199201.27 SPDES permit file

New York State Department of Environmental Conservation

2176 Guilderland Ave.
Schenectady, N.Y. 12306
(518)382-0680
(518)382-1065-FAX

Thomas C. Jorling
Commissioner

January 27, 1992

William Vosshell
Director of Compliance
Norlite Corp.
PO Box 694
628 So. Saratoga St.
Cohoes, N.Y. 12047

RE:DEC #4-0103-16/16-0
Norlite Facility
SPDES REN/MOD
Cohoes-C, Albany Co.

Dear Mr. Vosshell,

Please find enclosed the renewed SPDES permit for the Norlite Facility. No comments were received from the public, however, we have made several minor changes which we recently discussed with you and other representatives of the company. Specifically:

- You are named as the contact for Discharge Monitoring Reports on page 1.

- Temperature and pH limits are being added for Outfall 005 on page 3.

- On page 5 the current hazardous fuel (LGF) concentration limit for Copper was corrected and the corrected Arsenic and Chromium limits were added. Language was clarified on the restriction applying to implementation of the proposed increased limits and a corrected date put in for the Fugitive Dust Control Plan.

As a follow-up to our meeting of 1/8/92 we offer the following responses:

- Plans, specifications and an engineering report along with a Beneficial Use Determination request on the sludge filter cake will be submitted as per the schedule provided on 1/23/92 in compliance with the SPDES permit deadlines. The Department's review and approval is anticipated to be handled as a compliance matter under the permit with the final approved design incorporated into the permit by reference unless the final design could cause some unanticipated impact. I would appreciate it if you could provide us with a copy of the schematic drawings shown us and the proposed location of the WWTP so it can be evaluated now for any potentials in this regard. Information on the potential for odors, noise or other impacts and its proximity to residences and any other pertinent site factors are also needed.

- New York State Wastewater treatment system operator certification is not required for industrial facilities.

- Norlite will be seeking a Beneficial Use Determination on the filter cake sludge from the treatment process which will be submitted at the same time as the plans. Unless and until the Department approves the BUD request the sludge will be managed as a hazardous waste.

- Norlite will also be seeking a modification of its SPDES permit related to the limits on Outfall 1 after installation of the WWTP and PCB testing requirements on Outfall 4. Your application to modify the PCB testing requirement (which could be incorporated into your required engineering report would need to include a proposal for testing the underlying shale through the taking of boring samples. It would have to be demonstrated that the samples taken are representative of the landfill and that the leachability testing of the shale is capable of detecting (if they are present) the low PCB levels required by the permit.

- The BMP plan will be revised as per Department requirements.

- Additional information will be submitted to support your contention that interim wastewater treatment is not needed prior to the installation of the permanent WWTP even if the higher metals concentrations in the hazardous waste fuel are implemented. Added information regarding a mass balance of metals as well as your proposed and possible interim treatment and removal of increased precipitated metals is needed before the Department can perform an in depth review. We will be having our central office Bureau of Wastewater Facilities Design involved as well which may result in additional information needed to resolve this issue. As discussed, the permit condition #2 provides enough flexibility for resolution and therefore is being retained.

- Stormwater is already covered in your SPDES permit and the need for a letter of intent from Albany County Sewer District is not critical at this juncture as the WWTP will be designed to meet the SPDES permit discharge limits.

As we discussed briefly on 1/23/92 the WWTP and disposal of its sludge will also have to be added to the new Hazardous Waste permit as a regulated hazardous waste facility/activity. We are now determining how best to handle this administratively in order to not add delay to its construction and start-up.

If you have any further questions please feel free to contact either Carol Lamb-LaFay of our Division of Water or Myself.

Sincerely Yours,

William J. Clarke

William J. Clarke
Regional Permit Administrator
Region 4

NORLI16.D01
cc:C.Lamb-LaFay
S.Saraiya

91-20-2 (1/89)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

DISCHARGE PERMIT

Special Conditions (Part I)

Industrial Code:	1422	SPDES Number: NY-	0004880
Discharge Class (CL):	01	DEC Number:	4-0103-16/20-0
Toxic Class (TX):	T	Effective Date (EDP):	2/1/92
Major Drainage Basin:	13	Expiration Date (ExPD):	2/1/97
Sub Drainage Basin:	01	Modification Date(s):	
Water Index Number:	H-239	Attachment(s):	General Conditions (Part II) Date: 11/90
Compact Area:			

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et.seq.)(hereinafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS: Attention: Jay Derman, Executive VP

Name: Norlite Corporation
Street: 628 South Saratoga Street
City: Cohoes State: NY Zip Code: 12047

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS:

Name: Norlite Corporation
Location (C,T,V): Cohoes (C) County: Albany
Facility Address: 628 South Saratoga Street
City: Cohoes State: NY Zip Code: 12047
NYTM-E: . NYTM-N: 4 .
From Outfall No. 001 at Latitude: 42° 45' 14" & Longitude: 73° 40' 20"
into receiving waters known as: Salt Kill Creek ,Class:

and: (list other Outfalls, Receiving Waters & Water Classifications)

003	Salt Kill Creek	D
004	Salt Kill Creek	D
005	Salt Kill Creek	D

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in Special Conditions (Part I) and General Conditions (Part II) of this permit.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: Norlite Corporation
Street: 628 South Saratoga Street
City: Cohoes State: NY Zip Code: 12047
Responsible Official or Agent: William Vosshell Phone: (518) 235-0401

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION: Carol Lamb - Region 4
R. Hannaford - Room 318
Mark Wykes - ACHD
DRA

Permit Administrator: William Clarke
Address: 2176 Guilderland Avenue
Schenectady, NY 12306
Signature: William J Clarke Date: 1/27/92

91-20-2a (1/89)

SPDES No.: NY 000 4880

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

MODIFICATION DATE: ________

During the period beginning EDP

and lasting until EDP + 5 YEARS

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Minimum Monitoring Requirements Sample Type
Outfall 001 - Non-Contact Cooling Water, Boiler Blowdown, Scrubber water from Kiln #1 and Storm Water Lagoon Overflow					
Flow	Monitor	Monitor	GPD	Daily[1]	Measured
Solids, Total Suspended	25	45	MG/L	Daily[1]	Composite[3]
pH (Range)	(6.0 to 9.0)		SU	Daily[1]	Grab
Temperature	NA	90	degF	Daily[1]	Grab
Arsenic, Total	0.05	0.1	MG/L	Daily[1]	Grab
Barium, Total	2.0	4.0	MG/L	Daily[1]	Grab
Beryllium, Total	1.0	2.0	MG/L	Daily[1]	Grab
Cadmium, Total	NA	0.004	MG/L	Daily[1]	Grab
Chromium, Total	0.5	1.0	MG/L	Daily[1]	Grab
Chromium, Hexavalent	NA	0.016	MG/L	Daily[1]	Grab
Copper, Total	NA	0.018	MG/L	Daily[1]	Grab
Lead, Total	NA	0.08	MG/L	Daily[1]	Grab
Mercury, Total	NA	0.0002	MG/L	Daily[1]	Grab
Nickel, Total	NA	1.8	MG/L	Daily[1]	Grab
Selenium, Total	0.05	0.1	MG/L	Daily[1]	Grab
Zinc, Total	NA	0.3	MG/L	Daily[1]	Grab
PCB Aroclor 1016	ND	ND[2]		5/Month	Grab
PCB Aroclor 1221	ND	ND[2]		5/Month	Grab
PCB Aroclor 1232	ND	ND[2]		5/Month	Grab
PCB Aroclor 1242	ND	ND[2]		5/Month	Grab
PCB Aroclor 1248	ND	ND[2]		5/Month	Grab
PCB Aroclor 1254	ND	ND[2]		5/Month	Grab
PCB Aroclor 1260	ND	ND[2]		5/Month	Grab
Outfall 003 - Quarry Water					
Flow	Monitor	Monitor	GPD	Daily[1]	Instantaneous
Solids, Total Suspended	25	45	MG/L	Daily[1]	Composite[3]
pH (Range)	(6.0 to 9.0)		SU	Daily[1]	Grab

Outfall Number & Effluent Parameter	Discharge Limitations Daily Ave.	Daily Max.	Units	Meaurement Frequency	Sample Type
Outfall 004 - Shale Fines Leachate					
Flow	Monitor	Monitor	GPD	Daily[1]	Measured
Solids, Total Suspended	25	45	MG/L	Daily[1]	Composite[3]
pH (Range)	(6.0 to 9.0)		SU	Daily[1]	Grab
Temperature	NA	90	degF	Daily[1]	Grab
Arsenic, Total	Monitor	Monitor	MG/L	Daily[1]	Grab
Barium, Total	Monitor	Monitor	MG/L	Daily[1]	Grab
Beryllium, Total	Monitor	Monitor	MG/L	Daily[1]	Grab
Cadmium, Total	NA	0.004	MG/L	Daily[1]	Grab
Chromium, Total	NA	1.7	MG/L	Daily[1]	Grab
Chromium, Hexavalent	NA	0.016	MG/L	Daily[1]	Grab
Copper, Total	NA	0.018	MG/L	Daily[1]	Grab
Lead, Total	NA	0.08	MG/L	Daily[1]	Grab
Mercury, Total	NA	0.0002	MG/L	Daily[1]	Grab
Nickel, Total	NA	1.8	MG/L	Daily[1]	Grab
Selenium, Total	Monitor	Monitor	MG/L	Daily[1]	Grab
Zinc, Total	NA	0.3	MG/L	Daily[1]	Grab
PCB Aroclor 1016	ND	ND[2]		5/Month	Grab
PCB Aroclor 1221	ND	ND[2]		5/Month	Grab
PCB Aroclor 1232	ND	ND[2]		5/Month	Grab
PCB Aroclor 1242	ND	ND[2]		5/Month	Grab
PCB Aroclor 1248	ND	ND[2]		5/Month	Grab
PCB Aroclor 1254	ND	ND[2]		5/Month	Grab
PCB Aroclor 1260	ND	ND[2]		5/Month	Grab
Outfall 005 - Air Pollution Control Saline Water					
Flow	Monitor	Monitor	GPD	Daily[1]	Grab
Temperature		90	deg. F	Daily[1]	Grab
pH	(6.0 to 9.0)		SU	Daily[1]	Grab
Solids, Total Suspended	25	45	mg/l	Daily[1]	Grab
Solids, Settleable	NA	0.3	ml/l	Daily[1]	Grab
Arsenic, Total	Monitor	Monitor	mg/l	Daily[1]	Grab
Cadmium, Total	NA	0.004	mg/l	Daily[1]	Grab
Chromium, Total	NA	1.7	mg/l	Daily[1]	Grab
Chromium, Hexavalent	NA	0.016	mg/l	Daily[1]	Grab
Copper, Total	NA	0.018	mg/l	Daily[1]	Grab
Lead, Total	NA	0.08	mg/l	Daily[1]	Grab
Mercury, Total	NA	0.0002	mg/l	Daily[1]	Grab
Nickel, Total	NA	1.8	mg/l	Daily[1]	Grab
Zinc, Total	NA	0.3	mg/l	Daily[1]	Grab

FOOTNOTES

1 = Samples shall be taken each day a discharge occurs.
2 = Each individual Aroclor shall be non-detectable by USEPA Method 608 with a MDL of 0.065ppb. See the Compliance Criteria for PCB's below.
3 = Representative composite consisting of a minimum of three samples (one at the beginning, middle, and end of the discharge period.
4= The permittee must make application prior to any increase in allowable metals concentration of the Waste Fuel Oil (LGF) which would ensure compliance with the effluent limits set forth in this permit.

Compliance Criteria for PCB's in SPDES permits

1. If one or more of the five samples are found to have a PCB concentration at or above the MDL, the permittee will be in non-compliance with the permit for the one month when the samples were taken.

2. If only one sample out of the five has a concentration greater than or equal to the MDL and less than the Practical Quantitation Limit (PQL = 4 x Approved MDL) the permittee may elect to analyze three additional samples collected and extracted earlier during the same one month period.

3. If all of the additonal three samples are found to be less than the MDL, the permittee will be in compliance with the permit for the month.

4. If one or more of the additional three samples are found to exceed the MDL, the permittee shall be in non-compliance with the permit for the month.

Additional Special Conditions

1. The Permittee shall comply with DEC Consent Order (R4-0768-90-01), dated June 12, 1990 and approved plans dated August, 1990 to comply with dust control requirements.

2. The metals feed rate concentrations in the hazardous waste fuel (LGF) for Arsenic, Chromium, Copper, Mercury, Nickel, Selenium, and Zinc shall not increase above the previously permitted levels described below until such time as all applicable pre-increase requirements contained in the hazardous waste/air control permits and Consent Order (R4-0768-89-08) have been complied with and;

   A Department approved wastewater treatment system has been installed and operating to the satisfactin of the Department; or,

   The Department determines, based upon additional information submitted by the permittee, the acceptability of alternate control measures on an interim basis; or,

   The Department determines, based on additional information submitted by the permittee the acceptability of a demonstration that effluent limitatins set forth in this permit will not be exceeded by implementation of the proposed higher feed rate concentrations prior to the completion of construction and operation of the new wastewater treatment system required by this SPDES permit.

Feed Rate Concentrations (LGF)

PPM

PARAMETER	CURRENT CONCENTRATIONS	PROPOSED CONCENTRATIONS
Arsenic	1.7	25
Chromium	200	500
Copper	490	1000
Mercury	4.5	45
Nickel	440	600
Selenium	0.36	25
Zinc	100	1000

Definition of Daily Average and Daily Maximum

The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when the measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

Monitoring Locations

Permittee shall take samples and measurements to meet the monitoring requirements at the location(s) indicated below: (Show locations of outfalls with sketch or flow diagram as appropriate).

Outfall 005 - Air Pollution Control Saline Water

Barium, Total	0.40	MG/L	Weekly	Grab
Beryllium, Total	0.010	MG/L	Weekly	Grab
Selenium, Total	0.30	MG/L	Weekly	Grab

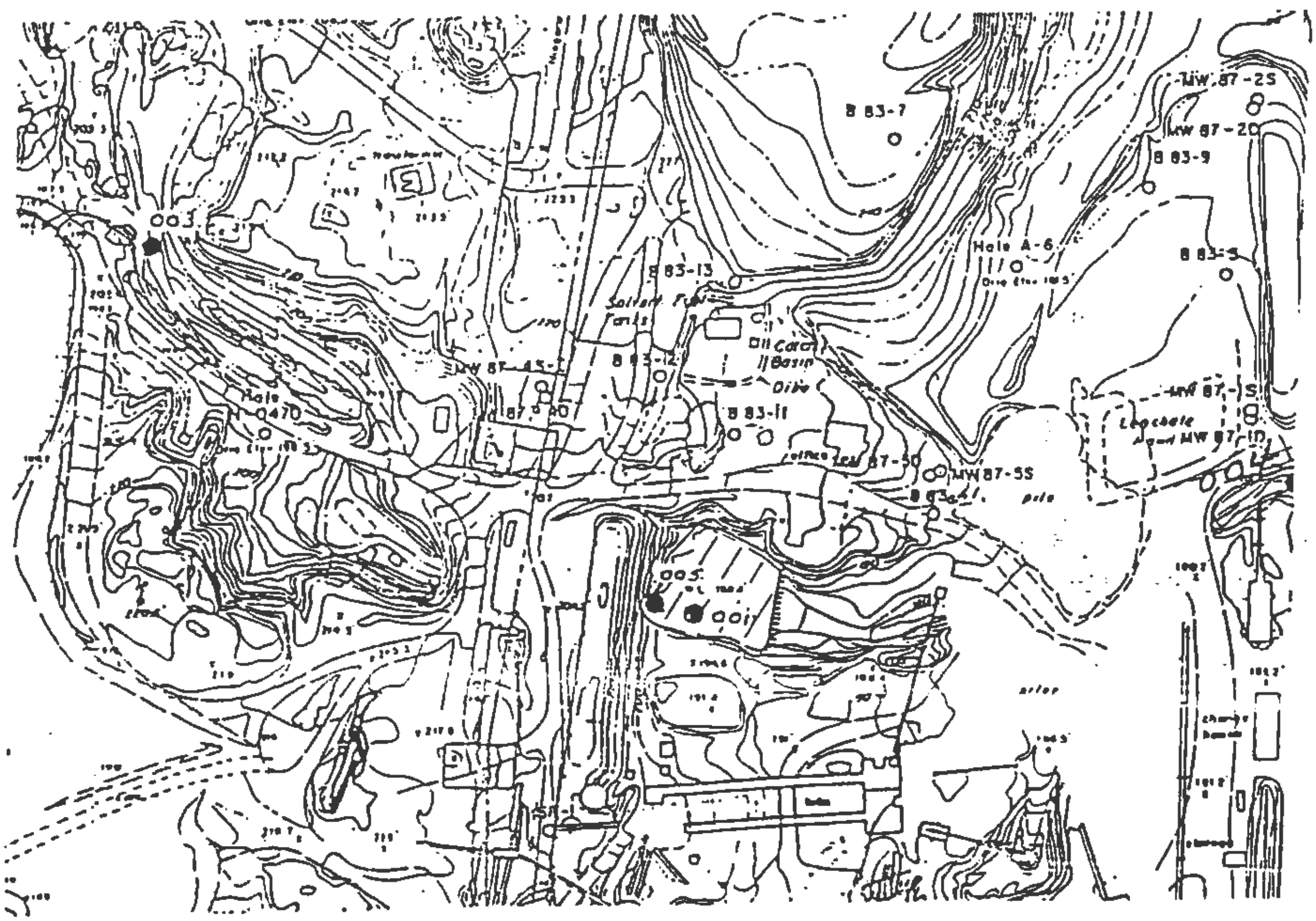
Definition of Daily Average and Daily Maximum

The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when the measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

Monitoring Locations

Permittee shall take samples and measurements to meet the monitoring requirements at the location(s) indicated below: (Show locations of outfalls with sketch or flow diagram as appropriate).



SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule.

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001 004 005	The permittee shall submit an approvable Engineering Report which provides a final and comprehensive description of the wastewater problem(s) and proposed solution(s) including applicable design criteria. The Engineering Report shall contain the basic elements as described in the Bureau of Wastewater Facilities Design's, Industrial Wastewater Treatment Facilities (see attached). The wastewater shall be characterized for Dioxins using USEPA Method 613, in addition to permit parameters (metals, PCB Individual Aroclors). The wastewater characterization shall adequately reflect the spectrum of operating conditions. Consideration should be given to account for contribution from both kilns once the additional air pollution control system is installed and low grade fuels are allowed. If the proposed solution is other than direct discharge to waters of the state, a letter of intent for approval from the appropriate authority must be included in the report for it to be considered approvable.	EDP + 3 mos.
		The permittee shall submit revised Best Management Plan (BMP) which incorporates comments as attached.	EDP + 3 mos.

b) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice under terms of the General Conditions (Part II), Section 5. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

c) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS, unless otherwise specified in this permit or in writing by the Department.

SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule.

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001 004 005	Submit an approveable Work Plan to conduct a Method Detection Limit (MDL) Study in accordance with 40 CFR 136, Appendix B utilizing the following analytical methods: Parameter — USEPA Method Cadmium, Total — 213.2 Chromium, Hexavalent — 220.2 Mercury, Total — 245.1 or 245.2 PCB Aroclor 1026 — 608 " 1221 — 608 " 1232 — " " 1242 — " " 1248 — " " 1254 — "	EDP + 1 mo.
		The permittee shall submit approvable plans and specificatons for construction of the wastewater treatment plant as approved in the Engineering Report	EDP + 6mos.
		Begin Construction of the wastewater treatment plant	EDP + 8 mos.
		Complete Construction of the wastewater treatment plant	EDP + 20 mos.
		Achieve Operational level of the wastewater treatment	EDP + 21 mos.
		Submit an approvable final report outlining the results of the MDL study.	EDP + 24 mos.

b) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice under terms of the General Conditions (Part II), Section 5. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

c) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS, unless otherwise specified in this permit or in writing by the Department.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of three years from the date of the sampling for subsequent inspection by the Department or its designated agent. Also;

[X] (if box is checked) monitoring information required by this permit shall be summarized and reported by submitting completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

Send the **original** (top sheet) of each DMR page to:

Department of Environmental Conservation
Division of Water
Bureau of Wastewater Facilities Operations
50 Wolf Road
Albany, New York 12233-3506

Phone: (518) 457-3790

Albany County Health Department
Division of Environmental Health
South Ferry & Green Streets
Albany, NY 12201

Send the **first copy** (second sheet) of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer
2176 Guilderland Avenue
Schenectady, NY 12306

c) A monthly "Wastewater Facility Operation Report..." (form 92-15-7) shall be submitted (if box is checked) to the [ ] Regional Water Engineer and/or [ ] County Health Department or Environmental Control Agency listed above.

d) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in the attached General Conditions (Part II).

e) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

f) If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording on the Discharge Monitoring Reports.

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit

h) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

i) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approvalpursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockerfeller State Plaza, BC

Norlite Corporation

P.O. BOX 694 628 SO. SARATOGA ST. COHOES, N. Y. 12047 TEL.: (518) 235-0401

March 5, 1992

WJZ-057-92

Mr. William Clarke
Regional Permit Administrator
New York State Department of
Environmental Conservation
Region IV
2176 Guilderland Ave.
Schenectady, NY 12306

RE: Impact of Higher Metals Limits on Scrubber Blowdown Characteristics

Dear Mr. Clarke:

In accordance with Additional Special Condition No. 2 of SPDES Permit No. NY0004880, Norlite is submitting the attached mass balance calculations to demonstrate that the scrubber blowdown to Outfall 005 at the higher proposed concentrations of metals in the hazardous waste fuel (LGF) will not be impacted beyond that resulting from current Part 360 levels. This mass balance supplements Norlite's letter of December 27, 1991 in which Norlite presented theoretical factors to support that the higher LGF metals limits would not affect the current characteristics of the scrubber blowdown and discharge to Outfall 005.

The mass balance calculations, attached, are based on eight months of operating data. These calculations support that for arsenic, chromium, copper, nickel, selenium and zinc, an increase in LGF limits to the proposed 373 permit levels will not have an impact on the current blowdown characteristics. Furthermore, if mercury is restricted to 10 ppm in the LGF feed, the scrubber blowdown characteristics for mercury will likewise not be impacted compared with current levels.

Based on the attached mass balance, Norlite requests that NYSDEC allow operation at the higher LGF metals limits, and a 10 ppm mercury limit, after issuance of the Part 373 permit, and before completion of construction of the full-scale wastewater treatment plant. The attached mass balance analysis demonstrates that a temporary wastewater treatment system is not needed prior to implementation of the higher LGF metals limits. Norlite is proceeding with the full-scale wastewater treatment system in accordance with the compliance schedule delineated on page 8 and 9 of the permit. Until the wastewater treatment plant is started up, the attached calculations demonstrate there is no need to restrict the higher proposed LGF metal limits, since the scrubber blowdown is not impacted.

If you have any questions on the attached mass balance calculations, please contact Rich Schlauch at 803/324-5310 or myself.

Sincerely,

William J. Ziegler

William J. Ziegler
Vice President of Health,
Safety and Environmental Affairs

WJZ:ncm

Attachments

cc: Carol Lamb-LaFay, DEC Region IV, Schenectady
Sanjay Saraiya, DEC Wolf Road
Bill Voshell
Mark Taylor
Dallas Robinson
Donald Faul

ATTACHMENTS

- o Mass Balance Demonstrating the Impact of Higher LGF Metals Limits on Scrubber Blowdown Characteristics

- o December 27, 1991 Letter Presenting Theoretical Factors supporting no impact of higher LGF Metals Limits on Scrubber Blowdown Characteristics

EFFECT OF HIGHER METALS LIMITS IN FUTURE PART 373 LGF PERMIT ON SCRUBBER WATER CHARACTERISTICS AS DISCHARGED TO OUTFALL 005

March 3, 1992

EFFECT OF HIGHER METALS LIMITS IN FUTURE PART 373 LGF PERMIT ON SCRUBBER BLOWDOWN

The following data and calculations are being submitted in response to Additional Special Condition No. 2 in Part 1, page 5 of the renewed Norlite SPDES permit (#NY0004880) effective 2/1/92. This process performance data demonstrates that the increased "Part 373" permit metals concentrations in the low grade fuel (LGF) for arsenic, chromium, copper, nickel, selenium and zinc will not significantly increase existing effluent metal concentrations before wastewater treatment is installed. This data also shows that increasing the mercury concentration from the 4.5 ppm level in the interim status "Part 360" permit to 10 ppm will have little if any detectable impact on the effluent mercury concentration. Based on the information presented here, Norlite respectfully requests that DEC allow Norlite to implement the proposed higher feed rate concentrations specified in the "Part 373" permit (except for mercury) without a temporary wastewater treatment system. We recommend that an interim feed rate concentration of 10 ppm be implemented for mercury until the approved full-scale wastewater treatment system has been installed. After the wastewater treatment system has been installed and operating, we request that the proposed 45 ppm mercury feed rate concentration for LGF be implemented.

COMPARISON OF PRESENT BLOWDOWN METAL CONCENTRATIONS WITH THE PREDICTED EFFECT OF FUTURE "PART 373" LGF LIMITS

In order to demonstrate what, if any, impact the proposed increases in LGF metals feed rates will have on the metal concentrations in the scrubber blowdown, a data evaluation was performed to establish the percentage of each metal in the total kiln feed streams that pass into the scrubber water. By comparing analyses of the LGF feed metals concentrations with scrubber blowdown metals concentrations obtained from 16 grab samples taken between April 1991 and January 1992, the summary of results shown in Table 1 were established. This table compares the actual present scrubber blowdown metals concentrations resulting from present "Part 360" LGF metals limits with calculated scrubber blowdown metals concentrations resulting from future "Part 373" LGF metals limits. It is demonstrated here that the only calculated blowdown metal concentration, based on future "Part 373" LGF limits, that will exceed both the SPDES permit limit and the present blowdown at 95 percent upper confidence level (UCL) metal concentration is mercury at 0.233

ppm (i.e., far right hand column). This indicates that (except for mercury) there is no statistical difference between the calculated future blowdown metals concentrations (based on LGF metal concentrations at the future "Part 373" limits) and present scrubber blowdown effluent concentrations. Mercury can be maintained in the untreated scrubber blowdown at concentrations well below the 95% UCL and maximum present blowdown concentrations by limiting it to an LGF feed concentration of 10 ppm.

STATISTICAL ANALYSIS OF KILN #2 SCRUBBER BLOWDOWN METAL CONCENTRATIONS BASED ON 4/91 - 1/92 GRAB SAMPLE RESULTS

Table 2 shows the mean, maximum and 95% confidence levels for the range of metal concentrations analyzed in the present blowdown (i.e., Norlite Outfall 005). Based on the 16 grab sample data points obtained during this period, a metal concentration falling between the 95% lower confidence level (LCL) and 95% upper confidence level (UCL) shown in the two right hand columns respectively, is considered to be part of the same data population as the 4/91 - 1/92 blowdown grab sample set reported in the two left hand columns. A calculated metal concentration based on a different LGF feed rate metal concentration that falls between these 95% LCL's and UCL's would also be part of the same data population. Comparison of the calculated blowdown concentrations based on future "Part 373" metal limits in Table 1, with these LCL and UCL concentrations in Table 2 shows that all metals (except mercury) would not be statistically increased by operating at the maximum "Part 373" LGF metals limits.

The individual grab sample data points for present blowdown metal concentrations that were used as the basis of these calculations are shown in Table A, Appendix A.

CALCULATED SCRUBBER BLOWDOWN CONCENTRATIONS BASED ON FUTURE LGF PERMIT METAL LIMITS

Table 3 shows the data used for calculating the effect of future LGF permit metals limits on scrubber blowdown. The calculated concentrations of metal in the scrubber blowdown (at a nominal blowdown rate of 10 gpm) is equal to the product of the blowdown (BD) to total feed (TF) metal concentration ratio times the sum of the LGF plus shale metal mass feed rates to the kiln.

The LGF and shale metals mass (i.e., lbs/hour) feed rates are based on an LGF feed rate of 4800 lbs/hour and a shale feed rate of 44,000 lbs/hr. The BD/TF concentration ratio is a factor that represents the percentage of metal in the total feed to the kiln that typically passes through the kiln and baghouse systems into the scrubber water. The percentages of feed metals passing into the scrubber blowdown are calculated from data shown in Table 4.

In Table 4, the concentration of metals in the LGF represent the long-term overall average metal concentrations analyzed over the period of April 1991 to January 1992. The LGF feed rate is 4800 lbs/hour. The shale feed rate metal concentrations are the same average concentrations shown in Table 3, at shale feed rates of 44,000 lbs/hr.

CALCULATION OF PERCENT OF KILN FEED METALS CONCENTRATIONS IN SCRUBBER BLOWDOWN

Table 4 also shows the metal concentration data used to calculate the percentage of metals passing from the kiln feed streams into the scrubber blowdown. The LGF and scrubber blowdown concentrations represent actual operating data obtained during Kiln #2 operation at present Part 360 permit limits from April 1991 to January 1992. The average blowdown rate was 6 gpm during this period. The shale metals concentrations represent the typical metals concentrations of the raw shale feed into the kiln.

CONCLUSIONS

Kiln #2 operating data collected from April 1991 to January 1992 shows that a predictable percentage of metals in the total kiln feeds will pass through the kiln and baghouse systems into the scrubber water. These percentages are shown in Table 4 and (except for mercury) are sufficiently low (i.e., less than 0.1 percent in most cases) that they will not significantly affect the concentration of metal in the scrubber blowdown, beyond the 95% confidence interval of current scrubber blowdown characteristics, if the LGF feed metals are increased to the proposed "Part 373" permit limits. These low percentages are expected and consistent with theoretical arguments based on solubility product constants presented in Norlite's letter of December 27, 1991 to DEC.

Mercury apparently could be significantly affected in the scrubber blowdown by an increase to the future "Part 373" permit limit of 45 ppm. However, the effect of increasing mercury in the LGF feed on scrubber blowdown can be held to an insignificant level by maintaining the LGF mercury concentration at a maximum of 10 ppm. This would maintain the predicted scrubber blowdown mercury concentration at about 0.077 ppm which is less than both the maximum and the 95% UCL concentration being observed for the present typical scrubber blowdown.

Calculation of the predicted scrubber blowdown mercury concentration at an LGF maximum mercury concentration of 10 ppm is performed according to Tables 3 and 4 as follows:

MERCURY IN LGF FEED (ppm)	MERCURY IN LGF FEED (lbs/hr)	+	MERCURY IN SHALE (lbs/hr)	=	MERCURY IN TOTAL FEED (lbs/hr)	x	(BD/TF) METAL RATIO	=	MERCURY IN SCRUBBER BD (lbs/hr)	MERCURY IN SCRUBBER BD (ppm)
10	0.048		0.0352		0.0832		0.004722		0.00033	0.077

According to Table 1, 0.077 ppm mercury in the scrubber blowdown is within the current statistical confidence interval of the typical blowdown concentrations under present Part 360 metal permit conditions and without wastewater treatment.

Therefore, these results demonstrate that Norlite's kiln operation scrubber blowdown metals concentrations will be maintained at present levels with the proposed "Part 373" LGF permit metal limitations, as long as mercury is maintained at a maximum concentration of 10 ppm in the LGF.

TABLE 1

COMPARISON OF CALCULATED BLOWDOWN METAL CONCENTRATIONS AT PRESENT AND FUTURE LGF PERMIT METALS LIMITATIONS WITH PRESENT SCRUBBER BLOWDOWN PERFORMANCE DATA

METAL	SPDES PERMIT LIMIT (mg/l)	CURRENT LGF PERMIT LIMITS ACTUAL PRESENT BLOWDOWN CONC. AT 10 GPM (4/91-1/92 DATA)(mg/l)			FUTURE 373 LGF PERMIT LIMITS CALCULATED BLOWDOWN CONC. AT 10 GPM (mg/l)
		MEAN	MAX	95% UCL	
Arsenic	Monitor	0.018	0.036	0.020	0.019
Chromium(T)	1.7	0.376	5.47	3.04	0.731
Chromium+6	0.016	0.007	0.012	0.010	0.014
Copper	0.018	0.508	2.52	1.85	1.71
Mercury	0.0002	0.033	0.158	0.113	0.233
Nickel	1.8	0.784	12.0	6.65	1.32
Selenium	0.30	0.058	0.168	0.183	0.189
Zinc	0.30	0.151	0.738	0.529	0.325

TABLE 2

STATISTICAL ANALYSIS OF KILN #2 SCRUBBER BLOWDOWN METAL CONCENTRATIONS AT 95% CONFIDENCE
(Based on 6 GPM Blowdown Flow)

METAL	PRESENT ANALYTICAL DATA FOR METALS (4/91-1/92), mg/l			RANGE OF PRESENT METAL DATA AT 95% CONFIDENCE LEVELS, mg/l	
	MEAN	MAX	S.D.	LCL	UCL
Arsenic	0.03	0.06	0.0017	0.0267	0.0333
Chromium(T)	0.626	9.12	2.2670	0.000	5.0693
Chromium+6	0.011	0.02	0.0027	0.0057	0.0163
Copper	0.847	4.20	1.1427	0.000	3.0867
Mercury	0.055	0.264	0.0678	0.000	0.1879
Nickel	1.306	20.0	4.9863	0.000	11.08
Selenium	0.097	0.28	0.1061	0.000	0.3050
Zinc	0.252	1.23	0.3214	0.000	0.8819

WHERE:

Upper Confidence Level (UCL) = Mean + (1.96 x S.D.)
Lower Confidence Level (LCL) = Mean - (1.96 x S.D.)

TABLE 3

FUTURE "373" PERMIT METAL LIMITS FOR LGF VS. SCRUBBER BLOWDOWN CONCENTRATIONS

OF-005 SPDES PERMIT METALS	LGF FEED PERMIT LIMIT (ppm)	LGF FEED PERMIT LIMIT (lbs/hr)	+	SHALE (lbs/hr)	=	TOTAL FEED (lbs/hr)	x	(BD/TF) METAL CONC. RATIO	=	SCRUBBER B.D. CONCENTRATION (lbs/hr)	SCRUBBER B.D. CONCENTRATION (ppm)
Arsenic	25	0.120		5.63		5.75		0.000017		0.000098	0.019
Chromium(T)	500	2.40		2.16		4.56		0.000874		0.00399	0.781
Chromium+6	500	2.40		2.16		4.56		0.000016		0.00007	0.014
Copper	1000	4.8		1.83		6.63		0.001318		0.0087	1.71
Mercury	45	0.216		0.0352		0.251		0.004722		0.00119	0.233
Nickel	600	2.88		4.18		7.06		0.000957		0.006756	1.32
Selenium	25	0.120		0.0528		0.1728		0.00557		0.00096	0.189
Zinc	1000	4.80		3.79		8.59		0.000193		0.00166	0.325

TABLE 4

PERCENT OF KILN FEED METALS IN SCRUBBER BLOWDOWN AT PRESENT LGF AND SHALE METAL LOADINGS

METAL IN SPDES PERMIT	KILN FEED METAL LOADINGS					BLOWDOWN METAL @ 3100 LBS/HR BD		PERCENT METAL PASSING THROUGH TO BLOWDOWN
	LGF		SHALE		TOTAL			
	ppm	lbs/hr	ppm	lbs/hr	lbs/hr	ppm	lbs/hr	
Arsenic	0.35	0.0017	128	5.632	5.6337	0.030	0.00009	0.0017%
Chromium(T)	3.86	0.0185	49	2.156	2.175	0.626	0.00194	0.0874%
Chromium+6	3.86	0.0185	49	2.156	2.175	0.011	0.000034	0.0016%
Copper	30.6	0.147	41.5	1.826	1.973	0.847	0.0026	0.1318%
Mercury	0.10	0.0005	0.80	0.035	0.036	0.055	0.00017	0.4722%
Nickel	10.5	0.050	95	4.18	4.230	1.306	0.00405	0.0957%
Selenium	0.27	0.0013	1.2	0.053	0.054	0.097	0.00030	0.5569%
Zinc	53.5	0.00078	86.1	3.788	4.045	0.252	0.00078	0.0193%
Flow Rate (lbs/hr)	-	4,800	-	44,000	-	-	31,000	-

APPENDIX A

NORLITE OUTFALL 005 GRAB SAMPLE DATA
FOR PRESENT SCRUBBER BLOWDOWN CONDITIONS

TABLE A

PRESENT SCRUBBER BLOWDOWN DATA

NORLITE OUTFALL 005 SAMPLE ANALYSES

PARAMETER	SPDES Limit (mg/l)	1991 Grab Samples 4/22	4/23	4/24	6/11	6/15
Arsenic	Monitor	<0.06	<0.06	<0.06	<0.05	<0.05
Barium	0.4	0.13	0.11	0.35	0.06	0.25
Beryllium	0.01	<0.006	0.002	0.001	<0.0006	<0.0006
Cadmium	0.004	0.54	0.18	0.23	0.006	0.003
Chromium (T)	1.7	0.10	0.04	9.12	0.34	0.14
Chromium +6	0.016	<0.02	<0.02	<0.04		
Copper	0.018	0.12	0.10	0.33	0.14	0.14
Lead	0.08	0.73	<0.004	0.15	0.06	0.02
Mercury	0.0002	0.264	0.006	0.008	0.03	0.148
Nickel	1.8	0.03	0.02	20.0	0.24	0.21
Selenium	0.30	<0.07	<0.07	0.28	<0.07	0.10
Zinc	0.30	0.21	<0.02	1.23	0.19	0.13
T.S.S.	25	350	218	555	708	708

NORLITE OUTFALL 005 SAMPLE ANALYSES

PARAMETER	SPDES Limit (mg/l)	1992 Grab Samples 1/6	1/7	1/8	1/9	1/10
Arsenic	Monitor	<0.06	<0.06	<0.06	<0.06	<0.06
Barium	0.4					
Beryllium	0.01					
Cadmium	0.004	0.011	0.009	0.011	0.003	<0.004
Chromium (T)	1.7	<0.006	<0.006	<0.006	<0.006	<0.006
Chromium +6	0.016	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	0.018	2.71	4.20	0.47	0.58	1.38
Lead	0.08	0.31	0.43	0.38	0.08	0.03
Mercury	0.0002	<0.0004	0.020	0.005	0.048	0.095
Nickel	1.8	0.12	<0.01	<0.01	<0.01	<0.01
Selenium	0.30					
Zinc	0.30	0.67	0.54	<0.02	0.09	0.07
T.S.S.	25	1648	1200	66	1050	2060

TABLE A

PRESENT SCRUBBER BLOWDOWN DATA

NORLITE OUTFALL 005 SAMPLE ANALYSES

PARAMETER	1992 Grab Samples 1/11	1/12	1/13	1/14	1/17	1/18
Arsenic	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Barium						
Beryllium						
Cadmium	<0.004	0.001	<0.004	0.002	0.0005	0.023
Chromium (T)	<0.006	<0.006	0.068	0.054	0.019	0.086
Chromium +6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	1.65	0.23	0.23	0.33	0.29	0.65
Lead	0.17	0.15	0.01	0.13	0.32	0.36
Mercury	0.044	0.058	0.043	0.027	0.066	0.012
Nickel	<0.01	0.18	<0.01	<0.01	<0.01	0.02
Selenium						
Zinc	<0.02	0.058	0.28	0.28	0.10	0.12
T.S.S.	2458	1700	1200	538	972	2000

NORLITE OUTFALL 005 SAMPLE ANALYSES

PARAMETER	SPDES Limit (mg/l)	4/91-1/92 Grab Samples Mean	Max	Min	Std. Dev.
Arsenic	Monitor	0.03	0.06	<0.05	0.0017
Barium	0.4	0.18	0.35	0.06	0.1179
Beryllium	0.01	0.0018	0.002	<0.0006	0.0013
Cadmium	0.004	0.064	0.54	0.0005	0.1442
Chromium (T)	1.7	0.624	9.12	0.006	2.2672
Chromium +6	0.016	0.011	<0.04	<0.02	0.0027
Copper	0.018	0.847	4.2	0.10	1.1427
Lead	0.08	0.208	0.73	<0.004	0.1998
Mercury	0.0002	0.055	0.264	<0.0004	0.0678
Nickel	1.8	1.304	20.0	<0.01	4.9863
Selenium	0.30	0.097	0.28	<0.07	0.1061
Zinc	0.30	0.252	1.23	<0.02	0.3214
T.S.S.	25	1089	2458	66	712

Norlite Corporation

"Norlite" A Rotary Kiln Expanded Shale Aggregate

P.O. BOX 694 628 SO. SARATOGA ST. COHOES, N. Y 12047 TEL. (518) 235-0401

December 27, 1991

RS-074-91

William J. Clarke
Regional Permit Administrator
New York Department of Environmental Conservation
Region IV
2176 Guilderland Avenue
Schenectady, New York 12306

SUBJECT: Comments Regarding Norlite 373 and SPDES Permit - Factors Affecting Solubility of Heavy Metal Ions in Scrubber Waters from Thermal Combustion Process Off-gases

Dear Mr. Clarke:

During the process of finalization of the draft permit conditions for Norlite's Part 373 and air permits, it became apparent that the DEC Division of Water has expressed concerns over increases in the allowable feed rates of certain metals in low grade fuel used by Norlite to operate the LWA kiln.

We would like to provide the Division of Water with the technical rationale as to why it should be expected that the concentrations of these metals will not increase in the discharge for Outfall 005. In providing this technical rationale, Norlite emphasizes that we fully intend to install wastewater treatment capability for the SPDES discharge. Norlite provides these comments mainly to clarify that the higher metal limits in the LGF feed will have no adverse impact on the effluent discharge to Outfall 005, even prior to installation of the wastewater treatment facilities. For this reason, Norlite requests that the Additional Special Condition No. 2 of the SPDES Permit Modification, and the same special condition in the Part 373 permit, be eliminated since the higher LGF metals limits will not have a negative impact on the effluent quality from Outfall 005. The technical basis of this conclusion is provided as follows.

Discussion of Theory of Fate of Metals in Water Outfall

During thermal combustion of material containing heavy metals, where oxygen is constantly available during the combustion process, the metal oxides of the non-refractory metal will form since these are the most thermodynamically stable form of the metals under these conditions. Depending on the specific metals present and the characteristics of other materials being combusted some percentage of these combustible metals forming oxides can be carried by the off-gas stream to the scrubber water phase in either gaseous or particulate form. Whether or not any of these metals exist in the gaseous metal oxide state in the off-gas depends on the temperature of the off-gas. In as much as the off-gas scrubbing process is carried out under conditions that maintain the scrubber water in the liquid phase, the metal oxides in both the liquid and gaseous scrubber streams will be in the solid or particulate state as they exit the scrubbing process. This is necessary since the temperature of both the liquid and gas scrubbing streams exiting the scrubber are well below the boiling point of water. In general, these exit temperatures will be less than 190°F at which temperature it is impossible for any heavy metal (or heavy metal oxide) to exist in the gaseous phase.

Once in the particulate form, these metal oxides will partition into the scrubber liquid stream and remain primarily as suspended solids until they are physically removed by wastewater treatment processing. Most heavy metal oxides are essentially insoluble in the scrubber water and remain in this form because they are thermodynamically stable under these conditions. Some metal oxides have a slight degree of solubility in the scrubber water and form metal hydroxides as they dissolve in the scrubber water.

The solubility of any heavy metal, whether it exists in the scrubber water as the oxide or the hydroxide is controlled by a chemical equilibrium process between the solid and aqueous phases by a relationship known as the solubility product constant. No more metal can exist dissolved in the water phase than a specific concentration of metal as governed by these solubility product constants for each metal. For any metal, the solubilities of the metal oxides and hydroxides (defined as concentration of metal in solution) can be found by consulting text books in chemistry and various published handbooks such as the Chemical Rubber Company Handbook of Physics and Chemistry (i.e., CRC Handbook). There are also tables listing the specific solubility product constant of each metal ion in water at constant temperature and pH of the water solutions.

This means that no metal can exist in aqueous solution at concentrations higher than the solubility product relationship defined for that metal hydroxide, as long as pH and temperatures are controlled at the values specified for that solubility product constant. All excess metal present in the scrubber water that exists at concentrations greater than the solubility product constant allows for, has to exist as solid metal hydroxide. As long as the pH and temperature of the scrubber water are controlled, the concentration of any heavy metal in the scrubber water solution will be limited to a specific value. This value is the maximum concentration permitted by the pH and temperature conditions (basically the ionic activity) present in the water solution. The solubility of the metals is most affected by the pH of the solution. Temperature variations less than the boiling point of water have only a slight affect on the solubility of metal hydroxides. So as long as the pH is controlled at neutral to alkaline values the concentration of dissolved heavy metals in the scrubber water will be controlled (as shown by the attached Figure). Adding alkali (such as lime or caustic to the scrubber water) ensures that the metals are maintained in precipitated form.

Therefore, the concentration of heavy metals that will exist as dissolved species in the scrubber water is essentially independent of the mass of heavy metals in materials being combusted in the thermal combustion unit and in the off-gas stream entering the scrubber system. The concentration of heavy metal dissolved in the scrubber water is primarily dependent on the pH of the scrubber water. Dissolved metals are controlled to limited concentrations by maintaining neutral to alkaline conditions in the scrubber water and wastewater treatment system by automatic pH controls.

Application of Theory to Norlite's Discharge

The scrubber water from the air pollution control system for the Norlite lightweight aggregate kiln is required to be maintained at a pH of greater than 8.0, by the addition of lime as specified by condition C(7)(a) and (b) of Module VII of the Air Pollution Control and Hazardous Waste Management permit. As discussed above, metal solubility is dependent upon pH, and at alkaline pH, the metals are maintained in precipitated form. Therefore, the solubility product constant limits the amount of metals that will solubilize, at a given pH, and the solubility of metals is independent of the mass of precipitated metals.

Therefore, despite the higher metal limits in the LGF feed to the kiln and the resulting higher metal input rates to the scrubber; at the pH of the scrubber water controlled by permit conditions, the increase metals will remain in precipitated form, and not in soluble form. Therefore, the effluent concentration of metals will not increase significantly, as the solubility product constant limits the amount of metal that can solubilize.

In conclusion, therefore, the higher feed limits for copper, mercury, nickel, selenium and zinc proposed in the Module VII of the draft 373 permit will have no negative impact on the current quality of the effluent discharge to Outfall 005. For this reason, Norlite requests that Special Condition No. 2 be eliminated from the modified permit.

Sincerely,

William J. Ziegler

William J. Ziegler

RS:nm

cc: Carol Lamb-LaFay, NYSDEC Region IV
Richard Schlauch
Donald Faul
Mark Taylor

Norlite Corporation

A ROTARY KILN "Norlite" EXPANDED SHALE AGGREGATE

P.O. BOX 694 628 SO. SARATOGA ST. COHOES, N.Y. 12047 TEL.: (518) 235-0401
FAX: (518) 235-0233

February 20, 1992

William Clarke
Regional Permit Administrator
New York State Department of
Environmental Conservation
Region 4
2176 Guilderland Avenue
Schenectady, NY 12306

Re: DEC #4-0103-16/16-0 -- Norlite Facility SPDES
REN/MOD Cohoes-C, Albany Co.

Dear Mr. Clarke:

This letter is in response to your letter to me dated January 27, 1992 enclosing the renewed SPDES permit for Norlite Corporation ("Norlite"). This letter is being submitted pursuant to 6 NYCRR §621.7(f) which requires an applicant to identify within 30 calendar days after the date of mailing of the final permit any conditions or objections to the permit.

First, I want to thank you and the region staff for the prompt professional attention you have given to Norlite's matters. By this letter, I would like to clarify Norlite's understanding of some of the terms and conditions of the SPDES permit forwarded under your cover letter dated January 27, 1992.

1. Page: 1 of 10 — Under the permittee name and address, it identifies Jay Derman as Executive Vice President of Norlite. Jay Derman is no longer an employee of Norlite and Dallas Robinson, Director of Operations, should be identified.

2. Page: 1 of 10 — The Salt Kill Creek is identified as a Class D stream. Last summer, the Department commenced a rulemaking proposing to upgrade the Salt Kill Creek

from a "D" classification to a "C" classification. Norlite participated in that rulemaking opposing the reclassification. It is our understanding based on discussions with the Department staff, that the Department will refrain from reclassifying the Salt Kill during this rulemaking.

3. Page: 2 of 10 — Outfall 001 no longer receives the scrubber water from Kiln #1 or the stormwater lagoon overflow. Norlite does not anticipate that the non-contact cooling water and boiler blowdown contain PCBs, and anticipates seeking at a later date modifications to add those discharges to Outfall 005 where the wastewater treatment system will be installed. The modification request will be incorporated in the Engineering Report required by the permit. In the meantime, the maximum discharge limitation for chromium is incorrectly listed as 1.0. Assuming a hardness of 100 mg/l, the calculated water quality standard for chromium is 1.7 mg/l.

4. Page: 2,3 of 10 — Water quality-based effluent limitations for Norlite's discharges to the Salt Kill are based on a base flow under MA 7/CD 10 conditions. The numerical water quality standards for cadmium, chromium, copper, lead, nickel and zinc are expressed in terms of the hardness of the water. DEC assumed that the Salt Kill is an intermittent stream and therefore reasoned that the entire flow in the stream downstream of Norlite's facility was made up solely of Norlite's discharges during MA 7/CD 10 conditions. Accordingly, the stream standards became the water quality-based effluent limitations. The Agency assumed a 100

mg/l hardness value. In the Engineering Report submitted in May, 1991, Norlite asserted that the hardness of the wastewater (i.e., 1274 mg/l), rather than the assumed 100 mg/l background level, should be used to ascertain the hardness of the stream under MA 7/CD 10 conditions. In a letter dated August 7, 1991, the Agency rejected that proposal and indicated that it would use hardness data representative of natural streams (i.e., 350 mg/l) in the calculation. It was suggested that Norlite submit such data. Norlite has tested the hardness in the Salt Kill and the data is shown on Table 1 of the Engineering Report. The hardness in the Salt Kill ranged to a high of 311 with a mean of 225. Nonetheless, the permit was issued with water quality-based standards based on the assumed hardness level of 100 mg/l. The more appropriate limitations are summarized below:

	Limitation (mg/l)		
Parameter	100 mg/l Hardness	350 mg/l Hardness	225 mg/l Hardness
Cd	.004	.058	.01
Cu	.018	.058	.038
Cr	1.7	4.8	3.4
Pb	.08	.4	.23
Ni	1.8	4.8	3.4
Zn	.3	.91	.63

Norlite requests that the permit be modified to properly reflect the discharge limits associated with the water quality-based limits with a hardness of 350 mg/l.

5. Page: 6 of 10 — It is Norlite's understanding that the parameters listed on the bottom of page 6 of 10 (i.e., Barium, Beryllium and Selenium) were meant to appear as additional parameters on page 3 of 10.

6. Page: 9 of 10 — It is Norlite's understanding that the method of detection limits study referred to on page 9 of 10 should be conducted after the wastewater treatment system is installed. The report from the MDL Study is due 24 months after the effective day of the permit.

7. Page: 9 of 10 — Under the terms of the permit, Norlite can continue its discharges without treatment and has 21 months after the effective date of the permit to install the wastewater treatment system and to achieve compliance with the effluent limitations in the permit. If Norlite seeks to increase the metal feed rate in the hazardous waste fuel above the previously approved levels prior to that date, it also must comply with Condition No. 2.

Again, thank you for you prompt attention. Should there be any questions to the above, call me at 518/235-0401.

Sincerely,

William Voshell

NORLITE CORPORATION

William Voshell
Director of Compliance

cc: Carol Lamb LaFay
New York State Department of
Environmental Conservation
Region 4
2176 Guilderland Avenue
Schenectady, NY 12306

Sanjay Saraiya
NYS Department of
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S. Ferry and Green Streets
Albany, NY 12201

028-020792BB.NOR

Norlite Corporation

"Norlite" Rotary Kiln Expanded Shale Aggregate

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January 28, 1992

WJZ-023-92

Mr. William Clarke
Regional Permit Administrator
New York State Department of Environmental Conservation
Region IV
2176 Guilderland Ave.
Schenectady, NY 12306

RE: Norlite Corporation - SPDES Permit No. NY0004880

Dear Mr. Clarke:

In compliance with the schedule presented on page 9 of the above mentioned revised SPDES permit effective January 4, 1992, Norlite is submitting the attached Method Detection Limit Study Work Plan. This study covers Outfalls 001, 004 and 005.

Please note that since the shale fines pond has been removed, Outfall 001 consists only of non-contact cooling water and boiler blowdown water. As part of the Engineering Report due April 4, 1992, Norlite may propose combining this outfall with 004 and 005 to the wastewater treatment plant, resulting in one net outfall for the wastewater treatment plant. If this engineering plan is approved by DEC, then only one outfall would need to be evaluated in the MDL study, which is intended to be conducted on the effluent from the final constructed wastewater treatment plant. Since the final report is not due until January 4, 1994, there will be ample time to make any necessary revisions to the MDL study, to accommodate the final direction decided based on the Engineering Report.

If you have any questions on the attached plan, feel free to contact Richard Schlauch at 803/324-5310, or Bill Voshell at Norlite.

Sincerely,

William J. Ziegler

William J. Ziegler
Vice President of Health,
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WJZ:ncm
Attachment

cc: (See Page 2)

cc: Carol Lamb-LaFay, NYSDEC Region 4
Dallas Robinson, Norlite
William Voshell, Norlite
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Richard Schlauch
Mark Taylor

METHOD DETECTION LIMIT STUDY

WORK PLAN

NORLITE CORPORATION

SPDES PERMIT NO. NY0004880

PREPARED FOR: NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Date: 1/28/92

Revision: 0

Objective

The objective of this study is to identify appropriate Method Detection Limits (henceforth MDLs) for wastewater effluent discharge matrices from permitted Outfalls 001, 004, and 005. This MDL study will be performed by a laboratory certified in the State of New York under the DOH-ELAP program.

Overview

The MDL is defined as the minimum concentration of a substance that can be identified, measured and reported with a 99% confidence that the analyte concentration is greater than zero (0). The MDL is further qualified by the analysis of the analytes of interest in a discrete matrix, under a given set of analytical operating parameters and conditions.

Grab samples of the discharge from each of the Outfalls 001, 004 and 005 will be collected, preserved and analyzed for the following parameters:

- o Cadmium
- o Hexavalent Chromium
- o Mercury
- o PCBs

Each of the outfalls will be analyzed to confirm that these constituents of interest are at a level below 10X the MDL of the constituent in reagent water. A spike will then be performed to each sample at 3X the estimated MDL. Seven replicates of each of the spiked samples will be performed. In addition, seven replicate analyses of reagent water spiked at 1X the estimated detection limit will also be performed. If any of the seven replicates are non-detect values, the sample will be spiked again at a higher level and seven new replicates analyzed. The results above non-detect levels of the seven replicate analyses will then be used to calculate MDLs for each constituent and each outfall.

MDL STUDY PROCEDURE

Sampling

Grab samples of each outfall will be collected. Two separate aliquots of each outfall grab sample will be stored, one preserved for metals by adjusting the pH to <2.0 with nitric acid, and the other unpreserved for PCB and hexavalent chromium analysis. All seven replicate samples will be collected in seven 1 liter glass containers with teflon lids, and will be stored at 4°C until analyzed. Each grab sample will be split into two portions, one for spiked and one for unspiked analysis.

Spike Sample Preparation

Each of the outfall samples and a reagent water sample, will be spiked with the analyte of concern at the following levels:

Spike Sample Levels, mg/l for MDL Study

Analyte	Reagent Water	Outfalls 001, 004, 005 Initial Spike Level	Outfalls 001, 004, 005 Maximum Spike Level*
Copper	.018	.05	.36
Cadmium	.004	.012	.08
Chromium, hexavalent	.016	.05	.3
Mercury	.0002	.001	.004
PCBs			
Aroclor 1016	.065	0.2	1
Aroclor 1221	.065	0.2	1
Aroclor 1232	.065	0.2	1
Aroclor 1242	.065	0.2	1
Aroclor 1248	.065	0.2	1
Aroclor 1254	.065	0.2	1

*If initial level is non-detect

These initial spiking levels are based on current EPA reported MDLs for reagent water matrices, found in the references cited at the end of this work plan. The outfalls will be spiked at an initial level of 3X the reported MDL for reagent water.

Analysis

A total of four spiked and four unspiked samples will be produced. All eight samples will be analyzed once initially to confirm that the level of spikes can be detected. If the spike cannot be detected in any given sample, a new spiked sample will be prepared at a higher level, in a sequence of multiples of 5X, 10X, 15X, and 20X the regulatory limit, until a detectible level is found. Seven replicate analyses will then be performed at the spike level that yields seven analytical results above non-detect levels.

Seven additional replicates of each of the samples will then be analyzed, following the procedures tabulated below:

Parameter		Method
Copper, total		EPA 220.2
Cadmium, total		EPA 213.2
Chromium, hexavalent		EPA 218.5 or SW846 Method 7196
Mercury, total		EPA 245.1
PCB, Aroclor	1016	EPA 608
	1221	EPA 608
	1232	EPA 608
	1242	EPA 608
	1248	EPA 608
	1254	EPA 608

Sample preparation will be in strict accordance with the methods outlined above.

Instrument calibration will also follow the aforementioned methods. Uniform, traceable standard reference materials will be used for spikes, and multiconcentration calibration standards will be analyzed before processing any samples. A five-point calibration will be prepared, at base concentrations starting at the lowest reagent blank water spike value.

A reagent blank will be analyzed prior to sample analysis. This reagent blank should be processed and prepared exactly as the sample will be. Information from this reagent blank will be used to determine method background interference.

Data Reporting - MDL Study

1.0 All standards will be reported with retention tables, area counts, concentrations and RRFs clearly labeled on quantitation reports.

2.0 Library outputs for standards will be reported with standard deviations and % RSD computed.

3.0 All sample chromatograms will be submitted, with one chromatogram for each fraction clearly labeled with the BDAT target analytes, internal standards, and surrogate standards.

4.0 Calibration curves for metals analysis will also be provided, along with copies of analytical notebook pages presenting the instrument output responses.

5.0 Quantitation values for each aliquot analysis will be reported based on average responses of calibration standards.

6.0 Reagent blanks and background matrix blanks will be reported, and quantitation values indicated for analytes.

Statistical Evaluation - Methods Check/MDL Study

1.0 Calculate the variance (S) and standard deviation (s) of the concentration for replicate analysis measurements as follows:

$$S^2 = \frac{1}{n-1} \left[\sum_{1=1}^{n} X_i^2 - \left(\sum_{1=1}^{n} X_i \right)^2 / n \right]$$

$$S = (S^2)^{1/2}$$

Where the i = 1 to n are the analytical results (in the final method reporting units) obtained from the n sample aliquots, and $\sum$ refers to the sum of the x values from i = 1 to n

2.0 Compute the MDLs as follows:

$$MDL = t\ (n-1,\ 1-\alpha = 0.99)\ \ (S)$$

Where: MDL = Method Detection Limit
$t\ (n=1,\ 1-\alpha = 0.99)$ = The student's t value appropriate for a 99% confidence level and a standard deviation estimated with n-1 degree of freedom (see Table 1.0).

S = Standard Deviation of Concentration of Replicate Analysis.

3.0 The 95% upper confidence limit MDL is then computed according to the following equation:

$$UCL = 2.20\ MDL$$

The UCL-MDL accounts for interlaboratory variability and should be used as the final practical MDL for each requested analyte.

TABLE 1.0

TABLE OF STUDENT'S t VALUES OF THE 99% CONFIDENCE LEVEL

Number of Replicates	Degrees of Freedom (n-1)	$t(n=1,1-\alpha= 0.99)$
7	6	3.143
8	7	2.998
9	8	2.896
10	9	2.821

Reporting

All MDLs and standard deviations will be reported. These results will then be evaluated and general correlations will be observed. Also, all raw data, chromatograms, standards, etc. will be provided for NYSDEC review.

REFERENCES

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, December 1982

Appendix B to 40 CFR 136 - Definition and Procedure for the Determination of the Method Detection Limit - Revision 1.11.

Norlite Corporation

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February 20, 1992

WJZ-044-92

RECEIVED
FEB 21 1992
REGION IV HEADQUARTERS
2176 GUILDERLAND AVENUE
SCHENECTADY, NEW YORK 12306

Mr. William Clarke
Regional Permit Administrator
New York State Department of
  Environmental Conservation
Region IV
2176 Guilderland Ave.
Schenectady, NY 12306

Dear Mr. Clarke:

Submitted with this letter is the mass balance analyzing the impact of the higher metals limits for LGF on the beneficial use determination (BUD) for the baghouse dust. The calculations are based on the data previously submitted in BUD petition to NYSDEC on January 9, 1991.

The conclusion from these calculations is that the proposed higher metals limits for LGF under the Part 373 permit have no adverse impact on the beneficial use determination granted by NYSDEC on October 17, 1991. The leachable metals levels increase only slightly and are still well below hazardous thresholds under 40 CFR Part 261 and LDR BDAT treatment standards under 40 CFR Part 268.

If you have any questions on the attached, please contact me.

Sincerely,

William J. Ziegler
Vice President of Health,
Safety and Environmental Affairs

WJZ:ncm

Attachment

cc: Sanjay Saraiya, NYSDEC, Wolf Road, Albany
Dallas Robinson
Bill Voshell
Donald Faul
Mark Taylor

IMPACT OF HIGHER ALLOWABLE METALS LIMITS IN THE WASTE FEED ON BENEFICIAL USE DETERMINATION FOR BAGHOUSE DUST

I. Introduction

On October 17, 1991 NYSDEC granted a beneficial use determination (BUD) to Norlite Corporation for the use of baghouse dust as the fine aggregate component of "block mix" for the manufacturing of lightweight aggregate concrete masonry units. This BUD had been granted in response to a petition submitted to NYSDEC dated January 9, 1991 and later amended on March 8, 1991. The data in the petition was based on baghouse dust generated while burning waste under metals limits currently in place under the Part 360 permit.

In December 1991, Norlite demonstrated compliance with Air Guide-1 and BIF emissions standards, while burning hazardous waste containing higher metals limits than currently allowed under the Part 360 permit (See ENSR Consulting and Engineering Report titled "Allowable Metal Concentrations in the Shale and Low Grade Fuel (LGF) used at the Lightweight Aggregate Plant - Document No. 9504-008-R3, dated December 1991). On the basis of this report and the Risk Assessment report also performed by ENSR, DEC issued a draft Part 373 permit proposing higher metals limits for certain metals, than currently allowed under the Part 360 permit. Increases in the metals limits were proposed in the Part 373 permit for the following metals:

Metal	Current Part 360 Limit in Waste, mg/kg	Proposed Part 373 Limit in Waste, mg/kg
Arsenic	1.7	25
Chromium	200	500
Mercury	4.5	45
Nickel	440	600
Selenium	0.36	25

Seven other BIF and Air Guide-1 metals are lower under the proposed Part 373 permit. Copper and zinc limits are also proposed to be higher than existing Part 360 limits, but are not evaluated here since copper and zinc are not regulated under Part 40 CFR 261 or 268 of RCRA as hazardous metals.

On January 23, 1992 NYSDEC requested that Norlite perform at mass balance to demonstrate that these higher metals limits will have no negative impact on the beneficial use determination for baghouse dust. The calculations for these higher metals limits are based on total and leachable metals data originally provided by Norlite in the Beneficial Use Determination petition from January 9, 1991. In addition, data collected in a sampling of the baghouse dust from

September 5, 1991 is also used. For the purpose of this evaluation, copper and zinc data are not included, as no BDAT treatment standards under 40 CFR Part 268 or characteristic hazardous waste thresholds under 40 CFR Part 261 exist under RCRA for these metals. Therefore, copper and zinc have no bearing on the beneficial use determination.

Since the baghouse dust is incorporated directly into the product and is not recycled back into the kiln, no concentration of metals in the baghouse dust is possible. Therefore, the calculations presented below based on previous data presented in the BUD petition do not need to address the concentration or build-up of metals in the baghouse dust. It is impossible for this to occur, as the baghouse dust is incorporated directly into the block mix as the fine aggregate component.

II. Detailed Evaluation of Metals Impact on the Baghouse Dust

Table 1 shows the important physical and chemical properties of the probable forms of metal compounds generated in the baghouse dust from burning of fuel and heat processing of shale. These properties indicate the low solubility of most of these metal oxides which are demonstrated by the results of TCLP analysis on the baghouse dust. Except for mercury and selenium, the solubility of the metal oxides alone explains why these metals do not leach above the regulatory characteristic levels from the baghouse dust.

The low TCLP leachability of mercury and selenium can be explained by the chemical characteristics of the baghouse dust matrix. Table 2 shows a comparison of the chemical composition of baghouse dust and raw shale. Since both of these matrices are high in aluminum silicates and calcium alkalinity, the key reactants required for stabilization by cementateous reactions (pozzuolans) are inherent. It is well demonstrated universally that chemical fixation by portland cements and other pozzuolans prevents TCLP leachability of metals including mercury and selenium, independent of total metal concentration in the matrix.

It is primarily due to the above chemical characteristics of the individual metal compounds and baghouse dust matrix that the following data show that TCLP leachability of metals will not be affected by the future increase in permit limits for these metals in the waste feed to the kiln.

A. Results of TCLP Analyses on Baghouse Dust Samples from Norlite Kiln #2

Table 3 shows the comparative results of total metal analysis in kiln dust samples and TCLP leachate analysis from various samples collected during kiln operation during the RCRA trial burn of June 1990 as used in the original Norlite Beneficial Use Determination Petition. Also, data presented in Table 4 is used for nickel, selenium and mercury from a September 5, 1991 sampling of the baghouse dust pile accumulated from 1991 and 1990 production. From these results it is seen that all TCLP leachable metals are well below the Regulatory Characteristic Limits by factors of at least 10 to over 100 times. This low level of leachability is shown to be independent of the total concentration of metal in the baghouse dust matrix. Specifically, results for TCLP metal leachability for the following metals are observed:

Arsenic - Due to significant concentration of arsenic in the raw shale, arsenic concentrations up to 125 ppm to 150 ppm are found in the baghouse dust. TCLP leachability of arsenic from baghouse dust is seen to be constantly less than 0.1 ppm which is less than 10 times below the regulatory limit of 5.0 ppm. This low degree of leachability is due to the form of arsenic generated in the baghouse dust $Ca3\ (AS04)_2$ which is a very low solubility compound.

Chromium - The form of chromium found in the baghouse dust is trivalent chrome oxide. This is an extremely stable and insoluble form of chrome under a wide range of leaching conditions including acids and bases. The analysis performed on scrubber water samples shows that virtually 100% of all chromium in the baghouse dust entering the scrubber water flow is trivalent chrome. All analysis of scrubber water existing for Kiln No. 2 operation during 1991 and January 1992 show that hexavalent chromium is less than 0.02 ppm and therefore not a detectable component of the baghouse dust.

The TCLP leachability of total chrome is shown to be less than .2 ppm which is less than 20 times below the regulatory limit of 5.0 ppm.

Mercury - Although the more thermo-dynamically stable form of mercury oxide (i.e., Hg_2O) is not the least soluble form, the TCLP leachability of mercury in baghouse dust shown in Table 3 results in leachable levels that are less than detection levels in all cases. Analysis of baghouse dust samples shows that mercury is typically present at levels up to 3 to 4 ppm but that TCLP leachability is typically less than 0.0002 ppm or less than 1000 times below the regulatory limit of 0.2 ppm.

Selenium - Selenium dioxide is the more stable form of selenium present in baghouse dust. Although this is a very soluble compound in aqueous solution, selenium will co-precipitate with both ferric oxides and calcium sulfate to form low solubility compounds. Results of the leachability tests presented in Table 3 show that for levels of selenium of over 1.0 ppm in the baghouse dust, less than detectable levels result in the TCLP leachate. These results indicate that typical selenium levels in the TCLP leachate are less than 0.1 ppm which is less than 10 times below the regulatory level of 1.0 ppm.

Nickel - Total nickel analysis made on typical samples of baghouse dust show it is present at an average concentration of 35 to 40 ppm and a maximum of 50 ppm. All TCLP results for nickel on typical baghouse dust samples show that it is not present at detectable levels in the leachate.

TABLE 1

PROPERTIES OF PROBABLE METAL COMPOUNDS DETERMINED TO BE IN KILN BAGHOUSE DUST

Metal		Compound		S.G.	M.P.	B.P.	Solubility		
							Water		Alkali
Name	MW	Formula	MW	g/cc	°F	°F	70°F	212°F	Ambient
Arsenic	74.92	AsO_4 $Ca_3(AsO_4)_2$	138.92	2.967			insol	insol	
Chromium	52.0	Cr_2O_3	151.99	5.21	3614		insol	insol	insol
Cadmium	112.41	CdO	128.41	6.95	>2599	1700	insol	insol	insol
Copper	63.55	CuO	79.55	6.4	1879		insol	insol	insol
Lead	207.2	PbO_2	239.2	9.38	554		insol	insol	sl.sol
Zinc	65.38	ZnO	81.38	5.61	3270	3270	1.6ppm		sol
Barium	137.33	$BaSO_4$	233.39	4.5	2876	2100	2.5ppm	4.1ppm	-
Nickel	58.69	NiO	79.69	6.67	1984	-	insol	insol	-
Mercury	200.59	HgO	216.59	11.1	932	-	53ppm	395ppm	insol
Selenium	78.96	SeO_2	110.96	3.95	644	600	sol.	sol.	-
Vanadium	50.94	VO_2	82.94	4.34	3573	-	insol	insol	sol

SOURCE: CRC Handbook of Chemistry and Physics, 66th Edition, R.C. Weast, Ph.D. 1985-86

TABLE 2

CHEMICAL COMPOSITION OF BAGHOUSE DUST AND RAW SHALE

Chemical	Raw Shale	Baghouse Dust
SiO_2	64.20	48.35
Al_2O_3	20.24	12.63
TiO_2	.7	1.37
P_2O_5	NA*	0.21
Fe_2O_3	4.86	6.18
CaO	2.0	11.87
SnO	NA*	0.08
MgO	3.62	2.72
Na_2O	NA*	1.41
K_2O	.30	3.12
SO_3	.66	1.41
Alkalies	3.16	NA*
LOI	.3	10.60
TOTAL	100.04	99.79

* "NA" means not analyzed or not reported under that chemical name.

TABLE 3

COMPILATION OF METALS ANALYSIS IN BAGHOUSE DUST
SOURCE: BUD PETITION DATA (10/91), TRIAL BURN DATA (6/90)

	Total, mg/kg	TCLP Leachate, mg/liter
Arsenic	111.5	<0.1
Chromium	37.6	0.147
Mercury	-	<0.0002
Selenium	-	<0.1

TABLE 4

BAGHOUSE DUST DATA
ANALYSIS OF 9 SAMPLES FROM DUST PILE - 1991

	Selenium (Total mg/kg)	Mercury (Total mg/kg)	Nickel (Total mg/kg)	Nickel (TCLP Leachable, mg/liter)
	0.37	0.25	35	less than 0.1
	1.35	0.34	46	less than 0.1
	0.72	0.34	29	less than 0.1
	0.63	0.34	33	less than 0.1
	0.56	0.26	27	less than 0.1
	2.0	2.6	37	less than 0.1
	0.75	0.12	28	less than 0.1
	0.69	0.89	31	less than 0.1
	1.1	3.3	69	less than 0.1
mean	0.908	0.938	37.2	less than 0.1
Std. dev.	0.5025	1.174	13.25	0
UCL	1.39	2.07	50.0	less than 0.1

Upper Confidence Limit = mean + (t) (std. dev.)/ $\sqrt{n}$

for n = 9, t = 2.896, at a level of 99% confidence

B. **Calculation of Baghouse Dust Metal Leachability Characteristics Resulting from Higher Metals Limits Proposed Under the Part 373 Permit**

Tables 5 through 9 present calculations of predicted metals leachability of baghouse dust resulting from the proposed higher metals limits under the Part 373 permit. These calculations represent a worst case since the metals are assumed to solubilize in the TCLP leachate without regard to the solubility product characteristics. The solubility product characteristics would result in metals concentrations that are lower than those predicted by these calculations.

The following is the procedure for performing the calculations of results presented in Tables 5 through 9. There are three columns of numbers in each table. The first column represents the test case that forms the basis of the calculations. The test case presents actual analytical and leachate data obtained from the sources presented in Tables 3 and 4. In addition, the test case column uses the typical baghouse dust generation rate of 1107 lbs/hr as measured during the trial burn.

This known data for the test case is used to calculate two important ratios that serve as constants for the calculation of data presented in columns 2 and 3. These constants are then used to calculate baghouse dust metal leachability for metals feed rates under the existing Part 360 and future Part 373 metals limits in the waste feed. The two important constant ratios are as follows:

1. **Fraction of Metals in the Waste Feed that passes through to the Baghouse Dust**

   This fraction is calculated as the lbs/hr metal in the baghouse dust divided by the lbs/hr total metal feed rate to the kiln. A sample calculation is provided below from Table 5 for chromium.

Sample Calculation

Total Metal Input = 2.167 lbs/hr

Metal in Baghouse Dust $= 37.6 \text{ ppm} \times \dfrac{1107 \text{ lbs/hr dust formed}}{1{,}000{,}000}$

$= 0.0416 \text{ lbs/hr}$

Fraction of Cr in kiln feed that goes to the Baghouse dust $= \dfrac{.0416}{2.167} = 0.0192$

2. **Fraction of Metal in the Baghouse Dust that is Leachable in the TCLP Test**

This ratio is simply the PPM of metal in the TCLP leachate divided by the PPM metal in the baghouse dust. A sample calculation is provided below from Table 5 for chromium.

Sample Calculation

Chromium in TCLP leachate = 0.147 ppm
Chromium in Baghouse Dust = 37.6 ppm

Fraction of Cr in Baghouse Dust that is leachable $= \frac{0.147}{37.6} = .0039$

Using these two constants, the leachable metal concentration for the existing and future metals limits is calculated in columns 2 and 3 of Tables 5 through 9. A sample calculation is provided below for chromium from Table 5.

Sample Calculation for Future Chromium Limits - Table 5

lbs/hr chromium that results in Baghouse Dust = 0.0192 x 4.56 lbs/hr Cr feed
= 0.0876 lbs/hr

PPM Chromium in Baghouse Dust $= \frac{0.0876 \text{ lbs/hr Cr}}{1107 \text{ lbs/hr dust}} \times 1{,}000{,}000$

= 79.1 PPM

TCLP leachable Cr in Baghouse Dust = 79.1 PPM x 0.0039
= 0.308 PPM leachable chromium

The latter is the final data point needed to ascertain the impact of the higher metals limits on the baghouse dust. The predicted leachability of the baghouse dust is used to determine if the dust is hazardous and complies with Part 268 standards.

TABLE 5

PREDICTED BAGHOUSE DUST CHARACTERISTICS

CHROMIUM

	Test Case	Existing 360 Permit Metal Limits	Future 373 Permit Metal Limits
Metal Input			
Waste	0.0067	0.96	2.40
Shale	2.16	2.16	2.16
TOTAL	2.167	3.12	4.56
Metals in Baghouse Dust			
Cr lbs/hr	0.0416	0.0599	0.0876
Cr PPM	37.6	54.1	79.1
Fraction of Cr in Feed that goes to Baghouse Dust *	0.0192	0.0192	0.0192
TCLP Leachability, mg/l	0.147	0.211	0.308
Fraction of Leachable Cr in Baghouse Dust	.0039	0.0039	0.0039
Part 261 Hazardous Threshold, TCLP mg/l	5.0	5.0	5.0
Part 268 BDAT Treatment Standards, TCLP mg/l	1.7	1.7	1.7

* Fraction of Cr Feed that goes to Baghouse Dust = $\frac{\text{Baghouse Dust Cr, lbs/hr}}{\text{Input Feed Cr, lbs/hr}}$

TABLE 6

PREDICTED BAGHOUSE DUST CHARACTERISTICS

ARSENIC

	Test Case	Existing 360 Permit Metal Limits	Future 373 Permit Metal Limits
Metal Input			
Waste	.0048	8.16E-03	0.12
Shale	5.63	5.63	5.63
TOTAL	5.63	5.64	5.75
Metals in Baghouse Dust			
As, lbs/hr	0.123	0.123	0.125
As, PPM	111	111	113
Fraction of As in Feed that goes to Baghouse Dust*	0.0218	0.0218	0.0218
TCLP Leachability, mg/l	<0.1	0.10	$\boxed{0.10}$
Fraction of As in Baghouse Dust Leachable	8.97E-04	8.97E-04	8.97E-04
Part 261 Hazardous Threshold, TCLP, mg/l	5.0	5.0	5.0
Part 268 BDAT Treatment Standards, TCLP, mg/l	5.0	5.0	5.0

$$\text{* Fraction of As Feed that goes to Baghouse Dust} = \frac{\text{Baghouse Dust As, lbs/hr}}{\text{Input Feed As, lbs/hr}}$$

TABLE 7

PREDICTED BAGHOUSE DUST CHARACTERISTICS

MERCURY

	Test Case	Existing 360 Permit Metal Limits	Future 373 Permit Metal Limits
Metal Input			
Waste	0.0005	0.0216	0.216
Shale	0.0352	0.0352	0.0352
TOTAL	0.036	0.0568	0.251
Metals in Baghouse Dust			
Hg, lbs/hr	0.0023	.0036	0.016
Hg, PPM	2.07	3.27	14.4
Fraction of Hg in Feed that goes to Baghouse Dust*	0.0637	0.0637	0.0637
TCLP Leachability, mg/l	<0.0002	0.0003	$\boxed{0.0014}$
Fraction of Hg in Baghouse Dust Leachable	9.66E-05	9.66E-05	9.66E-05
Part 261 Hazardous Threshold, TCLP, mg/l	0.2	0.2	0.2
Part 268 BDAT Treatment Standards, TCLP, mg/l	0.2	0.2	0.2

* Fraction of Hg Feed that goes to Baghouse Dust $= \dfrac{\text{Baghouse Dust Hg, lbs/hr}}{\text{Input Feed Hg, lbs/hr}}$

TABLE 8

PREDICTED BAGHOUSE DUST CHARACTERISTICS

SELENIUM

	Test Case	Existing 360 Permit Metal Limits	Future 373 Permit Metal Limits
Metal Input			
Waste	0.0013	1.73E-03	0.120
Shale	0.0528	0.0528	0.0528
TOTAL	0.0541	0.0545	0.173
Metals in Baghouse Dust			
Se, lbs/hr	1.54E-03	1.55E-03	4.91E-03
Se, PPM	1.39	1.40	4.44
Fraction of Se in Feed that goes to Baghouse Dust*	0.0284	0.0284	0.0284
TCLP Leachability, mg/l	<0.1	0.10	0.32
Fraction of Se in Baghouse Dust Leachable	0.0719	0.0719	0.0719
Part 261 Hazardous Threshold, TCLP, mg/l	1.0	1.0	1.0
Part 268 BDAT Treatment Standards, TCLP, mg/l	5.7	5.7	5.7

* Fraction of Se Feed that goes to Baghouse Dust = $\frac{\text{Baghouse Dust Se, lbs/hr}}{\text{Input Feed Se, lbs/hr}}$

TABLE 9

PREDICTED BAGHOUSE DUST CHARACTERISTICS

NICKEL

	Test Case	Existing 360 Permit Metal Limits	Future 373 Permit Metal Limits
Metal Input			
Waste	0.05	2.11	2.88
Shale	4.18	4.18	4.18
TOTAL	4.23	6.29	7.06
Metals in Baghouse Dust			
Ni, lbs/hr	0.0554	0.0824	0.0925
Ni, PPM	50.0	74.4	83.5
Fraction of Ni in Feed that goes to Baghouse Dust*	0.0131	0.0131	0.0131
TCLP Leachability, mg/l	less than 0.1	0.149	$\boxed{0.167}$
Fraction of Ni in Baghouse Dust Leachable	0.002	0.002	0.002
Part 261 Hazardous Threshold, TCLP, mg/l	-	-	-
Part 268 BDAT Treatment Standards, TCLP, mg/l	0.20	0.20	0.20

* Fraction of Ni Feed that goes to Baghouse Dust $= \dfrac{\text{Baghouse Dust Ni, lbs/hr}}{\text{Input Feed Ni, lbs/hr}}$

III. Conclusion

From the calculations presented in Tables 5 through 9 it can be concluded that the higher metal limits for the metals concentration in the waste feed will have no impact on the beneficial use determination granted for the baghouse dust. The relevant data that leads to this conclusion is summarized below in Table 10:

TABLE 10

PREDICTED TCLP LEACHABILITY OF METALS IN BAGHOUSE DUST, mg/liter

	Existing 360 Limits	Future Part 373 Limits	Hazardous Threshold 40CFR261	LDR BDAT Standard 40CFR268
Arsenic	0.10	0.10	5.0	5.0
Chromium	0.211	0.308	5.0	1.7
Mercury	0.0003	0.0014	0.2	0.2
Selenium	0.10	0.32	1.0	5.7
Nickel	0.15	0.17	-	0.20

The higher limits do not result in leachability exceeding hazardous threshold under 40CFR Part 261, or BDAT treatment standards for K wastes under 40CFR Part 268. Therefore, the beneficial use determination granted October 17, 1991 is still valid under the higher metals limits for the waste feed.

As stated in the introduction, this represents a worst case since solubility product constant data was not taken into account.

Actual metal leachate data should be even lower than the levels presented above, due to the effect of the solubility product constant equilibrium.