November 20, 1936

COPY

Mr. R. K. Tiffany, Executive Officer,
Washington State Planning Council,
107 Old Capitol Building,
Olympia, Washington.

Dear Mr. Tiffany:

In accordance with your request of September 10, I am sending you herewith a general description of a large-scale laboratory or pilot plant which would be suitable for the Bureau investigation of ores of the Pacific Northwest. This description and estimate of costs, which was prepared by Doctor Koster of our metallurgical staff, is not to be taken as a recommendation by this Bureau that the authorization of such a laboratory be requested from Congress.

This report represents an estimate of the space, equipment and personnel necessary to carry forward efficiently such an investigation. You will see that Doctor Koster has not included the estimate of building costs but has indicated the total floor space which would be required for each activity. If it were planned to erect an entirely new plant rather than to use existing buildings, the cost of a building would have to be added to these estimates.

Cordially yours,

/s/

John W. Finch,
Director.

Enclosure 837676

cc - Mr. O'Sullivan, Spokane, Wash.
Dr. Holland, Pullman, Wash.
H. A. Doerner, Pullman, Wash.
J. Koster, Reno Station
Metallurgical Division
Files

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GRAND SUMMARY OF INSTALLATION DATA -- FIRST YEAR

Total floor space required		17,100 sq. ft.	
Total power to be installed		5,125 kw	
Maximum total water rate expected		300 gal. per min.	
Total equipment and supplies	$ 179,000		
Total contract work	2,850		$181,850
PERSONNEL:			
3 Metallurgists at $3,800	11,400		
2 Electricians at $2,000	4,000		
2 Electrician Helpers at $1,500	3,000		
3 Mechanics (Millwrights) at $2,000	6,000		
3 Mechanics Helpers at $1,500	4,500		
Skilled and unskilled labor	8,750		37,650
ADMINISTRATION AND GENERAL:			
Engineer in Charge	4,600		
Electrician engineer	3,800		
Draftsman	2,600		
Principal clerk	2,200		
Clerk-Stenographer	1,820		15,020
EMERGENCY: 10% of $234,520			23,452
GRAND TOTAL			$257,972

COPY

SUMMARY OF YEARLY OPERATING EXPENSE

PERSONNEL:		
3 Metallurgists at $3,800	$11,400	
3 Jr. Metallurgists at $2,000	6,000	
1 Assistant Chemist at $2,600	2,600	
1 Assistant Petrographic Microscopist	2,600	
1 Electrician at $2,000	2,000	
1 Electrician Helper at $1,500	1,500	
1 Mechanic (Millwright)	2,000	
1 Mechanic Helper	1,500	
3 Senior Machinery Operators at $1,860	5,580	
1 Electric Furnace Operator	2,000	
3 Skilled Laborers at $1,320	3,960	
General Labor, w.a.e.	1,200	$ 42,340
SUPPLIES:		50,000
ADMINISTRATIVE:		
Engineer in Charge	4,600	
Principal Clerk	2,200	
Clerk-Stenographer	1,820	
Consulting Electrical Engineer	540	9,160
GENERAL EXPENSE (contract work, haulage)		1,000
GRAND TOTAL PER YEAR		$ 102,500

COPY

INSTALLATION -- FIRST YEAR

ORE-DRESSING UNIT:

Floor space (2 floors)	2,500	sq. ft.
Head room (per floor)	12	ft.
Power required	75	kw
Equipment and supplies	$20,000	
Metallurgist - 1/2 at $3,800	1,900	
Electrician - 1/4 at $2,000	500	
Electrician Helper - 1/4 at $1,500	375	
Mechanic or Millwright - 1/2 at $2,000	1,000	
Mechanic Helper - 1/2 at $1,500	750	
Labor	2,000	
Contract work (concrete, etc.)	500	
TOTAL	$27,025	

ELECTRIC FURNACE UNIT:

Floor space, 50' x 100'	5,000	sq. ft.
Head room	25	ft.
Yard space, 50 x 100 = 5,000 sq. ft.	5,000	sq. ft.
Power required	4,000	kva
Equipment cost	$75,000	
1 Metallurgist at $3,800	3,800	
1 Electrician at $2,000	2,000	
Electrician Helper, 1 at $1,500	1,500	
Mechanic and Welder, 1/2 at $2,000	1,000	
Mechanic Helper, 1/2 at $1,500	750	
Labor	3,000	
Contract work (concrete, haulage)	1,000	
TOTAL	88,050	

COPY

INSTALLATION -- FIRST YEAR (Continued)

AQUEOUS ELECTROLYSIS UNIT:

Floor space, 50 x 100'	5,000 sq. ft.
Head room, minimum	12 ft.
Power required	1,000 kw
Equipment and supplies	$50,000
Metallurgist - 1 at $3,800	3,800
Electrician - 1/2 at $2,000	1,000
Electrician Helper - 1/2 at $1,500	750
Mechanic and Lead Burner - 1 at $2,000	2,000
Mechanic Helper - 1 at $1,500	1,500
Labor	3,000
Contract work	1,000
TOTAL	63,050

FUSED ELECTROLYTE UNIT:

Floor space, 50 x 50'	2,500 sq. ft.
Head room, minimum	12 ft.
Power required (no additional)	
Equipment and supplies	$15,000
Metallurgist - 1/2 at $3,800	1,900
Electrician - 1/4 at $2,000	500
Electrician Helper - 1/4 at $1,500	375
Mechanic - 1/2 at $2,000	1,000
Mechanic Helper - 1/2 at $1,500	750
Labor	750
Contract work	350
TOTAL	$20,625

MISCELLANEOUS OPERATIONS:

Floor space - no additional needed
Power required - 50 kw
Equipment (installed) - $10,000

INSTALLATION -- FIRST YEAR (Concluded)

COPY

MACHINE SHOP:

Floor space	750	sq. ft.
Head room	--	
Power required	20	kw
Equipment and supplies	$ 3,000	
Installing labor	600	
TOTAL	$ 3,600	

CHEMICAL LABORATORY:

Floor space	450	sq. ft.
Head room, minimum	12	ft.
Power required	10	kw
Equipment and supplies	$ 3,000	
Installing labor	600	
TOTAL	$ 3,600	

OFFICE:

Floor space	900	sq. ft.
Equipment and supplies	$ 2,000	
Installing labor	300	
TOTAL	$ 2,300	

YARD:

Total Installation	$ 1,000
Installing labor	225
	$ 1,225

COPY

Nov. 16, 1936.

/s/
J. Koster
Super. Eng., Electromet. Section,
Metallurgical Division.

prefer to keep it as part of the Electrometallurgical Section but we may not be able to do this. In any case, we are recommending that you be promoted to the Senior Grade and have no doubt that this will be done if the Pullman appropriation materializes as we now expect.

I am wondering how this new appropriation will affect the co-operation from the State. Will you continue to have the funds which have been made available by the State, and if so, under what conditions? In view of the difficulties which have arisen over patent matters in particular, we will probably have to have a formal cooperative agreement in which the exact contribution which the State proposes to make and its basis would be set forth. We will also want to know what space is to be made available for this work and under what conditions. Our discussion with Dean Drucker called for a considerable alteration of the basement of your present building. Does the College or the State stand ready to make these alterations at an early date?

It should be pointed out that it is not permissible to do any building or alteration of buildings from the $35,000 appropriation. The erection of equipment including, of course, any platforms and things of that kind can be done, and within certain limits this could be extended to the erection or demolition of partitions and similar building activities which could be carried out by unclassified labor. Please let me know what the plans are with regard to housing the Bureau group under the new arrangement.

Very truly yours,

R. S. DEAN.

COPY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

METALLURGICAL DIVISION — PULLMAN, WASHINGTON

May 4, 1939.

COPY

Dr. R. S. Dean,
U. S. Bureau of Mines,
Washington, D. C.

Dear Dr. Dean:

Your letter of April 27th regarding the expectation of funds for the magnesium research arrived, and I thank you for the assurance of a promotion. In today's paper I read that the Interior Bill has passed the Senate, and will be approved soon.

The College has allotted $8,000 for the fiscal year beginning April 1, 1939. The small cut was due to a deplorable shortage of funds that has prevented any general increase of faculty salaries. I think we can count on as much for the next two years, since otherwise the College would have no participation in the work, and would have no staff if and when the Bureau withdraws. Dean Drucker will certainly oppose such a move to the last ditch. The present salaries require $6,600, and increases requested may take another $360. This leaves only $1,040 for all other expenses.

I agree that we should be slow in effecting an increase in the technical staff, and that an experienced clerk will be required by July 1st. Also, as you suggest, I think the major part of the budget during the first year at least should be spent for equipment. I would like to defer the selection of the staff until the program has been defined. It should be selected to provide technical experience along lines in which I need assistance. I hope we can meet and discuss these matters before final arrangements are made.

My present staff has been satisfactory, and what we now need is an electrician, two first class mechanics, and a good machine shop. I hope to acquire a complete shop in which any special apparatus can be constructed. This will include lathes, drill press, milling machine, and equipment for cutting and bending sheet metal, as the major items. In addition to the equipment you saw, we now have a 300 KVA motor generator (for welding as well as electrolysis) and several small wood working machines.

We also will need considerable electrical equipment, including transformers(I think 500 to 600 KVA will be ample) and instruments for control and measurement of current. To avoid costly delays we should have a large stock of structural materials and supplies that may be used in constructing furnaces and other apparatus.

For one year at least I expect to concentrate mainly on the electrothermic reduction and subsequent recovery of magnesium be redistillation. I think we will be ready in a few months to design a

small complete unit capable of continuous operation to produce about 100 pounds of metal per day. We may require a super centrifuge to remove the excess oil from the first condensate.

COPY

By comparison, the chlorination of MgO followed by electrolysis does not appear attractive. We have not yet developed apparatus for chlorination that is satisfactory for large scale continuous operation. The "flash" reaction chlorinates O.K., but condensation of the chloride fume is still giving trouble. I feel sure that we can eventually solve the problem, but am beginning to wonder if it is worth the effort, since thermal reduction seems to be a simpler and less costly process. I will appreciate your views on this and any suggestions for new phases that should be undertaken at Pullman. It may be difficult to keep a larger staff busy on the one problem. In this connection, if I find that all of my present staff is not required on the magnesium investigation, would you approve work under my direction on some other problems of local interest?

The matter of adequate quarters is quite a problem. The ground floor (basement) space in this building is almost all in use, as shown by the enclosed sketch. The only space not occupied when you were here now contains the rotating kiln that will be used for calcining chromite, and later for other purposes. Dean Drucker doubts that a new building can be obtained unless it is needed for large scale pilot plant experiments as planned in the $100,000 budget.

Dean Drucker has proposed an extension to Morrill Hall, as indicated by dotted lines in the sketch. I doubt if this will cost much less than a separate building of the same floor space. In the old mechanical engineering building (nearest to Morrill Hall) there is space not at present in use, that Drucker may obtain for our use. It has 2,500 square feet of cement floor in a brick building.

The big central laboratory on the top floor is available, but it can not be used for heavy equipment. It will serve for extra office, laboratory and storage space. We will need office furniture, such as desks, chairs, files, bookcases, and a calculator. Most of our present furniture belong, and is needed, in the offices of the faculty. Dean Drucker has even loaned some of his personal filing cases and bought equipment out of his own pocket. There is no doubt that Drucker will do all he can to get whatever is needed.

I feel sure that we can obtain a cooperative agreement similar to the one that was submitted last year, but not ratified by the Bureau. I would be glad to have the patent situation clarified, but if the Bureau has a definite and clear cut policy regarding patents, I do not know what it is. I plainly stated to President Holland that as far as I am concerned any assignment of a patent to the College is a voluntary personal coice. They have not yet made a definite proposal to me regarding the flotation patent.

In this connection I would like to have copies of the correspondence with Mr. Mossman regarding the "hypothetical" patent situation. I am still very much incensed at his insimuation. There was not the slightest justification for it.

Very truly yours,

H. A. DOERNER

cc-Dr. J. Koster

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

College Park, Maryland.
May 11, 1939.

Mr. H. A. Doerner,
Bureau of Mines,
The State College of Washington,
Pullman, Washington.

COPY

Dear Mr. Doerner:

I have your letter of May 4, concerning a projected program at Pullman.

It seems to me that we should concentrate on the electrothermic reduction and recovery of magnesium for the first year, pushing along and expanding your present work in that direction. If this works out I see no reason for working on the less promising methods. I think we will have to devote our entire effort at Pullman to magnesium.

There is no intention on our part to set this up as a general Bureau station. It is simply a project which we trust will have a beginning and an end.

I am quite worried over the lack of space for the expansion of the work. I was under the impression that there was some space which could be obtained in the basement of the building. As it now stands, arrangements will have to be made for each item of expansion as such items come up. I am wondering where you plan to put the machine tools which will be needed.

At the outset I have asked for the transfer of Miss Laubach, Mr. Wilson, and Mr. Holbrook of the present Division staff to Pullman. We will make up job sheets for an electrician and the mechanics and see if we can get certification from the Civil Service district in which Pullman is located.

Very truly yours,

/s/

R. S. DEAN.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

College Park, Maryland.
May 31, 1939.

COPY

Mr. H. A. Doerner,
Bureau of Mines,
The State College of Washington,
Pullman, Washington.

Dear Mr. Doerner:

I am attaching a copy of a letter which I have prepared for the Director's signature in answer to a letter Doctor Finch from President Holland. You will note that I have attempted to set President Holland straight about the nature of this appropriation. It is not made to Pullman, nor is there anything more than the general discussions in the hearings to indicate that the work will largely be carried out at Pullman. The appropriation is for magnesium research; and the allotment will in all probability be made to the Metallurgical Division, and I will be responsible for seeing that it is efficiently spent. The only criterion which can properly determine where the money will be spent is the efficiency which will be so obtained.

I have also called President Holland's attention to the fact that this is a three-year program for a definite problem; it is not an annual appropriation, as stated in President Holland's letter. Certainly it is not an annual appropriation for work to be carried on at Pullman under your direction. It may become an annual appropriation, as things have a habit of doing, but we may as well do what we can to keep the situation clear at the start.

Very truly yours,

/s/

R. S. DEAN.

May 31, 1939.

RSD:atc

COPY

Dr. E. O. Holland, President,
The State College of Washington,
Pullman, Washington.

Dear Doctor Holland:

Replying to your letter of May 22, concerning the appropriation for magnesium research which is incorporated in the Department of the Interior bill:

It is the intention of our Metallurgical Division to do such of this work as they can efficiently carry out at Pullman. I am glad to learn that you will find it possible to prepare the necessary space so that we can enlarge our program there on July 1, when the new appropriation becomes available. In order to expedite our work as much as possible we are planning to transfer three employees from other stations to Pullman. In addition, it will be necessary to hire some mechanics and laboratory assistants.

With regard to the cost of heat, light, janitor service, and electric power, we had expected to pay any excessive power bill which might result from our electrometallurgical work. While there is no fixed practice with regard to these expenditures in cases of cooperation between a Government agency and a State institution, I believe that all of our present cooperative agreements call for the furnishing of heat and light by the university, and most of them call for janitor service.

The form in which the State college makes the contribution to our cooperative effort would seem to be best determined by the efficiency with which the money available can be used to produce a definite and conclusive result from our magnesium research within the three-year period for which the project has been set up. In order that there may be no misunderstanding concerning the expenditures which are to be borne by both parties, I am asking Mr. Doerner to consult with you and draw up a tentative cooperative agreement such as we have with other State institutions and forward it to me for suggestions.

Yours faithfully,

JOHN W. FINCH,
Director.

THE STATE COLLEGE OF WASHINGTON
Office of the President
PULLMAN, WASHINGTON

COPY

May 22, 1939

Doctor John W. Finch,
Director, Bureau of Mines
United StatesDepartment of Interior
Washington, D. C.

Dear Doctor Finch:

We received word some time ago that the Congress had passed the Department of Interior bill incorporating an appropriation of $35,000.00 for research on the production of Magnesium metal in the Northwest to be carried on here at the State College of Washington and under the direction of your competent assistant, H. A. Doerner.

It is our understanding that the State College of Washington is expected to set aside adequate and satisfactory space for this important work. I shall ask the Board of Regents to approve of an expenditure of a reasonable sum to prepare such space in accordance with the suggestions we have received directly from your representative, Mr. Doerner. We hope that this space can be made available to the U. S. Bureau of Mines by July 1, 1939.

Unfortunately, the state legislature appropriated only a very small increase in the funds to maintain the State College of Washington for the biennial period, 1939-40. Consequently, I take the liberty of asking how much of the cost of heat, light, janitor service, and electric power could properly be charged against the special appropriation made by the Congress for the continuation and enlargement of the metallurgical investigations being carried on here at the State College of Washington. We do not want to ask for anything that is not entirely ethical and proper.

You will be pleased, I know, to learn that within the last five years, the State College of Washington, with the assistance of other public agencies, has spent about $40,000.00 for the metallurgical research work we have carried on here. I think the federal government has also spent close to $10,000.00.

Very sincerely yours,

/s/

E. O. Holland, President

COPY

UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Mines
Washington

June 7, 1939

Office of the Director

Administrative Order No. 245

Subject: Change in Assignments of personnel, Metallurgical Division.

In accordance with the recent authorization of Congress, there is hereby established in the Metallurgical Division of the Bureau of Mines, the Pullman Unit, to be engaged in the study of the production of magnesium from domestic ores.

Mr. H. A. Doerner is hereby designated as Engineer in Charge of this Unit, and will report to the Chief Engineer of the Metallurgical Division. Such other personnel of the Division as is deemed necessary by the Chief Engineer will be assigned to this project from time to time.

JOHN W. FINCH,
Director.

Pullman, Washington
June 21, 1939

COPY

Dr. R. S. Dean,
United States Bureau of Mines,
Interior Building,
Washington, D. C.

Dear Dr. Dean:

President Holland has assured me that adequate and satisfactory quarters for our program will be provided but has not yet been able to state just what arrangements will be made. His advisors have strongly opposed the use of the courtyard described in my letter of May 25th, and there appears to be some objection to our use of any other suitable quarters that now exist.

An extension of the present machine shop building has been planned for the future. The College architect has suggested that one wing of that extension be constructed at once, and used for our work. I believe President Holland is trying to arrange for that plan.

Without any exaggeration I have so impressed the College authorities with the fire and explosion hazards connected with our program that every effort will be made to provide a special structure separated from any other building. The cost of installing an electric power line is another factor that makes a location adjacent to the power plant or shops almost a necessity.

For electric power the college pays 5 mils per kw.-hr. plus a monthly charge of $1.75 for each kw. in the peak load for that month. Their peak is about 900 kw. and if we add 500 kw. to that peak it will cost $875.00 per month in addition to the 5 mil charge for consumed power. However, I think it will be feasible to limit our peak load to 200 kw. and perhaps stagger our peak load in relation to the peak for the College.

Dean Drucker is eager to start other lines of investigation, and was planning to use my present staff for that purpose as soon as I had a staff provided by the Bureau. Personally, I would be very glad to have an organization entirely separate from the College, but I think it would be a mistake, and unfair, to separate Harris, Dilling, and to a

COPY

lesser extent, Gould, from the work they are now doing under my direction. I therefore pointed out to Dean Drucker the covers on our cooperative publications and on those from regular experiment stations. He got the point and immediately changed his mind.

However, I agree with the following point he brought up in this connection. Five technical men and several mechanics may not all be required for the program on the thermal reduction process. I feel sure that I can retain the present arrangement with regard to Dilling, Harris and Gould in the cooperative agreement, but question the advisability of doing so after a Bureau Staff is acquired unless it can be arranged so that the men employed by the College can be assigned to other problems whenever they are not needed on the magnesium problem.

A copy of the tentative cooperative agreement approved by the College in February, 1938, is in our files. May I use that as a basis for our future relations? In such a contract, how much of the $35,000 may be stipulated under "Bureau Contribution"? Should I insist upon continuation of the present annual contribution by the College?

Mrs. Goudzward plans to leave on an extended vacation on or shortly after July 10th, and may not return at all. Can Miss Laubach be transferred in time to learn our present office system before that date? Please inform me as soon as possible the housing requirements and date of arrival of any Bureau employees so that I can help them find suitable quarters.

Very truly yours,

H. A. DOERNER

HAD:hg
cc-Dr. Koster
Files

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

College Park, Maryland.
June 26, 1939.

Mr. H. A. Doerner,
Bureau of Mines,
The State College of Washington,
Pullman, Washington.

COPY

Dear Mr. Doerner:

I have your letter of June 21.

What you say about power costs at Pullman is certainly a little disconcerting. So far as the cooperative agreement is concerned, I believe that the tentative agreement can serve as a guide with regard to the form. I think that the Bureau contribution to a cooperative arrangement at Pullman should be listed at $25,000. I do not know that we are prepared to insist that the college make any specified contribution, but merely that what they do list is a bona fide statement of what they plan to contribute to the cooperative effort.

The cooperative agreement should be restricted specifically to cooperation on magnesium research. We can not, of course, prevent Dean Drucker from using his staff on any kind of investigations he sees fit; but he should list in the cooperative agreement only those men who are going to work on the magnesium project. It seems to me that there are enough problems in connection with magnesium reduction to use all of the staff that is likely to be available, and then some. I am anxious to avoid the ever-present tendency to get spread out too thin.

Miss Laubach advises that she expects to come to Pullman some time during the week of July 9, so that under these conditions she would probably overlap your present secretary. I have asked Mr. Wilson and Mr. Holbrook to report at Pullman as soon as their present work can be put in shape. Neither of them has given me the exact date on which he will arrive, but I assume that both of them will get to Pullman some time in August, as it will probably take them this long to dispose of their present living quarters and make arrangements for the shipment of their furniture.

I am leaving for the West on Saturday and should be in Pullman about July 15, so that I can go over various questions that will come up at the start of the work.

Very truly yours,
/s/
R. S. DEAN.

Pullman, Washington
July 6, 1939

COPY

Dr. R. S. Dean,
United States Bureau of Mines,
Salt Lake City, Utah.

Dear Dr. Dean:

I have your letter of June 26th.

President Holland has submitted several alternative locations for additional quarters and I chose one that is quite satisfactory.. It is located in the basement of the College heating plant. Electric power obtained from the Washington Water Power Company is distributed from this plant. Enclosed are photos of the plant and a view of the campus showing the location of the plant (lower right) and of Morrill Hall (arrow).

The sum of $4,000.00 has been allotted to construct partitions, an outside entrance, and to provide facilities such as adequate lighting, water, ventilating flues, shower and locker room, etc. The space can be divided into separate rooms as follows: office - 9' x 13', machine shop - 21' x 32', furnace room - 48' x 13' (with partition in one end for transformers), and locker room. It will be completely fireproof, with drains in the cement floor and a high ceiling. The alterations will be started as soon as plans are drawn.

We will also retain our quarters in Morrill Hall. The present office will be used by the Bureau Staff, and additional office space will be provided on the first floor for the present staff.

Enclosed are copies of the tentative draft for a cooperative agreement that has been sent to President Holland for his consideration. It provides for a continuation of our present allotment, with a deduction of $2,250.00 to cover salaries to Mrs. Goudzward and Wayne Gould, who will be assigned to work under Dean Drucker.

In your letter of April 27th you suggested that I should go slow in building up a staff the first year so as to have more money for equipment. This will be