address of Permittee:

Material Service Corporation
222 N. LaSalle Street
Chicago, Illinois 60601

Facility Name and Address:

Material Service Corporation-Yard 19-MLR Quarry
9101 West 47th Street
McCook, Illinois 60525
(Cook County)

Discharge Number and Name:	Receiving Waters:
002 - Groundwater seepage, storm water runoff and pit pumpage	Unnamed tributary to McCook Ditch
003 - Groundwater seepage, storm water runoff and pit pumpage	Unnamed tributary to McCook Ditch

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of Ill. Adm. Code, Subtitle C and/or Subtitle D, Chapter 1, and the Clean Water Act (CWA), the above-named permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:DPG:00040601.dlk

NPDES Permit No. IL0001945

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day DAF (DMF) 30 DAY AVERAGE	LOAD LIMITS lbs/day DAF (DMF) DAILY MAXIMUM	CONCENTRATION LIMITS mg/l 30 DAY AVERAGE	CONCENTRATION LIMITS mg/l DAILY MAXIMUM	SAMPLE FREQUENCY	SAMPLE TYPE
1. From the effective date of this permit until the expiration date, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:						
Outfalls: 002 and 003						
Flow (MGD)				See Below		
pH	Shall be in the range of 6 to 9 Standard Units				1 per month	Grab
Total Suspended Solids			35	70	1 per month	Grab
Total Dissolved Solids				1000	1 per month	Grab
Sulfate				500	1 per month	Grab

Effluent monitoring for flow shall be continuous if hardware allows otherwise it shall be once a month single reading.

Flows shall be reported as a monthly average on the Discharge Monitoring Reports (DMR). pH shall be reported as a minimum and a maximum.

NPDES Permit No. IL0001945

Special Conditions

SPECIAL CONDITION 1. For the purpose of this permit, this discharge is limited to groundwater seepage, stormwater runoff and pit pumpage, free from process and other wastewater discharges.

SPECIAL CONDITION 2. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 3. The permittee shall record monitoring results on Discharge Monitoring Report forms using one such form for each discharge each month. The completed Discharge Monitoring Report form shall be submitted monthly to IEPA, no later than the 15th of the following month, unless otherwise specified by the Agency, to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 4. The permittee shall notify the Agency in writing by certified mail within thirty days of abandonment, cessation, or suspension of active mining for thirty days or more unless caused by a labor dispute. During cessation or suspension of active mining, whether caused by a labor dispute or not, the permittee shall provide whatever interim impoundment, drainage diversion, and wastewater treatment is necessary to avoid violations of the Act or Subtitle D, Chapter 1.

SPECIAL CONDITION 5. The Agency has determined that the effluent limitations in this permit constitute BAT/BAC for storm water which is treated in the existing treatment facilities for purposes of this permit issuance, and no pollution prevention plan will be required for such storm water. In addition to the chemical specific monitoring required elsewhere in this permit, the permittee shall conduct an annual inspection of the facility site to identify areas contributing to a storm water discharge associated with mining and determine whether any facility modifications have occurred which result in previously-treated storm water discharges no longer receiving treatment. If any such discharges are identified the permittee shall request a modification of this permit within 30 days after the inspection. Records of the annual inspection shall be retained by the permittee for the term of this permit and be made available to the Agency upon request.

SPECIAL CONDITION 6. Mining excavation operations shall maintain a minimum setback of 200 feet from the private potable wells located in Section 10, identified in the permit application as the Electro Motive Corp. wells (4 wells), pursuant to Section 14.2 of the Illinois Environmental Protection Act.

NPDES Permit No. IL0001945

Construction Authorization

Authorization is hereby granted to the above designee to construct the mine and mine refuse area described as follows:

The facility is a new, approximately 24 acre limestone quarry and stockpile, designated as the Material Service Corporation, Yard 19-MLR Quarry, located in Section 10, T38N, R12E of the 3rd P.M. in Cook County, Illinois in McCook. Mine operations include the excavation, stockpiling and loading of limestone aggregate for general agricultural and construction purposes. Processing occurs at the Material Service Corporation Yard 19-Federal Quarry. Groundwater seepage, storm water runoff and pit pumpage are collected in three settling basins prior to discharge. Mine operations result in the discharge of groundwater seepage, stormwater runoff and pit pumpage on an intermittent basis from Outfalls 002 and 003 to unnamed tributaries of the McCook Ditch.

The abandonment plan submitted with the application January 11, 2000 and February 25, 2000 shall be executed and completed in accordance with Rule 405.109 of Subtitle D: Mine Related Water Pollution.

This Authorization is issued subject to the following Special Condition(s). If such Special Conditions require additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval.

If any statement or representation in the application is found to be incorrect, this permit may be revoked and the permittee thereupon waives all rights thereunder.

The issuance of this permit (a) shall not be considered as in any manner affecting the title of the premises upon which the mine or mine refuse area is to be located; (b) does not release the permittee from any liability for damage to person or property caused by or resulting from the installation, maintenance or operation of the proposed facilities; (c) does not take into consideration the structural stability of any units or parts of the project; and (d) does not release the permittee from compliance with other applicable statutes of the State of Illinois, or with applicable local laws, regulations or ordinances.

This permit may not be assigned or transferred. Any subsequent operator shall obtain a new permit from the Illinois Environmental Protection Agency.

There shall be no deviations from the approved plans and specifications unless revised plans, specifications and application shall first have been submitted to the Illinois Environmental Protection Agency and a supplemental permit issued.

The permit holder shall notify the Illinois Environmental Protection Agency (217/782-3637) immediately of an emergency at the mine or mine refuse area which causes or threatens to cause a sudden discharge of contaminants into the waters of Illinois and shall immediately undertake necessary corrective measures as required by Rule 405.111 under Chapter 1, Subtitle D: Mine Related Water Pollution of Illinois Pollution Control Board Rules and Regulations.

Final plans, specifications, application and supporting documents as submitted and approved shall constitute part of this permit and are identified in the records of the Illinois Environmental Protection Agency, by the permit number designated in the heading of this Section.

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Attachment F

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24 Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8 Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) Duty to comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

(2) Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

(3) Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(5) Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) Permit ... s. This permit may be modified, revoked and reissued, or termina... for caus... ne Agency pursuant to 40 CFR 122.62. The filing of a request by ... permittee ... a permit modification, revocation and reissuance, or termination, c... notification of planned changes or anticipated noncompliance, does not stay ... permit condition.

(7) Property rights. This permit does not convey any property rights of any sort, or ... exclusive privilege.

(8) Duty to provide information. The permittee shall furnish to the Agency withi... reasonable time, any information which the Agency may request to determine whet... cause exists for modifying, revoking and reissuing, or terminating this permit, o... determine compliance with the permit. The permittee shall also furnish to the Agen... upon request, copies of records required to be kept by this permit.

(9) Inspection and entry. The permittee shall allow an authorized representative of ... Agency, upon the presentation of credentials and other documents as may be requi... by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity ... located or conducted, or where records must be kept under the conditions of t... permit;

(b) Have access to and copy, at reasonable times, any records that must be k... under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring a... control equipment), practices, or operations regulated or required under t... permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring per... compliance, or as otherwise authorized by the Act, any substances or parame... at any location.

(10) Monitoring and records.

(a) Samples and measurements taken for the purpose of monitoring shall ... representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including ... calibration and maintenance records, and all original strip chart recordings ... continuous monitoring instrumentation, copies of all reports required by t... permit, and records of all data used to complete the application for this permit, ... a period of at least 3 years from the date of this permit, measurement, report ... application. This period may be extended by request of the Agency at any tim...

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under ... CFR Part 136, unless other test procedures have been specified in this perm... Where no test procedure under 40 CFR Part 136 has been approved, t... permittee must submit to the Agency a test method for approval. The permitt... shall calibrate and perform maintenance procedures on all monitoring a... analytical instrumentation at intervals to ensure accuracy of measurements.

(11) Signatory requirement. All applications, reports or information submitted to t... Agency shall be signed and certified.

(a) Application. All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level ... vice president or a person or position having overall responsibility f... environmental matters for the corporation;

(2) For a partnership or sole proprietorship: by a general partner or t... proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either ... principal executive officer or ranking elected official.

(b) Reports. All reports required by permits, or other information requested by t... Agency shall be signed by a person described in paragraph (a) or by a d... authorized representative of that person. A person is a duly authoriz... representative only if:

(1) The authorization is made in writing by a person described in paragraph (... and

(2) The authorization specifies either an individual or a position responsible f... the overall operation of the facility, from which the discharge originates, su... as a plant manager, superintendent or person of equivalent responsibili... and

(3) The written authorization is submitted to the Agency.

FILE COPY

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 Mary A. Gade, Director

217/782-0610

December 9, 1997

Material Service Corporation
222 North LaSalle Street
Chicago, Illinois 60601

Re: Material Service Corporation -- Yard 19 - Federal Quarry
NPDES General Permit No. ILG840029
Final Permit

Gentlemen:

The Agency has determined that your facility falls under NPDES General Permit No. ILG840000 for non-coal mines. Attached to this letter is a copy of the final permit for your facility. The permit as issued covers discharge limitations, monitoring, and reporting requirements. The failure of you to meet any portion of the permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the permit as they relate specifically to your discharge.

This permit is effective for your facility on the date of this letter. You have the right to appeal placement of your facility under this permit to the Illinois Pollution Control Board within a 35 day period following the issuance date.

Changes may only be made to the construction authorization portion of this permit based on the comments received from the applicant. If changes in other portions of the general permit are necessary the Agency will require that the applicant obtain an individual permit for this facility.

If you have questions or comments regarding the above, please contact David Ginder at the above telephone number.

Very truly yours,

Thomas G. McSwiggin, P.E.
Manager Permit Section
Division of Water Pollution Control

TGM:DPG:G840029.doc

Attachments: General Permit

cc: DWPC, FOS, Maywood
Records Unit
CAS

12-29
M. Cahill
cc: J. Goldberg
V. King
M. Melton - plus proof
D. Olson
A. Urbanski

NPDES Permit No. ILG840029

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand East
Post Office Box 19276
Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

General NPDES Permit
For
Non-Coal Mines

Expiration Date: May 31, 2002 **Issue Date:** June 1, 1997

Coverage under this permit

The permit covers all areas of the State of Illinois discharging to General Use or Secondary Contact Waters.

Eligibility

This permit may cover all existing and proposed non-coal mines with discharges which currently have an existing NPDES permit or require an NPDES Permit. The types of facilities that may be covered by this permit include and are limited to those operations covered under 40 CFR 436, Subparts B, C and D, for crushed stone, construction sand and gravel, and industrial sand subcategories, and/or those same operations covered under 35 Ill. Adm. Code Subtitle D.

Discharge Number and Name: 001* Non-Coal Outfall **Receiving Waters:** General Use and Secondary Contact Waters of the State of Illinois

Effluent Limitations, Monitoring, and Reporting

From the effective date of this permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	CONCENTRATION LIMITS (mg/l)			
Parameter	**Monthly Average**	**Daily Maximum**	**Sample Frequency**	**Sample Type**
Flow (MGD)			See Below	
Total Suspended Solids	35	70	1 per month	Grab
Total Suspended Solids (for Industrial Sand operations only)	25	45	1 per month	Grab
pH	Shall be the Range of 6 to 9 Standard Units		1 per month	Grab

TSS shall be sampled at 1 per Month/Grab. Effluent sampling for flow shall be continuous if hardware allows otherwise it shall be once a month single reading.

Flows shall be reported as a monthly average on the Discharge Monitoring Reports (DMR). pH shall be reported as a minimum and a maximum.

*See Special Condition 16.

To receive authorization to discharge under this general permit, a facility owner or operator must submit the proper application forms to the Illinois Environmental Protection Agency. Authorization, if granted, will be by letter and include a copy of this permit.

ilg84.wpd

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

Special Conditions

SPECIAL CONDITION 1: For the purpose of this permit, this discharge is limited to storm water, process wastewater discharges, mine dewatering and pit pumpage.

SPECIAL CONDITION 2: Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 3: The permittee shall record monitoring results on Discharge Monitoring Report forms using one such form for each discharge each month. If there is no discharge during a reporting period, a Discharge Monitoring Report shall be submitted stating that no discharge occurred during that particular month. The completed Discharge Monitoring Report form shall be submitted monthly to Illinois Environmental Protection Agency, no later than the 15th of the following month, unless otherwise specified by the Illinois Environmental Protection Agency to the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Compliance Assurance Section
1021 North Grand East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 4: The permittee shall notify the Illinois Environmental Protection Agency in writing by certified mail within thirty days of abandonment, cessation, or suspension of active mining for thirty days or more unless caused by a labor dispute. During cessation or suspension of active mining, whether caused by a labor dispute or not, the permittee shall provide whatever interim impoundment, drainage diversion, and wastewater treatment is necessary to avoid violations of the Act or Subtitle D: Mine Related Water Pollution.

SPECIAL CONDITION 5: The abandonment plan submitted for the specific project shall be executed and completed in accordance with Sections 405.109 and 405.110 of Subtitle D: Mine Related Water Pollution.

SPECIAL CONDITION 6: If any statement or representation in the application is found to be incorrect, this permit may be revoked and the permittee thereupon waives all rights thereunder.

SPECIAL CONDITION 7: The issuance of this permit (a) shall not be considered as in any manner affecting the title of the premises upon which the mine or mine refuse area is to be located; (b) does not release the permittee from any liability for damage to person or property caused by or resulting from the installation, maintenance or operation of the proposed facilities; (c) does not take into consideration the structural stability of any units or parts of the project; and (d) does not release the permittee from compliance with other applicable statutes of the State of Illinois, or with applicable local laws, regulations or ordinances.

SPECIAL CONDITION 8: This permit may not be assigned or transferred. Any subsequent operator shall obtain a new permit from the Illinois Environmental Protection Agency.

SPECIAL CONDITION 9: There shall be no deviations from the approved plans and specifications unless revised plans, specifications and application shall first have been submitted to the Illinois Environmental Protection Agency for approval.

SPECIAL CONDITION 10: The permit holder shall notify the Illinois Environmental Protection Agency (217/782-3637) immediately of an emergency at the mine or mine refuse area which causes or threatens to cause a sudden discharge of contaminants into the waters of Illinois and shall immediately undertake necessary corrective measures as required by Section 405.111 under Subtitle D: Mine Related Water Pollution of Illinois Pollution Control Board Rules and Regulations.

SPECIAL CONDITION 11: Final plans, specifications, application and supporting documents as submitted and approved shall constitute part of this permit and are identified in the records of the Illinois Environmental Protection Agency, by the permit number designated in the heading of this Section.

SPECIAL CONDITION 12: The subject facility shall be operated in accordance with the attached Construction Authorization.

SPECIAL CONDITION 13: Requiring an individual permit or an alternative general permit.

a. The Illinois Environmental Protection Agency may require any person authorized by this permit to apply for and obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition the Illinois Environmental Protection Agency to take action under this paragraph. The Illinois Environmental Protection Agency may require any owner or operator authorized to discharge under this permit to apply for an individual NPDES permit only if the owner or operator has been notified in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the owner or operator to file the application, and a statement that on the effective date of the individual NPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. The Illinois Environmental Protection Agency may grant additional time to submit the application upon request of the applicant. If an owner or operator fails to submit in a timely manner an individual

NPDES permit application required by the Illinois Environmental Protection Agency under this paragraph, then the applicability of this permit to the individual NPDES permittee is automatically terminated at the end of the day specified for application submittal.

b. Any owner or operator authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit application. The owner or operator shall submit an individual application with reasons supporting the request, in accordance with the requirements of 40 CFR 122.21, to the Illinois Environmental Protection Agency. The request shall be granted by issuing of any individual permit or an alternative general permit if the reasons cited by the owner or operator are adequate to support the request.

c. When an individual NPDES permit is issued to an owner or operator otherwise subject to this permit, or the owner or operator is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the issue date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be. When an individual NPDES permit is denied to an owner or operator otherwise subject to this permit, or the owner or operator is denied for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the Illinois Environmental Protection Agency.

SPECIAL CONDITION 14:

Authorization: Owners or operators of existing permitted discharges must submit a Notice of Intent (NOI) in accordance with the requirements of this permit to be authorized to discharge under this general permit. Owners and operators of new discharges or modification(s) of existing discharges shall complete and submit Forms 1 and 2C and Form WPC-PS-MW with Schedules MA through ME to this Illinois Environmental Protection Agency. Authorization, if granted, will be by letter and include a copy of the permit. Upon review of the NOI, the Director may deny coverage under this permit and require submittal of an application for an individual NPDES permit.

Contents of Notice of Intent: The Notice of Intent shall be submitted to Illinois Environmental Protection Agency and include at a minimum the following information:

a. Name, mailing address, and location of the facility for which the notification is submitted;

b. The operator's name, address, telephone number, ownership status and status as Federal, State, private, public or other entity;

Renotification: Upon reissuance of a new general permit, the permittee is required to notify the Director of his intent to be covered by the new general permit.

SPECIAL CONDITION 15: This permit covers only those facilities under 40 CFR 436 Subparts B, C, and D and includes all requirements therein. [**NOTE**: 40 CFR 436 Subpart B and C specify the NPDES effluent limitations for the "Crushed Stone Subcategory" and the "Construction Sand and Gravel Subcategory", respectively. 40 CFR 436 Subpart D specifies the NPDES effluent limitations for the "Industrial Sand Subcategory.]

SPECIAL CONDITION 16: This permit covers only those discharge points identified in the Construction Authorization.

SPECIAL CONDITION 17: The permittee shall maintain the appropriate setback distances between the active pit and community and/or private water supply wells, as provided in the Illinois Environmental Protection Act. The community and/or private water supply wells for which this condition may apply are identified with the appropriate setback limits in the attached Construction Authorization.

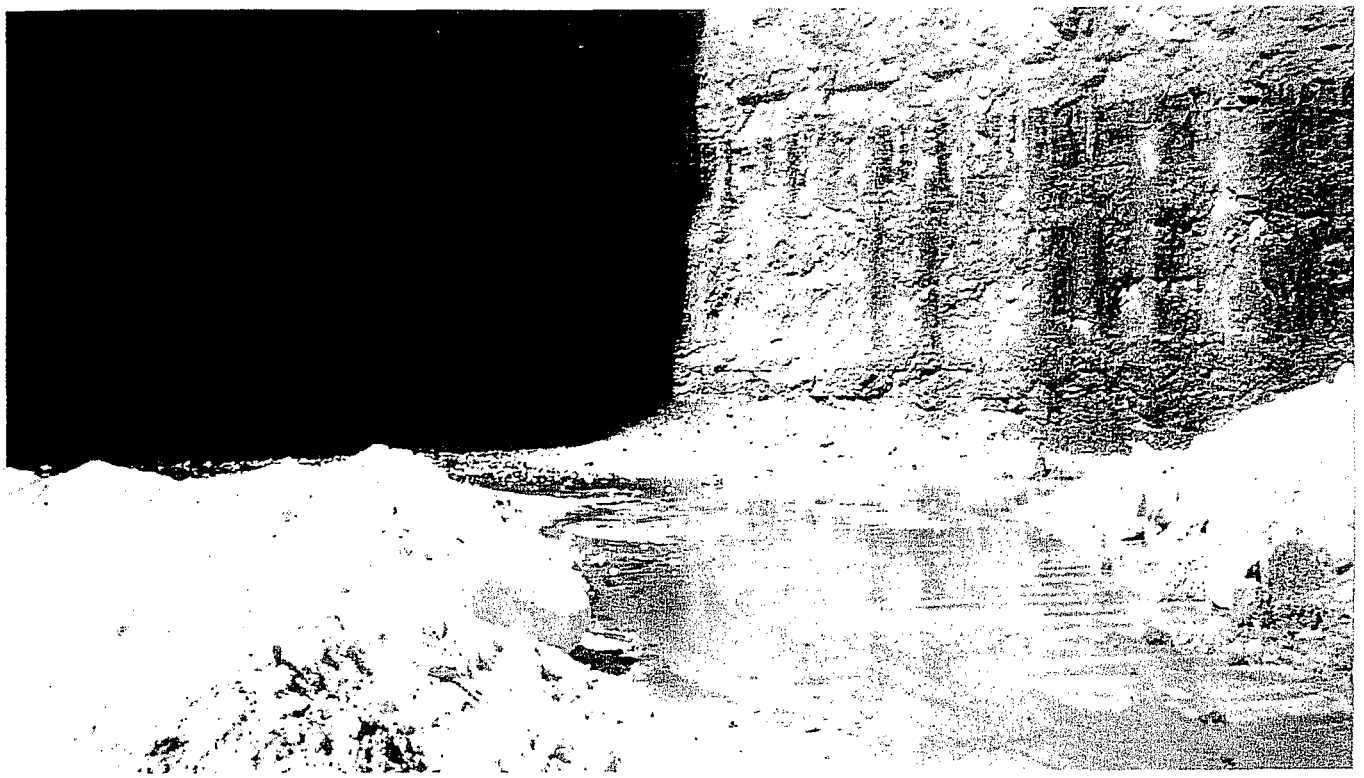
SPECIAL CONDITION 18: The Illinois Environmental Protection Agency has determined that the effluent limitations in this permit constitute BAT/BAC for stormwater which is treated in the existing treatment facilities for purposes of this permit issuance, and no pollution prevention plan will be required for such stormwater. This does not preclude the use of pollution prevention techniques as a means or partial means of meeting the effluent limits. In addition to the chemical specific monitoring required elsewhere in this permit, the permittee shall conduct an annual inspection of the facility site to identify areas contributing to a stormwater discharge associated with mining and determine whether any facility modifications have occurred which result in previously treated stormwater discharges no longer receiving treatment. If any such discharges are identified, the permittee shall request a modification of this permit within 30 days after the inspection. Records of the annual inspection shall be retained by the permittee for the term of this permit and shall be made available to the Illinois Environmental Protection Agency upon request.

NPDES Permit No. ILG840029

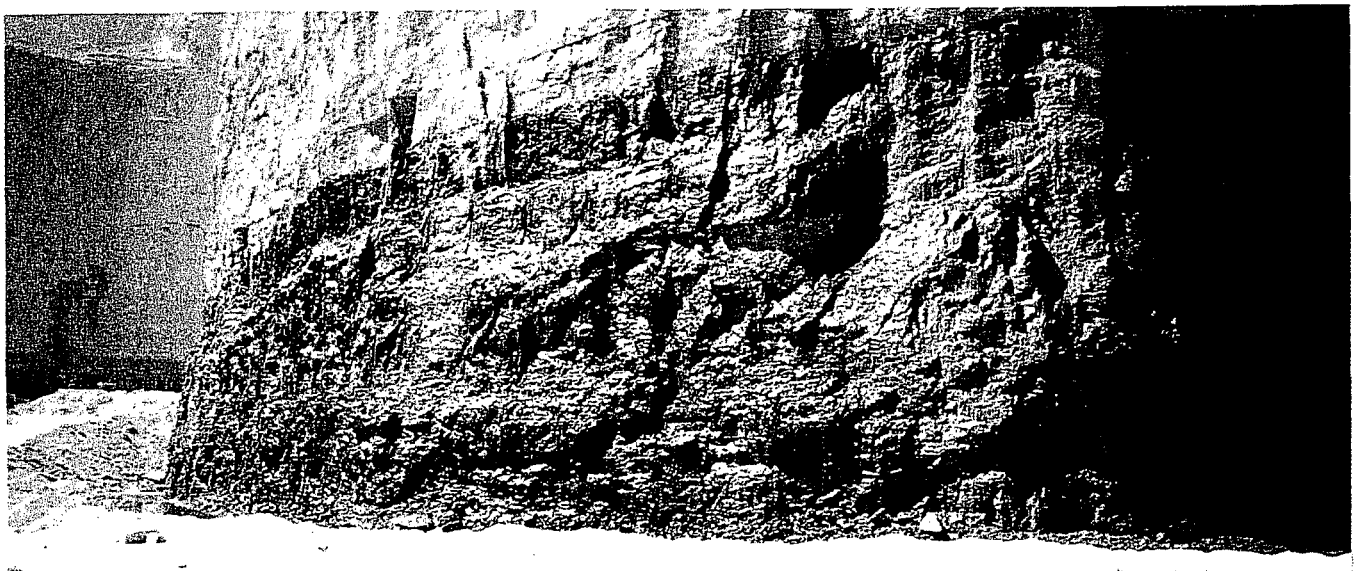
Construction Authorization

The facility is an existing, approximately 100 acre limestone quarry and stockpile, designated as the Material Service Corporation, Yard 19 - Federal Quarry, located in Section 10, T38N, R12E of the 3rd P.M. in Cook County, Illinois in McCook. Mine operations include the excavation, crushing, screening, sizing, stockpiling and loading of limestone aggregate for general agricultural and construction usage. Storm water runoff and pit pumpage are collected in two settling basins prior to discharge. Mine operations result in the discharge of storm water runoff and pit pumpage at an average rate of 2.6 MGD to the Summit - Lyons Ditch at Outfall 001.

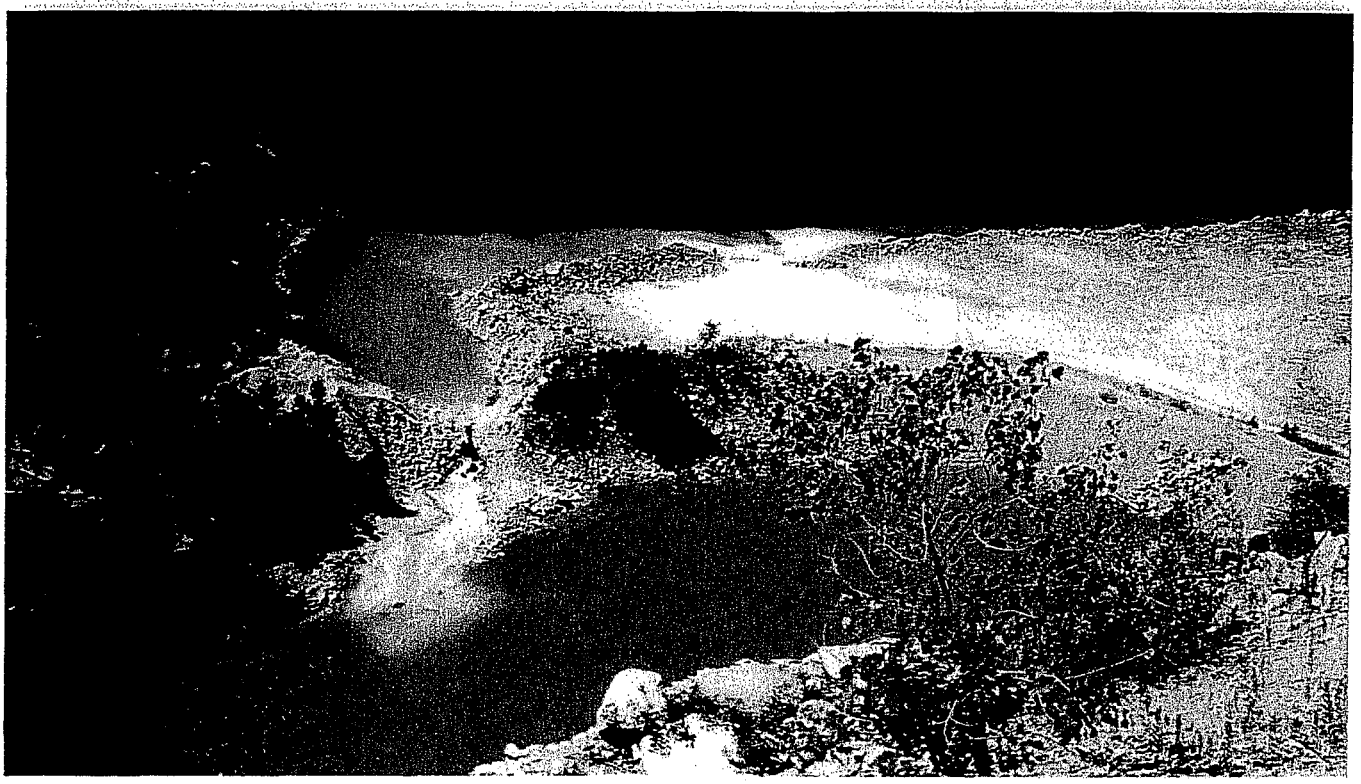
APPENDIX B
SITE PHOTOGRAPHS



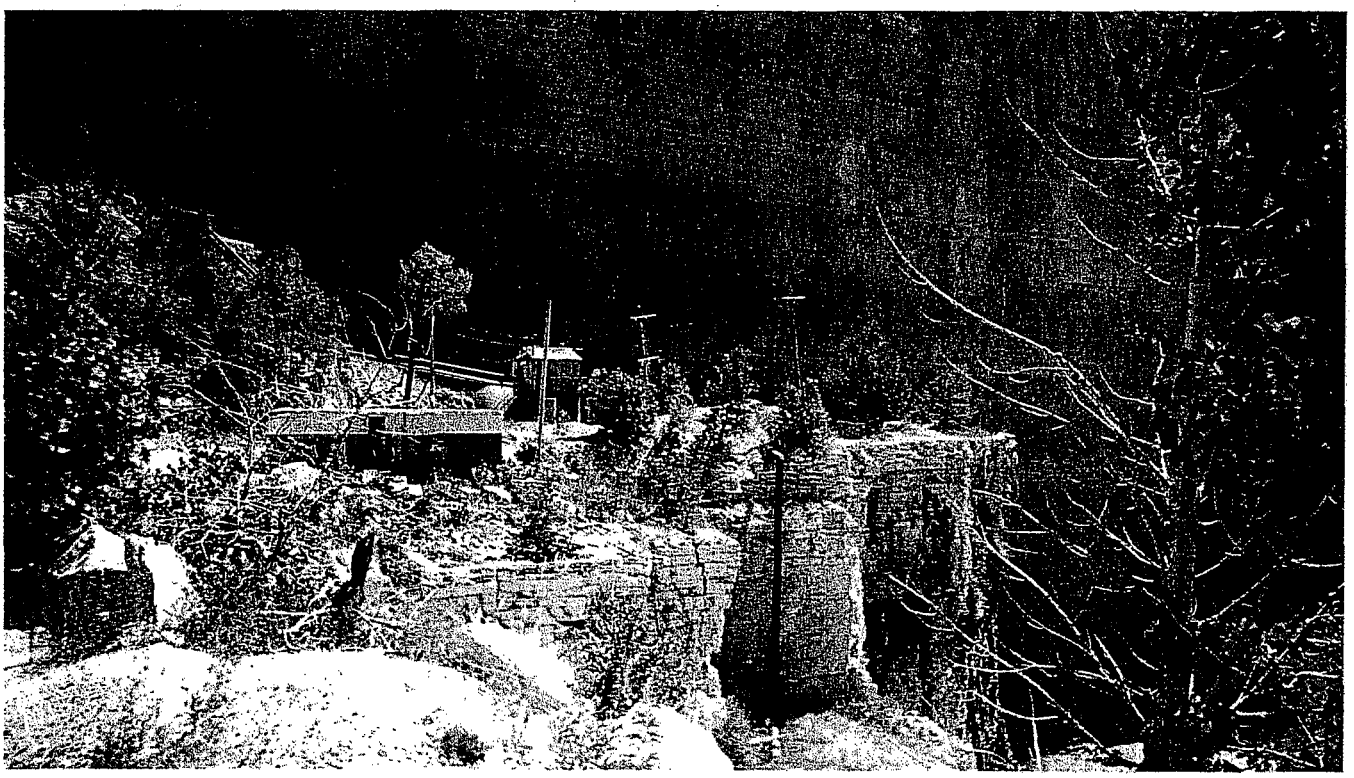
PHOTOGRAPH 1: View of groundwater seepage in southwest corner of the Yard 19 quarry.



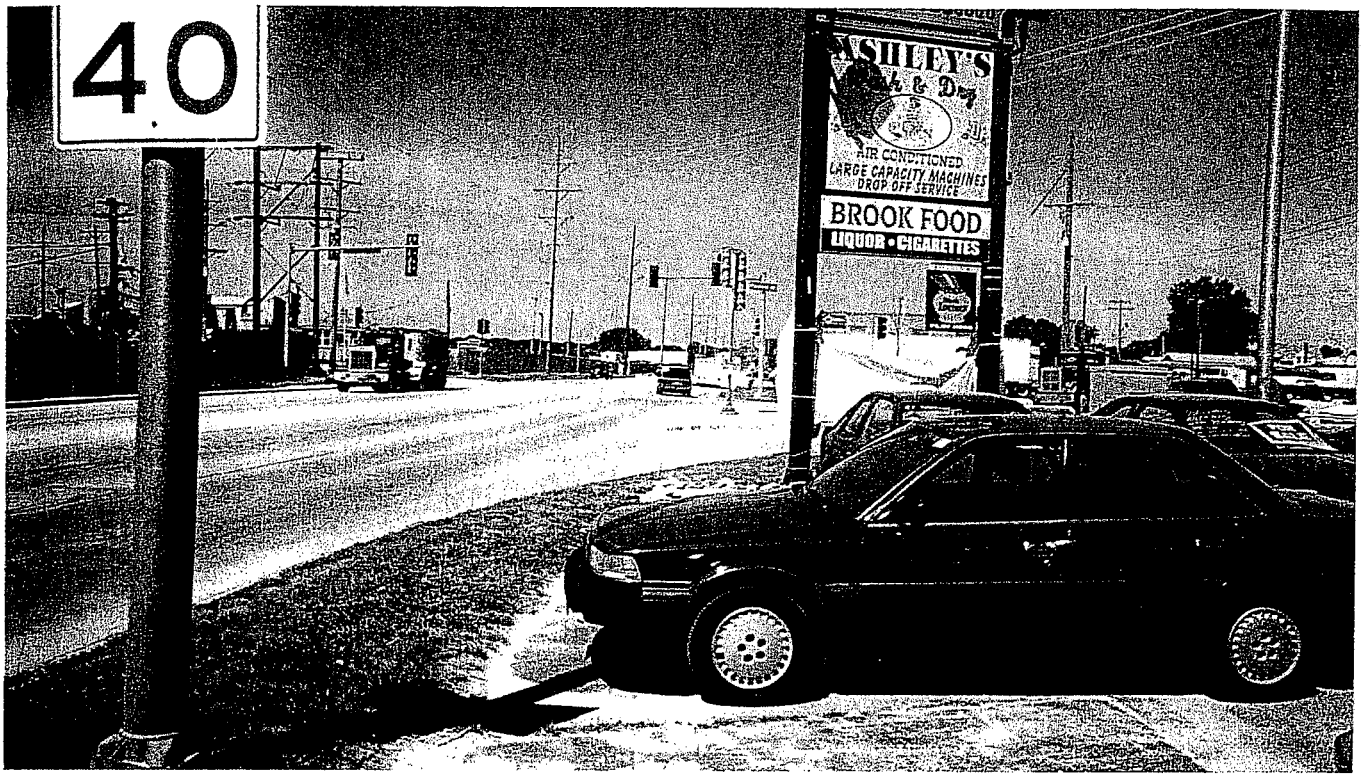
PHOTOGRAPH 2: View of groundwater seepage from western wall of the Yard 19 quarry.



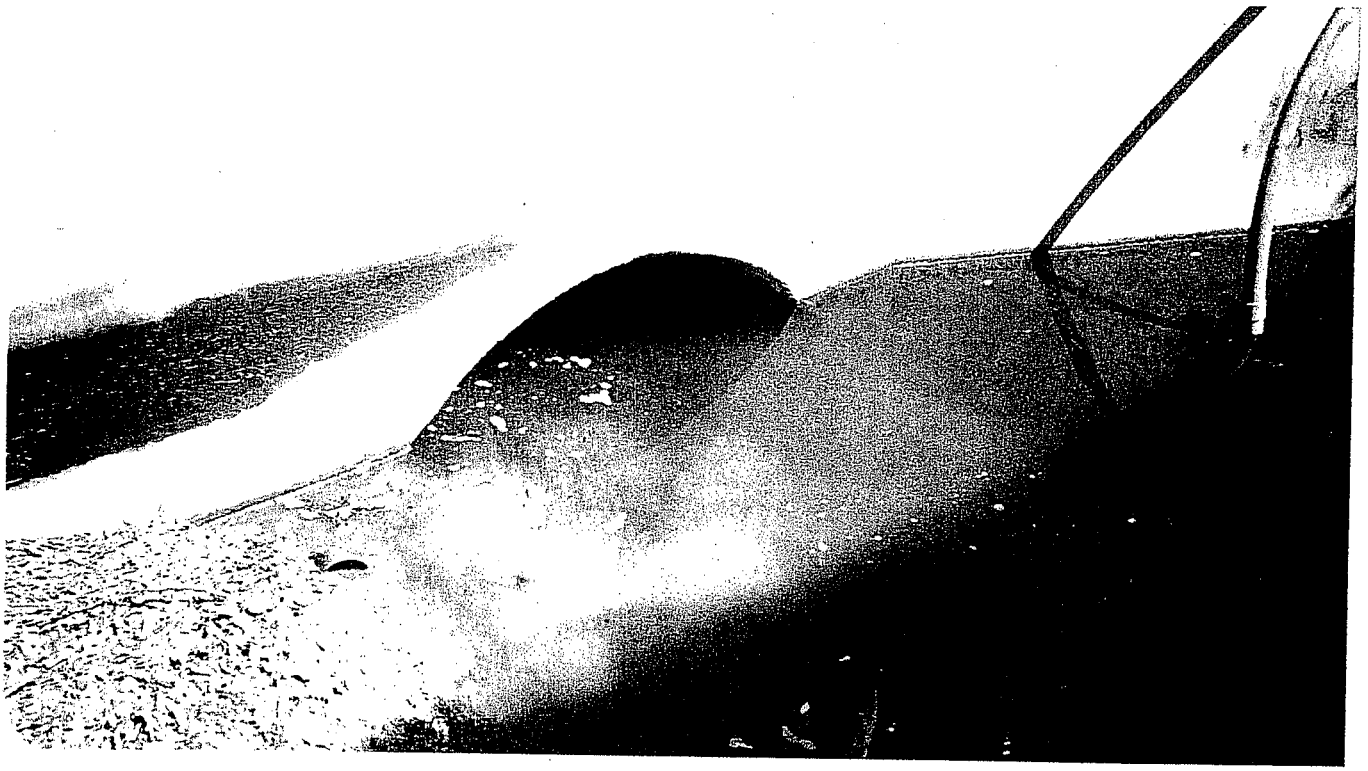
PHOTOGRAPH 3: View looking south of the settling ponds on the floor of the Yard 19 quarry.



PHOTOGRAPH 4: View of upper settling pond and collection sump with pump and associated piping located along northern wall of the Yard 19 quarry.

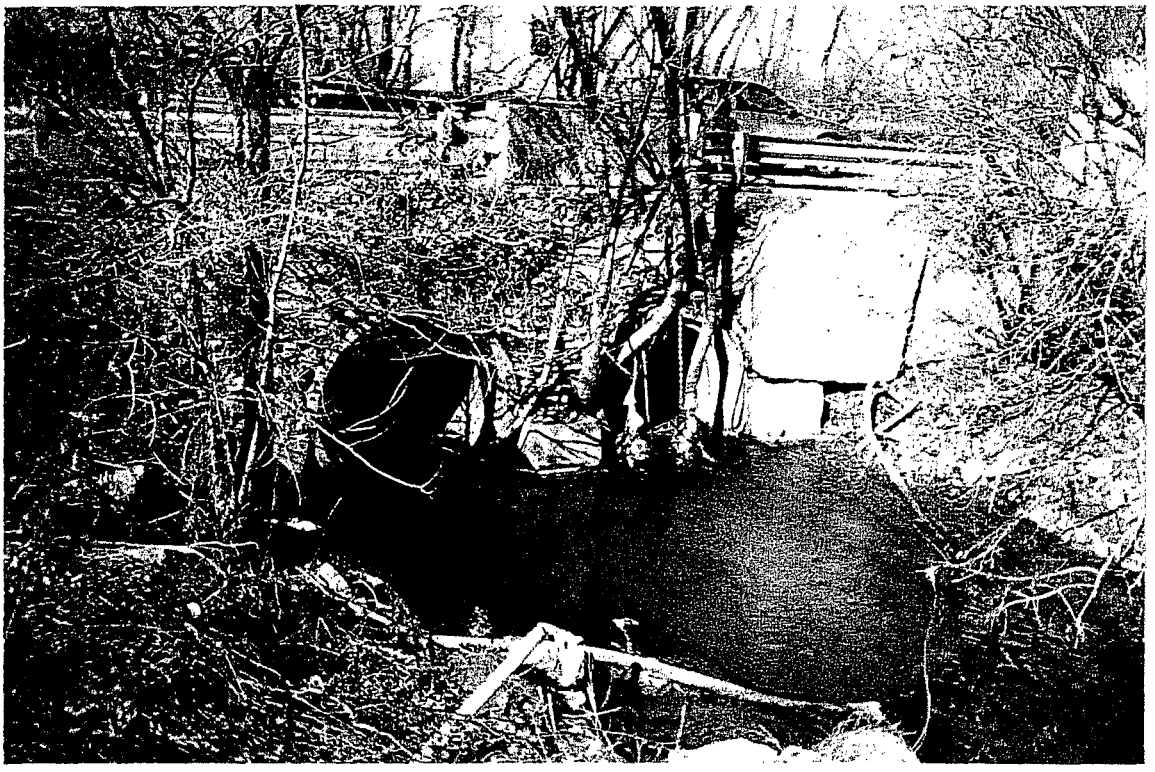


PHOTOGRAPH 5: View of upper storm water drainage area of McCook Drainage Ditch. View is looking west along 47th Street at the intersection with Plainfield Road.



PHOTOGRAPH 6: View of beginning of the McCook Drainage Ditch as it exits culvert on , south side of 47th Street.

PHOTOGRAPH 7: View looking north of McCook Drainage Ditch north of Joliet Road.



PHOTOGRAPH 8: View looking north of McCook Drainage Ditch as it exits culvert on south side of Joliet Road.

PHOTOGRAPH 9: View looking north of the McCook Drainage Ditch north of Illinois Western and Santa Fe Railroad line.

PHOTOGRAPH 10: View looking south of the McCook Drainage Ditch south of Illinois Western and Santa Fe Railroad line.

PHOTOGRAPH 11: View looking southwest of the McCook Drainage Ditch flowing northeast and parallel to the Des Plaines River.

PHOTOGRAPH 12: View looking south of the McCook Drainage Ditch as it enters the Des Plaines River conduit.

APPENDIX C
BACKGROUND SURFACE WATER QUALITY DATA

Surface Water Qualtiy Data: Metropolitan Water Reclamation District

	Sanitary & Ship Canal at Harlem Ave.		Sanitary & Ship Canal at Hwy. 83		Sanitary & Ship Canal at Cicero Ave.		Des Plaines River at Ogden Ave.	
DATE	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L
1/22/96	785.0	68.03	870.0	86.86	878.0	56.71	1061.0	98.62
2/13/96	529.0	79.80	532.0	72.79	506.0	52.15	976.0	102.70
3/11/96	790.0	90.99	867.0	90.68	533.0	48.55	937.0	93.82
4/8/96	587.0	83.76	575.0	94.03	505.0	59.10	857.0	8.10
5/13/96	445.0	62.58	456.0	63.71	753.0	46.80	610.0	65.94
6/10/96	511.0	52.48	531.0	61.68	496.0	38.73	517.0	63.73
7/8/96	471.0	63.53	507.0	9.54	340.0	57.87	914.0	112.21
8/12/96		63.03		57.86		37.50	711.0	103.00
9/16/96	521.0	70.46	429.0	68.48	383.0	28.84	554.0	89.07
10/21/96	435.0	78.00	471.0	72.90	349.0	43.78	631.0	101.84
11/13/96	470.0	87.17	453.0	74.84	345.0	49.73	835.0	97.04
12/9/96	587.0	88.74	662.0	93.33	527.0	45.70	664.0	94.45
1/13/97	608.0	45.01	1049.0	81.11	547.0	34.08	1279.0	101.76
2/10/97	927.0	97.56	736.0	89.66	793.0	51.20	719.0	51.77
3/10/97	628.0	82.52	722.0	95.14	549.0	54.36	861.0	95.81
4/14/97	587.0	70.11			494.0	52.15	901.0	102.14
5/12/97	588.0	70.55	567.0	73.41	411.0	39.01	656.0	79.15
6/9/97	494.0	60.40			369.0	42.90	572.0	58.80
7/14/97	383.0	51.70	404.0	50.20	270.0	28.40	572.0	58.10
8/11/97	403.0	58.50	419.0	54.70	263.0	25.70	673.0	73.10
9/15/97	421.0	60.50	394.0	50.00	276.0	28.90	589.0	82.40
10/13/97	352.0	47.20	346.0	49.90	240.0	30.10	330.0	45.80
11/17/97	604.0	62.30	513.0	69.70	370.0	36.20	797.0	98.50
12/8/97	515.0	67.70	536.0	74.40	468.0	45.30	1018.0	91.40

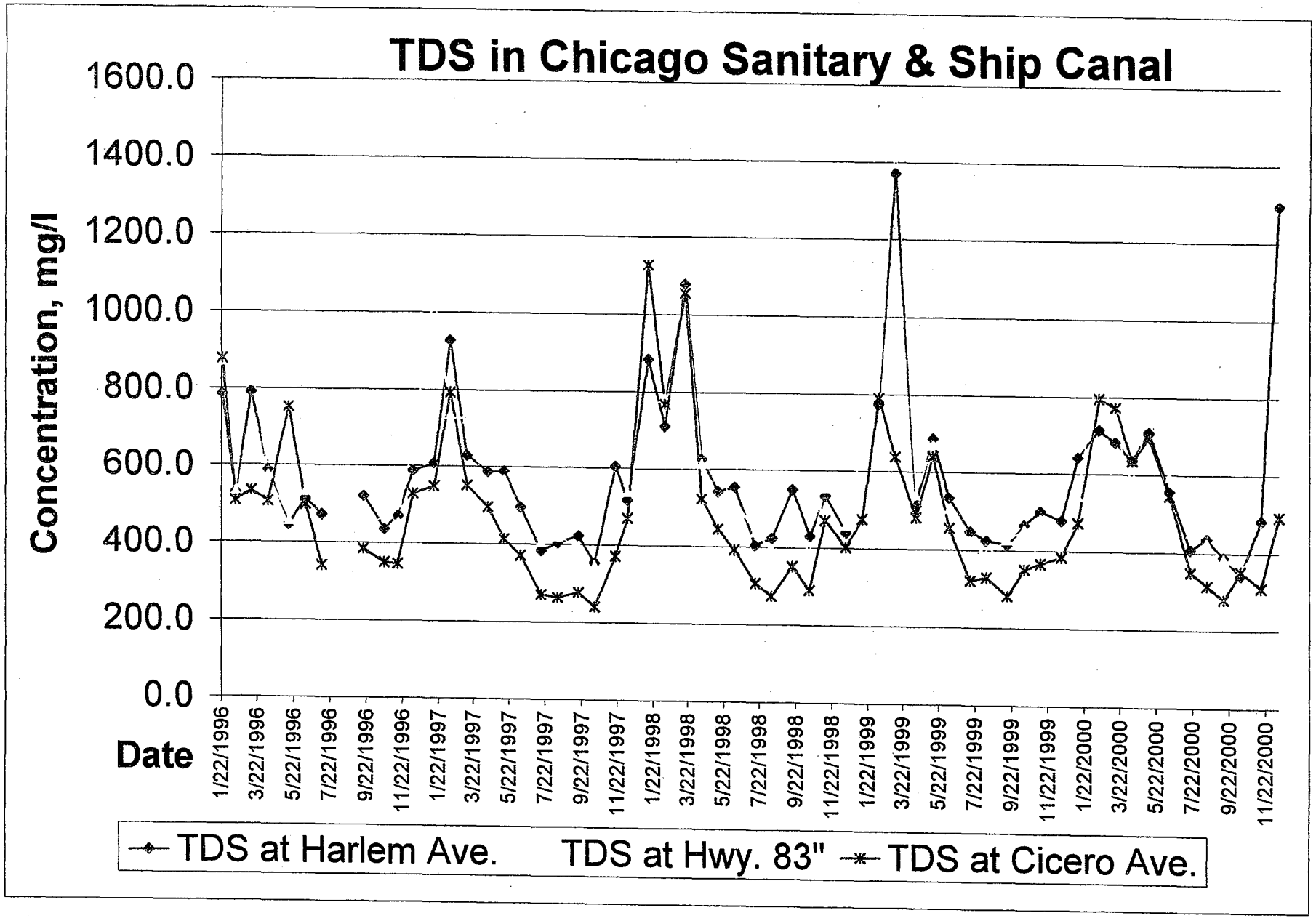
Surface Water Qualtiy Data: Metropolitan Water Reclamation District

	Sanitary & Ship Canal at Harlem Ave.		Sanitary & Ship Canal at Hwy. 83		Sanitary & Ship Canal at Cicero Ave.		Des Plaines River at Ogden Ave.	
DATE	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L
1/12/98	884.0	73.10	757.0	79.70	1127.0	43.70	1355.0	96.90
2/9/98	711.0	101.50	784.0	101.50	767.0	63.00	756.0	75.70
3/16/98	1077.0	99.50	1056.0	93.30	1054.0	62.90	862.0	87.10
4/13/98	626.0	80.00	614.0	81.00	522.0	51.00	583.0	67.20
5/11/98	541.0	65.90	580.0	75.60	444.0	43.90	656.0	74.10
6/8/98	554.0	89.60	521.0	74.00	391.0	40.60	621.0	74.20
7/13/98	403.0	44.50	437.0	53.70	306.0	35.20	699.0	118.00
8/10/98	424.0	50.50	394.0	48.70	273.0	26.80	525.0	76.30
9/14/98	549.0	78.90	472.0	64.90	350.0	36.00	631.0	89.40
10/13/98	428.0	75.10	385.0	69.30	290.0	41.00	621.0	89.30
11/9/98	534.0	76.20	555.0	12.60	469.0	53.10	621.0	97.10
12/14/98	439.0	73.70	459.0	80.40	401.0	48.80	681.0	107.00
1/11/99			663.0	71.20	474.0	44.90	758.0	56.00
2/8/99	773.0	87.90	795.0	93.20	790.0	71.00	612.0	80.60
3/8/99	1370.0	77.40	1463.0	77.10	638.0	56.10	843.0	76.80
4/12/99	509.0	49.60	539.0	55.30	480.0	47.20	445.0	47.50
5/10/99	687.0	91.30	670.0	88.70	640.0	65.70	563.0	66.50
6/7/99	533.0	69.60	504.0	70.00	455.0	49.60	504.0	57.60
7/12/99	446.0	76.50	424.0	64.90	321.0	40.60	577.0	75.80
8/9/99	423.0	56.70	388.0	53.00	329.0	41.90	611.0	90.30
9/13/99	414.0	64.80	426.0	66.10	282.0	42.30	714.0	104.60
10/11/99	465.0	90.50	454.0	86.00	351.0	48.50	657.0	102.10
11/8/99	500.0	70.40	481.0	68.00	365.0	44.50	703.0	95.00
12/13/99	477.0	96.00	388.0	73.00	383.0	46.00		
1/10/00	643.0	89.00	541.0	92.00	472.0	53.00		

Surface Water Qualtiy Data: Metropolitan Water Reclamation District

	Sanitary & Ship Canal at Harlem Ave.		Sanitary & Ship Canal at Hwy. 83		Sanitary & Ship Canal at Cicero Ave.		Des Plaines River at Ogden Ave.	
DATE	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	SULFATE (SO4) mg/L
2/14/00	714.0	80.00	900.0	79.00	795.0	58.00	1087.0	76.00
3/13/00	683.0	86.00	719.0	89.00	772.0	62.00	902.0	111.00
4/10/00	637.0	80.00	580.0	60.00	634.0	60.00	653.0	71.00
5/8/00	709.0	95.00	758.0	111.00	695.0	77.00	550.0	61.00
6/12/00	554.0	63.00	593.0	72.00	543.0	50.00	393.0	47.00
7/17/00	407.0	46.00	453.0	56.00	348.0	38.00	553.0	80.00
8/14/00	435.0	64.00	425.0	56.00	315.0	36.00	788.0	103.00
9/11/00	387.0	54.63	384.0	54.57	279.0	37.34	410.0	53.38
10/9/00	343.0	47.00	356.0	54.00	352.0	48.00	703.0	104.00
11/13/00	482.0	71.00	424.0	55.00	310.0	36.00	746.0	86.00
12/13/00	1294.0	92.00			491.0	64.00		
AVERAGE	**581.0**	**72.4**	**578.2**	**70.4**	**484.3**	**46.6**	**712.6**	**81.9**

ND = No Data


TDS in Chicago Sanitary & Ship Canal
Concentration, mg/l
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Date
1/22/1996
3/22/1996
5/22/1996
7/22/1996
9/22/1996
11/22/1996
1/22/1997
3/22/1997
5/22/1997
7/22/1997
9/22/1997
11/22/1997
1/22/1998
3/22/1998
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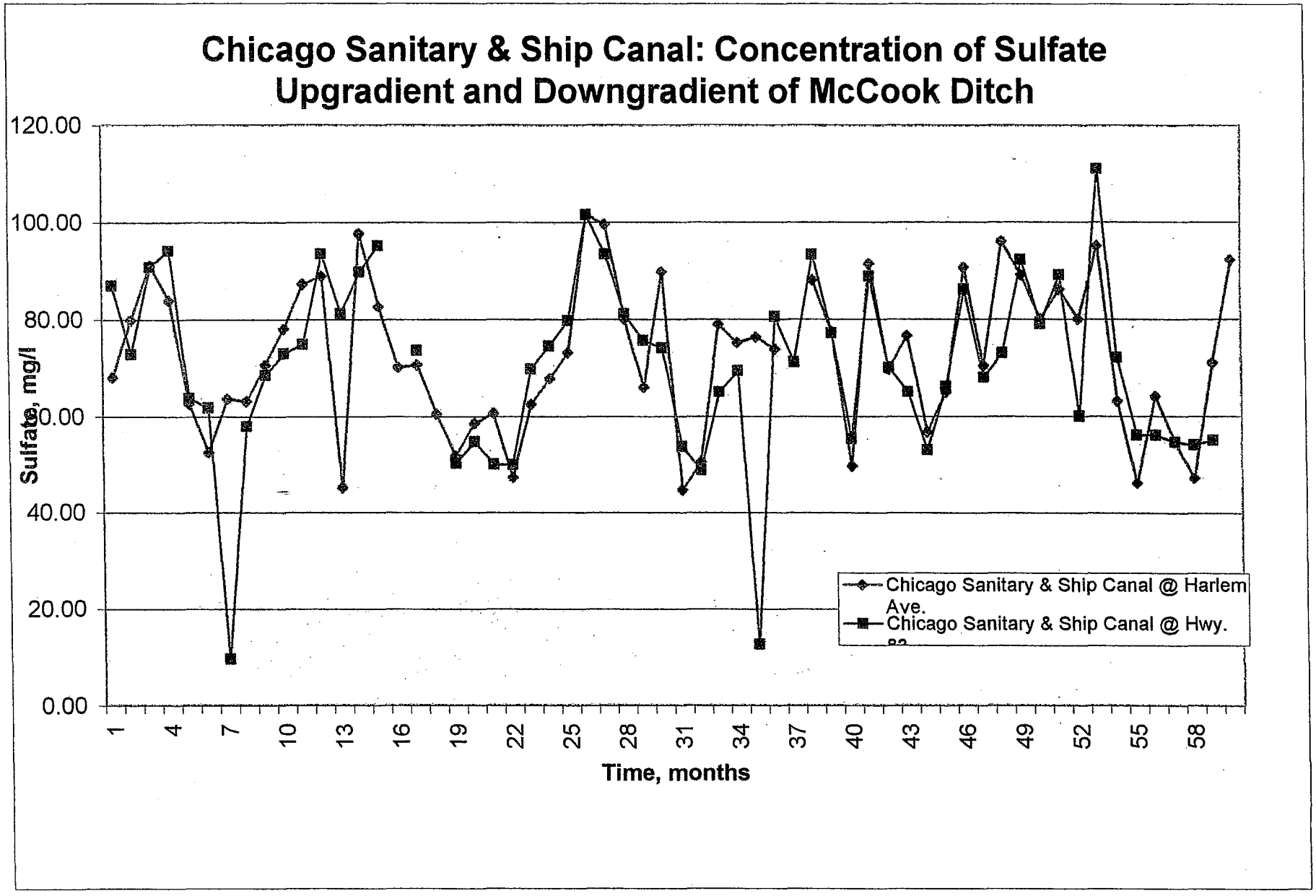
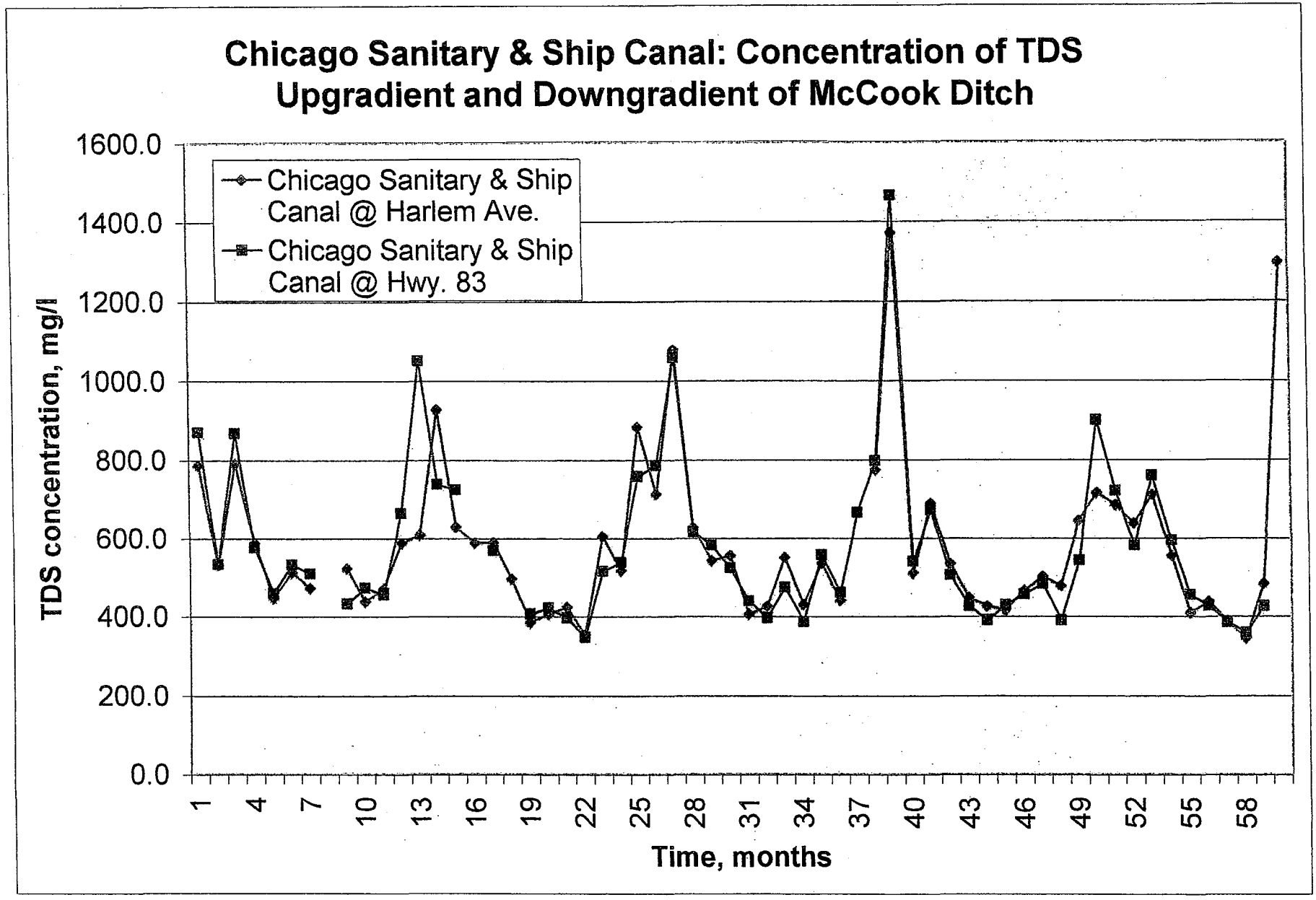
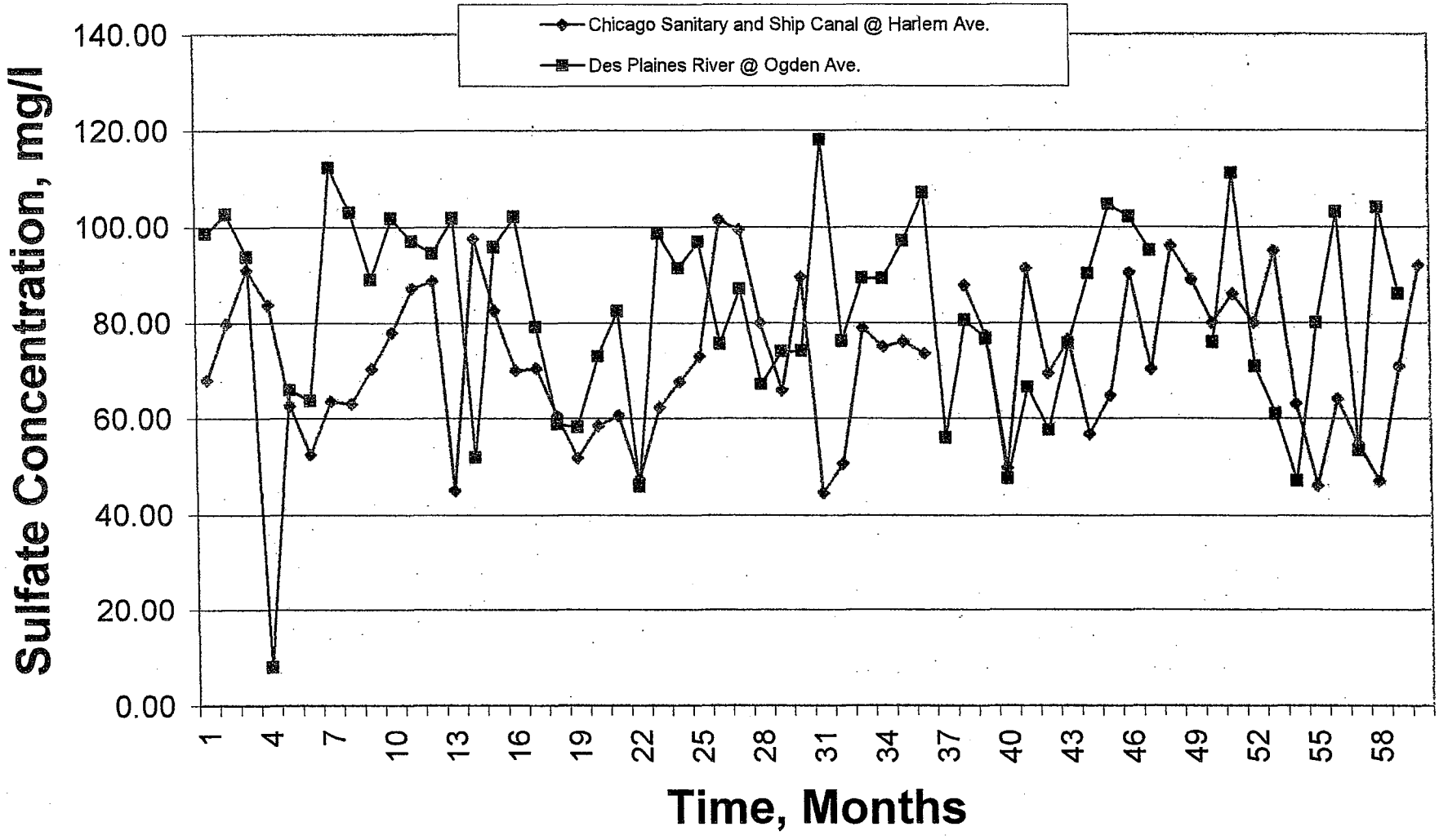
11/22/1998
1/22/1999
3/22/1999
5/22/1999
7/22/1999
9/22/1999
11/22/1999
1/22/2000
3/22/2000
5/22/2000
7/22/2000
9/22/2000
11/22/2000
TDS at Harlem Ave.
TDS at Hwy. 83"
TDS at Cicero Ave.

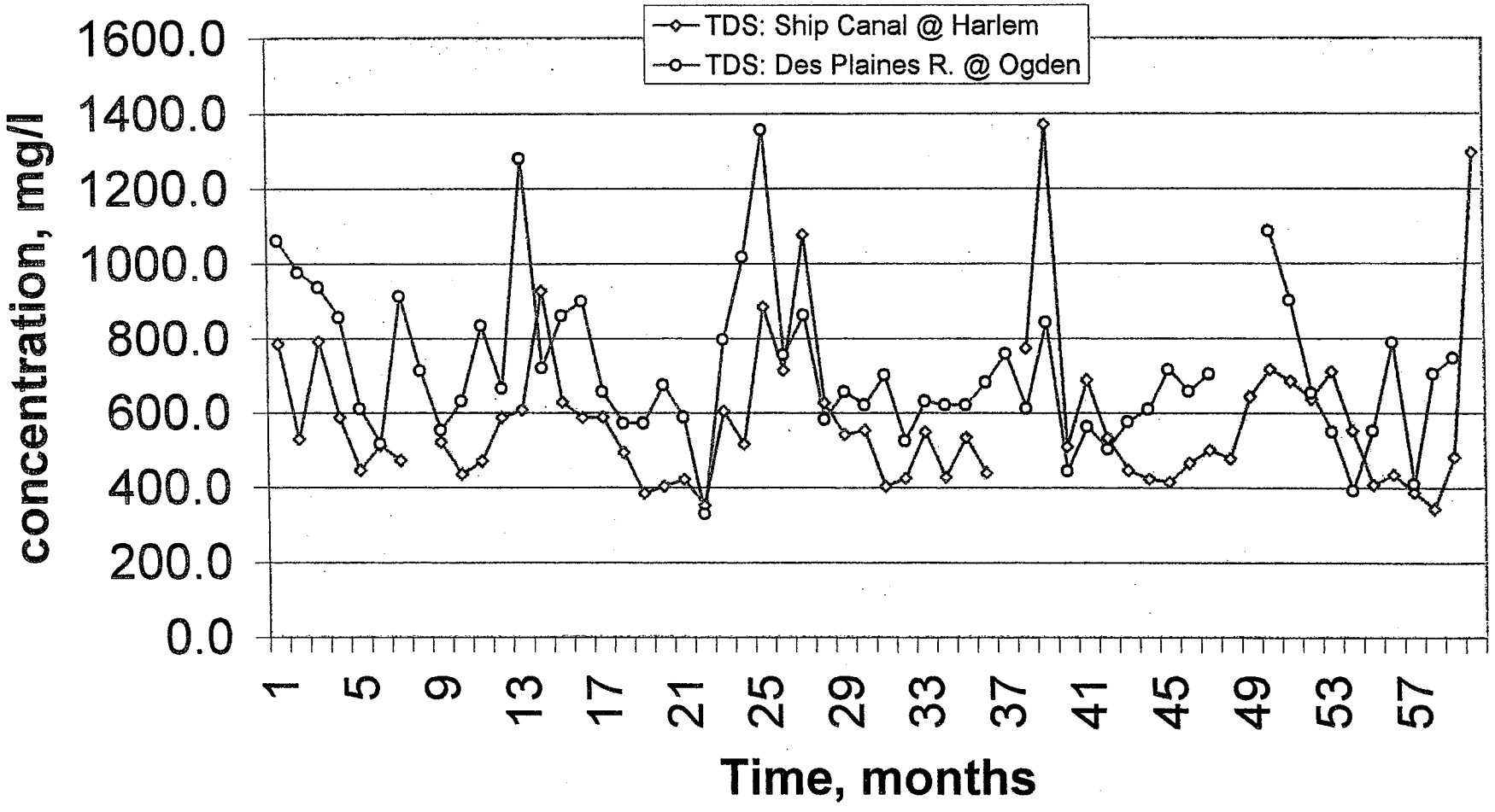

Chicago Sanitary & Ship Canal: Concentration of Sulfate
Upgradient and Downgradient of McCook Ditch
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Sulfate, mg/l
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
Time, months
Chicago Sanitary & Ship Canal @ Harlem Ave.
Chicago Sanitary & Ship Canal @ Hwy.

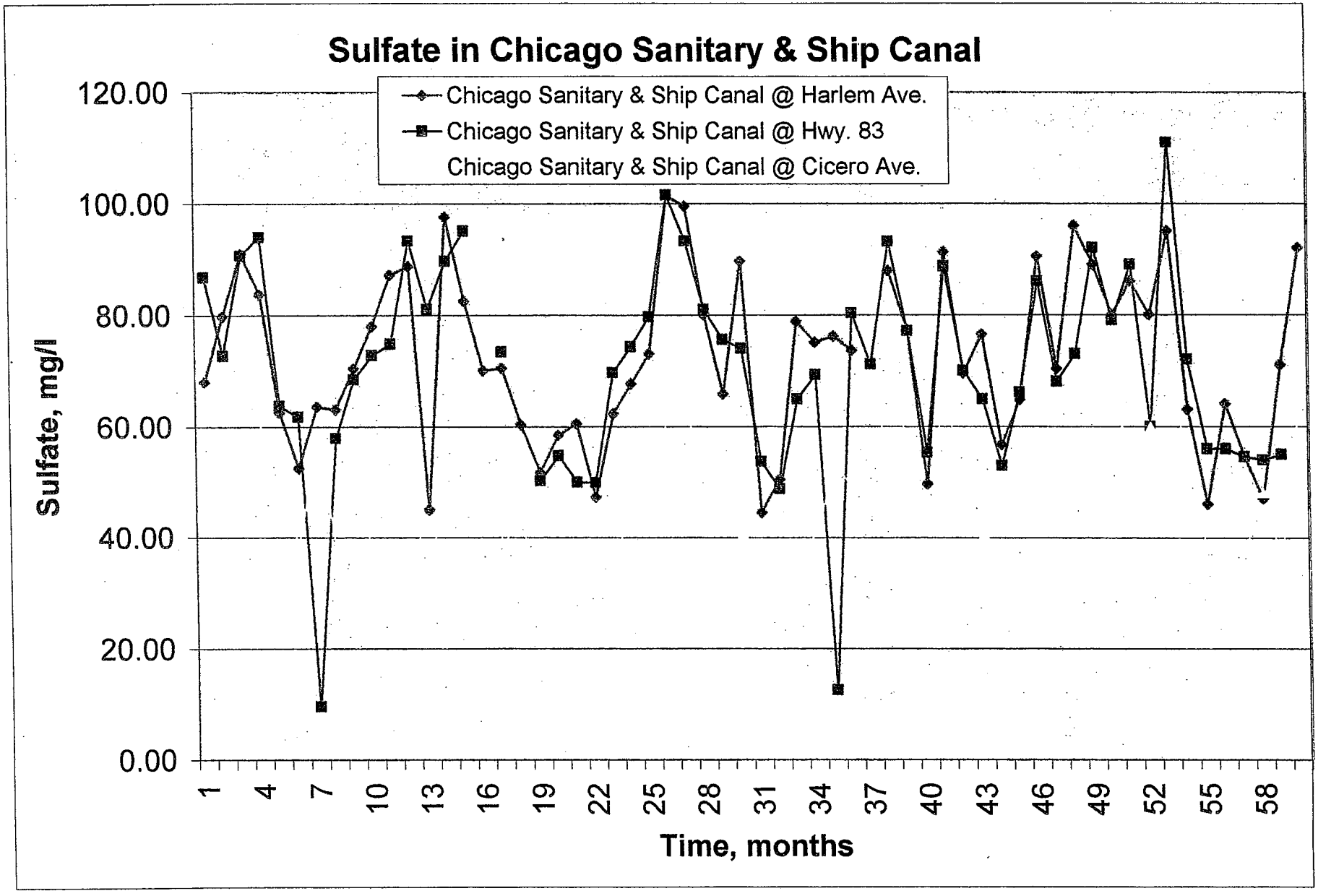

Chicago Sanitary & Ship Canal: Concentration of TDS
Upgradient and Downgradient of McCook Ditch
Chicago Sanitary & Ship Canal @ Harlem Ave.
Chicago Sanitary & Ship Canal @ Hwy. 83
TDS concentration, mg/l
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
Time, months

Comparison of Sulfate in Surface Water



Comparison of Surface Water Quality: Sanitary Ship Canal with Des Plaines River




Sulfate in Chicago Sanitary & Ship Canal
Chicago Sanitary & Ship Canal @ Harlem Ave.
Chicago Sanitary & Ship Canal @ Hwy. 83
Chicago Sanitary & Ship Canal @ Cicero Ave.
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Sulfate, mg/l
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
Time, months

APPENDIX D
MCCOOK DRAINAGE DITCH FLOW MEASUREMENTS

FLOW MEASUREMENTS AND DISCHARGE CALCULATIONS
Material Service Corporation -Yard 19

McCook Ditch at 47th Street (up-gradient)

Date	Area	Velocity	CFS	GPM	Potental GPD
4/6/01	0.33	0.35	0.12	52.0	74,921
6/1/01	0.45	1.40	0.63	284.1	409,079
6/8/01	0.48	0.70	0.34	152.0	218,881
6/12/01	0.72	0.65	0.47	210.4	302,980
6/18/01	0.45	1.35	0.60	270.7	389,757
6/26/01	0.07	0.35	0.02	10.4	15,020
7/6/01	0.16	0.35	0.06	24.8	35,719
7/13/01	0.16	0.35	0.06	24.8	35,719
AVERAGE	**0.35**	**0.69**	**0.29**	**128.7**	**185259**

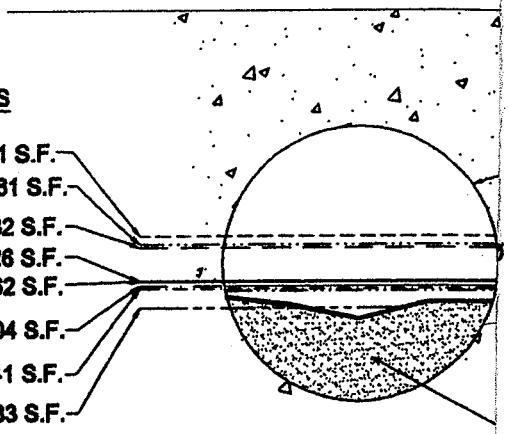
MSC's Discharge into McCook Ditch

Date	Area	Velocity	CFS	GPM	Potental GPD
3/13/01	5.33	0.72	3.84	1721.8	2479462
3/20/01	6.32	1.44	9.09	4081.5	5877425
3/26/01	5.58	0.82	4.57	2052.2	2955213
4/3/01	1.84	3.84	7.07	3171.9	4567597
4/6/01	0.18	1.91	0.35	157.1	226277
6/1/01	2.24	3.27	7.31	3282.0	4726098
6/8/01	1.59	3.10	4.94	2218.0	3193902
6/12/01	2.25	3.87	8.72	3912.7	5634293
6/18/01	1.84	3.33	6.13	2753.4	3964889
6/26/01	1.43	2.30	3.29	1476.7	2126474
7/6/01	1.84	3.97	7.30	3276.6	4718304
7/13/01	1.43	2.33	3.33	1496.0	2154211
AVERAGE	**2.66**	**2.58**	**5.50**	**2466.7**	**3552012**

McCook Ditch at Des Plaines River (down-gradient)

Date	Area	Velocity	CFS	GPM	Potental GPD
early March '01	23.53	1.89	44.43	19942.5	28717173
3/13/01	3.02	1.45	4.38	1966.0	2831058
3/20/01	5.29	2.01	10.64	4774.9	6875842
3/26/01	3.88	1.49	5.78	2593.0	3733877
4/3/01	4.33	1.64	7.11	3189.6	4593005
4/6/01	3.44	1.38	4.75	2130.3	3067563
6/1/01	7.37	2.75	20.26	9094.8	13096527
6/8/01	9.03	2.50	22.58	10132.3	14590566
6/12/01	5.63	2.00	11.25	5049.8	7271692
6/18/01	4.41	1.50	6.62	2969.7	4276345
6/26/01	3.48	1.47	5.10	2287.9	3294507
7/6/01	2.95	1.30	3.84	1723.1	2481223
7/13/01	3.30	1.67	5.50	2467.3	3552967
AVERAGE	**4.68**	**1.76**	**8.98**	**4031.5**	**5805431**

ONCRETE WALL



WATER LEVELS

20MAR01 - 6.3151 S.F.
26MAR01 - 5.5761 S.F.
13MAR01 - 5.3282 S.F.
12JUN01 - 2.2526 S.F.
01JUN01 - 2.2362 S.F.
03APR01 - 1.8404 S.F.
08JUN01 - 1.5941 S.F.
06APR01 - 0.1833 S.F.

CONCRETE PIPE

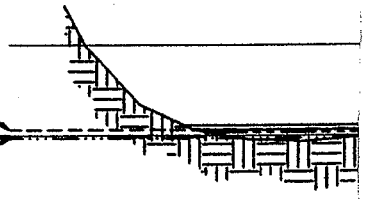
18JUN01 - 4.4110 S.F.
26JUN01 - 3.4754 S.F.
13JUL01 - 3.2977 S.F.
06JUL01 - 2.9531 S.F.

MSC DISCHARGE OUTFALL @

A

ER

EXISTING SURFAC



18JUN01 - 0.4467 S.F.
13JUL01 - 0.1579 S.F.
06JUL01 - 0.1579 S.F.
26JUN01 - 0.0664 S.F.

McCOOK DITCH @ 47

REV.NO.	DESCRIPTION	BY	DATE

REVISIONS
DESTROY ALL PREVIOUS PRINTS

RELEASED FOR CONSTRUCTION	
APPROVED FOR CONSTRUCTION	

MATERIAL SERVICE CORPORATION
222 NORTH LA SALLE STREET CHICAGO, ILLINOIS 60601 312-372-3600

FEDERAL QUARRY - YARD 19

N.P.D.E.S. DISCHARGE

ADJUSTED STANDARD

SCALE: NOT TO SCALE	JOB NO.
DRWN: POLACZEK DATE: 22MAY01	DWG No. 19372
AERIAL FLOWN: 23-Sep-96	

APPENDIX E
AGREGATE WASHING DATA AND CALCULATIONS

From MSC Engineering and Operations Departments

- Aggregate wash screen pump operated at 150 gpm.
- Average of 7.333 minutes to wash a load of stone.
- Average of 1100 gallons of water to wash load of stone.
- Average load of stone is 22 tons.
- Average 50 gallons of water to wash a ton of stone.
- Yard 19 sells an average of 500,000 tons of washed stone a year.

Water Needs for Aggregate Washing Operations

Gallons/Ton Stone	Tons washed/year	Gallons used per year	Ave daily water use
50	500,000	25,000,000	68,493

Water Needs for Aggregate Washing Operations if Production Increased by 50%

Gallons/Ton Stone	Tons washed/year	Gallons used per year	Ave daily water use
50	750,000	37,500,000	102,739.5

Water Needs if Aggregate Washing Operations if Production Increased by 100%

Gallons/Ton Stone	Tons washed/year	Gallons used per year	Ave daily water use
50	1,000,000	55,000,000	136,986

AGGREGATE WASH WATER AS A PERCENTAGE OF TOTAL DAILY QUARRY DEWATERING

At 25,000,000 gallons per Year or 68,493 gallons per day

- 1.9% of total flow if 3,600,000 gallons per day of quarry discharge is used.
- 1.36% of total flow if 5,030,000 gallons per day of quarry discharge is used.

At 37,500,000 gallons per Year or 102,739.5 gallons per day

- 2.85% of total flow if 3,600,000 gallons per day of quarry discharge is used.
- 2.04% of total flow if 5,030,000 gallons per day of quarry discharge is used.

At 50,000,000 gallons per Year or 136,986 gallons per day

- 3.81% of total flow if 3,600,000 gallons per day of quarry discharge is used.
- 2.72% of total flow if 5,030,000 gallons per day of quarry discharge is used.

EVALUATION OF CONTRIBUTION OF TDS FROM AGGREGATE WASH OPERATION

SAMPLE FROM MCS's AGGREGATE WASHING OPERATIONS COLLECTED ON 6/1/01

		TDS	Sulfate	pH	Chloride	TSS
Tested on	6/1/01			7.88		
Tested on	6/4/01	1210				
Tested on	6/7/01		526		225	
Tested on	6/11/01					17200
Tested on	6/14/01	1260				
Tested on	6/20/01	1380				19700
Tested on	6/21/01		498		230	
Tested on	6/21/01		518		230	
Wash sample average:		1283	514		228	18450

THE SAMPLES COLLECTED ON 6/1/01 HAVE THE FOLLOWING IMPACT:

	TDS	Sulfate	pH	Chloride
MSC Discharge (Pre-Aggregate Wash)	1210	524	7.76	210
Aggregate Wash Sample Average	1283	514	7.88	228
Impact of stone washing	73	-10	0.12	18

SAMPLE FROM MCS's AGGREGATE WASHING OPERATIONS COLLECTED ON 7/13/01

Sample #		TDS	Sulfate	pH	Chloride	TSS
Wash-1				Not tested		
Tested on	7/20/01	1350			215	16600
Tested on	7/21/01		529			
Wash-2				Not tested		
Tested on	7/27/01	1400				21500
Tested on	8/1/01		387			
Tested on	8/4/01				240	
Wash-3				Not tested		
Tested on	8/3/01	1410				21800
Tested on	8/4/01				240	
Tested on	8/8/01		419			
Wash sample average:		1387	445		231	19967

THE MSC DISCHARGE SAMPLE COLLECTED ON 7/13/01 PRIOR TO THE AGGREGATE WASH

Sample 19		TDS	Sulfate	pH	Chloride	TSS
Tested on	7/17/01			Not tested		9
Tested on	7/20/01	1450			230	
Tested on	7/21/01		460			

THE SAMPLES COLLECTED ON 7/13/01 HAVE THE FOLLOWING IMPACT:

	TDS	Sulfate	pH	Chloride
MSC Discharge (Pre-Aggregate Wash)	1450	460	Not tested	230
Aggregate Wash Sample Average	1386.67	445	Not tested	231
Impact of stone washing	-63.3333	-15	Not tested	1.667

APPENDIX F
YARD 19 QUARRY PUMPING CALCULATIONS

MATERIAL SERVICE CORPORATION
YARD 19 QUARRY PUMPING CALCULATIONS

FROM MSC ENGINEERING DEPARTMENT

- MSC utilizes two vertical turbine pumps (250 and 300 hp.) to de-water the quarry.
- The 250-hp. pump has a rated capacity of 2000 gpm, or 120,000 gallons per hour.
- The 300-hp. pump has a rated capacity of 3000 gpm, or 180,000 gallons per hour.

Maximum Theoretical Pumping

Pump	Gallons per Hour	Hours per Day	Gallons per Day
250 hp	120,000	24	2,880,000
300 hp	180,000	24	4,320,000
		Total	**7,200,000**

Pump Flows Metered by MSC

Pump	From	Days	Metered Hours	Gallons per Hour	Gallons per metered time
250 hp.	1/22/97 to 12/28/98	705	15,120	120,000	1,814,400,000
250 hp	1/25/99 to 12/20/00	696	15,498.6	120,000	1,859,832,000
250 hp	12/20/00 to 6/18/01	179	4,231	120,000	507,720,000
Totals		**1580**			**4,181,952,000**

Pump	From	Days	Metered Hours	Gallons per Hour	Gallons per metered time
300 hp.	1/22/97 to 12/28/98	705	10,583	180,000	1,904,940,000
300 hp	1/25/99 to 12/20/00	696	7,599	180,000	1,367,820,000
300 hp	12/20/00 to 6/18/01	179	2,728	180,000	491,040,000
Totals		**1580**			**3,763,800,000**

Combined Metered Flows for Both Pumps

Pump	Days	Total Gallons	Gallons Per Day
250 hp	1580	4,181,952,000	
300 hp	1580	3,763,800,000	
	Total	**7,945,752,000**	**5,028,956.962**

APPENDIX G
GROUNDWATER SEEPAGE CHEMISTRY DATA

Groundwater Seepage Quality Data Summary
Material Service Corporation
Yard 19 Facility
McCook, Illinois

Sample ID	Date	pH	TSS	TDS	Sulfate	Location
A	2/8/00			1240	390	3
B	2/8/00			1230	340	4
C	2/8/00			1410	660	3
D	2/8/00			1450	510	3
E	2/8/00			1280	440	2
F	2/8/00			1320	530	2
G	2/8/00			1120	580	5
47th St.	7/17/00			1290	388	1
East Ave.	7/17/00			1360	394	1
1	7/28/00			988	270	1
2	7/28/00			1350	370	1
3	7/28/00			1320	396	1
4	7/28/00			1410	452	1
5	7/28/00			1470	384	2
1	11/29/00	8.14	2	860	176	1
2	11/29/00	7.99	3	1230	370	1
3	11/29/00	7.32	3	1240	379	1
4	11/29/00	8.11	4	1230	377	1
5	11/29/00	7.39	5	1280	390	1
6	11/29/00	8.04	4	1310	390	1
7	11/29/00	7.85	2	1390	379	1
8	11/29/00	7.27	7	1300	414	1
9	11/29/00	7.08	9	1370	396	1
10	11/29/00	7.72	7	1290	425	1
11	11/29/00	7.85	17	1300	502	2
12	11/29/00	8.06	56	1390	506	1
13	11/29/00	7.7	7	1250	422	1
14	11/29/00	8.11	8	1300	436	1
16	11/29/00	7.81	4	1280	396	3
17	11/29/00	7.92	4	1450	381	4
18	11/29/00	7.66	9	1320	449	5
19	11/29/00	7.8	12	1380	500	6
AVG		**7.77**	**9**	**1294**	**418.5**	

Location Key:
1=GW wall sample
2= near wall
3=frm drainage away frm wall
4=frm settling ponds
5=after settling ponds

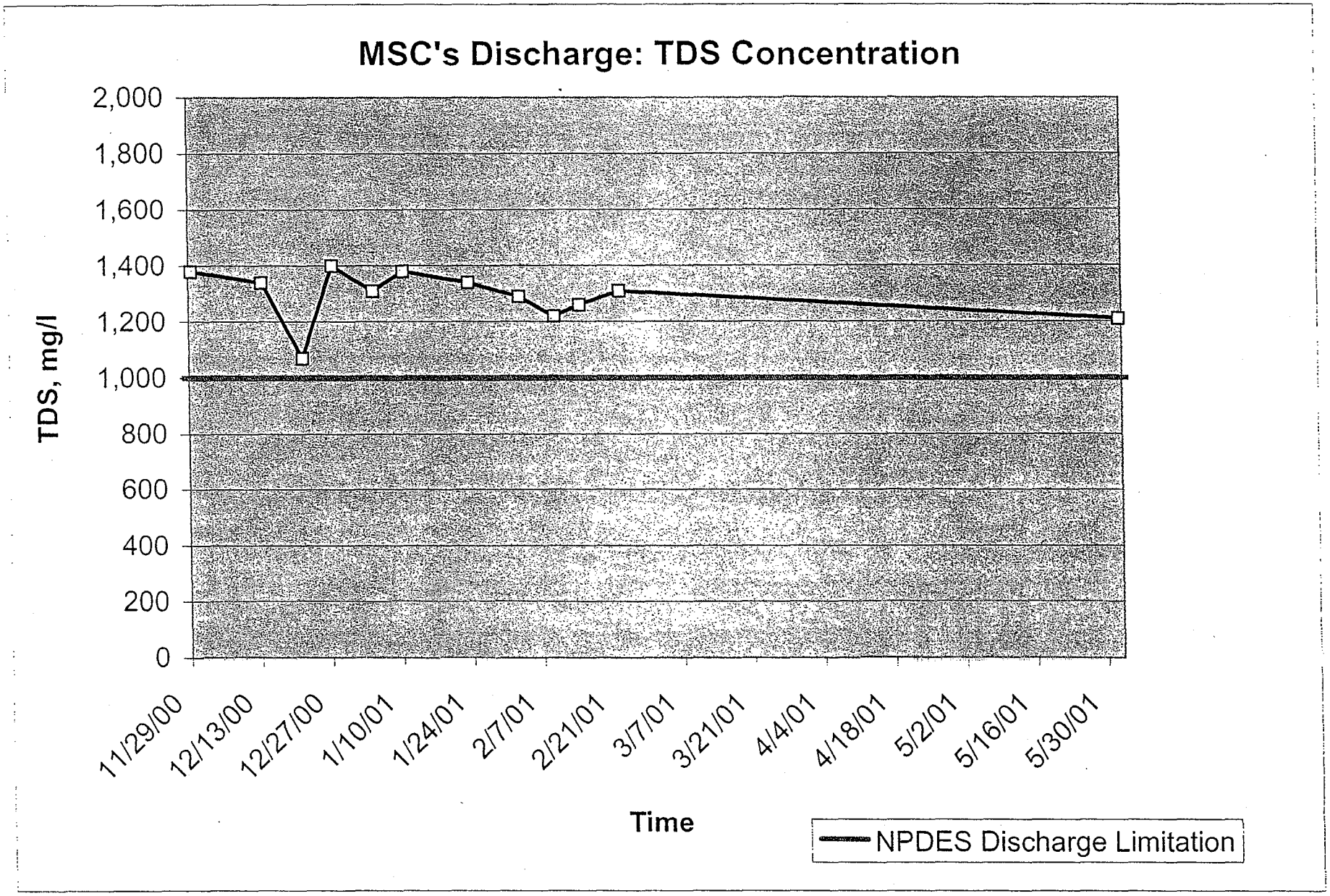
Groundwater Seepage Data
Material Service Corporation
Yard 19 Facility
McCook, Illinois

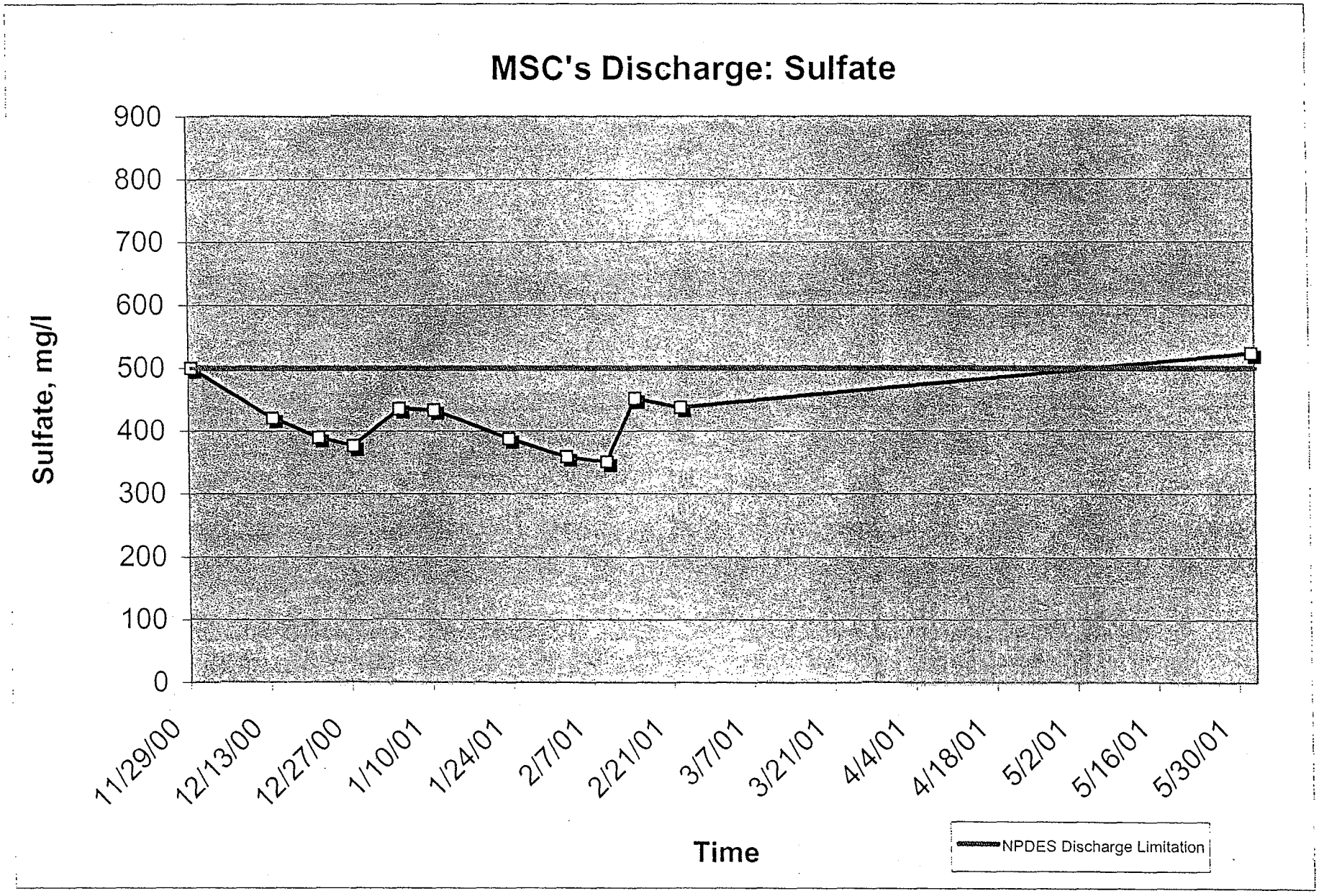
DATE	SAMPLE ID	pH	Sulfate	TDS	TSS	Location
12/13/00	11	na	493	1,410	4	2
12/27/00		7.90	419	1,490	7	
1/4/01		7.51	529	1,460	19	
1/10/01		8.02	513	1,470	6	
1/23/01		7.92	476	1,450	9	
2/2/01		na	471	1,440	19	
2/9/01		7.80	654	1,010	3,610	
2/14/01		7.60	533	1,530	328	
2/22/01		7.76	515	1,440	14	
AVG		**7.79**	**511**	**1,411**	**446**	
12/13/00	16	na	372	1,350	15	3
12/21/00		na	333	1,110	23	
12/27/00		7.87	373	1,260	2	
1/4/01		7.68	386	1,270	3	
1/10/01		7.97	388	1,350	16	
1/23/01		7.99	368	1,350	2	
2/2/01		na	320	1,360	2	
2/9/01		7.82	390	1,050	358	
2/14/01		7.83	386	1,240	15	
2/22/01		7.88	399	1,300	9	
6/1/01		7.78	471	1,200	NA	
AVG		**7.85**	**381**	**1,258**	**45**	
12/13/00	17	na	337	1,460	5	3
12/21/00		na	331	1,080	2	
12/27/00		8.08	368	1,330	34	
1/4/01		7.98	335	1,350	9	
1/10/01		8.25	335	1,320	11	
1/23/01		8.12	298	1,330	1	
2/2/01		na	331	1,300	43	
2/9/01		7.98	333	1,280	16	
2/14/01		7.94	392	1,400	5	
2/22/01		7.94	384	1,470	2	
AVG		**8.04**	**344**	**1,332**	**13**	
11/29/00	18	7.66	449	1,320	9	4
12/13/00		na	434	1,340	8	
12/21/00		na	408	1,070	1	
12/27/00		7.81	414	1,390	4	
1/4/01		7.52	454	1,270	9	
1/10/01		7.86	456	1,330	3	

1/23/01	18 (cont.)	7.80	390	1,360	6	
2/2/01		na	357	1,270	10	
2/9/01		7.74	362	1,080	45	
2/14/01		7.76	452	1,300	18	
2/22/01		7.84	443	1,360	6	
AVG		**7.75**	**420**	**1,281**	**11**	
11/29/00	19	7.80	500	1,380	12	5
12/13/00		na	421	1,340	13	
12/21/00		na	390	1,070	1	
12/27/00		7.89	377	1,400	5	
1/4/01		7.68	436	1,310	39	
1/10/01		7.81	434	1,380	5	
1/23/01		7.96	388	1,340	4	
2/2/01		na	359	1,290	16	
2/9/01		7.87	351	1,220	42	
2/14/01		7.80	452	1,260	18	
2/22/01		7.79	438	1,310	9	
6/1/01		7.76	524	1,210	NA	
AVG		**7.82**	**423**	**1,293**	**15**	
12/13/00	A	na	487	1,450	8	2
12/21/00		na	458	1,150	2	
12/27/00		7.94	465	1,490	5	
1/4/01		7.54	487	1,260	13	
1/10/01		7.85	511	1,290	5	
1/23/01		7.98	441	1,420	8	
2/2/01		na	447	1,430	19	
2/14/01		7.89	478	1,530	692	
2/22/01		7.99	487	1,400	39	
AVG		**7.87**	**473**	**1,380**	**88**	
12/13/00	B	na	441	1,290	9	2
12/21/00		na	427	1,090	4	
12/27/00		7.80	456	1,310	5	
1/4/01		7.63	487	1,480	2	
1/10/01		8.16	456	1,480	4	
1/23/01		7.89	388	1,300	3	
2/2/01		na	395	1,260	32	
2/14/01		7.91	476	2,450	11	
2/22/01		7.73	471	1,300	7	
AVG		**7.85**	**444**	**1,440**	**9**	
12/13/00	C	na	445	1,230	15	3
12/21/00		na	425	1,080	13	
12/27/00		8.02	416	1,240	3	
1/4/01		7.57	458	1,190	17	
1/10/01		8.19	425	1,210	17	
1/23/01		8.15	359	1,190	2	

2/2/01	C (cont.)	na	405	1,310	990	
2/9/01		8.06	351	718	1,200	
2/14/01		7.82	465	1,170	113	
2/22/01		7.85	471	1,270	19	
6/1/01		7.78	586	1,240	NA	
AVG		**7.93**	**437**	**1,168**	**239**	
12/13/00	D	na	471	1,200	6	3
12/21/00		na	412	1,050	40	
12/27/00		7.89	399	1,160	3	
1/4/01		7.56	427	1,280	3	
1/10/01		8.11	401	1,210	11	
1/23/01		8.14	386	1,280	1	
2/2/01		na	348	1,280	22	
2/9/01		7.26	498	1,190	861	
2/14/01		7.82	438	1,350	194	
2/22/01		8.06	436	1,320	14	
AVG		**7.83**	**422**	**1,232**	**116**	
1/4/01	E	7.34	381	1,300	4	2.8
1/10/01		7.88	359	1,390	9	
1/23/01		8.20	287	1,230	2	
AVG		**7.81**	**342**	**1,307**	**5**	
1/23/01	F	7.81	362	1,350	1	2.6
1/10/01	G	8.15	300	1,290	3	2
2/2/01		na	249	1,260	19	
2/14/01		8.03	309	1,260	7	
2/22/01		7.97	331	1,250	3	
AVG		**8.05**	**297**	**1,265**	**8**	
1/10/01	H	7.81	346	1,280	4	2
2/2/01		na	282	1,360	3	
2/14/01		7.67	386	1,300	5	
2/22/01		7.63	384	1,390	2	
AVG		**7.70**	**350**	**1,333**	**4**	

LOCATION KEY:
1=Groundwater wall sample
2=next to wall
3=frm drainage away frm wall
4=in/around settling ponds
5=after settling ponds


MSC's Discharge: TDS Concentration
TDS, mg/l
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/29/00
12/13/00
12/27/00
1/10/01
1/24/01
2/7/01
2/21/01
3/7/01
3/21/01
4/4/01
4/18/01
5/2/01
5/16/01
5/30/01
Time
NPDES Discharge Limitation


MSC's Discharge: Sulfate
Sulfate, mg/l
900
800
700
600
500
400
300
200
100
0
11/29/00
12/13/00
12/27/00
1/10/01
1/24/01
2/7/01
2/21/01
3/7/01
3/21/01
4/4/01
4/18/01
5/2/01
5/16/01
5/30/01
Time
NPDES Discharge Limitation

APPENDIX H
MCCOOK DRAINAGE DITCH SAMPLING RESULTS

McCook Drainage Ditch Sampling Results
Material Service Corporation - Yard 19
McCook, Illinois

SAMPLES COLLECTED AT THE HEAD OF THE MCCOOK DRAINAGE DITCH AT 47th STREET

Date	TDS	Sulfate	TSS	pH	Sodium	Chloride
5/3/00	1080	102	15	7.77		
2/2/01	1950	137	12			
2/22/01	1670	168	5	7.86	388	825
4/17/01	762	159	39	8		
4/24/01	980	181	7	8.04		
6/1/01	500	208		7.89		170
6/8/01	930	208	32			240
6/12/01	552	173	38			145
AVERAGE	**1053**	**167**	**21**	**7.9**		**345**

SAMPLES COLLECTED FROM MSC'S DISCHARGE INTO THE MCCOOK DRAINAGE DITCH

Date	TDS	Sulfate	TSS	pH	Sodium	Chloride
11/29/00	1380	500	12	7.80		
12/13/00	1340	421	13	not tested		
12/21/00	1070	390	1	not tested		
12/27/00	1400	377	5	7.89		
1/4/01	1310	436	39	7.68		
1/10/01	1380	434	5	7.81		
1/23/01	1340	388	4	7.96		
2/2/01	1290	359	16	not tested		
2/9/01	1220	351	42	7.87		
2/14/01	1260	452	18	7.80		
2/22/01	1310	438	9	7.79		
4/17/01	1310	414	10	7.81		
4/24/01	1270	423	15	7.89		
6/1/01	1210	524	not tested	7.76		210
6/8/01	1400	502	50	not tested		225
AVERAGE	**1299**	**427**	**17**	**7.8**		**218**

Note: 6/1/01 sample taken from upper sump at location No. 19

SAMPLES COLLECTED AT THE DES PLAINES RIVER CONDUIT

Date	TDS	Sulfate	TSS	pH	Sodium	Chloride
4/17/01	1310	315	11	8.1		
4/24/01	1200	355	8	8.23		
6/1/01	592	260	not tested	7.85	not tested	140
6/8/01	1230	467	179	not tested	not tested	220
6/12/01	760	250	42	not tested	not tested	150
AVERAGE	**1018**	**329**	**60**	**8.1**		**170**

APPENDIX I
IMPACT TO RECEIVING WATER CALCULATIONS

APPENDIX I
IMPACT TO CHICAGO SANITARY SHIP CANAL
MATERIAL SERVICE CORPORATION
YARD 19 QUARRY
MCCOOK, ILLINOIS

	CHICAGO SANITARY SHIP CANAL	MSC's DISCHARGE
AVERAGE FLOW, (mgd)	603	5
AVERAGE TDS CONCENTRATION, (mg/l)	580	1299
AVERAGE SO4 CONCENTRATION, (mg/l)	71	427

PREDICTED TDS CONCENTRATION	**585.9**
PREDICTED SO4 CONCENTRATION	**73.9**

Basic Equation:

((CSSC Conc. X (CSSC flow/Total Flow))+(Ditch Conc. X (Ditch flow/total flow))

APPENDIX I
IMPACT TO McCOOK DRAINAGE DITCH
MATERIAL SERVICE CORPORATION
YARD 19 QUARRY
MCCOOK, ILLINOIS

FLOW COMPONENT	FLOW (mgd)			CONCENTRATIONS (mg/l)					
	PEAK	AVG	LOW	PEAK TDS	PEAK SO4	AVG TDS	AVG SO4	LOW TDS	LOW SO4
MSC DISCHARGE	7.2	3.7	0.2	1400	524	1299	427	1070	351
MCCOOK DITCH (less MSC Discharge)	21.5	2.5	0.04	1950	208	720	144	500	102

FLOW/CONC SCENARIOS	PREDICTED CONC		(mg/l)	MODEL SCENARIOS
	TDS	SO4		
HIGH DITCH CONC/AVG MSC CONC/HIGH FLOWS	1787	263		Early Spring Rains
AVG DITCH CONC/AVG MSC CONC/HIGH FLOWS	865	215		Summer Rain
AVG CONC/AVG FLOW	1066	313		Normal period, transitional between events
AVG DITCH CONC/LOW DITCH FLOW/HIGH MSC CONC/AVG MSC FLOW	1393	520		Summer Draught
AVG MSC CONC/HIGH DITCH CONC/AVG FLOWS	1562	339		Winter Runoff

Basic Equation: (conc x (flow/total flow) + (conc x(flow/total flow)

APPENDIX J
COST SUMMARY TABLE

APPENDIX J

COST SUMMARY TABLE FOR WATER TREATMENT

Material Service Corporation
Yard 19

Mc Cook, Illinois

	Treatment Technology		
	Reverse Osmosis (1,000 to 1,400 gpm)	Deionization (1,000 to 1,400 gpm)	Deep Well Injection ** (2,500 to 3,500 gpm)
Total capital investment	$2.6 - 3.6	$2.3 - 3.2	$19.2 - 26.4
Total direct operating costs	$1.0 - 1.4	$1.7 - 2.4	$6.6 - 9.2
Total annual costs	$1.3 - 1.8	$2.3 - 3.2	$11.9 - 16.7
Treatment of brine*	$3.0 - 4.2	$3.0 - 4.2	---
20 year operating cost	**$81 - 113**	**$113 - 158**	**$390 - 546**

All costs in millions and in Year 2000 dollars.

* Treatment of brine assumes dilution or pre-treatment prior to well injection. If brine solidification and disposal are required, brine management costs may increase by a factor of 10.

** Does not include cost of pre-treatment prior to injection.

--- Indicates that no cost is associated with this treatment type.

Dollar amounts were taken from *"Evaluation of Underground Injection of Industrial Waste in Illinois"* (ISGS,1989), and a cost estimate provided by U.S. Filter (2001), then adjusted for inflation.

Total capital investment- one-time engineering and construction costs for the project, exclusive of depreciation and interest charges.

Total direct operating costs- annual costs for labor, materials, fuel, chemicals, and power.

Total annual costs- annual costs for overhead, taxes, insurance, administrative costs, and depreciation and interest on the capital investment.

The price ranges expressed are for a water discharge volume that may vary from 3.6 to 5 million gallons per day.