AIRCO PROPERTIES, INC.

575 Mountain Avenue
Murray Hill, New Jersey 07974
Tel: (908) 665-2400

VIA CERTIFIED MAIL WITH
RETURN RECEIPT REQUESTED

June 23, 1993

Mr. Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation
Office of Commissioner
50 Wolf Road
Albany, New York 12233-4015

Attn: Mr. Michael O'Toole
Director
Division of Hazardous Waste Remediation

Re: Petition for Delisting
Airco Properties, Inc. Landfill Site - Code 9-32-001
Witmer Road, Niagara Falls, New York

Dear Commissioner:

On October 21, 1992, representatives of Airco Properties, Inc. and The Carbide/Graphite Group (The C/G Group) met with the permitting and regulatory staff of the New York State Department of Environmental Conservation, Region 9 (NYSDEC) at the latter's offices in Buffalo, New York. The meeting was arranged to resolve outstanding permitting and other issues involving the Airco Properties, Inc. landfill at Witmer Road, Niagara Falls, New York (Permit No. 90-84-0293, Facility No. 32N39). At present, Airco Properties, Inc. is the owner-of-record and The C/G Group is the operator-of-record for this landfill at Witmer Road (the landfill site).

The 25-acre landfill site was first permitted by NYSDEC as a single solid waste management facility pursuant to 6 NYCRR Part 360. Historically, the site has been used as a landfill for more than 60 years and to the best of our knowledge it has never been subject to serious environmental violations nor has it been associated with any known, documented adverse environmental impact.

The landfill site has operated under several Part 360 permits since the early 1980s. The Part 360 permit was first issued in 1981 and has been renewed twice since then by NYSDEC. During all the years that the landfill operated under a Part 360 permit, it received essentially the same type of non-hazardous

solid waste materials which were generated at a carbon-graphite plant owned previously by the Airco Carbon Division of Airco, Inc. and now by The C/G Group. Solid wastes from the Airco Carbon Division manufacturing facility in Niagara Falls, New York were transported and disposed of at the landfill as part of a planned, progressive DEC-authorized landfill closing operation.

Nevertheless, for reasons unknown to Airco Properties, Inc., this landfill site along with the adjoining SKW Alloys site was included in the New York State Registry of Inactive Hazardous Waste Disposal Sites (Registry) as a Class 3 site since the time NYSDEC issued the first Part 360 permit. It is perhaps due to the extremely conservative policy followed by NYSDEC during the early stages of its hazardous waste management program that every landfill in the state, irrespective of its environmental condition, was included in the Registry. This landfill was no exception. Interestingly, however, the Class 3 status of the landfill has remained unchanged over all these years. It is important to note also that the types of non-hazardous wastes that have been deposited at the landfill pursuant to the Part 360 permit have remained virtually unchanged. The enclosed affidavit by Suzette D. Kosikowski (see Exhibit #1) clearly indicates that the landfill received identical types of solid wastes throughout the years it has been permitted as a landfill by NYSDEC.

It is more appropriate to recognize in this context that the centerpiece of the Part 360 permit issued and reissued by NYSDEC for the landfill has always been a progressive closure plan. By issuing the Part 360 permit, NYSDEC not only agreed to the soundness of the plan, but became fully involved in overseeing the progressive closure of the landfill by way of transportation and disposal of non-hazardous solid wastes from the carbon-graphite manufacturing facility. From the beginning, these non-hazardous solid wastes were deposited at the landfill for necessary filling and grading of the site. Through most of 1990 and until the expiration of the last Part 360 permit, some five acres of the landfill have been filled, graded and vegetated. This five-acre section of the landfill is considered permanently closed by NYSDEC as well.

In spite of this significant progress, for reasons unknown, when the last Part 360 permit for the operation of the landfill expired on July 1, 1990, NYSDEC decided not to renew the permit. This decision was made in spite of the timely receipt of a complete permit renewal application by NYSDEC. Furthermore, this decision by NYSDEC runs counter to the November 12, 1992 holding of the Appellate Division in the Third Department in the Matter of Scenic Hudson, Inc. v. Jorling.

During the meeting of October 21, 1992, these issues were openly discussed by Airco Properties, Inc. and The C/G Group with NYSDEC. Based on these open discussions, NYSDEC representatives indicated that the landfill site has been and will be under investigation by its consultants, for some time, although no details were released. This came as a surprise since NYSDEC's consultant, E.C. Jordan & Co. reportedly completed its investigation when it issued its final report in April 1991. Obviously, any extended scope of investigation without any technical basis defies logic. Moreover, it appears to be a fishing expedition since the study by E.C. Jordan was completed more than a year ago. More importantly, even after all the activities carried out at this site by NYSDEC and its consultants, the site still remains classified as a Class 3 site.

Upon learning from Airco Properties, Inc. for the first time at this meeting that NYSDEC's position should be reviewed in view of the Bevill Amendment to the Resource Conservation and Recovery Act (RCRA) and the regulations promulgated thereunder, NYSDEC indicated its willingness to review the entire matter from this new perspective. It felt that there are merits to reviewing the correct classification of the wastes deposited at the landfill based on the claim that an electrowinning process was pursued by Airco Alloys for separation and/or beneficiation of the ores and for making ferroalloys. This is indeed the process that generated ferrochrome and ferrosilicon slag and other related waste materials at the previous Airco Alloy plant from which wastes were taken out for disposal at the landfill.

In view of this existing information, Airco Properties, Inc. believes strongly that any delay by NYSDEC to reissue the Part 360 permit is inappropriate since the Bevill Amendment clearly applies in this specific situation. However, for an appropriate review of the matter by NYSDEC and at its behest, Airco Properties, Inc. and The C/G Group decided to submit this delisting petition in order to resolve the current stalemate over permit renewal.

Responding to NYSDEC's recommendation and pursuant to Section 27-1305.4.c.(1) of the Environmental Conservation Law (ECL) of the State of New York, Airco Properties, Inc. submits this as a formal petition for deletion and/or delisting of the Airco Properties, Inc. landfill located at Witmer Road, Niagara Falls, New York from the Registry.

Airco Properties, Inc. offers the following facts and legal basis to support its petition.

1. The landfill received only non-hazardous solid wastes and never posed any threat to human health or the environment.

Since the issuance of the very first Part 360 permit, the landfill received certain solid wastes from Airco Carbon's carbon-graphite plant in Niagara Falls. The solid wastes from the Airco Carbon plant consisted of brick, concrete, carbon fines, miscellaneous graphite plant wastes and baghouse dusts all of which were both non-hazardous and inert.

Furthermore, a number of studies have been done on these wastes to establish their true nature and their likely impact on the environment after their disposal at the landfill. As part of its permit renewal application, Airco Properties, Inc. submitted a comprehensive report of an engineering study performed by Snyder Engineering in 1990. In addition, on July 16, 1991, Snyder Engineering provided a detailed review of the Engineering Investigations and Preliminary Site Assessment Report prepared by E.C. Jordan in 1990 for the landfill site (see Exhibit #2). The review comments by Snyder Engineering clearly suggest that there is no indication of past disposal of hazardous wastes in this landfill and there has been no threat to human health or the environment because of the filling and grading of the landfill by solid wastes generated at Airco Carbon's carbon-graphite plant. Plant records fully demonstrate that the nature of the wastes generated at this facility has remained unchanged during the entire permitted period even after the change of ownership of the carbon-graphite plant. There is also no plan to change the processing technology or manufacturing processes at this carbon-graphite plant by The C/G Group. Hence, if a renewal permit is issued, the landfill will receive essentially the same type of solid wastes as in the past. Moreover, continued deposition of the solid waste materials at the landfill, will allow necessary filling and grading of the landfill which, in turn, will progressively allow permanent closure of the entire landfill.

2. The early deposited ferroalloy wastes are specifically excluded from hazardous waste classification.

During the past ownership and use of the landfill site by Airco Alloys Division of Airco, Inc., the landfill received typical ferroalloy wastes, including ferromanganese slag, ferrochrome silicon slag, ferrosilicon dust and ferrochrome silicon alloy dust. Such solid wastes are not considered hazardous wastes pursuant to the Bevill Amendment incorporated in RCRA. The Bevill

Amendment deals with high volume and low toxicity wastes and applies to mining and certain special wastes. Pursuant to this statutory provision, the solid wastes that are generated from extraction, beneficiation and processing of ores and minerals are not hazardous wastes.

Not surprisingly, both federal and state regulations have incorporated provisions that include this exclusion specifically. Pursuant to 40 CFR § 261.4 (b)(7), solid wastes from the extraction, beneficiation and processing of ores and minerals are not hazardous wastes. This is also the position of NYSDEC and included in 6 NYCRR § 371.1(e)(2)(vi). These regulations specifically exclude such solid wastes from the identification and listing of hazardous wastes.

Both statutorily and regulatorily, the excluded solid wastes cannot be considered or classified as hazardous wastes by anyone, irrespective of their nature, as long as the specific exclusion criteria are met. Arguably, even if the landfill had received certain solid wastes from the ferroalloy operation which may trigger one or more RCRA hazardous waste characteristics due to the presence of chromium, silicon, selenium, iron or other heavy metals or contaminants, NYSDEC has no legal authority to treat such wastes as hazardous.

In this context, it is further noted that one of the beneficiation activities of ores and minerals that is specifically recognized for this regulatory exclusion is electrowinning. The ferrochromium alloy production at the former Airco Alloys facility in Niagara Falls, New York followed the electrowinning process for its beneficiation activity. Technical details of ferroalloy processes are provided in an enclosed article that has been translated from the original Russian publication (see Exhibit #3). Typically, such a process operates as follows.

Ferrochromium ores are processed from chromite ore mixtures which are blended in a furnace charge mixture after ore beneficiation. Chromite ores are chromium-iron oxide minerals generally classified as spinels. Chromium in these ores is exclusively present in the trivalent state. These ores are crushed, washed, concentrated and sized prior to their being charged with slag forming ingredients and carbonaceous reductants into a three phase submerged arc electric furnace.

As the furnace charge descends into the electric furnace, the ore and slag forming materials become molten (i.e., liquefied) because of the heat generated by the electrical arcs formed between the triangularly arranged carbon or graphite electrodes. Temperatures in the furnace are typically greater than 1700°C (3092°F). Due to such high temperature, a chemical change takes

place in the furnace whereby the chromium and iron oxides in the chromium ore are reduced to a molten ferrochromium alloy metal which is covered with a molten oxide slag that contains a minimum quantity of chromium.

Periodically, the electric furnace is tapped to drain the liquid ferrochromium metal alloy and its accompanying molten oxide slag from the furnace. The ferroalloy is separated from its slag and allowed to cool to room temperature and sized for shipment to customers. The oxide slag is cooled and the resulting solid is disposed of in a landfill. Such landfill does not provide a chemically oxidizing environment. The reducing carbon monoxide atmosphere inside the electric furnace and its thermodynamic proclivity to form chromium-iron carbides rather than chromium-iron metal alone demonstrates that in this reducing environment, chromium in the oxide slag is present nearly exclusively in the trivalent state. Because hexavalent chromium oxide dissociates to trivalent chromium oxide and oxygen at 240°C (464°F), there is little, if any, hexavalent chromium present in the slag or in the furnace.

Chromium bearing dust captured by air pollution control devices such as bag houses is primarily an oxide material and the chromium present is nearly exclusively trivalent. Furthermore, various analytical data using NIOSH methodology for dusts encountered by workers clearly show that less than 0.40% of the dust from ferrochromium production is in the chromium hexavalent state.

3. **It is erroneous to conjecture that trivalent chromium present in the landfill is responsible for the formation of hexavalent chromium.**

In its preliminary site assessment study, E.C. Jordan & Co. which was hired by NYSDEC, opined incorrectly that some of the trivalent chromium is forming hexavalent chromium when deposited in the landfill.

This is nothing more than a wild conjecture. E.C. Jordan does not support its hypothesis by any scientific data or reliable evidence. As indicated earlier, the wastes bearing chromium when disposed of in the landfill are not in an oxidizing environment which is essential for the formation of hexavalent chromium. Additionally, the thermodynamic heats of formation, ▲Hs, for Cr_2O_3 (▲H = -270,700 cal/mole) and CrO_3 (▲H = -138,400 cal/mole) at 298°K (i.e. 25°C or 77°F) indicate that ▲H for Cr_2O_3 is almost twice of

that for CrO_3. This is a solid scientific proof that trivalent chromium in Cr_2O3 will be formed preferentially over hexavalent chromium in CrO_3 in a typical landfill environment.

4. **Comparison of upstream and downstream samples does not show that any elevation of hexavalent chromium is due to the landfilled materials.**

Over the years, several monitoring wells have been installed both upstream and downstream of the landfill site. Only on a very few occasions, did the hexavalent chromium level in the samples taken from the surface water entering the landfill appear to exceed the New York State groundwater and/or drinking water quality standards (0.05 mg/L). However, a comparison of the results from the downstream and upstream surface water samples does not suggest that the landfill is the cause or even contributor to such elevation. In this context, it is stressed that NYSDEC has not been monitoring the runoff from all the adjoining properties which, in all likelihood, contribute to the surface water that flows past the landfill site. It is also true that these elevated levels are infrequent and sporadic. The plain fact is NYSDEC, in spite of numerous investigations of the landfill site by several of its own consultants has failed to identify any evidence that the landfill is contributing to the elevated level of hexavalent chromium.

A similar conclusion can be made with respect to the occasional high pH and iron values in the groundwater samples. It is conceivable that certain waste materials that have been deposited upgradient of the landfill site by others are major contributors to these increased values. It is also obvious, based on the physical and chemical characteristics of the non-hazardous solid wastes generated at the carbon-graphite plant, that there is no potential for leaching of any contaminants from these wastes. Absent such a potential, elevated levels of pH and iron are difficult to account for unless the source or contribution arises elsewhere. The enclosed TCLP analyses (see Exhibit #4) of the solid wastes generated at the carbon-graphite plant of The C/G Group provides detailed toxic characteristics of such wastes. Certainly they do not suggest a high toxic profile or characteristic that warrants special handling or restricted disposal. Furthermore, NYSDEC cannot be totally oblivious of the natural high baseline levels of pH and iron in this area as well as the fact that portable pH meters typically used for field work are often found to provide incorrect readings.

In spite of NYSDEC' substantial efforts to associate hazardous wastes to the landfill, none of the past activities in the landfill has been found to be harmful to human health or the environment. In the respect, it must be stressed again that this landfill has been in existence for more than 60 years. If the landfill had created or posed any real threat to human health or the environment, such threat or harm would have manifested in a grand scale by now. Furthermore, to the best of our knowledge there are no private or public wells within a half mile radius of the landfill. It is therefore appropriate to say that any arbitrary imposition of drinking water quality standards for the groundwaters underneath the landfill site is not only an overkill, but a sad example of procedures overtaking substantive considerations. As a matter of fact, none of the wells that exist at a farther distance have demonstrated any adverse impact due to the filling and grading operations at the landfill site.

There can be no doubt that Airco Properties, Inc. undertook a well-conceived progressive closure plan for this landfill starting 1981 when the first Part 360 permit was issued by NYSDEC. Due to NYSDEC's failure to renew the Part 360 permit, Airco Properties, Inc. has been barred from proceeding with a landfill closure plan that was pre-approved by NYSDEC. It is also open to question who bears the brunt of this failure and what is the eventual impact of such seemingly improper decision in view of NYSDEC's stated policy of environmental improvement.

In the overall perspective, there appears to be no plausible reason for NYSDEC to continue to classify this landfill as a Class 3 site. In fact, such a classification is against the specific exclusions provided in RCRA and ECL and the applicable federal and state regulations. In this context, it is noted that on September 21, 1992, in United States v. Iron Mountain Mines, Inc., the federal district court for the Eastern District of California held on September 21, 1992 that any exemption for "special wastes" included in RCRA also applies under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Hence, there cannot be any actual or potential release of a hazardous substance from this landfill site. It has been more than two years since Airco Properties, Inc. has been unjustly denied the productive and beneficial use of the landfill. The arbitrary stoppage of the progressive closure plan for the landfill has resulted in an unhealthy and improper delay in improving the landfill site. It is, therefore, only appropriate that Airco Properties, Inc. be relieved of this unjust, severe

hardship forthwith.

In view of the totality of these circumstances, NYSDEC's past denial to renew the Part 360 permit is indeed questionable and appears somewhat cavalier. By current legal standards, this denial can only be construed as a regulatory taking.

Based on the above facts and various supporting documents and engineering study reports, most of which have been submitted to NYSDEC earlier, Airco Properties, Inc. respectfully requests that you order immediate delisting of its Witmer Road landfill currently owned by Airco Properties, Inc. in Niagara Falls, New York from the Registry.

Respectfully submitted,

AIRCO PROPERTIES, INC.

By: _____

Title: Vice President

cc: Mr. Joseph Sciascia, NYSDEC, Region 9
Mr. S. Foster - The C/G Group
Mr. Andrew Carlson, NYSDOH, Albany
S. B. Majumdar, Esq. - DSG&S

Attachments

NLW\SBM-5:LETTERS\12567.010

EXHIBIT #1

In the Matter of the
DELISTING PETITION
by Airco Properties, Inc.
Witmer Road Landfill
Niagara Falls, New York

AFFIDAVIT OF

SUZETTE D. KOSIKOWSKI

SUZETTE D. KOSIKOWSKI, being duly sworn, deposes and says:

1. I am a holder of a B.S. degree in Chemical Engineering from Clarkson University and an A.S. degree from Morrisville A.T.C. (Engineering Science).

2. From approximately June 1986 to the present, I have been employed by the Airco Carbon Division of The BOC Group, Inc. and currently by The Carbide/Graphite Group ("The C/G Group").

3. Currently, I am working for The C/G Group rendering my services in several areas of my expertise including environmental control and management.

4. I have served as a process engineer and environmental engineer at the carbon/graphite plant at Niagara Falls, New York ("the plant") which was owned and operated by the Airco Carbon Division of The BOC Group, Inc. until July 31, 1988 and by The C/G Group from August 1, 1988 to the present.

5. During the period of approximately February 15, 1988 through July 31, 1988, I served the Airco Carbon Division of The BOC Group, Inc. as the Supervisor of Environmental Compliance and during the period of approximately August 1, 1988 through the present, I have been serving The C/G Group as the Supervisor of Environmental Compliance at which periods I have been responsible for the management of the

environmental affairs as well as for the formulation of various environmental policies and programs for the plant.

6. During my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, my general duties have included, but have not been limited to, the following:

a. coordination of all environmental control and management activities at the plant;

b. coordination and implementation of various environmental programs for the plant;

c. formulating all permitting programs for water/wastewater discharge, air emissions and solid waste disposal as they relate to the plant;

d. evaluation of the environmental impact of new processes and production facilities, including generation of waste materials at the plant;

e. development, management, implementation and supervision of waste disposal programs for the plant;

f. arrangement for sample collection, testing, reporting and record-keeping as required by the terms and conditions of applicable local, state and federal permit(s);

g. evaluation of pollution control equipment and facilities at the plant; and

h. development, coordination and implementation of operating procedures to insure strict compliance with applicable environmental laws and regulations.

7. During my association with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, the plant has continued to make similar carbon and graphite products using the same process technology and manufacturing processes.

8. As a result, during my employment, the plant has produced the same type of waste materials consisting of carbon fines, miscellaneous graphite wastes and baghouse dusts.

9. To my best knowledge and belief, the waste materials generated at the plant and disposed of at the Witmer Road landfill by the Airco Carbon Division of The BOC Group, Inc. were both inert and non-hazardous.

10. To my best knowledge and belief, the non-hazardous waste materials from the plant along with discarded brick, concrete and other inert construction and demolition debris were transported off-site for ultimate disposal at the landfill at Witmer Road, Niagara Falls, New York from September 1986 through July 1988 as part of a progressive closure plan for the landfill currently owned by Airco Properties, Inc.

11. During my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, no hazardous wastes or substances have either been transported to or disposed of at the Witmer Road landfill of Airco Properties, Inc.

12. To my best knowledge and belief, since the formation of the C/G Group on August 1, 1988, no substance or waste has ever been disposed of by The C/G Group at the Witmer Road Landfill.

13. During my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, all hazardous wastes generated

and/or discarded along with all used hazardous substances have been taken off-site by licensed transporters using appropriate waste transporter manifests and disposed of at licensed hazardous waste disposal facilities.

14. To my best knowledge and belief, during my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, the Airco Properties, Inc. landfill at Witmer Road, Niagara Falls, New York has not been accessible to any outside party and appropriate guards have been stationed at the gates for necessary security check to allow disposal of only approved waste materials.

15. To my best knowledge and belief, during my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, the Airco Properties, Inc. landfill at Witmer Road received only those materials which were approved for disposal pursuant to a valid solid waste management facility permit issued under 6 NYCRR Part 360.

16. To my best knowledge and belief, during my employment with the Airco Carbon Division of The BOC Group, Inc. and The C/G Group, none of these companies ever arranged for the disposal of any hazardous waste or hazardous substance nor did they allow the disposal of any waste materials at the landfill at Witmer Road other than those solid wastes generated at the plant and at SKW, Inc.'s ferroalloy plant.

17. To my best knowledge and belief, I have no reason to believe that there has ever been any lapse of necessary check at the entrance/exit gate of the SKW Alloys, Inc. through which all vehicles must enter in order to reach the Airco Properties, Inc. landfill at

Witmer Road, Niagara Falls, New York.

Dated: May 24, 1993

Suzette D. Kosikowski

Suzette D. Kosikowski

Sworn to before me this
24 day of May, 1993.

Notary Public

DONNA J. McKEOWN
Notary Public, State of New York
Qualified in Niagara County
My Commission Expires December 31, 19...

DEVORSETZ STINZIANO GILBERTI & SMITH, P.C.
ATTORNEYS AND COUNSELORS AT LAW
BRIDGEWATER PLACE - 500 PLUM STREET
SYRACUSE, NEW YORK 13204-1428

EXHIBIT #2

(10)

Snyder Engineering

90 Parkview Drive • Grand Island, New York 14072 • 716-773-5661

July 16, 1991

RECEIVED

JUL 25 1991

P. FLEMING

Thomas A. Reamon, P.E.
New York State Department
of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Re: Review of Engineering Investigations and Preliminary Site Assessment Report at Inactive Hazardous Waste Site No. 932001

Dear Mr. Reamon:

Enclosed is my review of the Preliminary Site Assessment with respect to Inactive Hazardous Waste Site No. 932001 located in Niagara Falls, New York. Both myself and representatives of the affected parties (SKW Alloys, Inc., Airco Properties, Inc., and The Carbon/Graphite Group, Inc.) strongly believe that a number of errors have been made by both E.C. Jordan (consultant responsible for preparing the report) and the New York State Department of Environmental Conservation (personnel responsible for reviewing the document to insure both its factual accuracy and the supportability of its conclusions). We recognize that proper evaluation of such sites is not an easy task. However, I am sure you will concur that credible judgements concerning such a site can not be made until a clear understanding of the facts has been established.

As you recently discussed with Ms. S. Kosikowski of The Carbon/Graphite Group, it is in everyone's best interest to resolve these questions concerning the Phase 1 Investigation. The affected parties feel it is imperative that the technical issues be resolved as expeditiously as possible. For this reason we would like to schedule a meeting with the appropriate NYSDEC technical representatives to discuss the status of the Phase 1 Report. It is both hoped and expected that this meeting will serve as an important first step in getting this matter resolved to everyone's satisfaction.

I will give you a call to set up a meeting at a mutually convenient location, date, and time. If you have any questions concerning this matter please give me a call at your earliest possible convenience. Your Department's continued cooperation in this matter is sincerely appreciated.

Very truly yours,

Richard R. Snyder

Richard R. Snyder, P.E.

enc:

c.c: Mr. Yavuz Erk (NYSDEC)
Mr. Sri Maddineni (NYSDEC)
Mr. Herb Ridgeway (Carbon Graphite Group, Inc.)
Ms. Sue Kosikowski (Carbon Graphite Group, Inc.)
Mr. Tom Riscilli (SKW Alloys, Inc.)
Mr. Ron Stipp (SKW Alloys, Inc.)
Ms. Pat Flemming, Esq. (Airco Properties, Inc.)
Mr. Jerry Brown, Esq. (Hodgson, Russ, Andrews, Woods, and Goodyear)
Mr. Pat Berrigan, Esq.

Snyder Engineering

90 Parkview Drive • Grand Island, New York 14072 • 716-773-5661

Review of Engineering Investigations at Inactive Hazardous Waste Sites Preliminary Site Assessment for Site No. 932001

1.0 Introduction

Snyder Engineering has been engaged by SKW Alloys, Inc., Airco Properties, Inc. and The Carbon/Graphite Group, Inc. to undertake a review of the Preliminary Site Assessment for Site No. 932001 ("the report") which was prepared for the New York State Department of Environmental Conservation ("NYSDEC") by E.C. Jordan Company ("the Consultant"). This report was issued in final form in April 1991. Its primary objective was to provide information necessary for NYSDEC to reclassify or delist the site. Mr. Thomas A. Reamon, P.E. (NYSDEC) in cover letter to both SKW Alloys, Inc. and The Carbon/Graphite Group, Inc. stated that the report is considered acceptable to the NYSDEC as of the date of the cover letter.

In order to better understand the NYSDEC's rationale in this matter, we have reviewed both the report's conclusions and the data which should have been evaluated as part of the site assessment. As a result of this review, we believe that several of the conclusions reached by the Consultant cannot be supported by the available evidence. While we recognize the NYSDEC's need to be conservative in its judgement, we also believe that the NYSDEC has a responsibility to review the Consultant's conclusions in light of the data in order to ensure that its conclusions are supportable by the data. In this instance we strongly believe that several of the conclusions reached by the Consultant do not reflect sound engineering and scientific judgement. The purpose of this evaluation is to make NYSDEC personnel aware of our grave concerns with the appropriateness of conclusions stated in the report and of the reasons for our belief that both the Consultant's and the NYSDEC's present understanding of the site is in error.

2.0 Analysis of Conclusions and Recommendations

SKW Alloys, Inc., Airco Properties, Inc. and The Carbon/Graphite Group, Inc. strongly disagree with the report's conclusions that hazardous waste disposal and significant threat have been documented

at this site. We believe that the Consultant's recommendation to reclassify the site to "Class 2" is based upon a misrepresentation and misunderstanding of the available data. We believe further that a review of both the site data and our comments by the appropriate NYSDEC personnel will yield a basic understanding of the site vastly different from the one presented by the Consultant. We are confident that once a better understanding of the site is reached, the NYSDEC will not reclassify the site as "Class 2". Indeed, we believe that both the SKW Alloys, Inc. and Airco Properties, Inc. portions of the site should be declassified because there is no evidence in the existing data to support the report's assertion that hazardous waste was deposited at this site.

Comments specific to our disagreement with the report's conclusions concerning this site are centered around the following:

1) The consultant's interpretation and assessment of the validity of data associated with various EP toxicity test results (EP toxicity toxicity test data for ferrosilicon performed by Radian Corporation in 1984).
2) Consultants apparent misunderstanding of site's groundwater regimes.
3) Consultant's interpretation of data from the site's surface and groundwater monitoring program (particularly with respect to pH).
4) Assessment of how the Consultant concluded that this site represents a significant threat.

2.1 Interpretation and Assessment of Validity of EP Toxicity Data

The report's conclusion that hazardous wastes have been deposited at the site are based on two arguments. One of these is based on EP toxicity test data for ferrosilicon performed by Radian Corporation in 1984. However, the test data for selenium which the Consultant relied upon is clearly in error. This data has been previously discussed with Region 9 NYSDEC solid waste personnel (R. Mitrey, J. Goehrig, M. Mcintosh).

Radian Corporation performed EP toxicity, ASTM distilled water

leach, and total waste analysis on ferrosilicon emission control dust from SKW Alloys, Inc.'s production facility. A review of the results for selenium indicate that they are self-contradictory and should not be relied upon for any purpose. This is predicated on the following:

1. The total concentration of selenium in the waste dust sample was 0.64 mg/kg.
2. The maximum amount of selenium contained in 1 gram of waste is .00064 mg.
3. EP toxicity method results in 20 ml of extract/gram of waste sample.
4. Therefore, the maximum concentration of selenium which could be found in the extract is 0.032 mg/l.

Radian reported values of 2.000 mg/l and 5.300 mg/l for the EP toxicity extract and the ASTM distilled water leach method respectively. Based on selenium solubility data, the concentration of the selenium should be less using the ASTM distilled water leach. In short, the Radian Corporation data is clearly erroneous with respect to selenium.

Moreover, EP toxicity tests were subsequently performed by Advanced Environmental Services, Inc. As indicated by these test results (provided in Appendix D of the report) the selenium concentration found in the waste material's extract performed by the EP toxicity test is well below the allowable limit of 1.0 mg/l. These results were previously submitted to Region 9 NYSDEC personnel responsible for the site. No questions have ever been raised concerning their validity. If further evidence of the non hazardous nature of the waste is necessary, it can be provided by analyses of leachate samples from Cells No. 1 and 2. The amount and nature of contaminants leached from the waste materials deposited in these cells is consistent with the non hazardous character of the waste. It is clear that the site should not be listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites because a sample of the ferrosilicon waste material failed the previoiusly described EP Toxicity Test performed by Radian Corporation (refer to Section 2.0 of the Report).

2.2 Site Ground Water Regimes

As noted in the report, the site contains both perched water and groundwater in the glacial till soils. The site's perched water is temporal in nature. Many of the shallow monitoring wells are typically dry during the summer and early fall. This water is intermittently present in the fill material overlying the siltey-clay and clayey-silt. The second groundwater bearing zone is found in the glacial till soils. This is the permanent water table within the soil overlying the Lockport Dolomite. Groundwater elevations show that the perched water zone is not hydrologically connected with the deeper water bearing zone. The shallow perched water zone is comprised of surface infiltration waters contained in the overlying fill that can not infiltrate through the relatively impervious clayey-silt and silty-clay sediments and into the permanent water table.

The shallow wells at the site are sampling temporal water which is present in the site's fill material. The NYSDEC no longer requires SKW Alloys to sample the shallow wells. This decision was made jointly by Region 9 and Albany NYSDEC hydrogeologists. A similar situation exists on the Airco Properties, Inc. portion of the site. As part of the site's Part 360 renewal application, Carbon/Graphite proposed that sampling of the shallow wells be stopped. Based upon conversations with Region 9 solid waste personnel (M. Mcintosh and C. Webster), it was C/G's understanding that this would be acceptable.

2.3 Ground Water and Surface Water Quality Data Interpretation

Data from the shallow wells reflects the quality of the perched water at the site. In many instances the water in these wells has been in contact with waste fill materials at the site. As previously noted this perched water is temporal and is not reflective of a true aquifer. Therefore, such data should not be utilized in assessing the site's impact on groundwater. Data obtained from the site's deep wells reflect the groundwater quality in the glacial till overlying bedrock. We do not disagree with the basic statements made in the report concerning the quality of this water. However, without a proper evaluation of the data it is difficult to understand how one can incorporate such data into the decision making process relating

to any "significant threat" determination.

Factors which we believe to be significant in making this review include the following:

1) A review of data from the site's deep wells indicates that the barium standard of 1.0 mg/l was only exceeded on one sampling date (2/24/84 samples) during an 11 year period. On that date, however, barium levels exceeded 1.0 mg/l in almost all the well samples from both the SKW and Airco Properties sites. This strongly indicates that a problem existed with the analytical laboratory's barium analyses for that sampling date. Samples obtained on that date are clearly an aberration when taken in the context of the entire 11 year data base for barium. It is clear as a matter of sound engineering practice that barium data from the 2/24/84 samples should be eliminated from any consideration.
2) In the report no comparisons have been made between upgradient and downgradient data. We have performed such an evaluation using the data which has been collected during the last eleven years. The results of this evaluation indicate that the SKW Alloys, Inc. and Airco Properties, Inc. sites have had little or no effect on the site's groundwater quality as reflected by samples obtained from the site's deep wells.
3) Iron and manganese concentrations have been detected in various wells at concentrations in excess of their respective standard concentrations. Such incidences have been noted with no migration pattern evident. This has been discussed with various representatives of the NYSDEC Division of Solid Waste at the regional office.

The quality of the site's surface water has been monitored by sampling the site's drainage ditch at three locations. These are as follows:

Pt. 6 - Location at which drainage ditch enters Airco Properties, Inc. site
Pt. 6A - Location at which drainage ditch leaves Airco Properties, Inc. site and enters SKW Alloys, Inc. site
Pt. 7 - Location at which drainage ditch leaves SKW Alloys, Inc. site

The report concludes that the site's surface water run-off is a hazardous waste. It should be pointed out that the surface water which enters the site at monitoring location Pt. 6 is from upgradient of the site and should not be considered a waste material when evaluating the site. In addition the basis for the Consultant's assertion appears to be that pH measurements in excess of 12.5 have been reported in the site's surface water run-off. A review of the available data indicates the following:

Location	Data period	Number of samples	Number with pH>or=12.5
Pt. 6	3-7-79 thru 4-18-90	32	1
Pt. 6A	1-16-80 thru 4-18-90	27	2
Pt. 7	3-7-79 thru 1-8-91	33	2

This clearly indicates that only a very small percentage of these samples were characterized by pH measurements greater than or equal to 12.5.

In an attempt to better understand the actual effect of the site on the pH of the drainage ditch water, comparisons were made between pH values at the various surface water sampling points when one or more of the samples had a pH value >or = 12.0.

Date	pH at Pt. 6	pH at Pt. 6A	pH at Pt. 7
4-11-79	12.05	no sample	11.80
6-11-79	11.85	no sample	12.10
1-16-80	12.30	12.20	12.30
10-30-80	12.10	11.90	12.30
4-7-81	12.05	11.91	12.05
10-26-83	11.99	12.06	12.29
2-24-84	12.29	12.40	12.36
1-8-85	12.27	12.48	7.69
7-25-85	no sample	no sample	12.22
4-2-86	12.5	12.3	12.3

8-4-86	7.90	12.45	12.65
10-2-86	11.30	12.00	12.15
7-23-87	10.60	12.20	12.41
1-19-89	11.81	12.69	12.76
6-22-89	*	11.61	12.04
8-11-89	*	no sample	12.37
11-2-89	*	12.46	12.4
1-11-90	11.69	12.5	*
4-18-90	12.11	12.46	*

Note: * Indicates no attempt to sample point on that date.

It is apparent that there is very little difference in the pH values at the various surface water monitoring points.

Examination of the above data demonstrates that the occurrences of pH values above 12.5 are rare events and that when they occur there is no evidence that the cause of the excessive pH originates on the site. The pattern of results from upgradient and downgradient samples make it clear that it is not reasonable to conclude that wastes deposited at this site are having any significant effect on the pH of the drainage ditch water.

2.4 Site Threat Assessment

While the report concludes that this site represents a significant threat, it is not clear how this determination was made. It has been our understanding that NYSDEC consultants customarily use a hazard ranking system to evaluate the relative risk presented by a site such as the SKW Alloys, Inc. site. We have found no evidence that such an evaluation was performed.

As previously noted, we strongly disagree with much of the data interpretation as set forth in the Phase I Report. Many of the Consultant's judgements concerning those factors (typically utilized in evaluating a site's hazard ranking) are clearly in error based upon the available data. These include the following:

1) Evidence does not support past disposal of hazardous waste at the site.

2) Data does not support significant degradation of groundwater at the site.
3) Aquifer is not utilized as a drinking water supply downgradient of the site.

We believe, therefore that the NYSDEC should make its own independent evaluation of the significant threat issue after after an attempt has been made between the NYSDEC and the affected site owners to resolve the major areas of disagreement which now exist concerning the results from the Phase 1 Investigation performed by the E.C. Jordan Report.

3.0 Additional Corrections to the Record

The following information is provided in order to address additional inaccuracies in the report. We offer this information in addition to the corrections discussed in Section 2.0 of this document in order to assist NYSDEC in creating a more accurate administrative record. These corrections are as follows:

Correction 1: Executive Summary

par. 2

In 1964, the Air Reduction Company, Inc., which subsequently changed its name to Airco, Inc., purchased 62 acres of the site from Vanadium. In 1979, SKW purchased the western 37 acres of this 62 acre parcel from the Airco Alloys division of Airco. Airco Properties, Inc. (a wholly owned subsidiary of Airco, Inc.) retained ownership of the eastern 25 acres.

par. 3

The Airco landfill was operated by the Airco Carbon Division of Airco, Inc. from 1981 through 1988 under both NYSDEC Part 360 and Town of Niagara Local Law No. 8 permits. The landfill was used to dispose of brick, coke, concrete, carbon fines, and graphite plant waste. Its operation was directed toward implementation of a final progressive closure plan. During this period approximately

4 acres reached final fill grade and were covered with a closure cap (consisting of low permeability soil and soil capable of supporting vegetative growth). Prior to initiation of operations, permits were obtained from the NYSDEC (Part 360) and the Town of Niagara (Local Law No. 8). In 1988 Airco, Inc. sold its Niagara Falls, NY production facilities to the Carbon/Graphite Group, Inc. (C/G). No waste disposal has occurred at the disposal site since the sale. However, in early 1990 C/G submitted applications to both the NYSDEC and the Town of Niagara for renewal of the previously noted permits. C/G proposes to continue with the previously noted progressive final closure program while utilizing the site for disposal of non hazardous wastes.

par. 4

SKW Alloys, Inc. has constructed and operated two landfill cells in accordance with NYSDEC Part 360 and Town of Niagara Local Law No. 8 Permits on their 37 acre parcel of land (Figure 2). Cell No. 1 was capped in August 1990 and Cell No. 2 is scheduled to be closed by the end of August 1991. It will be capped during the summer of 1992. Waste currently disposed in Cell No. 2 includes ferrosilicon and silicon metal baghouse dust. Waste disposed in Cell No. 1 prior to its closure included ferrosilicon and ferrochrome silicon baghouse dusts.

Correction 2: Section 4.1.1 paragraphs 2 through 5

In 1964, 62 acres of the site were purchased by the Air Reduction Company, Inc. which subsequently became Airco, Inc. While Airco, Inc. owned the entire site, it was operated by Airco Alloys, Inc. (division of Airco, Inc.). Wastes deposited at the site during this period were similar to those disposed by Vanadium. In addition the disposal of slurried dusts (generated by baghouse dust collectors) at the site was initiated in 1971. In 1979 the site was split into two parcels. The western portion (approximately 37 acres) was purchased by SKW Alloys, Inc. (included in purchase of Airco Alloys, Inc. division). The eastern portion (approximately 25 acres) was retained by Airco Properties, Inc.

(a wholly owned subsidiary of Airco, Inc.). In 1978 Airco, Inc. was purchased by the British Oxygen Corporation.

In 1980, SKW received both NYSDEC (Part 360) and Town of Niagara (Local Law No. 8) permits to operate a solid waste disposal facility. This facility (designated as Landfill Cell No. 1) was constructed with a five foot clay liner and a leachate collection system (Snyder, 1990). It was designed for the disposal of ferrochrome silicon baghouse dust and ferrosilicon baghouse dust wastes. Cell No. 1 was closed in August 1990 per a NYSDEC approved closure plan.

In 1982, SKW received both NYSDEC and Town of Niagara permits to operate a second solid waste disposal facility. This facility (designated as Landfill Cell No. 2) was constructed with a two foot clay liner and leachate collection system. It was designed for the disposal of ferrosilicon and silicon metal baghouse dusts. Pursuant to a NYSDEC Consent Order waste deposition will cease in September 1991 and closure per a NYSDEC approved closure plan will be completed in August 1992. Leachate from both cells is collected and used to slurry the baghouse dusts (Snyder, 1990). In 1984 ....

Correction 3: Section 4.1.2

The Airco landfill was operated by the Airco Carbon Division of Airco, Inc. from 1981 through 1988. During this period the site's operation was directed toward implementation of a progressive final closure. Prior to initiation of operations, permits were obtained from the NYSDEC (Part 360) and the Town of Niagara (Local Law No. 8). The landfill is unlined and has no leachate collection system. In 1988 Airco, Inc. sold its Niagara Falls, NY production facilities to the Carbon/Graphite Group, Inc. (C/G). No waste disposal has occurred at the disposal site since the effective date of the sale (August 1, 1988). Wastes generated by C/G's production facility are being disposed of in the Modern Landfill located in Lewiston, NY (Kosikowski, 1990). However, in early 1990 C/G submitted applications to both the NYSDEC and the Town of Niagara for renewal of the previously noted permits. C/G proposes to continue with the previously noted

progressive final closure program while utilizing the site for disposal of non hazardous wastes.

EXHIBIT #3

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PRODUCTION OF FERROALLOYS

ELECTROMETALLURGY

Second Edition

Translated from Russian

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and the Department of The Interior by the
Israel Program for Scientific Translations

V. P. Elyutin, Yu. A. Pavlov,
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Electrometallurgy

SECOND REVISED AND COMPLETED EDITION

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as a textbook of "Metallurgy of ferrous metals"
for students of higher educational institutions

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ANNOTATION

In this book theoretical and practical data on the production of ferroalloys are classified and summarized. The theoretical principles and the technology of production of various ferroalloys are examined. To facilitate understanding of thermodynamic calculations, some information is given on physical chemistry. The economics of production of ferroalloys and safety procedures are also treated.

Compared with the first edition, a more detailed description of the technology and achievements of Soviet and foreign ferroalloy industry is given.

This is a textbook for students of metallurgical institutes of higher education, and may serve as a handbook for engineers and scientists.

Chapter IV

FERROCHROMIUM

Lehmann described in 1766 the mineral "Siberian red lead", the crocoite $PbCrO_4$. In 1797 Vauquelin and Klaproth studying this mineral simultaneously discovered a new element. Because of the bright color of its compounds, Vauquelin called it chromium. (Greek "chroma" = color).

Chromium was discovered later in other minerals, among them in chromite. Pure chromium was first obtained in 1854 by electrolysis of aqueous solutions of chromium chlorides. A very pure metal (99.96 % Cr) was prepared in 1908 by reduction of chromium oxide with hydrogen.

Ferrochromium was first produced in 1820 by reduction with charcoal of a mixture of chromium and iron oxides in a crucible.

The first attempts to produce carbon ferrochromium in a blast furnace were made in the sixties of the last century.

The use of the electrothermic process was the turning point in the development of ferrochromium production. In 1893, Moissan obtained in an electric furnace ferrochromium containing 60 % Cr and 6 % C. However, low-carbon ferrochromium and metallic chromium were first obtained by the aluminothermic process.

At present the most extensively used method for the production of low-carbon ferrochromium is the silicothermic process, introduced to industry by F. M. Becket (1907), and improved by G. Jean (1909).

Metallic chromium and ferrochromium are used in making of special alloys and steels of various grades.

Ferrochromium is a widely used alloying compound, chromium being a component of many alloy steel grades.

In countries with a developed metallurgy, 2-3 kg ferrochromium are being used per ton of smelted steel.

1. Physicochemical Properties of Chromium and its Compounds

Chromium has the following physicochemical properties:

Atomic number	24
Atomic weight	52.01
Atomic diameter	2.57
Crystal lattice . . . body centered cubic	a = 2.871 Å
Specific gravity at 20°C	7.19

The $Cr_2O-Al_2O_3-MgO$ system

The phase diagram of the Cr_2O_3 - Al_2O_3 - MgO system as constructed by Wilde /40/ is given in Figure 76. Ternary chemical compounds are absent in this system as well as eutectics. As the diagram shows, all alloys, consisting of Cr_2O_3, Al_2O_3, and MgO are extremely refractory.

2. Ferrochromium Grades

Ferrochromium is (Table 31) to conform to GOST (All-Union State Standard) 4757-49; it provides thirteen grades of ferrochromium differing mainly in their carbon content.

Table 31

Composition of ferrochromium, %

Ferrochromium group	Grade	Cr not below	C	Si			P	S	N Not below
				Low-silicon	Medium-silicon	Silicon			
				not less					
Carbon-free	Khr0000	65	0.06						
	Khr000	65	0.07-0.10	1.0	1.5	-	0.06	0.04	-
	Khr00	60	0.11-0.15						
Low-carbon	Khr0	60	0.16-0.25	1.5	2.0	3.0	0.06	0.04	-
	Khr01		0.26-0.50						
Medium-carbon	Khr1	60	0.51-1.0						
	Khr2		1.1 -2.0	-	2.5	3.0	0.10	0.04	-
	Khr3		2.1 -4.0						
Carbon	Khr4	65	4.1 -6.5	2.0	3.0	5.0	0.07	0.04	-
	Khr5		6.6 -8.0				0.07	0.04	-
Special carbon-free	Khrb1	70	up to 0.04	-	0.8	-	0.02	0.03	-
	Khrb2		up to 0.04		1.0		0.03	0.03	-
Nitrided	Khrn1	70	up to 0.05	-	1.0	-	0.03	0.03	0.10

The chromium content of an alloy is determined mainly be the natural chromium - iron ratio in chromium ores, and depends upon the process of production of the alloy. The complexity of the production of ferrochromium and, accordingly, its cost, increases with the decrease of its carbon content.

Therefore, ferrochromium, with the highest admissible carbon content, being the most advantageous from the economic point of view, should be used in industrial practice.

Thus,for structural steel with a low chromium content, and with a comparatively high carbon content, or for tool steels, it is quite possible to use the high-carbon grades of ferrochromium Chr6 and Chr4. For structural steels with low carbon content, medium- and low-carbon ferrochromium is used, and, finally, for production of high-chromium alloys with a low carbon content (stainless, heat-resistant steels, high resistant alloys) carbon-free grades of ferrochromium are used.

When the iron content of the chromium alloys is limited by the manufacturing specification, metallic chromium conforming to GOST 5905-51 (Table 32) is used.

Table 32

Composition of metallic chromium

Grade	Chemical composition, %							
	Cr not below	Fe	Al	Si	Cu	C	P	S
		not above						
Kh0	98.5	0.6	0.5	0.4	0.06	0.03	0.02	0.02
Kh1	98.0	0.8	0.7	0.5	0.06	0.05	0.03	0.04
Kh2	97.0	1.2	0.8	0.5	0.1	0.06	0.05	0.05

3. Chromium Ores

According to Acad. A. P. Vinogradov, the average chromium content of the earth's crust is 0.02 %. Ore formations containing 45-55 % Cr_2O_3, which would be more than 1,500 times its concentration in the earth's crust, that is 30-37 % Cr are often found in rocks.

The number of typical native chromium compounds is small. About 99.9 % of all the chromium in the earth's crust is contained in the oxygen compounds of the spinel type.

Chromium as a trivalent element often occurs in small quantities in other minerals, mainly in alumosilicates.

The main chromium-bearing minerals of commercial importance are chromium spinels, often called chromite, which is incorrect, as their formulas differ considerably from the formula $FeO \cdot Cr_2O_3$ (67.8 % Cr_2O_3).

The Kimpersaiskii-range ores are divided, according to the distribution of the ore mineral, into: compact ores in which the amount of ore grains exceeds 80 % of the volume, and "disseminated" ores, in which the magnochromite grains are cemented, usually by serpentine with small impurities of other minerals.

According to their physical state, the ores are subdivided into massive (lump), friable and powdery ores.

The friable and powdery ores occur, as a rule, in the upper layers of the deposits, sometimes outcropping to the surface. These varieties were formed as a result of the weathering of the cementing gangue, and they occur sometimes as an almost pure magnochromite containing 58-62 % Cr_2O_3 and less than 1 % SiO_2.

Friable chromium ores are found, as a rule, in lower layers than powdery ores, and lump ores in still lower layers.

A fairly widespread variety is the ochrous ore in which a part of the FeO contained in the ore mineral and in the cementing rock, has been oxidized to Fe_2O_3. These ores, characterized by their color, varying from brown to yellow, are comparatively easily reduced owing to their low Cr_2O_3: FeO ratio (2,5-3.0), contrasting with the average ratio of the deposit estimated as 3.87.

The specific gravity of industrial ores ranges between 3.8 and 4.3, and their porosity is 19-34 %.

The technological properties of these ores are determined not only by their chemical composition but also by their physical state, as well as by the distribution of the ore mineral.

Ores containing ochrous cement have special technological properties.

Because of the constancy of the composition of magnochromite, and its high content of Cr_2O_3, even its poorest grade ores are readily dressed by usual gravity methods.

4. Methods of Ferrochromium Production

Ferrochromium and metallic chromium may be produced by various methods.

Depending upon the quality of the alloy and its designation, different technological production methods are used, to secure the production of an alloy of the required composition by the most efficient use of the raw material and under the best possible technical and economic conditions. Thus, the most efficient method of production of carbon ferrochromium is smelting in an electric shaft furnace with carbon as a reducing agent.

Smelting of carbon ferrochromium in a blast furnace is used much less.

The following methods are used to produce medium-carbon ferrochromium (0.51-2 % C):

a. refining carbon ferrochromium by chromium ore addition in an electric furnace;

b. refining carbon ferrochromium in a converter by blowing oxygen through it;

c. refining chromium-silicon by chromium ore addition in an electric furnace, according to several alternative methods; refining chromium-silicon containing 30 % Si, with flux added to the charge; the same process without adding flux; refining chromium-silicon containing 50 % Si, with the addition of carbon ferrochromium to the charge.

Carbon-free (0.06-0.15 % C) ferrochromium and low-carbon ferrochromium (0.16-0.50 % C) are usually produced in an electric furnace by refining chromium-silicon containing 50 % Si with chromium ore. Another variation of this method is the refining of chromium-silicon by smelting chromium ore with lime outside the furnace.

Carbon-free and low-carbon ferrochromium may also be produced by oxygen blasting through carbon ferrochromium in a converter in vacuum.

Carbon-free ferrochromium containing less than 0.06 % (0.02-0.04 %) C, is produced on reducing chromium ore by aluminum outside the furnace, or by refining under high vacuum with various oxides of crushed carbon ferrochromium. Metallic chromium may be produced by reduction of a technical grade of chromium oxide by aluminum outside the furnace, as well as by electrolysis of chromic anhydride of sulfate salts of chromium.

We give below a description of the main features of various methods of production of ferrochromium.

Production of Carbon Ferrochromium

When carbon ferrochromium is smelted, chromium and iron oxides contained in the chromium ore are reduced by a carbonaceous reducing agent.

The multistage reaction of the reduction of chromium oxide from the ore by carbon $Cr_2O_3 \rightarrow CrO \rightarrow Cr \rightarrow Cr_7C_3$ is characterized by the following summary reaction:

$$2/3\ Cr_2O_3 + 1\ 8/7\ C = 4/21\ Cr_7C_3 + 2CO.$$

The reaction of reduction of FeO proceeds simultaneously according to the equation

$$FeO + C = Fe + CO.$$

Iron formed by this reaction dissolves in chromium carbide, as a result of which carbon ferrochromium is produced, corresponding in its composition to a complex carbide of chromium and iron $(CrFe)_7C_3$. The theoretical carbon content of this carbide is 8.7 %. The carbon concentration of commercial alloys is somewhat lower than that calculated theoretically because of the presence of other impurities in ferrochromium and of special measures taken.

The equation of the free energy of the basic reaction for high temperatures may be obtained from the following data:

$$2/3\ Cr_2O_3 = 4/3\ Cr + O_2; \quad \Delta Z^\circ = 183{,}740 - 44.21\ T$$

$$4/3\ Cr + 12/21\ C = 4/21\ Cr_7C_3; \quad \Delta Z^\circ = -8{,}354 - 0.9\ T$$

$$3C + C_2 = 2CO; \quad \Delta Z^\circ = -53{,}400 - 41.9\ T$$

$$2/3\ Cr_2O_3 + 18/7\ C = 4/21\ Cr_7C_3 + 2CO; \quad \Delta Z^\circ = 121{,}986 - 87.01\ T.$$

The reduction of Cr_2O_3 to chromium may proceed according to the following reaction:

$$2/3\ Cr_2O_3 + 3C = 4/3\ Cr + 2CO; \quad \Delta Z^\circ = 130{,}340 - 86.11\ T.$$

As it is evident from Figure 77, the value of the free energy of this reaction is considerably lower than that of the free energy of a reaction accompanied by the formation of carbide, and therefore, from the thermodynamic point of view, the latter reaction should predominate. The theoretical initial temperature of reduction of chromium oxide by carbon to carbide is 1,130°c, and that of reduction to pure chromium is 1,240°C.

Therefore, the formation of carbide is unavoidable when reducing Cr_2O_3 by carbon.

The calculated temperatures of reduction of Cr_2O_3 fairly coincides with the results obtained experimentally. It has been established experimentally that the initial temperature of reduction of Cr_2O_3 by carbon is between 1,090 and 1,185°C.

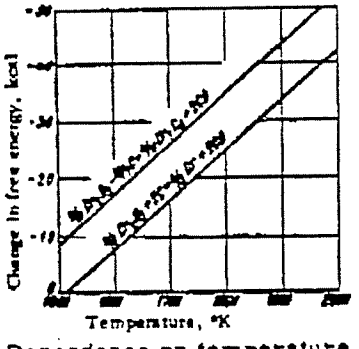


Figure 77. Dependence on temperature of the change in the free energy of reactions of reduction of Cr_2O_3 by carbon

To reduce the carbon content to the limits stipulated by GOST (All-Union State Standard), particularly when manufacturing Chr4 grades (4.1-6.5 % C), the alloy should be partially decarburized in the furnace.

Such a decarburization is possible at a sufficiently high temperature and with an increased concentration of chromic oxide in the reaction zone.

The refining process can be carried out at a high temperature only in the presence of refractory slags, which is ensured by a suitable selection of ores. Ores with an increased Al_2O_3, and especially MgO content, as well as ores with a reduced SiO_2 content, are suitable for this purpose.

A high concentration of Cr_2O_3 in the slag is disadvantageous, as this results in considerable losses of chromium. Therefore, a partial refining of the alloy is achieved by forming above the alloy a so-called ore layer, which is a mixture of partly molten lumps of ore with slag.

As this layer is very viscous, it does not emerge from the furnace when alloy and slag are tapped.

Droplets of metal flowing down, pass through this layer and partially are purified from carbon.

An ore layer can be formed only with high-grade lump ores. The ore layer is especially well maintained when using for this purpose Aktyubinsk lump ores (of solid and dense structure), with comparatively large grains of magnochromite. These ores, being refractory and difficult to reduce, particularly when in lumps, are not completely reduced and often reach the surface of the metal where they form an ore layer.

It has been practically established that for the safe manufacture of ferrochromium of the Khr4 grade the quantity of this ore in the charge should be not less than 30 %.

At present, as a rule, carbon ferrochromium is smelted in 3000-8000 kw low-shaft electric furnaces. In the Soviet Union ferrochromium is smelted in 7500-8000 kw furnaces.

The hearth and the walls of the furnace are lined with magnesite bricks, and the joints filled with fine magnesite powder.

A furnace with a new lining is fired more slowly than a ferrosilicon furnace. First smeltings after the firing of the furnace should be conducted for the formation of slag only. After slagging of the lining, regular smelting is started. The charge materials used for smelting carbon ferrochromium have to be prepared first. Chromium ore is crushed to a lump size of 50-80 mm, and fluxes are crushed in the same manner.

Sometimes intermediate slag with high chromium oxide content (27-32 % Cr_2O_3 and 28-30 % SiO_2), which is also previously crushed, is used as an acid flux for smelting carbon ferrochromium. Coke lumps should not be larger than 25 mm. Unlike the requirements of production

of ferrosilicon, and especially when fine chromium ore is used, the presence of coke dust (less than 5 mm) is permitted, but to ensure a constant composition of the charge, coke fines should be screened and added under control. To obtain the best technical and economic results of production, coke fines with a constant moisture content should be used.

When selecting coke fines for the production of carbon ferrochromium special attention should be paid to their sulfur content.

Coke containing over 0.50 % sulfur is unsuitable for the production of carbon ferrochromium.

The prepared charge materials are weighed in the proportion required by the charge calculation and thoroughly mixed. The charge enters the bunkers situated above the furnace, from where it is fed into the furnace through metal pipes equipped at their ends with mobile chutes.

Carbon ferrochromium is usually smelted continuously, and the charge materials are fed in small portions, always keeping the furnace full, while alloy and slag are tapped at regular intervals through the tapping hole.

The charge is fed chiefly toward the electrodes. Charge spilled to the sides and the middle of the furnace is raked up to the electrodes. If the charge "hangs", it is stirred by metal or wooden rods.

In the production of carbon ferrochromium the constancy of the chemical composition of the materials should be closely watched, since chromium ores, as stated above, often vary in their chemical composition. Therefore, the ore should be kept at a homogeneous composition, and its quality should be systematically checked.

Insufficient quantity of the reducing agent results in the decrease of the reduction rate of chromic oxide which, in its turn, causes a rise of the viscosity and the melting point of the slag; the slag leaves the furnace with difficulty, and the furnace operation is troubled. On the other hand, an excess of the reducing agent causes a rise of silicon content of the alloy and reduces the depth of immersion of the electrodes in the charge, which may result in the setting of the metal on the hearth. In this case, smelting is accompanied by "honeycombs", and coke not having reacted emerges from the tapping hole.

Since the charge is not completely melted, it is impossible to heat the alloy by increasing the time during which it is being held in the furnace. Consequently, the process temperature is determined by the temperature of the formation of slag and by its melting point.

The melting point of carbon ferrochromium, containing 65-70 % Cr and 6-8 % C, lies between 1,520 and 1,550°C, and therefore the melting point of the slag should be 1,600-1,650°C. Actually the slag is heated in the furnace up to 1,700-1,720°C.

Slag having roughly the following composition corresponds to the best possible conditions of smelting, the chromium content of the alloy being 70 %

SiO_2	MgO	Al_2O_3
27-32	32-36	26-30

Below we give a typical composition of the slag of industrial smelting of carbon ferrochromium, in %:

SiO_2	Al_2O_3	MgO	FeO	Cr_2O_3	CaO
27.5	28.5	34.0	1.0	6.0	3.0

When selecting the electrical operation data for the process, the following peculiarities of the determination of the value of the secondary voltage should be kept in mind:

1. About 70 % of the total useful power consumption is spent for reducing the oxides, and about 30 % is for smelting and heating the metal and slag, while the part of power acting above the smelting level may be less than in ferrosilicon smelting.

2. The necessity of creating moderate temperatures for the reduction of Cr_2O_3 and of FeO, which is fully achievable when working without electric arc.

3. The high melting point of the alloy and the insignificant difference between the melting points of the metal and of the slag require that the high temperature zone should be brought near the furnace hearth. At too high a voltage the temperature at the furnace hearth may fall so much that the alloy solidifies.

This fact makes it necessary to use a comparatively low secondary voltage, which should ensure a low generation of power at the electrode tips.

On the other hand, unlike the case of smelting ferrosilicon, a large layer of slag is formed in this case, which causes a considerable voltage drop, to which the lower electrical conductivity of the charge contributes as well.

The combined effect of all these factors is such, that the value of the useful phase voltage which ensures satisfactory production characteristics, is 65-74 v for 8,000-9,000 kva furnaces.

At higher values of useful phase voltage complications may arise connected with the decrease in the temperature of the hearth, and solidifying of the alloy.

It should be borne in mind that the electrical operational data of a furnace when smelting carbon ferrochromium change sharply after having tapped the slag and the metal.

Metal and slag are tapped at regular intervals, approximately every 2 hours, at the rate of their accumulation in the furnace, which is determined by the amount of charge introduced into the furnace and the electric power consumption. Metal and slag may be tapped simultaneously through a common tap hole, or through separate tap holes. In the latter case, the slag tap hole is situated 100-150 mm above the metal tap hole. The metal is discharged into a ladle, from which it is poured into flat molds. If metal and slag are tapped together, the slag is poured through the ladle spout into a slag pot at hand.

The process described above is also used for producing medium chromium designed for the production of ferrosilicochromium. It contains less chromium (60 %-65 %) than the standard grade of carbon ferrochromium, and should have a higher silicon content (3-5 %). Its carbon content is not limited, and for this reason the charge may contain more silica and an excess of reducing agent. The lower chromium content and the required higher silicon content permit work with ores of a poorer quality (more fines are permitted), as well as with ochrous ores; it also permits the use of refining slags (25-30 % Cr_2O_3) and the wastes of ferrosilicon and ferrochromium production.

Medium ferrochromium may be used as crushed and granulated. The alloy is granulated in a special installation by means of a water jet.

We give below the charge calculation for the smelting of grade Khr4 ferrochromium.

The composition of the charge related to its main components is given in Table 36.

Table 36

Composition of charge materials

Material	Chemical composition, %									Moisture
	Cr_2O_3	FeO	SiO_2	MgO	Al_2O_3	CaO	P_2O_5	C	S	
Chromium ore	53.00	12.00	3.00	17.00	14.00	1.00	0.02	–	0.03	–
Coke dust	Ash 16	–	–	–	–	–	–	78.00	0.05	5.5
Coke dust ash	–	Fe_2O_3 15.00	45.00	5.00	30.00	4.30	0.70	–	–	–
Quartzite	–	1.00	97.00	0.10	1.50	0.27	0.05	–	0.08	–

Chromium-sulfur

Chromium and sulfur combine to form two compounds: CrS and Cr_2S_3; The heat of formation of Cr_2S_3 from its elements ΔH_{298} = = −110,000 cal.

Chromium-phosphorus

Chromium and phosphorus combine to form two compounds: CrP and Cr_2P_3; the second phosphide passes into CrP at 440°C.

Chromium-nitrogen

Chromium combines with nitrogen to form stable nitrides: Cr N and Cr_2 N. The heat of formation of one mole of nitride from the elements is:

CrN	ΔH_{298} = − 28,500 cal
Cr_2N	ΔH_{298} = − 26,500 cal

The dependence of the partial pressure of nitrogen on its concentration in chromium at 1,100° and 1,200°C is represented in Figure 72. The solubility of nitrogen in chromium decreases as the temperature rises. In chromium-iron alloys the solubility of nitrogen decreases with the decrease of chromium concentration as well as with increase in temperature.

Chromium-oxygen

Chromium combines with oxygen to form three oxides: the basic chromium oxide CrO, the amphoteric oxide Cr_2O_3 and the acid oxide CrO_3. Chromic oxide Cr_2O_3 is the most stable under ordinary conditions; the other oxides readily pass into Cr_2O_3 when heated in the air.

Chromic oxide is a bright green substance having a specific gravity of 5.21 and a melting point of 2,275°C. The heat of formation of one mole of chromic oxide from its elements ΔH_{298} = − 270,700 cal.

Chromium trioxide (chromic anhydride) is a crimson substance, its specific gravity is 2.70 and its melting point is 196°C. CrO_3 dissociates at 240°C into Cr_2O_3 and O_2 forming intermediate oxides:

$$CrO_3 - Cr_5O_{13} - Cr_5O_{12} - Cr_2O_3.$$

The heat of formation of one mole CrO_3 from its elements at 298°K ΔH = − 138,400 cal.

The basic oxide CrO is unstable in the air and passes quickly into Cr_2O_3; nevertheless, there are indications in the literature that it probably forms in molten slags of high silicon content.

The heat of formation of chromous oxide in slag from chromium dissolved in iron and from oxygen, according to the reaction

$$2\,[Cr]_{Fe} + O_2 = 2\,[CrO]\ \text{slag}$$

is about 213,500 cal/40/.

The Cr_2O_3 - FeO system

The compound $FeO \cdot Cr_2O_3$ (chromite) is formed in this system, its specific gravity is 4.93 and its melting point is 2,250°C.

Chromite has a cubic structure with a parameter a = 8.358 Å.

The free energy of formation of $FeO \cdot Cr_2O_3$ from oxides at high temperatures is about -8000 cal.

Already in the solid state (1200 - 1600°C) FeO may be displaced from chromite by magnesium oxide according to the reaction:

$$FeO \cdot Cr_2O_3 + MgO = MgO \cdot Cr_2O_3 + FeO$$

Magnesium chromite $MgO \cdot Cr_2O_3$ is thus a compound which is more stable and more difficult to reduce than chromite. The melting point of $MgO \cdot Cr_2O_3$ is about 2,350°C.

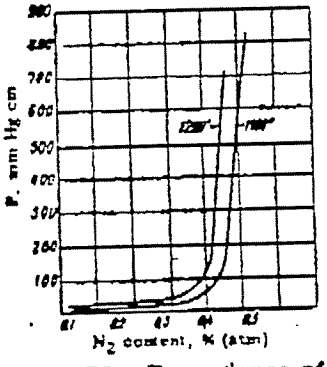


Figure 72. Dependence of the partial pressure of nitrogen on its concentration in the alloy

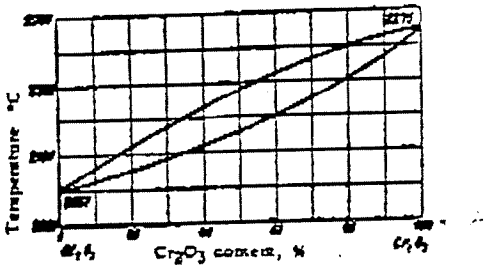


Figure 73. Phase diagram of the Cr_2O_3–Al_2O_3 system

The calculated slag is:

52,548 : 46.143 = 1.14

MATERIAL BALANCE

Input, kg		Output, kg	
Chromium ore	100,000	Ferrochromium	46.143
Coke dust	21.475	Slag	52.548
Quartzite	12.352	Loss (by difference)	35.135*
Total	133,827	Total	133.827

To obtain the best possible technical and economic production characteristics, special attention should be paid to as complete a reduction of the Cr_2O_3 in the ore as possible, to decrease losses of chromium in the slag in the form of metal reguli, and to eliminate losses of chromium when tapping and pouring the metal.

The electric power and the charge materials consumed in the production of 1 t of carbon ferrochromium range within wide limits, depending upon the chromium oxide content of the ore.

The quantity of flux consumed is determined by the composition of the gangue and the coke ash.

The main economic and technical features of the ferrochromium production, determining its cost, are the electric power consumption and the degree of extraction of chromium.

To produce 1 ton of 60 % carbon ferrochromium, 1,850 kg chromium ore (50 % Cr_2O_3), 450 kg coke fines and 3,400-3,500 kw-hrs of electric power are required. The degree of extraction of chromium is 90-94 %. For the production of medium ferrochromium low-grade ores and intermediate slags are used as well as high-grade chromium ore, and for this reason the electric power consumption amounts in this case to about 3,700 kw-hrs/ /ton.

* [Translator's note: obviously printing error, should be 35.136.]

EXHIBIT #4

C/G
The Carbon/Graphite Group, Inc.

4861 Packard Road
Niagara Falls, NY 14304

(716) 285-9381

September 17, 1990

Mr. Paul D. Eismann
Deputy Permit Administrator
New York State Department
of Environmental Conservation
600 Delaware Avenue
Buffalo, New York 14202-1073

Subject: Witmer Road Landfill
TCLP Waste Analyses

Dear Mr. Eismann:

Enclosed please find copies of the TCLP waste analyses as previously requested. The analyses are included as ATTACHMENTS A-E.

An extract from R. Snyder's "Part 360 Engineering Report for a Solid Waste Management Facility at the Airco Properties, Inc. Witmer Road Site" is included as ATTACHMENT F. This extract outlines the wastes to be deposited at the site. The TCLP analyses for sample composited waste streams are identified on ATTACHMENT F.

There was a problem sampling the waste sand in ATTACHMENT E. High levels of volatiles were noted in the report dated 7/11/90 within ATTACHMENT E. Samples were resubmitted as the presence of the volatiles in this waste stream was not likely. The first and second sets of samples were collected in paper sample bags. It was decided to resample again with glass sample jars to avoid contamination through the paper bags. The 8/29/90 report for volatiles represents the most accurate results. Copies of the first two sampling results are included.

Sincerely,
The Carbon/Graphite Group, Inc.

Suzette D Kosikowski
Suzette D. Kosikowski
Supervisor of Environmental
Conservation

SDK/bm

Based upon existing C/G production rates, C/G will initially deposit approximately 2,000 cubic yards per month of wastes at the Witmer Road site. Actual monthly disposal requirements will be dependent on the following:

1) Plant manufacturing units which are operational and associated operating rates,
2) Degree of long term success achieved by efforts to reduce waste generation rates at the individual production sources,
3) Amounts of various waste materials which can be marketed.

The site's original Part 360 Application Document entitled "Application for a Solid Waste Management Facility for the Airco Properties, Inc. Witmer Road, Niagara Falls, New York, Site (prepared by Richard R. Snyder, P.E. dated May 23, 1980) split the wastes into two general categories (Group I and Group II wastes). This breakdown will continue to be followed by C/G. Group I wastes continue to constitute approximately 70 percent of the total non hazardous waste volume to be deposited at the Witmer Road site. These wastes consist of the following:

Reference ATTACHMENT

1) Graphitizing waste pack, bricks and solid block pieces from Plant #1, — D
2) Waste sand from bake department, — E
3) Dumping station - Bake department, sand, bake pieces of electrodes — E

Reference ATTACHMENT

and other waste materials,
4) Pitch dust and solid pitch from P.I. Department, C
5) Green scrap electrode pieces, C
6) Bake scrap electrode pieces, C
7) Waste pack and pieces of side blocks, bricks, and other wastes from Plants 2-5, A
8) Scrap wood, pallets, and cardboard.

Group II wastes continue to constitute approximately 30 percent of the non hazardous waste volume to be deposited at the Witmer Road site. These wastes consist of the following:

1) Plant 1, waste pack and dust collector fines, D
2) Graphitizing dust collector #3 fines (for mix), A
3) Graphitizing dust collector #2 fines (for pack), A
4) Plant #6 Gulper dust, B
5) Plant #6 screen fines, B
6) Mill-Mix outside dust collectors fines,
7) Mill-Mix 36 inch and 25 inch mill dust collector fines,
8) Wheelabrator dust from Bake department. C

C/G waste materials can be categorized per the previously noted typical waste materials as follows:

1) Coke unloading dust collector fines - Group II Item 6
2) Silo dust collector fines- Group II Item 6
3) Mill Mix (36 inch) dust collector fines- Group II Item 7
4) Mill Mix (25 inch) dust collector fines - Group II Item 7
5) Raymond Mill (36 inch) dust collector fines - Group I Item 2
6) Raymond Mill (25 inch) dust collector fines - Group I Item 2
7) PangBorne dust collector fines - Group I Item 2

A

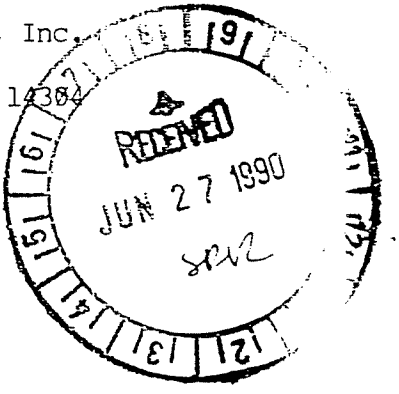
FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: June 21, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4329-01	Graph Mix Dust	Grab	Date: May 30, 1990 Time: 1300 hrs
4329-02	Graph ~~Poole~~ Pack Dust	"	Date: May 30, 1990 Time: 1300 hrs
4329-03	Graph Waste Pack	"	Date: May 30, 1990 Time: 1300 hrs
4329-04	Graph Waste Mix	"	Date: May 31, 1990 Time: 1330 hrs
4329-05	Graph Blocks	"	Date: May 30, 1990 Time: 1300 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4329-01/05	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. L. Lucia

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4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4329-01/05

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Composite	Sulfide Spot Test	SM 16 427 C	NA	Positive
	Cyanide Spot Test	SM 16 412 J	NA	Negative
	pH	EPA SW-846 (150.1)	NA	7.3
	Sulfide	EPA SW-846 (376.1)	2.65 mg/kg	43.2 mg/kg

NA = Not Applicable

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4329-01/05

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Composite	Sulfide Spot Test	SM 16 427 C	NA	Positive
	Cyanide Spot Test	SM 16 412 J	NA	Negative
	pH	EPA SW-846 (150.1)	NA	7.3
	Sulfide	EPA SW-846 (376.1)	2.65 mg/kg	43.2 mg/kg

NA = Not Applicable

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4329-01/05

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Composite	Arsenic	EPA SW-846 (7061)	0.01	0.05
	Barium	" " (7080)	0.10	0.67
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.03
	Lead	" " (7420)	0.01	0.13
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.12
	Silver	" " (7760)	0.01	0.01

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4329-01/05

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	<DL
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	105
Toluene D8	102
4-Bromofluorobenzene	100

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4329-01/05

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.02	<DL
m-Cresol	0.02	<DL
p-Cresol	0.02	<DL
Cresol	0.02	<DL
2,4,6-Trichlorophenol	0.02	<DL
2,4,5-Trichlorophenol	0.02	<DL
Pentachlorophenol	0.02	<DL
Pyridine	0.02	<DL
Hexachloroethane	0.02	<DL
Nitrobenzene	0.02	<DL
Hexachlorobutadiene	0.02	<DL
2,4-Dinitrotoluene	0.02	<DL
Hexachlorobenzene	0.02	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	41
2-Fluorophenol	52
Nitrobenzene D5	48
2-Fluorobiphenyl	69
2,4,6-Tribromophenol	81
4-Terphenyl D14	105

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4329

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
*	Arsenic	1.2	108	0.02 ppm	91.0
	Barium	(1)	94.0	2.00 ppm	101
	Cadmium	(2)	93.0	0.18 ppm	101
	Chromium	0.0	88.0	0.20 ppm	103
	Lead	(2)	108	0.18 ppm	92.0
	Mercury	(2)	103	5.00 ppb	98.8
	Selenium	2.3	77.0	0.02 ppm	91.0
	Silver	(2)	89.0	0.18 ppm	102
	Sulfide	5.5	86.3	40 ppm	80.9

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

(1) Result less than 5 X DL. "RPD" value within + 1DL.

(2) N.C. - Not Calculated. Result(s) less than DL.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4329

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
*	1,1-Dichloroethene	1	126	250 ng
	Trichloroethene	7	101	250 ng
	Benzene	8	100	250 ng
	Toluene	10	78	250 ng
	Chlorobenzene	2	103	250 ng
*	Phenol	0	54	200 ng
	2-Chlorophenol	0	80	200 ng
	1,4-Dichlorobenzene	14	92	100 ng
	N-Nitroso-Di-Propylamine	7	69	100 ng
	1,2,4-Trichlorobenzene	3	95	100 ng
	4-Chloro-3-Methylphenol	0	81	200 ng
	Acenaphthene	2	87	100 ng
	4-Nitrophenol	18	66	200 ng
	2,4-Dinitrotoluene	4	89	100 ng
	Pentachlorophenol	3	82	200 ng
	Pyrene	19	70	100 ng

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

FEL
CHAIN OF CUSTODY

PROJECT #

PROJECT NAME

Samplers Signature S. D. Kaschock

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Graph Mix Dust	9329-01	5/30/90	1:00 pm	C/G	grab	1	bag	samples to be composited as follows:
Graph Pack Dust	02	5/30/90	1:00 pm	C/G	grab	1	bag	Graph Mix Dust 30%
Graph Waste Pack	03	5/30/90	1:00 pm	C/G	grab	1	bag	Graph Pack Dust 30%
Graph Waste Mix	04	5/31/90	1:00 pm	C/G	grab	1	bag	Graph Waste Pack, Graph Waste Mix, Graph Blocks } 40%
Graph Blocks	05	5/30/90	1:00 pm	C/G	grab	1	bag	

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
	5/31/90				

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: July 9, 1990

ADDENDUM TO
ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4329-01	Graph Mix Dust	Grab	Date: May 30, 1990 Time: 1300 hrs
4329-02	Graph ~~Poole~~ Pack Dust	"	Date: May 30, 1990 Time: 1300 hrs
4329-03	Graph Waste Pack	"	Date: May 30, 1990 Time: 1300 hrs
4329-04	Graph Waste Mix	"	Date: May 31, 1990 Time: 1330 hrs
4329-05	Graph Blocks	"	Date: May 30, 1990 Time: 1300 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4329-01/05	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. F. Kosikowski

RECEIVED
JUL 11 1990

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4329-01/05

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Composite	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

B

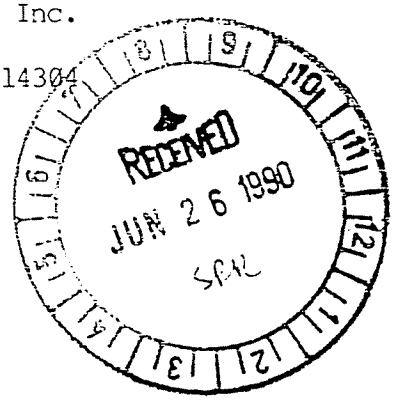
FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: June 21, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4331-01	Plant VI Dust	Grab	Date: May 30, 1990 Time: 1500 hrs
4331-02	Plant VI Solid	Grab	Date: May 30, 1990 Time: 1500 hrs
4331-03	Plant VI Saw	Grab	Date: May 31, 1990 Time: 0900 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4331-01/03	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: Ralph F. Scarpelli

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-01/03

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Plant VI Dust	Sulfide Spot Test	SM 16 427 C	NA	Positive
Plant VI Solid	" "	" "	NA	Positive
Plant VI Saw	" "	" "	NA	Negative
Plant VI Dust	Cyanide Spot Test	SM 16 412 J	NA	Negative
Plant VI Solid	" "	" "	NA	Negative
Plant VI Saw	" "	" "	NA	Negative
Plant VI Dust	pH	EPA SW-846 (150.1)	NA	6.0
Plant VI Solid	"	" "	NA	7.3
Plant VI Saw	"	" "	NA	7.3
Plant VI Dust	Sulfide	EPA SW-846 (376.1)	2.65 mg/kg	2910 mg/kg
Plant VI Solid	"	" "	2.65 mg/kg	6200 mg/kg

NA = Not Applicable

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O Box 309.• Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-01

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Plant VI Dust	Arsenic	EPA SW-846 (7061)	0.01	0.05
	Barium	" " (7080)	0.10	0.33
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.05
	Lead	" " (7420)	0.01	0.06
	Mercury	" " (7470)	0.0002	0.0002
	Selenium	" " (7741)	0.01	0.11
	Silver	" " (7760)	0.01	0.01

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M P.O. Box 309 • Niagara Falls. New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-02

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Plant VI Solid	Arsenic	EPA SW-846 (7061)	0.01	0.05
	Barium	" " (7080)	0.10	0.43
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.03
	Lead	" " (7420)	0.01	0.04
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.09
	Silver	" " (7760)	0.01	0.02

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-02

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Plant VI Solid	Arsenic	EPA SW-846 (7061)	0.01	0.05
	Barium	" " (7080)	0.10	0.43
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.03
	Lead	" " (7420)	0.01	0.04
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.09
	Silver	" " (7760)	0.01	0.02

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-03

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Plant VI Saw	Arsenic	EPA SW-846 (7061)	0.01	0.02
	Barium	" " (7080)	0.10	0.20
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.03
	Lead	" " (7420)	0.01	<DL
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.06
	Silver	" " (7760)	0.01	<DL

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4331

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
*	Arsenic	(2)	99.0	0.02 ppm	91.0
	Barium	6.9	99.0	2.00 ppm	101
	Cadmium	0.0	110	0.16 ppm	101
	Chromium	0.0	88.0	0.20 ppm	103
	Lead	14	70.0	0.20 ppm	92.0
	Mercury	(1)	99.3	5.00 ppb	98.8
	Selenium	9.9	80.1	0.02 ppm	91.0
	Silver	(1)	84.0	0.20 ppm	102
	Sulfide	5.5	86.3	40 ppm	80.9

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

(1) Result less than 5 X DL. "RPD" value within + 1DL.

(2) N.C. - Not Calculated. Result(s) less than DL.

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4331

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
Plant VI Dust	1,1-Dichloroethene	1	126	250 ng
	Trichloroethene	7	101	250 ng
	Benzene	8	100	250 ng
	Toluene	10	78	250 ng
	Chlorobenzene	2	103	250 ng
Plant VI Saw	Phenol	0	56	200 ng
	2-Chlorophenol	0	80	200 ng
	1,4-Dichlorobenzene	14	82	100 ng
	N-Nitroso-Di-Propylamine	7	82	100 ng
	1,2,4-Trichlorobenzene	3	90	100 ng
	4-Chloro-3-Methylphenol	0	92	200 ng
	Acenaphthene	2	88	100 ng
	4-Nitrophenol	18	32	200 ng
	2,4-Dinitrotoluene	4	86	100 ng
	Pentachlorophenol	3	101	200 ng
	Pyrene	19	109	100 ng

RPD = Relative Percent Difference

TV = True Value

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-01 SAMPLE ID: Plant VI Dust

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.04	<DL
m-Cresol	0.04	<DL
p-Cresol	0.04	<DL
Cresol	0.04	<DL
2,4,6-Trichlorophenol	0.04	<DL
2,4,5-Trichlorophenol	0.04	<DL
Pentachlorophenol	0.04	<DL
Pyridine	0.04	<DL
Hexachloroethane	0.04	<DL
Nitrobenzene	0.04	<DL
Hexachlorobutadiene	0.04	<DL
2,4-Dinitrotoluene	0.04	<DL
Hexachlorobenzene	0.04	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	0*
2-Fluorophenol	0*
Nitrobenzene D5	33
2-Fluorobiphenyl	73
2,4,6-Tribromophenol	81
4-Terphenyl D14	105

* Note: Low surrogate recoveries due to matrix effect.

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-02 SAMPLE ID: Plant VI Solid

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.04	<DL
m-Cresol	0.04	<DL
p-Cresol	0.04	<DL
Cresol	0.04	<DL
2,4,6-Trichlorophenol	0.04	<DL
2,4,5-Trichlorophenol	0.04	<DL
Pentachlorophenol	0.04	<DL
Pyridine	0.04	<DL
Hexachloroethane	0.04	<DL
Nitrobenzene	0.04	<DL
Hexachlorobutadiene	0.04	<DL
2,4-Dinitrotoluene	0.04	<DL
Hexachlorobenzene	0.04	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	40
2-Fluorophenol	41
Nitrobenzene D5	53
2-Fluorobiphenyl	51
2,4,6-Tribromophenol	108
4-Terphenyl D14	96

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-03 SAMPLE ID: Plant VI Saw

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.04	<DL
m-Cresol	0.04	<DL
p-Cresol	0.04	<DL
Cresol	0.04	<DL
2,4,6-Trichlorophenol	0.04	<DL
2,4,5-Trichlorophenol	0.04	<DL
Pentachlorophenol	0.04	<DL
Pyridine	0.04	<DL
Hexachloroethane	0.04	<DL
Nitrobenzene	0.04	<DL
Hexachlorobutadiene	0.04	<DL
2,4-Dinitrotoluene	0.04	<DL
Hexachlorobenzene	0.04	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	56
2-Fluorophenol	65
Nitrobenzene D5	83
2-Fluorobiphenyl	68
2,4,6-Tribromophenol	122
4-Terphenyl D14	105

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-01 SAMPLE ID: Plant VI Dust

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	<DL
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	108
Toluene D8	95
4-Bromofluorobenzene	92

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-02 SAMPLE ID: Plant VI Solid

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	0.4
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	106
Toluene D8	94
4-Bromofluorobenzene	89

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4331-03 SAMPLE ID: Plant VI Saw

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	<DL
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	107
Toluene D8	94
4-Bromofluorobenzene	94

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: July 9, 1990

ADDENDUM TO
ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4331-01	Plant VI Dust	Grab	Date: May 30, 1990 Time: 1500 hrs
4331-02	Plant VI Solid	Grab	Date: May 30, 1990 Time: 1500 hrs
4331-03	Plant VI Saw	Grab	Date: May 31, 1990 Time: 0900 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4331-01/03	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. J. Gruza

RECEIVED JUL 11 1990 SDK

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4331-01

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Plant VI Dust	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4331-02

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Plant VI Solid	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4331-03

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Plant VI Saw	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

FEL CHAIN OF CUSTODY	PROJECT #	PROJECT NAME

Samplers Signature S. D. Kaufman

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont	Type of Cont	Remarks
Plant VI Dust	4331-01	5/30/90	3 PM	C/G	grab	1	bag	[redacted]
Plant VI Sold	02	5/30/90	3 PM	C/G	grab	1	bag	
Plant VI Saw	03	5/31/90	9 AM	C/G	grab	1	plastic	

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
S. D. Kaufman	5/31/90 3:15PM	Renee M. Morris			

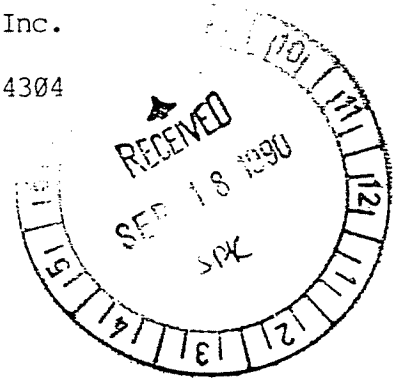
FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: September 13, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4563-01	Plant VI Solid A	Grab	Site: Carbon/Graphite
4563-02	Plant VI Solid B	Grab	Date: September 11, 1990
			Time: 0900 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4563-01/02	Properly preserved and collected.	Date: September 12, 1990 Time: 1017 hrs

REPORT RELEASED BY: E. J. Guza

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: September 13, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# 4563-01/02 Composite of Plant VI Solids A & B

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Composite	Spot Sulfide	SM 16 427 C	NA	Positive
	Total Sulfide	EPA SW-846 (376.1)	0.16 mg/kg	5300 mg/kg

NA = Not Applicable

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4563

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
*	Sulfide	23			108

RPD = Relative Percent Difference

TV = True Value

* Quality Control results were generated from samples of a similar matrix.

FEL CHAIN OF CUSTODY	PROJECT #	PROJECT NAME

Samplers Signature Suzette D. Kosharek

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Plant VI Sld A	4563-01	9/11/90	9 AM	C/G	grab	1	paper	to be composited equally as one sample
Plant VI Sld B	4563-02	9/11/90	9 AM	C/G	grab	1	paper	

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
S. Kosharek	9/12/90 10:17 AM				

C

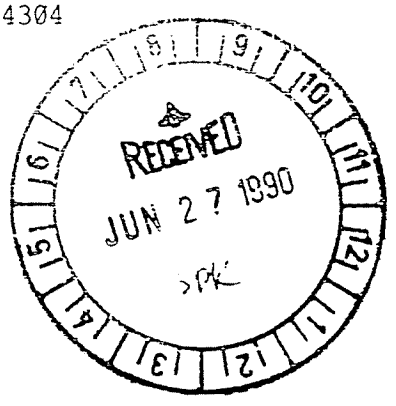
FRONTIER ENvIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: June 20, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4328-01	PI Pitch	Grab	Date: May 31, 1990 Time: 1100 hrs
4328-02	Green Scrap	Grab	Date: May 31, 1990 Time: 1230 hrs
4328-03	Bake Scrap	Grab	Date: May 31, 1990 Time: 1230 hrs
4328-04	Wheel Dust	Grab	Date: May 30, 1990 Time: 1100 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4328-01/04	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: D. H. Sluga

FRONTIER ENvIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 20, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4328-01/04

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Composite	Sulfide Spot Test	SM 16 427 C	NA	Negative
	Cyanide Spot Test	SM 16 412 J	NA	Negative
	pH	EPA SW-846 (150.1)	NA	7.4

NA = Not Applicable

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 20, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite 4328-01/04

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Composite	Arsenic	EPA SW-846 (7061)	0.01	0.03
	Barium	" " (7080)	0.10	0.27
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.19
	Lead	" " (7420)	0.01	0.01
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.07
	Silver	" " (7760)	0.01	<DL

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENvIRONMENTAL LABORATORIES, INC.

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DATE: June 20, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4328-01/04

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	<DL
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	102
Toluene D8	100
4-Bromofluorobenzene	98

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: June 20, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4328-01/04

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.02	<DL
m-Cresol	0.02	<DL
p-Cresol	0.02	<DL
Cresol	0.02	<DL
2,4,6-Trichlorophenol	0.02	<DL
2,4,5-Trichlorophenol	0.02	<DL
Pentachlorophenol	0.02	<DL
Pyridine	0.02	<DL
Hexachloroethane	0.02	<DL
Nitrobenzene	0.02	<DL
Hexachlorobutadiene	0.02	<DL
2,4-Dinitrotoluene	0.02	<DL
Hexachlorobenzene	0.02	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	41
2-Fluorophenol	49
Nitrobenzene D5	37
2-Fluorobiphenyl	77
2,4,6-Tribromophenol	105
4-Terphenyl D14	95

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4328

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
Composite:					
01-04	Arsenic	1.2	108	0.02 ppm	91.0
	Barium	(1)	94.0	2.00 ppm	101
	Cadmium	(2)	92.9	0.18 ppm	101
	Chromium	0.0	88.0	0.20 ppm	103
	Lead	0.0	108	0.18 ppm	92.0
	Mercury	(2)	103	5.00 ppb	98.8
	Selenium	2.3	77.0	0.02 ppm	91.0
	Silver	(2)	89.0	0.18 ppm	102

RPD = Relative Percent Difference

TV = True Value

(1) Result less than 5 X DL. "RPD" value within + 1DL.

(2) N.C. - Not Calculated. Result(s) less than DL.

FRONTIER ENvIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4328

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
Composite:				
01-04	Phenol	0	54	200 ng
	2-Chlorophenol	0	80	200 ng
	1,4-Dichlorobenzene	14	92	100 ng
	N-Nitroso-Di-Propylamine	7	69	100 ng
	1,2,4-Trichlorobenzene	3	95	100 ng
	4-Chloro-3-Methylphenol	0	81	200 ng
	Acenaphthene	2	87	100 ng
	4-Nitrophenol	18	66	200 ng
	2,4-Dinitrotoluene	4	89	100 ng
	Pentachlorophenol	3	82	200 ng
	Pyrene	19	70	100 ng

RPD = Relative Percent Difference

TV = True Value

FEL
CHAIN OF CUSTODY

PROJECT #

PROJECT NAME

Samplers Signature S. D. Kochmin

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
PI Pitch	4028-01	5/31/90	11 00 AM	C/G	grab	1	bag	Samples to be composited as follows
Green Scrap	02	5/31/90	12 30 PM	C/G	grab	1	bag	10% PI Pitch
Bake Scrap	03	5/31/90	12 30 PM	C/G	grab	1	bag	10% Green Scrap
Wheel Dust	04	5/30/90	11 00 AM	C/G	grab	1	bag	70% Bake Scrap
								10% Wheel Dust

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
	5/31/90				

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: July 9, 1990

ADDENDUM TO
ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

Site of Collection: Carbon/Graphite

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4328-01	PI Pitch	Grab	Date: May 31, 1990 Time: 1100 hrs
4328-02	Green Scrap	Grab	Date: May 31, 1990 Time: 1230 hrs
4328-03	Bake Scrap	Grab	Date: May 31, 1990 Time: 1230 hrs
4328-04	Wheel Dust	Grab	Date: May 30, 1990 Time: 1100 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4328-01/04	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. L. Tuga

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FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4328-01/04

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Composite	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

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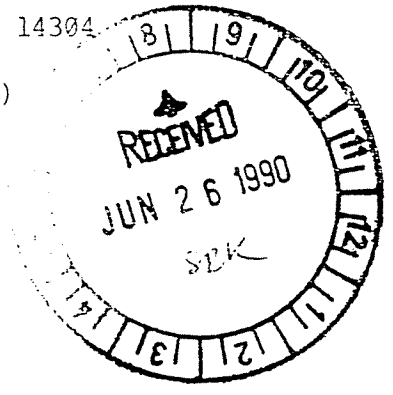
FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: June 21, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: J. Snopkowski

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4330-01	Plant I Solids	Grab	Site: Carbon/Graphite
4330-02	Plant I Dust	Grab	Date: May 30, 1990
			Time: 1400 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4330-01/02	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. J. Snopkowski

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4330-01/02

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Composite	Sulfide Spot Test	SM 16 427 C	NA	Positive
	Cyanide Spot Test	SM 16 412 J	NA	Negative
	pH	EPA SW-846 (150.1)	NA	8.9
	Sulfide	EPA SW-846 (376.1)	2.65 mg/kg	74.6 mg/kg

NA = Not Applicable

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DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4330-01/02

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Composite	Arsenic	EPA SW-846 (7061)	0.01	0.05
	Barium	" " (7080)	0.10	0.46
	Cadmium	" " (7130)	0.01	<DL
	Chromium	" " (7190)	0.01	0.03
	Lead	" " (7420)	0.01	0.15
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.01	0.11
	Silver	" " (7760)	0.01	0.04

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: June 21, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4330-01/02

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.2	<DL
1,1-Dichloroethylene	0.2	<DL
Methyl ethyl ketone	0.2	<DL
Chloroform	0.2	<DL
1,2-Dichloroethane	0.2	<DL
Benzene	0.2	<DL
Carbon Tetrachloride	0.2	<DL
Trichloroethylene	0.2	<DL
Tetrachloroethylene	0.2	<DL
Chlorobenzene	0.2	<DL
1,4-Dichlorobenzene	0.2	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	116
Toluene D8	95
4-Bromofluorobenzene	105

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DATE: June 21, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4330-01/02

PARAMETER	DETECTION LIMIT mg/L	RESULT mg/L
o-Cresol	0.02	<DL
m-Cresol	0.02	<DL
p-Cresol	0.02	<DL
Cresol	0.02	<DL
2,4,6-Trichlorophenol	0.02	<DL
2,4,5-Trichlorophenol	0.02	<DL
Pentachlorophenol	0.02	<DL
Pyridine	0.02	<DL
Hexachloroethane	0.02	<DL
Nitrobenzene	0.02	<DL
Hexachlorobutadiene	0.02	<DL
2,4-Dinitrotoluene	0.02	<DL
Hexachlorobenzene	0.02	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	45
2-Fluorophenol	53
Nitrobenzene D5	63
2-Fluorobiphenyl	67
2,4,6-Tribromophenol	95
4-Terphenyl D14	96

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4330

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
*	1,1-Dichloroethene	1	126	250 ng
	Trichloroethene	7	101	250 ng
	Benzene	8	100	250 ng
	Toluene	10	78	250 ng
	Chlorobenzene	2	103	250 ng
*	Phenol	0	54	200 ng
	2-Chlorophenol	0	80	200 ng
	1,4-Dichlorobenzene	14	92	100 ng
	N-Nitroso-Di-Propylamine	7	69	100 ng
	1,2,4-Trichlorobenzene	3	95	100 ng
	4-Chloro-3-Methylphenol	0	81	200 ng
	Acenaphthene	2	87	100 ng
	4-Nitrophenol	18	66	200 ng
	2,4-Dinitrotoluene	4	89	100 ng
	Pentachlorophenol	3	82	200 ng
	Pyrene	19	70	100 ng

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4330

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
*	Arsenic	1.2	108	0.02 ppm	91.0
	Barium	(1)	94.0	2.00 ppm	101
	Cadmium	(2)	92.9	0.18 ppm	101
	Chromium	0.0	88.0	0.20 ppm	103
	Lead	(2)	108	0.18 ppm	92.0
	Mercury	(2)	103	5.00 ppb	98.8
	Selenium	2.3	77.0	0.02 ppm	91.0
	Silver	(2)	89.0	0.18 ppm	102
	Sulfide	5.5	86.3	40 ppm	80.9

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

(1) Result less than 5 X DL. "RPD" value within + 1DL.

(2) N.C. - Not Calculated. Result(s) less than DL.

FEL CHAIN OF CUSTODY	PROJECT #	PROJECT NAME

Samplers Signature S.D. Kozlowski

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Plant I Solids	4330-01	5/30/90	2 pm	C/G	grab	1	bag	Samples to be composited as follows:
Plant I Dust	4330-02	5/30/90	2 pm	C/G	grab	1	bag	60% Plant I Dust 40% Plant I Solids

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
S.D. Kozlowski	5/31/90	[illegible]			

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: July 9, 1990

ADDENDUM TO
ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: J. Snopkowski

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4330-01	Plant I Solids	Grab	Site: Carbon/Graphite
4330-02	Plant I Dust	Grab	Date: May 30, 1990
			Time: 1400 hrs

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4330-01/02	Properly preserved and collected.	Date: May 31, 1990 Time: 1515 hrs

REPORT RELEASED BY: B. J. Fuga

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JUL 11 1990
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FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: July 9, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL # 4330-01/02

SAMPLE ID	PARAMETER	DETECTION LIMIT mg/L	RESULTS mg/L
Composite	Chlordane	0.0005	<DL
	Heptachlor	0.00005	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

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FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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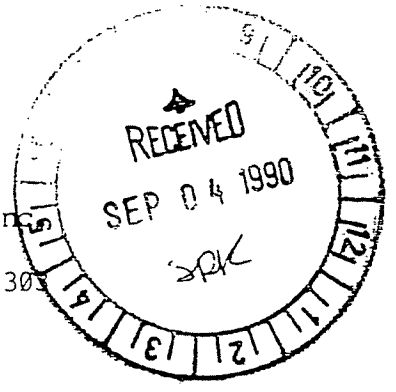

Date: August 29, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14303

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: F. Quaranta

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4480-01	Sandmill North	Grab	Site: Carbon/Graphite
4480-02	Sandmill South	"	Date: August 15, 1990
4480-03	Sandmill Bag	"	Time: 1400 hrs
4480-04	Loader Bag	"	
4480-05	Loader Hopper	"	
4480-06	Dumper Bag	"	

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4480-01/06	Properly preserved and collected.	Date: August 15, 1990 Time: 1515 hrs

REPORT RELEASED BY: Rudolph F. Scapelli

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: August 29, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4480-01/06

PARAMETER	DETECTION LIMIT µg/kg	RESULT µg/kg
Vinyl Chloride	20	<DL
1,1-Dichloroethylene	20	<DL
Methyl ethyl ketone	20	<DL
Chloroform	4.0	5.9
1,2-Dichloroethane	20	<DL
Benzene	4.0	21.2
Carbon Tetrachloride	20	<DL
Trichloroethylene	20	<DL
Tetrachloroethylene	20	<DL
Chlorobenzene	20	<DL
1,4-Dichlorobenzene	20	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	93
Toluene D8	84
4-Bromofluorobenzene	52

* Surrogate out of spec due to matrix effect.

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4480

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
*	1,1-Dichloroethene	2	82	250 ng
	Trichloroethene	4	92	250 ng
	Benzene	4	94	250 ng
	Toluene	7	94	250 ng
	Chlorobenzene	1	97	250 ng

RPD = Relative Percent Difference

TV = True Value

* Quality Control results were generated from samples of a similar matrix.

FEL
CHAIN OF CUSTODY

PROJECT #

PROJECT NAME

Samplers Signature: I S Kashuba

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Sandmill North	4480-01	8/15/90	2 pm	C/G	grab	1	glass	to be composited
Sandmill South	02					1	plastic	equally as one
Sandmill Bag	03					1	glass	sample
Loader Bag	04					1	glass	
Loader Hopper	05					1	glass	
Dumper Bag	06					1	glass	

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
S A Kashuba	8/15/90 3:15 PM	Renee M Morris			

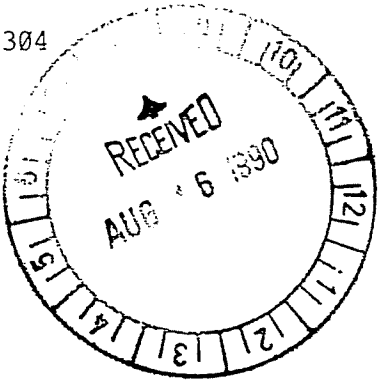
FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

Date: August 10, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304



ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4448-01	Dumper Bag	Grab	Site: Carbon/Graphite
4448-02	Loader Bag	"	Date: July 27, 1990
4448-03	Loader Hopper	"	Time: 0930 hrs
4448-04	Sandmill North	"	
4448-05	Sandmill South	"	
4448-06	Sandmill Bag	"	

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4448-01/06	Properly preserved and collected.	Date: July 27, 1990 Time: 1320 hrs

REPORT RELEASED BY: R. L. Puga

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

4626 Royal Avenue • M.P.O. Box 309 • Niagara Falls, New York 14302 • Phone (716) 285-2587 — FAX (716) 285-3521

DATE: August 10, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of: 4448-01/06

PARAMETER	DETECTION LIMIT µg/kg	RESULT µg/kg
Vinyl Chloride	20	<DL
1,1-Dichloroethylene	20	<DL
Methyl ethyl ketone	4.0	180
Chloroform	4.0	27
1,2-Dichloroethane	20	<DL
Benzene	4.0	130
Carbon Tetrachloride	20	<DL
Trichloroethylene	20	<DL
Tetrachloroethylene	20	<DL
Chlorobenzene	20	<DL
1,4-Dichlorobenzene	20	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	91
Toluene D8	85
4-Bromofluorobenzene	41

Note: Surrogates out of spec due to matrix effect.

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4448

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
*	1,1-Dichloroethene	10	77	250 ng
	Trichloroethene	5	95	250 ng
	Benzene	2	107	250 ng
	Toluene	3	107	250 ng
	Chlorobenzene	3	106	250 ng

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

FEL
CHAIN OF CUSTODY

PROJECT #

PROJECT NAME

Samplers Signature S.D. Kosiorek

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Dumper Bag	4/4/8-01	7/27/90	9:30 AM	C/G	grab	1	bag	to be composited equally as one sample
Loader Bag	02	7/27/90	9:30 AM			1		
Loader Hopper	03	7/27/90	9:30 AM			1		
Sandmill North	04	7/27/90	9:30 AM			1		
Sandmill South	05	7/27/90	9:30 AM			1		
Sandmill Bag	06	7/27/90	9:30 AM			1		

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
	7/27/90 1:20 PM				

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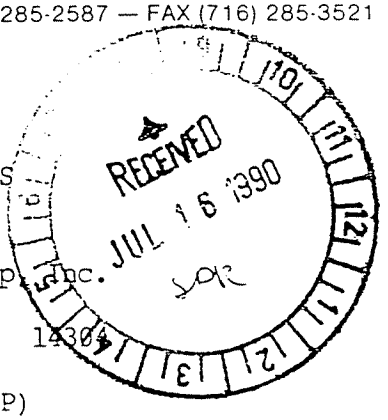

Date: July 11, 1990

ANALYTICAL RESULTS
FOR

The Carbon/Graphite Group, Inc.
4861 Packard Road
Niagara Falls, New York 14304

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ELAP)
CERTIFICATION #10797

FIELD INFORMATION

Name of Collector: S. Kosikowski

ASSIGNED FEL# I.D.	SAMPLE I.D.#	SAMPLE TYPE	Site, Date and Time of Collection
4353-01	Sandmill North	Grab	Site: Carbon/Graphite
4353-02	Sandmill South	"	Date: June 11, 1990
4353-03	Sandmill Bag	"	Time: 0800 hrs
4353-04	Dumper Bag	"	
4353-05	Loader Bag	"	
4353-06	Loader Hopper	"	

Laboratory Information

Sample ID	Preservation Status Upon Acceptance	Date/Time Received
FEL #s: 4353-01/06	Properly preserved and collected.	Date: June 11, 1990 Time: 1035 hrs

REPORT RELEASED BY: B. Gucia

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: July 11, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4353-01/06

SAMPLE ID	TEST	TEST METHOD	DETECTION LIMIT	RESULTS
Composite	Spot Cyanide	SM 16 412 J	NA	Negative
	Spot Sulfide	SM 16 427 C	NA	Positive
	Sulfide	EPA SW-846 (376.1)	5.22 mg/kg	143 mg/kg

NA = Not Applicable

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: July 11, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4353-01/06

SAMPLE ID	TEST METHOD		DETECTION LIMIT ppm	RESULT ppm
Composite	Arsenic	EPA SW-846 (7061)	0.001	0.021
	Barium	" " (7080)	0.10	0.44
	Cadmium	" " (7130)	0.01	0.02
	Chromium	" " (7190)	0.01	<DL
	Lead	" " (7420)	0.01	0.09
	Mercury	" " (7470)	0.0002	<DL
	Selenium	" " (7741)	0.001	0.026
	Silver	" " (7760)	0.01	<DL

DL = Detection Limit

TCLP METHOD: 40 CFR, PART 268, APPENDIX I

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: July 11, 1990

ELAP# 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4353-01/06

PARAMETER	DETECTION LIMIT mg/kg	RESULT mg/kg
Vinyl Chloride	0.40	<DL
1,1-Dichloroethylene	0.40	<DL
Methyl ethyl ketone	0.40	<DL
Chloroform	0.40	<DL
1,2-Dichloroethane	0.40	<DL
Benzene	0.40	0.44
Carbon Tetrachloride	0.40	<DL
Trichloroethylene	0.40	0.65
Tetrachloroethylene	0.40	0.66
Chlorobenzene	0.40	<DL
1,4-Dichlorobenzene	0.40	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8260)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
1,2-Dichloroethane D4	103
Toluene D8	99
4-Bromofluorobenzene	100

FRONTIER ENVIRONMENTAL LABORATORIES, INC.

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DATE: July 11, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4353-01/06

PARAMETER	DETECTION LIMIT µg/L	RESULT µg/L
o-Cresol	20	<DL
m-Cresol	20	<DL
p-Cresol	20	<DL
Cresol	20	<DL
2,4,6-Trichlorophenol	20	<DL
2,4,5-Trichlorophenol	20	<DL
Pentachlorophenol	20	<DL
Pyridine	20	<DL
Hexachloroethane	20	<DL
Nitrobenzene	20	<DL
Hexachlorobutadiene	20	<DL
2,4-Dinitrotoluene	20	<DL
Hexachlorobenzene	20	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8270)

DIGESTION METHOD: TCLP, 40 CFR, PART 268, APPENDIX I

SURROGATE RECOVERIES	% RECOVERY
Phenol D6	38
2-Fluorophenol	39
Nitrobenzene D5	69
2-Fluorobiphenyl	62
2,4,6-Tribromophenol	84

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DATE: July 11, 1990

ELAP # 10797

ANALYSIS FOR: The Carbon/Graphite Group, Inc.

FEL# Composite of 4353-01/06

PARAMETER	DETECTION LIMIT	RESULTS
Chlordane	0.0005 mg/L	<DL
Heptachlor	0.00005 mg/L	<DL

DL = Detection Limit

TEST METHOD: EPA SW-846 (8080)

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4353

SAMPLE ID#	PARAMETER	DUPLICATE RPD	SPIKE %,RECOVERY	QUANTITY OF SPIKE ADDED	QC CHECK % TV
Composite	Arsenic	9.5	87.0	0.08 ppm	95.0
	Barium	(1)	99.2	2.00 ppm	107
	Cadmium	(1)	93.0	0.20 ppm	100
	Chromium	(2)	85.0	0.50 ppm	110
	Lead	0.0	106	0.50 ppm	90.0
	Mercury	(2)	101	0.005 ppm	101
	Selenium	12	75.2	0.08 ppm	84.0
	Silver	(2)	107	0.50 ppm	103

RPD = Relative Percent Difference

TV = True Value

(1) Result less than 5 X DL. "RPD" value within ± 1DL.

(2) N. C. - Not Calculated. Result(s) less than DL.

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QUALITY ASSURANCE/QUALITY CONTROL DATA

CUSTOMER NAME: The Carbon/Graphite Group, Inc.

FEL# 4353

SAMPLE ID #	PARAMETER	MATRIX SPIKE DUPLICATE RPD	MATRIX SPIKE % REC	QUANTITY OF SPIKE ADDED
*	1,1-Dichloroethene	12	98	250 ng
	Trichloroethene	2	91	250 ng
	Benzene	1	100	250 ng
	Toluene	5	87	250 ng
	Chlorobenzene	5	99	250 ng
*	Phenol	7	39	200 ng
	2-Chlorophenol	4	51	200 ng
	1,4-Dichlorobenzene	0	60	100 ng
	N-Nitroso-Di-Propylamine	5	76	100 ng
	1,2,4-Trichlorobenzene	1	73	100 ng
	4-Chloro-3-Methylphenol	2	63	200 ng
	Acenaphthene	4	69	100 ng
	4-Nitrophenol	21	56	200 ng
	2,4-Dinitrotoluene	12	69	100 ng
	Pentachlorophenol	10	95	200 ng
	Pyrene	6	70	100 ng

RPD = Relative Percent Difference

TV = True Value

* Quality Control Results were generated from samples of a similar matrix.

FEL CHAIN OF CUSTODY	PROJECT #	PROJECT NAME

Samplers Signature: S.D. Kashuba

Customer Sample I.D.	FEL #	Sample Date	Sample Time	Sample Location	Sample Type	# of Cont.	Type of Cont.	Remarks
Sandmill North	4353-01	6/11/90	8 AM	C/G	grab	1	bag	to be composited
Sandmill South	-02	6/11/90	8 AM	C/G	grab	1	bag	equally as
Sandmill Bag	-03	6/11/90	8 AM	C/G	grab	1	bag	one sample
Dumper Bag	-04	6/11/90	8 AM	C/G	grab	1	bag	
Loader Bag	-05	6/11/90	8 AM	C/G	grab	1	bag	
Loader Hopper	-06	6/11/90	8 AM	C/G	grab	1	bag	

Relinquished By (sign)	Date/Time	Received By (sign)	Relinquished By (sign)	Date/Time	Received By (sign)
	6-11-90	Barbara Prado			