3461

OH.29-1

OH.29

MEMORANDUM

TO: FILE

DATE 4/30/87

FROM: S. Jones

SUBJECT: Elimination - Clifton Products

SITE NAME: Clifton Products

ALTERNATE NAME: _____

CITY: Painesville STATE: OH

OWNER(S)

Past: _____ Current: _____

Owner contacted ☐ yes ☒ no; if yes, date contacted _____

TYPE OF OPERATION

☐ Research & Development

- ☐ Production scale testing
- ☐ Pilot Scale
- ☐ Bench Scale Process
- ☐ Theoretical Studies
- ☐ Sample & Analysis

☒ Facility Type

- ☐ Manufacturing
- ☐ University
- ☐ Research Organization
- ☐ Government Sponsored Facility
- ☒ Other Beryllium

☐ Production
☐ Disposal/Storage

TYPE OF CONTRACT

- ☐ Prime
- ☐ Subcontractor
- ☐ Purchase Order

☐ Other information (i.e., cost + fixed fee, unit price, time & material, etc) _____

Contract/Purchase Order # _____

CONTRACTING PERIOD: _____

OWNERSHIP:

	AEC/MED OWNED	AEC/MED LEASED	GOVT OWNED	GOVT LEASED	CONTRACTOR OWNED	CONTRACTOR LEASED
LANDS	☐	☐	☐	☐	☐	☐
BUILDINGS	☐	☐	☐	☐	☐	☐
EQUIPMENT	☐	☐	☐	☐	☐	☐
ORE OR RAW MATL	☐	☐	☐	☐	☐	☐
FINAL PRODUCT	☐	☐	☐	☐	☐	☐
WASTE & RESIDUE	☐	☐	☐	☐	☐	☐

AEC/MED INVOLVEMENT AT SITE

Control
- ☐ AEC/MED managed operations
- ☐ AEC/MED responsible for accountability
- ☐ AEC/MED overviewed operations
- ☐ Contractor had total control
- ☐ unknown

☐ Health Physics Protection
- ☐ Little or None
- ☐ AEC/MED responsibility
- ☐ Contractor responsibility

MATERIALS HANDLED:

Type (on basis of records reviewed)

- ☒ No Radioactive
- ☐ Natural Radioactive from Feed Materials Production
  - ☐ Ore
  - ☐ Refined Source Material
  - ☐ Residue
- ☐ Natural Radioactive Material from Non-Nuclear Activities
- ☐ Man-Made
- ☐ Other_____

Comment Beryllium

Quantities (on the basis of records reviewed)

- ☐ None
- ☒ Production Quantities
- ☐ Small Amounts

Comment_____

OTHER PERTINENT FACTS:

- ☐ Facility was Licensed
  - ☐ During AEC/MED-Related Operations
  - ☐ For Similar Activities
  - ☐ For Other Activities

  Comment_____
- ☐ Commercial Production Involving Radioactive Material during AEC/MED Operations
- ☐ Facility was Decontaminated and Released
  - ☐ Availability of Close Out Records

    ☒ None ☐ Some ☐ Sufficient
- ☐ Radioactive Status:

	YES	MAYBE	PROBABLY NOT	NOT
Contaminated	___	___	___	X
Potential for Exposure (accessible)	___	___	___	X

QUANTITY OF RECORDS AVAILABLE:

☐ Very Little ☐ Some ☒ Sufficient

PROBABILITY OF FINDING ADDITIONAL RECORDS:

☒ Low ☐ Possible ☐ High

RECOMMENDATIONS:

☒ Eliminate
☐ Consider for Remedial Action
☐ Collect More Data

Comment Site handled beryllium only

REFERENCES: W Welborn to F. Walters dtd 7/29/49
F Belmore to T Chapman dtd 11/21/45
J Vivian to T. Chipman dtd 8/15/45
J. Chapman to A Compton dtd 6/24/44
J Chapman to C. Winbecker dtd 3/29/44
J Chapman to N. Bass dtd 12/31/43
J Chapman to N. Hilberry dtd 11/19/43
J Chapman to C. Cooper dtd 9/27/43

SUMMARY No radioactive material was handled at this site

COPY

F. M. Walters

July 29, 1949

W. W. Wellborn

EVALUTATION OF CLIFTON FLAKE BERYLLIUM

EFERENCE: LAB-CMR-6

In reference to the letter of July 21, 1949, from J. P. Morgan to G. Udell, Subject: "Evaluation of Flake Beryllium Metal", Reference symbol, PB:DDR, to which you requested me to prepare an answer, I have the following comments.

If it is your desire that the powder metallurgy section of Group CMR-6 undertake the suggested investigation of Clifton Metal, we will be happy to do so, and we believe that we could complete any necessary investigation by September 30.

We believe, however, that sufficient work has been done on the two types of beryllium metal in question, to make the following evaluations, and raise the following questions at this time.

In every case in which the two materials under consideration have been used for powder metallurgy applications, the Clif ton flake has produced more satisfactory results. This we attribute to the following characteristics of the Clifton flake.

1. Higher purity. - We have found that all grades of Brush metal seem to have an excessive carbon content, which greatly hinders fabrication by producing beryllium carbide inclusions, which hinders bonding. In addition we have found excessive amounts of magnesium present in even high purity material. Methods for removing these materials are available, but produce excessive oxidation before good powder can be obtained for fabrication. Neither of the difficulties were encountered in the use of Clifton flake.

2. Ease of Producing Proper Powder. - The small, thin, brittle flakes of the Clifton product may be milled readily and easily into the high bulk density powder which has a relatively high number of fresh oxide-free surfaces. It has not been possible for us to obtain any reasonably good comminution results with the massive lumps of high purity brush metal, which has so far been available. Powders which have so far been able to produce from Brush metal, have been highly unsatisfactory.

It is our contention that only freshly milled beryllium powder, with fresh oxide-free surfaces are really satisfactory powders. Because of shipping delays and the necessity of maintaining a supply of beryllium in stock, we have found it best to have available quanity of massive beryllium which can be quickly milled into fresh powder, and immediately used. Clifton Flake has supplied this need in the past. Powders of the Brush material must be obtained as powders, and stored as powders, and consequently have at least partially oxidized by the time they are needed for use.

3. Particle Sizes Obtainable - We have found that the particle sizes of beryllium powder available from Brush are not adequate, and require additional millin, which is often quite difficult to achieve. The Clifton Flake requires further milling, but we believe that due to its superior milling qualities, requires only approximately 50% of the work necessary on the Brush material.

In summing up the opinions of this section, it is well to point out that only relatively small quantities of beryllium powder are needed at Los Alamos, at the present time, (less than 100 lbs. per year). It would appear, however, that Clifton Flake is far superior to Brush powder available at the present time. It would further appear that it would be much better to evaluate the improved and cheaper Brush powder mentioned in the before ment onod letter, to see if it is a satisfactory substiture for Clifton Flake, than to try and accumulate more data on Clifton Flake.

/s/ William W. Wellborn
William W. Wellborn
Section Leader, Powder Metallurgy
Group CMR-6

mp

cc: Walters
Taub
file

Med History
Box 136
Folder 17
041129

EIDM 0-291-B
[illegible]

21 November 1946

REM:ar

Subject: Shipment of Beryllium

To: The Area Engineer, Chicago Area, Chicago, Illinois
(Attention: Capt. [illegible])

1. In accordance with your request dated 31 October 1946, 150 pounds of [illegible] ([illegible]) was shipped to the following address:

[illegible] Chemical Company,
[illegible] Highway [illegible],
[illegible], Michigan.

Attn: Dr. Carl [illegible].

2. This shipment was made from Clifton Products, Inc., Painesville, Ohio, on 12 November 1946 on U. S. Government Bill of Lading number W-[illegible].

For the Area Engineer:

FREDERICK M. [illegible]
Engineer (Chemical),
Assistant.

CLASSIFICATION CANCELLED OR
CHANGED TO [illegible] 2/10/82
BY AUTHORITY OF [illegible]
[illegible]

OH.29

MUC EC #132 3474
This document consists of 3 pages and 0 figures.
No. 5 of 8 copies, Ser. B

METALLURGICAL LABORATORY
P.O. Box 5207
Chicago 80, Illinois

August 15, 1944

MEMORANDUM

TO: Dr. Chipman, Dr. Cohen
FROM: J. E. Vivian

Subject: Visit to Clifton Products Company

On August 10, a visit was made to the Clifton Products Company at Painesville, Ohio, for the purpose of investigating the possibility of having that Company produce light metal of a high degree of purity.

This Company is at present engaged in the production of beryllia of high purity for use in the fluorescent lamp industry, and also beryllium-copper alloys. The officials of the Company contacted were Mr. Charles E. Windecker, Mr. E. T. McGowen and Dr. Anton Schormuller.

The ore, beryl, is received from two foreign sources, Brazil and India, and one domestic source, the Dakotas. All movement of the ore is under Government control and the nominal cost is set at $200 per ton. The beryl from the three sources mentioned above runs 12-13% beryllia.

At Clifton Products the ore is crushed, mixed with alkali and either fused or sintered. The older process, fusing, is done in large pots batch-wise, while the sintering is carried out in a continuous oil-fired rotary kiln. After crushing, the fused cake or the sintered frit is dissolved in sulfuric acid, a process whereby the beryllium and aluminum oxides in the beryl are converted to the sulfates and the silica is left insoluble. Impurities such as iron oxide, manganese oxide, etc. are also converted to the sulfate. Settling and filtration remove the insoluble silica and undissolved silicates. Concentration precipitates most of the $Al_2(SO_4)_3$, ammoniation under controlled pH precipitates the remaining aluminum and impurities such as iron and manganese. Further addition of ammonia and probably caustic after filtering out the impurities precipitates the beryllium from solution as the hydroxide. Any aluminum, iron, etc. in solution at this point will also come down with the beryllium. This precipitate is fired at 1600°C in silica trays in an oil-fired kiln where the hydroxide is converted to the oxide. This oxide product is sold to the fluorescent lamp industry or used in the production of beryllium-copper.

The production of beryllium-copper alloys is effected by direct reduction of beryllia by carbon in the presence of metallic copper in an arc furnace.

The Company also has six chlorinating units and two cells for the production of beryllium metal by the electrolysis of the fused chloride. The beryllia from the chemical plant is charged into an oil-fired silica retort together with carbon black. Chlorine gas is charged at the base of the retort after the temperature of the charge has been raised to 900-1000°C. The reaction is $BeO + Cl_2 + C \rightarrow BeCl_2 + CO$. Beryllium chloride, having a vapor pressure of one atmosphere at about 490°C distills off and passes out of the retort with the CO. On leaving the retort, cooling is very rapid because of the large cooling surface provided relative to the amount of material flowing, the result being the condensation of the chloride vapor in the form of snow having an apparent density of about 8 lbs. cu. ft. Except for the silica retort, ducts, separator and collector are constructed of transite. Present retort capacity is about 250 lbs. of beryllium chloride per day.

Electrolysis of the chloride is carried out in direct-fired stainless steel pots which act as cathodes in the electrolysis. The anode is a five inch carbon rod. The voltage across the cell ranges from 5 to 12 volts with a current of 2500 amps. The cells are operated batch-wise, and at the start of a run the melt is a mixture of sodium, potassium and beryllium chlorides. The cells are operated until the beryllium chloride is depleted, the beryllium collecting on the cathode in the form of loosely adhering scales. Much of the plated beryllium is removed from the cathode by the scouring action of convection currents in the molten salt bath. The temperature of the bath is about 400°C. When the decomposition of the beryllium chloride is complete, the molten charge is poured into a stainless steel bucket and allowed to solidify. The undecomposed salt is dissolved in water and the beryllium flake recovered. These flakes form the product marketed by the Company as metallic beryllium. Present plant capacity is about 25 lbs of flake per day.

At the request of the Manhattan District, the Company undertook to remelt and cast their flake product into bars. Although the bars submitted were not exhibited, the indications are that the technique required to handle this material is in need of considerable development. Some specimens were on hand which indicated the difficulty encountered by the Company in melting their product. This may well be due to the amount of oxide present since the ratio of surface to volume in the flake is abnormally high.

Considering the use to which this material is to be put, the degree of purity obtainable in the final material is of the utmost importance. Considerable thought and discussion were directed to this end during the conference.

An analysis of the beryllia charged to the chlorinating furnace or of the chloride product was not available. However, because of the nature of the chlorides of heavy metals which might be present in the beryllia, it is certain that they will pass off with the beryllium chloride and collect with it. Furthermore there will be a pick-up of silicon by chlorination of the reaction retort. Unless there are unexpected complications because of associated double salts, it should not be difficult to produce a very pure

beryllium chloride by simple fractionation and condensation under controlled conditions. This can easily be tried in the laboratory.

Because of the ease with which beryllium chloride hydrolyses even in contact with moisture in the air, consideration should be given to the method of handling the beryllium chloride snow. Controlled condensation so that a product in the form of pellets or cake could be obtained would be a decided advantage in reducing oxygen contamination of the chloride. It is not known whether this contamination is detrimental in the subsequent electrolysis other than a loss of efficiency.

There are indications of the possibility of further pick-up of traces of heavy metals during the electrolysis of the fused salts. Such impurities may come from the ingredients used to make up the bath as well as from the cathode itself. Various possibilities which might be tried to eliminate this difficulty were discussed, however, no definite conclusions can be set forth at this time. Some consideration of the arrangement of the elements of the cell as well as the method of operation seem to be in order.

To summarize, it may be said that:
1. the Clifton Products Co. produces a high grade beryllium oxide; however, a complete analysis would be desirable in controlling subsequent chlorination and electrolysis;
2. the Clifton Products Co. is equipped to produce beryllium chloride of unknown purity; an analysis of this material would also be helpful in controlling operations;
3. with relatively simple equipment it should be possible to purify the beryllium chloride product to a high degree;
4. the Clifton Products Co. can produce metallic beryllium in the form of flakes, analyzing about 99% Be;
5. the technique required to handle this flake product is in need of development;
6 consideration and study of the electrolysis of the fused chloride should be undertaken to develop means to prevent contamination during this operation, and such study might lead to the production of the metal in more satisfactory form than the present flake.

For Nickson MUC 04.29

(MUC-JC-136)

This document consists of 4 pages and 0 figures. No. 9 of 26 copies, Series A.

June 24, 1944

To A. H. Compton

From J. Chipman

In Re: Revised Research Program on Beryllium

It is generally agreed that the metallurgy of beryllium should be among the first of the Class 3 priority programs to be undertaken. Up to the present time it has appeared inadvisable to assign this problem to any of our metallurgy groups. Recently, however, a small group at Massachusetts Institute of Technology has completed its development of the frost test for HEW and I have asked this group to undertake experiments in the melting and casting of beryllium.

Referring to my letter to you of March 27, 1944, MUC-JC-94, the above group will undertake Part 2 of the program submitted and will prepare to undertake portions of Part 3 and Part 5. It is planned that they will produce billets for extrusion experiments to be carried out by Mr. Creutz at Wolverine.

It is further planned to arrange with the Clifton Products Company of Painesville, Ohio, for the production of electrolytic beryllium for use in this program. At the present time this Company is producing the purest beryllium available commercially and it therefore appears to be our best hope for obtaining pure beryllium until such time as we can undertake a serious study of production methods (Part 1 of program).

TECHNICAL DIVISION
J. Chipman, Assoc. Director

John Chipman

JC:HP

cc S. K. Allison
H. Hilberry
H. C. Vernon
E. Fermi
T. R. Hogness
J. Franck
C. M. Cooper
R. S. Stone
C. J. Watson
W. W. Watson
A. H. Gronigner
R. S. Mulliken
Zay Jeffries
E. P. Wigner
H. Cohen (2)
Capt. J. H. McKinley (2)
Lt. Col. J. F. Duhoff (2)
E. C. Creutz
Reading File
Technical File

RESTRICTED

Metallurgical Laboratory

MLR ✓

CH. 231

March 29, 1944

Mr. C. E. Windecker, President
Clifton Products Company
Painesville, Ohio

Dear Mr. Windecker:

You may be interested in the following report on the analysis of a sample of the flake beryllium which we purchased from you several months ago:

Fe	360	p.p.m.
Ni	30	"
Cu	100	"
Si	250	"
Mn	120	"
Mg	400	"
Na	2500	"

COPY

I am attempting to revive a little added interest in beryllium and it may be that I shall want to discuss it further with you in the near future.

Very truly yours,

TECHNICAL DIVISION
J. Chipman, Assoc. Director

JC:MP

cc Tech. File
Reading File ✓
JC File

CLASSIFICATION CHANGED
TO: NOT CLASSIFIED
NOV 7 1969 L. N. Pratt
Authority of: USAEC
NOV 20 1969

Metallurgical Laboratory

MCRF
OH. 29

December 21, 1943

Mr. N. W. Bass
Mica-Graphite Division
Beryllium Section
WPB Dept. 7520
Washington, D. C.

Dear Mr. Bass:

This is in reply to your letter of December 7, 1943, with regard to our projected purchase of beryllium metal from Clifton Products, Inc. After several delays, I have learned that our order for this material has finally been placed.

With regard to our estimate for 1944, I can say that this proved to be smaller than we had originally expected it to be. The urgency of certain other programs in which we are engaged has made it necessary to curtail development work on beryllium for the next six months at least.

Very truly yours,

TECHNICAL DIVISION
J. Chipman, Assoc. Director

JC:MP

cc N. Hilberry
Reading File
JC File

Metallurgical Laboratory

MLRF
CH. 29

November 19, 1943

N. Hilberry

J. Chipman

Beryllium from Clifton Products Company

On September 28rd, I visited Clifton Products Company, Painesville, Ohio, in company with Major G. W. Russell and Captain Bassett. Clifton is producing an electrolytic beryllium of somewhat higher purity than we are obtaining from Brush. At that time it was agreed that as soon as Clifton's production was established, they would quote us a price and that we could place an order for approximately 100 lbs. of this material. I now have a quotation from Mr. E. T. McGown of Clifton of $65.50 per pound.

It is requested that arrangements be made through the Area Engineer for the purchase of 100 lbs. of this material to be delivered to Site B, attention: Frank Foote.

TECHNICAL DIVISION
J. Chipman, Assoc. Director

JC:MP

cc N. Hilberry
A. B. Greninger-Frank Foote
Reading File
JC-CMC

MLRF

ON. 29

September 27, 1945

C. M. Cooper

John Chipman

~~RESTRICTED~~

Visit to Clifton Products Company, Painesville, Ohio

On September 25rd, I visited the above company along with Major G. W. Russell and Captain Bassett. We discussed with Mr. C. E. Windecker, President, and Mr. E. T. McGown and Mr. Anton Schormuller, completion of their plant which has been delayed by slow deliveries on their AA-5 priority rating. They are also devoting some time to the design and construction of a plant for remelting beryllium copper scrap. They estimate that when the plant is finished, which will be about January or February, they will have a capacity of 500 lbs. per month of metallic beryllium and this could possibly be extended to 900 lbs. per month as the absolute top.

Their plant utilises an electrolytic method in which beryllium oxide is first converted into chloride by treatment with chlorine in the presence of coke at high temperatures. The chloride is then electrolised to produce a granular product. The analyses of some of this product made on a laboratory scale are satisfactory except for boron and copper. There seems to be no doubt that these two elements can be put under sufficient control as the process develops.

The electrolytic part of the plant is practically ready to operate and Mr. Windecker proposes to operate it perhaps during November to produce about 200 lbs. of metal from oxide which he has on hand. When this operation begins, he will quote us a price and I have indicated to him that we would require something less than 100 lbs. of this product for experimental purposes.

TECHNICAL DIVISION
J. Chipman, Section Chief

JC:MP

cc A. B. Greninger
S. K. Allison
Reading File
JC File