UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

OCT 3 1984

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

President
Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

Re: Notice of Issuance of Final Permit Decision
RCRA Permit No.: NYD002123461

Dear Sir:

Pursuant to authority granted by Section 3005 of the Resource Conservation and Recovery Act (RCRA), as amended, you are hereby served with this Notice of Issuance of a Final RCRA Permit for the above-indicated facility.

This final permit, a copy of which is enclosed, becomes effective in its entirety and a legally enforceable document on the date indicated on the first page of the permit unless a request for a hearing is granted pursuant to 40 CFR §124.74 or 124.144.

Please read the final permit carefully, since it may contain changes from the draft permit which you received. If comments were timely submitted as a result of EPA's Public Notice of its preparation of a draft permit, they have been considered in making this final permit decision and a copy of a memorandum is enclosed which explains EPA's position on issues raised by any comments submitted.

Please be advised that violation of any of the conditions of the enclosed permit may subject you and your facility to the civil and criminal penalties provided for in Section 3008 of RCRA.

Your cooperation in the RCRA program is appreciated.

Sincerely yours,

Ronald Testa, for

Richard A. Baker, Chief
Permits Administration Branch
Office of Policy & Management

Enclosure

cc: Paul Counterman, NYSDEP
David Fagan, U.S.-EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 28 SEP 1984

SUBJECT: Finalization of Three RCRA Permits

FROM: Ernest A. Regna, Chief
Solid Waste Branch (2AWM-SW)

TO: Richard A. Baker, Chief
Permits Administration Branch (20PM-PA)

Attached please find the finalized permits for Nepera Chemical Company, Harriman, New York (NYD002014595); Olin Corporation, Niagara Falls, New York (NYD002123461); Noury Chemicals, Burt, New York (NYD043815158), which have been signed by the Regional Administrator. If comments were received during the public notice period, a memo to file listing comments received and EPA's response, is also attached.

Please commence the issuance procedures we have established. In addition to the individuals routinely receiving copies of the permits, it is necessary that the people identified in the memo to file receive a copy of the same, which addresses all comments raised during the public notice period.

Attachments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 27 SEP 1984

SUBJECT: Finalization of Resource and Recovery Act (RCRA)
Permit: Olin Corporation, EPA I.D. No. NYD002123461

FROM: Frank Langone, Environmental Engineer
RCRA Permit Section
Solid Waste Branch

TO: File

Name and Address of Applicant: Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

Name and Address of Applicant: Olin Corporation
2400 Buffalo Avenue
Niagara Falls, NY 14303

Public Comments

The Public Notice issued by EPA, Region 2 on July 20, 1984 for the draft RCRA permit for the above referenced facility called for the submission of comments no later than September 4, 1984. No comments have been received by the Permits Administration Branch (PAB) concerning this matter.

The facility is also subject to the provisions of the Federal Coastal Zone Management Act of 1972, as amended. The New York State Department of State is required to provide a Public Notice in conjunction with the requirements of this Act. The Public Notice was issued on July 25, 1984 and called for the submission of public comments to the New York State Department of State no later than August 24, 1984. The Department of State has indicated that no comments had been received concerning this matter.

Changes In The Final Permit

1. The original closure cost estimate specified in Attachment VIII of the Draft Permitt will be modified in the Final Permit. This revision is based on an arithmetic error found in the applicant's estimate for closure of the Brine Mud Management Area. Specifically, the Contingencies cost in Section III, Item 27 will be changed from $2,621.00 to $26,213,00. The Administration cost in Section III, Item 28 will be changed from $2,621.00 to $26,213.00. The Total Closure Cost for 1982 in Section III, Item 29 will be changed from $267,380.00 to $314,564.00. The Approximate Total Closure Cost in Section V, Item 2 will be changed from $268,000.00 to $315,000.00. The Total Closure Cost in Section V will be changed from $305,000.00 to $352,000.00.

2. The first page of each Attachment in the Draft Permit contained a single reference to the Code of Federal Regulations Part 122. This Part had previously contained regulations governing the content of the RCRA permit application but no longer does. These references will be deleted in the Final Permit.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: SEP 28 1984

SUBJECT: Finalization of RCRA Permit No. NYD002123461 (Olin Corporation)

FROM: Ernest A. Regna, Chief
Solid Waste Branch (2AWM-SW)

TO: Richard A. Baker, Chief
Permits Administration Branch (2PM-PA)

Enclosed please find the finalized permit for the Olin Corporation (EPA I.D. No. NYD002123461) which has been signed by the RA. If comments were received during the public notice period, a memo to file listing comments received and EPA's response, is also enclosed.

Please commence the issuance procedures we have established. In addition to the individuals routinely receiving copies of the permit, it is necessary that the people identified below received a copy of permit also.

Attachment

cc: F. Langone

Supplemental Mailing List

Mr. M.L. Norsworthy
Plant Manager
Olin Chemicals Group
P.O. Box 748
Niagara Falls, New York 14302

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

PERMIT

Permittee: Olin Corporation
2400 Buffalo Avenue
Niagara Falls, New York 14303

I.D. Number: NYD002123461
Effective Date: November 30, 1984
Termination Date: November 30, 1994

Pursuant to the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC §6901 et seq., commonly known as RCRA) and regulations promulgated thereunder by the U.S. Environmental Protection Agency (EPA) (codified and to be codified in Title 40 of the Code of Federal Regulations), a permit is issued to Olin Corporation (hereafter called the Permittee), to operate a hazardous waste storage and treatment facility located in Niagara Falls, New York on Buffalo Avenue.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions contained herein (including those in any attachments) and the applicable regulations contained in 40 CFR Parts 260 through 264 and 270 and 124 as specified in the permit. Applicable regulations are those which are in effect on the date of issuance of this permit. (See 40 CFR §270.32(c)).

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated August 20, 1982 as modified by subsequent amendments dated November 16, 1982, January 18, 1983, May 5, 1983, September 30, 1983, October 19, 1983, November 22, 1983, December 22, 1983, January 23, 1984, February 7, 1984, April 17, 1984 and July 20, 1984 (hereafter referred to as the application) is accurate and that the facility will be constructed and operated as specified in the application. Any inaccuracies found in this information may be grounds for the termination or modification of this permit (40 CFR §270.41, §270.42 and §270.43) and potential enforcement action. The Permittee must inform EPA of any deviation from or changes in the information in the application which would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

This permit is effective as of November 30, 1984 in accordance with 40 CFR §124.15, and shall remain in effect until November 30, 1994 in accordance with 40 CFR §270.50, unless revoked and reissued, or terminated (40 CFR §270.41 and §270.43) or continued in accordance with §270.51.

Issued by the U.S. Environmental Protection Agency - Region II

Christopher J. Daggett

Christopher J. Daggett
Regional Administrator
U.S. Environmental Protection Agency
Region II

9/28/84
Date

MODULE I - STANDARD CONDITIONS

A. EFFECT OF PERMIT

The Permittee is allowed to treat and store hazardous waste in accordance with the conditions of this permit. Any storage, treatment, or disposal of hazardous waste not authorized in this permit is prohibited unless authorized by a special form of a RCRA permit as specified in 40 CFR 270, Subpart F or exempt from RCRA permit requirements as allowed under 40 CFR 264.1. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Section 3013 or Section 7003 of RCRA, Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9606 (a), commonly known as CERCLA), or any other law providing for protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR §270.41, §270.42 and §270.43. The filing of a request for a permit modification, revocation and reissuance, or termination or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. DUTIES AND REQUIREMENTS

1. Duty to Comply. The Permittee shall comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by an emergency permit [See §270.61]. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of RCRA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

2. Duty to Reapply. If the Permittee wishes to continue an activity allowed by this permit after the expiration date of this Permit, the Permittee shall submit a complete application for a new permit at least 180 days before this permit expires.

3. Permit Expiration. As set forth in 40 CFR 270.51, this permit and all conditions herein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application (see 40 CFR 270, Subpart B) and through no fault of the Permittee the Regional Administrator has not issued a new permit.

4. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for the 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.

5. Duty to Mitigate. The Permittee shall take all reasonable steps to prevent, minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

6. 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 the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operation staffing and training, and adequate sampling and laboratory controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of back-up or auxiliary facility or similar systems only when necessary to achieve compliance with the conditions of the permit.

7. Duty to Provide Information. The Permittee shall furnish to the Regional Administrator, within a reasonable time, any relevant information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

8. Inspection and Entry. The Permittee shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

   (a) Enter at reasonable times upon the Permittee's premises where a regulated activity is located or conducted, or where records must be kept under the conditions of this permit;

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

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

   (d) Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by RCRA, any substances or parameters at any location.

9. Monitoring and Records.

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

(b) The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record. These periods may be extended by request of the Regional Administrator at any time.

(c) Records of monitoring information shall specify:

(i) The dates, exact place, and times of sampling or measurements;

(ii) The individuals who performed the sampling on measurements;

(iii) The dates analyses were performed;

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

(v) The sampling techniques or methods used;

(vi) The analytical techniques or methods used; and

(vii) The results of such analyses.

(d) The Permittee shall conduct a quality assurance program to ensure that the monitoring data are technically accurate and statistically valid. The quality assurance program shall be in accordance with Section 10 of Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA Publication SW-846, Second Edition, 1982.

10. Reporting Planned Changes. The Permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility.

11. Certification of Construction on Modification. The Permittee may not commence treatment, storage or disposal of hazardous waste at a newly constructed facility nor in a modified portion of an existing facility until:

(a) The Permittee has submitted to the Regional Administrator by certified mail or hand delivery a letter signed by the Permittee and a registered professional engineer stating that the facility has been constructed or modified in compliance with the permit; and

(b) (i) The Regional Administrator inspected the modified or newly constructed facility and finds it is in compliance with the conditions of the permit; or

(ii) The Regional Administrator has either waived the inspection or has not within 15 days notified the Permittee of his or her intent to inspect.

12. Anticipated Noncompliance. The Permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

13. Transfer of Permits. This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to 40 CFR §270.41(b)(2) or §270.42(d). Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Parts 264 and 270.

14. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

15. Twenty-four Hour Reporting. The Permittee shall report to the Regional Administrator any noncompliance with the permit which may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. This report shall include the following:

(a) Information concerning the release of any hazardous waste which may cause endangerment to public drinking water supplies.

(b) Any information of a release or discharge of hazardous waste, or of a fire or explosion at the facility, which could threaten the environment or human health.

(c) The description of the occurrence and its cause, as reported in Module I, Condition D.15(a) or (b) shall include:

(i) Name, address, and telephone number of the owner or operator;

(ii) Name, address, and telephone number of the facility;

(iii) Date, time, and type of incident;

(iv) Name and quantity of materials involved;

(v) The extent of injuries, if any;

(vi) An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and

(vii) Estimated quantity and disposion of recovered material that resulted from the incident.

A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); whether the noncompliance has been corrected; and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Permittee need not comply with the five day written notice requirement if the Regional Administrator waives the requirement and the Permittee submits a written report within 15 days of the time the Permittee becomes aware of the circumstances.

The oral reports required above may be made by contacting the EPA Region II 24-hour Emergency Response Center at 201/548-8730, or any designated telephone number which may subsequently replace it.

16. Unmanifested Waste Report. A report must be submitted to the Regional Administrator within 15 days of receipt of unmanifested waste and include the information listed in 40 CFR §264.76.

17. Manifest Discrepancy Report. If a significant discrepancy (as defined by 40 CFR §264.72(a)) in a manifest is discovered, the Permittee must attempt to reconcile the discrepancy. If not resolved within 15 days, the Permittee must submit a letter report to the Regional Administrator. The report must include a copy of the manifest and must meet the information requirements of 40 CFR §264.72.

18. Additional Noncompliance Reporting. The Permittee shall report all instances of noncompliance (including release of hazardous waste, fire, or explosion) not required to be reported under Module I, Condition D (15). Such noncompliance shall be reported for each calendar quarter (i.e., January through March and each subsequent quarter) by no later than 30 days after the end of the quarter. The reports shall contain the information listed in Module I, Condition D (15) (c) (i-vii).

19. Other Information. Whenever the Permittee becomes aware that he failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, the Permittee shall promptly submit such facts or information.

E. Signatory Requirement. All reports or other information requested by the Regional Administrator shall be signed and certified as required by 40 CFR §270.11(b).

F. Confidential Information. The Permittee may claim confidential any information required to be submitted by this permit in accordance with 40 CFR §270.12 and 40 CFR Part 2.

G. Documents to be Submitted Prior to Operation. Not applicable.

H. Documents to be Maintained at the Facility. In addition to a copy of this permit and any amendments, revisions or modifications to the permit and its attachments, the following information must be recorded, as it becomes available, and maintained in the operating record until closure of the facility, except as noted.

(1) A description and quantity of each hazardous waste received, and method(s) and date(s) of its treatment, storage, or disposal at the facility as required by 40 CFR §264, Appendix I.

(2) The location of each hazardous waste within the facility and the quantity at each location. For disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area. For all facilities, this information must include cross references to specific manifest document numbers, if waste was accompanied by a manifest.

(3) Records and results of waste analyses performed as specified in §264.13, §264.17 and §264.341.

(4) Summary reports and details of all incidents that require implementation of the contingency plan as specified in §264.56(j).

(5) Records and results of inspections as required by §264.15(d) (except these data need be kept only three years).

(6) Monitoring, testing, or analytical data where required by §264.347 [for incinerators].

(7) Notices to generators as specified in §264.12(b) [for off-site facilities].

(8) All closure cost estimates under §264.142 and for disposal facilities, all post closure cost estimates under §264.144.

(9) Training records on current personnel must be kept until closure of the facility; training records on former employees must be kept for at least three years from the date the employee last worked at the facility as specified in 40 CFR §264.16(e).

(10) A copy of each manifest and shipping paper (if signed in lieu of the manifest at the time of delivery) (except these manifests need only be kept for three years from date of delivery).

I. Major/Minor Modifications. The permit may be modified for cause as allowed under 40 CFR §270.41 and §270.42. Major modifications shall be requested in writing as required by §124.5 and show cause as required by §270.41. Minor modifications as listed in 40 CFR §270.42 shall be submitted to the Regional Administrator for approval and permit modification. The information to be submitted for minor modifications must be received by certified mail a minimum of 15 business days prior to the proposed day of modification.

J. All Reports and Submittals. All reports and submittals required by this permit to be submitted to the Regional Administrator shall be sent to the following addressee:

Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Attn: Permits Administration Branch
(Room 432)

Copies shall also be sent to the following addressees:

New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233-0001

Attn: Bureau of Hazardous Waste Technology
Division of Solid and Hazardous Waste

New York State Department of Environmental Conservation
Region 9
600 Delaware Avenue
Buffalo, New York 14202

Attention: Regional Solid Waste Engineer

MODULE II - GENERAL FACILITY CONDITIONS

A. Design and Operation of Facility. The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

The Permittee is authorized to treat or store only the hazardous wastes identified in Condition A of Modules III, IV and V which are generated at the Permittee's facility. Acceptance of hazardous waste generated off-site is not authorized by this permit.

B. Required Notice.

(1) The Permittee shall notify the Regional Administrator in writing at least four weeks in advance of the date the permittee expects to receive hazardous waste from a foreign source. Notice of subsequent shipments of the same waste from the same foreign source in the same calendar year is not required.

(2) When the Permittee is to receive hazardous waste from an off-site source he must inform the generator in writing that he has the appropriate permits for, and will accept, the waste the generator is shipping. The Permittee shall keep a copy of this written notice as part of the operating record. (See Module II, Condition L.1).

C. General Waste Analysis. The Permittee shall follow the procedures described in the waste analysis plan, Attachment I, and conduct a quality assurance program as specified in Module I, Condition D.9.(d), which at a minimum, ensures that the Permittee maintains proper functional instruments, uses approved sampling and analytical methods, assures the validity of sampling and analytical procedures and performs correct calculations.

D. Security. The Permittee shall comply with the security provisions of 40 CFR §264.14(b) and shall follow the security plan outlined in Attachment II.

E. General Inspection Requirements. The Permittee shall follow the inspection plan, Attachment III. The Permittee shall remedy any deterioration or malfunction discovered by an inspection as required by 40 CFR §264.15(c). Records of inspections shall be kept as required by 40 CFR §264.15(d).

F. Personnel Training. The Permittee shall conduct personnel training as required by 40 CFR §264.16(a), (b) and (c). This training program shall follow the attached outline, Attachment IV. The Permittee shall maintain training documents and records as required by 40 CFR §264.16(d) and (e).

G. General Requirements for Ignitable, Reactive, or Incompatible Waste. The Permittee shall take precautions to prevent accidental ignition or reaction of ignitable or reactive waste as required by 40 CFR §264.17 and as described in Attachment V.

H. Location Standards. Not applicable.

I. Preparedness and Prevention

1. Required Equipment. At a minimum, the Permittee shall equip the facility with the equipment set forth in the Preparedness and Prevention Plan, Attachment XI.

2. Testing and Maintenance of Equipment. The Permittee shall test and maintain the equipment specified in the previous permit condition as necessary to assure its proper operation in time of emergency, as set forth in the Inspection Schedule (Attachment III) and in the Preparedness and Prevention Plan (Attachment XI).

3. Access to Communications or Alarm System. The Permittee shall maintain access to the communications or alarm system as required by 40 CFR §264.34, in accordance with Attachment XI.

4. Required Aisle Space. At a minimum, the Permittee shall maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of the facility in an emergency as required by 40 CFR §264.35, and to provide access for inspections as required by §264.174. Aisle space in the container storage area shall be maintained in accordance with Attachment VII.

5. Arrangements with Local Authorities. The Permittee shall attempt to make arrangements with State and local authorities as required by 40 CFR §264.37. If State or local officials refuse to enter into preparedness and prevention arrangements with the Permittee, the Permittee must document this refusal in the operating record.

J. Contingency Plan.

1. Implementation of Plan. The Permittee shall immediately carry out the provisions of the contingency plan, Attachment VI, and follow the emergency procedures described by 40 CFR §264.56 whenever there is a fire, explosion, or release of hazardous waste or constituents which threatens or could threaten human health or the environment.

2. After any event requiring implementation of the contingency plan, the Permittee shall not resume hazardous waste management in the affected area until all equipment used during the contingency has been cleaned, recharged or replaced, as appropriate.

3. Copies of Plan. The Permittee shall comply with the requirements of 40 CFR §264.53.

4. Amendments to Plan. The Permittee shall review and immediately amend, if necessary, the contingency plan as required by 40 CFR §264.54.

5. Emergency Coordinator. The Permittee shall comply with the requirements of 40 CFR §264.55, concerning the emergency coordinator.

K. Manifest System. The Permittee shall comply with the manifest requirements of 40 CFR §265.71, §264.72, and §264.76.

L. Recordkeeping and Reporting.

1. Operating Record. The Permittee shall maintain a written operating record at the facility in accordance with the applicable portions of 40 CFR §264.73.

2. Availability, Retention, and Disposition of Records. All records, including plans, must be made available to EPA in accordance with 40 CFR §264.74(a). Retention period for all records is extended automatically during any unresolved enforcement action regarding the facility or as requested by the Regional Administrator. A copy of records of waste disposal locations and quantities under §264.73(b)(2) must be submitted to the Regional Administrator and local land authority upon closure of the facility as required by §264.74(c).

3. Biennial Report. The Permittee shall comply with the biennial report requirements of 40 CFR §264.75.

M. Closure.

1. Performance Standand. The Permittee shall close the facility as required by 40 CFR §264.111 and in accordance with the closure plan, Attachment VIII.

2. Amendment to Closure Plan. The Permittee shall amend the closure plan whenever necessary in accordance with 40 CFR §264.112(b).

3. Notification of Closure. The Permittee shall notify the Regional Administrator at least 180 days prior to the date he expects to begin closure.

4. Time Allowed For Closure. After receiving the final volume of hazardous waste, the Permittee shall treat or remove from the site all hazardous wastes and shall complete closure activities in accordance with the schedule specified in the closure plan, Attachment VIII.

5. Disposal on Decontamination of Equipment. The Permittee shall decontaminate [and/or] dispose of all facility equipment as required by 40 CFR §264.114 and as outlined in the closure plan, Attachment VIII.

6. Certification of Closure. When closure is completed, the Permittee shall submit to the Regional Administrator certifications by the Permittee and by an independent registered professional engineer that the facility has been closed in accordance with the specifications in the closure plan as required by 40 CFR §264.115.

N. Cost Estimate for Facility Closure. The Permittee's original closure cost estimate, prepared in accordance with 40 CFR §264.142(a), is specified in Attachment VIII.

1. The Permittee must adjust the closure cost estimate for inflation within 30 days after each anniversary of the date on which the first closure cost estimate was prepared, as required by 40 CFR §264.142(b).

2. The Permittee must revise the closure cost estimate whenever there is a change in the facility's closure plan as required by 40 CFR §264.142(c).

3. The Permittee must keep at the facility the latest closure cost estimate as required by 40 CFR §264.142(d).

O. Financial Assurance for Facility Closure. The Permittee shall demonstrate continuous compliance with 40 CFR §264.143 or when applicable with 40 CFR §264.145, §264.146, §264.149 and §264.150 by providing documentation of financial assurance, as required by 40 CFR §264.151, in at least the amount of the cost estimates required by Module II, Condition N. Changes in financial assurance mechanisms must be approved by the Regional Administrator pursuant to 40 CFR §264.143.

P. Liability Requirements. The Permittee shall demonstrate continuous compliance with the requirements of 40 CFR §264.147 and the documentation requirements of 40 CFR §264.151, including requirements to have and maintain liability coverage for sudden and accidental occurrences in the amount of at least $1 million per occurrence with an annual aggregate of at least $2 million, exclusive of legal defense costs.

Q. Incapacity of Owners or Operators, Guarantors, or Financial Institutions.

The Permittee shall comply with 40 CFR §264.148 whenever necessary.

MODULE III - STORAGE IN CONTAINERS

A. Authorized Storage Area, Waste Types and Storage Volume.

The Permittee may store the following wastes in containers at the facility, subject to the terms of this permit:

	Waste #	Waste Description
1.	K071	Brine Mud
2.	D001	HTH Process Waste
3.	D009	Contaminated Earth
4.	D009	Retort Ash
5.	K106	Wastewater Treatment Sludge from Mercury Cell Process
6.	D002, D009	Caustic Filter Backwash
7.	D009	Funda Filter Cake
8.	D009	Decomposed Packing
9.	D009	Methylate Filter Tube
10.	D009	Contaminated Apparatus

Only the container storage area described in Attachment VII is authorized by this permit. The total number of containers must not exceed 288 and the total capacity of the containers must not exceed 15,840 gallons.

B. Containment. The Permittee shall maintain the containment system in accordance with the requirements of 40 CFR §264.175 and as specified in the plans and specifications incorporated in Attachment VII.

C. Condition of Containers. If a container holding hazardous waste is not in good condition (e.g., severe rusting, apparent structural defects) or if it begins to leak, the Permittee shall transfer the hazardous waste from such container to a container that is in good condition or otherwise manage the waste in compliance with the conditions of this permit. Each such occurrence shall be recorded in the inspection log and maintained as part of the operating record as described in Module I, Condition H. (5). If any leaking container threatens human health or the environment, it must be reported as specified in Module I, Condition D. (15),(i.e., 24-hour reporting).

D. Compatibility of Waste with Containers. The Permittee shall assure that the ability of the container to contain the waste is not impaired as required by 40 CFR §264.172, and in accordance with Attachment VII.

E. Management of Containers. The Permittee shall manage containers as required by 40 CFR 264.173.

F. Special Requirements for Ignitable or Reactive Waste. The Permittee shall not store containers holding ignitable or reactive waste within 15 meters (50 feet) of the facility's property line.

G. Special Requirements for Incompatible Waste.

1. The Permittee shall not place incompatible wastes or incompatible wastes and materials in the same container.

2. The Permittee shall not place hazardous waste in an unwashed container that previously held an incompatible waste or material.

3. The Permittee shall separate containers of incompatible wastes as required by 40 CFR §264.177(c).

MODULE IV - STORAGE/TREATMENT IN TANKS

A. Waste Identification. The Permittee may store or treat the following hazardous wastes in tanks subject to the terms of this permit:

Tank	Waste	Minimum Thickness Walls	Minimum Thickness Base
1. Brine Mud Storage Tanks	Brine Mud (K071)	9 inches	6 inches
2. Lime Pit Treatment Unit	HTH Process Waste (D001)	11 inches	7 inches

B. Design of Authorized Tanks. The Permittee shall maintain all tanks as required by 40 CFR §264.191, and as specified in the plans and specifications incorporated in Attachment IX. The Permittee shall maintain the minimum shell thickness specified in Module IV, Condition A at all times to ensure sufficient shell strength.

C. General Operating Requirements.

1. The Permittee shall protect tanks from accelerated corrosion, erosion or abrasion as required by 40 CFR §264.192(a), and in accordance with Attachment IX.

2. The Permittee shall prevent overfilling of tanks as required by 40 CFR §264.192(b) and in accordance with Attachment IX.

D. Special Requirements for Ignitable or Reactive Wastes.

1. The Permittee shall not place ignitable or reactive waste in a tank unless the procedures described in Attachment V are followed, as required by 40 CFR §264.198(a).

2. The Permittee shall document compliance with Module IV, Condition D.1 as required by 40 CFR §264.17(c) and place this documentation in the operating record (Module II, Condition L.1).

E. Special Requirements for Incompatible Wastes.

1. The Permittee shall not place incompatible wastes in the same tank or place hazardous waste in a tank that previously held an incompatible waste or material.

F. Comprehensive Inspection Schedule. The Permittee shall perform comprehensive inspections of the tanks used to manage hazardous waste, as specified in 40 CFR §264.194(b) and in Attachment III.

G. Corrective Action. If cracking or deterioration is discovered during an inspection, it shall be repaired in accordance with Section II.E of Attachment II of Attachment III (Inspection Plan).

H. Lime Pit Treatment Unit - Inspection and Corrective Action

Before resuming use of the lime pit treatment unit to store or treat hazardous waste, the permittee shall perform a comprehensive inspection of the unit in accordance with Sections I.C and II. A, B, C and D of Attachment II of Attachment III and shall repair any cracking, deterioration or other damage in accordance with Section II.E of Attachment II of Attachment III (Inspection Plan).

MODULE V - STORAGE WASTE PILE

A. Authorized Waste

The Permittee may store the following hazardous wastes in waste piles, subject to the terms of this permit:

Waste #	Waste Description
K071	Brine Mud

B. Design and Operating Requirements

1. The Permittee shall maintain the pile liner in accordance with the requirements of 40 CFR 264.251(a)(1) and as specified in the plans and specifications incorporated in Attachment X.

2. The Permittee shall maintain and operate the leachate collection and removal system immediately above the liner that will collect and remove leachate from the pile as required by 40 CFR 264.251(a)(2) and in accordance with the plans and specifications in Attachment X.

3. The Permittee shall operate and maintain run-on and run-off control systems, as required by 40 CFR 264.251(c) and (d) respectively and in accordance with the plans and specifications incorporated in Attachment X.

4. The Permittee shall empty or otherwise manage run-on and run-off collection and holding facilities to maintain the design capacity of the system(s) as required by 40 CFR 264.251(e) and in accordance with the methods specified in Attachment X.

5. The Permittee shall cover or otherwise manage the pile to control wind dispersal of particulate matter, as required by 40 CFR 264.251(f) and in accordance with Attachment X.

C. Exemption from Subpart F Ground Water Protection Requirements

1. The permittee must maintain the waste pile (including its underlying liner) so that it is located entirely above the seasonal high water table. The permittee must have a liner under the waste pile which must meet all the specifications of 264.251(a)(1) and the plans and specifications incorporated in Attachment X.

2. The permittee must remove the wastes from the pile and inspect the liner for deterioration, cracks or other conditions that may result in leaks in accordance with Attachment III.

3. The liner must be of sufficient strength and thickness to prevent failure due to puncture, cracking, tearing or other physical damage from equipment used to place waste in or on the pile or to clean and expose the liner surface for inspection.

4. The permittee must have a leachate collection and removal system above the liner that is designed, constructed, maintained and operated in accordance with 264.251(a)(2) and the plans and specifications incorporated in Attachment X.

5. If cracking or deterioration is discovered during an inspection, it shall be repaired in accordance with Section II.E of Attachment II of Attachment III (Inspection Plan).

D. Monitoring and Inspection

The Permittee shall follow the inspection schedule in Attachment III as required by 40 CFR 264.15(a) and 264.254.

E. Special Requirements for Ignitable or Reactive Waste

1. The Permittee shall not place ignitable or reactive waste in a waste pile.

F. Special Requirements for Incompatible Wastes

1. The Permittee shall not place incompatible wastes or incompatible wastes and materials in the same waste pile.

2. The Permittee shall document compliance with V.F.1 as required by 40 CFR 264.17(c) and place this documentation in the operating record (see Module II, Condition L.1.).

G. Closure

1. The Permittee shall close the facility in accordance with the closure plan in Attachment VIII and as required by 40 CFR 264.258(a).

2. If during closure, it is found that all wastes and contaminated materials cannot be removed or decontaminated, the Permittee shall close the waste pile as a landfill and conduct post-closure care at the facility in accordance with the requirements of Section 264.310. The permittee shall notify the Regional Administrator within 7 days of such finding and shall submit a revised closure plan and a post-closure plan within 60 days of such finding.

ATTACHMENT I

WASTE ANALYSIS PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

WASTE ANALYSIS PLAN

I. GENERAL STATEMENT

The following waste analysis plan is presented in order to characterize the waste being generated for proper treatment, storage, disposal or recycle-reuse. Analytical parameters for each hazardous waste were selected based upon raw material usage, chemical reactions, and historical analytical data of each waste. The minimum required analysis frequency is specified for each waste. However, the plant Laboratory Manager or Environmental Engineer may request more frequent analyses or the analysis of additional parameters. This will be done particularly if there is a change in the waste generating process or operating conditions which may affect the hazardous waste characteristics. Sampling will be conducted under the supervision of the Engineering Services Department according to the procedures outlined in "Test Methods for Evaluating Solid Waste, Physical Chemical Methods", (TMESW) May 1980. RCRA analyses will also be conducted according to the procedures outlined in TMESW.

II. BRINE MUD (RCRA Part A Item IV-1., EPA I.D. No. K071)

A. General -

Brine muds are principally composed of natural salt insolubles which have been removed from the brine system of the chlor-alkali process. The insolubles vary in particle size and are generated by either sedimentation or filtration processes.

The larger, more dense particulates which have accumulated in the bottom of various brine process tanks are purged and flow by gravity to the brine mud treatment unit. In this tank, brine is separated from the mud by gravity. Brine, a principal circulating production process stream, is decanted from the tank and is cycled back into the brine system. Solids remaining in the tank are removed by a front-end loader and are deposited to form a pile on the concrete pad contiguous to the tank.

Fine particulates are removed from the brine system by a plate and frame filter press. Once a day, the filtration operation produces a cake which drops directly into a hopper located beneath the filter. The filtrate is cycled to the brine system while the containerized cake is transported by forklift to the waste pile or is disposed of directly. This operation takes place on a weekly basis.

Muds are accumulated in the waste pile until they have lost sufficient moisture to be manageable. Runoff and leachate generated during this period flow to a collection sump located in the southwest corner of the waste pile base. From here the liquid is pumped into the brine mud tank where it is cycled to the production process.

When the brine mud has dewatered sufficiently, it is sampled and loaded into trucks for transport to an authorized secure hazardous waste landfill. The muds physical characteristics at this point most closely resemble a damp sand and it is fairly homogeneous in nature. If after dewatering the mud does not have adequate stability to permit landfilling, masonry sand will be mixed into the mud with a front-end loader. Sand will be added until the waste satisfies the disposal facility slump specifications.

Approximate amount generated: 4,800 tons/year

B. Sampling Methodology -

1. A sampling trier is used to obtain a representative composite sample of the brine mud prior to shipment.
2. The brine mud sample is collected from various locations in the front-end loader bucket before the material is deposited in a dump truck. A minimum of one representative composite sample is obtained from each 50 tons or approximately 5 truck loads of sludge transported.
3. The total volume of each composite sample should be approximately 500 ml.

C. Analysis -

The parameters for analysis were selected from historical data compiled on the Niagara Falls brine mud and knowledge of raw material usage.

Parameter	Analysis Frequency	Methodology
Mercury	Each Sample	TMESW Section 7 and Appendix II, Method 245.1

III. HTH® PROCESS WASTE (RCRA Part A Item IV-2., EPA I.D. No. D001)

A. General -

Lime and calcium hypochlorite wastes are decomposed in the lime pit treatment unit. Wastes in a liquid state flow through an open trench which connects the production area to the treatment unit. Solid materials generated from floor sweepings and clean-up operations are added manually to the unit. These wastes, rendered non-hazardous immediately upon introduction to the tank, are decomposed with water and steam. During the treatment process, solid material settles to the

bottom of the tank and the supernatant overflows through a pipe to the plant wastewater pretreatment facility. Once the residual material has an available chlorine residual less than or equal to 5%, the solids are allowed to concentrate and the liquid is decanted and pumped to the plant wastewater pretreatment facility. A front-end loader type vehicle then enters the ramp on the front of the tank, scoops up the material, and deposits it in a truck for transport to an authorized sanitary landfill. A vacuum truck may also be used for removal and transport of the material.

Approximate amount generated: 300 tons/year

B. Sampling Methodology -

1. A sampling trier is used to obtain a representative composite sample of the fairly homogenous tank contents.
2. Each subsample is collected at various points and depths in the tank and composited together.
3. A 500 ml representative composite sample will be collected from the total tank contents (approximately 750 gallons).

C. Analysis -

Calcium hypochlorite is the hazardous constituent of the waste treated in the lime pit treatment unit. It is an ignitable hazardous waste (40 CFR 261.21(a)(4)) by virtue of being an oxidizer with respect to 49 CFR 173.15, i.e., it yields oxygen readily to stimulate the combustion of organic matter. The waste will be considered non-hazardous when it no longer possesses the hazardous characteristics of calcium hypochlorite mixtures outlined in 49 CFR 172.02 (it must be dry and have an available chlorine residual greater than 39%).

Immediately upon introduction into the tank, the material becomes saturated with water. It no longer satisfies the definition of an oxidizer above because the water content is greater than 15%; thus, it is no longer a hazardous waste with respect to ignitability. The main consideration remaining is with respect to corrosivity. Analyses have shown that the material is not corrosive by the standard NACE corrosivity method for a liquid. A theoretical calculation using the compounds in solution (worst case) shows that the maximum pH should not exceed 11.5 standard units. However, this will be analytically verified before disposing of the waste. Also prior to disposal, the available chlorine concentration must be less than or equal to 5%; well below the 39% required for dry calcium hypochlorite to be classified an oxidizer.

Parameter	Analysis Frequency	Methodology
Available Chlorine	Each Sample	Olin Method 1170-1 (attached)
pH	Each Sample	TMESW Appendix II, Method 150.1

IV. CONTAMINATED EARTH (RCRA Part A, Item IV-5., EPA I.D. No. D009)

A. General -

Excavated earthen material at the Niagara Falls plant site will be analyzed for toxic characteristics before it is disposed of at an appropriately authorized landfill. The material is mainly composed of large grained solids and is non-uniformly, heterogeneous in nature. Approximate amount generated: 1,500 tons/year (highly variable) of which approximately 25 ton is placed in the storage unit and the rest is disposed of directly.

B. Sampling Methodology -

1. The material will be sampled from the excavation site using a large trier.
2. Since the composition and characteristics of the material will vary with each excavation, the number of subsamples need to make up a representative composite cannot be stipulated. This will be left to the discretion of the technician collecting the sample.
3. A minimum of one 500 ml representative composite sample will be collected per each 50 tons of materials excavated or per each excavation, whichever is greater.

C. Analysis -

The EPA extraction procedure toxicity (EPT) analysis will be utilized to characterize the material as hazardous or non-hazardous. The parameters for analysis were selected based upon historical record of the type of materials produced or stored in each section of the facility. Material excavated in Plant 1 will be subject to EPT mercury analysis. Material from Plant 2 will be subjected to EPT mercury and hexachlorocyclohexane (BHC) analyses, as appropriate.

Parameter	Analysis Frequency	Methodology
Mercury	Each Sample for Characterization	TMESW Section 7 and Appendix II, Method 245.1
BHC	Each Sample for Characterization (From Plant 2 in Former Organics Production Areas)	TMESW Section 7 and Appendix III, Page 7

V. RETORT ASH (RCRA Part A, Item IV-6., EPA I.D. No. D009)

A. General -

Mercury rich materials such as caustic filter backwash and other mercury wastes generated in the cellroom of the chlor-alkali process are thermally treated to reclaim the mercury. The by-product of this process is a mercury contaminated ash also known as retort ash. Recovered mercury is reused in the production process while the ash is placed in drums and stored in the waste drum storage unit prior to disposal at an authorized secure hazardous waste landfill.

Approximate amount generated: 12 tons/year

B. Sampling -

1. A sampling trier is used to obtain a representative composite sample of each drum of ash generated.
2. A minimum of one 500 ml sample is collected from each drum of waste prior to placement in the waste drum storage unit.

C. Analysis -

The parameters for analysis were selected based upon raw material usage and historical analytical data. Historical data has shown that this material will fail the EPT analysis for mercury. Therefore, the total mercury analysis will be performed only to maintain an accurate characterization of the material.

Parameter	Analysis Frequency	Methodology
Mercury	Quarterly	Olin Method-ENV-2 (attached)

VI. WASTEWATER TREATMENT SLUDGE FROM MERCURY CELL PROCESS (RCRA Part A Item IV-7., EPA I.D. No. K106)

A. General -

Mercury contaminated wastewater generated in the chlor-alkali and sodium methylate production processes is treated in plant wastewater pretreatment facilities. Treatment consists of pH neutralization, available chlorine decomposition with sodium sulfite when necessary, and mercury precipitation with sodium sulfide. A plate and frame filter press removes solids from the wastewater prior to it being discharged to the City of Niagara Falls wastewater treatment facility. This process generates mercury contaminated sludge either as filter cake or accumulated solids in the bottom of the process tanks.

Each filtration cycle produces a cake of solids which fall into a collection hopper located beneath the filter. A filter cleaning, which occurs on the average twice a week, produces approximately 475 lbs of sludge. This sludge is transported to an authorized secure hazardous waste landfill in the collection hoppers.

The solids which accumulate in the process tanks are allowed to flow by gravity from the process vessels into decanting containers located within the contained treatment area. Liquids generated in the decanting containers are recycled back to the treatment process while the solids are removed by a vacuum truck. The vacuum truck transports the sludge in bulk to an authorized off-site hazardous waste treatment facility. Cleaning of the process tanks takes place at least three times annually and produces a total of approximately 33 tons of sludge.

Approximate total amount generated: 75 tons/year

B. Sampling -

1. A trier is used to obtain a representative sample of both the tank sludge and filter cake. The filter cake is sampled from the collection hopper and the sludge sample is obtained from the decanting containers after the liquid has been removed.
2. A composite 500 ml sample is collected from each tank cleaning operation and from every filter cleaning cycle.

C. Analysis -

The parameters for analysis were selected based upon knowledge of raw material usage and historical analytical results. Historical data has shown that this material will fail the EPT analysis for mercury. Therefore, the analysis will be performed only to maintain an accurate characterization of the material.

Parameter	Analysis Frequency	Methodology
Mercury	Quarterly	Olin Method-ENV-2 (attached)

VII. CAUSTIC FILTER BACKWASH (RCRA Part A Item IV 3, 4., EPA I.D. No. D009, D002)

A. General -

Filters which utilize an activated carbon precoat are used to remove mercury from caustic soda produced in the chlor-alkali process. Approximately once a week, the filters are backwashed to a holding tank. The caustic in the tank is decanted back into the production process while the residue is transferred to 55-gallon drums. After the solids have settled in the drums, the liquid is siphoned off and

treated in the wastewater pretreatment facility. The remaining solids are accumulated in drums and stored in the waste drum storage unit until they can be retorted on-site for mercury recovery. Disposal of this waste will only take place if the retorts are out of service for an extended period of time.

Approximate amount generated: 40 tons/year

B. Sampling -

1. A representative sample of the accumulated solids is collected from a 55-gallon drum with a trier prior to disposal. If the waste is retorted, however, a sample is not collected.
2. A minimum of one 500 ml sample is collected from each drum of waste intended for disposal.

C. Analysis -

Parameters for analysis were selected based upon knowledge of raw materials used in the process and historical analytical data. Historical data has shown that this material will fail the EPT analysis for mercury. Therefore, the total mercury analysis will be performed only to maintain an accurate characterization of the material.

Parameter	Analysis Frequency	Methodology
Mercury	Quarterly	Olin Method-ENV-2 (attached)
pH	Quarterly	TMESW Appendix II, Method 150.1

VIII. FUNDA FILTER CAKE (RCRA Part A Item IV-3., EPA I.D. No. D009)

A. General -

Mercury is removed from sodium methylate liquor by passing it through activated carbon filters. The filter cake produced from this process

is air dried to reduce the moisture content and drummed. The drummed waste is stored in the waste drum storage unit prior to being disposed of in an authorized secure hazardous waste landfill. One to two drums of this waste is generated each week.

Approximately amount generated: 57 tons/year

B. Sampling -

1. A representative sample of the cake is collected from each drum using a trier.
2. A minimum of one 500 ml sample is collected from each five drums of sludge generated prior to disposal.

C. Analysis -

Parameters for analysis were selected based upon knowledge of raw materials used in the process and historical analytical data. Historical data has shown that this material will fail the EPT analysis for mercury. Therefore, the total mercury analysis will be performed only to maintain an accurate characterization of the material.

Parameter	Analysis Frequency	Methodology
Mercury	Quarterly	Olin Method-ENV-2 (attached)

IX. DECOMPOSER PACKING (RCRA Part A Item IV-3., EPA I.D. No. D009)

A. General -

Mercury cell decomposers, used in the chlor-alkali production process, act as short-circuited cells which form caustic from the sodium amalgam. The decomposers are packed with graphite which acts as a

cathode during this process. When the graphite ceases to function properly, it is replaced. The spent graphite is placed in drums and is either retorted or placed in the waste drums storage unit prior to disposal.

Approximate amount generated: 5 tons/year

B. Sampling -

1. A representative sample is collected from the drummed material using a trier. If the material is retorted, however, a sample is not collected.
2. A minimum of one 500 ml sample is collected every time the graphite in a decomposer is replaced. Approximately 700 lbs of waste is generated during each replacement operation.

C. Analysis -

Parameters for analysis were selected based upon knowledge of the raw materials used in the process and historical analytical data. Historical data has shown that this material will fail the EPT analysis for mercury. Therefore, the total mercury analysis will be performed only to maintain an accurate characterization of the material.

Parameter	Analysis Frequency	Methodology
Mercury	Quarterly	Olin Method-ENV-2 (attached)

X. METHYLATE FILTER TUBES (ADAMS AND CUNO FILTERS) (RCRA Part A Item IV-3., EPA I.D. No. D009)

A. General -

Graphite, carbon, and plastic cartridge filters are utilized to remove mercury from liquid sodium methylate. These filters are replaced on a periodic bases. The spent filters are placed in drums and transported to an authorized secure hazardous waste landfill for disposal.

Approximate amount generated: 12 tons/year

B. Sampling and Analysis -

This material cannot be sampled because of its physical makeup. Therefore, every drum of the material generated will be considered having failed the EP toxicity analysis for mercury and will be disposed of accordingly. One out of every ten drums generated will be opened and inspected to verify the contents by a qualified environmental technician.

XI. CONTAMINATED APPARATUS (RCRA Part A Item IV-3., EPA I.D. No. D009)

A. General -

Any mercury contaminated material which is assumed to fail or actually fails the EPT analysis is placed in drums or shipped in bulk to an authorized secure hazardous waste landfill for disposal. This waste may be made up of mercury bottles, ceramic packing, piping, insulation, wood, and other materials associated with chlor-alkali production.

Approximate amount generated: 60 tons/year

B. Sampling and Analysis -

A representative sample of this material is not easily obtained. Therefore, every drum of the material generated will be considered having failed the EP toxicity analysis for mercury and will be disposed of accordingly. One out of every ten drums generated will be opened and inspected to verify the contents by a qualified environmental technician.

VDL/vrp

1/10/83

WASTE ANALYSIS PLAN

ATTACHMENT I

OLIN CORPORATION

NIAGARA FALLS QUALITY ASSURANCE LABORATORY

ENVIRONMENTAL METHOD ENV-2

SOLID WASTE SAMPLES - DETERMINATION OF MERCURY

SUMMARY:

All species of mercury are converted to mercuric ions in an aqua-regia digestion. The mercuric compounds in the sludge are reduced to elemental mercury with stannous chloride and then sparged with nitrogen gas. The mercury in the nitrogen stream is measured using a Liquid Data Control (LDC) UV monitor.

REAGENTS:

1) Aqua-regia; 3:1 HCl:HNO_3 Measure 10 mls of concentrated nitric acid, HNO_3 into a 50 ml graduate cylinder. Slowly add 30 mls of concentrated hydrochloric acid, HCl, to the graduate cylinder. Mix solution thoroughly and allow to stand five minutes before using. Slowly pour entire volume into sludge sample to avoid foaming.

2) Stannouschloride; 10% $SnCl_2 \cdot 2H_2O$ Weigh 100 grams of $SnCl_2 \cdot 2H_2O$ into a clean 600 ml beaker. Slowly add 200 mls of concentrated HCl and dissolve on hot plate until solution turns clear. Remove from heat and pour into a 1 liter bottle. Bring to volume with deionized water. Mix solution well and sparge with N_2 gas for 5 minutes.

3) Nitrogen; N_2 carrier gas

4) Magnesium perchlorate; $MgClO_4$ Drying agent

5) Mercury standard 1 ppm stock solution

APPARATUS (see figure 1)

1) L.D.C.-UV Monitor (Model 1235) with recorder

2) Sample train consisting of a 125 ml gas wash bottle with extra coarse fritted bubbler. The bottle has a volume calibration mark at 60 ml.

APPARATUS (continued):

3) Gas trap for overspills.

4) Magnesium perchlorate drying tube.

5) Appropriate glassware and dispensers.

PROCEDURE:

Pour off any liquid that has decanted from the sludge. Thoroughly mix the entire contents of the sample jar to a uniform consistency. Weigh 20 - 25 grams of sample (±0.01g) into a 150 ml boiling flask. Do not add any water. Slowly add 40 mls of freshly prepared aqua-regia with mixing to avoid foaming over (use fume hood). Allow mixture to digest away from heat for 10 minutes. Bring to a gentle boil on hot plate, remove from heat and cool sample. Dilute sample to one liter in a volumetric flask. Pipet a suitable aliquot into the gas wash bottle. Add 2 mls of 10% $SnCl_2 \cdot 2H_2O$, rinse down the sides of the gas wash bottle and adjust the volume to the calibration mark (60 mls). Sparge the sample with the nitrogen stream and record peak height, sample size and dilution used. Calculate ppm Hg from a previously prepared standard curve.

CALCULATIONS:

$$\text{ppmHg} = \frac{\text{micrograms Hg from standard curve}}{\text{grams in original sample}} \times \frac{\text{dilution}}{\text{final aliquot}}$$

NOTES:

1) Proper safety protection is required when handling chemicals and mixing solutions. This includes gloves, lab coats, and face shields where appropriate.

2) Check all glassware prior to use for cracks or signs of fatigue.

3) Clean all glassware with 1:1 nitric acid and rinse with deionized water before use.

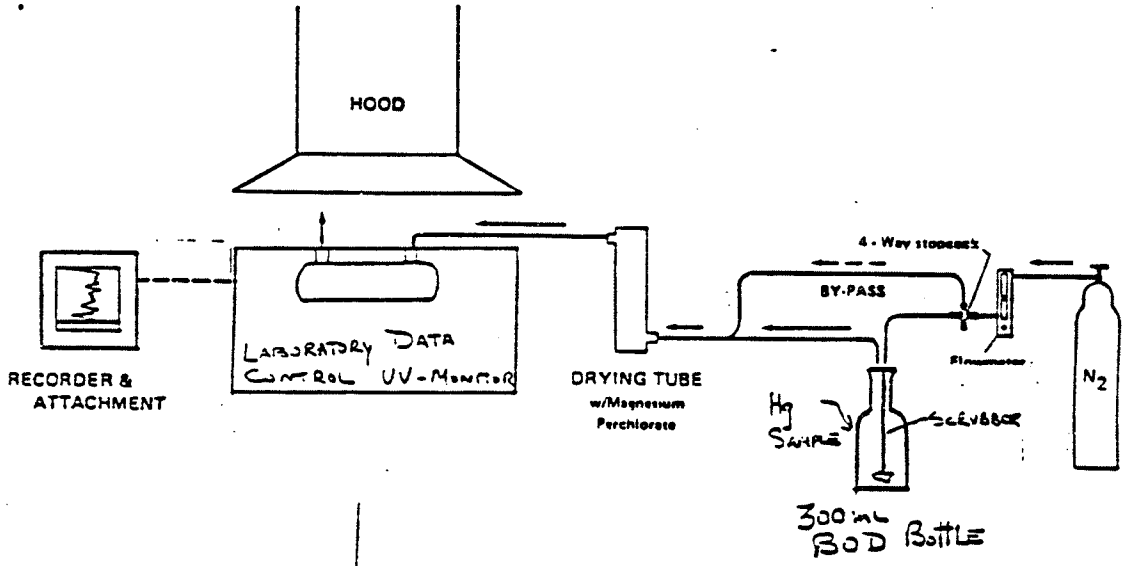
4) In case of skin contact with acid, wash affected area immediately with cold water. In case of eye contact, wash thoroughly and report to first aid immediately.

PREPARED BY: Lorraine Miller DATE 2/24/82

APPROVED BY: Allan F. Kajteina DATE 2/26/82

Figure 1

MERCURY DETECTION SYSTEM
AERATION AND RECORDING



Issued By L. Waller 2/24/82
Date

Approved By A. Kajteina 2/26/82
Date

ATTACHMENT II

OLIN MATHIESON CHEMICAL CORPORATION
745 FIFTH AVENUE, NEW YORK, N.Y.
QUALITY CONTROL DEPARTMENT
CHEMICALS DIVISION

CALCIUM HYPOCHLORITE METHOD NO. 1170-1

Determination of AVAILABLE CHLORINE and CALCIUM HYPOCHLORITE

SUMMARY OF METHOD

"Available Chlorine", a measure of oxidizing power due to the presence of hypochlorite, is determined by iodimetric titration. Iodine, released from potassium iodide in the presence of acetic acid, is titrated with sodium thiosulphate.

(Eq. 1) $Ca(OCl)_2 + 4\ KI + 4\ HAc \rightarrow CaCl_2 + 4\ KAc + 2\ I_2 + 2\ H_2O$

(Eq. 2) $2\ I_2 + 4\ Na_2S_2O_3 \rightarrow 2\ Na_2S_4O_6 + 4\ NaI$

REAGENTS

Sodium Thiosulphate ($Na_2S_2O_3$), standard 0.1 N solution.
Potassium Iodide (KI), crystals.
Acetic Acid ($HC_2H_3O_2$), glacial.
Starch Indicator Solution, 0.5%.

PROCEDURE

When "available chlorine" only is to be determined, accurately weigh 3.6-4.0 g. of calcium hypochlorite in a tared, glass-stoppered, weighing bottle. Add 100 ml. of water to a 500 ml. volumetric flask and transfer the sample through a funnel from the weighing bottle to the flask with the help of a fine stream of water from a wash bottle. Make up to volume, add a magnetic stirring bar to the flask and thoroughly mix the contents on magnetic stirrer (Note 1).

Without allowing any insoluble matter to settle out, and keeping the contents well mixed, pipet a 25 ml. aliquot

PROCEDURE (Continued)

into a clean 500 ml. narrow-mouth Erlenmeyer flask. Add 150 ml. of water and 2 g. of KI crystals. Mix and then add 8 ml. of glacial $HC_2H_3O_2$. Immediately titrate the liberated iodine with standard 0.1 N $Na_2S_2O_3$, adding 2 ml. of starch indicator solution when most of the yellow iodine color has disappeared. Carefully finish the titration until the blue starch-iodide color just disappears. Record the volume of solution used.

CALCULATIONS

$$\% \text{ Available Chlorine (as } Cl_2) = \frac{\text{ml. Thio x Norm. x 20 x 3.5453}}{\text{g. of sample}}$$

$$\% \text{ } Ca(OCl)_2 = \frac{\text{ml. Thio x Norm. x 20 x 3.5746}}{\text{g. of sample}}$$

357 →

✡

NOTES

1. The stirring bar must be added to the volumetric flask after it is filled to the mark. Otherwise, there is an error equal to the volume of the bar.

2. This titration has a very sensitive end point which requires only a fraction of a drop of titrant to remove the last trace of color. Beware of over-titrating.

3. When only available chlorine or calcium hypochlorite is to be determined, U.S.P. potassium iodide maybe used. Neutral or ACS reagent grade potassium iodide must be used when the total alkalinity is determined on the same sample.

Date: July 15, 1966

✡ When using a four (4) gram sample
Avcl₂ = ml thio x 1.7729

ATTACHMENT II

SECURITY PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

SECURITY PROCEDURES AND EQUIPMENT

The entire Niagara Falls plant, including all active portions of the facility, is enclosed with 7' chain link fencing and 1' barbed wire. The plant maintains a 24-hour a day surveillance system which is operated by Olin personnel. These personnel provide security at two pedestrian/vehicular gates while other gates are secured. In addition, three Motorola® television surveillance cameras are utilized to patrol three back perimeter gates of Plant 2.

All back perimeter gates are locked prior to second and third shifts on a daily basis. Two secured entrance gates in the Plant 2 area can be electrically operated by the guard stationed at Gate 22. During the second and third shifts, security personnel perform security rounds of Plants 1 and 2 to check lighting, fire protective devices, perimeter checks, etc. Plant 2 rounds start at 5:00 p.m. and continue every hour until 6:30 a.m. Plant 1 rounds start at 5:40 p.m. and continue every hour until 7:00 a.m. All plant surveillances are made on foot. On occasions the local security company performs outside perimeter checks with their company patrol car.

Signs displaying, "Danger - Unauthorized Personnel Keep Out" are posted at the entrance and other locations around the active portions of the facility. The signs are displayed in sufficient size and number to be legible from any approach from a distance of at least 25 feet.

VDL/vrp

1/18/83

ATTACHMENT III

INSPECTION PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

Consisting of Attachment I - General Inspection Schedule and
Attachment II - Detailed Inspection Procedures

Attachment I
GENERAL INSPECTION SCHEDULE

I. GENERAL

Hazardous wastes treated and stored at the Niagara Falls facility are either ignitable, toxic (mercury) and/or corrosive. However, none of the wastes treated or stored in the same location are incompatible. The following inspection plan was developed taking these points into consideration.

II. INSPECTION PROCEDURE

The following inspection schedule will be adhered to when the indicated units are in operation. Inspections and recordkeeping will not be conducted if a unit is not being utilized. Prior to placing a hazardous waste unit back into operation, a thorough inspection will be conducted to insure that the unit is in compliance with the regulations. If a unit fails the inspection, remedial work will be conducted prior to activating the unit.

(Note: Detailed inspection procedures are outlined in the Procedures, Structures, and Equipment Section of this application).

A. Waste Drum Storage Unit

1. Perform Daily

- Check the lock on the main gate which secures the unit
- Inspect the sump level and instigate pumping runoff into mobile collection tanks as required
- Inspect areas subject to spills, such as loading and unloading areas

2. Perform Weekly

- Check identification labeling on drums
- Verify waste is properly packaged
- Inspect containers for leaking or deterioration
- Verify structural integrity of the building, dike, sump, and coatings
- Insure containment system base, base joints and sump are free of cracks
- Insure all containers are closed during storage, except when adding or removing waste.

- Insure containers are handled and stored in a manner which does not promote rupture or leaking
- Verify only designated hazardous waste is stored in this unit
- Insure safety and emergency equipment are available and operational
- Verify sump pump is operational

B. Brine Sludge Treatment/Storage Area

1. Perform Daily

- Inspect the level of waste in each section of the tank for compliance with the containment requirement
- Check waste feed cut-off system and ability to alternate operation between tanks
- Verify accumulated liquids do not exceed one foot depth on any part of the waste pile base. (Verification must also be performed after a major storm event).
- Inspect loading and unloading area to insure brine mud is not tracked out of the designated hazardous waste area

2. Perform Weekly

- Inspect above ground portions of tank for deterioration and leaking
- Check area immediately surrounding tank for erosion or obvious signs of leakage
- Verify proper operation of leachate collection system
- Inspect waste pile base and curbs for deterioration and cracks
- Observe amount of brine mud in waste pile
- Insure safety and emergency equipment are available and operational

3. Perform Quarterly

- Remove waste and inspect pile base for structural integrity (see Attachment II for details).

4. Perform Semi-Annually

Remove waste from each section of the tank and visually inspect structure for cracks or deterioration which could provide a pathway for exfiltration or potential exfiltration (see Attachment II for details).

Monitor the static liquid level in each tank and sumps for a 24-hour period to insure exfiltration is not occurring (see Attachment II for details).

C. Lime Pit Treatment Unit

1. Perform Daily

- Inspect the level of waste in each tank for compliance with the containment requirement
- Check influent and effluent screens for clogging
- Verify wash-down water was not left running into the tank
- Inspect loading and unloading areas
- Verify ignitable wastes are not stored within 50 feet of the property line.

2. Perform Weekly

- Inspect above ground portions of tank for deterioration and leaking
- Check area immediately surrounding tank for erosion and obvious signs of leakage or spills
- Check for unauthorized material or trash in the area
- Insure safety and emergency equipment are available and operational

3. Perform Semi-Annually

Remove waste from the tank and visually inspect structure for cracks or deterioration which could provide a pathway for exfiltration or potential exfiltration (see Attachment II for details).

Monitor the static liquid level in the tank for a 24-hour period to insure exfiltration is not occurring (see Attachment II for details).

D. Safety/Emergency Equipment

The plant safety department is responsible for insuring that the emergency equipment in each area of the plant is inspected according to the following schedule:

- Fire extinguishers - inspected monthly
- Scott Air Packs - inspected monthly
- Plant emergency alarm - tested every Wednesday at 12:00 Noon
- Fire protection sprinkler system - drain test performed once-a-week (weather permitting)
- The water flow alarms - checked monthly by ADT Security Systems, Inc., Olin's contract alarm service
- Fire hose houses and hydrants - checked monthly and hydrostatically tested

The plant environmental technician ensures on a weekly basis that the following spill equipment is available for emergency use:

- Portable pump (gas operated) - Bldg. 94
- Speedi-Dry Absorbent - Bldg. 17
- Hoses - Bldg. 94
- Front end loader - Bldg. 51
- Shovels - Bldg. 49
- Tow motor - Bldg. 49
- Overpack drums - Bldg. 15
- Steel drums - outside Bldg. 72
- Drum liners - Bldg. 91

III. PROBLEM ENCOUNTERED DURING AN INSPECTION

A. General

Any deterioration or malfunction of equipment and structures which the inspection reveals will be remedied on an appropriate schedule as determined by the plant environmental engineer. The schedule will ensure the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, remedial action will be taken immediately. The following steps outline the procedure which will be followed by the inspector if a problem is encountered.

a. Determine the degree of the potential hazard

b. Assess the immediate and potential effects

c. Take corrective action, if possible

d. If the severity of the problem dictates, initiate the procedures outlined in the Contingency Plan.

B. Specific

1. Waste Drum Storage Unit

If a leaking container is encountered during the inspection of the Waste Drum Storage Unit, the drum will be placed in an overpack to contain the leaking material or the waste will be transferred to another polyethylene-lined container which is in good condition and compatible with the waste in question.

IV. INSPECTION RECORDS

A. A written record is maintained of each inspection.

B. The inspection log must contain the following:

1. Date and time of the inspection

2. Inspectors initials

3. Observations (tank levels, leaks, spills)

4. Any immediate or potential problems

5. Action taken to correct a problem

C. The time, date, and degree of remediation taken to correct a problem must be clearly noted in the inspection log.

D. A notation must be made when management is notified that remedial action is required.

E. Records will be maintained at the facility for at least three years from the date of inspection.

VDL/vrp
3/14/84

Amended 3/14/84
Revised 6/21/84 by USEPA

PROCEDURES, STRUCTURES, AND EQUIPMENT
ATTACHMENT II

DETAILED INSPECTION PROCEDURES

BRINE MUD MANAGEMENT AREA AND LIME PIT TREATMENT UNIT

A comprehensive inspection of the brine mud management area, and the lime pit treatment unit shall be conducted to detect leaks, cracks, corrosion, erosion of wall thickness, and joint integrity. (See note below)

I. WASTE REMOVAL PROCEDURES

The following procedures shall be implemented to ensure the proper preparation of the tanks for entry and assessing the condition of the tank and brine mud waste pile base:

A. Brine Mud Treatment Unit

1. Remove brine mud from the tank, one section at a time.
2. Decant brine from the tank using process sump pump or portable pump. Liquid is to be pumped back into the on-line salt storage tank.
3. Remove brine mud from the tank using a front-end loader.
4. Place material into dump trucks and/or waste pile.
5. Remove remaining mud from the tank to expose all joints and seams manually or with a vacuum truck.
6. Wash all surfaces of the structure with high pressure hoses.
7. Pump washwater from tank to process sump and on-line salt storage tank.
8. Fine silty sludge deposited at low point of pit during washdown process shall be removed with shovels and deposited into front-end loader.
9. Repeat Steps 6 through 8 until all surfaces and joints of the unit are free of mud.

B. Brine Mud Waste Pile

1. Remove brine mud from section of waste pile base with a front-end loader.
2. Manually shovel remaining mud from base to expose all joints and seams.

Note: Notice of the date of each inspection will be provided 30 days prior to such inspection to the U.S. Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC).

3. Deposit mud into lined dump truck for disposal or on another part of the pad not being inspected.

4. Wash surface of base with high pressure hoses until no brine mud remains on base.

5. Collect washwater in drainage sump where it will become part of the brine production stream.

C. Lime Pit Treatment Unit

1. The slurry waste shall be removed from the pit using a vacuum truck.

2. Pit sides and bottom shall be flushed with water to remove waste deposits.

3. Washwater shall then be removed with a vacuum truck until lime pit treatment unit is clean and free of standing water.

II. INSPECTION PROCEDURES

A. General

Concrete structures will be inspected and maintained to insure water tightness. Water tightness, the ability of a structure to retain liquid, will be reasonably assured if:

1. A visual inspection demonstrates the concrete is experiencing no infiltration and is free of through cracks and deterioration.

2. All joints are properly sealed and maintained.

3. The unit allows no measurable exfiltration over a 24-hour period.

B. Visual Inspection

A visual inspection will be conducted to insure the unit is free of cracks or deterioration, and experiencing no infiltration. The inspection will be conducted by a qualified engineer under the direction of a registered professional engineer who shall certify to the structural integrity and water tightness of the structure at the time of the inspection.

At the engineer's discretion and considering the results of the previous inspection, the following steps may also be performed. The following steps will be performed at a minimum of every 2 years regardless the inspection results.

1. A grid will be drawn on the unit, thus dividing it in quadrants for reference purposes, using the method outlined in the Wendel Engineer's reports referenced in Section II.E of this Attachment.

2. Notes and sketches will be made as to the structural condition in each quadrant. The presence of cracks, deterioration or infiltration will be noted.

3. The quadrants will be tested for structural soundness by impacting the structure with a hammer. A ringing sound indicates a sound condition while a hollow sound indicates problem areas.

4. Photographs will be taken to document the unit's condition.

5. All of the information will be assembled into an inspection report, which will be submitted to USEPA and NYSDEC.

The following conditions may be referenced in the inspection report.

1. Crazing

The occurrence of numerous fine cracks, which appear on the surface of concrete in hexagonal or octagonal pattern similar to a crushed eggshell, are shallow and the patterns are usually small, varying from less than an inch to several inches in diameter. Although crazing cracks are unsightly and may collect dirt, crazing is of no serious consequence and does not ordinarily indicate the beginning of deterioration.

2. Shrinkage Cracks

Are due to the failure in tension caused by external or internal restraints, such as reduction in moisture content, developed during the curing process.

Plastic - shrinkage cracks occur almost entirely on horizontal surfaces exposed to the atmosphere. These cracks form no definite pattern and are usually at least two-inches deep. Their width may be as great as one-eight inch, and they may extend several feet in length. They do not have the appearance of a clean break as do the cracks that form after the concrete hardens. The latter are sharp-edged and clearly defined, and they frequently break through aggregate particles.

Once formed, the plastic-shrinkage cracks normally retain their original shape and do not serve as a nucleus for progressive deterioration. They do not usually impair the performance of a slab except where they have extended entirely through the slab where they then become a cause of leakage.

3. Structural Cracks

Caused by failure of the structure to resist cracking in the areas of maximum stress or from inadequate soil bearing capacity resulting in non-uniform settlement of the slab sub-base. They are sharp-edged and clearly defined, and they frequently break through aggregate particles.

4. Corrosion

Rusting (oxidation) of reinforcing steel in concrete often leads to cracking, spalling, and ultimate deterioration of concrete. Iron rust, which occupies a greater volume than the original steel that oxidizes, exerts a strong disruptive force on concrete.

5. Scaling

Disintegration that occurs at a concrete surface and develops as a flaking off of mortar or concrete to depths up to one-fourth inch for a light scaling and as much as one inch and more for severe scaling. Scaling may occur over a limited area, or it may be a continuing phenomenon that spreads over virtually the entire concrete surface. Scaling may be caused by chemical attack and by repeated freezing and thawing cycles.

6. Spalling

A loosely defined term and usually refers to an area of concrete or a chunk that has broken from the surface. Spalling may be caused by mechanical damage such as impact. Spalling also may be caused by corrosion of reinforcing steel or other embedded metals.

7. Construction Joint Seals

Since the tanks are of the underground type, once they are empty infiltration can be used as a determination of water stop failure and this can be evidenced by water seepage at the wall-to-floor joint.

C. Structural Testing

If the impact test cited above indicates that a structural problem may exist, the following test methods may be employed to further aid in assessing both visible and unseen deterioration. These tests will also help determine whether corrosion is active or whether cracks are being initiated by other causes. The determination as to which tests are to be performed will be at the discretion of the engineer.

1. Sonic tests for pulse velocities and fundamental frequencies can be made on the concrete in place to estimate severity and extent of deterioration, cracking or voids within the concrete that cannot be seen. This would require exposing both sides of the wall.

2. The pachometer, a magnetic device that measures the depth of reinforcement, if the bar size is known, may be used to locate areas endangered by corrosion because of insufficient cover of reinforcing steel.

3. Based upon the results of the sounding test, core samples can be taken and shipped to a lab for a petrographic analysis and other tests. Items that can be identified are chloride ion content, strength of concrete, and visual inspection of the rebar for thickness and deterioration. The core samples would be 8-10 inches deep, and the number would depend upon the outcome of the sounding test.

Amended 3/14/84
Revised 6/21/84 by USEPA

D. Exfiltration Testing (Static Liquid Level)

Prior to performing exfiltration testing, the applicable waste removal procedures in Section I of this Attachment will be performed. shortly before exfiltration testing, the Brine Mud Tank and Sumps will be refilled with brine or water and the Lime Pit Treatment Unit will be refilled with water. The liquid level in the filled tank will be monitored for a 24-hour period. During this period, material will not be removed or added to the tank. The tank level will be measured to the nearest 0.01 inch and losses due to evaporation and additions due to precipitation will be taken into account. If unaccounted losses are observed, the tank will be emptied and a complete visual inspection conducted. Any problems found during the inspection will be corrected as outlined in the following section. A brief report of the findings of the testing will be submitted to USEPA and NYSDEC every 2 years with the report required by II.B.5.

E. Corrective Measures

If minor cracking or deterioration is discovered during the inspection or other time, USEPA and NYSDEC will be notified within 7 days of identifying the problem. Repairs will be performed using the methods outlined in the Wendel Engineers Post-Repair Engineering Report dated February 29, 1984, Project No. 2287-35/300 and Wendel Engineers Engineering Report dated January 18, 1984, Project No. 2287-35/102 (as corrected February 13, 1984). If Olin determines another method is acceptable, it will be submitted to USEPA and NYSDEC for approval. A report verifying that repairs were performed according to such methods will be submitted to USEPA and NYSDEC.

If other than minor cracking or deterioration is discovered during the inspection or other time or if a problem is found which is a threat or has the potential to threaten human health or the environment, the following steps will be followed before returning the unit to service.

1. Item II of the General Inspection Schedule (Section 5 of this application) will be implemented.

2. Olin will contact the NYSDEC and USEPA within 7 days of identifying the problem.

3. A remedial plan and work schedule will be submitted to USEPA and NYSDEC.

4. Once the plan and schedule are approved by USEPA and NYSDEC, repair of the unit will begin.

5. A registered Professional Engineer will verify that the repairs were performed according to the remedial plan and photographs will be taken to support such documentation. A report on such verification will be submitted to USEPA and NYSDEC.

ATTACHMENT IV

PERSONNEL TRAINING

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

TRAINING PROGRAM

I. PURPOSE

To enable the employee to recognize potential chemical hazards, maintain personnel safety including selection and use of protective clothing and equipment, implementation of the Contingency Plan, federal, state and local regulations regarding the handling of hazardous materials and wastes; understand the relationship of good plant housekeeping to minimize accidents and injuries and the use of this knowledge to minimize accidents and injuries.

II. GENERAL

All personnel associated with the hazardous waste treatment or storage units are required to participate in the following training program. In addition to general classroom instruction and on-the-job training, each employee will participate in an annual review of the initial training. All employees will be trained within six months of assignment to a position which deals with hazardous waste or a hazardous waste management unit and will not be allowed to work unsupervised until they have completed the training requirements.

III. TYPES OF TRAINING

A. General Classroom Instruction

1. Prior to beginning work in a hazardous waste management area, all employees will be trained in the hazards associated with the

wastes they are handling, emergency procedures associated with this material, and all respective regulatory requirements.

2. Each employee will be given a copy of the Contingency Plan and instructions for implementation relative to their positions. This would include emergency shutdown operations.
3. All employees will be instructed in emergency procedures, evacuation procedures, and the location and use of all emergency equipment. Included in this instruction would be response requirements to groundwater contamination incidents.
4. Employee responsibility for complying with federal, state, and local regulations will be reviewed. This will include an overview of USEPA and NYSDEC hazardous waste regulations as it affects each employee.
5. Each employee will sign a statement to the effect that they have received a copy of the Contingency Plan have been instructed in emergency and handling procedures and have been informed of government regulations regarding hazardous wastes.
6. Hazardous waste training records will be kept in each employees personnel file.

B. Annual Training

1. The Contingency Plan and emergency and handling procedures will be reviewed. Changes in government regulation or company policy and procedures will be updated.

2. Documentation of this training will be placed in the employee's personnel file.

C. On-the-Job Training

1. This training will be conducted by the immediate supervisors and will be specific to the jobs the employees are performing.
2. A record of this training will also be maintained in the employee personnel file.

IV. TRAINING DIRECTOR

The training program will be directed by the plant Environmental Engineer, Ms. Dorothy C. Chute. Ms. Chute's background in hazardous waste management includes:

1982 - Attended New York State "Hazardous Waste Regulation Workshop".

1981 - Environmental Engineer with Acres America Incorporated. Responsible for the evaluation of environmental impacts of various solid and hazardous waste management projects especially for compliance with the Resource Conservation and Recovery Act (RCRA).

Reviewed modifications to a major hazardous waste management facility for environmental compliance (federal, state, and local regulations).

Reviewed a proposed industrial wastewater treatment facility for RCRA and OSHA regulations. Recommended procedures for phasing out an existing sludge lagoon containing hazardous waste.

1980 - Project Engineer, Waste Resource Associates, Inc., Niagara Falls, New York

Responsible for the evaluation of existing treatment, storage, and disposal facilities for compliance with the Resource Conservation and Recovery Act (RCRA).

Responsible for environmental coordination, compliance, and evaluation for all solid and hazardous waste management projects including Contingency and Emergency Procedure Plans.

Aided industrial clients with RCRA compliance including proper labeling of waste, establishing recordkeeping procedures, and manifest tracking system.

Obtained ICC licensing for hazardous waste haulers and advised transporters on DOT regulations, RCRA compliance, manifest handling, placarding, spill contingency plans, and proper methods in the handling of hazardous materials.

Prepared contingency and emergency response plans for a plastic manufacturing plant generating and storing hazardous waste.

Redesigned an existing landfill to control leachate and bring the facility into compliance with RCRA.

V. INTRODUCTORY TRAINING PROGRAM OUTLINE

A. Overview of RCRA and NYSDEC Hazardous Waste Requirements

1. Generator, storage and treatment facilities
2. Transporter
3. Receiving facility

B. Training for Personal Safety

1. Chemical aspects of handling, storage, treatment and disposal of hazardous wastes
2. Chemical aspects of personal safety
3. Basic toxicology
4. Personal safety - selection and use of personal protective equipment

C. Preparedness and Prevention

1. Alarms and communication devices
2. Emergency equipment
3. Aisle space requirements

D. Contingency Plan Review

1. Employee responsibilities
2. Supervisor's responsibilities
3. Olin's responsibilities

E. Documentation Required

1. Manifest system
2. Labeling and placarding
3. Incident reporting
4. Training records
5. Inspection reports
6. Contingency Plan
7. Security
8. Waste handling procedure
9. Waste Analysis Plan
10. Closure Plan

F. Job Specific Instruction Based on Job Safety Instruction Analysis (JSI's)

VI. CONTINUING TRAINING PROGRAM OUTLINE

A. Introduction

1. The intent of the law
2. The penalty for not complying with the law

B. Manifest and Shipping Requirements

1. The key to RCRA Hazardous Waste Management
2. Preparing the manifest prior to shipment
   a. Sign and date manifest
   b. Note any discrepancies
   c. Have transporter sign Part A
3. DOT shipping regulations
   a. Labelling of drums
   b. Packaging
   c. Placarding trucks
4. Landfill requirements for accepting waste
   a. Plastic liners
   b. Six inch air space or less and no free liquids in drums
   c. Bolting drum covers
   d. Preapproved landfill codes

C. Drum Loading Procedures

1. Stress proper procedures for loading drums

   a. Gloves
   b. Pinch points
   c. Transferring drum from pallet to truck bed

2. Procedure for over-packing leaking drums

3. Highlight spill control procedure (also covered in Contingency Plan)

D. Transporting Hazardous Waste to Drum Storage Area

1. Use of color code (white) drums only

2. Use of white plastic pallets only

3. Use of safety equipment (safety cage)

4. Placing of drums on pallet and into cage

5. Labelling drum as to content

6. Moving drums into storage area

7. Placing drums in proper location

E. Caustic Filter Backwash

1. Generating location

2. Movement of drummed waste

3. Placement of drum in storage area

F. Brine Mud Management Area

1. Treatment tank

2. Tank cleaning procedure

3. Waste pile

4. Truck loading procedure

5. Checking truck prior to leaving site

   a. Leakage
   b. Placards
   c. Wash brine mud from truck

6. Washing all equipment prior to leaving site

G. Lime Pit Treatment Area

1. Drums containing hazardous waste will not be stored within 50 feet of the property line.

H. Retort Ash

1. Moving waste drum to retort

2. Removing ash in white drum on pallet to storage area

I. Mobile Collection of Mercury Contaminated Wastes

1. Mobile tanks location and use

2. Disposal of waste in on-site pretreatment facilities

J. Contaminated Equipment

1. Procedures for movement of equipment

2. Storage of equipment

K. Funda Filter Sludge

1. Collection of the sludge

2. Transport procedure to the drum storage area

L. Secondary Treatment

1. Procedures for cleaning the filters and tank

2. Processing and loading the sludge for disposal

M. Location of Hazardous Waste Equipment

1. Location of white drums

2. Location of plastic pallets

3. Location of spill control equipment

N. Preparedness and Prevention Plan

1. Alarms and communication devices

a. Plant alarm systems
b. Emergency rescue service (ERS) telephone
c. Intercom system
d. ADT alarm system
e. Personnel pagers
f. Two-way radios

2. Use of portable emergency equipment

3. Location of emergency equipment

   a. Brine mud management area
   b. Waste drum storage unit
   c. Lime pit treatment unit

4. Aisle space requirements

5. Notification letters

O. Contingency Plan

1. Purpose and requirements

2. Employee responsibilities

3. Supervisor responsibilities

4. Emergency Coordinator responsibilities

5. Olin's responsibilities

P. Inspection Plan

1. Waste drum storage unit

   a. Daily inspection requirements
   b. Weekly inspection requirements

2. Brine mud management area

   a. Daily inspection requirements
   b. Weekly inspection requirements
   c. Monthly inspection requirements
   d. Yearly inspection requirements

3. Lime pit treatment unit

   a. Daily inspection requirements
   b. Weekly inspection requirements
   c. Yearly inspection requirements

4. Inspection record requirements

VII. DOCUMENTATION OF TRAINING

Olin will maintain the following records at the facility per 40 CFR 264.16(d).

A. The job title and description of each position related to hazardous waste management.

B. The name of the employee filling the position.

C. Documentation that introductory and continuing training have been provided to each employee.

Records on current personnel will be maintained until the facility is closed. Training records on former employees will be kept for at least three years from the date the employee last worked at the facility. The training records may accompany the employees if they transfer within Olin.

VDL/vrp

1/11/83

TRAINING PROGRAM

ATTACHMENT I

Example Job Safety Instruction Worksheets (JSI's)

JOB SAFETY INSTRUCTION WORKSHEET

ANT Niagara TITLE OF JOB OPERATION Cleaning Lime Pit

DEPARTMENT HTH DATE 6/7/82

SECTION POSITION TITLE OF EMPLOYEE WHO DOES THE JOB

(REV. 11/78)

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job "changing a light bulb" breaks down into its basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Take the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Asks: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exac should the employee do or not do to avoid the accide Get your answers by either (1) observing the job (or lea (2) discussing the job with others who are experien therein, (3) drawing on your own experience, or (4 combination of all three. Describe specific precautions in concrete detail. Give e recommended precaution the same number as was gi the potential accident (center column) to which it app Avoid generalities like "Be alert", "Be careful" "Take caution". Use simple do or don't statemen e.g. "Lock out main power switch", "Stand clea lift before signaling", or "Check wrench grip bef exerting full force". If necessary, explain how as as what to do. Amount of detail is a matter of ju ment. Also question the basic job method. Is there an ent different way to do the job that is better and safe a repair or service job, can anything be done to incr the life of the job.
(1 Use lift truck with boom on forks to remove grating from east end of lime pit.	(1A) No hazzard. (1B) SB Struck by lift truck (1C) CB Hands or fingers caught between cable on grating or between cable and hook on boom. (1D) SA Backing onto object or someone.	(1A) Drive lift truck to pit ar in front of grating. (1B) Set brakes to keep lift tr from rolling into pit. Sh off engine. (1C) Wear gloves to attach cabl to boom hook. (1D) Release probing brake, sou horn on lift truck and bac up.
(2 Back up lift truck with grating and move to one side.	(2A) SB Struck by grating. (2B) CB Caught between grating and pit railing or other objects.	(2A) Attach rope to grating to guide it as it is being mo (2B) Same as (2A) above.

JSI MADE BY JSI APPROVED BY

(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Cleaning Lime Pit

DEPARTMENT HT DATE 6/7/82

SECTION POSITION TITLE OF EMPLOYEE WHO DOES THE JOB

REV. 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job "replacing a light bulb" breaks down into basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make job steps neither too fine nor too general. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exact should the employee do or not do to avoid the accider Get your answers by either (1) observing the job for reac (2) discussing the job with others who are experienc therein, (3) drawing on your own experience, or (4) combination of all three. Describe specific precautions in concrete detail. Give ea recommended precaution the same number as was giv the potential accident (center column) to which it appl Avoid generalities like "Be alert", "Be careful" a "Take caution". Use simple do or don't statemer e.g. "Lock out main power switch", "Stand clear lift before signaling", or "Check wrench grip bef exerting full force". If necessary, explain how as w as what to do. Amount of detail is a matter of jud ment. Also question the basic job method. Is there an entir different way to do the job that is better and safe? a repair or service job, can anything be done to increa the life of the job.
2) To clean pit use front end loader to remove waste.	(3A) CW Contact with, splashed with waste from pit.	(3A) Wear safety glasses, respir ator, full face shield and rain gear (wet suit).
4) Use dump truck to haul waste to secure landfill area.	(4A) CW Contact with or splash of waste or leak from truck.	(4A) Place plastic sheeting into dump truck bed to seal off any leaks.
	(4B) CW Contact with waste spill over top side of truck bed enroute to landfill.	(4B) Place plastic sheeting or other cover over top of was in truck bed.
5) After pit is cleaned wash front end loader.	(5) CW Contact with, or splash from fire hose.	(5) Wear safety glasses, respi ator, face shield, rain ge rubber gloves.
(6) After truck is empty wash down truck bed.	(6) Same as #5 above	(6) Same as #5 above
(7) Replace grating back in pit.	(7A) Struck by grating.	(7A) Attach rope to grating to guide it as it is being mo

JSI MADE BY JSI APPROVED BY

(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Cleaning Lime Pi

DEPARTMENT HT DATE 6/7/82

SECTION POSITION TITLE OF EMPLOYEE WHO DOES THE JOB

REV. 11/78

LIMITED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job of "replacing a light bulb" breaks down into the following steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Try to make job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "Struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for ideas, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful", "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgment. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? For a repair or service job, can anything be done to increase the life of the job.
	(78) CB Caught between grating and pit railing or other objects.	(78) Same as #7A above.

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(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Dumping in Pit

DEPARTMENT HTH DATE 5-25-82

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB ALL HTH OPERATORS

REV. 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job "changing a light bulb" breaks down into basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make the job steps neither too fine nor too rough. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safe? If a repair or service job, can anything be done to increase the life of the job.
1) Move tubs, drums to pit area by hand truck.	1a) E - Exposure to dust and fumes. 1b) S.O. - Strain over-exertion. 1c) C.W. - Contact with dust.	1a) Safety glasses, respirator to be used. 1b) Secure tubs, drums to hand truck. 1c) Wear gloves, long sleeve shirt.
2) Dump tubs, drums on incline end of pit.	2a) S.O. - Strain over-exertion. 2b) E - Exposure to dust and fumes. 2c) F - Fall or slip on wet incline edge of ramp of pit.	2a) Place both hands on edge of tub, get a firm grip, wear gloves (waterproof gloves). 2b) Use safety glasses face shield, respirator. 2c) Wear rubber foot wear, stay back of incline part of ramp.

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(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

REV. 11/78

PLANT Niagara TITLE OF JOB OPERATION Dumping in Pit

DEPARTMENT HTH DATE 5-25-82

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB ALL HTH OPERATORS

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job "Replacing a light bulb" breaks down into basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "Struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exact should the employee do or not do to avoid the accider Get your answers by either (1) observing the job for leas (2) discussing the job with others who are experienc therein, (3) drawing on your own experience, or (4) combination of all three. Describe specific precautions in concrete detail. Give ea recommended precaution the same number as was giv the potential accident (center column) to which it appli Avoid generalities like "Be alert", "Be careful" a "Take caution". Use simple do or don't statemen e.g. "Lock out main power switch", "Stand clear lift before signaling", or "Check wrench grip befc exerting full force". If necessary, explain how as w as what to do. Amount of detail is a matter of jud ment. Also question the basic job method. Is there an entir different way to do the job that is better and safe? a repair or service job, can anything be done to increa the life of the job.
1) Move tubs, drums to pit area by hand truck.	1a) E - Exposure to dust and fumes.	1a) Safety glasses, respirator to be used.
	1b) S.O. - Strain over-exertion.	1b) Secure tubs, drums to hand truck.
	1c) C.W. - Contact with dust.	1c) Wear gloves, long sleeve shirt.
2) Dump tubs, drums on incline end of pit.	2a) S.O. - Strain over-exertion.	2a) Place both hands on edge of tub, get a firm grip, wear gloves (waterproof gloves).
	2b) E - Exposure to dust and fumes.	2b) Use safety glasses face shield, respirator.
	2c) F - Fall or slip on wet incline edge of ramp of pit.	2c) Wear rubber foot wear, stay back of incline part of ramp.

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OB SAFETY INSTRUCTION WORKSHEET

ANT Niagara TITL F JOB OPE TION Handling waste mater

DEPARTMENT Chlor/Alkali DATE 6/4/82

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB All skilled laborer

REV. 11/78

JIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
...e job down into basic steps that tell ... done first, what is done next, and so ... can do this by (1) observing the job, ...cussing it with the operator, (3) draw... your knowledge of the job, or (4) a ...ination of all three. Record the job steps ... normal order of occurrence. Describe ... done, not the details of how it is done. ... three or four words are sufficient to ... each job step. For example: The job ...acing a light bulb" breaks down into ...ps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder ...the job steps neither too fine nor too ...rse. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CB — Contacted by SA — Struck against CW — Contact with CI — Caught in CO — Caught on CB — Caught between F — Fall SO — Strain-overexertion E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident? Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" or "Take caution". Use simple do or don't statement e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgment. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? For a repair or service job, can anything be done to increase the life of the job.
) Place covers and seal drums of waste material for transporting to secure landfill.	(1A) E Exposure to fumes and liquid from waste (1B) SO Strain, overexertion (1C) CB Pinch points on covers and between drums	(1A) Safety glasses, respirator, rubber gloves needed. Rubber suit and boots may be needed. (1B) Move tubs and drums in safe way to avoid strain. (1C) Using both hands firmly gri drum and move. Watch for pinch points on next drum (wear rubber gloves). Watc for pinch points on spring cover - locking band.

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(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

REV. 11/78

P. NT Niagara TITLE JOB OPER. ON Dewater Brine Pits

DEPARTMENT E-11 - Brine DATE 6/4/82

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB All skilled laborers

E... D PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
eak ... t job down into basic steps that tell ... hat ... one first, what is done next, and so ... You can do this by (1) observing the job, ... discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in the normal order of occurrence. Describe what ... one, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example: The job "Changing a light bulb" breaks down into basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make your job steps neither too fine nor too coarse. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "Struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on (CB) — Contacted by CB — Caught between S — Struck against F — Fall (CW) — Contact with (SO) — Strain-overexertion CI — Caught in (E) — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a redesign or service job, can anything be done to increase the life of the job.
(1 Remove water from brine pits using portable sump pumps.	(1A) E Exposure to dust, fumes, and liquid from brine settler discharge.	(1A) Safety glasses, respirator, boots, rubber suit, and rubber gloves may be needed.
	(1B) SO Strain, overexertion	(1B) Use care in handling of suction and discharge hoses also pumps.
	(1C) CW Contact with settler discharge liquid	(1C) Wear rubber safety equipment as needed and directed.
	(1D) CB Pinch points of hoses and pumps	(1D) Handle hoses and pumps in a safe and protected way.

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(Continue on Reverse Side)

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JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Hauling brine to LP

DEPARTMENT E-11 Brine DATE 1/11/83

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB _____

REVISED 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three, or four words are sufficient to describe each job step. For example: The job of changing a light bulb" breaks down into steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Keep the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB -- Struck by CO — Caught on CB — Contacted by CB — Caught between SA -- Struck against F — Fall CIV — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a repair or service job, can anything be done to increase the life of the job. 4A) Cont'd.
		slipping.
		4B) Exposure to brine should be
		prevented by washing boots and
		equipment off before leaving the
		area.

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(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Removal of Brine Sludge

DEPARTMENT E-11 From Storage Unit DATE 1/11/83

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB Laborers

Rev. 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. This can be done by (1) observing the job, (2) discussing it with the operator, (3) drawing upon your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three or four words are sufficient to describe each job step. For example, the job step "replacing a light bulb" breaks down into steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Keep the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion C — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for ideas, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a repair or service job, can anything be done to increase the life of the job.
1. Decant liquid from pit with pumps.	1A) CB-Contacted by 1B) F-Fall 1C) E-Exposure	1A) Safety equipment including rubber boots should be worn to minimize contact with the brine sludge. 1B) Brine sludge can be slippery. Caution should be used when walking in the area. 1C) Exposure should be minimized by washing equipment and boots off before leaving the area.
2. The brine is removed from pit by front-end loader and placed behind pit for further dewatering.	2A) CB-Contacted by	2A) Front-end loader operators must be aware of traffic in the area. Use horn when backing up.

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(Continue on Reverse Side)

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JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE JOB OPERATION Filling and Preparing Drums of Hazardous Waste

DEPARTMENT Plant II DATE 1/11/83

SECTION ____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB Laborer

167 REV. 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three, or four words are sufficient to describe each job step. For example: The job of "changing a light bulb" breaks down into basic steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion C — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for ideas, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a repair or service job, can anything be done to increase the life of the job.
1. Place liner inside special hazardous waste drums white-colored DOT approved drums.	1A) SO-Strain-overexertion	1A) When placing liners in drums, caution should be used bending over drum to insert liner.
2. Fill drum as near to capacity as possible.	2A) CB-Caught between 2B) E-Exposure	2A) Contact with the waste should be minimal. Wear protective clothing and all required safety equipment. 2B) Exposure to the waste can be minimized by respirator and protective clothing. Remove clothes after the job is completed and wash before leaving the area.
3. Attach lid with ring nut and bolt.	3A) C)-Caught on	3A) Pinch points should be watched when tightening the bolt.

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(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Filling and Preparing Drums of Hazardous Waste

DEPARTMENT Plant II DATE 1/11/83

SECTION _____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB Laborer

REVISED 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break the job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually two, three, or four words are sufficient to describe each job step. For example: The job of "changing a light bulb" breaks down into the steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make the job steps neither too fine nor too broad. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (2) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench slip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a repair or service job, can anything be done to increase the life of the job.
4. Drum is labeled		
5. Tow motor operator is contacted to remove drum to storage area.		

MADE BY _____ JSI APPROVED BY _____

(Continue on Reverse Side)

JOB SAFETY INSTRUCTION WORKSHEET

PLANT Niagara TITLE OF JOB OPERATION Hauling brine to LF

DEPARTMENT E-11 Brine DATE 1/11/83

SECTION ____ POSITION TITLE OF EMPLOYEE WHO DOES THE JOB Laborers & Contractors

REV. 11/78

REQUIRED PERSONAL PROTECTIVE EQUIPMENT →

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURE
Break job down into basic steps that tell what is done first, what is done next, and so on. You can do this by (1) observing the job, (2) discussing it with the operator, (3) drawing on your knowledge of the job, or (4) a combination of all three. Record the job steps in their normal order of occurrence. Describe what is done, not the details of how it is done. Usually three, or four words are sufficient to describe each job step. For example: The job "Changing a light bulb" breaks down into the steps as follows: 1. Make sure power is off 2. Bring and set up ladder 3. Ascend ladder 4. Remove light globe 5. Remove light bulb 6. Replace light bulb 7. Replace light globe 8. Descend ladder 9. Remove and store ladder Make the job steps neither too fine nor too coarse. They should sound natural.	Ask yourself for each job step what accidents could occur to the person doing the job step. Get your answers by either (1) observing the job, (2) discussing it with others, (3) recalling past accidents, or (4) a combination of all three. Ask: Can he be struck by anything? Can he strike against or contact anything? Can he be caught in, on, or between anything? Can he fall? Can he strain or overexert himself? Can he be exposed to gas, fumes, radiation, etc.? Record potential accidents by combining one of the accident type abbreviations below with the agent of contact. For example, "struck by a crane hook" is recorded "SB-crane hook". Number each potential accident. SB — Struck by CO — Caught on CB — Contacted by CB — Caught between SA — Struck against F — Fall CW — Contact with SO — Strain-overexertion CI — Caught in E — Exposure If you prefer, explain hazards and potential accidents more fully. Draw a line to indicate where the entries for one job step end and the next begin.	For each potential accident, ask yourself what exactly should the employee do or not do to avoid the accident. Get your answers by either (1) observing the job for leads, (2) discussing the job with others who are experienced therein, (3) drawing on your own experience, or (4) a combination of all three. Describe specific precautions in concrete detail. Give each recommended precaution the same number as was given the potential accident (center) column) to which it applies. Avoid generalities like "Be alert", "Be careful" and "Take caution". Use simple do or don't statements, e.g. "Lock out main power switch", "Stand clear of lift before signaling", or "Check wrench grip before exerting full force". If necessary, explain how as well as what to do. Amount of detail is a matter of judgement. Also question the basic job method. Is there an entirely different way to do the job that is better and safer? If a repair or service job, can anything be done to increase the life of the job.
. Line truck with heavy-	1A) SO-Strain overexertion	1A) Caution should be used when
...ry plastic to prevent leak-	1B) CO-Caught on	climbing on truck.
...e during transport.	1C) CB-Caught between	1B) Safety shoes, hard hat, gloves,
		and respirator should be worn.
		1C) Watch pinch points when lining
		truck bed w/plastic.
. Payloader operator fills	2A) E-Exposure to brine	2A) Safety equipment
...e truck two-third	sludge	
. ...over truck with tarp	3A) CO-Caught on	3A) Watch pinch points when cover-
	3B) CB-Caught between	ing w/tarp.
	3C) SO-Strain overexertion	3B) Caution should be used when
		climbing on the truck.
. ...ash frontend loader and	4A) CW-Contact with	4A) Caution should be heeded when
...k after delivery	4B) E-Exposure	walking in the wash area. Rubber
		boots should be worn to prevent

JSI MADE BY ____ JSI APPROVED BY ____

(Continue on Reverse Side)

ATTACHMENT V

IGNITABLE, REACTIVE, INCOMPATIBLE WASTE

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES

Hazardous wastes treated and stored at the Niagara Falls facility are either ignitable, toxic (mercury) and/or corrosive. However, none of the wastes treated or stored in the same location are incompatible with other hazardous or non-hazardous materials.

The lime pit treatment unit is the only management unit which receives ignitable wastes, as defined by RCRA. Lime/hypochlorite wastes are classified ignitable before they are placed in the treatment unit. Once this material is mixed with water, it is immediately rendered non-hazardous. No other type of hazardous waste is placed in this unit. This treatment unit is located in an area of the facility where HTH®, one of the products of the plant is produced. HTH® (calcium hypochlorite) is itself an oxidizer. Therefore, every procedure and operation in this section of the plant revolves around maintaining a safe working environment free from fire or explosion. "No Smoking" signs are placed throughout this area and no operations which could cause ignition of the material are allowed while the material is being handled. All employees in this section of the plant are well versed in the proper handling and safety procedures associated with this product and waste (see Olin Material Safety Data Sheet attached). Therefore, there is no real threat to human health or the environment from operations at this treatment unit.

All ignitable wastes are maintained at least 50 feet from the property line except when they are being introduced to the treatment unit. The 50-foot interval is denoted by a painted line. Hazardous wastes, as defined by RCRA, stored at the brine sludge and waste drum storage units are not ignitable nor are they reactive. Also none of the wastes are incompatible.

ATTACHMENT VI

CONTINGENCY PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

CONTINGENCY PLAN

I. GENERAL INFORMATION

The following plan was developed for the Olin Corporation production facility located at 2600 Buffalo Avenue in Niagara Falls, New York. The plan was designed to minimize hazards to human health and/or the environment from fires, explosions, or any unplanned sudden or non-sudden release of a hazardous waste to the air, soil, or surface water. Provisions outlined here will be carried out immediately whenever such a situation occurs.

Hazardous wastes treated and stored at this facility are either ignitable, toxic, and/or corrosive. The only ignitable waste at the facility, as defined by RCRA, is treated at the lime pit treatment unit. Due to the high percent water content of the treatment unit, this waste is rendered non-ignitable upon being introduced to the unit. Other hazardous wastes, which are stored either in the brine mud storage unit or the waste drum storage unit are either toxic and/or corrosive. The toxic waste contains mercury which is either in elemental form, tied up as mercuric sulfide, or complex mercury ions. The sudden release of any of these wastes is not considered any more catastrophic than a spill or release of a number of the products handled at the plant on a daily basis.

The Niagara Falls facility has established emergency procedures to deal with a gas release, fire, explosion, and outside product emergency (see Attachments). All of the contingency plan content requirements, under 40 CFR Part 264, Subpart D, are satisfied in one or more of these existing procedures. In order to

maintain continuity and avoid undue confusion in the event of an emergency, the existing procedures will be followed for a hazardous waste release. The following is presented only to reiterate emergency procedures specifically as they apply to a hazardous waste release from storage container, tanks, and treatment tanks.

II. EMERGENCY COORDINATORS

If an emergency situation develops at the facility, the guard at Gate 1 must be contacted by dialing 6445 on any plant telephone 24 hours a day. This guard, who has access to the plant area-wide alarm system and a direct line to the City of Niagara Falls Public Safety Department, will act as emergency communications coordinator throughout the emergency.

The Gate 1 guard will then immediately contact Alan Swavy, the primary emergency coordinator and Safety Manager for the plant. If he is not available, Michael Davis should be contacted. These individuals can be reached at the following telephone numbers:

Individual	Work No.	Home No.
Alan Swavy, Safety Manager (Primary emergency coordinator)	278-6464	754-8901
Michael Davis, Safety Supervisor (Secondary emergency coordinator)	278-6540	297-5967

The emergency coordinator will immediately contact one of the following environmental coordinators (in the order listed) if the situation represents a threat to the environment.

Individual	Work No.	Home No.
Alan Kapteina, Quality Control Manager (Primary environmental coordinator)	278-6584	754-8769
Dorothy Chute, Environmental Engineer (Secondary environmental coordinator)	278-6585	833-2829
James Reed, Engineering Services (Secondary environmental coordinator)	278-6581	731-9840
Arthur Szustak, Engineering Services Mgr. (Secondary environmental coordinator)	278-6567	791-4922
Milton Norsworthy, Plant Manager (Secondary environmental coordinator)	278-6415	688-0043

The following table lists the organizations which will be contacted, as appropriate, during an emergency situation.

Emergency	Organization/Agency	Phone No.
Injury	Niagara Falls Memorial Medical Center	278-4000
	Poison Control Center	278-4511
Fire/Explosion	City of Niagara Falls Public Safety Dept. (Fire & Police Depts.)	911 Plant has a direct line
Hazardous Material Spill or Release	City of Niagara Falls Public Safety Dept.	911
	National Response Center (if spill reaches navigable waters)	(800) 424-8802
	New York State Department of Environmental Conservation (NYSDEC) Albany (24-hr. no.) Buffalo	 (518) 457-7362 (716) 884-4461
	USEPA Region II (24-hr. no.)	(201) 321-6657
	Niagara County Health Dept.	(716) 439-6109

III. IMPLEMENTATION OF THE CONTINGENCY PLAN

A. The decision to implement the Contingency Plan depends upon whether or not an imminent or actual incident exists which could threaten human health or the environment. The purpose of this section is to provide guidance to the emergency coordinator in making this decision by providing decision-making criteria.

B. The following represents the type of situations for which the Contingency Plan will be implemented:

1. Fire and/or Explosion

   a. A fire causes the release of toxic fumes.

   b. The fire spreads and could possibly ignite materials at other locations on-site or could cause heat-induced explosions.

   c. The fire could possibly spread to off-site areas.

   d. Use of water or water and chemical fire suppressant could result in contaminated runoff.

   e. An imminent danger exists that an explosion could occur, causing a safety hazard because of flying fragments or shock waves.

   f. An imminent danger exists that an explosion could ignite other hazardous waste at the facility.

   g. An imminent danger exists that an explosion could result in release of toxic material.

   h. An explosion has occurred.

2. Spills or Material Release

a. The spill could result in release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.

b. The spill could cause the release of toxic liquids or fumes.

c. The spill can be contained on-site, but the potential exists for groundwater contamination.

d. The spill cannot be contained on-site, resulting in off-site soil contamination and/or ground or surface water pollution.

3. Floods

a. The potential exists for surface water contamination.

IV. EMERGENCY COORDINATION PROCEDURES

A. In the event of a fire, explosion, life threatening and/or non-containable hazardous waste release, the following procedure will be adhered to:

1. Employee Responsibilities

a. Employees must notify their supervisor.

b. Only if the supervisor is incapacitated should an employee take the initiative to contact the emergency communications coordinator.

c. All employees shall then follow the procedures outlined for a gas release with respect to; use of alarm and communication systems, evacuation procedure, and use of emergency equipment. (Emergency equipment type and location provided in the Preparedness and Prevention Plan.)

2. Supervisor's Responsibility

a. Supervisors must assess the situation quickly and notify the emergency communications coordinator by dialing 6445 on any plant telephone.

b. Assist the employee obtain more help from within the department.

c. Obtain required protective equipment.

d. Implement shutdown procedures.

e. Cut off the electrical power to areas affected.

f. Post an employee at the guardhouse to direct any emergency equipment that has been called for. Upon arrival of the Safety Department, the supervisor will identify himself to the Fire Chief and tell him what hazards exist in the area and what extinguishing agent to use.

g. If evacuation of the area is required, designate someone to take a personnel count in the assembly area.

h. Assist the Safety Department by fulfilling their requests and directions.

3. Emergency Communications Coordinator's Responsibility

a. The guard at Gate 1 will act as the emergency communications coordinator for all emergency situations and is responsible for contacting the emergency coordinator as outlined in Section II of this plan.

b. He shall use the E.R.S. phone which is a direct line to the Niagara Falls Public Safety Department. When the Department answers, the coordinator will state the following:

i. His name;

ii. The type of emergency;

iii. Area where it occurred - building number and plant;

iv. State if emergency is containable to the plant site and if it will threaten human health and/or the environment.

c. Activate plant alarm for correct area.

d. Transmit exact nature and location of emergency over the plant radio system and appropriate plant intercom systems.

e. Call or arrange to have the necessary gates open.

f. If the emergency is located in the HTH® warehouses (Building 101, 102, 103, 124), HTH® employees must be alerted. Put this information on the HTH® intercom.

g. Contact the persons listed on the call list posted by the phone.

h. Call the plant nurse. She will make arrangements for medical coverage if needed.

i. All gates shall be secured during the emergency and are to be opened for emergency use only.

j. Stand by the phone to receive instructions and relay messages.

4. Emergency Coordinator's Responsibility

a. If the emergency coordinator determines that the facility has had a release, fire, or explosion which could threaten human health, or the environment, outside the facility, he must report his findings to the appropriate governmental agencies listed in Section II of this plan.

b. If his assessment indicates that evacuation of local areas may be advisable, he must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated; and

c. If the emergency involves a hazardous waste, the emergency must contact the environmental coordinator listed in Section II of this plan.

d. During an emergency, the emergency coordinator will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility. These measures will include, where applicable, stopping processes and operations, collecting and containing release waste, and removing or isolating containers.

e. The primary emergency coordinator and alternate have complete authority to commit all resources of the company in the event of an emergency.

f. If the facility stops operations in response to a fire, explosion, or release, the emergency coordinator will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

g. He will ensure all emergency equipment listed in the Contingency Plan is cleaned and fit for its intended use before operations are resumed.

5. Environmental Coordinator's Responsibility

a. Immediately after an emergency, the environmental coordinator will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility.

b. As soon as possible after an emergency which involves a hazardous material, the environmental coordinator must contact one of the following Environmental Affairs Department (E.A.D.) personnel to discuss the emergency and required action:

E.A.D. Personnel	Work No.	Home No.
V. D. Laquidara	(615) 336-4510	(615) 476-5945
D. L. Cummings	(615) 336-4549	(615) 472-9635
D. R. Vaughn	(615) 336-4555	(615) 336-5287
J. C. Brown	(615) 336-4308	(615) 336-6608
V. M. Norwood	(615) 336-4395	(615) 336-5244

c. On concurrence with EAD, the environmental coordinator must notify the appropriate governmental agencies listed in Section I of this plan. The report to these agencies must include:

i. Name and telephone number of reporter;

ii. Name and address of facility;

iii. Time and type of incident (e.g., release, fire);

iv. Name and quantity of material(s) involved, to the extent known;

v. The extent of injuries, if any; and

vi. The possible hazards to human health, or the environment, outside the facility.

d. The environmental coordinator must ensure that in the affected areas of the facility no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed.

e. The environmental coordinator, with EAD recommendations, will develop the final plan of action to deal with the released material and ultimate cleanup and disposal.

6. Olin's Responsibility

a. Olin will notify USEPA Region II, NYSDEC and local authorities that the facility is in compliance with 40 CFR 264.56(h) before operations are resumed in the affected areas of the facility.

b. Olin will note in the operating record the time, date, and details of any incident that requires implementing the Contingency Plan. Within fifteen (15) days after the incident, Olin will submit a written report on the incident to the Regional Administrator. The report will include:

1. Name, address, and telephone number of the owner or operator;
2. Name, address, and telephone number of the facility;
3. Date, time, and type of incident (e.g., fire, explosion);
4. Name and quantity of materials(s) involved;
5. The extent of injuries, if any;
6. An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
7. Estimated quantity and disposition of recovered material that resulted from the incident.

B. In the event of a non-life threatening hazardous waste release containable to the plant site, the following procedure shall be adhered to:

1. Employees will follow procedures for containing the material using the emergency equipment at hand.
2. Employees will know location of nearest communications or alarm device and proper procedure to report an emergency, if required.
3. Employees must notify their supervisor of the incident.
4. The supervisor will notify the environmental coordinator and Safety Department to assess the situation and take corrective action to prevent the incident from reoccurring.

C. The contents of all emergency procedures are reviewed with the local fire department emergency response teams at least twice per year by the Niagara Plant Safety Department.

V. EMEREGENCY PROCEDURES

A. Fire/Explosion

Olin personnel will follow the detailed procedures contained in Appendix II of this plan.

B. Hazardous Waste Spill or Release

The following general guidelines outline the steps which will be taken to address a hazardous waste spill or release at the plant. Examples of incidents which would warrant implementation of procedures are:

- A failure of a drum in the storage area
- Drums ruptured during loading or unloading operations
- Leaks develop in the wall of a storage tank, dike, or pile base
- Brine mud accumulates in non-designated areas.
- A waste material is spilled during transfer operations.

As many of these incidents as possible will be prevented through the implementation of a thorough inspection schedule and the observance of safe operating procedures. However, when an accident does occur, the following steps will be implemented immediately by Olin personnel.

1. Identify the spilled material and its hazardous characteristics.
2. Assess spill magnitude and threat the human health and the environment.
3. Take appropriate safety precautions to safeguard life and the environment.
4. Initiate the appropriate aspects of the general emergency coordination procedure outlined in Section IV of this plan.
5. Stop the discharge, if possible, by one of the following methods:
   a. Close valves and shut off pumps - especially if a transfer operation is involved.
   b. Rebuild or repair container - includes rebuilding, reinforcing, patching and insertion of plugs both to the inside (rags to get caught in the leak) and from the outside (wooden plugs forced into hole to reduce area of leak).
   c. If possible, change the position of the container - move the container so the leak is at the highest level.
   d. Transfer or collect the material from the leaking container- usually into an undamaged container of the same or similar type.
   e. Encase the entire container or construct a suitable alternate - either overpacks or actual containment can be done in this circumstance.

6. Choose an appropriate method to contain the spill such as diking, excavation, diversion or any combination of these.
7. If the spill residue is in an easily collectable form such as brine mud, return the material to the storage area using the appropriate equipment and containers.
8. Small liquid spills may require an adsorbent material be used to collect the waste residue while larger spill may need to be pumped into compatible containers.
9. Representative samples of contaminated materials such as soils must be collected and analyzed for hazardous characteristics.
10. Materials determined to be hazardous either by definition or analysis will be removed from the plant site.
11. All hazardous material which is generated during a spill cleanup will be properly packaged prior to being introduced to a treatment, storage, or disposal unit.

The above procedure may be varied slightly to accommodate a particular waste or unusual circumstances.

If a condition is identified which could cause or is causing a leak in the brine mud waste pile base, Olin will

1. notify the Regional Administrator of the condition in writing within seven days after detecting the condition.
2. repair or replace the base and obtain certification from a qualified engineer that the condition is alleviated or begin groundwater monitoring pursuant to 40 CFR 264.98.

VI. EMERGENCY EQUIPMENT

Details on the type and location of emergency equipment maintained at the Niagara Falls facility are contained in the Preparedness and Prevention Plan. This plan will be maintained as an attachment to the Contingency Plan.

VII. AMENDING THE PLAN

Mr. Alan Kapteina, Quality Control Manager for the plant, will be responsible for maintaining all accurate and up-to-date copies of this document held by the appropriate Federal, State and local authorities as well as Olin personnel.

VIII. PLAN LOCATIONS

A. A copy of this plan will be provided to the City of Niagara Falls Public Safety Department.

B. This plan has been integrated into the Plant Policy/Procedure Manual. This manual is maintained at the following plant site locations.

1. Plant Manager's Office
2. Operations Manager's Office
3. Production Services Manager's Office
4. Purchasing/Traffic Manager
5. Accounting Manager
6. Engineering Services Manager
7. Industrial Relations Manager
8. Quality Control Manager
9. Chlor/Alkali-Speciality Products Manager
10. Chlor/Alkali Products Supervisor's Office
11. Chlor/Alkali & Caustic Area Shipping Supervisor
12. Maintenance Work Control Superintendent
13. HTH® Manager
14. HTH® General Foreman
15. HTH® Supervisor's Office
16. HTH® Shipping & Receiving Supervisor
17. Work Execution Superintendent
18. 1 - Each Maintenance Supervisor

a. Instrument Supervisor
b. Scheduler/Planner
c. Central Shop Supervisor
d. Electrical Supervisor
e. Instrument/Electrical Superintendent
f. Area II East Supervisor
g. Area II West Supervisor
h. Storehouse Supervisor

19. Medical Department
20. SERE Construction Supervisors
21. Speciality Products Supervisor
22. Sr. Project Engineer
23. Guardhouse No. 1
24. HTH® Main Lunch Room
25. Guardhouse No. 22
26. Maintenance Lunch Room
27. Outside Specialty Products Supervisor's Office - Bulletin Board

VDL/vrp
1/18/83

CONTINGENCY PLAN

August 10, 1979

Re-issued: November

ATTACHMENT I

OLIN CHEMICALS
NIAGARA FALLS PLANT

2.3 SAFETY & LOSS PREVENTION PROCEDURE

EMERGENCY PROCEDURE FOR GAS RELEASE

PURPOSE

To establish a policy and procedure to be followed in the event a gas release occurs at the Niagara Plant.

SCOPE

This procedure provides for the basic emergency measures to be taken should a gas release occur and is not intended to limit any employee from taking further action as he may deem necessary. Specific shut down procedures will be handled in accordance with special instruction sheets, which are part of each Production Area's Operating Procedure Manual.

RESPONSIBILITY

In general, all employees at Niagara Falls are charged with the responsibility of complying with this policy and procedure.

POLICY

For any gas release where it is doubtful that it will be confined to the perimeters of the plant, the Fire Department will be notified and put on alert. Through them, efforts to seal off an area and evacuation will be co-ordinated. If any doubt exist as to whether or not the City Fire Department should be called, it should be resolved in favor of calling them.

Once alerted the Fire Department can prepare to take further measures to evacuate residents if necessary.

A north wind would carry any gas release towards the river. Although this is an area of low population density, consideration must be given to DuPont and Carborundum employees and traffic on the Robert Moses Parkway.

A south or southwest wind (which is the prevailing wind direction) would tend to carry any gas release towards the city. A severe gas release would be very detrimental to the residents north of the plant. The Fire Department should be notified immediately so they can prepare to evacuate residents who could be effected.

The Emergency Co-ordinator is the security guard at Gate 1 Guard House. However, should this area become untenable, the guard at Gate 22 will assume responsibilities of the Emergency Co-ordinator.

The E.R.S. (Emergency Rescue Service) phones located in the Gate 1 and Gate 22 Guard Houses are to be used only by management or the guards when authorized by management.

POLICY - (Cont'd.)

No open flames or welding/cutting and no smoking anywhere in the plant until the emergency is terminated unless specifically authorized by the Safety Department.

The following are the designated alarm areas for the AUTO CALL (dial ACCESS CODE + 55 + 1, 2, 3, 4 or 5):

Area 1 - Main Office (Building #130)
HTH Warehouse (Building #124)
HTH Production Office and Repair Shop (Building #123)

Area 2 - HTH Shipping (Building #101, 102, 103)
HTH Canning Area, Lunchroom, Foreman's Office (Building #104)
HTH Process Area
Personnel Office

Area 3 - All buildings east of Chemical Road to the E-11 Cell Room and Electric Shop.

Area 4 - E-11 Cell Room
Sodium Methylate
Caustic Loading & Storage
Electric Shop and Storehouse
Building #46

Area 5 - All buildings between Alundum Road and Gill Creek.

PERSONNEL POSSESSING PAGERS

Upon hearing the emergency signal over the AUTO CALL, all personnel with pagers will depress the bar on top of their pagers and continue to hold down. This will enable you to receive the emergency co-ordinator who will be transmitting the exact location and nature of the emergency.

EMPLOYEE'S RESPONSIBILITY

1. Employees will know the location of Scott Air Packs in their area and how to use them.

2. Alert other employees and contractors in the area by announcing over the P.A. Systems. (E-11 page system in Plant 2 (dial 103) - HTH page system in Plant 1.)

3. Follow established operating procedure to control the leak (use Scott Air Pack to remain in area).

4. Employees will not notify the emergency co-ordinator unless the supervisor is incapacitated. If an employee has to call the emergency co-ordinator he should:

- Dial 6445 and state his name
- Location of gas release - what type
- Extent of release (how serious)
- What happened to supervisor

EMPLOYEE'S RESPONSIBILITY - (Cont'd.)

5. If asked to evacuate to an assembly area, remain in the area until further instructions are received.

ASSEMBLY AREAS

Plant I personnel report to parking lot across from Guard House 1.
Alternate - Parking lot across from Main Office.

Plant II personnel assemble inside of Gate 2 (Construction Gate) at Chemical Road.
Alternate - Parking lot across from Guard House 22.

Alternate areas are to be used only if primary areas are exposed to immediate danger (i.e. gas release). Remain at assembly area until roll call or further assignment.

6. If it is necessary to leave the department to escape injury, report to one of the guard houses so your whereabouts will be known and then proceed to an assembly area and remain there until otherwise notified.

7. No employee shall leave one plant and go to the other plant unless directed to do so. (Stay clear of the problem area.)

SUPERVISOR'S RESPONSIBILITY

1. The supervisor must quickly assess the situation. He will assist in attempting to correct the situation or obtain more help from within the department to do so.

2. The supervisor will authorize the emergency co-ordinator to notify the City Fire Department when danger to the community exists or is immediately eminent. When calling the emergency co-ordinator state the following:

   - Identify yourself
   - What type of gas release
   - Area where it occurred - what plant
   - If a fire or explosion potential exists
   - Request closure of Buffalo Avenue or Robert Moses Parkway if necessary.
   - Tell guard to inform fire department to evacuate residents that will be affected.
   - Request rescue equipment if needed
   - Personnel injuries if known
   - If danger exist to DuPont, Carborundum, Industrial Welding or Newco have guard notify them.

3. Obtain required protective equipment.

4. Implement shutdown procedures.

5. If employees are injured, AND IN DANGER, move them to a safe location.

SUPERVISOR'S RESPONSIBILITY - (Cont'd.)

6. Post an employee at the gate where emergency equipment, that has been called for, will be arriving. This employee will direct the emergency equipment through the plant. The supervisor will identify himself to the person in charge and tell him what hazards exist and what precautions to take.

7. If employees must evacuate the area, designate someone to take a personnel count in the assembly area.

EMERGENCY CO-ORDINATOR'S RESPONSIBILITIES - (GUARD AT GATE 1)

1. Pickup the E.R.S. phone (this is a direct line to the fire department). When they answer state the following:

   - Identify yourself
   - What type of gas release
   - Area where it occurred - what plant
   - If a fire or explosion potential exists
   - Request closure of Buffalo Avenue or Robert Moses Parkway (if specifically authorized)
   - Inform them to evacuate residents (if specifically authorized)
   - Request rescue equipment (if needed)
   - Personnel injuries if known

2. Put alarm on AUTO CALL (dial ACCESS CODE + 55 + 1, 2, 3, 4 or 5 for correct area).

3. Transmit exact nature and location of emergency over the Motorola paging system.

4. Call or arrange to have the necessary gates open.

5. If danger exist to DuPont, Carborundum, Industrial Welding or Newco, notify them by calling the following number:

   - DuPont - 278-5100
   - Carborundum - 278-2486
   - Newco - 278-1832
   - Industrial Welding - 285-3418

6. Notify the persons listed on the Gas Emergency Call List which will be posted by the phone. (See appendix A)

7. Call the plant nurse, Sylvia Burke, 694-3638. She will make arrangements for medical coverage if needed.

8. If there are injured employees, notify Dr. Robert Breezing, 278-1444. Tell Dr. Breezing's answering service that an Olin emergency exist. If Dr. Breezing cannot be reached, call Dr. John Prout, 282-1303.

9. Stand by the phone to receive instructions and relay messages.

SECURITY GUARDS' RESPONSIBILITY

1. Guards will not contact the fire department unless specifically authorized to do so from production supervision or management.

2. If a guard discovers a gas leak, he will report it to the appropriate supervisor immediately.

3. If a guard on rounds hears the AUTO CALL emergency signal, he will return to the guard house immediately.

4. Should a gas release occur in Plant 1 that requires calling the fire department and activation of the call-in list, one of the guards at Plant 2 will come to Plant 1 and assist the guard there (if the gas release is in Plant 2 the guards will remain there).

5. If conditions warrant evacuation of the guard house, the guards will ensure that they take the master key with them. Guards at Gate 22 will also take the emergency oxygen cylinder with them.

6. As employees arrive in the plant:

   A. Note their names, time and initial destination.
   B. If an area in the plant is off limits, all employees coming into the plant should be told so.

7. People from the news media should be treated courteously, but are not to be allowed into the plant. Refer them and all questions to the Personnel Office or phone number 716/278-6462/6460.

8. All gates will be secured. Only emergency equipment will be permitted to enter and exit until conditions are returned to normal.

9. Assist with the initial arrival of emergency equipment as to pointing out directions through the plant.

OTHER RESPONSIBILITIES

SAFETY DEPARTMENT

- Emergency control co-ordination with production supervision and outside agencies.

- Communicate accident alert to Corporate Headquarters if serious injuries or fatalities occurred.

PRODUCTION DEPARTMENT

- Account for personnel.

- Emergency control activities in conjunction with Safety Department.

- Initiate shut down procedures

- Communicate accident alert to Corporate Headquarters other than serious injuries or fatalities (through Safety Department).

MAINTENANCE DEPARTMENT

- Account for personnel.
- Provide assistance and necessary support to production.

INDUSTRIAL RELATIONS DEPARTMENT

- Collection of medical treatment information.
- Control news releases.
- Food service if required.

CONSTRUCTION

- Account for contractor personnel.
- Secure all vehicular traffic in the plant during the emergency.

C. W. Newton, III

C.W. Newton, III
Plant Manager

G.S. Schade
Safety Manager

dmh

APPENDIX A

2.3 EMERGENCY CALL-IN LIST FOR GAS RELEASE

The following people are to be called in the event a gas release occurs of sufficient magnitude to require activation of the E.R.S. telephone.

For a gas release in E-11, Secondary Treatment, Chlorine or Brine Area call:

J. McIntosh	688-0076 (E-11, Chlorine or Brine Area)
B. Fleming	837-6416 (Secondary Treatment)
R. Stadalius	773-4323

For a gas release in C-2 call:

J. McIntosh	688-0076
G. Strablow	751-9948
B. Fleming	837-6416
E. Chempiel	773-9110

For a gas release in HTH® call:

J. Cecala	693-5464
E. Harris	236-0449
J. Hyland	773-1354

For all gas releases call:

A. Swavy	754-8901
M. Davis	297-5967

The manager of the area affected will determine if it is necessary to call additional people into the plant, and will inform the co-ordinator whether or not additional calls are necessary.

The following are key people who must be notified in the event of an emergency:

K. White	773-4583
B. Noble	837-6083
M. Norsworthy	688-0043
J. S. Bellamy	688-8713
B. Histing	773-1334
M. Bentley	297-5152
J. Barlow	282-2537

August 10, 1979
Re-issued: December 29, 1981

CONTINGENCY PLAN

ATTACHMENT II

OLIN CHEMICALS
NIAGARA FALLS PLANT

2.2 SAFETY & LOSS PREVENTION PROCEDURE

EMERGENCY PROCEDURE FOR FIRE AND/OR EXPLOSION

PURPOSE

To establish a policy and procedure to be followed in the event a fire/explosion occurs at the Niagara Plant.

SCOPE

This procedure provides for the basic emergency measures to be taken should a fire occur and is not intended to limit any employee from taking further action as he may deem necessary. Specific shut down procedures will be handled in accordance with special instruction sheets, which are part of each Production Area's Operating Procedures Manual.

RESPONSIBILITY

In general, all employees at Niagara Falls are charged with the responsibility of complying with the policy procedure.

POLICY

All departments will fight fires in their own areas which can be immediately controlled.

Since the City Fire Department can respond to a fire in essentially the same time a plant fire brigade could be assembled, no explicit fire brigade exist. All employees will know the location of portable fire extinguishers and hose houses within their areas and how to utilize them.

The City Fire Department is indoctrinated in the plant's water system, fire hydrants, pumper connections, and chemical hazards within the plant. They are kept informed of any changes made within the plant that would affect their fire fighting operations.

If any doubt exist as to whether or not the City Fire Department should be called, it should be resolved in favor of calling the fire department. City fire officials have stated repeatedly they would rather arrive at the scene of a fire that has been extinguished than at one which is out of control because they were not contacted in time.

As a general rule, water may be used in the form of a fog pattern or a straight stream except around electrical equipment (such as transformers or bus bars) and large flammable liquid spill fires. Fires involving high powered equipment should be extinguished with CO_2 or dry chemical. Large flammable liquid spill fires should be contained and exposures protected until arrival of fire department. (Example: alcohol, oil and etc.)

OLICY (Cont'd)

No open flames or welding/cutting and no smoking anywhere in the plant until the emergency is terminated unless specifically authorized by the Safety Department.

The communications co-ordinator is the security guard at Gate #1 guard house. However, should this area become untenable, the guard at Gate #22 will assume responsibilities of the communications co-ordinator.

The Safety Manager will act as the emergency co-ordinator. In his absence the Safety Supervisor or shift foreman will assume the responsibility.

The E.R.S. (Emergency Rescue Service) phones located in the Gate#1 and Gate #22 guardhouses are to be used only by management or the guards when authorized by management.

The following are the designated alarm areas for the AUTO CALL (dial ACCESS CODE + 55 + 1, 2, 3, 4, or 5):

Area 1 - Main Office (Building #130)
HTH® Warehouse (building #124)
HTH® Production Office and Repair Shop (Building#123)

Area 2 - HTH® Shipping (Buildings #101, 102 and 103)
HTH® lunchroom, Foreman's Office (building #104)
HTH® Process Area and Decomp
Safety Department

Area 3 - All buildings east of Chemical Road to the E-11 Cell Room and Electric Shop

Area 4 - E11 Cell Room
Buildings 46,47,51,& 88
Electric Shop & Storehouse
Sodium Methylate

Area 5 - All buildings between Alundum Road and Gill Creek

PERSONNEL POSSESSING PAGERS

Upon hearing the emergency signal over the AUTO CALL, all personnel with pagers will depress the bar on top of their pagers and continue to hold down. This will enable you to receive the communication co-ordinator who will be transmitting the exact location and nature of the emergency.

EMPLOYEE'S RESPONSIBILITY

1. Employees will know locations of extinguishers in their area and how to use them.

2. Employees will know locations of hose houses in their area and how to use equipment within.

3. Employees will know location of all assembly areas in their area.

4. Employees will know the location of the nearest ADT alarm box in their area and how to report a fire to the communications co-ordinator via 6445. To report a fire by phone state the following:

   - Your name
   - Whether fire, explosion or both
   - Area where it occurred - building number and plant
   - Any personnel injuries
   - Any gas release that would effect the community and what type

5. If a fire can be controlled by portable fire extinguisher or water hose, act quickly and safely to extinguish the fire (see fire extinguisher procedure).

6. If the fire cannot be controlled immediately by a portable fire extinguisher or water hose, the employee discovering the fire will report the fire by dialing 6445 to notify the communications co-ordinator at Gate #1 or by pulling the nearest ADT fire alarm box. If the alarm is given via the ADT alarm box, the employee must also call the communications co-ordinator (dial 6445 and report the fire).

7. If asked to evacuate to an assembly area go directly to the assembly area and remain there until further instructions are received.

   Assembly Areas

   Plant I personnel report to parking lot across from Gate #1.
   Alternate - parking lot across from the Main Office.

   Plant II personnel report to parking lot across from Gate #22.
   Alternate - assemble inside of Gate #2 (Construction Gate).
   Alternate - Building 46 R. R. Gate

8. Main Office personnel will receive evacuation instructions from the communications co-ordinator through the receptionist/operator in the Main Office.

9. If it is necessary to leave your department via an other than normal route to escape injury, report to one of the guard houses so your whereabouts will be known and then proceed to an assembly area and remain there until otherwise notified.

10. No employee shall leave one plant and go to the other plant unless directed to do so. ** Stay clear of the problem area. **

SUPERVISORS RESPONSIBILITIES

1. Ensure that all employees are properly trained in the use of fire protection equipment and that they properly understand the emergency procedures. This training should be conducted at least quarterly, with a summer session to be conducted with the Safety Department in fire suppression training.

2. The supervisor must appraise the fire situation quickly. If an employee has not already done so, notify the communications co-ordinator that the fire department is required and advise what gate to use. If danger exists to DuPont, Carborundum, or Frontenac tell the co-ordinator to notify them.

3. If personnel are injured, notify the communications co-ordinator that a medical emergency exists and an ambulance (s) is needed. Assign someone to stay with the injured person (s) until emergency medical care arrives. If you do not have emergency care team members available notify the communications co-ordinator that they are needed.

4. If evacuation is necessary:

   a. Notify the communications co-ordinator and state which plant needs to be evacuated and what assembly area to use.

   b. Notify all employees in their department to evacuate and which area to use.

   c. Predesignate a shift person and alternate to take a personnel count to ensure that no one re-enters the emergency area.

   d. Ensure all personnel are off roofs.

5. Assist the employee fighting the fire or obtain more help from within the department.

6. Obtain required protective equipment.

7. Implement shutdown procedures.

8. Cutoff electrical power to affected areas.

9. Predesignate an employee and alternate to be posted at the proper guard house to direct any emergency equipment that has been called for. Upon arrival of the fire department, the supervisor will identify himself to the Fire Chief and advise him of what hazards exist in the area and what extinguishing agents to use.

10. Assist the fire department by fulfilling their requests and directions.

11. Direct all questions from the media to the Personnel Office.

COMMUNICATION CO-ORDINATORS RESPONSIBILITY

1. Use the emergency checklist to properly record all information received about the emergency.

2. Pickup the E.R.S. phone (This is a direct line to the fire department). When they answer state the following:

   - Your name
   - Whether fire, explosion or both
   - Area where it occurred - building number and plant
   - Any personnel injuries and ambulance if needed
   - Any gas release that would affect the community
   - Which gate to use (if known)

3. Activate the AUTO CAll by dialing (Access Code + 55 + 1,2, 3, 4, or 5 for correct area)

4. Transmit exact nature and location of emergency over the motorola paging system, radios and plant PA system (activate Plant II PA by dialing 103 on the telephone). Allow approximately 20-30 seconds after activating auto call to transmit this information. If evacuation is required at this time transmit that information over communication system also.

5. Determine either through foreman or other guard which gate(s) are to be used, arrange to have it open.

6. If the fire is located in the HTH® Warehouses (Bldgs, 101, 102, 103 and 124) HTH® employees must be alerted quickly. Put this information on the HTH® intercom.

7. If danger exists to DuPont, Carborundum, or Frontenac, notify them by calling the following numbers:

   - DuPont - 278-3100
   - Carborundum - 278-2486
   - Frontenac - 282-2300

8. Call the persons on the fire call list which will be posted by the phone. (See Appendix A).

9. If an evacuation is determined to be necessary after the emergency is in progress, reactivate the autocall and transmit the evacuation message, stating which assembly area to use, over the motorola paging system, radios, and the plant PA system.

10. Notify building 46, 17, & 1 for Plant II evacuation, 130, and 109 for Plant I evacuation:

Building	Phone Number	
1	6419	Day Time
17	6514	All Times
46	6401	Day Time
Main Office	- 0 -	Day Time
109	6478	Day Time

11. On offshifts, weekends, and holidays, if emergency care team members are needed notify them as they call in. If it is unknown whether emergency care team members are needed, take their phone numbers and advise them that you will contact them if they are needed.

    During normal working hours contact emergency care team members by making the announcement on PA and radios.

12. Whenever an employee is injured, Sylvia Burke, 694-3638 should be notified.

13. All gates should be secured during the emergency and are to be opened for emergency use only.

14. Refer any media questions to the Personnel Office 278-6462/6460. People from the media should be treated courteously, but are not to be allowed into the plant.

15. Stand by the phone to receive instructions and relay messages.

16. Test Extension 6445 Every morning.

SECURITY GUARDS RESPONSIBILITY

1. Security guards are not expected to fight fires.

2. If a guard discovers a fire while on rounds, he will announce it by calling the communications co-ordinator on his two way radio, or by either pulling the nearest ADT alarm box or dialing 6445 to notify the communications co-ordinator.

3. If a guard on rounds hears the AUTOCALL emergency signal, he will contact the communications co-ordinator on his two way radio and follow the instructions given. If he is unable to communicate by radio he will return to the guard house immediately.

4. Should a fire occur on the off shifts, that requires calling the Fire Department and activation of the call-in list, one of the guards at Plant II will come to Plant I and assist the guard there. If the fire is in Plant II the guards will remain there.

5. If conditions warrant evacuation of the guard house, the guards will ensure that they take the master keys with them. Guards at Gate #22 will also take the emergency oxygen cylinder with them.

6. As employees arrive in the Plant:

   a. If the emergency is still in progress and evacuation has taken place they should wait in the assembly area unless they are specifically requested in the plant.

   b. If there is no evacuation note their names, time, and initial destination.

   c. If any area in the plant is off limits, all employees coming into the plant should be told so.

7. People from the news media should be treated courteously, but are not to be allowed into the plant. Refer them and all questions to the Personnel Office or phone number 278-6462/6460.

8. Assist with the initial arrival of the Fire Department as to pointing out directions through the plant.

9. All phone lines should be left open and no personal calls should be made while the emergency is in progress.

OTHER RESPONSIBILITIES

SAFETY DEPARTMENT

1. The Safety Manager will act as the emergency co-ordinator between production and the fire department. In the event of the Safety Managers' absence, the Safety Supervisor will assume the responsibilities. In the event that neither the Safety Manager or Supervisor is available the most senior man in production supervision will assume the responsibilities.

2. Safety Manager will work with insurance companies in roll as claims co-ordinator.

3. Assist the Fire Department in pre-emergency planning.

4. Communicate accident alert to Corporate Headquarters if serious injuries or fatalities occurred.

5. Investigate for cause.

6. Restore fire protection equipment immediately.

7. Safety technician assist communications co-ordinator during day shift.

EMERGENCY CARE TEAM

1. Insure that the sign in board is kept up-to-date.

2. If required to leave the department to assist in emergency medical treatment, notify your supervisor before leaving.

3. On dayshifts proceed to the emergency if it is in your plant, if it is not in your plant stay alert for a call for help.

4. On offshifts, weekends, and holidays if the emergency is in your plant proceed to the location, if it is not in your plant call 6426 (Gate #1) to see if you are needed, if it is unknown whether you are needed or not leave your phone number and name with the guard and remain at that location.

5. If you're performing first aid stay with the injured until the ambulance or other Emergency Care Team members arrive.

PRODUCTION DEPARTMENT

1. Ensure all employees are properly trained in fire suppression and emergency procedures.

2. Account for personnel.

3. Fire protection activities in conjunction with Safety Department.

4. Initiate emergency first aid for injured and call for Emergency Care Team members if needed.

5. Initiate shutdown procedures.

6. Communicate accident alert to Corporate Headquarters other than serious injuries or fatalities (through Safety Department).

7. Investigate for cause.

MAINTENANCE DEPARTMENT

1. Ensure all employees are properly trained in fire suppression and emergency procedures.

2. Account for personnel.

3. Fire protection activities in conjunction with Safety Department for fires in Maintenance and/or utility (boiler house) facilities.

4. Power shut-off or control, as necessary, in co-ordination with production.

5. Emergency power.

6. Utilities in co-ordination with producation.

7. Make arrangements for heavy equipment as necessary.

8. Assist in investigation if requested (i.e., electrical and utility causes).

INDUSTRIAL RELATIONS DEPARTMENT

1. Collection of medical treatment information.

2. Control news releases.

3. Food service if required.

CONSTRUCTION

1. Assure all contractors are properly trained in fire suppression and Emergency Procedures.

2. Account for contractor personnel.

3. Secure all vehicular traffic in plant during the emergency.

M.L. Norsworthy

M.L. NORSWORTHY
PLANT MANAGER

A.J. Swavy

A.J. SWAVY
SAFETY/LOSS PREVENTION MANAGER

APPENDIX A

2.2 EMERGENCY CALL-IN LIST FOR FIRE

The following are key people who must be notified in the event of an emergency:

K. White	773-4583
B. Noble	837-6083
M. Norsworthy	688-0043
M. Bentley	297-5152
A. Szustak	791-4922
J. Barlow	282-2537

CONTINGENCY PLAN

ATTACHMENT III

OLIN CORPORATION
NIAGARA FALLS PLANT
SAFETY & LOSS PREVENTION PROCEDURES

2.4 EMERGENCY MEDICAL VEHICLE SYSTEM

I. PURPOSE

This procedure is established to outline an efficient mode of operation in case of an inplant medical emergency, requiring vehicle use.

II. PROCEDURE

The HTH Shipping and Receiving green van will be the primary vehicle used for plant medical emergencies, requiring plant nurse response or to be used to take plant personnel to the hospital/physician visit.

THIS VEHICLE SHALL NOT BE USED TO TAKE SERIOUSLY INJURED PERSONNEL TO THE HOSPITAL - AMBULANCE SHALL BE UTILIZED.

This vehicle will be parked behind Building 109, Plant 1 Medical Department with the keys in it and at no time shall the gasoline gauge read less than "1/4" full.

PERSONNEL USING VEHICLE ON OFF SHIFTS ARE RESPONSIBLE FOR RETURNING THE VEHICLE AND CHECKING THE GAS GAUGE.

If for some reason the green van has to be used when the plant nurse is at the plant, the plant nurse shall be contacted prior to use and alternate vehicle put on standby. Preferably, another vehicle will be placed behind the Medical Department Building, however, if this is not possible, a vehicle shall be in direct contact with the Medical Department. (Example: Bronco being used by hourly Safety Skilled Laborer having a pager.)

During off shifts (when the plant nurse is not at the plant), if the green van has to be used, the guard at Gate 1 shall be contacted. The guard will then notify the three supervisors on duty, instructing them that they will have to use their backup transportation means.

BACKUP TRANSPORTATION

PLANT 1

- HTH Supervisor - Use white maintenance van.
  The van shall be parked at the maintenance supervisor's trailer and keys are to be left inside on wall where clip boards are.

PLANT 2

- Chlor-Alkali Supervisor and Specialty Products Supervisor - Use Ford Bronco.
  Chlor-Alkali Supervisor has the key in their office and the Bronco shall be parked beside Building 46.

- OR -

II. PROCEDURE - (Cont'd.)

BACKUP TRANSPORTATION

PLANT 2 - (OR)

The blue maintenance van may be used. The van shall be parked outside Building 21 and keys are to be left in M. Clark's office on top of the file cabinet.

AGAIN, THESE VEHICLES SHALL NOT BE USED FOR SERIOUS INJURIES.- AN AMBULANCE SHALL BE USED.

G.S. Schade
Safety Manager

dmh

C.W. Newton, III
Plant Manager

Issued: September 16, 1978
Re-issued: April 24, 1981
Re-issued: November 19, 1981

OLIN
NIAGARA FALLS PLANT
SAFETY & LOSS PREVENTION PROCEDURE

2.1 OLIN PRODUCT OUTSIDE EMERGENCY SYSTEM

PURPOSE

This procedure is established to outline an efficient mode of operation in case of an outside product emergency.

PROCEDURE

In the event of an emergency outside of the plant which involves one of our products: (Examples of an emergency: railroad or truck accident, etc) , the guard at Gate #1 (phone number 716-278-6426) will receive all emergency calls, record on the attached sheet in detail (Exhibit A) and notify the following:

All "Outside" product emergencies are reported to:

1. M.L. Norsworthy - Plant Manager
   (716) 278-6415
   Home telephone (716) 688-0043

OR

2. J. S. Bellamy - Production Manager
   (716) 278-6538
   Home telephone (716) 688-8713

After notifying the above, if the product involves HTH® notify:

1. J.G. Cecala - HTH® Manager
   (716) 278-6484
   Home telephone (716) 693-5464

OR

2. A.J. Fitch - Shipping & Receiving Coordinator
   (716) 278-6429
   Home telephone (716) 297-3381

If the product involves chlorine caustic soda notify:

1. J.L. McIntosh - C/A Manager
   (716) 278-6545
   Home telephone (716) 688-0076

OR

2. B. Fleming - Production Engineer
(716) 278-6468
Home Telephone - (716) 837-6416

If the product involves sodium methylate or sodium chlorite (C-2) notify:

1. J. McIntosh
(716) 278-6545
Home Telephone (716) 688-0076

OR

2. B. Wysocki - Day Supervisor
(716) 278-2535 or 278-6405
Home Telephone (716) 283-6647

Information noted on the emergency checklist shall be relayed to plant personnel when contacted.

The completed emergency checklist shall be forwarded to the Safety Department by the next day.

M.L. NORSWORTHY
PLANT MANAGER

A.J. SWAVY
SAFETY/LOSS PREVENTION MANAGER

A

EMERGENCIES OUTSIDE OF THE WORKS

When an emergency phone call concerning one of the products produced by Olin Chemical is received, the guard on duty is to follow the procedure outlined below:

1. Date _____

2. Time _____

3. Name of the Caller _____

4. Telephone Number of the Caller _____

5. Type of Product involved, check one

   A. Chlorine

   B. Caustic Soda

   C. Sodium Chlorite (C-2)

   D. Calcium Hypochlorite (HTH)

   E. Sodium Methylate

6. Location of the Product involved

   _____

   _____

   _____

7. The amount of Product involved

   _____

   _____

   _____

8. Call the people on the emergency list.

_____

Guard's Signature

DISASTER INVESTIGATION T[illegible]

DEPARTMENT	RESPONSIBILITIES	PRIMARY	ALTERNATE
Technical Service & Development - Team Leader	1. On-site Investigation 2. Spokesperson, if necessary	J.P. Brennan (203) 789-6077 (203) 265-2168	K.A. Wachter (203) 789-6095 (203) 375-3862
Coordinator	1. Notify other Team members 2. Provide communications link to field 3. Provide support as needed	K.A. Wachter (203) 789-6095 (203) 375-3862	F.M. Gray (203) 789-6086 (203) 248-5650
Sales	1. Provide liaison with Olin account personnel	Sales Manager or Designated Sales Representative	Regional Manager or Product Marketing Manager
Public Relations	1. Identify Olin representatives to media and local officials 2. Provide communication between the Team and the above	A.M. Houston	C.A. Dana
Insurance	1. Advise Team during investigation 2. Other responsibilities defined in Olin Contract No. 612	See INA Claim Service Manual for local representative.	
Business Manager	1. Evaluate need for implementing The Disaster Investigation Team	HTH®-R.L. Bertrand PACE®-P.C. Kosche	B. E. Foster B. E. Foster
Legal	1. Evaluate need for implementing The Disaster Investigation Team 2. Advise Business Manager & Team leader, as needed	M.E. Campbell	W. J. Sparks

OPES INFORMATION

Manufacturing	1. Primary OPES respondents See Group Policy No. 11 2. Advise Team leader of conditions or events relative	OPES: To Report Incident (203) 356-2345 To Respond " (203) 356-3232

ATTACHMENT VII

CONTAINER STORAGE

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

DETAIL OF STORAGE IN CONTAINERS

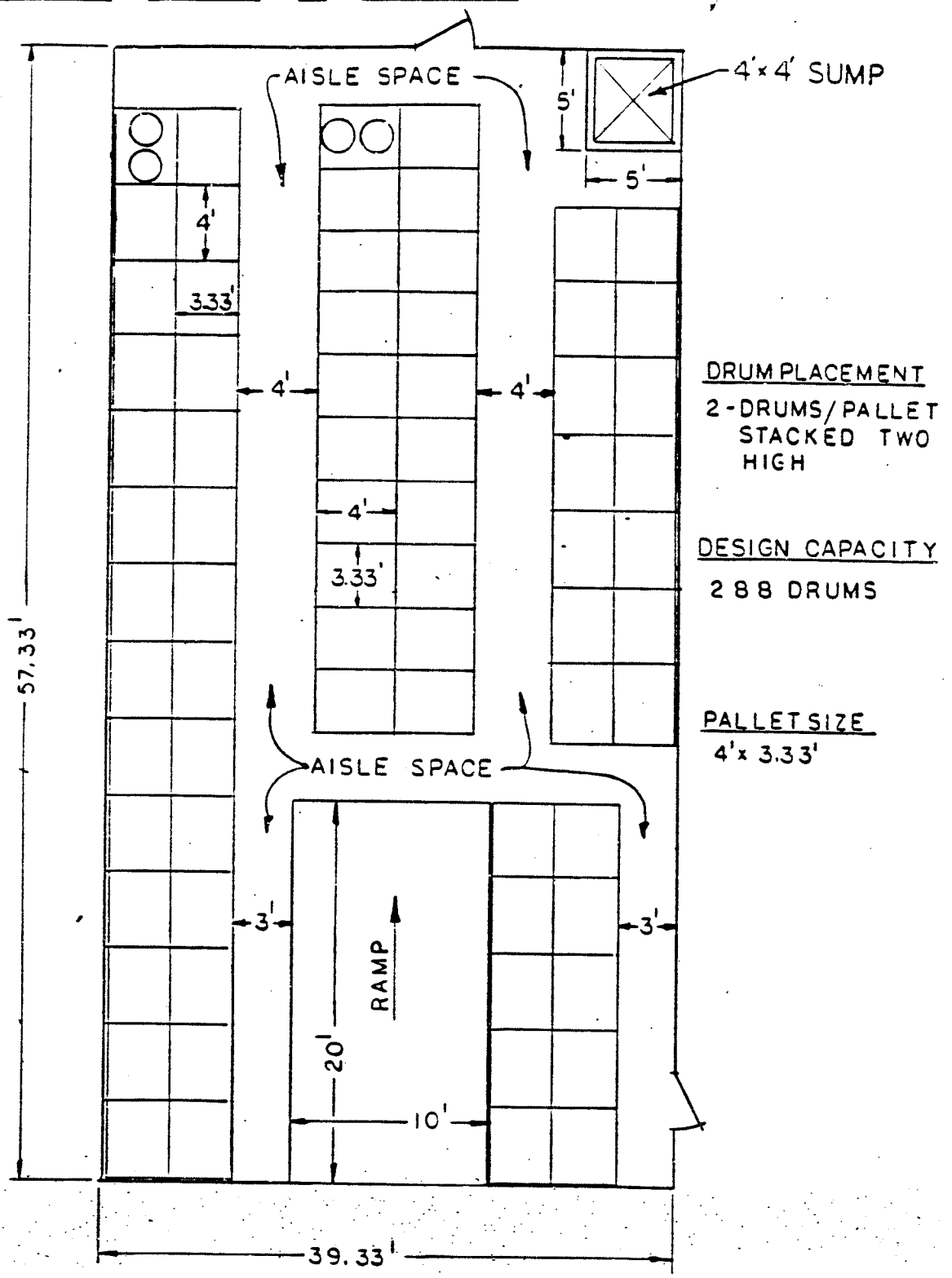
I. DESCRIPTION

Hazardous waste in containers are stored in the waste drum storage unit which is detailed in Drawing No. D-2376-020-1-1, D-2376-020-2-2, D-2376-020-2-1 found in the Appendix. The structure consists of a covered concrete slab which is diked and sloped toward a runoff collection sump. The slab, coated with an impermeable material, (Ceilcote, Coroline® 510), is encircled by a dike ranging in height from 6 to 14 inches above the floor of the structure. The 4' x 4' x 2'-10 runoff collection sump is located in the southwest corner of the diked slab and the whole structure is covered by a sloped steel roof. A manually operated pump fixed to the side of the structure, above the sump, is used to transfer any collected runoff into mobile collection tanks prior to treatment. The total storage unit is completely enclosed by a six foot high fence. Double gates located on the north side of the unit are kept secured except when drums are being introduced or removed from the structure. A concrete ramp which slopes from the truck loading area downward into the structure facilities the movement of drums into and out of the storage unit.

II. DESIGN CAPACITY

The storage unit will contain 288 55-gallon drums stacked two-high while maintaining an aisle space of at least three feet between pallets. Attachment I to this Section of the application illustrates drum placement in the unit. An analysis of the load bearing capacity of the unit's base is provided as Attachment II. The interior of the storage unit has a contained volume, using the shortest dike height of 6" and adjusting for the ramped area, of 5,000 gallons which demonstrates compliance with the free liquid standard.

DETAIL OF STORAGE IN CONTAINERS - ATTACHMENT I



DRUM PLACEMENT

2-DRUMS/PALLET STACKED TWO HIGH

DESIGN CAPACITY

288 DRUMS

PALLET SIZE

4'x 3.33'

JAN 13 1983

NO.	REVISION	BY	DATE

Olin

NIAGARA

DRAWN BY F S DATE 1-10-83

CHECKED BY F M DATE 1-10-83

APP. BY DATE

APP. BY DATE

DRUM STORAGE FACILITY LOADING DIAGRAM

BLDG. 15

DRUM PALLET LAYOUT

SCALE

DWG. SK-C4388

REV.

1055-1

III. MATERIALS OF CONSTRUCTION AND COMPATIBILITY

A. General

The following discussion is based on the fact that wastes placed in storage are either EP toxic and/or corrosive. Ignitable, reactive, or incompatible wastes are not stored in this unit.

B. Storage Unit

The storage unit is completely coated with Ceilcote, Coroline® 510. Attachment III to this Section of the application is the manufacturers technical bulletin on this material which demonstrates it is compatible with the wastes stored in the unit.

C. Drums

Olin uses a 22/20 gauge steel drum which meets DOT 37A350 standards (Attachment IV). The 55-gallon drums are 22½" in diameter and 30¼" high. Low density polyethylene liners are placed in each drum before waste is added. The liners are 40 mils on the top and bottom and 15-20 mils on the sides. Attachment V to this application section verifies this material is compatible with the wastes. Further verification can be found in the "Encyclopedia of Plastic Piping Systems", by Plastic Piping Systems, Syracuse, N.Y., pp. 225-233, 1974 or "Chemical Engineers' Handbook", edited by R. H. Perry and C. H. Chilton, 5th Ed., pp. 23, 17-23, 32, 1973.

D. Pallets

Drums are stored on a high density polyethylene pallet in the storage unit. The pallets are 48" x 40" x 5½" and have a dynamic load bearing capacity of 2500 lbs. and a static capacity of 10,000 lbs. The information cited above also demonstrates that the pallets are compatible with the wastes.

IV. DRAINAGE (Run-on, Run-off)

Drawing No. D-0000-840-10-3 found in the Appendix illustrates the drainage patterns around the storage unit. As can be seen from the drawing, the area outside the structure is graded to promote drainage away from the unit and eliminate potential run-on. The sloped steel roof of the structure prevents precipitation from directly entering the storage unit by transferring it to the area outside the unit. Any precipitation blown into the unit will drain into the collection sump. The level of runoff collected in this sump will be inspected daily and after any storm event. Once the sump reaches near capacity, the material will be transferred to mobile collection tanks and treated at the plant wastewater treatment facility.

VDL/vrp

1/18/83

WENDEL ENGINEERS PC
consulting engineers, planners/surveyors
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NUMBER 2287-35110
BY PWH DATE 1/14/83
APP. [illegible] DATE 1/14/83 5 OF _

SUMMARY - WASTE DRUM STORAGE UNIT SLAB

CHECKED K.F.L 1/14/83

Drawing Reference: D-0000-840-10-3 ✓
also D-2376-020-1-1 "
D-2376-020-2-1 "
D-2376-020-2-2 "

Design Criteria:

1) Pad structure
   6" concrete slab-on-grade w/ ✓
   6" min. compacted subbase ✓
2) Determine slab capacity for -
   a) fork lift truck traffic ✓
   b) uniform load ✓
3) Materials
   a) Concrete F'c = 3,000 psi @ 28 days
   b) Grade 60 bars
   c) Grade 60 WWF

Design Codes:

1) "Slab Thickness Design for Industrial Concrete Slabs on Grade", R Packard, PCA

Design Results:

1) Pad can carry 15,000 fork lift truck axle load at 1.6 FS
2) Maximum allowable uniform load is 877 psf vs. 120 psf. with Factor of Safety of 2.0+

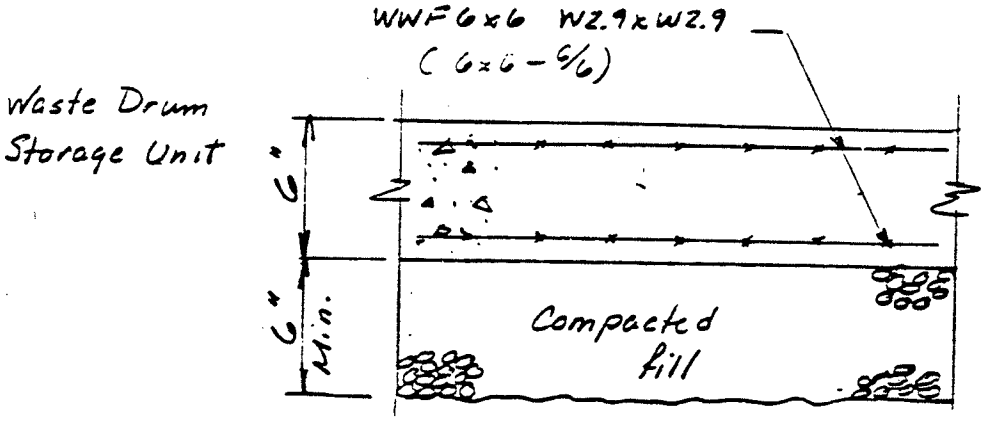
FLOOR SLOPE:

1) THE FLOOR SLOPE (PER THE ABOVE DRAWINGS) IS 1% WHICH IS TYPICAL FOR FLOOR DRAINAGE OF WATER. THIS SLOPE IS ADEQUATE FOR THIS INSTALLATION SINCE THE MATERIAL IN THE DRUMS WILL BE SOLIDIFIED AND IT IS ANTICIPATED THAT ONLY WATER WILL BE DRAINED FROM THE FLOOR.

WENDEL
ENGINEERING
consulting engineers / planners / surveyors
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME Olin Chemica
PROJECT NUMBER 2287-35/1
BY PWH DATE 1/14/83
APP. _____ DATE _____ 1 OF

WASTE DRUM STORAGE UNIT - SLAB ANALYSIS



Section - Typ.-

General Design Guide: Design of slab is based upon "slab-on-grade" design and thickness design for concrete pavements as applicable.

References:
1) "Slab Thickness Design for Industrial Concrete Floors on Grade", R. Packard
2) "Thickness Design for Concrete Pavements", PCA.
(Charts attached.)

Soil Data: No borings in area.

Design Criteria: Concentrated loads - vehicle wheels, pneumatic
Distributed loads - storage area, drum, pallets
Controlling design considerations
- flexural stress under load
- negative moment in unload area
- joint faulting
- settlement

Design: Loads -

4 drums/pallet x 400 lb./drum = 1,600 lb/pallet ✓

Use 6,000 lb. rated capacity lift truck

Assumed — Data for Lift-Truck:

Axle load	15 kips ✓
Wheel spacing	36 in. ✓
No. wheels on axle	2 ✓
Tire inflation pressure	100 psi ✓

Tire contact area = $\frac{15{,}000/2}{100}$ = 75 sq. in.

Subgrade and Concrete Data:

Subgrade modulus, k	100 pci (assumed)
w/ 6" compacted subbase	140 pci ←
Concrete flexural strength, MR	493 psi

Design Steps:

1) From Fig. 3 (Ref. 1) for 6" slab, k = 140 pci
75 sq. in. effective contact area, and
36 in. wheel spacing.
Slab stress per 1,000 lb axle load = 20 psi

2) WS = 20.0 x 15 = 300 psi

3) $F_s = \frac{MR}{WS} = \frac{493}{300} = 1.6$

1.4 < 1.6 < 2.0 ∴ o.k.

4) Stress ratio = $\frac{300}{493}$ = 0.61

Allowable stress repetitions = 24,000

5) Check maximum uniform load allowed

$f_t = \frac{MR}{FS_u} = \frac{493}{2.0} = 246$ psi

$W = 0.123\, f_t \sqrt{h\,k}$

where,
W = allowable load, psf
f_t = working stress, psi
h = slab thickness, in.
k = subgrade modulus, pci

$W = 0.123 \times 246 \sqrt{6 \times 140}$
W = 877 psf

Pallet load = 1,600 / 4x3.3 = 120 psf
Actual load < Allowable load
120 < 877 ∴ o.k.

Reinforcement

$$A_s = \frac{wLF}{2f_s}$$

where,

A_s = area per foot width of slab
f_s = allowable stress (30,000 psi)
w = weight of slab, psf
F = subgrade friction coefficient
L = distance between joints, ft.

for $w = 75$, $F = 1.5$, $L = 60'$

$$A_s = \frac{75 \times 60 \times 1.5}{2 \times 30{,}000} = 0.11$$ ✓

Use: 2 layers WWF 6x6 - W2.9 x W2.9 (6x6 - 4/4)

As provided = 2 x .058 = 0.12 say o.k. ✓

Estimating the traffic is an important factor in floor design. The required traffic information includes the load magnitudes, wheel configurations, and frequencies of loading for the heaviest vehicles that will use the floor. Traffic and load data for past and future plant or warehouse operating conditions can be gathered from several sources, including plant maintenance and engineering departments, planning and operations departments, and manufacturers' data for lift trucks and other vehicles. Based on this information, an adequate safety factor can be selected and used to determine an allowable working stress.

The safety factor (ratio of design flexural strength to working stress) depends on the expected frequency of loadings of the heaviest vehicles. For industrial floor design, safety factors in the range of 1.7 to 2.0 are suggested.* The higher end of this range should be used where heavy load traffic is frequent and channelized, as in aisleways and staging areas.

Because of the large variety of sizes, axle loads, and wheel spacings of industrial trucks, it is not practical to provide separate design charts for each vehicle. Consequently, two design charts, Figs. 3 and 4, have been prepared that can be used for the axle loads and axle-wheel configurations of most industrial trucks affecting floor design.

Fig. 3 is used for industrial trucks with axles equipped with single wheels. The chart is entered with an allowable working stress per 1,000 lb. of axle load. This allowable stress is computed by dividing the concrete flexural

*The fatigue criteria described in Reference 12 gives a more quantitative procedure for selecting safety factors and determining the allowable number of load repetitions. However, in most cases the projected traffic data are only an estimate that does not warrant a more precise analysis.

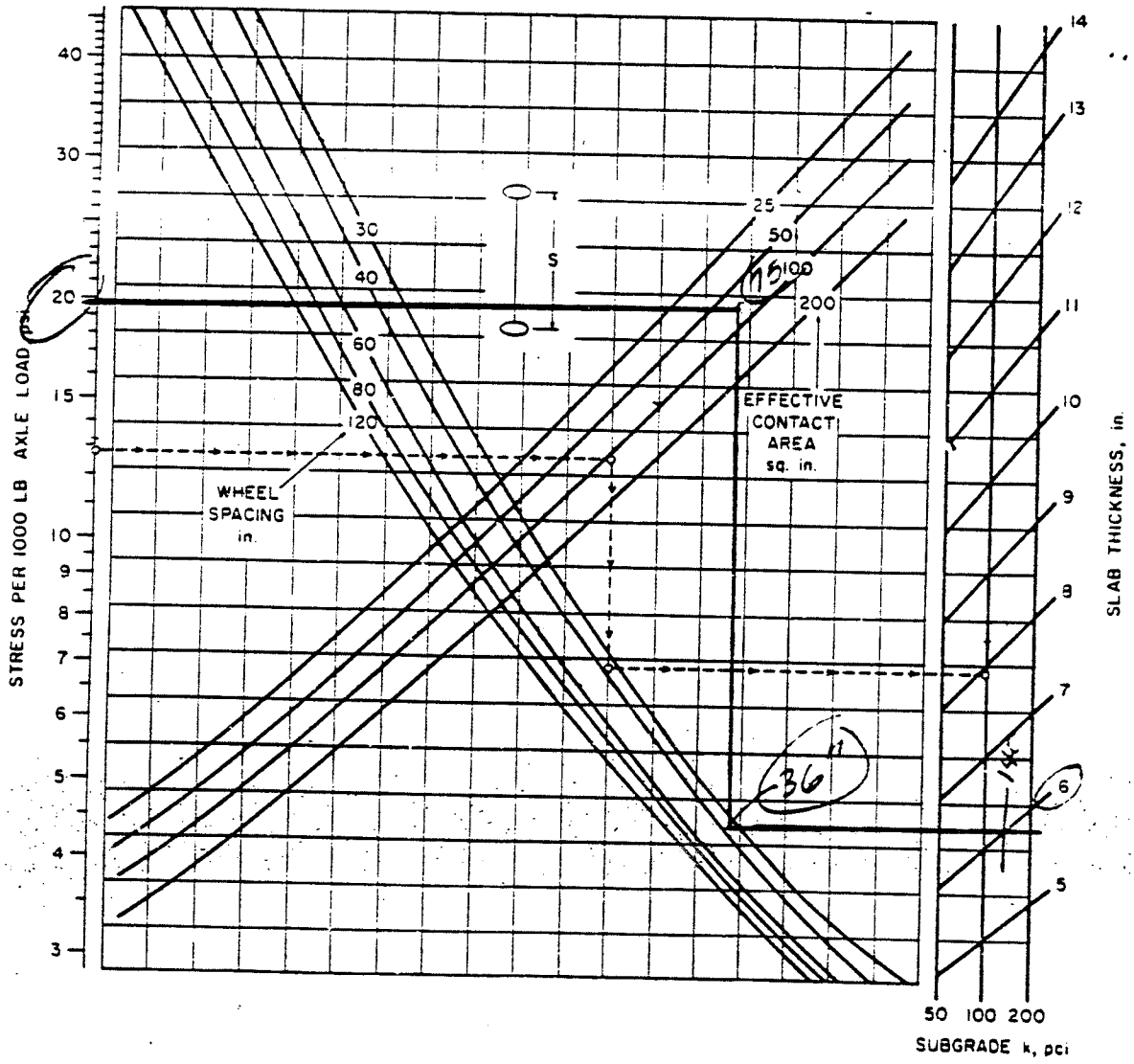
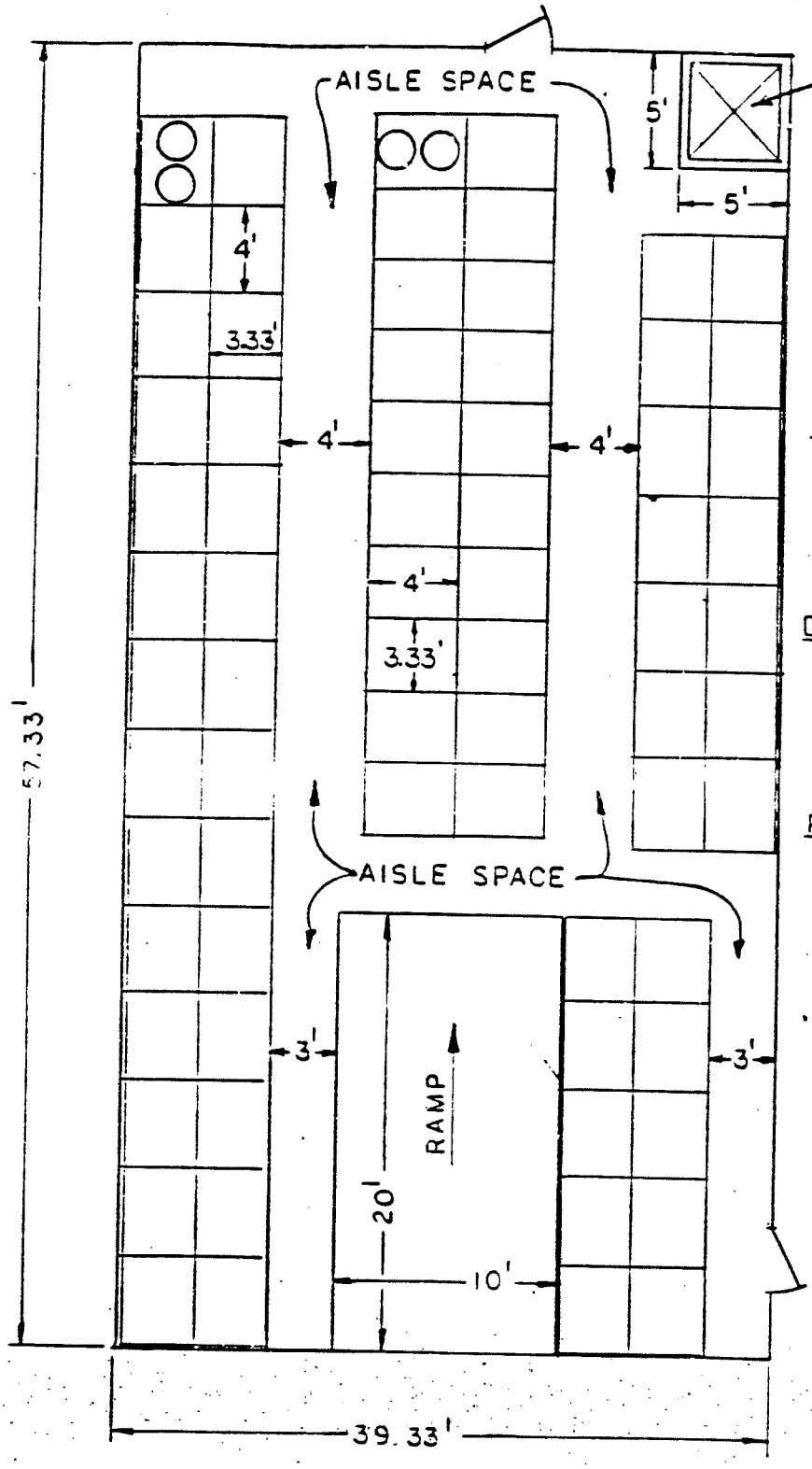


Fig. 3. Design chart for axles with single wheels.



DRUM PLACEMENT

2-DRUMS/PALLET STACKED TWO HIGH

DESIGN CAPACITY

288 DRUMS

PALLET SIZE

4'x 3.33'

NO.	REVISION	BY	DATE

Clin

NIAGARA

DRAWN BY F.S. DATE 1-10-83

CHECKED BY F.M. DATE 1-10-83

APP. BY DATE

APP. BY DATE

DRUM STORAGE FACILITY
LOADING DIAGRAM

BLDG. 15

DRUM PALLET LAYOUT

SCALE

DWG. SK-04388

REV.

CD 1055-1

DETAIL OF STORAGE IN CONTAINERS
ATTACHM. I III

Ceilcote®

COROLINE® 510

TECHNICAL BULLETIN 5-6

June, 1977
Supersedes all previous editions

CONDUCTIVE REINFORCED EPOXY LINING

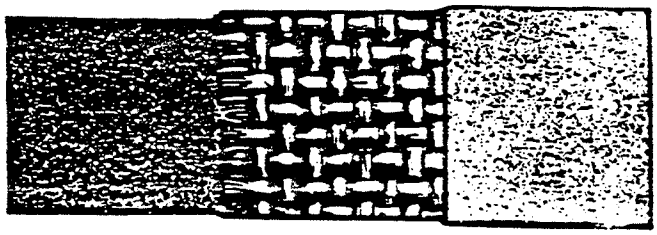
Coroline 510 is used primarily as an electrically conductive flooring in areas where static electricity must be eliminated: explosive processing plants, solvent handling areas or areas where dust explosion could occur.

Coroline 510 is a troweling compound based on a modified epoxy resin. The resin is combined with a curing agent, a conductive filler, and usually reinforced with glass or synthetic fabric. It is also used as a lining, 1/8"—3/16" thick, to protect concrete and steel from corrosion. Maximum service temperature range is 180°F., depending upon chemical conditions, 170° on concrete, 180° on steel.

PHYSICAL PROPERTIES

Color	Black
Tensile Strength (ASTM C307-55)	3,000
Compressive Strength (ASTM C306-55)	14,600
Coefficient of Expansion* (in./in./F.) 70°F.—210°F.	14.3×10^{-6}
Thermal Conductivity* BTU/hr./sq. ft./°F./in.	3.89
Flammability (ASTM D635-56T) in./min.	0.5
Electrical Properties Megger Reading	0 to 200,000 ohms. (500 to 10,000 ohms typical)

*Tests run on samples reinforced with Type "K" Glass Cloth.



CHEMICAL RESISTANCE

Following are some chemicals found to have little or no effect on Coroline 510 in immersion service. A broader list is included in the Ceilcote Master Corrosion Resistance Chart (Bulletin 1-4). This information is provided only as an indication of the chemical resistant properties of properly applied Coroline 510. No statement as to suitability to specific operating conditions or service warranty is intended or implied.

Acids, Inorganic
Hydrofluoric — under 10% cold
Sulfuric — under 10% cold
Chromic — under 5% cold
Nitric — under 5% cold
Sulfurous

Acids, Organic
Oleic — cold
Linoleic — cold
Stearic — cold
Other Fatty Acids — cold

Salts
Acetates
Nitrates
Chlorides
Phosphates

Gases
All-except,
Fluorine
Chlorine
Bromine
Iodine

Alkalis
All concentrations

Solvents
Aliphatic — Straight chain: gasoline, etc.
Aromatic — benzene, etc.
Ketones — cold
Esters
Alcohols, cold

THE CEILCOTE COMPANY/A UNIT OF GENERAL SIGNAL
140 SHELDON ROAD/BEREA, OHIO 44017/PHONE: 216-243-0700/TELEX: 098-5590

...icals found to effect COROLINE 510 in immer-...service are as follows; any conditions chemically ...ed to these should be questioned:

A...ds, Inorganic	**Gases**
Ni...ic — over 5%	Fluorine
Su...uric — over 10% cold	Chlorine
C...mic — over 5%	Bromine
	Iodine
A...ds, Organic	
Ac...ylic	**Solvents**
A...tic — over 10%	Acrylonitrile
Cr...ylic	Aniline
C...bolic (Phenol)	Cresol
Fo...nic	Methyl Chloride
	Phenol

C...ROLINE 510 will withstand certain concentrations of these chemicals; tests should be performed in all applications involving them, or recommendations ...ained from The Ceilcote Company.

...IMATING AND ORDERING

Reinforcing Cloth Specifications

Reinforcing cloth should be used in linings exposed to ...lutions, hot or cold, and to hot gases and vapors.

...pe	Wt./ sq. yd.	Thickness	Description and Use
...e O	6 oz.	.013"	For linings calling for resistance to Hydro-fluoric Acid.
T...e H	10 oz.	.018"	Light weight woven roving for general use.

...orage:

...E: **Coroline 505 liquid is used in Coroline 510.**

L... COROLINE 510/sq. ft.

(...prox. 1/8" thick)

R... rcement	505 Liquid	B Powder No. 4	Hardener 4A
Ty... O Cloth	.50	.60	.05
Ty... H Cloth	.60	.60	.06

T-430 Smoothing Liquid

T-430 is used for cleaning tools, in addition to smoothing the Coroline. Order 1 gallon for up to 150 sq. ft. or so. This quantity may be scaled down for larger ...tallations. For example: 5 gallons will handle 1000-...600 sq. ft.

Packaging

505 Liquid — 1 gal. (9 lbs.), 5 gal. (45 lbs.), 55 gal. (500 lbs.)

Powder B-4 — 70 lb. bags.

Hardener 4A — 1 pt. (1 lb.), 1 qt. (2 lbs.), ½ gal. (4.3 lbs.), 5 gal. (40 lbs.), 55 gal. (450 lbs.)

Smoothing Liquid T-430 — 1 gal. (7½ lbs.), 5 gal. 37½ lbs.), 55 gal. (412 lbs.)

Glass Cloth O — 57.5" wide rolls of 2080 sq. ft. (115 lbs.)

Glass Cloth H — 44" wide rolls of 1230 sq. ft. (102 lbs.)

FLASH POINT:

Coroline 510 107°F. (43°C.)
Hardener 4A 210°F. (99°C.)
Pensky-Martens Closed Cup

Storage:

All materials are stable indefinitely if packages are kept closed and dry. In winter store in warm place to assure workability. In summer store in a cool place so cure will not be too fast.

INSTALLATION PROCEDURES

Additional installation procedures are contained in the Ceilcote Installation Procedures Bulletin 5-5.1. These procedures are as specific as possible, but cannot cover all variations in field conditions. Therefore, supervisors experienced in installing Ceilcote materials may sometimes deviate slightly from the published information. This is done to give a better installation by using the most up-to-date methods to fit specific field and service conditions.

SURFACE PREPARATION:

STEEL — All steel surfaces must be sandblasted to "white metal" in accordance with Steel Structures Painting Council Specification SP5-63 or NACE No. 1 using a clean, dry blasting abrasive. After the blasting has been completed, the surface should be inspected visually for stains which might have been caused by foreign substances, such as perspiration, water, or other. These stains should be removed by reblasting or grinding. Prime blasted steel with 680 Sealer/Primer to forestall rusting.

Concrete Floors — Etch and clean with 50% dilution of concentrated Hydrochloric Acid. Flush with clear water. Dry thoroughly. See Bulletin 4-3.1 "Preparation of Concrete for monolithic toppings," for details. Prime with Ceilcote 680 Sealer/Primer. Allow to dry until surface is only slightly tacky before applying COROLINE 510. This may require several hours. If primer cures for several days rough it with coarse sandpaper before proceeding with the lining.

Mixing Proportions

(These proportions are superceded by those accompanying a shipment if they differ.)

Primer for Steel and Concrete

680 Sealer/Primer	1 gal.
Hardener#8	32 fl. ozs.
T-470 Thinner	2 quarts

Allow the mixed primer to stand at least one hour before use. Pot life 6 hr. plus.

Lining:	Base & Top Coat	Saturating Coat
COROLINE 510 (505) Liquid	1 gal. (9 lbs.)	1 gal. (9 lbs.)
Hardener No. 4A	16 fl. ozs.	16 fl. ozs.
Type B Powder No. 4	14 lbs.	None

1. Stir Hardener into liquid very thoroughly for several minutes. A mixing whip powered by a ½" electric drill is good for mixing.

2. Mix in the powder to form an easy trowelling paste. Powder content may be varied, if desired, but may result in conductivity changes.

Application:

1. Using a stiff bristle brush or a trowel, apply an even film of the base coat to the clean steel or concrete, at approximately 1/16" thickness.

2. With dry brush or roller press fabric into basecoat until material starts to show through openings in the fabric. Lap each strip about 1" over preceding strips. Press cloth carefully into corners.

3. Apply saturant with a brush or roller until all fabric is wet. In cases where cloth is being placed overhead, it may be desireable to allow a hardening period of several hours previous to Step No. 3.

4. After the saturant has become hard, brush or trowel on the topcoat to a minimum of 1/16".

   a. Examine the hardened saturating coat before recoating. If it appears damp or has a film on it, wash with water and allow to dry.

   b. Smooth by wetting the surface with T-430 and brushing with a clean soft brush.

5. COROLINE 510 cures very slowly at temperatures below 70°F. To speed this cure use portable heaters. At 70°F. Complete cure should be achieved in 24-48 hours. For exceptionally severe immersion service a cure of 24 hours or so at 160°F. is recommended.

SAFETY

1. Material is combustible. Keep away from open flame, high heat source or sparks. No welding should be permitted within fifty feet of working area. No smoking signs should be posted in working area.

2. Mix in a well ventilated area. Avoid excess breathing of vapors.

3. Eye protection shuld be worn at all times during mixing of grout and hardener; also when applying mixed grout. If material gets in eyes, flush with water and consult a physician.

4. Material is not to be taken internally. Call a physicain immediately. If hardener is taken internally, do not induce vomiting. Give lots of water and at least one ounce of vinegar in equal volume water.

5. Material contians epoxy resin and polyamine hardener. Avoid direct contact with skin or mucous membranes. Hardeners can cause skin irritation or dermatitis. Wear gloves and protective clothing. In case of skin contact, wash with soap and water immediately. Clothing should be changed daily to prevent contamination with resin and hardener.

6. Hardeners with RED Ceilcote labels must never be combined with hardeners with YELLOW Ceilcote labels. They will react violently if mixed together in the same container. Do not store packages with RED labels near packages with YELLOW labels. Use only in accordance with manufacturer's instructions.

NOTE: DOT diamond shipping labels are not color coded as per the above warning.

§ 178.130–5 Parts and dimensions.

(a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Welded side seam required	Minimum thickness uncoated sheets (gauge)	
				Body sheet	Head sheet
55	775	Straight side	Yes	22	22

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness [1] (inch)	Minimum thickness (inch)
22	0.0299	0.0269

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.130–6 Closure required.

(a) Adequate to prevent leakage; to be of bolted ring or lever lock ring types only; sponge rubber gaskets required; flowed-in gaskets not permitted.

§ 178.130–7 Defective containers.

(a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.130–8 Marking.

(a) Marking on each container by embossing on head, except that such embossment must be on the permanent head for drums having removable heads, with raised marks, or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter, as follows:

(1) DOT-37K275.

[41 FR 38180, September 9, 1976]

(2) Name or symbol of person making the marks specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Associate Director for OE.

[43 FR 36445, August 17, 1978; 44 FR 55577, September 27, 1979]

(3) Gauge of metal in thinnest part, rated capacity in gallons, and year of manufacture (for example, 18–55–50). When gauge of metal in body differs from that in head, both must be indicated with slanting line between and with gauge of body indicated first (for example 14/12–55–50 for body 14 gauge and head 12 gauge).

(4) The letters STC; located near the DOT mark to indicate "single-trip container".

[29 F.R. 18893, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5756, Apr. 23, 1965]

§ 178.130–9 Size of markings.

(a) Size of markings (minimum): ½" high for 30-gallon or less, ¾" for over 30 gallons.

§ 178.130–10 Type test.

(a) Samples taken at random and closed as for use, shall withstand prescribed tests without leakage. Tests to be made of each type and size by each company starting production and to be repeated every 4 months. Samples last tested to be retained until further tests are made or for 1 year, whichever period is shorter. The type test is as follows:

(1) Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

[29 F.R. 18893, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5756, Apr. 23, 1965]

§ 178.131 Specification 37A: steel drums.

Single trip container. Removable head required.

§ 178.131–1 Compliance.

(a) Required in all details.

§ 178.131–2 Rated capacity.

(a) Rated capacity as marked, see § 178.131–9(a)(2). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent for containers not over 12 gallons capacity. Maximum actual capacity of containers not over 12 gallons capacity shall be not greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater; for others, minimum actual capacity shall be not less than rated (marked) capacity plus 2 percent and maximum actual capacity shall not be greater than rated (marked) capacity plus 3 percent or rated (marked) capacity plus 2 percent plus 1 quart whichever is the greater.

§ 178.131–3 Composition.

(a) Sheets for body and heads to be hot-rolled or cold-rolled, low carbon, open-hearth or electric steel or standard commercial quality.

§ 178.131–5 Seams.

(a) Side seams must be welded; or locked and soldered when 28-gauge tin plate is used for containers of 2-gallon capacity or less.

§ 178.131–6 Capacities, weights, type, and gauges.

(a) Capacities, weights, type, and gauges must be as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Minimum thickness, uncoated sheets [1] (gauge)		Minimum ring gauge bolted type [2]
			Body sheet [3]	Head sheet	
2	40	Straight side	28	28	Lug.
5	60	do	26	26	
6	80	do	24	24	Lug or plain ring seal.
10	160	do	24	24	
55	550	do	26	26	18, plain.
55	775	do	24	24	Do.
55	550	do	24	24	16, 2 inch overlap.
55	[4] 490	do	22	22	Do.

[1] All gauges specified are minimum except as provided by Part 173 of this chapter. Heavier (but not lighter) gauges may be specified if shipper so desires.

[2] Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

[44 FR 66197, November 19, 1979]

[3] Containers of 16 gallons capacity and over must have 2 swedged or corrugated rolling hoops of sufficient height to clear the closing device when the drum is rolled.

[4] A gross weight of 490 pounds is authorized when defined by Part 173 of this chapter (see §173.164(a)(2) of this chapter).

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness [1] (inch)	Minimum thickness [1] (inch)
22	0.0299	0.0269
24	.0239	.0209
26	.0179	.0159
28	.0149	.0129

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.131–7 Closures.

(a) Closures of the type specified in the above table adequate to prevent leakage; gaskets required, all closures to be of the full-removable head type. Curl at top of shell for all drums 30 gallons capacity and larger must have a minimum diameter of 7/16 inch, and so made as to form a circular section with the under portion substantially in contact with the vertical shell. The removable head must have a minimum depth of ¾ inch and the cover bib must be large enough to extend to the horizontal center line of the top curl when the drum is sealed with the gasket in place. Drums of less than 30 gallons capacity may be made with an outside curl diameter of ⅜ inch minimum and a head depth of ¾ inch minimum; except that for drums less than 16 gallons capacity the outside curl diameter may be 9/32 inch and the

:over depth may be ⅜ inch minimum.

(b) The closing ring must be so constructed that the bottom leg will extend well inside the vertical center line of the shell curl but must not touch the shell (recommended clearance is 1/16 inch minimum, 3/32 inch maximum) when sealed for usage. The top leg of the locking ring must have sufficient length to extend well inside the vertical center line of the curl on the shell. Closing rings must have a 2 inch overlap at joint when gross weight of drum exceeds 275 pounds. Overlap is not required for drums of 275 pounds or less gross weight. The clearance between ends of rings without overlap should be a minimum of 1/8 inch and a maximum of ½ inch.

(c) Closures or fittings in the removable head of any type capable of withstanding test prescribed by § 178.131–11 are authorized.

§ 178.131–8 Defective containers.

(a) Defective containers to be repaired by method used in constructing container. Soldering not authorized except for tin plated steel as authorized by § 178.131–5.

§ 178.131–9 Marking.

(a) Marking on each container by embossing on head, except that such embossment must be on the permanent head for drums having removable heads, with raised marks, or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter, as follows:

(1) DOT-37A***. Stars to be replaced by the authorized gross weight, or less, at which the container was type tested (for example, DOT-37A150).

[41 FR 38180, September 9, 1976]

(2) Gauge of metal in thinnest part, rated capacity in gallons, and year of manufacture (for example, 24–55–54) When gauge of metal in body differs from that in either head, both must be indicated with slanting line between and with gauge of body indicated first (for example, 22/24–55–54 for a container having 22 gauge body, 22 gauge bottom head and 24 gauge top head).

(3) Name or symbol of person making the marks specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Associate Director for OE.

[43 FR 36445, August 17, 1978; 44 FR 55577, September 27, 1979]

(4) The letters STC: located near the DOT mark to indicate "single-trip container".

[29 F.R. 18893, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5756, Apr. 23, 1965]

§ 178.131–10 Size of markings.

(a) Size of markings, not less than ½ inch high for all containers.

§ 178.131–11 Type test.

(a) Samples, taken at random and closed as for use, shall withstand prescribed tests without leakage. Tests to be made of each type and size by each company starting production and to be repeated every 4 months. Samples last tested to be retained until further tests are made or for 1 year, whichever period is shorter. The type test is as follows:

(b) Test by dropping on top chime, or other part considered to be weaker, with drum filled to normal loading depth and to the gross weight at which container is marked with dry powdered material, and topped with at least two inches of a finely divided, dry, free-flowing powder of the following sieve analysis:

% retained on 42 mesh = Trace (max.).
% retained on 50 mesh = 3% (max.).
% retained on 100 mesh = 88% (min.).

A material such as sodium bicarbonate is recommended. Container shall be dropped from a height of 4 feet onto solid concrete so as to strike diagonally on the chime and so positioned when equipped with bolted ring type closure that crush pattern will terminate at closure joint. Closing devices and other parts projecting beyond chime or rolling hoops must be capable of withstanding this test. No disc or material other than regular gaskets in closure part is permitted for test purposes.

[29 F.R. 18893, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5756, Apr. 23, 1965]

§ 178.132 Specification 37B; steel drums.

Single trip container. Removable head not authorized.

§ 178.132–1 Compliance.

(a) Required in all details.

§ 178.132–2 Rated capacity.

(a) Rated capacity as marked, see § 178.132–9(a)(2). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent for containers not over 12 gallons capacity. Maximum actual capacity of containers not over 12 gallons capacity shall be not greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater; for others, minimum actual capacity shall be not less than rated (marked) capacity plus 2 percent and maximum actual capacity shall not be greater than rated (marked) capacity plus 3 percent or rated (marked) capacity plus 2 percent plus 1 quart whichever is the greater.

§ 178.132–3 Composition.

(a) Sheets or body and heads to be hot-rolled or cold-rolled, low carbon, open hearth, or electric steel of standard commercial quality.

§ 178.132–5 Seams.

(a) Side seams may be welded, Gordon lock, or other equally efficient construction.

§ 178.132–6 Capacities, weights, type and gauges.

(a) Capacities, weights, type and gauges must be as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Minimum thickness, uncoated sheets (gauge)	
			Body sheet [1]	Head sheet
5	60	Straight side	28	28
55	275	do	26	26
55	450	do	24	24
55	650	do	22	[2] 22

[1] Containers of 16 gallons capacity and over must have small or series corrugations rolled into the shell or 2 swedged or corrugated rolling hoops.
[2] Twenty-four (24) gauge top head and cover authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness [1] (inch)	Minimum thickness [1] (inch)
22	0.0299	0.0269
24	.0239	.0209
26	.0179	.0159
28	.0149	.0129

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.132-7 Closures.

(a) Closures shall be of any type that will withstand prescribed drop tests without leakage, see §178.132-11 of this section. Openings shall not exceed 9 inches in diameter in containers of 16-gallon capacity and larger nor 6½ inches in diameter in containers less than 16-gallon capacity. Larger openings may be used when approved by the Associate Director for OE.

[44 FR 66197, November 19, 1979]

§ 178.132–8 Defective containers.

(a) To be repaired by method used in constructing container except that Gordon lock, or other similarly constructed seam must be welded. Soldering not authorized.

§ 178.132–9 Marking.

(a) Marking on each container by embossing on head with raised marks, or by embossing or die stamping on footing on drums equipped with footrings or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter, as follows:

(1) DOT–37B * * * Stars to be replaced by the authorized gross weight, or less at which container was type tested (for example, DOT-37B450, etc.).

[41 FR 38180, September 9, 1976]

DETAIL OF STORAGE IN CONTAINERS
ATTACHMENT V

CHEMICAL RESISTANCE AND PHYSICAL PROPERTIES OF THE RESINS USED IN NALGENE LABWARE

Interpretation of Chemical Resistance

The Chemical Resistance Chart on the facing page and this Chemical Resistance Summary Chart are general guides only. Because so many factors can affect the chemical resistance of a given product, you should test under your own conditions. If any doubt exists about specific applications of Nalgene products, please contact Technical Service, Nalgene Labware Department, Nalge Company, Box 365, Rochester, New York 14602, or call (716) 586-8800.

Effects of Chemicals on Plastics

Chemicals can affect the strength, flexibility, surface appearance, color, dimensions or weight of plastics. The two basic modes of interaction which cause these changes are: (1) chemical attack on the polymer chain, including oxidation; reaction of functional groups in or on the chain; or depolymerization, with resultant reduction in physical properties; and (2) physical change; absorption of solvents, resulting in softening and swelling, or permeation of solvent through the plastic; dissolving in a solvent; cracking from interaction of a "stress-cracking agent" with molded-in stresses.

The reactive combination of compounds of two or more classes may cause a synergistic or undesirable chemical effect. Other factors affecting chemical resistance include temperature, pressure and internal or external stresses (e.g., centrifugation), length of exposure and concentration of the chemical. **As temperature increases, resistance to attack decreases.**

Caution

Do not store strong oxidizing agents in plastic labware except that made of Teflon FEP. Prolonged exposure causes embrittlement and failure. While prolonged storage may not be intended at time of filling, a forgotten container will fail in time and result in leakage of contents. Do not place plastic labware in a direct flame or on a hot plate.

Resin Codes

CPE:	Conventional (Low Density) Polyethylene	**TFE:**	Teflon TFE (tetrafluoroethylene)
LPE:	Linear (High Density) Polyethylene	**ETFE:**	Tefzel ETFE (ethylene-tetrafluoroethylene)
PP:	Polypropylene	**PC:**	Polycarbonate
PA:	Polyallomer	**PVC:**	Polyvinyl Chloride
PMP:	Polymethylpentene ("TPX")	**PSF:**	Polysulfone
		PS:	Polystyrene
FEP:	Teflon FEP (fluorinated ethylene propylene)		

Chemical Resistance Classification:

E—30 days of constant exposure cause no damage. Plastic may even tolerate for years.

G—Little or no damage after 30 days of constant exposure to the reagent.

F—Some effect after 7 days of constant exposure to the reagent. Depending on the plastic, the effect may be crazing, cracking, loss of strength or discoloration. Solvents may cause softening, swelling and permeation losses with CPE, LPE, PP, PA and PMP. The solvent effects on these five resins are normally reversible; the part will usually return to its normal condition after evaporation.

N—Not recommended for continuous use. Immediate damage may occur. Depending on the plastic, the effect will be a more severe crazing, cracking, loss of strength, discoloration, deformation, dissolution or permeation losses.

Special Problems

Grease and Oils. For many applications, washing with a mild detergent will remove greases and oils.

When more rigorous cleaning is needed, organic solvents (such as acetone, alcohols or methylene chloride) may be used with caution. Extended exposure to these solvents may cause some swelling of polyolefins. Be sure to rinse off all solvents before using labware. Use only alcohols on polycarbonate, polysulfone, polystyrene or PVC; other organic solvents will attack these plastics. Do not use any organic solvent with acrylic.

Boiling labware in dilute sodium bicarbonate (Na_2CO_3) is also an effective method for removing grease and oil. Do not use with polycarbonate, conventional polyethylene, acrylic or polystyrene.

Organic Matter. Chromic acid solution will remove organic matter, but since this solution is a strong oxidizing agent, it will eventually embrittle plastics. To minimize embrittlement, soak plastic for no more than 4 hours. The following formula is an effective cleaning agent:

Dissolve 120 grams of sodium dichromate ($Na_2CR_2O_7.2H_2O$) in 1000 mL tap water. Carefully add 1600 mL concentrated sulfuric acid to this solution. Note: Because this solution generates considerable heat, we recommend external cooling. Do not mix in a plastic container.

This solution is designed to produce an excess of dichromate in the form of a precipitate which actually extends the useful life of chromic acid and dissolves as needed. This chromic acid solution can be used repeatedly until it begins to develop a greenish color, indicating a loss of potency. Because of the excess dichromate built into this formula, this solution lasts considerably longer than commercially available solutions. Sodium hypochlorite solutions (bleaches) are also effective in removing organic matter. Use at room temperature for this application.

	LOW DENSITY POLYETHYLENE	LINEAR POLYETHYLENE	POLYPROPYLENE	CROSS LINK LINEAR POLYETHYLENE	HALAR‡ ETHYLENE-CHLOROTRIFUORO-ETHYLENE
PROPERTIES	**LDPE**	**LPE**	**PP**	**XLPE**	**Halar E-CTFE**
Chemical resistance	Generally excellent. See chart on pages 32-33.				Superior
Stress-cracking resistance	Good	Very Good	Excellent	Excellent	Excellent
Upper temperature limit*					
Unsupported	140°F	180°F	230°F	180°F	275°F
FRP—Supported	212°F**	220°F	250°F	220°F	300°F
Lower temperature limit (approx.)	0°F	—60°F	+32°F	—140°F	—110°F
Impact resistance	Good	Very good	Fair	Excellent	Good
Abrasion resistance	Excellent	Very good	Very good	Very good	Excellent
Rigidity	Fair	Good	Excellent	Good	Excellent
Cleanability	Excellent	Excellent	Very good	Very good	Excellent
Translucence	Liquid level observable	Liquid level observable	Liquid level observable	Liquid level observable	Liquid level observable
Weldability†	Weldable	Weldable	Weldable	Not Weldable	Weldable
FDA acceptability	Yes	Yes	Yes	No	No
Color (natural)	White	White	Tan	Tan	White

*Assuming acceptable chemical resistance at these temperatures.
**180°F for 500-gal. tanks and larger.
†Fitting can be installed by hot inert-gas welding.
‡Reg. trademark of Allied Chemical Corp.

NALGENE LABWARE CHEMICAL RESISTANCE CHART

This Chemical Resistance Chart is intended to be used as a general guide only. Since each pair of ratings listed is for ideal conditions, all factors affecting chemical resistance (see facing page) must be considered. First letter of each pair applies to conditions at 20°C; the second to those at 50°C.

CAUTION

Do not store strong oxidizing agents in plastic labware except that made of Teflon FEP. Prolonged exposure causes embrittlement and failure.

Do not place plastic labware in a direct flame or on a hot plate.

1st letter: at 20°C → EG ← 2nd letter: at 50°C

CHEMICAL	CPE	LPE	PP/PA	PMP	FEP/ETFE/ETFE	PC	PVC	PSF
Acetaldehyde	GN	GF	GN	GN	EE	FN	GN	NN
Acetamide, Sat.	EE	EE	EE	EE	EE	NN	NN	NN
Acetic Acid, 5%	EE	EE	EE	EE	EE	EG	EE	EE
Acetic Acid, 50%	EE	EE	EE	EE	EE	EG	EG	GG
Acetone	EE	EE	EE	EE	EE	NN	NN	NN
Acetonitrile	EE	EE	FN	FN	EE	NN	NN	NN
Acrylonitrile	EE	EE	FN	FN	EE	NN	NN	NN
Adipic Acid	ZG	EE	EE	EE	EE	EE	EG	GG
Alanine	EE	EE	EE	EE	EE	NN	NN	NN
Allyl Alcohol	EE	EE	EE	EG	EE	GF	GF	GF
Aluminum Hydroxide	EG	EE	EG	EG	EE	FN	EG	GG
Aluminum Salts	EE	EE	EE	EE	EE	EG	EE	EE
Amino Acids	EE	EE	EE	EE	EE	EE	EE	EE
Ammonia	EE	EE	EE	EE	EE	NN	EG	GF
Ammonium Acetate, Sat.	EE	EE	EE	EE	EE	EE	EE	EE
Ammonium Glycolate	EG	EE	EG	EG	EE	GF	EE	GG
Ammonium Hydroxide, 5%	EE	EE	EE	EE	EE	FN	EG	GG
Ammonium Hydroxide, 30%	EG	EE	EG	EG	EE	NN	EG	GG
Ammonium Oxalate	EG	EE	EG	EG	EE	EE	EE	EE
Ammonium Salts	EE	EE	EE	EE	EE	EG	EG	EE
n-Amyl Acetate	GF	EG	GF	GF	EE	NN	NN	NN
Amyl Chloride	NN	FN	NN	NN	EE	NN	NN	NN
Aniline	EG	EG	GF	GF	EE	FN	NN	NN
Benzaldehyde	EG	EE	EG	EG	EE	FN	NN	NN
Benzene	FN	GG	GF	GF	EE	NN	NN	NN
Benzoic Acid, Sat.	EE	EE	EG	EG	EE	EG	EG	FF
Benzyl Acetate	EG	EE	EG	EG	EE	FN	NN	NN
Benzyl Alcohol	NN	FN	NN	NN	EE	GF	GF	NN
Bromine	NN	FN	NN	NN	EE	FN	GN	NN
Bromobenzene	NN	FN	NN	NN	EE	FN	GN	NN
Bromoform	NN	NN	NN	NN	EE	NN	NN	NN
Butadiene	NN	FN	NN	NN	EE	NN	FN	NN
n-Butyl Acetate	GF	EG	GF	GF	EE	NN	NN	NN
n-Butyl Alcohol	EE	EE	EE	EG	EE	GF	GF	GF
sec-Butyl Alcohol	EG	EE	EG	EG	EE	GF	GG	GF
tert-Butyl Alcohol	EG	EE	EG	EG	EE	GF	EG	GF
Butyric Acid	NN	FN	NN	NN	EE	FN	GN	GG
Calcium Hydroxide, Conc.	EE	EE	EE	EE	EE	NN	EE	GG
Calcium Hypochlorite, Sat.	EE	EE	EE	EG	EE	FN	GF	EE
Carbazole	EE	EE	EE	EE	EE	NN	NN	NN
Carbon Disulfide	NN	NN	NN	NN	EE	NN	NN	NN
Carbon Tetrachloride	FN	GF	GF	NN	EE	NN	GF	NN
Cedarwood Oil	NN	FN	NN	NN	EE	GF	FN	FF
Cellosolve Acetate	EG	EE	EG	EG	EE	FN	FN	NN
Chlorine, 10% in Air	GN	EE	GN	GN	EE	EG	EE	NN
Chlorine, 10% (Moist)	GN	GF	GN	GN	EE	GF	EG	NN
Chloroacetic Acid	EE	EE	EG	EG	EE	FN	FN	NN
p-Chloroacetophenone	EE	EE	EE	EE	EE	NN	NN	NN
Chloroform	FN	GF	GF	FF	EE	NN	NN	NN
Chromic Acid, 10%	EE	EE	EE	EE	EE	GF	EG	NN
Chromic Acid, 50%	EE	EE	GF	GF	EE	FN	GF	NN
Cinnamon Oil	NN	FN	NN	NN	EE	GF	NN	FF
Citric Acid, 10%	EE	EE	EE	EE	EE	EG	GG	EE
Cresol	NN	FN	GF	NN	EE	NN	NN	NN
Cyclohexane	FN	FF	FN	NN	EE	EG	GF	NN
Decalin	GF	EG	GF	FN	EE	NN	NN	NN
o-Dichlorobenzene	FN	FF	FN	FN	EE	NN	NN	NN
p-Dichlorobenzene	FN	GF	GF	GF	EE	NN	NN	NN
Diethyl Benzene	NN	FN	NN	NN	EE	FN	NN	NN
Diethyl Ether	NN	FN	NN	NN	EE	NN	FN	NN
Diethyl Ketone	GF	GG	GG	GF	EE	NN	FN	NN
Diethyl Malonate	EE	EE	EE	EG	EE	FN	GN	FF
Diethylene Glycol	EE	EE	EE	EG	EE	FN	GN	FF
Diethylene Glycol Ethyl Ether	EE	EE	EE	EE	EE	GF	FN	GG
Dimethyl Formamide	EE	EE	EE	EE	EE	FN	FN	FF
Dimethylsulfoxide	EE	EE	EE	EE	EE	NN	FN	NN
1,4-Dioxane	GF	GG	GF	GF	EE	FN	GF	NN
Dipropylene Glycol	EE	EE	EE	EE	EE	GF	GF	GG
Ether	NN	FN	NN	NN	EE	NN	FN	NN
Ethyl Acetate	EE	EE	EE	EG	EE	NN	NN	NN
Ethyl Alcohol	EG	EE	EG	EG	EE	EG	EG	EG
Ethyl Alcohol, 40%	EG	EE	EG	EG	EE	EG	EE	EG
Ethyl Benzene	FN	GF	FN	FN	EE	NN	NN	NN
Ethyl Benzoate	FF	GG	GF	GF	EE	NN	NN	NN
Ethyl Butyrate	GN	GF	GN	FN	EE	NN	NN	NN
Ethyl Chloride, Liquid	FN	FF	FN	FN	EE	NN	NN	NN
Ethyl Cyanoacetate	EE	EE	EE	EE	EE	NN	FN	FF
Ethyl Lactate	EE	EE	EE	EE	EE	FN	FN	FF
Ethylene Chloride	GN	GF	FN	NN	EE	NN	NN	NN
Ethylene Glycol	EE	EE	EE	EE	EE	GF	EE	EE
Ethylene Glycol Methyl Ether	EE	EE	EE	EE	EE	FN	FN	FF
Ethylene Oxide	FF	GF	FF	FN	EE	FN	FN	EE
Fluorides	EE	EE	EE	EE	EE	EE	EE	EE
Fluorine	FN	GN	FN	FN	EG	GF	EG	NN
Formaldehyde, 10%	EE	EE	EE	EG	EE	EG	GF	GF
Formaldehyde, 40%	EG	EE	EG	EG	EE	EG	GF	GF

CHEMICAL	CPE	LPE	PP/PA	PMP	FEP/ETFE/ETFE	PC	PVC	PSF
Formic Acid, 3%	EG	EE	EG	EG	EE	EG	GF	GG
Formic Acid, 50%	EG	EE	EG	EG	EE	EG	GF	GG
Formic Acid, 90-100%	EG	EE	EG	EF	EE	EG	GF	FF
Fuel Oil	FN	GF	EG	GF	FE	EG	EE	EG
Gasoline	FN	GG	GF	GF	FE	EG	EE	EG
Glacial Acetic Acid	EG	EE	EG	EG	EE	NN	EG	FN
Glycerine	EE	EE	EE	EE	EE	EE	EE	EE
n-Heptane	FN	GF	FF	FF	EE	EG	GF	EG
Hexane	NN	GF	GF	FN	EE	EG	GF	EG
Hydrochloric Acid, 1-5%	EE	EE	EE	EG	EE	EE	EE	EE
Hydrochloric Acid, 20%	EE	EE	EE	EG	EE	GF	EE	EE
Hydrochloric Acid, 35%	EE	EE	EG	EG	EE	NN	EE	EE
Hydrofluoric Acid, 4%	EG	EE	EG	EG	EE	GF	EE	GF
Hydrofluoric Acid, 48%	EE	EE	EE	EE	EE	NN	GF	GF
Hydrogen Peroxide, 3%	EE	EE	EE	EE	EE	EE	EE	FF
Hydrogen Peroxide, 30%	EG	EE	EG	EG	EE	EE	EE	EE
Hydrogen Peroxide, 90%	EG	EE	EG	EG	EE	EG	EE	EE
Isobutyl Alcohol	EE	EE	EE	EE	EE	EG	EG	EE
Isopropyl Acetate	GF	EG	GF	GF	EE	NN	NN	NN
Isopropyl Alcohol	EE	EE	EE	EE	EE	EG	EE	EE
Isopropyl Benzene	FN	GF	FN	NN	EE	NN	NN	NN
Kerosene	FN	GG	GF	GF	EE	EG	GF	GF
Lactic Acid, 5%	EG	EE	EG	EG	EE	EE	EE	EE
Lactic Acid, 85%	EE	EE	EG	EG	EE	EG	GF	EE
Methoxyethyl Oleate	EG	EE	EG	EG	EE	FN	NN	NN
Methyl Alcohol	EE	EE	EE	EE	EE	EE	EE	EE
Methyl Ethyl Ketone	EG	EE	EG	EF	EE	NN	NN	NN
Methyl Isobutyl Ketone	GF	EG	GF	GF	EE	NN	NN	NN
Methyl Propyl Ketone	GF	EG	GF	FF	EE	NN	NN	NN
Methylene Chloride	FN	GF	FN	FN	EE	NN	NN	NN
Mineral Oil	GN	EE	EE	EG	EE	EG	EG	EE
Nitric Acid, 1-10%	EE	EE	EE	EE	EE	EG	EG	EE
Nitric Acid, 50%	GG	GN	FN	GN	EE	GF	GF	GF
Nitric Acid, 70%	FN	GN	FN	GF	EE	NN	FN	NN
Nitrobenzene	NN	FN	NN	NN	EE	NN	NN	NN
n-Octane	EE	EE	EE	EE	EE	EE	EE	EE
Orange Oil	FN	GF	GF	FF	EE	EE	FF	FF
Ozone	EG	EE	EG	EG	EE	EG	EG	EE
Perchloric Acid	GN	GN	GN	GN	GF	NN	GN	NN
Perchloroethylene	NN	NN	NN	NN	EE	NN	NN	NN
Phenol, Crystals	GN	GF	GN	FN	EE	EE	FN	-
Phosphoric Acid, 1-5%	EE	EE	EE	EE	EE	EE	EE	EE
Phosphoric Acid, 85%	EE	EE	EG	EG	EE	EG	EG	EE
Pine Oil	GN	EG	EG	GF	EE	FN	FF	EE
Potassium Hydroxide, 1%	EE	EE	EE	EE	EE	FN	EE	EE
Potassium Hydroxide, Conc.	EE	EE	EE	EE	EE	EG	EG	EE
Propane Gas	NN	FN	NN	NN	EE	FN	EG	EE
Propylene Glycol	EE	EE	EE	EE	EE	EE	EE	GG
Propylene Oxide	EG	EE	EG	EG	EE	GF	FN	GG
Resorcinol, Sat.	EE	EE	EE	EE	EE	EE	EE	EE
Resorcinol, 5%	EE	EE	EE	EE	EE	EE	FN	NN
Salicylaldehyde	EG	EE	EG	EG	EE	GF	FN	FF
Salicylic Acid, Powder	EE	EE	EE	EG	EE	GF	GF	EE
Salicylic Acid, Sat.	EE	EE	EE	EE	EE	EG	GF	EE
Salt Solutions, Metallic	EE	EE	EE	EE	EE	EE	EE	EE
Silver Acetate	EE	EE	EE	EE	EE	EG	GG	EE
Silver Nitrate	EG	EE	EE	EE	EE	EE	EE	EE
Sodium Acetate, Sat.	EE	EE	EE	EE	EE	EE	EE	EE
Sodium Hydroxide, 1%	EE	EE	EE	EE	EE	EE	EG	EE
Sodium Hydroxide, 50% to Sat.	EE	EE	EE	EE	EE	NN	EG	EE
Sodium Hypochlorite, 15%	EE	EE	EE	EE	EE	GF	GF	EE
Stearic Acid, Crystals	EE	EE	EE	EE	EE	EG	EG	GG
Sulfuric Acid, 1-6%	EE	EE	EE	EE	EE	EE	EE	EE
Sulfuric Acid, 20%	EE	EE	EE	EG	EE	EG	EE	EE
Sulfuric Acid, 60%	EG	EE	EE	EG	EE	GF	EE	EE
Sulfuric Acid, 98%	GG	GG	GG	GG	EE	NN	GN	NN
Sulfur Dioxide, Liq., 46 psi	NN	FN	NN	NN	EE	GF	FN	GG
Sulfur Dioxide, Wet or Dry	EE	EE	EE	EE	EE	EG	EG	GG
Sulfur Salts	EE	EE	EE	EE	EE	EE	EE	EE
Tartaric Acid	EE	EE	EE	EE	EE	EG	EG	EE
Tetrahydrofuran	FN	GF	GF	FF	EE	NN	NN	NN
Thionyl Chloride	NN	NN	NN	NN	EE	NN	NN	NN
Toluene	FN	GG	GF	GF	EE	NN	NN	NN
Tributyl Citrate	GF	EG	GF	GF	EE	NN	FN	FF
Trichloroethane	NN	FN	NN	NN	EE	NN	NN	NN
Trichloroethylene	NN	FN	NN	NN	EE	NN	NN	NN
Triethylene Glycol	EE	EE	EE	EE	EE	GF	GF	NN
Tripropylene Glycol	EE	EE	EE	EE	EE	EG	GF	EE
Turpentine	FN	GG	GF	FF	EE	NN	NN	NN
Undecyl Alcohol	EF	EG	EG	EG	EE	EG	EF	FF
Urea	EE	EE	EE	EG	EE	NN	GN	FF
Vinylidene Chloride	NN	FN	NN	NN	EE	NN	NN	NN
Xylene	GN	GF	FN	FN	EE	NN	NN	NN
Zinc Stearate	EE	EE	EE	EE	EE	EE	EG	EE

ATTACHMENT VIII

CLOSURE PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

CLOSURE PLAN

(Revised 9/6/83)

I. GENERAL STATEMENT

The following steps will be followed to close the hazardous waste units at this site at any time during or at the end of its intended life. The Olin Niagara Falls plant closure plan may be amended at any time during the active life of the facility. The plan will be amended within 60 days of any change in operating procedures or facility design which affects this plan.

II. BRINE MUD MANAGEMENT AREA (Treatment Tank/Waste Pile)

All hazardous wastes can be removed from this area, therefore, post-closure is not required.

A. Estimated date of final closure - December 31, 2032.

B. Maximum inventory in storage at any one time:

Tank - 600 tons

Waste pile - 300 tons

C. Decontamination and closure procedure

NOTE: The time periods in parenthesis represent approximate milestone dates when this activity will take place after the final volume of waste is placed in the unit.

1. All plant personnel will be notified by means of circulated memorandum and signs posted at the site that the unit is closed and will accept no additional waste. (Day 0)

2. After decanting of the mud is complete, the waste material will be removed from the tank by a front-end loader and placed on the waste pile pad to allow for additional dewatering. (Day 30-60)

3. Surface runoff and brine supernatant will be pumped from the area (via-established on-site pumping system) back into the production process or treated at the mercury wastewater treatment facility. (Day 30-60)

4. Once the material has dewatered sufficiently, a composite sample will be collected and the EPA toxicity extraction procedure for mercury will be performed. The waste will then be disposed of in an authorized secure hazardous waste landfill. (Day 60-90)

5. All structures which came in contact with the waste will be washed with water at high pressure. (Day 90-100)

6. Contaminated process equipment such as pumps and piping will be either acid washed and reused or disposed of in an appropriate landfill. (Day 95-105)

7. Wash water (estimated 100,000 gallons) will be collected and treated at the mercury wastewater treatment facility. (Day 90-120)

8. Contaminated concrete from the tank and waste pile base will be analyzed and, if hazardous, disassembled and transported in bulk to an approved secure hazardous waste landfill (estimated maximum of 600 cubic yards). A mercury analysis will be performed on a sample of each 8 cubic yards leaving the unit. (Day 110-160)

9. A composite sample of earth, removed in disassembling will be subjected to the EPA toxicity extraction procedure for mercury and γBHC. If the earth passes the test it may be used as backfill, if it fails, it will be transported to an authorized secure hazardous waste landfill. (Day 160-170)

10. The area will then be backfilled with non-hazardous material. (Day 170-180)

D. Partial Closure

The brine mud management area may be closed either at the end of its intended life or when the chlor-alkali manufacturing operation at this site is permanently terminated. If the tank and/or waste pile in the area is replaced, the new unit(s) will be designed, constructed, and permitted prior to closing the existing unit(s). These units could be closed without effecting the other hazardous waste management units and production processes.

E. Schedule for Final Closure

1. The Regional Administrator and the NYSDEC Commissioner will be notified at least 180 days prior to the date closure is expected to begin.
2. The complete hazardous waste inventory will be disposed of, in compliance with this plan, within 90 days after placing the final volume of brine mud on the waste pile.
3. Final decontamination will be completed and the closure activities completed within 90 days of complete inventory disposal.
4. When closure is complete, Olin will submit to the Regional Administrator certification, by Olin and a registered professional engineer, that the unit has been closed in accordance with the approved plan.

III. WASTE DRUM STORAGE UNIT

A. Estimated date of final closure - December 31, 2032

B. Maximum inventory in storage at any one time - 288 55-gallon drums or 15,840 gallons.

C. Decontamination and closure procedure

NOTE: The time periods in parenthesis represent approximate milestone dates when this activity will take place after the final volume of waste is placed in the unit.

1. Wastes, generated in the closure procedures, will be accepted at this facility until all other plant facilities and equipment are decontaminated.
2. All plant personnel will be notified by means of circulated memorandum and signs posted at the storage facility that the site is closed and will accept no additional waste. (Day 0)
3. Drums of hazardous waste stored on the site will be transported to an approved secure hazardous waste landfill. (Day 10-90)
4. All concrete surfaces in this facility are coated with Ceilcote Coroline® 510, an impervious material. Therefore, decontamination in this area can be accomplished with wash water.
5. Plastic pallets will be washed prior to reuse at another facility or disposal in an approved non-secure landfill. (Day 100-150)
6. The sump pump and auxiliary piping will be acid washed and reused or disposed of in an authorized secure hazardous waste landfill. (Day 100-150)
7. Wash water will be collected and treated at the mercury wastewater treatment facility. (Day 160-180)
8. Since the complete area is paved and diked, there is little potential for ground contamination.
9. The remaining portions of the structure could be reused.

D. Partial Closure

The waste drum storage unit may be closed either at the end of its intended life or when the total manufacturing operation at this site is permanently terminated. If the unit is replaced, the new unit will be designed, constructed, and permitted prior to closing the existing unit. This unit could be closed without affecting other hazardous waste units or any of the manufacturing operations by operating under the 90-day accumulation exemption (40 CFR 262.34).

E. Schedule for Final Closure

1. The Regional Administrator and the NYSDEC Commissioner will be notified at least 180 days prior to the date closure is expected to begin.
2. The complete hazardous inventory will be disposed of, in compliance with this plan, within 90 days after placing the final drums of waste in storage.
3. Final decontamination will be completed and the closure activities completed within 90 days of complete inventory disposal.
4. When closure is complete, Olin will submit to the Regional Administrator certification, by Olin and a registered professional engineer, that the unit has been closed in accordance with the approved plan.

IV. LIME PIT TREATMENT UNIT

A. Estimated date of final closure - December 31, 2032

B. Maximum inventory in storage at any one time - 47 cubic yards

C. Decontamination and closure procedure

NOTE: The time periods in parenthesis represent approximate milestone dates when this activity will take place after the final volume of waste is placed in the unit.

1. All plant personnel will be notified by means of circulated memorandum and signs posted at the treatment unit that the site is closed and no additional waste will be accepted. (Day 0)
2. Calcium hypochlorite plant waste will be dissolved in the treatment tank and rendered non-hazardous. (Day 5-50)
3. Once treatment is completed, the supernatant will be decanted from the tank, and treated at the chlorine wastewater treatment facility. (Day 50-70)
4. A composite sample of waste sludge will be collected and analyzed for residual chlorine and pH. (Day 75-80)
5. The sludge will then be removed from the pit by means of a front-end loader and transported in bulk to an authorized sanitary landfill. (Day 80-90)
6. The pit will be washed with water at high pressure and the wash water will be collected and treated at the chlorine wastewater treatment facility. (Day 100-140)
7. The area will then be backfilled with non-contaminated material. (Day 150-180)

D. Partial Closure

The lime pit treatment unit may be closed either at the end of its intended life or when the calcium hypochlorite manufacturing operation

at this site is permanently terminated. If the tank is replaced, the new unit will be designed, constructed, and permitted prior to closing the existing tank. This unit could be closed without affecting the other hazardous waste management units and production processes.

E. Schedule for Final Closure

1. The Regional Administrator and the NYSDEC Commissioner will be notified at least 180 days prior to the date closure is expected to begin.
2. The complete hazardous waste inventory will be 90 days after the final volume of waste is disposed of in the pit.
3. Final decontamination will be completed and the closure activities completed within 90 days of complete inventory disposal.
4. When closure is complete, Olin will submit to the Regional Administrator certification, by Olin and a registered professional engineer, that the unit has been closed in accordance with the approved plan.

VDL/vrp

9/6/83

1982

CLOSURE COST ESTIMATE AND FINANCIAL ASSURANCE MECHANISM

I. The closure estimate will be upgraded annually within 30 days of May 19, the anniversary date of this estimate. Actual 1981 costs were used as the initial bases of this estimate. All costs, except disposal costs, will be upgraded using an inflation factor derived from the Annual Implicit Price Deflator for Gross National Product as published in "Survey of Current Business". Since the disposal costs are primarily affected by factors other than inflation, current disposal costs will be incorporated into the estimate on an annual basis.

II. Waste Drum Storage Unit

1) Maximum number of drums in facility at the time of closure - 288 drums

2) Unit cost (1982) per drum for disposal at NYSDEC authorized landfill - $42/drum

3) Total cost of drum disposal

$$288 \text{ drums} \times \frac{\$42}{\text{drum}} = \$12,096$$

4) Loading cost based upon past plant experience of loading 72 drums with 3 operators during 4 hours

$$\frac{288 \text{ drums}}{72 \text{ drums}} \times 3 \text{ operators} \times 4 \text{ hrs} \times \frac{\$25}{\text{hour}} = \$1,200$$

5) Unit cost of shipping 72 drums to an authorized landfill located in Ohio - $1800/load. (While a site in New York State could be used for disposal, Ohio represents the more severe costs.)

6) Total freight cost

$$288 \text{ drums} \times \frac{1 \text{ load}}{72 \text{ drums}} = 4 \text{ loads}$$

$$4 \text{ loads} \times \frac{\$1800}{\text{load}} = \$7,200$$

7) Olin maintenance labor to wash surface area of drum storage facility and plastic pallets with 20,000 gallons through two (2) 10 gpm hoses with a two (2) man crew for each nose

$$\frac{20,000 \text{ gal}}{20 \text{ gal/min}} \times \frac{1 \text{ hour}}{60 \text{ min}} \times \frac{1 \text{ day}}{8 \text{ hrs}} = 2 \text{ days}$$

$$2 \text{ days} \times 4 \text{ men} \times \frac{8 \text{ hrs}}{\text{day}} \times \frac{\$20.55}{\text{hour}} = \$1315$$

8) Cost of treating 20,000 gallons of wastewater for mercury removal at $38.00/gal

$$20{,}000 \text{ gallons} \times \frac{\$38.00}{1000 \text{ gal}} = \$760$$

9) Disposal cost of plastic pallets at non-secure landfill

$$\frac{288 \text{ drums}}{2 \text{ dms/pallet}} = 144 \text{ pallets}$$

$$\frac{144 \text{ pallets}}{6 \text{ pallets/box}} = 24 \text{ boxes}$$

$$24 \text{ boxes} \times \frac{\$50}{\text{box}} = \$1{,}200$$

10) Freight to haul trash dumpster boxes to sanitary landfill based upon plant experience of hauling 4 boxes per day with one (1) truck with operator.

$$\frac{21 \text{ boxes}}{4 \text{ boxes/day}} \times \frac{\$200}{\text{day}} = \$1050$$

11) Professional certification by registered P.E.

$$2 \text{ inspections} \times \frac{4 \text{ hours}}{\text{inspection}} = 8 \text{ hours}$$

$$8 \text{ hours} \times \frac{\$35}{\text{hour}} = \$280 \text{ technical}$$

$$4 \text{ hours} \times \frac{\$\ 8}{\text{hour}} = \$32 \text{ clerical}$$

Total certification cost = $312

12) Partial Summary Cost

Drum loading	(line 4)	$ 1,200
Total freight	(line 6)	7,200
Labor to wash facility	(line 7)	1,315
Wastewater treatment	(line 8)	760
Pallet disposal	(line 9)	1,200
Freight to haul pallets	(line 10)	1,200
Professional certification	(line 11)	312
Partial closure cost (May 1981)		$ 13,187

13)	Inflation factor for 1982/1981	1.0921
14)	Adjusted closure cost for 1982	14,402
15)	Actual drum disposal cost for 1982 (line 3)	12,096
	Subtotal	$ 26,498
16)	Contingencies (10%)	2,650
17)	Administration (10%)	2,650
18)	Total closure cost for 1982	$ 31,798

III. Brine Mud Management Area

1) Maximum brine mud inventory at the time of closure - 890 yd^3 (This amount represents the maximum quantity of mud in the waste pile after the tank has been emptied.)

2) Specific gravity of sludge - 1.2 gm/l

3) Calculation of weight of brine mud to be removed:

$$890\ yd^3 \times \frac{1.2\ gm}{l} \times \frac{62.4\ lbs/ft^3}{1\ gm/l} \times \frac{27\ ft^3}{yd^3} \times \frac{1\ ton}{2000\ lbs} = 900\ tons$$

4) Unit cost (1982) of disposal at a NYSDEC authorized facility - $41/ton

5) Total cost of brine mud disposal:

$$900\ tons \times \frac{\$41}{ton} = \$36,900$$

6) Unit cost of handling and hauling brine mud based upon experience with one (1) front end loader and two (2) dump trucks:

$$\frac{3\ operators \times \$200/operator}{\frac{8\ loads}{day} \times \frac{12\ tons}{load}} = \$6.25/ton$$

7) Total cost of handling and hauling brine mud:

$$900\ tons \times \frac{\$6.25}{ton} = \$5,625$$

8) Olin maintenance labor to wash brine mud area concrete with 100,000 gallons through two (2) 10 gpm hoses with a two (2) man crew for each hose.

$$\frac{100,000\ gal}{20\ gal/min} \times \frac{1\ hour}{60\ min} \times \frac{1\ day}{8\ hrs} = 10\ days$$

$$10\ days \times 4\ men \times \frac{8\ hours}{day} \times \frac{\$20.55}{hour} = \$6576$$

9) Cost of treating 100,000 gallons of wastewater for mercury removal at $38.00/gal.

$$100{,}000 \text{ gallons} \times \frac{\$38.00}{1000 \text{ gal}} = \$3800$$

10) Number of concrete samples to be obtained for EPA toxicity testing

16 samples

11) Unit cost of sample analysis - $300/sample

12) Total cost of sample analysis

$$16 \text{ samples} \times \frac{\$300}{\text{sample}} = \$4800$$

13) Contractor estimated to remove all concrete from brine mud management area - $121,000

14) Maximum amount of contaminated concrete to be disposed of

Brine mud tank approximately	200 yd^3
Brine mud waste pile base approximately	400 yd^3
Total	600 yd^3

15) Calculation of weight of concrete to be removed

$$600 \text{ yd}^3 \times \frac{2 \text{ tons}}{\text{yd}^3} = 1200 \text{ tons}$$

16) Unit cost (1982) of concrete disposal at an authorized secure hazardous landfill - $50/ton

17) Total cost of concrete disposal

$$1200 \text{ tons} \times \frac{\$50}{\text{ton}} = \$60{,}000$$

18) Unit cost of loading and hauling contaminated concrete, based upon experience with one (1) front end loader and two (2) dump trucks

$$\frac{3 \text{ operators} \times \$200/\text{operator}}{10 \text{ loads/day} \times 14 \text{ tons/load}} = \$4.29/\text{ton}$$

19) Total cost of loading and hauling contaminated concrete

1200 tons x $\frac{\$4.29}{\text{ton}}$ = \$5148

20) Backfill cost

650 yd^3 x $\frac{\$3.00}{yd}$ = \$1950

21) Professional certification by registered P.E.

6 inspections x $\frac{4 \text{ hours}}{\text{inspection}}$ = 24 hour

24 hours x $\frac{\$35}{hr}$ = \$840 technical

8 hours x $\frac{\$8.00}{hr}$ = \$64 clerical

Total certification cost = \$840 + \$64 = \$904

22) Partial Summary Cost

Brine mud hauling	(line 7)	\$ 5,625
Labor costs to wash concrete	(line 8)	6,576
Wastewater treatment	(line 9)	3,800
Sample analysis	(line 12)	4,800
Concrete removal	(line 13)	122,500
Concrete hauling	(line 19)	5,148
Backfill	(line 20)	1,950
Professional certification	(line 21)	904
Partial Closure Cost (May 1981)		\$151,303
23) Inflation factor for 1982/1981		1.0921
24) Adjusted partial closure cost for 1982		\$165,238
25) Actual brine mud disposal cost for 1982 (line 5)		36,900
26) Actual concrete disposal cost for 1982 (line 17)		60,000
Subtotal		\$262,138
27) Contingencies (10%)		26,213
28) Administration (10%)		26,213
29) Total Closure Cost for 1982		\$314,564

IV. Lime Pit Treatment Unit

1) Maximum amount of lime sludge inventory at the time of closure - 47 yd^3

2) Specific gravity of sludge - 1.2 gm/l

3) Calculation of weight of lime sludge to be removed

$$47\ yd^3 \times \frac{1.2\ gm}{l} \times \frac{62.4\ lbs}{ft^3} \times \frac{27\ ft^3}{yd^3} \times \frac{1\ ton}{2000\ lbs} = 47.5\ tons$$

4) Unit cost (1982) of disposal at a NYSDEC authorized landfill - $33/ton

5) Total cost of lime sludge disposal

$$47.5\ tons \times \frac{\$33}{ton} = \$1568$$

6) Unit cost of handling and hauling lime sludge based upon experience with one (1) front end loader and two (2) dump trucks

$$\frac{3\ operators \times \$200/operator}{6\ loads/day \times 6\ tons/load} = \$16.67/ton$$

7) Total cost of handling and hauling lime sludge

$$47.5\ tons \times \frac{\$16.67}{ton} = \$792$$

8) Sample analysis cost for residual chlorine by Olin

$$1\ sample \times \frac{\$100}{sample} = \$100$$

9) Olin maintenance labor to wash lime pit concrete with 20,000 gallons through one (1) 20 gpm hose with a two-man crew

$$\frac{20{,}000\ gal}{20\ gal/min} \times \frac{1\ hour}{60\ min} \times \frac{1\ day}{8\ hrs} = 2\ days$$

$$2\ days \times 2\ men \times \frac{8\ hours}{day} \times \frac{\$20.55}{hour} = \$658$$

10) Cost of treating wastewater for chlorine removal at $16.00/1000 gal.

$$200{,}000\ gal \times \frac{\$16.00}{1000\ gal} = \$320$$

11) Backfill costs

55 yd^3 @ $\frac{\$3.00}{yd^3}$ = \$165

12) Professional certification by registered P.E.

8 hours x $\frac{\$35}{hr}$ = \$280 technical

4 hours x $\frac{\$\ 8}{hr}$ = \$32 clerical

Total certification cost = 280 + 32 = \$312

13) Partial Summary Cost

Lime sludge hauling	(line 7)	\$ 792
Total analytical cost	(line 8)	100
Labor to wash concrete	(line 9)	658
Wastewater treatment	(line 10)	320
Backfill cost	(line 11)	165
Professional certification	(line 12)	312
Partial Closure Cost (May 1981)		\$ 2,347

14) Inflation factor for 1982/1981 1.0921

15) Adjusted partial closure cost for 1982 \$ 2,563

16) Actual lime sludge disposal cost for 1982 (line 5) 1,568

Subtotal \$ 4,131

17) Contingencies (10%) 413

18) Administration (10%) 413

19) Total Closure Cost for 1982 \$ 4,957

V. Approximate Total Closure Cost

1)	Waste drum storage unit	$32,000
2)	Brine mud management area	315,000
3)	Lime pit treatment unit	5,000
	Total Closure Cost	$352,000

VDL/vrp
6/29/83

FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

COPY
OLIN CORPORATION

July 1, 1982

Regional Administrator - Region II
Environmental Protection Agency
26 Federal Plaza
New York, NY 10007
Attention: RCRA Financial Requirements

Gentlemen:

I am the chief financial officer of Olin Corporation, 120 Long Ridge Road, Stamford, CT 06904. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in Subpart H of 40 CFR Parts 264 and 265.

This firm is the owner or operator of the following facilities for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by the test are shown for each facility:

	Closure Cost	Post-Closure Cost
E.P.A. I.D. No. OHD 001813708 Ashtabula Plant P.O. Box 206 Ashtabula, Ohio 44004	$ 177,000	$ -
E.P.A. I.D. No. GAD 040690737 Augusta Plant P.O. Box 1234 Augusta, Georgia 30913	900,000	168,000
E.P.A. I.D. No. TXD 008097487 Beaumont Plant P.O. Box 30 Beaumont, Texas 77704	56,000	-

E.P.A. I.D. No. CAD 009702564 Benecia Plant Benecia Industrial Park P.O. Box 847 Benecia, California 94510	$ 2,000	$ -
E.P.A. I.D. No. OHD 045214947 Brook Park Plant 6367 & Rear Eastland Rd. Brook Park, Ohio 44142	43,000	-
E.P.A. I.D. No. TND 003337292 Charleston Plant P.O. Box 248 Charleston, Tennessee 37310	1,600,000	1,500,000
E.P.A. I.D. No. KYD 006396246 Doe Run Plant P.O. Box 547 Brandenburg, Kentucky 40108	32,000	-
E.P.A. I.D. No. ILD 000802819 East Alton Casting Plant East Alton, Illinois 62024	14,205	-
E.P.A. I.D. No. ILD 006271696 East Alton Plant East Alton, Illinois 62024	42,701	-
E.P.A. I.D. No. PAD 047353172 Fogelsville Plant P.O. Box 300 Fogelsville, Pennsylvania 18051	6,000	-
E.P.A. I.D. No. ILD 049809379 Joliet Plant P.O. Box 2219 Joliet, Illinois 60434	22,000	-
E.P.A. I.D. No. LAD 008080681 Lake Charles Plant P.O. Box 2896 Lake Charles, Louisiana 70602	800,000	750,000
E.P.A. I.D. No. MSD 007035843 Leland Plant Drawer B Leland, Mississippi 38756	105,000	-
E.P.A. I.D. No. ALD 008188708 McIntosh Plant P.O. Box 23 McIntosh, Alabama 36553	1,000,000	-

E.P.A. I.D. No. ILD 000802801 Meridian Energy Technical Systems Operation Drawer G Marion, Illinois 62959	$ 21,750	$ -
E.P.A. I.D. No. CTD 052544376 Middletown Plant 475 Smith Street Middletown, Connecticut 06457	30,000	-
E.P.A. I.D. No. WVD 004374021 Moundsville Plant P.O. Box 596 Moundsville, West Virginia 26041	1,200,000	-
E.P.A. I.D. No. CTD 001451004 New Haven Research Center 275 Winchester Avenue New Haven, Connecticut 06511	61,000	-
E.P.A. I.D. No. NYD 002123461 Niagara Falls Plant P.O. Box 748 New York, NY 14302	320,000	-
E.P.A. I.D. No. ARD 006354542 North Little Rock Plant P.O. Box 398 North Little Rock, Arkansas 72114	20,000	-
E.P.A. I.D. No. ILD 006317473 Ordill Industrial Area Technical Systems Operations Drawer G Marion, Illinois 62959	38,412	-
E.P.A. I.D. No. KSD 000203638 Kansas City Plant (OWS) 51 Corporate Woods 9393 West 110th Street Overland Park, Kansas 66210	50,000	-
E.P.A. I.D. No. CAD 076206507 Los Angeles Plant (OWS) 3312 Long Beach Avenue, East Los Angeles, California 90058	20,000	-
E.P.A. I.D. No. NYD 068212695 New York Plant (OWS) 615 West 131st Street New York, NY 10027	7,000	-

NOTE: New York, NY should read Niagara Falls, NY

E.P.A. I.D. No. NYD 002220804 Rochester Plant P.O. Box 205 Rochester, New York 14611	$ 245,000	$ -
E.P.A. I.D. No. FLD 047094524 St. Marks Powder Operation P.O. Box 222 St. Marks, Florida 32355	23,000	-
E.P.A. I.D. No. LAD 052528965 Shreveport Plant P.O. Box 5098 Shreveport, Louisiana 71105	1,000	-
E.P.A. I.D. No. CTD 053704110 Waterbury Plant P.O. Box 270 Waterbury, Connecticut 06720	548	-
E.P.A. I.D. No. MAD 001403104 Wilmington Plant 51 James Street Wilmington, Massachusetts 01887	245,000	-

This firm guarantees, through the corporate guarantee specified in Subpart H of 40 CFR Parts 264 and 265, the closure or post-closure care of the following facilities owned or operated by subsidiaries of this firm. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility: None.

In states where EPA is not administering the financial requirements of Subpart H of 40 CRF Parts 264 and 265, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by such a test are shown for each facility: None.

This firm is the owner or operator of the following hazardous waste management facilities for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Parts 264 and 265 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility: None.

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31st. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 1981.

Alternative I

1.	Sum of current closure and post-closure cost estimates	$ 9,500,616
* 2.	Total liabilities	$824,847,000
* 3.	Tangible net worth	$781,707,000
* 4.	Net worth	$793,187,000
* 5.	Current Assets	$669,635,000
* 6.	Current liabilities	$376,339,000
7.	Net working capital	$293,296,000
* 8.	The sum of net income plus depreciation, depletion and amortization	$214,802,000
* 9.	Total operating assets in U.S.	$1,450,537,000

		YES	NO
10.	Is line 3 at least $10 million?	X	
11.	Is line 3 at least 6 times line 1?	X	
12.	Is line 7 at least 6 times line 1?	X	
*13.	Are at least 90% of firm's operating assets located in the U.S.? If not, complete line 14.		X
14.	Is line 9 at least 6 times line 1?	X	
15.	Is line 2 divided by line 4 less than 2.0?	X	
16.	Is line 8 divided by line 2 greater than 0.1?	X	
17.	Is line 5 divided by line 6 greater than 1.5?	X	

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 264.151 (f) as such regulations were constituted on the date shown immediately below.

Original Signed by
E. P. Lyons

Edward P. Lyons
Vice-Chairman and
Chief Financial and
Administrative Officer

Date: July 1, 1982

CJS:mac

Letter Recipients - Other Regional Offices:

Regional Administrator - Region I
Regional Administrator - Region III
Regional Administrator - Region IV
Regional Administrator - Region V
Regional Administrator - Region VI
Regional Administrator - Region VII
Regional Administrator - Region IX

MUD BRINE TREATMENT UNIT DESIGN

→ 9. MAINTAIN MAX. G.W. LEVEL ≈ 3'-6" BELOW GRADE OR EL. 567.68'
10. ACTUAL GW ELEVATION 567.67± FROM HARZA REPORT
HYDROSTATIC O.K.

COMPUTE NET SOIL PRESSURES FOR DEEP END - DEPTH = 8.83' ✓
FOR SLOPED END - AVG. DEPTH = 4.83' ✓

1. $q_{NET} = q/A_T - \gamma D_f$ WHERE D_f = DEPTH OF G.W. TO BOTTOM OF FOOTING

WITH MAX. G.W. LEVEL ≈ 3'-6" BELOW GRADE
- DEEP END DEPTH OF G.W. = 8.83' - 3.5' = 5.33'
- SLOPED END DEPTH OF G.W. = 5.33'/2 = 2.67'

DEEP END
$Q = 3\,(7.83' \times 8.5' \times .83') + (60' - .83') \times 8.5' \times .83') \times .150^{K}/FT^3$
$Q = 88^{K}$ ↓
$A = 7.83' \times 61.67' = 482.9\ FT^2$ ↓

SLOPED END
$Q = 3\,(53' \times 4.5' \times .83') \times .150^{K}/FT^3 = 89^{K}$ ↓
$A = 53' \times 61.67' = 3{,}268.5\ FT^2$ ↓

CASE I
DEEP END $q_{NET} = \frac{88^{K}}{482.9\ FT^2} - .060^{K}/FT^3\,(5.33') = -.14^{K}/FT^2$ ↑ UPWARD PRESSURE
SLOPED END $q_{NET} = \frac{89^{K}}{3268.5\ FT^2} - .060^{K}/FT^3\,(2.67') = -.13^{K}/FT^2$ ↑ UPWARD PRESSURE

CASE II
DEEP END $q_{NET} = \frac{88^{K} + \frac{324^{K}}{2}}{482.9\ FT^2} - .060^{K}/FT^3\,(5.33') = +.20^{K}/FT^2$ ↓ DOWNWARD PRESSU
SLOPED END $q_{NET} = \frac{89^{K} + \frac{1097^{K}}{2}}{3268.5\ FT^2} - .060^{K}/FT^3\,(2.67') = +.03^{K}/FT^2$ ↓ DOWNWARD PRESSUR

CASE III
DEEP END $q_{NET} = \frac{88^{K} + 324^{K}}{482.9\ FT^2} - 0 = +.85^{K}/FT^2$ ↓ DOWNWARD PRESSURE
SLOPED END $q_{NET} = \frac{89^{K} - 1097^{K}}{3268.5\ FT^2} - 0 = +.36^{K}/FT^2$ ↓ DOWNWARD PRESSUR

CASE IV
DEEP END $q_{NET} = \frac{88^{K} + 324^{K}/2}{482.9\ FT^2} - 0 = +.52^{K}/FT^2$ ↓ DOWNWARD PRESSU
SLOPED END $q_{NET} = \frac{89^{K} + 1097^{K}/2}{3268.5\ FT^2} - 0 = +.20^{K}/FT^2$ ↓

MUD BRINE TREATMENT UNIT DESIGN

CASE I DEEP END $q_{NET} = \frac{88^K}{482.9\ FT^2} - 0$ $= +.18^K/FT^2$ DOWNWARD PRESSURE

SLOPED END $q_{NET} = \frac{89^K}{3268.5\ FT^2} - 0$ $= +.03^K/FT^2$ DOWNWARD PRESSURE

BY INSPECTION: ALL CASES $< 1.5^K/FT^2$ MAX. ALLOW. SOIL BEARING PRESSURE

WALL ① (TREAT AS A CANTILEVERED RETAINING WALL WITH TOE BUT NO HEEL.)

ASSUME - a. 9'-3" WALL HEIGHT FOR 33'-10" LENGTH OF WALL W/ 4'-0" TOE.

ASSUME - b. 5'-4" AVE. WALL HEIGHT FOR 27'-0" LGH. OF WALL W/ 2'-7

ASSUME - c. NO CONNECTION OF WALL ① TO WALL ③.

d. LATERAL EARTH PRESSURES, SURCHARGE LINE LOADING AND HYDROSTATIC PRESSURES ACT AS THRUST ON OUTER SURFACE OF WALL W/ TANK EMPTY

e. CONTAINED BRINE SLUDGE LATERAL PRESSURE ACT AS THRUST ON INNER SURFACE OF WALL W/ TANK FULL & NO OUTER EARTH PRESSURE.

WALL ② (TREAT AS A CANTILEVERED RETAINING WALL WITH TOE AND HEEL)

ASSUME - a. 9'-3" WALL HEIGHT FOR 33'-10" LENGTH OF WALL W/ 3'-7" TOE & 3'-7" HEEL.

ASSUME - b. 5'-4" AVE. WALL HEIGHT FOR 27'-0" LENGTH OF WALL W/ 2'-0" TOE.

ASSUME - c. NO CONNECTION OF WALL ② TO WALL ③.

d. CONTAINED BRINE SLUDGE LATERAL PRESSURE ACTS AS THRUST W/ ONE SIDE (FULL TANK) AND OPPOSITE SIDE EMPTY

WALL ③ (TREAT AS A CANTILEVERED RETAINING WALL WITH TOE BUT NO HEEL)

ASSUME - a. 9'-3" WALL HEIGHT FOR 61'-8" LENGTH OF WALL W/ 7'-0" TOE

ASSUME - b. NO CONNECTION OF WALL ③ TO WALL ① AND ②.

c. LATERAL EARTH PRESSURES & HYDROSTATIC PRESSURES ACT AS THRUST ON OUTER SURFACE OF WALL W/ TANK EMPTY.

d. CONTAINED BRINE SLUDGE LATERAL PRESSURE ACTS AS THRUST ON INNER SURFACE OF WALL W/ TANKS FULL & NO OUTER EARTH

MUD BRINE TREATMENT UNIT DESIGN

BASE SLAB (TREAT AS A SLAB-ON-GRADE)

ASSUME a. AVE. THICKNESS = 6"

b. AVE. WIDTH = 26'-0"

c. HINGED CONNECTIONS TO RETAINING WALL TOES

d. FRONT END LOADER (VEHICULAR LOADS) USED AS CONCENTRATED MOVING LIVE LOADS *, CONTAINED BRINE SLUDGE MATERIAL USED AS UNIFORM DEAD LOADS.

(* REFER TO RAMP SLAB CALCULATIONS SH. #16-#20)

WALL ① DESIGN (9'-3" WALL HEIGHT) 33'-10" LENGTH OF WALL DESIGN WALL ① DEEP END FOR CASE I W/ SURCHARGE LOADING (G.W. EL. 3'-3 BELOW GRADE)

USE IN WALL ① ; ② & ③ DESIGNS

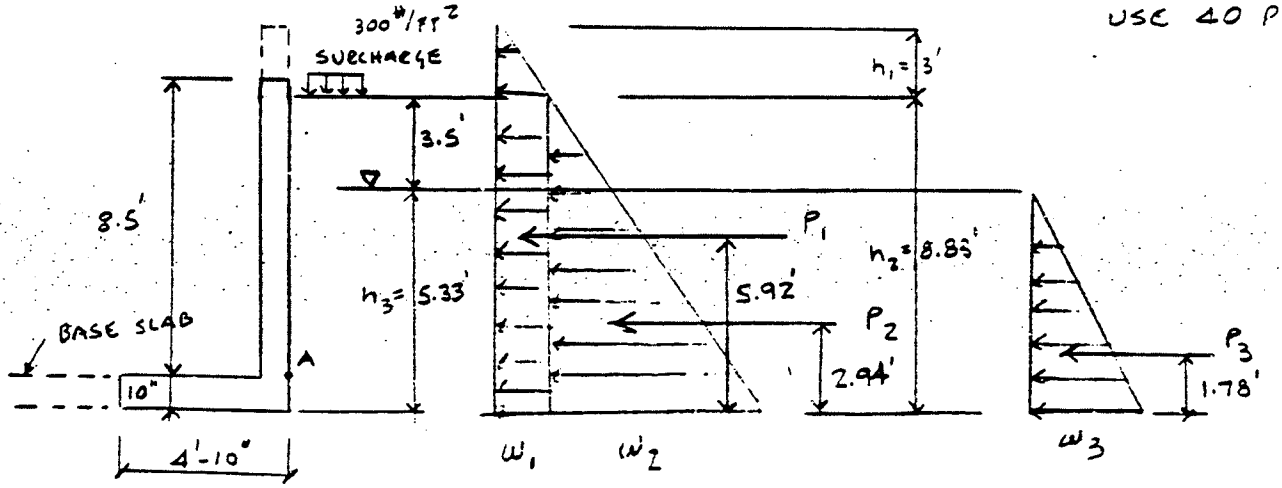
1. EQUIVALENT FLUID PRESSURE (CA). (REFER TO SOILS DATA)

$$CA = \frac{1 - \sin\phi}{1 + \sin\phi} = \frac{1 - \sin 30^\circ}{1 + \sin 30^\circ} = .33$$

(RANKINE - COULOMB EQ.)

2. EQUIVALENT FLUID DENSITY, $CaW = .33\ (115\ ^{\#}/FT^3) = 38$ PCF — DRY

USE 40 PCF



3. THRUST PRESSURES $W_1 + W_2 + W_3$

SURCHARGE PRESSURE $W_1 = Ca\,w\,h_1 = 40\,PCF\,(3') = 120\ ^{\#}/FT^2$ 150 but o.k

LATERAL EARTH PRESSURE $W_2 = Ca\,w\,h_2 = 40\,PCF\,(8.83') = 353\ ^{\#}/FT^2$ ✓

HYDROSTATIC PRESSURE $W_3 = 62.4\,PCF\,(5.33') = 333\ ^{\#}/FT^2$ ✓

MUD BRINE TREATMENT UNIT DESIGN

4. RESULTANT FORCES P_1 & P_2 USE $b = 1'$

$P_1 = w_1 h_2 b = 120^{\#}/FT^3 (8.83')(1') = 1060^{\#}$ ✓

$P_2 = w_2 h_2/2\, b = 353^{\#}/FT^3 (8.83'/2)(1') = 1558^{\#}$ ✓

$P_3 = w_3 h_3/2\, b = 333^{\#}/FT^2 (5.33'/2)(1') = 887^{\#}$

$3505^{\#}$

5. OVERTURNING MOMENT ABOUT (A)

$M_A = P_1(5.92') + P_2(2.94') + P_3(1.78') = 1060^{\#}(5.92') + (1558^{\#})(2.94' + 887(1.78')$

$M_A = 12{,}434^{'\#} = 12.4^{'K}$ ✓

$V = 3505^{\#} = 3.5^{K}_{V}$

6. (W.S.D.) DESIGN STEM

$f'_c = 3{,}000$ PSI , $f_c = 1{,}350$ PSI

$f_Y = 40{,}000$ PSI , $f_s = 20{,}000$ PSI

$n = 9.2$

7. FROM RCDH, TABLE 2 $M_{max\,A} = 12.4^{'K}$

SELECT $d = 8'' + 2''$ COVER $= 10''$ TOTAL DEPTH ✓

8. CHECK SHEAR

$\tau = \frac{V}{bd} = \frac{3.5^{K}}{12(8'')} = .036$ KSI $< .060$ KSI O.K.

9. TABLE 1, RCDH, $K = 226$, $b \times d = 12 \times 8$, TABLE 4, $F = .06$

$M - KF = 12.4^{'K} - 226(.064) = -2.06$ (NO COMP. STEEL REQ'D

10. TABLE 1, RCDH, $f_s = 20{,}000$, $a = 1.44$

A_S REQ'D $= \frac{M}{ad} = \frac{12.4^{'K}}{1.44(8'')} = 1.08\ IN^2$ (EXCESSIVE)

SINCE WALL ① @ DEEP END < 1/8 TOTAL WALL LENGTH AND $12.8^{'K}$ ASSUMES NO SUPPORT AT VERT. EDGE OF WALL ③, WHICH THEIR IS KNOWN TO BE, $M = 12.8^{'K}$ IMPROBABLE. USE $M = 6.2'$ $= 1/2(12.4^{'K})$.

NEW A_S REQ'D $= \frac{M}{ad} = \frac{6.2^{'K}}{1.44(8'')} = .54\ IN^2$ (per P.C.A. O.B. PWH) ✓

MUD BRINE TREATMENT UNIT DESIGN

SELECT FROM TABLE 3a

USE #5 @ 6½" MIN. REINF. IN OUTER FACE OF WALL (VERT.)

11. CHECK BOND

$$U = \frac{1000(3.5^K)}{3.6\ 7/8\ (8)} = 139 < 298$$

12. MIN. DEVELOPMENT LENGTH $L_d = \frac{f_s}{4U} D = \frac{20{,}000}{4(298)} .625 = 10"$ *

OR $.0004(D) F_Y = .0004(.625)(40{,}000)$
$= 10"$

* ACTUAL STEM REINFORCING BAR LENGTH (MIN) = 10". EXTEND (STEM) WALL REINFORCING INTO FULL LENGTH OF TOE - USE BENT 8A

13. TEMPERATURE AND SHRINKAGE FOR STEM

$A_{ST} = .0025\ b\ t = .0025\ (12")(10") = .3\ IN^2$

SINCE INNER FACE IS EXPOSED ∴ 2/3 (A_{ST}) USED IN THIS FACE (HORIZ.)
1/3 (A_{ST}) USED IN OUTER FACE

∴ INNER FACE $A_{ST} = 2/3\ (A_{ST}) = 2/3\ (.3) = .20\ IN^2$ USE #4 @ 12"

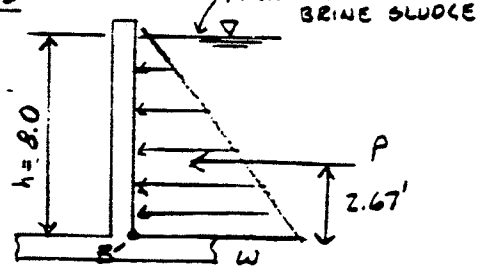
OUTER FACE $A_{ST} = 1/3\ (A_{ST}) = 1/3\ (.3) = .10\ IN^2$ USE #4 @ 12"

NOTE: BY INSPECTION OF ABOVE RESULTS, THE THRUST PRESSURE OF BRINE SLUDGE ON THE INNER FACE OF WALL ① W/TANK FULL IS $\gamma = 87.4$ PCF COMPARED W/EARTH, SURCHARGE & HYDROSTATIC THRUST PRESSURES $\gamma = 142$ ON THE OUTER FACE OF WALL ① W/TANK EMPTY, ∴ VERT. (OUTER FACE REINF. OF WALL ① IS MORE THAN ADEQUATE FOR VERT. (INNER FACE REINF. OF WALL ① (USE #5 @ 6½" MIN. REINF IN INNER FACE (VERT)

WALL ② DESIGN

DESIGN STEM FOR CASE IV - 1 TANK FULL
1 TANK EMPTY

DEEP END



THRUST PRESSURE (w) = 87.4 PCF (8.0')

$(w) = 699\ ^{\#}/_{FT^2}$ ✓

$P_1 = w\ h/2\ b$ USE $b = 1$

$= 699\left(\frac{8.0'}{2}\right)(1) = 2797\ ^{\#}/\checkmark$

BRINE MUD TREATMENT UNIT DESIGN

1. OVERTURNING MOMENT ABOUT ⓑ

$M_B = P_1 (2.67') = 2797^{\#} (2.67') = 7468^{'\#} = 7.5^{'K}$ X

$V = 2797^{\#} = 2.8^{K}$

2. (W.S.D.) DESIGN STEM

$f'_c = 3{,}000$ PSI , $f_c = 1350$ PSI

$f_y = 40{,}000$ PSI , $f_s = 20{,}000$ PSI

$n = 9.2$

3. FROM ECCH, TABLE 2, $M_{ⓑ} = 7.5^{'K}$ SELECT $d = 6"$

BUT USE $d = 8.0" + 2"$ COVER $= 10"$ TOTAL DEPTH

BY INSPECTION $A_{s\,req'd} = M/ad = \frac{7.5^{'K}}{1.44\,(8")} = .65$ (EXCESS OF)

FROM TABLE 3a USE #6 @ 8" MIN. REINF OF WALL @ OUTER FACE

SINCE EMPTY / FULL CONDITIONS VARY FROM ONE TANK TO THE OTHER, USE #6 @ 8" MIN. REINF EACH FACE ✓ @ DEEP END WALL

4. CHECK SHEAR

$v = \frac{V}{bd} = \frac{2.8^{K}}{12(8")} = .029$ KSI $<$ .060 KSI O.K.

5. CHECK BOND

$u = \frac{1000\,(2.8^{K})}{3.5\ 7/8\,(8)} = 114$ PSI $<$ 248 PSI O.K

6. MIN. DEVELOPMENT LENGTH $L_d = \frac{f_s}{4u} D = \frac{20{,}000}{4(248)}(.75) = 15"$ ⇐ CONTRO

OR $.0004\,(D)\,F_Y = .0004(.75)40000 = 12"$

* ACTUAL STEM REINFORCING BAR LENGTH (MIN) = 15". EXTEND STEM WALL REINFORCING INTO FULL LENGTH OF TOE (EITHER SIDE) - USE BENT B.

5. A_s DEEP CHANGES UP SLOPED END. M CHANGES.

CHECK M & A_s REQ'D AT AVE. 4.00' DEPTH.

$w = 350^{\#}/FT^2$, $P_1 = 700^{\#}$, $M = 700\left(\frac{4.00'}{3}\right) = 933^{'\#} = .93^{'K}$

USING SAME EFFECTIVE $d = 8"$

$A_{s\,req'd} = \frac{M}{ad} = \frac{.93^{'K}}{1.44\,(8")} = .08\ in^2$ TRY #4 @ 18 SPACING NO GO

∴ CAN USE #4 @ 12 ✓ EACH FACE (VER

BRINE MUD TREATMENT UNIT DESIGN

6. TEMP. AND SHRINKAGE

$A_{ST} = .0025 \times 12 \times 10'' = .3\ in^2$

REFER TO WALL ① ITEM 13 (SH. #8) USE #4 @ 12" INNER AND OUTER FACE (HORIZ.)

WALL 3 DESIGN

BY INSPECTION WALL ③ IS SIMILAR TO WALL ① DEEP END WHICH EXPERIENCES EARTH AND HYDROSTATIC PRESSURES, BUT IN SURCHARGE (REFER TO WALL ① DESIGN ITEM 1-14)

CASE I

1. w_1 = SURCHARGE = 0
   $w_2 = 40\ PCF\ (8.83') = 353\ PSF$ ✓
   $w_3 = 62.4\ PCF\ (5.33') = 333\ PSF$ -
2. $P_2 = 1558^{\#}$, $P_3 = 887^{\#}$
3. $M_{③} = 1558^{\#}(2.94) + 887^{\#}(1.78') = 6159^{'\#} = 6.2^{'K}$
4. $A_{S\,REQ'D} = \frac{M}{1.44(d)}$ USING SAME EFFECTIVE d AS WALL ① d = 8"
   $= \frac{6.2^{'K}}{1.44(8)} = .53\ in^2$

FROM TABLE 3a RCDH

USE #5 @ 7" √ MIN. REINF. IN EACH FACE OF WALL (VERT
WITH MIN. #4 @ 12" V OUTER FACE (HORIZ) - TEMP. STEEL -
MIN. #4 @ 12" V INNER FACE (HORIZ.) - TEMP. STEEL -

5. CHECK, BOND, AND DEVELOPMENT LENGTH O.K. BY INSPECTION!

WALL ① & ② BASE DESIGN

WALL ① FTG'S VARY FROM 2'-10" TO 4'-10"
WALL ② FTG'S VARY FROM 2'-5" TO 4'-5" EACH SIDE

REINF. IN LONG DIRECTION OF CANTILEVERED WALL FOOTINGS SHOULD BE .15 PERCENT OF THE CROSS SECTIONS.

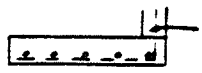
WALL ①

FOR A 10" THICK SLAB x 4'-10" FTG. WIDTH (MIN REINF REQ'D) AS PER ACI CODE - $A_S = .0015\ (10" \times 58") = .87\ in^2$

BRINE MUD TREATMENT UNIT DESIGN

FROM TABLE 3b, RCDH TRY 5 - #4 BARS = 5(.20) = 1.00 IN

USE #4 @ 12" BOT. ✓



TYPICAL DETAIL

FOR 10" THICK SLAB x 2'-10" FTG. WIDTH (MIN. REINF. REQ'D)

$A_S = .0015 (10" \times 34") = .51 \text{ IN}^2$

FROM TABLE 3b, RCDH TRY 3 (#4 BARS) = 3(.20) = .60 IN²

USE #4 @ 14" BOT. ✓

WALL ②

FOR 10" THICK SLAB x 2'-5" FTG (MIN. REINF REQ'D)

$A_S = .0015 (10" \times 29") = .44 \text{ IN}^2$ TRY 3 (#4 BARS) = 3(.20) = .60 IN²

USE #4 @ 12 BOT. EA SIDE ✓

FOR 10" THICK SLAB x 4'-5" FTG (MIN REINF. REQ'D)

$A_S = .0015 (10" \times 53") = .80 \text{ IN}^2$

FROM TABLE 3b, RCDH TRY 4 (#4 BARS) = 4(.20) = .80 IN²

USE #4 @ 12" BOT. EA SIDE ✓

WALL 3 BASE DESIGN WALL ③ FTG. = 7'-0" LG. AVE.

FOR 10" THICK SLAB x 7'-0" FTG. WIDTH (MIN REINF REQ'D) AS FOR ACI CODE

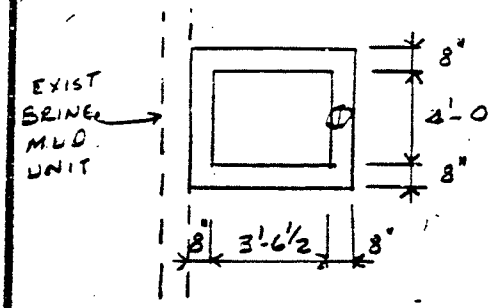
$A_S = .0015 (10" \times 84") = 1.26 \text{ IN}^2$

FROM TABLE 3a, RCDH, TRY 4 (#5 BARS) = 4(.32) = 1.28 IN²

USE #5 @ 12" BOT. ✓

BRINE MUD TREATMENT UNIT - DEWATERING SUMP DESIGN

SETTLER AREA DRAINAGE SUMP



BY INSPECTION: WALL ① WORST DESIGN CASE

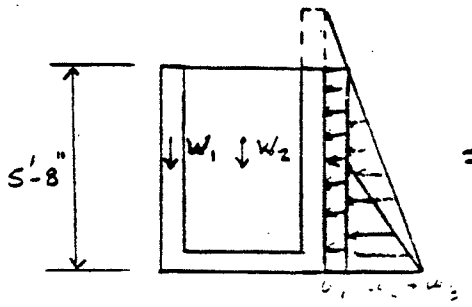
DESIGN AS ONE-WAY SLAB ON END SIMPLY-SUPPORTED

SURCHARGE W_1 = 40 PCF (3') = 120 #/FT²

EARTH W_2 = 40 PCF (5.67') = 227 #/FT²

HYDROSTATIC W_3 = 62.4 PCF (2.17') = 135 #/FT²

482 #/FT²



$W_T = W_1 + W_2 + W_3$

1) $M_{MAX} = \frac{w_T L^2}{8} = \frac{(120 + 227/2 + 135/2\ (5.67')^2}{8} = 1{,}210^{1\#} = 1.2^{1K}$ ✓

2) FROM TABLE 2, M = 1.2 K FOR f_s = 20,000 PSI, f_c = 1350 PSI

SELECT d = 2.5", BUT USE SINGLE REINF. WALL - 4" COVER EA. SIDE
∴ USE d = 4"

3) FROM TABLE 1, RC04

$A_{S\ REQ'D} = \frac{M}{ad} = \frac{1.2^{1K}}{1.44\ (4")} = .21\ IN^2$

* SHEAR & BOND O.K (BY INSPECTION)

USE #5 @ 12" (VERT.) ✓ A_S = .31 IN² (SINGLE LAYER)

4) TEMP. & SHRINKAGE

$A_{ST} = p\,b\,t = .0025\ (12")\ (8") = .24\ IN^2$

USE #5 @ 12" (HORIZ.) ✓ (SINGLE LAYER)

5) W_1 = 5.34' x .67' x 5.0' x .150 PCF x 2 = 5.4 K

W_2 = 3.54' x .67' x 5.0' x .150 PCF x 2 = 3.6 K

DOWNWARD PRESSURE = $\frac{9^K}{5.34' \times 4.88'}$ = .35 K/FT² ⇐ CONTROLS SLAB DESIGN

HYDROSTATIC UPLIFT = .060 K/FT³ (2.17') = -.13 K/FT²

BRINE MUD TREATMENT UNIT - DEWATERING SUMP DESIGN

6) SLAB DESIGN USE $W = .35^{K}/FT^{2}$ (DESIGN AS ONE WAY SLAB WORST CASE $L = 4'-0"$

$$M_{MAX} = \frac{WL^2}{8} = \frac{.35^{K}/FT^{2}(4')^2}{8} = .7^{1K}$$

SINCE M_{MAX} @ SLAB $= .7^{1K}$ IS LESS THAN M_{MAX} @ WALLS $= 1.2$

∴ SAFE TO USE SAME REINF. - #5 @ 12" EA. WAY (SINGLE LAYER)

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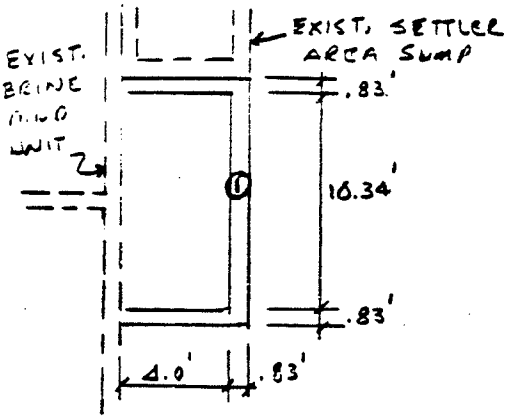
PROJECT NAME OLIN CHEMICAL
PROJECT NUMBER 2287-35/10
BY K.F.L. DATE 1/12/83
APP. _____ DATE _____

BRINE MUD TREATMENT UNIT - PROCESS SUMP DESIGN

PROCESS SUMP



DESIGN WALL AS SLAB ON END, USE PCA TABLE II $b = 10.34'$ $a = 8.5'$

$b/a = \frac{10.34'}{8.5'} = 1.2$ USE 1.25

MOMENT COEFFICIENTS

x/a	y = 0		y = b/4		y = b/2	
	M_x	M_y	M_x	M_y	M_x	M_y
0	0	+.017	0	+.003	0	-.034
1/4	+.005	+.020	+.002	+.005	-.008	-.042
1/2	+.017	(+.023)	+.009	+.009	(-.010)	(-.049)
3/4	(+.021)	+.017	+.013	+.009	-.009	-.044

MINUS SIGN - TENSION ON LOADED S.
+ COMPR. IN FAR SIDE

DESIGN FOR CASE I

$W_T = W_1 + W_2 + W_3 = 120\ PCF + 353\ PCF + 333\ PCF$ (REFER TO WALL ① DESIGN SH. #6)

(W_1 = SURCHARGE, W_2 = EARTH, W_3 = HYDROSTATIC (NO REDUCTION))

$W_T = 806\ PCF$ (1' WIDTH OF WALL) $= 806\ ^{\#}/FT^2 = .806\ ^{K}/FT^2$

$M_{Y\ MAX}\ \ominus = +.023\ w a^2 = +.023\ (.806\ ^{K}/FT)(8.83')^2 = 1.44^{IK}$

$M_{Y\ MAX}\ \ominus = -.049\ w a^2 = -.049\ (.806\ ^{K}/FT)(8.83')^2 = 3.08^{IK}$

$M_{X\ MAX}\ \oplus = +.021\ w a^2 = +.021\ (.806\ ^{K}/FT)(8.83')^2 = 1.32^{IK}$

$M_{Y\ MAX}\ \ominus = -.010\ w a^2 = -.010\ (.806\ ^{K}/FT)(8.83')^2 = .63^{IK}$

$V_{MID-BOTTOM\ EDGE} = .264\ w a = .264\ (.806\ ^{K}/FT)(8.83') = 1.9^{K}$

$V_{1/3\ PT.\ SIDE\ EDGE} = .334\ w a = .334\ (.806\ ^{K}/FT)(8.83') = 2.4^{K}$

W.S.D. WALL ① WORST CASE

1. $f'_c = 3{,}000\ PSI$, $f_c = 1{,}350\ PSI$
   $f_Y = 40{,}000\ PSI$, $f_s = 20{,}000\ PSI$
   $N = 9.2$

BRINE MUD TREATMENT UNIT - PROCESS SUMP DESIGN

2. FROM RCDH, TABLE 2, $M_{Y\,max}\,\Theta = 3.08^{IK}$
SELECT $d = 4''$ USE $d = 8'' + 2''$ COVER $= 10''$ / TOTAL D -

3. FROM TABLE 1, RCDH, FOR $f_s = 20{,}000$ PSI, $a = 1.44$

$$A_s = \frac{3.08^{IK}}{1.44\,(8)} = .27\ IN^2$$

SELECT BARS FROM TABLE 3a

USE *4 @ 9" MIN REINF. / (VERT.) E.F. ALL WALLS

4. TEMP. AND SHRINKAGE

$$A_{ST} = .0025\,(12)(10) = .3\ IN^2$$

SINCE INSIDE FACE IS EXPOSED USE $\frac{2}{3}(.3) = .2\ IN^2$

USE *4 @ 12" HOLIZ
E.F.

5. BY INSPECTION SLAB RECEIVES LESS PRESSURE THAN WALLS, ∴ WALL REINF. ADEQUATE FOR SLAB

*4 @ 9 TOP & BOT / SHORT DIRECTION OF SLAB (TWO LAYERS

*4 @ 12 TOP & BOT / LONG DIRECTION OF SLAB

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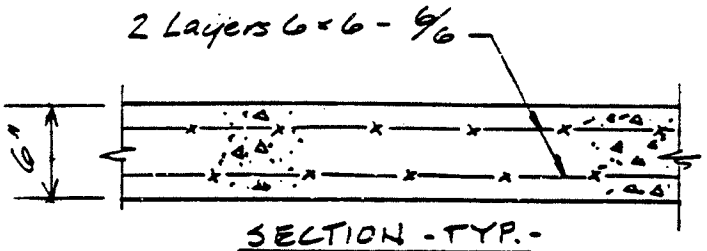
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME Olin Chemical
PROJECT NUMBER 2287-36/1
BY PWH DATE 1/10/83
APP. _____ DATE _____ 16 of

BRINE MUD TREATMENT UNIT BASE SLAB & CONCRETE PAD ANALYSIS

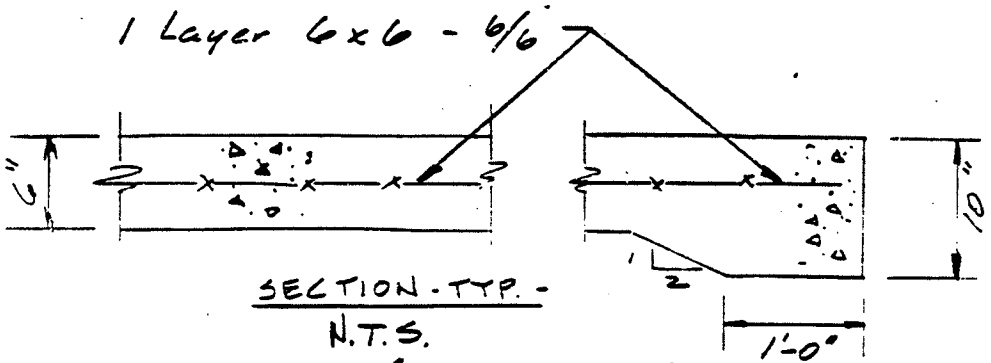
CHECKED: K.F.L. 1/12/83

BRINE MUD TREATMENT UNIT BASE SLAB:



SECTION - TYP. -
N.T.S.

CONCRETE PAD @ BRINE MUD TREATMENT UNIT:



SECTION - TYP. -
N.T.S.

General Design Guide: The design of the concrete slab-on-grade are based on "Slab Thickness Design for Industrial Concrete Floors on Grade."* Subgrade, concrete, safety factors, loads were based on the above report, information supplied by Olin and engineering judgement

Soils Data: Based on soil boring information (drill hole no. BH-7) at depths from 1' to 7.6' clayey gravel - ASTM Soil Classification System (Unified Classification) GC.

Assumption: Use Subgrade Modulus k = 200 pci for gravelly soils.

Design Criteria: Loads normally based on tractor shovel (wheel mounted) used on site. Use H15 axle load of 24,000 lbs. (AASHTO) single axle.

* Charts attached.

BRINE MUD TREATMENT UNIT BASE SLAB & CONCRETE PAD ANALYSIS

Design:

Axle load 24 kips

Wheel Spacing 12 x 60 x 12 (dual wheels)

No. of wheels on axle 2

Tire inflation pressure 80 psi

Tire contact area = $\frac{\text{wheel load}}{\text{inflation pressure}}$

$= \frac{24{,}000/4}{80} = 75$ sq. in.

No correction for effective slab thickness due to large load contact areas. (Fig. 5)

Subgrade and Concrete Data.

Subgrade modulus, k 200 pci

Concrete flexural strength, MR 493 psi @ 28 days (3,000 psi compressive strength)

Design Steps,

1. From Fig 4 in "Slab Thickness Design..." due to 'F', Equivalent Load Factor = 0.81
2. From Fig. 3 for 6" slab thickness k = 200 pci, 80 sq. in. effective contact area and 60" wheel spacing determine stress per 1000 lb. axle load, psi
3. Slab stress per 1,000 lb. of axle load = 16.5 psi
4. WS = slab stress x axle load kips
   = 16.5 x 24 x .8 = 321 psi
5. $SF = \frac{MR}{WS} = \frac{493}{321} = 1.5$

Safety factor (SF) $1.4 \leq 1.5 \leq 2.0$ ∴ o.k.

BRINE MUD TREATMENT UNIT BASE SLAB & CONCRETE PAD ANALYSIS

Reinforcement: 6 x 6 - 6/6 provided
equivalent to WWF 6 x 6 - W2.9 x W2.9

$$A_s = \frac{wLF}{2f_s} \qquad f_s = 30{,}000 \text{ psi}, \quad F = 1.5$$

$$= \frac{75 \times 60 \times 1.5}{2 \times 30{,}000}$$

$A_s = 0.1125$ sq in / ft of slab

A_s provided $= 2 \times .058 = 0.116$ sq in / ft. slab

A_s provided $> A_s$ required · o.k.

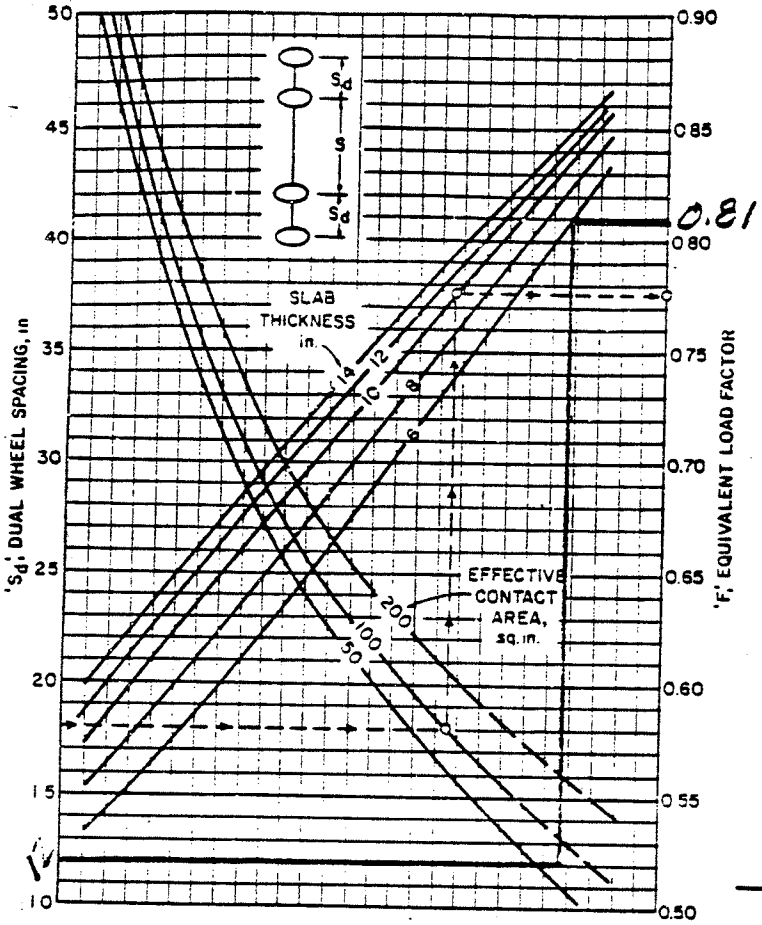


Fig. 4. Design chart for axles with dual wheels.

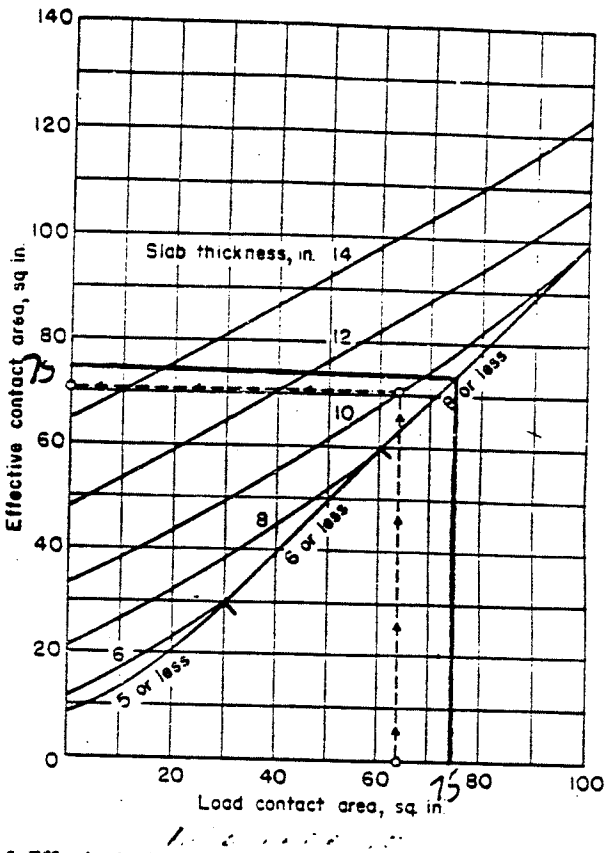


Fig. 5. Effective load contact area depends on slab thickness.

strength by the safety factor and then dividing this result by the axle load in kips (1 kip = 1,000 lb.).

For axles equipped with dual wheels, Figs. 3 and 4 are used together to determine floor slab thickness. First, Fig. 4 is used to convert the dual-wheel axle load to an equivalent single-wheel axle load (the axle load is multiplied by the factor, *F*). Then, with the equivalent load, Fig. 3 is used to determine the flexural stress in the slab.

The load contact area is the area of slab contact of one tire.* If tire data are not available, the contact area may be estimated for pneumatic tires by dividing wheel load by inflation pressure and roughly approximated for solid or cushion tires by multiplying tire width by three or four. If the tire size is known, the tire data may be obtained from manufacturers' tables.[14,15]

When the tire contact area has been determined, Fig. 5 is used to find the effective contact area for use in the design charts. The reason for making this correction is that the slab stresses for small load contact areas are overestimated when computed by conventional theory. The basis for this adjustment is given in Reference 13. (This same adjustment is used for post loads discussed in a later section.) In using Fig. 5 it is necessary to assume a slab thickness; this is a trial-and-error process to be checked against the final required design thickness. The degree of correction increases as contact area becomes smaller and slab thickness becomes greater.

The following example problems illustrate the use of Figs. 3 and 4 for slab-thickness design for vehicle loads:

Design Example—Single Wheels

Data for Lift Truck A

Axle load	25 kips
Wheel spacing	37 in.
No. of wheels on axle	2
Tire inflation pressure	110 psi

$$\text{Tire contact area} = \frac{\text{wheel load}}{\text{inflation pressure}}$$

$$= \frac{25{,}000/2}{110} = 114 \text{ sq.in.}$$

Subgrade and Concrete Data

Subgrade modulus, *k*	100 pci
Concrete flexural strength, *MR*	640 psi at 28 days

*The contact area to be used is sometimes referred to as the gross contact area, that is, the total area of the contact envelope regardless of the tire tread design.

Estimating the traffic is an important factor in floor design. The required traffic information includes the load magnitudes, wheel configurations, and frequencies of loading for the heaviest vehicles that will use the floor. Traffic and load data for past and future plant or warehouse operating conditions can be gathered from several sources, including plant maintenance and engineering departments, planning and operations departments, and manufacturers' data for lift trucks and other vehicles. Based on this information, an adequate safety factor can be selected and used to determine an allowable working stress.

The safety factor (ratio of design flexural strength to working stress) depends on the expected frequency of loadings of the heaviest vehicles. For industrial floor design, safety factors in the range of 1.7 to 2.0 are suggested.* The higher end of this range should be used where heavy load traffic is frequent and channelized, as in aisleways and staging areas.

Because of the large variety of sizes, axle loads, and wheel spacings of industrial trucks, it is not practical to provide separate design charts for each vehicle. Consequently, two design charts, Figs. 3 and 4, have been prepared that can be used for the axle loads and axle-wheel configurations of most industrial trucks affecting floor design.

Fig. 3 is used for industrial trucks with axles equipped with single wheels. The chart is entered with an allowable working stress per 1,000 lb. of axle load. This allowable stress is computed by dividing the concrete flexural

*The fatigue criteria described in Reference 12 gives a more quantitative procedure for selecting safety factors and determining the allowable number of load repetitions. However, in most cases the projected traffic data are only an estimate that does not warrant a more precise analysis.

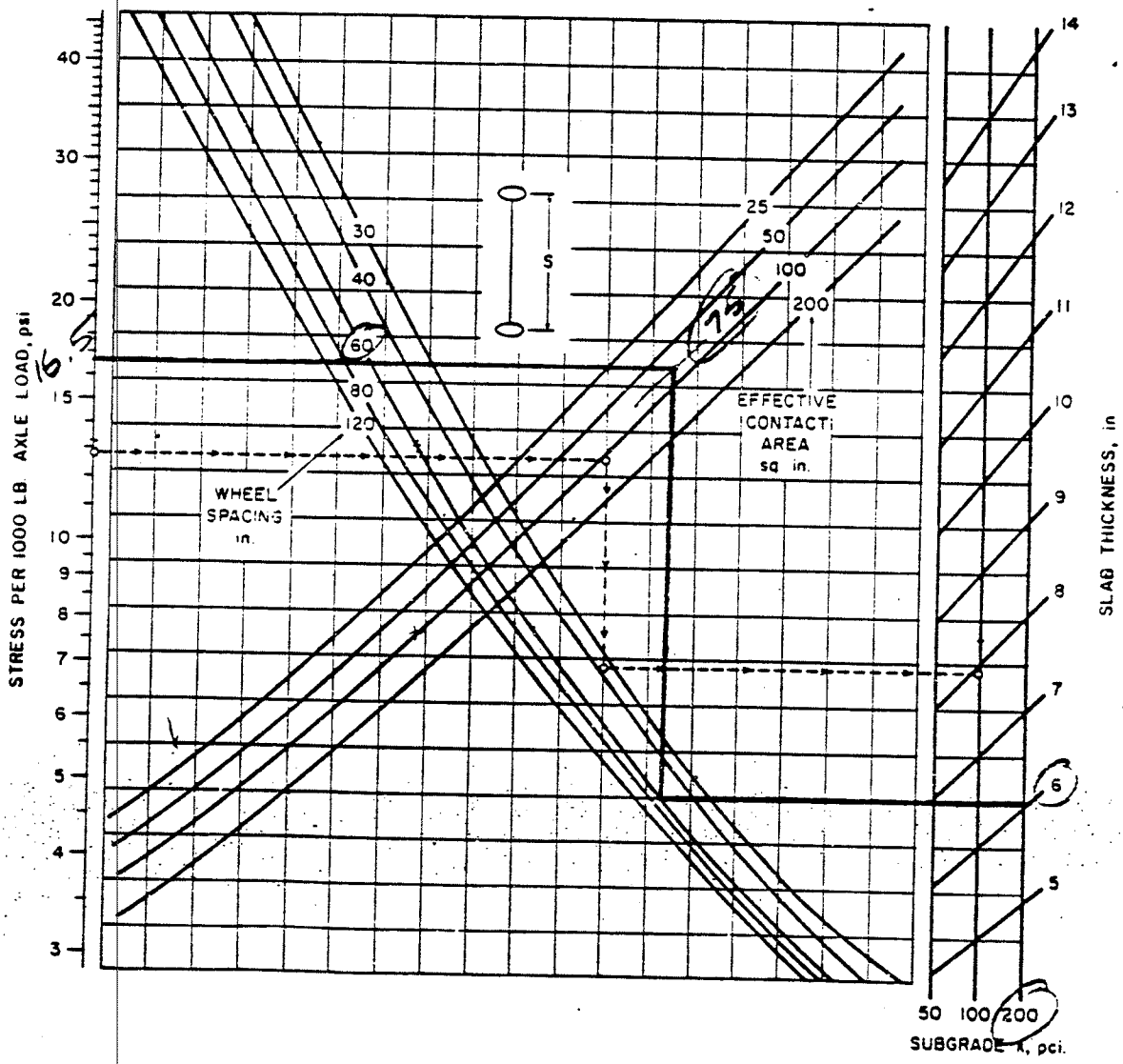


Fig. 3. Design chart for axles with single wheels.

PERMEABILITY OF CONCRETE

SUMMARY :

1. BASED UPON THE BEST AVAILABLE DESIGN INFORMATION AND INFORMATION CONTAINED HEREIN THE CONCRETE USED IN THE BRINE MUD WASTE PILE PAD , HAS SUFFICIENT STRENGTH , THICKNESS , REINFORCEMENT AND SUBBASE MATERIAL REQUIREMENTS TO ASSURE AN IMPERVIOUS CONDITION TO STOCKPILED MATERIALS WITH RESPECT TO 40 CFR 264. 251 (a)(1).

2. BASED UPON THE BEST AVAILABLE DESIGN INFORMATION AND INFORMATION CONTAINED HEREIN THE CONCRETE USED IN THE LIME AND BRINE MUD TREATMENT UNITS (TANKS), HAS SUFFICIENT STRENGTH, THICKNESS AND REINFORCEMENT REQUIREMENTS TO ASSURE AN IMPERVIOUS CONDITION TO CONTAINED MATERIALS WITH RESPECT TO 40 CFR 122.25 (b)(2).

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LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME OLIN CHEMICAL
PROJECT NUMBER 2287-35/101
BY K.F.L. DATE 1/12/83
APP. _____ DATE _____ 1 OF 6

LIME AND MUD DECANTING TANKS

CHECK PERMEABILITY OR CONCRETE

FROM ACI 318-71 INSURANCES AGAINST PERMEABILITY

1. CONCRETE IS IMPERVIOUS TO RETAINED LIQUID
2. CRACK WIDTH IS MINIMIZED
3. JOINTS ARE PROPERLY SEALED

1. MINIMUM PERMEABILITY IS OBTAINED BY LOW-WATER CEMENT RATIOS

CONCRETE USED WAS DESIGNED USING WATER-CEMENT RATIO = 3 TO 7 %
(REFER TO LIME TANK DWG. - D-0000-851-1-1)
(" " MUD TANK DWG - D-6004-052-970-1-1.00)

2. CRACK WIDTH IS MINIMIZED BY USING RECOMMENDED STEEL [illegible]

FROM ACI 350 R-77, TABLE 2.6.2, RECOMMENDED STRESSES FOR VERY SEVERE EXPOSURE (#3, #4, #5, #6, #7, & #8 BARS) AND f_y = 40,000 PSI IS f_s = 20,000 PSI ⇐ USED IN DESIGN

MAX. BAR SPACING (FROM FIG. 2.6.1 & 2.6.2) IS 12" FOR #3 – #5 BARS (Z = 85)

AND 6½" FOR #6 – #8 BARS (Z = 85)
8½" FOR " " " (Z = 95)
10" FOR " " " (Z = 100)

MAX. BAR & SPACING USED IN DESIGN OF BOTH TANKS #7 @ 8"

MIN. BAR & SPACING USED IN DESIGN OF BOTH TANKS #4 @ 10"

3. JOINTS AND CORNERS ARE ADEQUATELY SEALED BY USING CONTINUOUS WATER STOPS AND PROPER CORNER REINFORCEMENT

AS INDICATED ON BOTH TANK DRAWING & CALCULATIONS, THESE AREAS ARE COVERED.

as the working stress method gives a better picture of the stress distribution under service loads than does the ultimate strength method. In sanitary engineering structures, service load performance is of paramount importance.

1.3—Watertightness

Watertightness — the ability of a structure to retain liquid — will be reasonably assured if:

a. The concrete is impervious to liquids.

b. Crack width is minimized.

c. Joints are properly sealed.

Usually it is more economical and more dependable to prevent liquid permeation through the concrete by use of quality concrete rather than by provision of an impervious barrier.

Minimum permeability of the concrete will be obtained by using water-cement ratios as low as possible consistent with obtaining satisfactory workability and good compaction. Impermeability increases with age of the concrete and is improved by a slow, moist cure. Surface treatment is important, surface troweling and use of smooth forms give good results. Air entrainment also reduces permeability. Other admixtures are useful when they lead to better workability and compaction with lower water-cement ratios.

Cracking can be held to a minimum by proper design and spacing of joints. Some shrinkage will always occur in concrete, and joints should be designed to accommodate this and any other movement resulting from thermal dimensional changes and differential settlements. Joints permit movement along predetermined control planes. Some type of waterstop (see Sections 2.8.2 and 2.8.3) may be needed. Good placement operations, adequate consolidation and proper curing are also essential to control of cracking in sanitary engineering structures.

1.4—Durability

Durability of concrete in a sanitary engineering structure means the resistance of the structure to the deteriorating effects of its environment. In particular, the concrete must be resistant to the action of chemicals, alternate wetting and drying, and exposure to the elements. Resistance to chemical attack can be improved by using good quality concrete with a smooth surface finish. Care should also be taken to provide adequate cover for the reinforcement and to use fittings which are not themselves corroded thus causing damage to the concrete.

Most sanitary engineering structures will be exposed to the elements and adequate provisions should be made to avoid atmospheric, ground water, and frost damage. Structures subject to movement of liquids must be resistant to erosion. In this respect, a smooth surface finish is important. In some cases, adequate durability can only be obtained by use of special protective barriers. This is discussed in Chapter 5.

CHAPTER 2 – STRUCTURAL DESIGN CONSIDERATIONS

2.1—Introduction

The design of sanitary engineering structures should be executed in four consecutive steps as follows:

1. Functional design
2. Physical plant layout
3. Hydraulic design
4. Structural design

Authoritative texts and several ASCE manuals of engineering practice[1,2,3] will be helpful in the first three phases of design which must be established before the fourth phase can be undertaken. Except as otherwise indicated in this chapter, structural design should be in general conformance with ACI 318-63.

For the structual design of circular or rectangular reinforced concrete tanks, several publications[4,5,6] of the Portland Cement Association are available. For circular prestressed concrete tanks, the report of ACI Committee 344[7] would be helpful.

The recommendations in the above cited publications may require adjustments to conform with ACI 318 and with the applicable local building code.

2.2—Principal types of structures

Sanitary engineering installations are generally either water treatment or waste treatment facilities composed of a number of separate units as shown below.

Water treatment plants

Intake structures	Filters
Screen chambers	Filter pipe galleries
Rapid mix chambers	Clear wells
Flocculating basins	Pumping stations
Settling tanks	Service reservoirs
Conduits	Chemical storage
Chlorination facilities	Office building and laboratory

take into consideration their exposure to a humid, possibly corrosive interior atmosphere.

Superstructures of sanitary engineering structures other than tanks are not discussed here, since they are similar to those of other buildings and structures.

2.6—Recommended stresses

ACI 318 contains general requirements for reinforced concrete building structures which are valid also for sanitary engineering structures. The design engineer must establish the design criteria for a specific structure within the limitations of the ACI or local building codes, based on the special requirements of sanitary engineering structures.

Sanitary engineering structures generally belong to the category of structures for which minimal cracking is a paramount requisite. Long life is required by all municipal establishments, and leaking in and out of pure or contaminated water or waste must be avoided to protect public health. Therefore, experienced designers of sanitary engineering structures have established somewhat more conservative allowable stresses for such reinforced concrete structures, governed mostly by the tensile strength of the concrete which is its weakest characteristic and the most difficult to predetermine accurately. In reinforced concrete, it is assumed the concrete has no tensile strength and all tension will be taken by the reinforcing steel. Even with this assumption, the concrete itself will be subject to tension.

TABLE 2.6.1—RECOMMENDED STRESSES* FOR CONCRETE IN SANITARY ENGINEERING STRUCTURES WHICH MUST BE WATERTIGHT AND RESISTANT TO CHEMICALS

Description	Recommended value
Modulus of elasticity ratio; n	9
Flexure; f_c	
Extreme fiber stress in compression	1350 psi
Extreme fiber stress in tension in plain concrete footings and walls	88 psi
Shear; v (as a measure of diagonal tension at d from face of support)	
Beams with no web reinforcement	60 psi
Joists with no web reinforcement	66 psi
Members with web reinforcement or properly combined bent bars and vertical stirrups	274 psi
Slabs and footings (peripheral shear)	110 psi
Bearing:	
On full area	750 psi
On one-third area or less	1125 psi

*Recommended working stresses are for all strengths of concrete. For minimum recommended f_c', see Section 3.5.1.

The strain of the reinforcing bars under stress will be transferred to the adjoining concrete. Low stress in reinforcement at service loads is good insurance against cracking.

Recommended steel stresses for design at service loads are presented in Table 2.6.2. These stresses and bar spacings have been established to control crack widths for concrete surfaces exposed to conditions encountered in sanitary engineering structures. Fig. 2.6.1, 2.6.2, and 2.6.3 are presented for lesser bar spacings and a broader range of Z values. For structural safety, the total stresses at service loads shall not exceed 20,000 psi for Grade 40 reinforcing bars nor 30,000 psi for Grade 60 reinforcement. Development lengths and end anchorages shall conform to the requirements of ACI 318-71 with 1976 supplement.

The concrete and steel stresses given in Tables 2.6.1 and 2.6.2 are suggested for reinforced concrete which must be watertight and resistant to chemicals.

TABLE 2.6.2—RECOMMENDED STRESSES AT SERVICE LOAD FOR RECOMMENDED MAXIMUM 12-IN. SPACING OF REINFORCING BARS IN SANITARY STRUCTURES

Bar sizes	Sanitary structure exposure condition* and maximum Z-value†	Maximum stress at service load, psi
All sizes	Members in direct tension	14,000
#3, #4, #5	Flexural members. Very severe exposure. (Maximum $Z = 95$)	22,000
	Flexural members. Normal sanitary exposure. (Maximum $Z = 115$)	27,000
#6, #7, #8	Flexural members. Very severe exposure. (Maximum $Z = 95$)	18,000
	Flexural members. Normal sanitary exposure. (Maximum $Z = 115$)	22,000
#9, #10, #11	Flexural members. Very severe exposure. (Maximum $Z = 95$)	17,000
	Flexural members. Normal sanitary exposure. (Maximum $Z = 115$)	21,000

*Very severe exposure is defined as the face exposed to liquid sewage retention or condensation of fumes from sewage, plus freezing-and-thawing and wetting-and-drying. Normal sanitary exposure is defined as the face remote from corrosive conditions above or exposure in water storage or water treatment plants.

†The Z-values referred to are defined in ACI 318-71. Derivation for crack control formulas are in the Commentary to ACI 318-71.

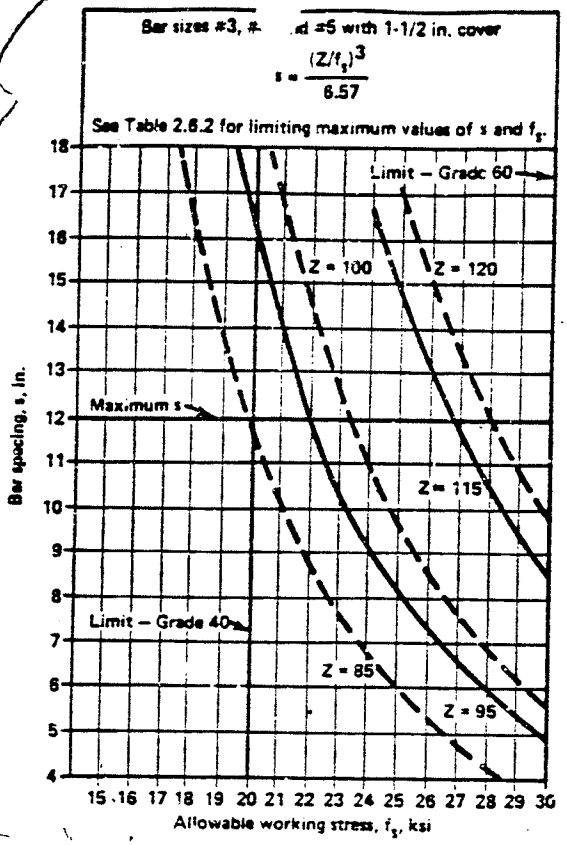

Fig. 2.6.1—Bar spacing for flexural crack control (#3-#5 bars)

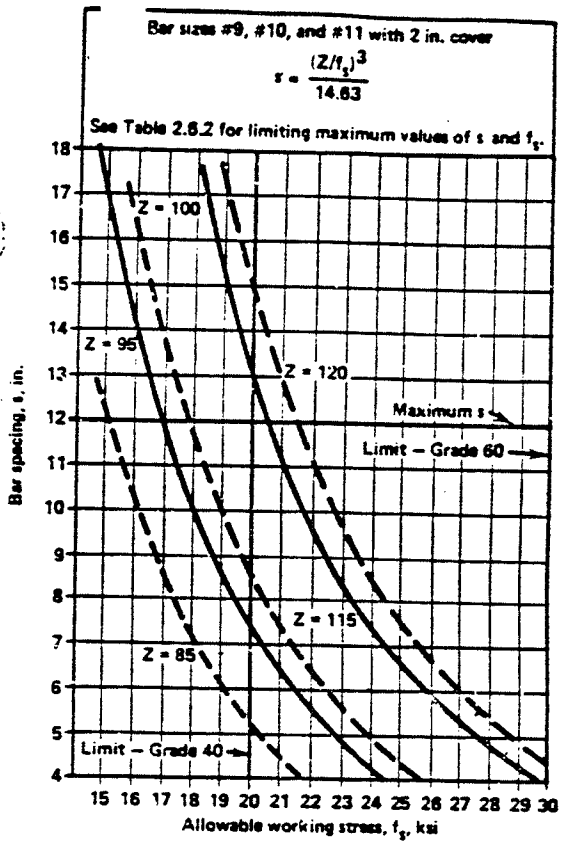

Fig. 2.6.3—Bar spacing for flexural crack control (#9-#11 bars)

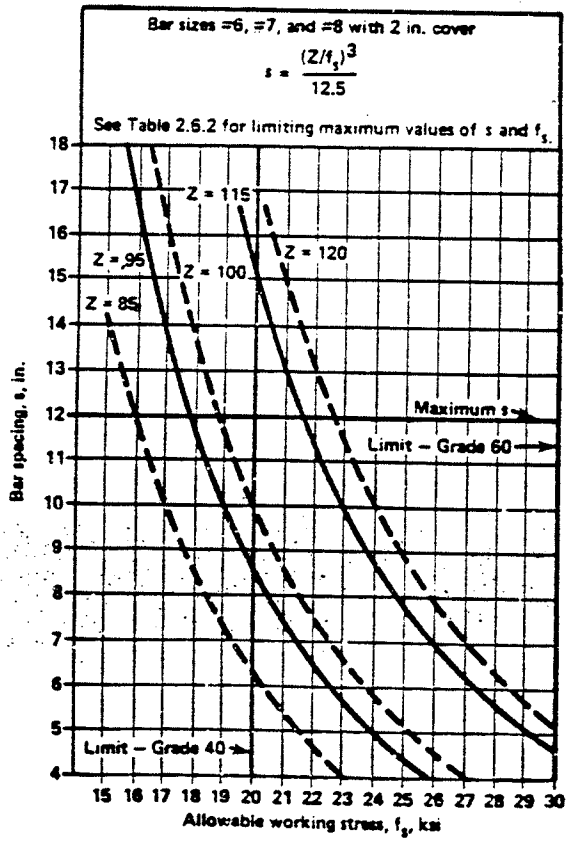

Fig. 2.6.2—Bar spacing for flexural crack control (#6-#8 bars)

2.7—Reinforcement splices

Splices in deformed reinforcing bars should conform to the general requirements of ACI 318-71, but in circular tanks designed for ring tension the splices should be a minimum of 40 bar diameters and locations of splices should be staggered.

2.8—Joints

2.8.1 *Volume changes* — Volume changes in concrete are generally caused by expansion or contraction in response to change in temperature or moisture content. Temperature variations, being daily and seasonal, are somewhat more regular and predictable than moisture changes.

Contraction due to evaporation of excess water is uniform as long as the loss of moisture is controlled by proper curing methods, and may continue for several years, as is shown in Fig. 2.8.1. However, in sanitary structures designed to contain liquids, the contraction may be halted when the structures are placed in use, and even reversed during hot humid weather.

To provide for volume changes in a manner that will minimize damage to the concrete, expansion and/or construction joints are provided at definite locations in the structure by the design engineer.

TABLE 4.5 — MAXIMUM PERMISSIBLE WATER-CEMENT RATIOS FOR CONCRETE WHEN STRENGTH DATA FROM TRIAL BATCHES OR FIELD EXPERIENCE ARE NOT AVAILABLE

Specified compressive strength, f'_c, psi*	Maximum permissible water-cement ratio			
	Non-air-entrained concrete		Air-entrained concrete	
	Absolute ratio by weight	U. S. gal. per 94-lb bag of cement	Absolute ratio by weight	U. S. gal. per 94-lb bag of cement
2500	0.67	7.6	0.54	6.1
3000	0.58	6.6	0.46	5.2
3500	0.51	5.8	0.40	4.5
4000	0.44	5.0	0.35	4.0
4500	0.38	4.3	†	†
5000	†	†	†	†

*28-day strength. With most materials, water-cement ratios shown will provide average strengths greater than indicated in Section 4.3.1 as being required.

†For strengths above 4500 psi (non-air-entrained concrete) and 4000 psi (air-entrained concrete), proportions shall be established by methods of Sections 4.3 or 4.4.

4.4 – Proportioning by laboratory trial batches

4.4.1 – When laboratory trial batches are used as the basis for selecting concrete proportions, strength tests shall be made in accordance with "Method of Test for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C 39) on cylinders prepared in accordance with "Method of Making and Curing Test Specimens in the Laboratory" (ASTM C 192).

4.4.2 – When laboratory trial batches are made, air content shall be within ±0.5 percent and slump within ±0.75 in. of maximums permitted by the specifications.

4.4.3 – A curve shall be established showing relationship between water-cement ratio (or cement content) and compressive strength. Curve shall be based on at least three points representing batches which produce strengths above and, below required average compressive strength specified in Section 4.3.1. If concrete construction facility does not have a record based on 30 consecutive strength tests representing similar materials and conditions to those expected, required average compressive strength shall be 1200 psi greater than f'_c. Each point shall represent the average of at least three cylinders tested at 28 days or the specified earlier age.

4.4.4 – Maximum permissible water-cement ratio (or minimum cement content) for concrete to be used in the structure shall be that shown by the curve to produce the average strength indicated in Section 4.3.1 or 4.4.3 unless a lower water-cement ratio or higher strength is required by Section 4.6.

4.5 – Proportioning by water-cement ratio

4.5.1 – If suitable data from a record of 30 consecutive tests (Section 4.3) or from laboratory trial batches (Section 4.4) are not available, permission may be granted to base concrete proportions on water-cement ratio limits in Table 4.5.

4.5.2 – Table 4.5 shall be used only for concrete to be made with cements meeting strength requirements for Types I, IA, II, IIA, III, IIIA, or V of "Specification for Portland Cement" (ASTM C 150), or Types IS, IS-A, IS(MS), IS-A(MS), IP, IP-A, or P of "Specification for Blended Hydraulic Cements," (ASTM C 595), and shall not be applied to concrete containing lightweight aggregates or admixtures other than those for entraining air.

4.5.3 – Concrete proportioned by water-cement ratio limits prescribed in Table 4.5 shall also conform to special exposure requirements of Section 4.6 and to compressive strength test criteria of Section 4.8.

4.6 – Special exposure requirements

4.6.1 – Concrete that, after curing, will be exposed to freezing temperatures while wet shall contain entrained air within limits of Table 4.6.1, and in addition:

4.6.1.1 – For concrete made with normal weight aggregate, water-cement ratio shall not exceed 0.53 by weight.

4.6.1.2 – For concrete made with lightweight aggregate, specified compressive strength f'_c shall be at least 3000 psi.

TABLE 4.6.1 — CONCRETE AIR CONTENT FOR VARIOUS SIZES OF COARSE AGGREGATE

Nominal maximum size of coarse aggregate, in.	Total air content, percent by volume
3/8	6 to 10
1/2	5 to 9
3/4	4 to 8
1	3.5 to 6.5
1 1/2	3 to 6
2	2.5 to 5.5
3	1.5 to 4.5

4.6.2 – Concrete that is intended to be watertight shall conform to the following:

4.6.2.1 – For concrete made with normal weight aggregate, water-cement ratio shall not exceed 0.50 by weight for exposure to fresh water and 0.45 by weight for exposure to seawater.

4.6.2.2 – For concrete made with lightweight aggregate, specified compressive strength f'_c shall be at least 3750 psi for exposure to fresh water and 4000 psi for exposure to seawater.

4.6.3 – Concrete that will be exposed to injurious concentrations of sulfate-containing solutions shall be made with sulfate-resisting cement, and in addition:

4.6.3.1 – For concrete made with normal weight aggregate, water-cement ratio shall not exceed 0.50 by weight.

4.6.3.2 – For concrete made with lightweight aggregate, specified compressive strength f'_c shall be at least 3750 psi.

4.7 – Average strength reduction

After sufficient test data become available from the job, methods of "Recommended Practice for Evaluation of Compression Test Results of Concrete (ACI 214-65)" may be used to reduce the amount by which the average strength must exceed f'_c below that indicated in Section 4.3.1 provided:

(a) Probable frequency of strength tests more than 500 psi below f'_c will not exceed 1 in 100,

(b) Probable frequency of an average of three consecutive strength tests below f'_c will not exceed 1 in 100, and

(c) Special exposure requirements of Section 4.6 are met.

4.8 – Evaluation and acceptance of concrete

4.8.1 – Frequency of testing

4.8.1.1 – Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cu yd of concrete, nor less than once for each 5000 sq ft of surface area for slabs or walls.

4.8.1.2 – On a given project, if total volume of concrete is such that frequency of testing required by Section 4.8.1.1 would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

4.8.1.3 – When total quantity of a given class of concrete is less than 50 cu yd, strength tests may be waived by the Building Official, if in his judgment adequate evidence of satisfactory strength is provided.

4.8.1.4 – Average strength of two cylinders from the same sample, tested at 28 days or the specified earlier age, is required for each strength test.

4.8.2 – Tests of laboratory-cured specimens

4.8.2.1 – Samples for strength tests shall be taken in accordance with "Method of Sampling Fresh Concrete" (ASTM C 172).

4.8.2.2 – Cylinders for strength tests shall be molded and laboratory-cured in accordance with "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C 31) and tested in accordance with "Method of Test for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C 39).

4.8.2.3 – Strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

(a) The average of all sets of three consecutive strength tests equal or exceed required f'_c.

(b) No individual strength test (average of two cylinders) falls below required f'_c by more than 500 psi.

4.8.2.4 – If either of the requirements of Section 4.8.2.3 are not met, steps shall be taken immediately to increase the average of subsequent strength test results. Additionally, requirements of Section 4.8.4 shall be observed if the requirement of Section 4.8.2.3(b) is not met.

4.8.3 – Tests of field-cured specimens

4.8.3.1 – The Building Official may require strength tests of cylinders cured under field conditions to check adequacy of curing and protection of concrete in the structure.

4.8.3.2 – Field-cured cylinders shall be cured under field conditions in accordance with Section 7.4 of "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C 31).

4.8.3.3 – Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test cylinders.

4.8.3.4 – Procedures for protecting and curing concrete shall be improved when strength of field-cured cylinders at the test age designated for measuring f'_c is less than 85 percent of that of companion laboratory-cured cylinders. When

DETAIL OF TREATMENT IN TANKS

ATTACHMENT III

COMPATIBILITY DATA

The following information is cited from "Corrosion Data Survey", (Non-metals Section), 5th Edition, compiled by Norman E. Hamner for the National Association of Corrosion Engineers, 1975.

Compound	% Solution Compatible with Concrete	% Solution Not Compatible with Concrete
Sodium Chloride (Brine Mud)	5-95% @ 75-212°F	ND
Calcium Sulfate (Brine Mud)	ND	100% @ 60-70°F
Calcium Hypochlorite (HTH® Waste)	5-100% @ 60-70° C and pH >7	ND
Calcium Hydroxide (HTH® Waste)	65-100% @ 21-66°C	ND
Calcium Carbonate (HTH® Waste)	ND	ND
Calcium Chlorate (HTH® Waste)	ND	ND
Calcium Chloride (HTH® Waste)	ND	55-75% @ 60-70° F
Sodium Chlorate (HTH® Waste)	100% @ 21-66°C	ND
Sodium Hydroxide (HTH® Waste)	5-95% @ 70-175°F	ND

ND = No data

WENDEL ENGINEERS P.C.
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LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NUMBER 3287-35/101
BY K.F.L. DATE 1/12/83
APP. [illegible] DATE 1/12/83

DESIGN SUMMARY FOR LIME PIT TREATMENT UNIT

CHK. PWH DATE: 1/12/83

DRAWING REFERENCE : OLIN DRAWING D-0000-845-1-1

DESIGN CRITERIA :

1. STRUCTURE
   a. INGROUND SINGLE CELL TANK W/ RAMP
   b. TANK SIZE - 35'L x 15'W x 5'-5½"D
2. GOALS OF DESIGN
   a. CHECK STRUCTURAL CAPABILITIES OF UNIT AS AN INGROUND HOLDING TANK FOR RETAINING LIME SLURRY MATERIALS
   b. PERFORM A STRUCTURAL EVALUATION OF CONCRETE THICKNESS AND REINFORCING TO INSURE STABILITY AND WATERTIGHTNESS.
3. PERTINENT DESIGN INFORMATION
   a. EXIST. TANK BY INSPECTION SHOWS NO SIGN OF INSTABILITY OR CRACKING.

DESIGN DATA :

1. MATERIALS (a, b & c - ASSUMPTIONS)
   a. CONCRETE f'_c = 3,000 PSI @ 28 DAYS
   b. REINFORCING BARS (DEFORMED) f_y = 40,000 PSI
   c. SOIL EQUIVALENT FLUID PRESSURE - 40 PCF
   d. HYDROSTATIC PRESSURE - 62.4 PCF
   e. BOUYANT UNIT WEIGHT - 60 PCF
   f. SURCHARGE LOADING - 300 PSF

DESIGN CODES:

1. REFERENCES :
   a. ACI CODE (1963) WORKING STRESS DESIGN
   b. CRSI (1975)
   c. CONC. SANITARY ENG'NG. STRUCT. (ACI 350R-77)
   d. RECTANGULAR CONC. TANKS (PCA IS003.02D)
   e. REINF. CONC. DESIGN HANDBOOK (ACI-SP-3)

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LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME OLIN CHEMICAL
PROJECT NUMBER 2287-35/101
BY K. F. L. DATE 1/12/83
APP. _____ DATE _____ 2 OF 2

DESIGN SUMMARY FOR LIME PIT TREATMENT UNIT

DESIGN RESULTS:

1. TANK STABLE AND STRUCTURALLY ADEQUATE
2. BASED UPON BEST AVAILABLE INFORMATION AND ASSUMPTIONS CONTAINED HEREIN THIS STRUCTURE MEETS THE DEFINITION OF A TANK WITH RESPECT TO 40 CFR 260.10. HOWEVER A FIELD INSPECTION WILL BE REQUIRED TO VERIFY THE STRUCTURE'S CURRENT CONDITION.

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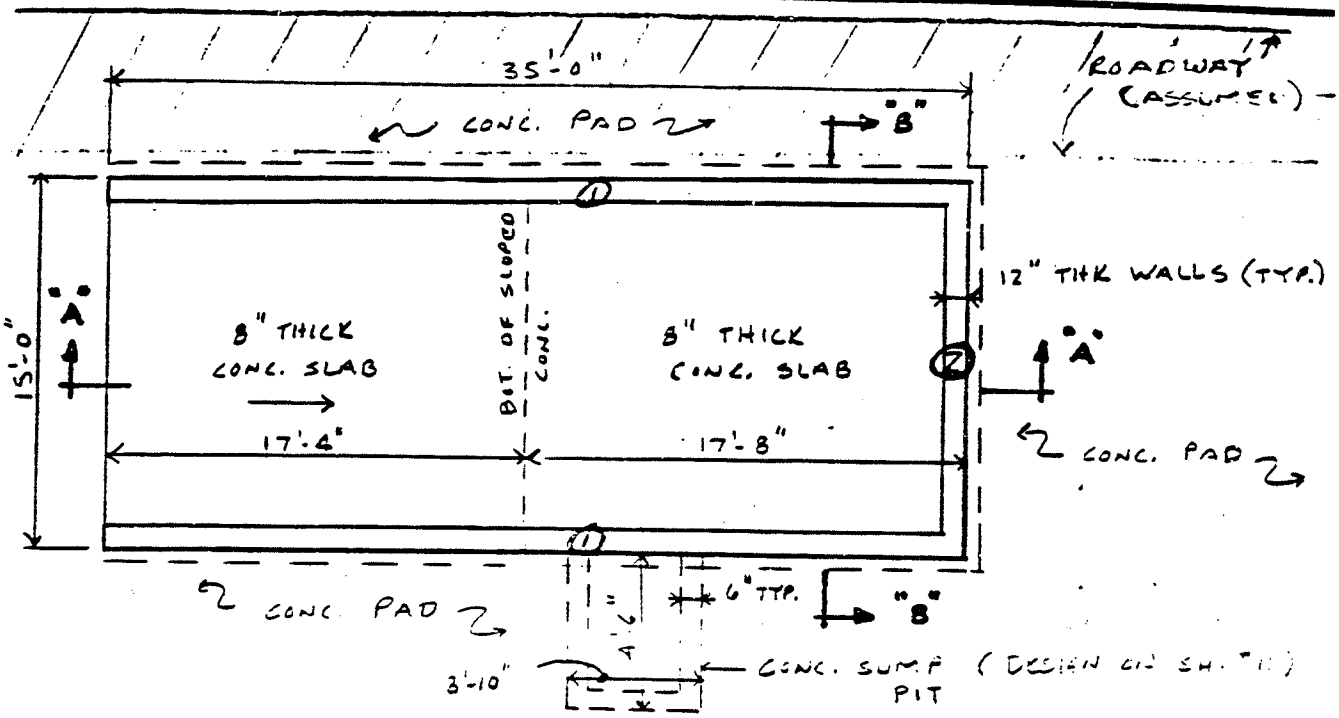
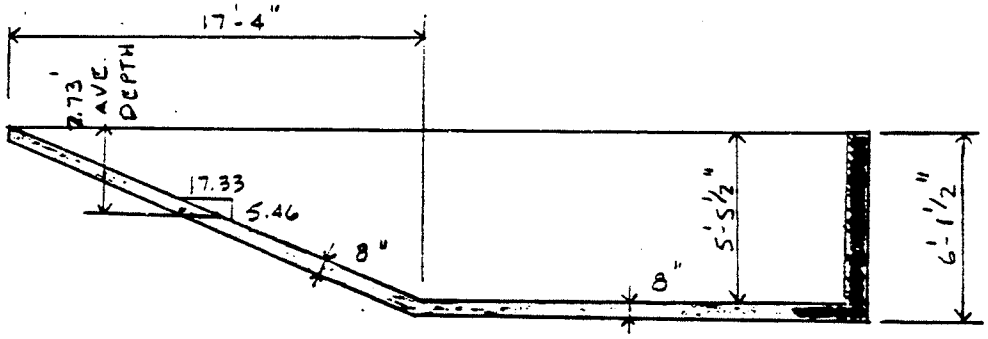
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME OLIN CHEMICA
PROJECT NUMBER 2287-35/1C
BY K.F.L. DATE 1/12/83
APP. _____ DATE _____ 1 OF _____

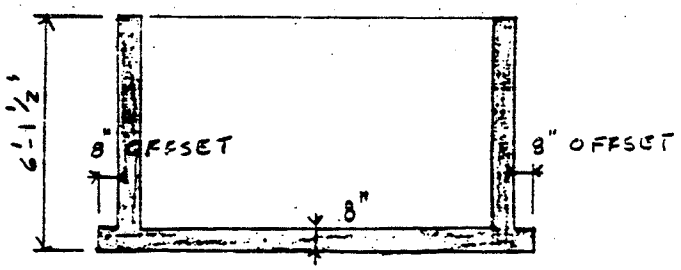
LIME PIT TREATMENT UNIT DESIGN



PLAN - PHYSICAL DIMENSIONS -



SECTION "A-A"



SECTION "B-B"

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LIME PIT TREATMENT UNIT DESIGN

GENERAL DESIGN GUIDE

THE FOLLWING DESIGN LOADS FOR INGROUND CONC. TANK WERE DETERMINED FROM PHYSICAL PROPERTIES TYPES OF SOIL, DEPTH OF CONTAINED MATERIALS DENSITY OF CONTAINED MATERIALS, VEHICULAR LOADS AND GROUND WATER INFORMATION.

SOILS DATA ASSUMPTIONS

- MAX. BEARING CAPACITY = 1500 PSF
- ANGLE OF INTERNAL FRICTION = 30°
- WT. OF SOIL W = 115 DRY (DRY)

DESIGN CRITERIA:

12" THK WALLS & ASSUMED 8" THK. CONC. SLAB

ASSUMPTION — MAX. ALLOWABLE SOIL BEARING PRESSURE - USE 1500P

HYDROSTATIC PRESSURE = 62.4 PCF

SURCHARGE LOADING = 300 PSF (BASED ON CRSI)

SAFETY FACTORS: SUSTAINED UPLIFT = 2.0

TRANSIENT UPLIFT = 1.5

ASSUMPTION — SHEAR RESISTANCE OF SOIL = 340 WHERE D = DEPTH IN FT

BOUYANT UNIT WEIGHT = 60 PCF

LIME SLURRY SPECIFIC GRAVITY S = (1.2 - 1.4)

∴ SPECIFIC WT. $\gamma = S(\gamma_w) = 1.4\ (62.4\ PCF) = 87.4\ PC$

REFERENCE MATERIALS:

ACI CODE (1963) WORKING STRESS DESIGN
CRSI (1975)
CONCRETE SANITARY ENGINEERING STRUCTURES (ACI 350R-77)
REINFORCED CONCRETE DESIGN HANDBOOK (RCDH)
RECTANGULAR CONCRETE TANKS (P.C.A.) 15003.02D

DESIGN CASES:

CASE I TANK EMPTY, G.W.

CASE II TANK FULL, NO G.W.

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LIME PIT TREATMENT UNIT DESIGN

DESIGN LOADS (TANK EMPTY)

1. WALLS ① $[2(17.67' \times 5.46' \times 1') + 2(17.33' \times 2.73' \times 1')] \times .150^K/FT^3$
$= 43^K$ ✓

2. WALL ② $(13' \times 5.46' \times 1') \times .150^K/FT^3 = 11^K$ ✓

3. SLAB $(16.34' \times 35.67' \times .67') \times .150^K/FT^3 = 59^K$ ✓

TOTAL CONC. WT. — 113^K ✓

4. WT. OF SOIL ON OFFSET $.06^K/FT^3 [(.83' \times 51.68' \times 5.46') + (.83' \times 34.66' \times 2.73')] = 19^K$ ✓

5. SHEAR RESISTANCE OF SOIL
$\frac{1}{2}$ [illegible] $= .06^K/FT^3 (51.68')(6.13') = 33^K$ ✓
① Low $\frac{1}{2}$ $34(3.4') = .06^K/FT (34.66')(3.4') = 7^K$ ✓
172^K

6. CHECK BOUYANCY (ASSUME HIGH G.W. AT GRADE EL.)
$F_1 = \gamma h_1 A_1$
$= \frac{60^\#/FT^3 (6.13')(13.34' \times 16.34')}{1000} = 110^K$ ✓

$F_2 = \gamma h_2 A_2$
$= \frac{60^\#/FT^3 (3.4')(17.33 \times 16.34')}{1000} = 58^K$ ✓
168^K ✓

7. BOUYANT (UPWARD FORCES) < DESIGN LOADS
$168^K < 172^K$

SAFETY FACTOR $= \frac{172^K}{168} = 1.02 < 1.5$ FOR TRANSIENT UPLIFT
O.K. SINCE TANKS EMPTY ONLY DURING CLEANOUT.

8. WT. OF LIME SLUDGE $= [(17.67' \times 15' \times 5.46') + (17.33' \times 15' \times 2.73')] \times .0874^K/FT^3$
$127 + 62 = 189^K$ ✓

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LIME PIT TREATMENT UNIT DESIGN

COMPUTE NET SOIL PRESSURES FOR DEEP END = 6.13'
FOR SLOPED END = 3.4'

1. $q_{NET} = Q/A_T - \gamma D_f$

D_f = DIST. FROM G.W. TO BOT./FOOTIN
DEEP END = 6.13'
SLOPED END = 3.4'

DEEP END $Q = [2(17.67' \times 5.46' \times 1) + (13' \times 5.46' \times 1')] \times .150^K/FT^3$
$Q = 40^K$ ✓
$A = 18.34' \times 16.34' = 300\ FT^2$ ✓

SLOPED END $Q = 2(17.33' \times 2.73' \times 1') \times .150^K/FT^3 = 14^K$ ✓
$A = 17.33' \times 16.34' = 283\ FT^2$ ✓

INVESTIGATE MAX. TANK PRESSURES EXERTED ON SUBBASE SOIL TO DETERMINE IF THEY EXCEED MAX. ALLOWABLE BEARING CAPACITY OF SOIL.

CASE I

DEEP END $q_{NET} = \frac{40^K}{300\ FT^2} - .06^K/FT^2(6.13') = -.23^K/FT^2$
UPWARD PRESSURE

SLOPED END $q_{NET} = \frac{14^K}{283\ FT^2} - .06^K/FT^2(3.4') = -.15^K/FT^2$
UPWARD PRESSURE

CASE II

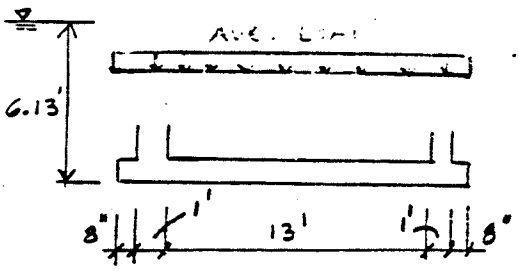
DEEP END $q_{NET} = \frac{40^K + 127}{300\ FT^2} - 0 = +.56^K/FT^2$
DOWNWARD PRESSURE

SLOPED END $q_{NET} = \frac{14^K + 62}{283\ FT^2} - 0 = +.27^K/FT^2$

BY INSPECTION: ALL CASES $< 1.5^K/FT^2$ MAX. ALLOW. SOIL BEARING PRESSURE

LIME PIT TREATMENT UNIT DESIGN

BASE SLAB



DESIGN SLAB AS A ONE-WAY SIMPLY SUPPORTED AT WALLS
DESIGN FOR DEEP END WORST CASE

WT. OF BASE SLAB AND LIME SLUDGE DOES NOT CREATE ANY BENDING OR SHEARING STRESSES IN CONCRETE ASSUMING SUBSOIL IS UNIFORMLY WELL COMPACTED

∴ CASE I CONTROLS DESIGN OF BASE SLAB
$w = -.23^{K}/FT^2$ ✓
(UPWARD PRESSURE)

$$M_{MAX} = \frac{wL^2}{8} = \frac{.23^{K}/FT^2 (13')^2}{8}$$

$M_{MAX} = 4.86^{IK}$ ✓

$$V_{MAX} = \frac{wL}{2} = .23^{K}/FT (13') = 1.5^{K}$$ ✓

W.S.D

1. $f'_c = 3,000$ PSI $\quad f_c = 1,350$ PSI
$f_y = 40,000$ PSI $\quad f_s = 20,000$ PSI
$N = 9.2$

2. WITH $M = 4.86^{IK}$ (FROM TABLE 2) R.C.D.H
FOR $f_s = 20,000$ PSI, $f_c = 1350$ PSI
SELECT $d = 6" + 2"$ COVER

USE 8" SLAB

3. CHECK SHEAR
$1.1\sqrt{f'_c}$
$$v = \frac{V}{b_w d} = \frac{1.5^{K}}{12" \times 6"} = .021^{K}/FT^2 < .060^{K}/FT^2 \text{ O.K.}$$

4. FROM TABLE 1, RCDH $K = 226$; $b \times d = 12 \times 6$, TABLE 4, $F = .036$

$M - KF$

$4.86^{IK} - 226(.036) = -3.28$ (NO COMP. STEEL REQ'D)

LIME PIT TREATMENT UNIT DESIGN

5. TABLE 1, ECDH, FOR $f_s = 20{,}000$ PSI, $q = 1.44$

$$A_{s\,req'd} = \frac{M}{qd} = \frac{4.86^{IK}}{1.44(6")} = .56\ IN^2$$

SELECT BARS FROM TABLE 3a

USE #6 @ 9" $A_s = .59\ IN^2$ O.K. PROVIDE 2" COVER

7. CHECK BOND $v = \dfrac{1000\,V}{E_o\ 7/8\ d}$

$$v = \frac{1000\,(1.5^K)}{3.1\ 7/8\ (6")} = 92\ PSI < 248\ PSI \quad \text{O.K.}$$

$v = \dfrac{3.4\sqrt{f'_c}}{P_i \cdot DIA.\ OF\ BAR}$

8. TEMPERATURE AND SHRINKAGE $A_{ST} = F\,b\,t$

CONCRETE FLOOR AREA 12" WIDTH

$A_{ST} = .0020 \times 12" \times 8" = .19\ IN^2$

USE W9.5 x W9.5 6/6 W.W.F. PROVIDE 3" COVER

WALL ① DESIGN WALL ① DEEP END FOR CASE I W/SURCHARGE

NOTE: SINCE WALL @ DEEP END IS > 1/2 TOTAL WALL LENGTH, USE REQ'D STEEL REINF. THROUGHOUT WALL

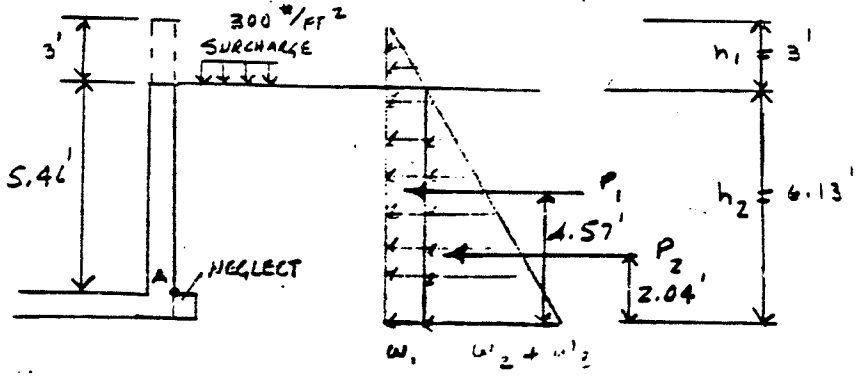
1. EQUIVALENT FLUID PRESSURE (CA) (REFER TO SOILS DATA)

$$CA = \frac{1 - \sin\phi}{1 + \sin\phi} = \frac{1 - \sin 30^\circ}{1 - \sin 30^\circ} = .33$$

(RANKINE - COULOMB EQ.)

2. EQUIVALENT FLUID DENSITY, $Ca\,w = .33\,(115^{\#}/FT^3) = 38$ PCF

USE 40 PCF



LIME PIT TREATMENT UNIT DESIGN

3. THRUST PRESSURES $w_1 + w_2 + w_3$

SURCHARGE PRESSURE $w_1 = C_a w h_1 = 40\ PCF\ (3') = 120\ ^{\#}/FT^2$

LATERAL EARTH PRESSURE $w_2 = C_a w h_2 = 40\ PCF\ (6.13') = 245\ ^{\#}/FT$

HYDROSTATIC PRESSURE $w_3 = \gamma h = 62.5\ ^{\#}/FT^3\ (6.13') = 383\ ^{\#}/FT$

4. RESULTANT FORCES $P_1 + P_2$ USE $b = 1'$

$P_1 = w_1 (h_2)(b) = 120\ ^{\#}/FT^2\ (6.13')(1) = 736^{\#}$

$P_2 = w_1 + w_2\ (h_2/2)(b) = 245 + 383\ (6.13'/2)(1') = 1925^{\#}$

$2661^{\#}$

5. [illegible] MOMENT ABOUT (A)

$M_{(A)} = P_1 (4.57') + P_2 (2.04)$

$= 736^{\#}(4.57') + 1925^{\#}(2.04') = 7291'^{\#} = 7.3^{K}$

$V = 2661^{\#} = 2.7^{K}$

6. (W.S.D.) DESIGN STEM

$f'_c = 3{,}000$ PSI , $f_c = 1{,}350$ PSI

$f_y = 40{,}000$ PSI , $f_s = 20{,}000$ PSI

$N = 9.7$

7. FROM RCDH, TABLE 2 $M_{max\ (A)} = 7.3^{K}$

SELECT $d = 6'' + 2''$ COVER $= 8''$ (TANK HAS 12" WALLS

$\therefore$ USE $d = 10'' + 2''$ cover

8. CHECK SHEAR

$v = \frac{V}{b\,d} = \frac{2.7^{K}}{12''(10'')} = .023\ KSI < .060\ KSI$ O.K.

LIME PIT TREATMENT UNIT DESIGN

9. TABLE 1, RCDH, $K = 226$, $b \times d = 12 \times 10$, TABLE 4, $F = .100$

$M - KF = 7.3^{1K} - 226(.100) = -15.3$ (NO COMP. STEEL REQ'D)

10. TABLE 1, RCDH, $f_s = 20,000$ $a = 1.44$

$$A_s \text{ req'd} = \frac{7.3^{1K}}{1.44(10)} = .51 \text{ IN}^2$$

SELECT BARS FROM TABLE 3a

USE #6 @ 9" IN OUTER FACE OF WALL (VERT.)

11. CHECK BOND

$$v = \frac{1000(2.7^{1})}{.3.1\ 7/8(10)} = 100 \text{ PSI} < 248 \text{ PSI} \quad \text{O.K.}$$

12. MIN. DEVELOPMENT LENGTH $L_d = \frac{f_s}{4u} D$

$$= \frac{20,000}{4(248)} .75 = 15" \Leftarrow \text{GOVERN}$$

USE 23"

OR $.0004 (D)(F_Y)$

$.0004 (.75")(40,000) = 12"$

13. ACTUAL BAR LENGTH INTO FOOTING 8" - 3" = 5" (DOWN) + 18" INTO BASE SLAB (ACROSS)

14. TEMPERATURE AND SHRINKAGE

$A_{S_T} = .0025bt = .0025 \times 12" \times 12" = .36 \text{ IN}^2$

SINCE INNER FACE IS EXPOSED ∴ 2/3 (A_{ST}) USED IN THIS FACE

1/3 (A_{ST}) USED IN OUTER FACE

(HORIZONTAL)

∴ INNER FACE $A_{S_T} = 2/3 (A_{ST}) = 2/3 (.36) = .24 \text{ IN}^2$ USE #4 @ 12"

OUTER FACE $A_{S_T} = 1/3 (A_{ST}) = 1/3 (.36) = .12 \text{ IN}^2$ USE #4 @ 12"

USE #4 @ 12" (VERTICAL) TO SUPPORT INNER FACE STEEL

LIME PIT TREATMENT UNIT DESIGN

WALL ②

DESIGN WALL AS SLAB ON END USE PCA TABLE II $b = 13'$ $a = 5.46'$

$b/a = 13'/5.46 = 2.4$ USE 2.5

MOMENT COEFFICIENTS

$\frac{x}{a}$	$y = 0$		$y = b/4$		$y = b/2$	
	M_x	M_Y	M_x	M_Y	M_x	M_Y
0	0	(+.061)	0	+.019	0	(-.138)
1/4	+.024	+.053	+.010	+.022	(-.026)	-.132
1/2	(+.042)	+.044	+.025	+.022	-.023	-.115
3/4	+.041	+.027	+.030	+.016	-.016	-.078

[illegible] on edges all
+ comp. on far side

DESIGN FOR CASE I $b = 1'$ WIDTH

$W_T = w_1 + w_2 + w_3 (b)$

$120 + 245 + 383 (1') = .748^K/FT$ ✓

$M_{Y\,MAX}\ (-) = +.061\ w\ a^2 = +.061\ (.748^K/FT)(5.46')^2 = 1.36^{IK}$

$M_{Y\,MAX}\ (-) = -.138\ w\ a^2 = -.138\ (.748^K/FT)(5.46')^2 = 3.08^{IK}$ ✓

$M_{X\,MAX}\ (+) = +.042\ w\ a^2 = .042\ (.748^K/FT)(5.46')^2 = .94^{IK}$

$M_{X\,MAX}\ (-) = -.026\ w\ a^2 = -.026\ (.748^K/FT)(5.46')^2 = .58^{IK}$

$V_{MID-BOTTOM\ EDGE} = .415\ w\ a = .415\ (.748^K/FT)(5.46') = 1.7^K$

$V_{1/3\ PT\ SIDE\ EDGE} = .411\ w\ a = .411\ (.748^K/FT)(5.46') = 1.7^K$

W.S.D.

1. $f'_c = 3,000$ PSI, $f_c = 1,350$ PSI

$f_Y = 40,000$ PSI, $f_s = 20,000$ PSI

$N = 9.2$

LIME PIT TREATMENT UNIT DESIGN

2. FROM ZCDH, TABLE 2, M_y MAX @ = 3.08 IK SELECT d = 4", SINCE 12" TK WALL USE d = 10" + 2" COVER

3. FROM TABLE 1, ZCDH, FOR f_s = 20,000 PSI, a = 1.44

$$A_s = \frac{3.08^{IK}}{1.44\,(10")} = .21\ IN^2$$

SELECT BARS FROM TABLE 3a

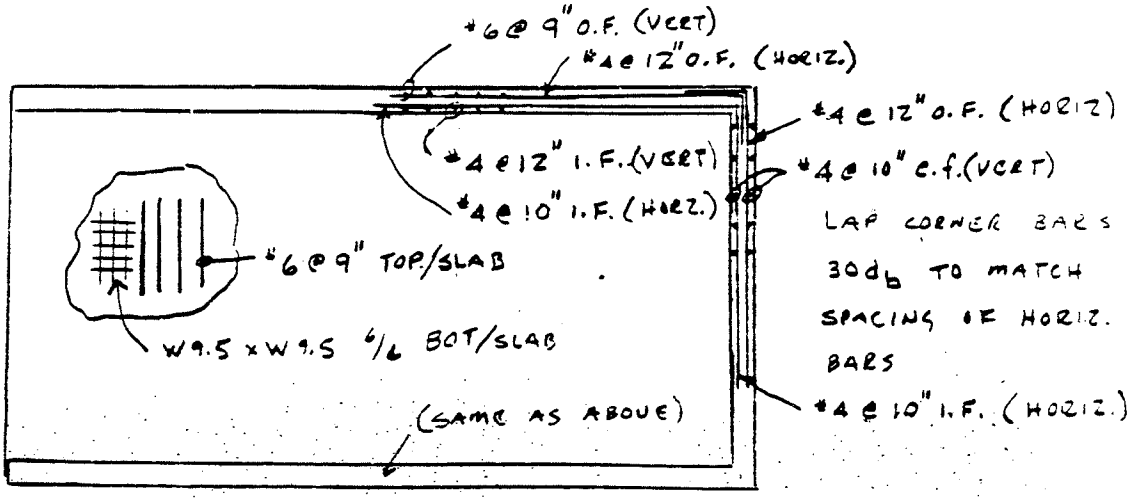
USE #4 @ 10" c.f. (VERT) (INCLUDES VERT TEMP. STEEL INNER EXPOSED FACE)

4. TEMPERATURE AND SHRINKAGE

$A_{sT} = \rho t t = .0025\,(12")(12") = .36\ IN^2$

SINCE INNER FACE EXPOSED USE 2/3 OR .24 IN^2 USE #4 @ 10" I.F. (HORIZ.)

1/3 OR .12 IN^2 USE #4 @ 12" O.F.



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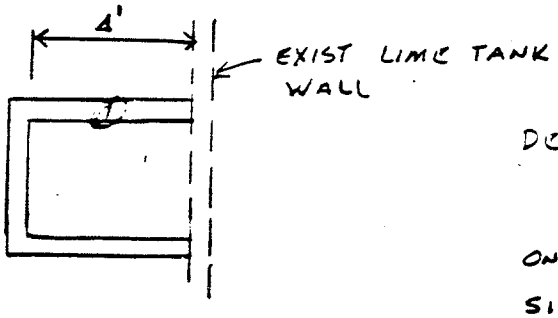
LIME PIT TREATMENT UNIT - SUMP PIT DESIGN



DESIGN WALL ① AND USE FOR ALL WALLS

ONE WAY SLAB DESIGN ON END SIMPLY-SUPPORTED

$w = .748^K/FT$ (HYDROSTATIC, EARTH & SURCHARGE LOADING)

1. $M_{MAX} = \frac{wL^2}{8} = \frac{.748^K/FT\,(4.0')^2}{8} = 1.5^{IK}$; $V_{MAX} = \frac{wL}{2} = 1.5^K$

2. FROM RCDH TABLE 2 $M = 1.5^{IK}$ FOR $f_s = 20{,}000$ PSI
$f_c = 1000$ PSI

SELECT $d = 3" + 3"$ COVER $= 6"$ TOTAL D

3. CHECK SHEAR

$v = \frac{V}{bd} = \frac{1.5^K}{12"(3")} = .042$ KSI $< .060$ KSI O.K.

4. FROM TABLE 1, RCDH, FOR $f_s = 20{,}000$ PSI, $a = 1.44$

$A_{S\,REQ'D} = \frac{M}{ad} = \frac{1.5^{IK}}{1.44\,(3")} = .35\ IN^2$

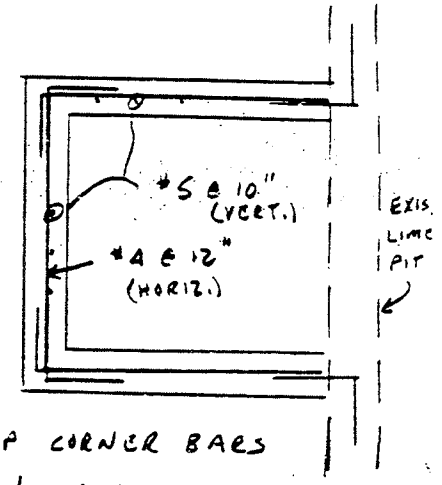
SELECT BARS FROM TABLE 3a

USE #5 @ 10" (VERT)

5. SHRINKAGE AND TEMPERATURE

$A_{ST} = .0025\,(12")(6") = .18\ IN^2$

USE #4 @ 12 (HORIZ.)



LAP CORNER BARS $24\,d_b$ MIN.

6. BT INSPECTION SLAB RECEIVES LESS PRESSURE THAN WALLS, ∴ WALL REINF. ADEQUATE FOR SLAB.

USE #5 @ 10" SHORT DIRECTION OF SLAB
#4 @ 12" LONG DIRECTION OF SLAB (SINGLE LAYER)

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SUMMARY - LIME PIT TREATMENT UNIT PAD, PAVING

Drawing References: D-0000-845-1-1

CHECKED: KFL 1/12/83

Design Criteria:

1. Pad structure (ASSUMPTION)
   7" Concrete slab-on-grade with 6" compated gravel subbase.
2. Goals of Design
   a. Determine structural capacity of pad with respect to maximum vehicle loads.
   b. Find maximum uniform load carried by the pad.
3. Materials (ASSUMPTION)
   a. 3,000 psi concrete
   b. Grade 40 bars
   c. Grade 60 WWF

Design Codes:

1. "Slab Thickness Design for Industrial Concrete Slabs on Grade," Packard, PCA.
2. Standard Specification for Highway Bridges 12th edition, 1977, AASHTO.

Design Results:

1. Pad can carry HS20-44 load (32,000 single axle) with 1.5 factor of safety.
2. Pad can carry uniform load of 1,200 lbs per square foot at safety factor of 2.0.

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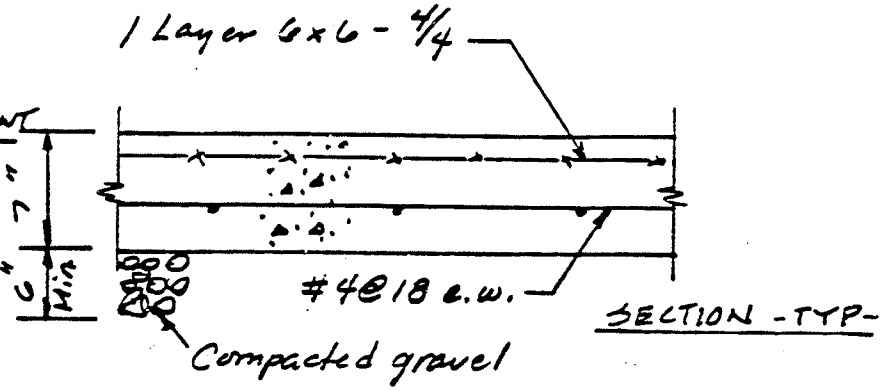
LIME PIT TREATMENT UNIT - PAD ANALYSIS

Concrete Pad around LIME PIT TREATMENT UNIT



SECTION - TYP -

General Design Guide: Design of pad is based on "Slab-on-Grade" design and thickness design for concrete pavements as applicable.

References: 1) "Slab Thickness Design for Industrial Concrete Floors on Grade" by Packard
2) "Thickness Design for Concrete Pavements" PCA. * Charts attached.

Soil Data: Based on closest boring to area (BH-7) ASTM Soil Class GC.

Design Criteria: Use H20-44 axle load of 32,000 lbs axle load (AASHTO) single axle.

Design. Data for truck.

Axle load	32 kips
Wheel spacing	12 x 60 x 12 (dual)
No. wheels on axle	4
Tire inflation pressure	80 psi

Tire contact area = $\frac{\text{wheel load}}{\text{inflation pressure}}$

= $\frac{32{,}000/4}{80}$ = 100 sq.

No correction for effective slab due to large load contact area. (Fig 5)

Subgrade and Concrete Data,

Subgrade modulus, k	200 pci
Subbase w/ 6" stone k,	230 pci

LIME PIT TREATMENT UNIT - PAD ANALYSIS

Concrete flexural strength, MR 493 psi @ 28 days
(3,000 psi compressive strength)

Design Steps.

1. From Fig. 4 (Ref. 1) 'F' Equivalent Load Factor = 0.835
2. From Fig. 3 (Ref. 1) for 7" slab

   k = 230 pci, 100 sq. in. effective contact area and 60" wheel spacing.

   Slab stress per 1000 lb axle load = 12.4 psi
3. WS = 12.4 x 32 x 0.835 = 331 psi
4. $FS = \frac{MR}{WS} = \frac{493}{331} = 1.5$ o.k.
5. From pavement design (PCA Ref 2)

   $\frac{WS}{MR} = \frac{331}{493} = 0.67$ = stress ratio

   corresponding allowable repititions of such stresses = 4,500.

Reinforcement: Joint spacing unknown, place 0.18% reinf. in slab

7 x 12 x 0.0018 = 0.15 sq. in.

As provided = 0.11/1.5 = 0.10 #4@18
+ 0.08 = 0.08 WWF

0.18 sq in/ft.

o.k.

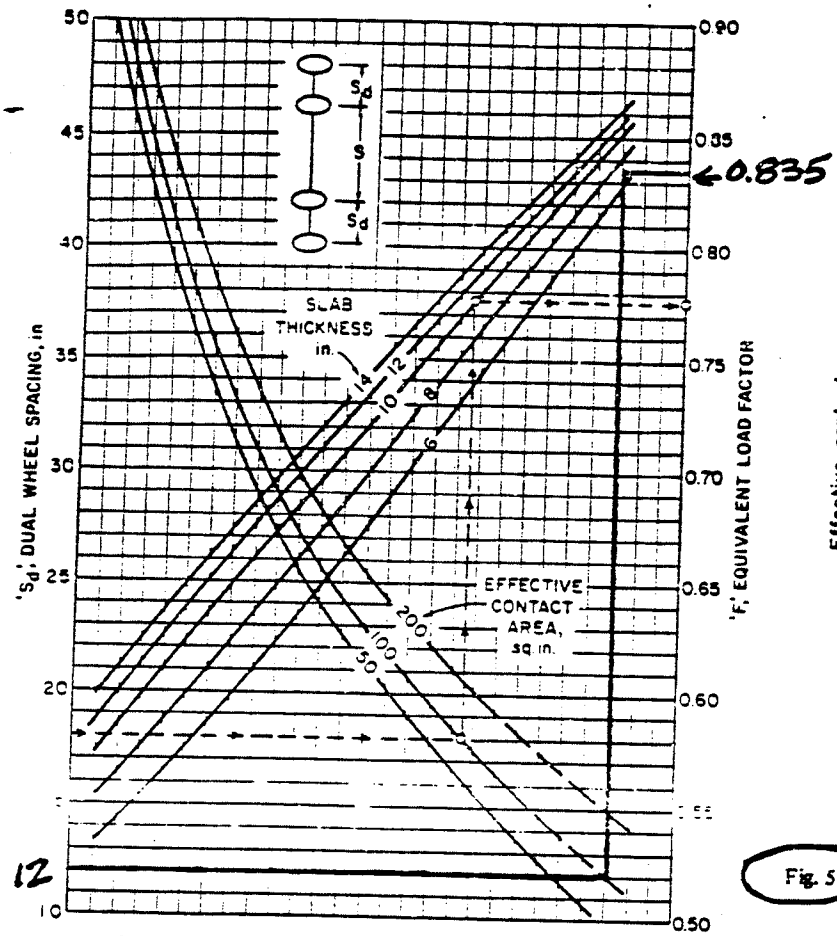
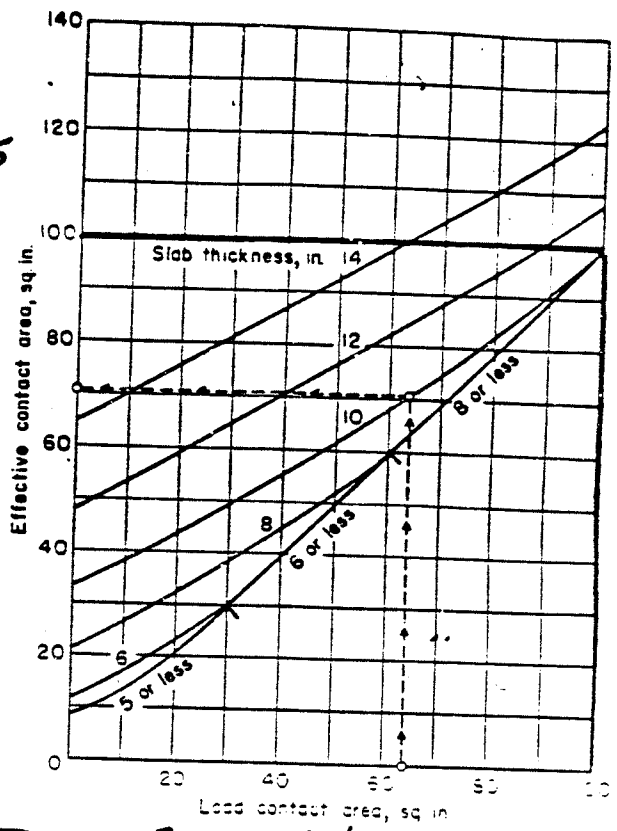


Fig. 4. Design chart for axles with dual wheels.



no correction

Fig. 5. Effective load contact area depends on slab thickness.

strength by the safety factor and then dividing this result by the axle load in kips (1 kip = 1,000 lb.).

For axles equipped with dual wheels, Figs. 3 and 4 are used together to determine floor slab thickness. First, Fig. 4 is used to convert the dual-wheel axle load to an equivalent single-wheel axle load (the axle load is multiplied by the factor, *F*). Then, with the equivalent load, Fig. 3 is used to determine the flexural stress in the slab.

The load contact area is the area of slab contact of one tire.* If tire data are not available, the contact area may be estimated for pneumatic tires by dividing wheel load by inflation pressure, and roughly approximated for solid or cushion tires by multiplying tire width by three or four. If the tire size is known, the tire data may be obtained from manufacturers' tables.[14,15]

When the tire contact area has been determined, Fig. 5 is used to find the effective contact area for use in the design charts. The reason for making this correction is that the slab stresses for small load contact areas are overestimated when computed by conventional theory. The basis for this adjustment is given in Reference 13. (This same adjustment is used for post loads discussed in a later section.) In using Fig. 5 it is necessary to assume a slab thickness; this is a trial-and-error process to be checked against the final required design thickness. The degree of correction increases as contact area becomes smaller and slab thickness becomes greater.

The following example problems illustrate the use of Figs. 3 and 4 for slab-thickness design for vehicle loads:

Design Example—Single Wheels

Data for Lift Truck A

Axle load	25 kips
Wheel spacing	37 in.
No. of wheels on axle	2
Tire inflation pressure	110 psi

$$\text{Tire contact area} = \frac{\text{wheel load}}{\text{inflation pressure}}$$

$$= \frac{25{,}000/2}{110} = 114 \text{ sq.in.}$$

Subgrade and Concrete Data

Subgrade modulus, *k*	100 pci
Concrete flexural strength, *MR*	640 psi at 28 days

*The contact area to be used is sometimes referred to as the gross contact area, that is, the total area of the contact envelope regardless of the tire tread design.

Estimating the traffic is an important factor in floor design. The required traffic information includes the load magnitudes, wheel configurations, and frequencies of loading for the heaviest vehicles that will use the floor. Traffic and load data for past and future plant or warehouse operating conditions can be gathered from several sources, including plant maintenance and engineering departments, planning and operations departments, and manufacturers' data for lift trucks and other vehicles. Based on this information, an adequate safety factor can be selected and used to determine an allowable working stress.

The safety factor (ratio of design flexural strength to working stress) depends on the expected frequency of loadings of the heaviest vehicles. For industrial floor design, safety factors in the range of 1.7 to 2.0 are suggested.* The higher end of this range should be used where heavy load traffic is frequent and channelized, as in aisleways and staging areas.

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Fig. 3 is used for industrial trucks with axles equipped with single wheels. The chart is entered with an allowable working stress per 1,000 lb. of axle load. This allowable stress is computed by dividing the concrete flexural

*The fatigue criteria described in Reference 12 gives a more quantitative procedure for selecting safety factors and determining the allowable number of load repetitions. However, in most cases the projected traffic data are only an estimate that does not warrant a more precise analysis.

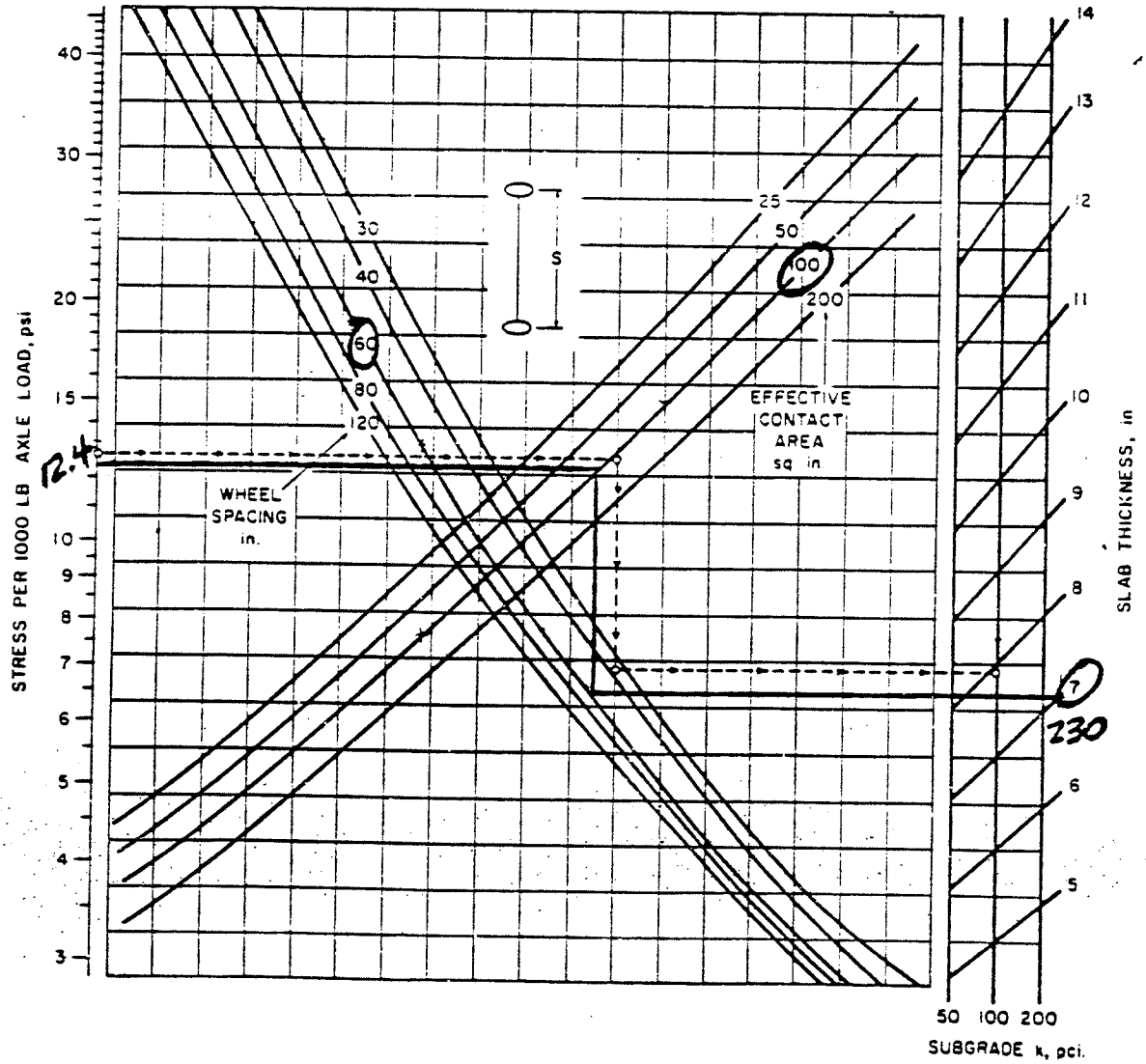


Fig. 3. Design chart for axles with single wheels.

DETAIL OF TREATMENT IN TANKS ATTACHMENT VI

CD 35 REV. 8/75 **Olin** CHEMICALS GROUP

JOB NO. _____ PAGE 1/5

LOCATION Brine Mud Management Area DATE 1/18/82

SUBJECT Verify adequacy of run-off control system BY VDL

DESIGN CRITERIA

- The brine mud treatment unit inward drainage confines must be able to contain or control the 24-hr, 25-yr. storm event

DESIGN PARAMETERS

- Waste pile run-off added to north or south chamber of the brine mud treatment tank = 32089 GPD (see calculation in Section zz)

- 12" gravity sewer drains approximately 28,000 ft² of brine production process area into the north sump

- The north sump pump discharges an average of 40 GPM to the north chamber of the brine mud treatment tank

- Decant flows thru two 6" pipes, invert 6.79' below top of tank, into the process sump.

- The two process sump pumps cycle the decant back to the brine production process.

- 24-hr, 25 yr storm = 4" precipitation *

* Technical Paper No. 40, Rainfall Frequency Atlas of the United States, U.S. Dept. of Commerce, 1961

CD 35 REV. 8/73

Olin CHEMICALS GROUP

JOB NO. _____ PAGE 2/5

LOCATION Brine Mud Management Area DATE 1/18/83

SUBJECT Verify adequacy of run-off control system BY VDL

ASSUMPTIONS

- Minimum velocity thru 12" sewer 2.5 ft/sec
- Brine Mud Treatment Tank is operating with two feet of freeboard
- Waste is not being added to the tanks during the storm event.

CD 35 REV. 8/75

Olin CHEMICALS GROUP

JOB NO. _____

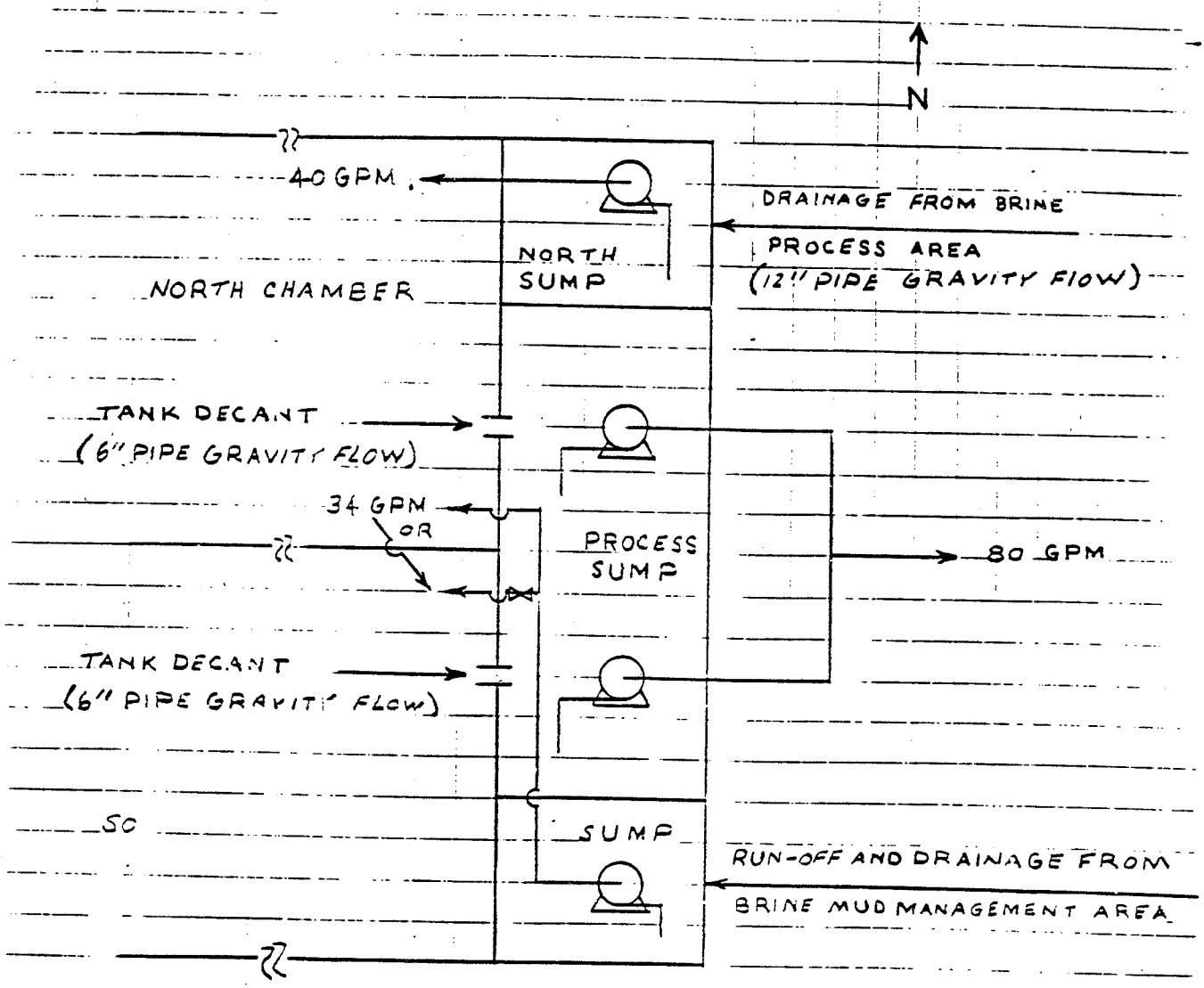
LOCATION Brine Mud Management Area

SUBJECT Verify adequacy of run-off control system

PAGE 3/5

DATE 1/18/82

BY VDL



BRINE MUD MANAGEMENT AREA

RUN-OFF CONTROL SYSTEM

FLOW DIAGRAM

CD 35 REV. 8/75

Olin CHEMICALS GROUP

JOB NO. _____
LOCATION Brine Mud Management Area
SUBJECT Verify adequacy of run-off control system

PAGE 4
DATE 1/1
BY VDL

CALCULATIONS

RUN-OFF (Brine Production Area)

24-hr, 25-yr storm = 4" = 0.33'/day

(28,000 ft²)(0.33 ft) = 9,240 ft³/day
= 0.107 ft³/sec

CAPACITY 12" SEWER

Q = AV ; V = 2.5 ft/sec , A = 0.785 ft²

Q = (2.5)(0.785) = 1.9 ft³/sec

1.9 > 0.107 ∴ Sewer is adequate

CAPACITY NORTH SUMP PUMP

40 GPM = 5.35 ft³/MIN = .089 ft³/sec

0.089 < 0.107 ∴ 0.018 ft³/sec would spill over into waste pile drainage area. The waste pile drainage sump pump has 0.026 ft³/sec reserve capacity and could adequately transfer the flow into the brine mud treatment tank.

CAPACITY OF DECANT PIPES

Head above center line of pipes = 4.79 - 0.25 = 4.54

$V = \sqrt{2gh}$ where V = velocity (ft/sec)
g = 32.2 ft/sec²
h = head (ft)

$= \sqrt{(2)(32.2)(4.54)}$

= 17.1 ft/sec.

CD 35 REV. 8/75

Olin CHEMICALS GROUP

JOB NO. _____ PAGE 5/5

LOCATION Brine Mud Management area DATE 1/13/83

SUBJECT Verify adequacy of run-off control system BY VDL

$Q = A V$; $A = 0.196\ ft^2$ $V = 17.1\ ft/sec$

$Q = (0.196)(17.1) = 3.35\ ft^3/sec$ for each pipe

∴ Input to Tank = Run-off from brine production area + drainage from waste pile

$= 0.107 + 0.05$

$= 0.157\ ft^3/sec$

$3.35 > 0.157$ ∴ Decant pipes are adequate

CAPACITY PROCESS SUMP

2 pumps @ 40 GPM/ea = 80 GPM

$= 10.7\ ft^3/min$

$= 0.178\ ft^3/sec$

$0.178 > 0.157$ ∴ Sump is adequate

SUMMARY

The brine mud management area run-off control system is adequate to control the 24-hr, 25-yr storm event

DETAIL OF TREATMENT IN TANKS ATTACHMENT VII

CD 35 REV. 8/75 **Olin** CHEMICALS GROUP

JOB NO. _____ PAGE 1/2

LOCATION Lime Pit Treatment Unit DATE 1/18/83

SUBJECT Verify Adequacy of Run-off Control System BY VDL

DESIGN CRITERIA

- The lime pit treatment unit inward drainage confines must be able to contain or control the 24-hr, 25-yr storm event

DESIGN PARAMETERS

- Drainage area (including roof drains) $\cong$ 10,000 ft^2
- 24-hr, 25-yr storm = 4" precipitation *
- Run-off controlled by a 4" gravity sewer

ASSUMPTIONS

- 4" sewer flowing full
- minimum velocity = 2.5 ft/sec.

* Technical Paper No. 40, Rainfall Frequency Atlas of the United States U.S. Dept of Commerce 1961.

CD 35 REV. 8/75

Olin CHEMICALS GROUP

JOB NO. _____
LOCATION Lime Pit Treatment Unit
SUBJECT Verify Adequacy of Run-off Control System

DATE 1/18/83
BY RDL

CALCULATIONS

TOTAL RUN-OFF

- 24-hr, 25-yr storm = 4" = 0.33'/day
- Run-off = 10,000 ft² x 0.33 ft = 3300 ft³/day
  = 0.04 ft³/sec

SEWER CAPACITY

$Q = AV$

$A = 0.087$ ft²

$V = 2.5$ ft/sec

$Q = (0.087)(2.5) = 0.22$ ft³/sec

$0.22 > 0.04$

∴ Sewer can adequately control the run-off from the 24-hr, 25-yr storm event and the run-off control system is adequate.

ATTACHMENT X

WASTE PILE

OLIN CORPORATION

NIAGARA FALLS, NEW YORK

RCRA PART B PERMIT

DETAIL OF STORAGE IN A WASTE PILE

I. DESCRIPTION

Brine mud is removed from the brine mud treatment tank and deposited on a waste pile. Brine mud generated by the pressure filter in Bldg. No. 60 may also be deposited on the waste pile. These muds may be mixed with masonry sand if they fail to have adequate stability. The pile may accumulate 200-250 tons of brine muds prior to shipment off-site for ultimate disposal. The waste pile base is contiguous to the treatment tank and occupies an area of approximately 4800 ft^2. A 98 ft^3 sump, located scutheast of the pile base, collects drainage from the area. The sump contains a float actuated pump which has a capacity of 34 gpm at a TDH of 10 feet and 30 psi. All materials which collect in the sump are pumped into either the north or south chamber of the brine mud treatment unit. This system has no by-passes and it can be manually controlled . Drawings No. D-0000-970-1-17 and D-0000-840-10-4, in the Appendix, depict the area.

II. DESIGN CAPACITY AND SPECIFICATIONS

A. Waste Pile Base

1. Design

Plans, section, and detail of the waste pile base and leachate collection sump are provided on Drawing No. D-0000-970-1-17 in the Appendix.

2. Loadings

A structural analysis of the waste pile base and foundation has been provided as Attachment I to this section. The analysis verifies the base and foundation have sufficient thickness and strength to withstand the loadings to which they are subjected. Groundwater elevation with respect to the pile base is also illustrated in this attachment.

3. Permeability

Information provided in the previous section of the application (Section No. 21, Attachment II) demonstrated that the waste pile base design and specifications promote watertightness.

4. Material Compatibility

Attachment III to the previous section of the application provides information on the compatibility of the constituents in brine mud with concrete. The available date illustrates that brine mud is compatible with concrete.

5. Inspection

A comprehensive inspection procedure for assessing the condition of hazardous waste management structure is provided as Attachment II to the Procedures, Structures and Equipment section of this application. Upon approval of this procedure by the NYSDEC, Olin will have a Professional Engineer conduct the inspection to insure that the structure presently meets the requirements outlined in 40 CFR 264.251(a)(1). The results of this inspection will then be furnished to the Agency.

B. Leachate Collection System

1. Design

The waste pile has a drainage collection system to collect brine drainage from the brine muds and storm run-off and drainage. These flows are not properly termed leachate since we have shown that little, if any, mercury leaches from the muds under such conditions. Analysis of the drainage collection system is provided as Attachment II to this section of the application. The analysis demonstrates that the system can control the run-off from the 24-hour 25-year storm event and the drainage depth will not exceed one foot.

2. Material Compatibility

Specifications on the drainage collection pump are contained in Attachment III. This float actuated diaphragm pump, Model SB1½A, Type SN-4-A2, is constructed of materials compatible with the constituents in brine mud. The pump is designed to operate without clogging under conditions typical to those in the brine mud area.

C. Run-On

Drawing No. D-0000-840-10-4 illustrates that the brine mud management area has sufficient topographical relief and is sufficiently diked and curbed to prevent run-on from a 24-hour 25-year storm event.

D. Wind Dispersal

The moisture content and agglomerative properties of brine mud insure that brine mud is not subject to wind dispersal.

E. Operation

1. All tanks and sumps in the brine mud management area will be operated to maintain the design capacity of the system during the 24-hour 25-year storm event.
2. Wastes will be contained on the liner base.
3. Ignitable, reactive, or incompatible wastes are not placed on the waste pile.

III. GROUNDWATER MONITORING EXEMPTION (40 CFR 264.253)

A. Assuming the comprehensive inspection verifies the pile base satisfies the regulations, Olin will request an exemption from the groundwater monitoring requirements and will comply with the following requirements.

1. The waste pile and base are located entirely above the seasonal high water table.

2. The waste pile base meets the following specifications:

   a) Materials of construction are adequate to prevent failure from contact with the waste, weather, stress of operation, and pressure gradients during the active life of the waste pile.

   b) It is placed on a sound foundation which provides adequate support and resistance to settlement, compression and uplift.

   c) It covers all surrounding earth likely to be in contact with the waste or leachate.

3. Waste will be removed at least monthly and the base will be inspected for deterioration, cracks, or other conditions which may result in failure according to the procedure provided in Section 8 of this application.

4. The base will not be physically damaged by equipment operated on it.

5. A drainage collection system is present which

   a) will not allow the drainage depth to exceed one foot over the base.

   b) is resistent to the properties of the waste and drainage.

   c) will not collapse from the weight of the waste and operating equipment.

B. If a condition is identified which could cause or is causing a leak, Olin will

1. notify the Regional Administrator of the condition in writing within seven days after detecting the condition.
2. repair or replace the base and obtain certification from a qualified engineer that the condition is alleviated or begin groundwater monitoring pursuant to 40 CFR 264.98.

VDL/vrp

1/18/83

ENGINEERS P.C
consulting engineers/planners/surveyors
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NUMBER 2287-35/101
BY PWH DATE 1/12/83
APP. [illegible] DATE 1/14/83 5 OF

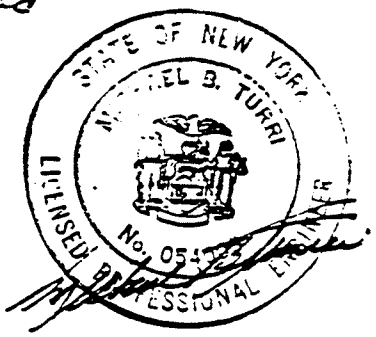
SUMMARY - BRINE MUD WASTE PILE PAD

Drawing References: D-6004-052-970-1-1.00
D-0000-970-1-17

CHECKED: KFL 1/12/83

Design Criteria:

1. Pad structure
   7" Concrete slab-on-grade with 6" compated gravel subbase.
2. Goals of Design
   a. Determine structural capacity of pad with respect to maximum vehicle loads.
   b. Find maximum uniform load carried by the pad.
3. Materials
   a. 3,000 psi concrete
   b. Grade 40 bars
   c. Grade 60 WWF



Design Codes:

1. "Slab Thickness Design for Industrial Concrete Slabs on Grade," Packard, PCA.
2. Standard Specification for Highway Bridges 12th edition, 1977, AASHTO.

Design Results:

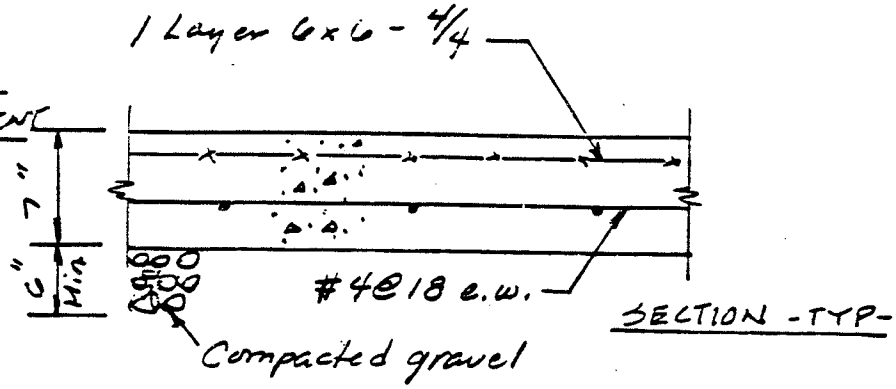
1. Pad can carry HS20-44 load (32,000 single axle) with 1.5 factor of safety.
2. Pad can carry uniform load of 1,200 lbs per square foot at safety factor of 2.0.
3. BASED UPON BEST AVAILABLE INFORMATION AND ASSUMPTIONS CONTAINED HEREIN THIS PAD MEETS THE DESIGN REQUIREMENTS FOR A WASTE PILE WITH RESPECT TO 40 CFR 264.251(a)(1). HOWEVER A FIELD INSPECTION WILL BE REQUIRED TO VERIFY THE PAD'S CURRENT CONDITION.

WENDEL ENGINEERS PC
consulting engineers / planners / surveyors
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME Olin Chemical
PROJECT NUMBER 2287-35/10
BY PWH DATE 11/10/83
APP. _____ DATE _____ 1 of 5

BRINE MUD WASTE PILE - PAD ANALYSIS

Concrete Pad around BRINE MUD TREATMENT UNIT



SECTION - TYP -

General Design Guide: Design of pad is based on "Slab-on-Grade" design and thickness design for concrete pavements as applicable.

References: 1) "Slab Thickness Design for Industrial Concrete Floors on Grade" by Packard *
2) "Thickness Design for Concrete Pavements" PCA. * Charts attached.

Soil Data: Based on closest boring to area (BH-7) ASTM Soil Class GC.

Design Criteria: Use H20-44 axle load of 32,000 lbs axle load (AASHTO) single axle.

Design. Data for truck.

Axle load	32 kips
Wheel spacing	12 x 60 x 12 (dual)
No. wheels on axle	4
Tire inflation pressure	80 psi

Tire contact area = $\frac{\text{wheel load}}{\text{inflation pressure}}$

$= \frac{32{,}000/4}{80} = 100$ sq. in

No correction for effective slab due to large load contact area. (Fig 5)

Subgrade and Concrete Data,

Subgrade modulus, k	200 pci
Subbase w/ 6" stone k,	230 pci

BRINE MUD WASTE PILE - PAD ANALYSIS

Concrete flexural strength, MR 493 psi @ 28 days
(3,000 psi compressive strength)

Design Steps.

1. From Fig. 4 (Ref. 1) 'F' Equivalent Load Factor = 0.835
2. From Fig. 3 (Ref. 1) for 7" slab

   k = 230 pci, 100 sq. in. effective contact area and 60" wheel spacing.

   Slab stress per 1000 lb axle load = 12.4 psi

3. WS = 12.4 x 32 x 0.835 = 331 psi
4. $FS = \frac{MR}{WS} = \frac{493}{331} = 1.5$ o.k.
5. From pavement design (PCA Ref 2)

   $\frac{WS}{MR} = \frac{331}{493} = 0.67$ = stress ratio

   corresponding allowable repititions of such stresses = 4,500.

Reinforcement: Joint spacing unknown, place 0.18% reinf. in slab

7 x 12 x 0.0018 = 0.15 sq. in.

As provided = 0.11/1.5 = 0.10 #4@18
+ 0.08 = 0.08 WWR

0.18 sq in/ft

o.k.

BRINE MUD WASTE PILE - PAO ANALYSIS

$$W = 0.123 f_t \sqrt{hk}$$

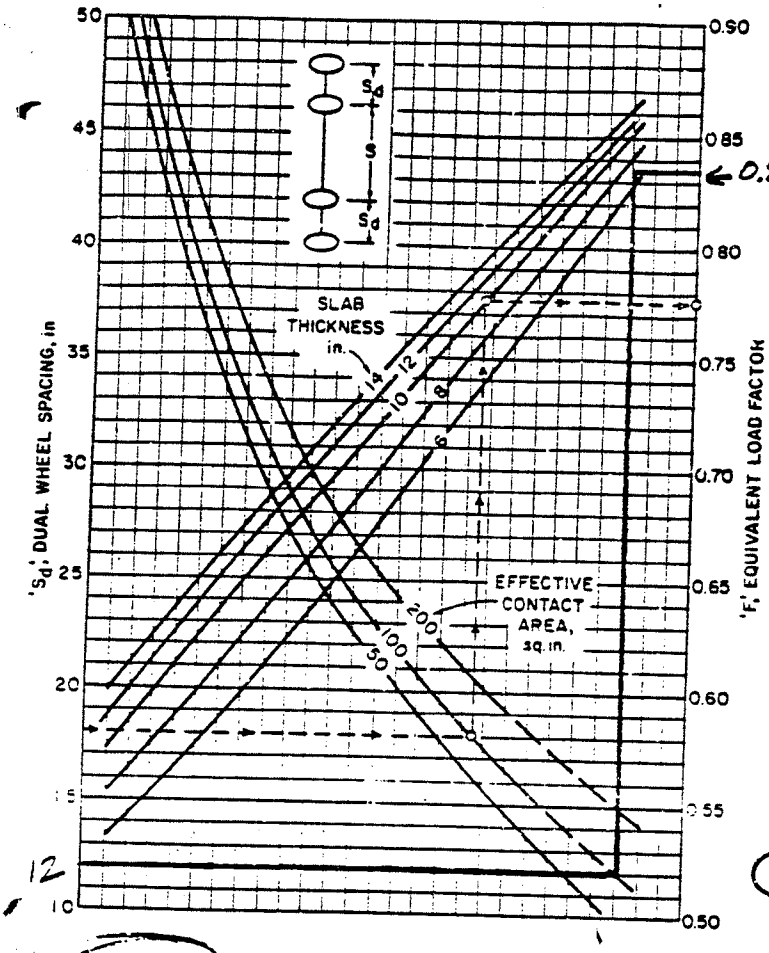
W = allowable load, psf
f_t = working stress
h = slab thickness, in.
k = subgrade modulus, pci

$$W = 0.123 \times 246 \cdot \sqrt{7 \times 230}$$

$$W = 1214 \text{ psf}$$

Determine maximum height of mud piles at 90 pcf

$$h = \frac{1214}{90} = 13.5' \text{ max.}$$



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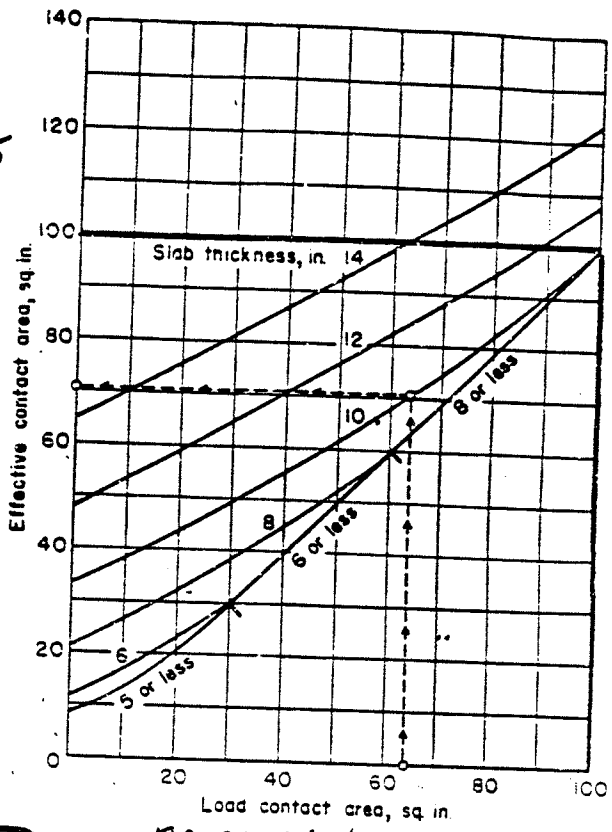

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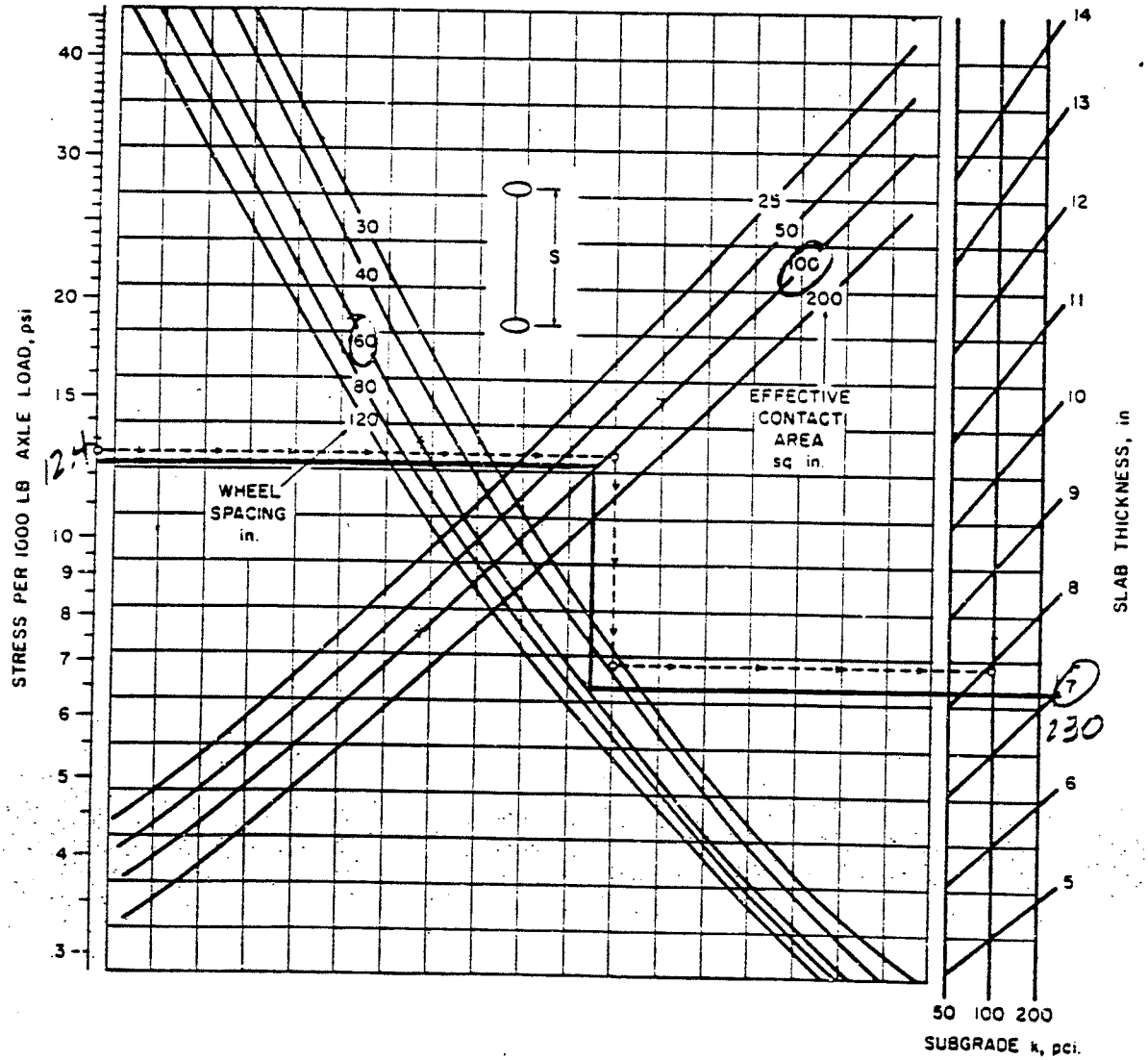
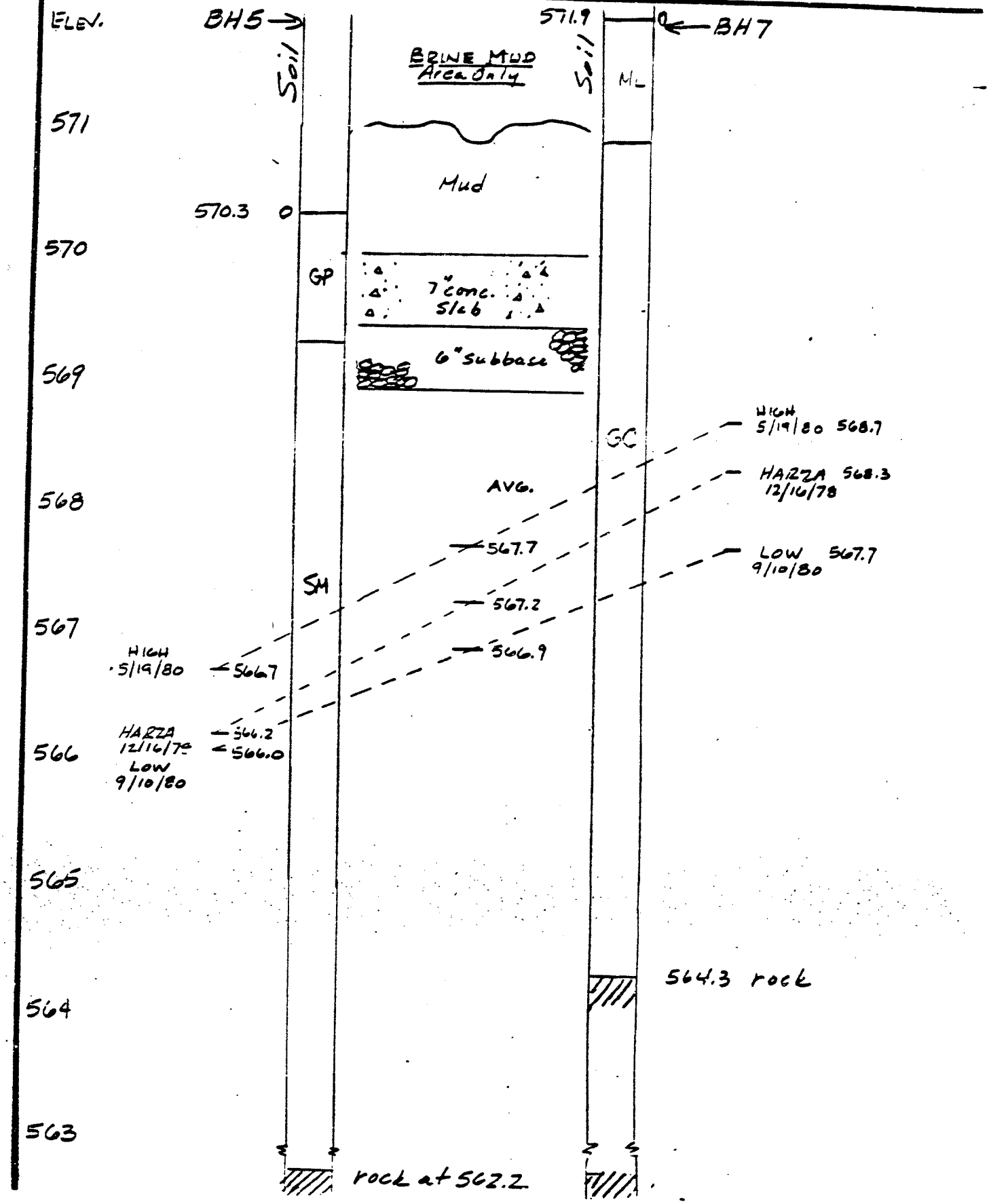


Fig. 3. Design chart for axles with single wheels.

WENDEL ENGINEERS P.C.
consulting engineers / planners / surveyors
LOCKPORT N.Y. - BUFFALO N.Y.

PROJECT NAME Olin Chemical
PROJECT NUMBER 2287-35/101
BY PWH DATE 1/12/83
APP. _____ DATE _____ 6 OF 6

BRINE MUD WASTE PILE - PAD



DETAIL OF STORAGE IN A WASTE PILE — ATTACHMENT II

CD 35 REV. 8/75 — Olin CHEMICALS GROUP

JOB NO. _____ PAGE 1/2

LOCATION Brine Mud Management Area DATE 1/12/82

SUBJECT Verify adequacy of waste pile drainage system BY VDL

DESIGN CRITERIA

- Drainage collection system must collect and control the run-off of the 24-hr, 25-yr storm event
- Drainage depth must not exceed 1 foot on the waste pile base

DESIGN PARAMETERS

- Drainage area (including roof drainage) ≅ 13000 ft²
- 24-hr, 25-yr storm = 4" *
- Run-off collection pump capacity ≅ 34 gpm @ 10' TDH and 30 psi

* Technical Paper No. 40, Rainfall Frequency Atlas of the United States, U.S. Dept of Commerce, 1961

CD 73 REV. 8/73

JOB NO.

LOCATION Brine Mud Management Area

SUBJECT Verify adequacy of waste pile drainage system

Olin CHEMICALS GROUP

PAGE 2/2

DATE 1/17/83

BY VDL

CALCULATIONS

TOTAL RUN-OFF

24-hr, 25-yr. storm = 4" ≈ 0.33'

Run-off = 13,000 ft² X 0.33 ft = 4290 ft³/DAY

= 32089 GPD

= 0.05 ft³/sec

SUMP PUMP CAPACITY

34 GPM = 48960 GPD

48960 GPD > 32089 GPD

∴ Run-off collection is adequate to control 24-hr, 25-yr. storm event

Run-off will not accumulate on the waste pile base

Since 34 GPM is the lowest pumping rate the rest of the system is adequate to control the flow

Sump pump has 16,871 GPD reserve capacity or 0.026 ft³/sec.

ATTACHMENT XI

PREPAREDNESS AND PREVENTION PLAN

OLIN CORPORATION

Niagara Falls, New York

RCRA PART B PERMIT

PREPAREDNESS AND PREVENTION PLAN

I. GENERAL STATEMENT

All hazardous waste units are designed, constructed, maintained, and operated to minimize the possibility of fire. explosion, or release of any hazardous waste which could threaten human health or the environment.

II. ALARMS AND COMMUNICATION NETWORK

A. Various types of communications and alarm systems will be used in the event of an emergency at the Niagara Falls facility. The following is a list of these devices:

1. Plant Alarm System (Fire, Evacuation, etc.)

a. A plant alarm system is used to notify an emergency situation exists and to begin evacuation procedures. The alarm is audible to all personnel and can be initiated from any plant phone by dialing the access code + 55 + plant area code. Only the Emergency Communications Coordinator, Safety Manager and other responsible invidiuals have knowledge of the access code. The alarm signal consists of five air horn blasts repeated twice followed by one to five blasts, which indicate the location of the emergency. A diagram which indicates area location codes is included in Attachment IV.

b. The Emergency Communications Coordinator, guard at Gate 1, can be contacted by dialing 6445 on any plant telephone 24 hours a day.

c. Safety Department may be contacted by dialing 6464 on any plant telephone Monday through Friday, 8:00 a.m. to 5:00 p.m.

2. Emergency Rescue Service (E.R.S.) Telephone

   a. The facility maintains a direct telephone line to the City of Niagara Falls Public Safety Department.

   b. Emergency information can be immediately provided to the fire, police, rescue service and hospitals over this telephone.

3. Intercom System

   a. Separate intercom systems in Plants I and II are utilized to transmit emergency information to employees in their respective locations.

4. A.D.T. Alarm System (Alarm Switches)

   a. A.D.T. alarm pull boxes, marked with a red light, are located throughout the facility at the following locations. (See Drawing No. D-0000-830-10-22 in the Appendix).

      Plant 1

      SE corner of Bldg. 130
      West side of Bldg. 104
      North side of Bldg. 133
      SE side of Bldg. 109

      Plant 2

      East side Gate 2 guard house
      SE corner of carpenter shop
      West side Bldg. 74 (no light)
      West side of Gate 22 guard house
      Northwest corner No. 46
      North side of Bldg. 89

   b. If this system is used, the employee must also call the Emergency Communications Coordinator and provide information about the emergency.

5. Personnel Pagers

a. These devices, carried by shift supervisors, production managers, and responsible individuals, are utilized in an emergency situation.

b. The Emergency Communications Coordinator transmits the required information over these devices.

6. Two-Way Radios

a. A two-way radio base station is presently maintained in the Maintenance Department, Gate 1, and Gate 22 guard houses.

b. Responsible individuals, shift supervisors, and the guard on patrol each carry a two-way radio.

B. Employees have immediate access to one or more of these communication/alarm systems. Also for added safety, there will be at least two people engaged in any activity which involves the handling of a hazardous waste in a hazardous waste management unit.

III. PORTABLE EMERGENCY EQUIPMENT

Emergency equipment is located throughout the facility at Niagara Falls. All employees are trained in the use of fire extinguishers and hose house equipment to suppress or control incipient stage fires. Any major fire fighting is executed by the City of Niagara Falls Fire Department.

Safety showers are located throughout the facility. At each shower locations is an emergency cabinet which contains a pair of disposable coveralls and a disposable blanket. Should an employee become severely contaminated, he is instructed to go to the nearest safety shower, turn it on, and remove contaminated clothing while showering for 15 minutes. After showering, the disposable garments are available to cloth and protect employee while being transported to medical facilities.

IV. LOCATION OF EMERGENCY EQUIPMENT

A. Brine Mud Management Area

The telephones in either the brine control room, Bldg. 33, or secondary treatment, Bldg. 97, shall be used to report any emergency in this area. Employees will report an incident to the security guard/emergency coordinator by dialing 6445 or announce an emergency over the Plant II intercom by dialing 103.

A 10 lb. multi-purpose dry chemical fire extinguisher located in the brine area would be utilized for initial fire fighting.

Safety showers recommended for use in this area are located on the north side of the 7S pH control facility, ground floor level, on the ground floor of the brine pressure filter building, Bldg. 60, and the southwest corner of Bldg. 37 on the ground floor.

The closest fire hydrant is hose house 20. It is located at the southeast corner of secondary treatment, Bldg. 97. The hose house contains 250 feet of 2½ inch and 50 feet of 1½ inch Neoprene impregnated fire hose. Fire hydrant pressure at the plant varies between 70 and 80 psi. and a 1½ to 2½ inch hose will deliver between 1200 and 1700 gpm. of flow.

Note: Emergency equipment location is illustrated on Drawing No. D-0000-840-10-4 in the Appendix.

B. Waste Drum Storage Unit

Telephones in the basement of the carpenter shop (Bldg. 14) or boiler house (Bldg. 80) shall be used to report an emergency in this area.

Ten pound, multi-purpose dry chemical fire extinguishers are located due east on the fuel oil storage tank dike wall and in the carpenter shop. There is a portable 150 lb. dry chemical fire extinguisher used for flammable liquids located in the boiler house. Also located there are the nearest safety showers and eye wash station.

The closest fire hydrants, hose houses 14 and 13, are located on the east and west sides of the carpenter shop, respectively. Each hose house contains 250 feet of 2½ inch and 50 feet of 1½ inch neoprene impregnated fire hose.

Note: Emergency equipment location is illustrated on Drawing No. D-0000-840-10-3 in the Appendix of this application.

C. Lime Pit Treatment Unit

The intercoms located in the packout area (Bldg. 133) and on the south wall, first floor of Bldg. 139, shall be used to report an emergency in this area. This system is monitored by the security guard/emergency communications coordinator at the Gate 1 guard house.

Twenty pound, multi-purpose dry chemical fire extinguishers and emergency shower/eyewash stations are located in the above mentioned areas.

The closest fire hydrant, hose house 4, is located at the southeast corner of Bldg. 133. It contains 250 feet of 2½ inch and 100 feet of 1½ inch Neoprene impregnated fire hose.

Note: Emergency equipment location is illustrated on Drawing No. D-0000-845-10-28 in the Appendix.

D. Spill Control Equipment

The following is a list of equipment and its location which will be employed to control the spill or release of a hazardous waste. (See Drawing No. D-0000-830-10-22 in the Appendix).

- Portable pump (gasoline operated) Bldg. 94
- Speedi Dry Absorbent - Bldg. 17
- Hoses - Bldg. 94
- Front end loader - Bldg. 51
- Shovels - Bldg. 49
- Tow motor - Bldg. 49
- Overpack drums - Bldg. 15
- Steel drums - outside Bldg. 72
- Drum liners - Bldg. 91

V. EMERGENCY EQUIPMENT INSPECTION SCHEDULE

The Safety Department is responsible for overseeing the testing and maintenance of emergency equipment according to the flowing schedule.

- Portable fire extinguishers - inspected monthly
- Scott Air Packs - inspected monthly
- Plant emergency alarm - tested every Wednesday at 12:00 Noon
- Fire protection sprinkler system - drain test performed once-a-week (weather permitting)

- The water flow alarms - checked once-a-month by ADT Security Services, Inc., our contract alarm service
- Fire hose houses and hydrants - checked monthly and hydrostatically tested yearly
- Spill control equipment - inspected weekly

VI. AISLE SPACE REQUIREMENTS

It is a policy of the Niagara Falls facility that all roads to and around hazardous waste facilities be maintained unobstructed to provide immediate emergency access. The traffic patterns illustrated on Drawings No. D-0000-845-10-27 and D-0000-845-10-2 in the Appendix demonstrate how emergency equipment will gain access to each hazardous waste unit. A minimum aisle space of three feet will be maintained between all pallets of drums stored two high in the waste drum storage unit.

VII. ARRANGEMENTS WITH LOCAL AUTHORITIES

A. Notification Letters (See Attachments)

1. Letters were sent to the City of Niagara Falls Fire (Emergency Response Team) and Police Departments which contained the following information:
   a. Layout of the facility.
   b. Properties of the hazardous waste handled at the facility and associated hazards.
   c. Places where facility personnel would normally be working.
   d. Entrances to and roads inside the facility.
   e. Possible evacuation routes.

2. A letter was sent to the local hospital (Niagara Falls Memorial Medical Center) which contained the following information:

   a. Properties of hazardous waste handled at the facility.

   b. Types of injuries or illness which could result from fire, explosion, or releases at the facility.

B. Fire Department

The City of Niagara Falls Fire Department will act as lead agency during an emergency. Olin has developed a "dispatch file" for the Fire Department which catalogs all buildings and areas at the facility and the chemicals or hazards present therein. Additional information pertinent to an emergency such as routes by which to enter the plant and presence of fire walls in buildings is also contained in the file. In the event of an emergency, the Fire Department dispatcher will provide this information to the responding Fire Department team.

C. Police Department

The City of Niagara Falls Fire Department has the responsibility to contact the Police Department if their presence is required during an emergency situation. Police will provide back-up support to the Fire Department and control traffic on the public roads around the facility.

D. Hospital

Niagara Falls Memorial Medical Center maintains a copy of the "Chemical Emergency Action Manual" which documents the preferred procedures and treatments for exposure to 35 selected chemicals. This manual provides guidance to occupational health personnel, emergency medical technicians (EMT's), emergency service personnel (fire and police), rescue personnel, and emergency room personnel.

VIII. PUBLIC SAFETY INSPECTION

Personnel from the Niagara Falls Fire Department tour the facility once a year to maintain familiarity with the plant.

VDL/vrp

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