

Brush - (medical)

MEDICAL MEETING AT LUCKEY, OHIO, MARCH 20, 21, 1951

IN ATTENDANCE: Mr. B. Kjellgren  
 Mr. H. Schaffner  
 Mr. C. Schwenzfeier  
 Dr. J. Zielinski  
 Mr. J. Botts  
 Mr. R. Smith, AEC  
 Mr. E. Velten, AEC  
 Dr. Quigley, AEC  
 Mr. Sparks, AEC  
 Mr. F. Thomas, AEC  
 Mr. W. Harris, AEC

This meeting was called by the AEC Production Group to determine what The Brush Beryllium Company has in the way of health problems; to determine conditions of plant practices from the standpoint of safe operation; to re-examine the criteria; and to consider a number of recommendations.

The following agenda was set up for this meeting:

- I. What are the criteria?
- II. Available present data
  - (a) air samples
  - (b) medical
- III. Supply data to plant  
 (Determine recommendations, tie them to cost and time).

Mr. Smith said that if we have anything major to do, now is the time to do it, attendant upon construction.

It was generally agreed that beryllium is being produced for Commission requirements in a government-owned plant operated by The Brush Beryllium Company employees and processes under a cost-plus, fixed-fee contract. The criteria were never made an official part of the contract.

There are a number of memoranda which were loosely related and allow room for ambiguity. The General Manager of The Atomic Energy Commission, Mr. Carroll Wilson, issued a set of criteria which were very brief and very specific for a maximum air concentration. These criteria were threefold: (1) The average concentration to which each individual can be subjected is not to exceed two micrograms per cubic meter; (2) The maximum air concentration at any point for any time should not be more than 25 micrograms per cubic meter; and (3) The beryllium content of the outside atmosphere should not exceed one hundredth of one microgram per cubic meter on a monthly basis.

It is believed that the two microgram figure has not been proven with any degree of technical rigidity to be an absolute safe maximum concentration. It was set up as a level which would presumably prevent chronic disease in the plant employees. It was reviewed very carefully by the Beryllium Advisory Committee, which contains the people best fitted in the medical field, passed upon and approved by the General Manager, who saw fit to send them further recommendations. This is the only single basic recommendation that the Health Division sets forth. This Advisory Committee met again in January of this year, but did not take any action.

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The two microgram figure is a daily weighted average figure based on the average exposure of a man's occupation, and is computed over a two month spread, with enough samples being taken so that daily exposure could be computed.

The contract states that we will abide by the regulations or the maximum safe levels set up by the Health and Safety Division of AEC. These regulations would have to be specifically submitted as a requirement of the contract by the contracting officer. As the contract is now written, it does not state that The Brush Beryllium Company is bound to abide by the directives of the Health and Safety Division of AEC.

Mr. Velten said that we had two sets of figures that the General Manager set up, which have to be interpreted by New York, and Harris has prepared an interpretation which in effect makes these our objective.

Mr. Harris said that this is a projected goal and we do not know whether we can meet this without excess expense. The Luckey Plant was designed originally as a practical chemical process plant. It was our belief at that time that with conventional control we could maintain these levels. What we have done is to allow the plant to operate while making an effort to keep below the criteria. We attempted to stick directly and specifically to the recommendations of the General Manager, but we never have operated at these levels for any extended period of time, although for the first few months of plant operation, we were within the General Manager's recommended levels.

There are indirect data to support that it is dangerous if we get over 25 micrograms per cubic meter. Up to 25 was considered probably safe.

Dr. Quigley said that when you say a "minor case" it means bronchial, not pneumonia--not severe. Not like Flavell, who was very definitely a serious illness, from one exposure.

Mr. Schwanzfeier told Dr. Quigley that we have data from Lorain, which he could consider in the future.

Mr. Harris put the following table on the blackboard:

	Target <u>ug/M3</u>	Recommended by <u>ug/M3</u>	Shutdown <u>ug/M3</u>
1. Individual daily weighted average calculated over 2 months period.	2 or less	Contr. no time 2-10 spec.	over 10
2. Maximum peak value at any time and place	25 or less	Comm. 25-100 no time spec.	over 100
3. Outplant concentration calculated on calendar month basis	0.01 or less	0.01 - 0.05 Comm. no time	0.05 or over

Mr. Harris said he thought that the values in the center column were those that if exceeded and not corrected within 30 days after it had been established that they were exceeded would require that the plant or operation would be shut down.

The analysis and interpretation is not done by Brush. This requires ten weeks, or two weeks after close of period.

Mr. Velten said that it was his understanding that the daily weighted average compilation, Item #1, is to be the weighted average of the exposure for the individual for each individual type of operation in the plant.

BZ - for specific operation

Ca - when not at specific operation, lunchroom, locker room, etc.

The daily weighted average is calculated from a potential rather than an actual exposure basis, based on the philosophy that no one in the plant in normal operation will be required to wear a respirator.

When Brush knows that they have exceeded the maximum allowable criteria, special permission must be obtained to provide exposed individuals with a respirator. For these specific purposes permission must be obtained. There has not been a specifically formalized procedure to this moment. Any exceptions to the table data would be by the special exceptions. This has not been formalized.

In the case of the melts crusher, Dr. Sawyer called Mr. Harris and said that the melts crusher was over the 100 microgram limit, and we wanted to give the man a respirator. Mr. Harris said yes, go ahead. This is a breach of AEC responsibility actually, but something which requires judgement.

There is no sampling time limit specifically established on BZ's and CA's. They are to be taken to do two things: (1) establish concentration throughout operation; (2) provide enough sample to determine the concentration. It depends on the concentrations: trace or low would require a long period, high would require a short period, and medium a medium period.

It was agreed that there was a possibility for personal bias. Mr. Harris said he was sure there was personal bias. One of the reasons Frank Thomas was sent here was that over a period of time it was hoped he would be able to spend enough time with each sampler so as to standardize the procedure.

Mr. Velten said he wanted to discuss this because the implications are serious enough in dollars and cents of production capacity that he must understand how samples are taken so that he can interpret them correctly.

Mr. Velten said that he would like to proceed as follows:

1. Analytical accuracy of the data.
2. Air sampling portion of obtaining the data itself.
3. The interpretation of the data obtained.

Mr. Harris said in the first place, one must realize that we are dealing with microgram quantities. The analytical procedures are at best very difficult.

Mr. Harris continued to say, that the answers at best, are apt to be in error.

In general, the analysis tend to follow the trend of spiked samples set up to represent as closely as possible a field sample. They seem to go along at good accuracy so that in a mass of 200 samples we can get a reasonably accurate sample. Results of samples from Luckey analyzed at Luckey appear to be quite consistent with the results we get. There does not seem to be any reason to question over-all data, although there is reason to question an individual sample.

Mr. Harris said that the original criteria were based on very limited data. These are the best numbers we have, hoping to eliminate illness. If we find we still get illness it will be necessary to recheck. Mr. Velten asked who would interpret administratively on the borderline cases, particularly in the case of the Brush Beryllium Company, who must control on their own, with checks from AEC. For the last column there is an absolute zone. Except for Item #2 the numbers on the table are not average numbers.

According to the center column, if the operation was not corrected in 30 days, the operation would fall under the next column.

The last one is out of the hands of Brush and the time lag on this is ten weeks, or two weeks after the close of the period.

Line #1 is a daily weighted average compilation of exposure for the individual for each individual operation in the plant. (BZ for specific operation, GA for when not specific operation: i.e., lunchroom, locker room).

When an operation is carried out and we know it is apt to be above the maximum criteria, it may be above either column and the plant says we know this is wrong, and want to do something right now, such as provide this individual with a respirator, this has been a matter of liaison between Brush and AEC, and has not been formalized. Special permission must be obtained in such instances from the Health and Safety Division.

This is a breach of our responsibility actually, but something that calls for judgement.

The BZ sample is taken to do two things: (1) establish concentration throughout the operation; (2) provide enough sample to determine the concentration.

The sampling time depends upon the concentration; a trace or low concentration would require a long period; a high concentration, a short period; and a medium concentration, a medium period. There will, of course, be a certain amount of personal bias, as there is bound to be some variation between the different samples, i. e., one may hold the sampler closer to the individuals nose.

If a series of samples is taken for one-half minute on a particular operation, and they came out 10, 12, 19, and 16, we assume that one-half minute is long enough. If there is a variation of 10 - 100 and it is a short sample, the time must be longer.

Mr. Velten asked whether this test was being applied statistically, and Mr. Thomas said there was not enough time for statistics.

Mr. Schwenzfeier asked whether a standard air sampling procedure had been written up, and Mr. Harris said that this had not been done, but plans were being actively pursued.

Mr. Harris added that in the New York Office of AEC, an attempt is made to control along with our analytical results from day to day to validate results as far as we can, and we (AEC) know that there is a possibility for error, even as much as a factor 10 in any sample.

Mr. Harris said that three to five samples per unit of a man's job are probably required with some judgement of the data obtained.

Mr. Schwanzfeier said that John Botts was preparing this statistical data from our data. Mr. Botts said this was started and we should have some figures within ten days.

Mr. Harris said that this is the written code of industry; three to five samples is the procedure followed by Industrial Hygiene Departments for many years. It is written into the codes of various states.

In a discussion of analytical bias, Mr. Harris said that they had a very complete study of analytical bias. Analytical data show that if we do four analysis on each sample that this is a satisfactory representation of the amount of material that was in the sample. 20% accuracy with 95% confidence. He also said that the figure 25 was an administrative problem. I do not believe we can draw a straight line, there must be some fuzz.

Mr. Velten asked whether the AEC Medical People intend to submit a hard and fast criteria, and Mr. Harris replied that they can only transmit a criteria which is 'hard and fast', and which can be modified by administration.

Mr. Velten asked who had the prerogative of modifying this administratively and Mr. Harris replied that this could justifiably come only from a conference. Example: If it runs over 25 two times, say 26 and 25.2, what would happen? you would not immediately shut down; you would say, 'let's get together; let's take a few more samples. I do not believe you can define it any closer.

Mr. Kjellgren suggested that this could be handled contract-wise. If the limit of 25 is exceeded, we would have to inform you (AEC) that we are going to shut down because of this limit and if you tell us that we should not shut down, but take more samples, we should be informed at that time.

Mr. Velten said that he understood that we take data and get results and these are used for interpretation. An analytical error exists of relatively known magnitude. Sampling error exists of what the individually gets from person to person. There must be some interpretation, especially of the border-line cases.

Mr. Kjellgren said that it was his understanding that some individuals are extremely sensitive to beryllium, some are not. This enters into the picture. Can we ever run this plant without running into some individual that will be sensitive no matter what the limit.

Mr. Harris said the real figure should be 3 in column 1.

Mr. Kjellgren asked what would happen if in one case where we did not exceed the limit we had 1 or 2 super-sensitive people in there, and Dr. Quigley replied that the plant might be closed down if several people were sick even if we were under limits.

If results come back better than 100 we would not go back with one sampler but would go back with several to have more information along these lines.

Mr. Velten said that the contractor is given the criteria and regulations. He must be responsible for the health of the people, and control within the plant is the health of the people. Dr. Quigley said that the plant manager is responsible for the health and AEC will give him these guides.

Mr. Velten said that there had been in his opinion considerable misinterpretation of that point.

Mr. Schaffner said he has had this feeling. AEC has given Brush the criteria and it is his responsibility, and in view of the very facts that have been presented here, there is no question but that there must be considerable administrative prerogative extended.

Mr. Velten said that his point was that in the past it has not been that way. We want to find something that is uniformly understood by all and that administrative responsibility must rest with Brush and they must fall within these and they must justify their course of action.

Mr. Schwenzfeier asked where the administrative prerogative ceases. Mr. Harris stated that administrative discretion ceases when the plant hits the righthand column. You have checked the results and you have no course but to shut down. You can request and receive approval. You must justify your decision if you are requested to do so.

Dr. Quigley said that a very important point was that we do not have to wait until reaching this point.

Mr. Schaffner said that if there are a series of illnesses on operators on a particular unit even if all air analyses are under 2, we may still have to do something about it.

Mr. Smith said that Brush would have the responsibility of determining the action. AEC can request an explanation.

Mr. Velten asked whether this would reflect on production quotas.

Mr. Smith said that if we operate outside the limits and are sued, the law suit would be all ours.

Mr. Sparks said that he did not see what is accomplished by shutdown and Harris replied that if you are deliberately exposing men you must shut down so that if it no longer does there is something wrong.

Mr. Schaffner said that on the melts crusher we have spent operation money on three different revisions, extensively on two occasions, and still are not on top of it and still got out production. As a result the unit was so constructed that we are doing what we can to protect the employees although the air samples might have shown that we were on the high side. We now operated it as a dry box with supplied air masks.

Mr. Smith said that this is a stop-gap measure and would not enter into it until you knew the man was not exposed.

Dr. Quigley asked whether this leaves the balance to Mr. Schaffner. If he knows the operation is out of line and wants to continue operation with an air mask and he calls Bill Harris and Harris says you are taking a chance; can Mr. Schaffner still run it?

Mr. Velten said, "Correct, unless there is a provision in the contract".

Dr. Quigley said, "What if he called Mr. Harris and said it is 200 instead of 100, and Mr. Harris said no. Mr. Harris would then get in touch with people in AEC. Mr. Velten said, "Get Kelley to get us to shut it down".

Mr. Harris said if I do not concur, then he has to find some other person to say "yes" because the only way he can do it is to have it in writing.

Mr. Velten said that it depends on whether and how the limits are set down under the contract. If they are set down 'hard and fast' in the contract there is no longer any prerogative.

Mr. Kjellgren said he believe it can be handled contractwise. You should be informed in writing -- we should be informed in writing.

Mr. Smith said the if we have a requirement which is "hot", we will take it to Mr. Kelley and Brush leaves it to us. We will hold you blameless to this limit and you will not be responsible under this limit. Beyond the terms of the contract, it is a breach of contract and we will not be responsible to back you up on it.

Mr. Velten said to date we have no such definition in light of the contract.

Mr. Schwenzfeier asked whether we could expect to receive a written definition.

Mr. Smith said that they would very definitely tie a set of these limits to the contract. He does not think they have any right to expect us to operate without that. They have been mentioned but never formally presented.

Mr. Velten said that since decisions with respect to medical problems get into problems beyond the field of the Medical Division, he would like to take a look at some of the data here, some of the medical data on which he has had some memos and with which he disagrees to find out who are the interpreters. These data are:

Air samples, medical data, review some of the high spots in light of this, the interpretation, and who interprets it and why.

Mr. Schwenzfeier asked how Brush stood with regard to the criteria, and Mr. Harris replied that approximately February 1, 1951, we combined the data that we obtained from Brush sampling that was done in September and October. At that time there were only four operations in the production cycles that were below 2 on the daily weighted basis.

Mr. Velten said that the original target referred to the individual as referred to the general manager's letter. This is a point I want to make, as we make these binding under the contract.

Mr. Schwenzfeier said we check individual unit operation.

Mr. Harris said that we cannot check every man in the plant; it would be too big a problem. We check representative operations of each individual type of man, not every single individual. When we see the pressure furnace operator has 5.12 times the maximum allowable concentration and we see another pressure furnace operator, we assume that particular operation survey covers the average man on the job.

Mr. Schwenzfeier asked if we might still be within these limits by rotation. If we moved the man around so that the individual man was never exposed more than 1 hour, although the operation might be at 10-12 he would still not be receiving more than the allowed amount of intake.

Mr. Harris said that AEC has suggested in earlier discussions that Brush attempt to maintain medical records on a yearly weighted average, based on the number of days per two month period spent on each of the operations.

Mr. Schaffner said that this is being done now.

Mr. Harris said we have provision in original discussion for rotation; this now is academic.

Mr. Velten said that he was saddled indirectly with the responsibility of getting out the beryllium requirements of the Commission and all related items thereto, of which medical happens to be just one. The predominant reason all of these operations exist is because of beryllium requirements reason all of these operations exist is because of beryllium requirements with the commission. A plant was built to meet these requirements and a decision was made that we can, or think we can, produce these requirements with conventional chemical equipment and by conventional chemical methods and still reach the goal from medical standpoint. If the understanding was that it was to get within that goal within a certain period of time, money would have to be provided to allow certain experts to say if our original conjecture was or was not true. With this before the house, by administrative determination on your part or on our part, we recommend on certain time limits on such and such a plan, shut the plant down, we are getting into an impossible situation from the standpoint set down to me: "Fill the Be requirements and abide by all the other requirements that come with it. I think it is an unfair and unworkable method, I must justify the economics of this thing."

Mr. Harris said that these data show that practically all of plant operations except three were above the maximum allowable concentration. Stacked up against 10, all but one below 10.

Dr. Quigley asked whether this plant had ever operated for any period of time within the two micrograms, and Mr. Schwenzfeier replied that since actually in production, he did not think we had ever had all departments at any time under two. As one section, could it be that it remained within a certain time at the limit?

Mr. Schwenzfeier mentioned that ore melting was very low when we started. Recently it has been five times over what original start-up was. I cannot see any evidence that it was housekeeping.

Dr. Quigley remarked that if the beryl furnace ran for a certain period of time within the limits, it can be run within limits if things are done in a certain way.

Mr. Smith agreed with Dr. Quigley on this point, and said that if they were run within limits and went off them, it is something you can find out about.

Mr. Kjellgren said that he could see in the beginning that we might keep to these limits, but gradually the plant gets saturated with beryllium; but since it was not really made so that it can be kept clean, gradually everything in the plant has a film of beryllium dust or some beryllium compound and when you get these conditions, how are you going to get the level down. You come to a point where you simply have to shut down the plant for a good scrubbing, cleaning, painting, and start over again.

Mr. Smith remarked that it may be that we will have to stop one or two times a year to clean this up.

Dr. Quigley suggested partitioning. Some types of equipment must be taken apart and you scatter Be. Those types of equipment should not be put in.

Mr. Schwenzfeier exhibited the bottles of Be and Be powder, and explained that this small amount was the daily allowable limit. Mr. Smith said that is tough. If you get more than that and are going to kill people, you are stuck with it. If we are going to maintain this amount in the air, we might as well stop and start over again.

Mr. Harris asked if we could keep it to three times this amount, and Mr. Schwenzfeier replied that three times this much is a question.

Mr. Schaffner said that he has been extremely forceful in any Medical record. We have had a year's medical record, air samples and a considerable amount of Be production in that period of time. I have not as yet been able, through my medical records, to find any direct or indirect connection by the air sample results and medical incidence. In the first analysis, we are trying to keep men from getting sick. That is what makes my job so confusing.

Mr. Veltan said that on the medical record, both dermal and respiratory-- particularly on the respiratory cases, he would like to question specifically where they are pinned down to Be.

Mr. Kjellgren said we have had about 350 employees for a year and have had 17 true troubles. Is there any plant that does not have that much trouble?

Mr. Harris said there have been 70 cases of upper respiratory tract cases, of which 17 were classified, as occupational.

Dr. Quigley said that no other reasons besides Be could be found. He continued that when a man reports to the dispensary they look for complaints that could possibly be connected with Be, he is first given a medical transfer for a mild case, for a more severe case, a PLO; the man is sent home and reports in for observation; OD when you definitely determine that the case is an OD. We assume that these cases are OD's until proven otherwise.

During the year that we have had Brush on our books in New York, there were 17 cases of serious respiratory cases, where 2 were diagnosed as pneumonitis and one nearly died. This can be serious. If every one of the tracheitis had not been picked up quickly, you might have had a half-dozen deaths. There are 82 conditions that can cause similar X-ray condition of the chest. Flourides and sulfates were considered as other possibilities; ethylene-dibromide was also mentioned.

Mr. Harris said that they had started a series of analyses to determine the flourine concentration. They are simultaneously doing the same thing with Harshaw. They have had two samples both very low, 1/10 of concentration. We hope to have 100 samples to determine whether the flourine concentration here is higher than Harshaw to determine whether it is flourine. He had never heard of any trouble with sulfates and flourides and in copper with Be carbide and finely divided oxide. Mr. Kjellgren wondered whether the toxicity of beryllium depended on the form.

Dr. Quigley said they have taken oxide from us and one of our former competitors and injected into animals to try and produce the disease. With oxide from the other plant they could produce it. They have traced it to a type of crystal formation.

Mr. Schaffner said it has been proven time and time again by Dr. VanOrstrand Dr. Zielinski, and Dr. DeNardi, that sensitivity in a controlled plant responds the same as in an uncontrolled plant. On Flavell, Brush could not run anything down. This was his third illness. Never returned to work for more than four days.

Mr. Harris said that the future of the plant bears out what we have found in the past, we are undoubtedly going to have to do something about the flouride department between the solution of the hydroxide and the production of the BeF<sub>2</sub> and pebbles. Flouride control may have to be introduced. It may be we will have to get better samples before we know the story.

Mr. Valtan said that 10 of the 17 cases occurred before the plant was in continued production.

In referring to the table, Mr. Smith said that Line 1 was related to production, because it is a steady thing -- Line 2 is not.

Mr. Velten asked whether we could correlate air levels in the plant and Dr. Quigley replied that we would have to have many more medical cases before we are able to correlate.

Mr. Schaffner remarked that we have not been able yet to attain, and until such time until we can attain, or bring this plant into a position where we do attain the Line #1, other than making a big file, what purpose does reducing the limit serve. He continued, he wanted to kill the inference that if New York Medical Division is going to be .2 instead of 2 by virtue of all we did at Luckey, that is not true. If I cannot get the 2, I cannot get the 1.

Mr. Harris said that he had some numbers, but did not know how good they were. There were a number of cases of illness in four plant units from March through December. In Hydroxide between 2 and 4 cases--some men worked in both places; in sulfate, 1; orehandling, between 1 and 2; this defines the area that we are talking about pretty well. The fluoride operations are definitely the worst as far as these operations are concerned. Ball mill operation, 2; Reduction furnace, 1; Wet plant, 4; Fluoride furnace area, 4; by frequency or percentage - 2 out of 6, or one-half in the Ball Mill area. There were eight cases in either the fluoride furnace or the wet metal plant. It looks as if we have to be the most careful between the production of ammonium beryllium fluoride and the production of beryllium fluoride.

Mr. Kjellgren said he thought this checks with Lorain.

Mr. Harris said that he thinks as Mr. Velten said, it centers down to the fact that fluoride may be a synergetic agent or a bad actor by itself.

Mr. Harris continued by saying that (in discussing number of breathing zone samples) far the two worst of these operations were the ball mill and the reduction furnace, where there appears to be no correlation--or even inverse correlation.

Dr. Quigley said that sensitivity is very, very important. He said that the Be Advisory Committee spent the better part of a day discussing the sensitivity. They have not been able to set themselves on this point. There is something peculiar about it.

Mr. Schaffner said that if we are going to spend the money which we are spending on air sampling, it should be made more of a usable tool for controlling the plant than it is now. Now it is viewed more or less as a tool. When it gets into line #2, we move on it. Because of this correlation, you have no basis to sell it to your department heads.

Mr. Harris said when he was talking to M. Eisenbud about this and he said he was not the least bit concerned about Line #2, it could be controlled. The thing that worried Mr. Harris is that where you have all operations above two you can get chronic disease and then you are in trouble.

Mr. Schaffner asked Dr. Quigley if there had ever been a case with acute disease that developed into chronic, and Dr. Quigley replied that there had been.

Mr. Harris said that he was not afraid of a cute disease, because it can be controlled; chronic disease, as far as we know, is fatal.

Mr. Schaffner said that we have had a years' experience here at Luckey. He thought we had developed a group of men --and have stated in my reply to Mr. Thomas' report--to obtain this goal of two or less we are going to have to completely revise our thinking along the lines of our entire ventilation system. When we came into this plant, two things were involved: speed and economics. During the construction period when we came here we used a lot of old duct work. However, I do not think this goal can be achieved in much less than two years.

Mr. Harris said he thought there are some things that can be done right now. Could shut down and figure out concentration and then make re-evaluation of entire situation.

Mr. Schaffner inquired if any installations made at this plant can be made on a strictly health reason.

Mr. Smith replied that they were prepared to spend money on health alone.

Mr. Sparks asked if .01 is to protect people who are sensitive to beryllium, and Mr. Harris replied, no, just chronic disease.

Dr. Quigley added that sensitivity is considered to be an important factor.

Mr. Harris said that the 2 or less is to minimize chronic disease. It is liable to allow chronic disease, but it is as good a figure as we are able to design the plant for to prevent or minimize chronic disease.

Mr. Smith said that .01 is the only safe figure for the avoidance of chronic disease. This was arrived at from out-plant data.

Mr. Velten said that since the level of two was set on a calculated risk basis, someone made a calculation of risk in dollars. Just what the calculation means is you want to take it back to the ultimate.

Mr. Harris said not exactly a calculated risk in dollars. One out of 10,000 will come down with the disease.

Mr. Smith added that even on a calculated risk, it will some day give a chronic disease. The second column gives us the 10. We have an idea of what the odds are between 2 and 10, but don't know what they are.

Mr. Velten said there is probably a considerable difference between 2 and 5 in dollars and cents.

Mr. Kjellgren asked why fear was expressed when we came to 2, and asked if there was any data available to indicate that frequency incidence changes with concentration--if there were enough cases to validate statistics.

Mr. Harris said there was data available--and quite a lengthy discussion ensued on the various cases at Lorain.

Dr. Quigley stated that on chronic cases there has been a delay on onset from three years or more.

Mr. Sparks said that it is important enough that we make beryllium, we can build a plant where there will be no exposure, but what about money?

Dr. Quigley said there are various ways, but which is best?

Mr. Smith asked Dr. Quigley how far he wanted to go--if even at 2 it was not safe.

Mr. Kjellgren said we could (1) improve ventilation as first step; (2) enclose fluoride furnaces; (3) ventilate the entire plant more closely.

Mr. Harris said that right now the directive out of Washington is shut down at 2. When we allow 2 or 10, we are assuming a certain amount of responsibility. Mr. Eisenbud has assumed it. We have to eventually get to two, and if we get there and still not corrected, they talk about going lower.

Mr. Velten remarked that this can be argued pro and con--whether we can get to two.

Dr. Quigley asked if we are doing the best we can with what we have.

Mr. Smith said that he has looked at this thing, and am not too alarmed; that frankly, he never got to the basis of it until today. He said that he would like to see a couple of months and see how we come out without spending money.

Mr. Harris said he thought they wanted to see whether all the ductwork was sound.

Mr. Sparks asked who is to say the designs will do it; that you don't know until you run it.

Mr. Harris remarked that they started with certain concepts.

Mr. Smith said that maybe operation has shown that concept is out.

Dr. Quigley said we discussed this when he was here in January. He said that at the January meeting, Mr. Eisenbud brought out one point--handling of drums open without tops, stacked three high. The original design called for nothing there. This is one example of where the original design was not followed.

Mr. Velten said that to the best of his knowledge, there is only one reason for this plant and it is because I have been instructed to get beryllium. Unless he was instructed otherwise, production comes first and then health.

Mr. Smith said that his objection is that we must run the plant without killing people, and he would like to look at it from that way.

Mr. Kjellgren said that on Hydroxide drums, Dr. Quigley says we have not done the best we can. But he objected to that. This is a technical problem. We are trying to get a centrifuge and are pushing all of the time.

Mr. Smith said today is March 20, 1951. He does not care what went on a year ago. All recriminations. He would like to come out of these two days with a program. How are we going to do it? When are we going to do it? Who is going to do it? What is the cost?

Mr. Schaffner read from his reply to Mr. Thomas' report (Mr. Schaffner's recommendations in answer to Mr. Thomas' report). He remarked that the cost of this thing can be partially covered by the economics of the thing.

Mr. Smith asked, "Do you (Mr. Schaffner) want an argument? I think that is right.

Mr. Schaffner replied, "We did not get these things in two days." And Mr. Smith said that was understood.

Mr. Schwenzfeier said that he did not know that it is. We are confronted by the same inference from members of the production group. It comes down to how many dollars we are going to spend. There is at least an inference that we have not been doing all we could.

Mr. Harris said he thought that Sharples could have been done six months ago.

Mr. Schwenzfeier said that our staff has been thoroughly and completely engaged and it comes back to dollars; and when we go into the phase two, let's keep that in mind. Unless we expand the staff, we are not going to solve both problems.

Mr. Smith said we are faced with this: Kelley can say "To Hell with the requirements, we can shut it down." We may not have to look at the first vertical line.

Mr. Schwenzfeier said that undoubtedly we can meet it if we have the money;

Mr. Smith said that Kelley may not want to risk going to 10. Assuming that we have taken it up and he is agreeable, he may want to change his mind.

Mr. Schwenzfeier said that we cannot without a major expansion in our engineering staff.

Mr. Smith said that the only thing he could do, would be to tell Kelley how much time and how much money. It is purely a matter of risk even if we hit two.

Mr. Schwenzfeier suggested that we get off on a specific program that we are going to embark upon from here on.

At this point the group went out into the plant and looked at the sore spots in the plant and then come back and discussed some of them. An attempt is to be made to put time and cost on them.

Mr. Harris put the following on the blackboard:

1. Am BeF<sub>2</sub> Salt production  
Am BeF<sub>2</sub> Salt decomposition  
Ball Mill and Pebble Leacher
2. Melts crusher
3. Hydroxide filtration
4. Reduction Furnaces
5. Batch furnaces
6. Frit
7. Vacuum Casting

Mr. Schaffner asked if the above were in priority of order.

Mr. Harris replied that essentially, they were.

Mr. Kjellgren said that he was not surprised to see that salt is first.

Mr. Harris said that this has been giving us the most trouble.

Mr. Kjellgren said that we have always tried to solve these problems. The problem of getting these levels down has been the aim of The Brush Beryllium Company for years, and when you talk of pioneering you cannot do things perfectly the first time. This report gives no recognition for its efforts. The report which Frank Thomas prepared, he has made very sweeping statements in regard to The Brush Beryllium Company, which I must protest. Not good housekeeping in plant, sloppy operation. The report itself proves it was not in all of the plant. Many operations in the plant are below the limits. I think it is only fair that I make a request that they be changed to correct this impression.

Mr. Schaffner said that even more serious is perhaps the attitude of company personnel—you must remember that these might come up in legal proceedings some time and could be very damaging.

Mr. Smith said that we are losing sight of our objective. I assume you are going to send us a reply. Housekeeping refers to any industry. I think that is what Frank had in mind in his report.

Mr. Harris asked if an addendum should be made to the report to state that bad housekeeping was noted in such and such a department.

Mr. Kjellgren said he wanted it made clear that we do appreciate criticism. It's just that the report stated 'the whole plant' and from a contractor's point, this is a very sweeping statement.

Mr. Velten suggested we finish off this day by going into the plant and view the seven above mentioned points. Tomorrow we can make recommendations, and come out with a list or program of what must be done by whom and when.

Mr. Kjellgren said Dr. Sawyer has been advocating taking the breathing zone sample with a mask. He asked Mr. Harris what his position was regarding this type of test and whether he agreed that the tests should be taken in this manner.

Mr. Harris said he agreed and believed that both Cleveland and Luckey had received confirmation on this.

March 21, 1951

-16-

Dr. Quigley said the last time Mr. Eisenbud was at Luckey, he thought the beryl furnace was not functioning nearly as well as when he saw it before.

Mr. Harris said he would prefer to forget the beryl furnace and get to more important things.

Mr. Schwenzfeier mentioned that it might be deterioration.

Mr. Schaffner read the comments on the beryl furnace from his reply to Mr. Thomas' paper. Harris said he would go along with that 100%.

Mr. Schwenzfeier said that from a safety standpoint rather than health, the beryl furnace layout is in for a complete re-do. It had a runout in the pit and a blowup after we started. It is in our engineering schedule to change this when time permits.

The mastic floor was discussed to establish the relationship between it and the air concentration. Mr. Harris said he was not convinced it would help. Cleaning the floors may be a problem, but he did not think this would help.

Mr. Schwenzfeier said we have some evidence on floor washing. Mr. McGraw went to floor washing every two hours, and I do not think we have seen any remarkable improvement so that it can be tied to this.

The walls are in the same category as the mastic flooring.

Mr. Harris marked certain items -- Stripping Sparkler Plates, Pebble Leacher - Ball Mill, Discharge Salt Bird, and Discharge 3 Fluoride Furnaces -- with an asterisk as primary trouble areas.

Mr. Smith asked whether we have reasonable assurance of bringing this plant into this range, and Mr. Harris replied yes, for 80% of the operation categories with the possibility you may for example still get high results in the ore handling operation, but that is something we have put off because it does not cause too much trouble.

Mr. Schaffner said he felt, in large part, that these items on the board will, if properly corrected, go a long way to substantially reduce our medical incidence.

Mr. Harris said he thought that Chick hit this on the head. If these are adequately controlled, we may be faced with one or two cases a year.

Mr. Velten said that satisfies him.

USA 009229

	<u>6 - 8 Weeks</u>	<u>9 - 16 Weeks</u>	<u>16 - 40 Weeks</u>
1. *Stripping Sparkler Plates	\$ 5,000		\$ 50,000
2. *Pebble Leacher - Ball Mill	5,000		20,000
3. *Discharge Salt Bird	500		
4. *Discharge 3 Fluoride Furnaces	3,000		
5. Hercules Filters			50,000
a. Sharples			
b. Backwash remaining Hercules			
c. Re-pipe area			
6. Discharge Melts Crusher	300		2,000
7. Flotation Dryer			
8. Vacuum Casting	possible \$5,000 for vac. cast.		
9. Reduction Furnaces			
10. BeO Furnaces			
11. Review Air Cleaning Needs Ventilation Piping			(12 mos.) 30,000
12. Drum Inventory Storage Control			
13. Sample (Process) Taking			

\*Marks primary trouble areas

1. WASHING OF SPARKLER PLATES

Mr. Harris said his impression yesterday was it might be possible to have a tank a little larger with a hood so that plates could be set in it and stripped sideways with a place on one side where sludge could go and papers could go on the other side. The plates could be put into either a sink or mechanical device for flushing with a minimum of water. The cost in this case would be a new sink arrangement with a hood, plus whatever holding capacity you need.

Mr. Schwenzfeier said he could not think of anything basically wrong with this thought.

Mr. Schwenzfeier said we have run some pilot scale tests on the Sharples centrifuge. They were run last week and the two engineers who witnessed and supervised the tests report that they looked excellent. We do not know whether we get the sulfate out of the cake; but even if it was not washed out, I think from what we have seen and the samples brought back, it will work and that it can do a better job than the Hercules could ever do.

We have also been using a Bird machine on sludge from the metal plant with apparently good results. This could give a high production rate, and, of course, there would be no need to strip filter plates. There will be no handling at all in the metal plant if this machine is made to work, except for sealing drums filled with sludge by the machine so that the drums can be shipped off the plant site for final, permanent disposal of the sludge.

A discussion ensued on the number of units which would be required, the interim solution, and the costs.

Depending upon a review of the production capacity of the machine, we will probably need two for hydroxide and may need one or two for the metal plant.

Mr. Harris' opinion regarding the interim and ultimate solutions of the problem was if the cost of an interim solution was \$1,000 and required three months and the ultimate would cost \$5,000 and require eight months, he would say go ahead with the interim.

Mr. Schwenzfeier suggested that we might be able to go part way; that is, build a unit that would not completely answer the problem but modify and make improvement while we set up the Sharples. I was thinking of installing a tank and having a receiving tank--no hood. The filter cake would drop into a rewash tank below.

Mr. Harris asked whether there was a possibility that we may never be able to find a solution to this problem.

Mr. Schwenzfeier replied that it appears almost certain that laboratory tests will show that this continuous centrifuge will be successful. We have no economic data. Without complete laboratory data, he feels certain in his own mind that the machine will work. He believes the machine will do the job; whether it will cost an awful lot of money he does not know.

Mr. Harris asked how long it would take to evaluate this from a cost standpoint and Mr. Schwenzfeier replied that it depended on how much

urgency was attached. We have only so many people to do this job and other business. It would probably be complete in six weeks, and it might be partly completed in three weeks.

Mr. Harris asked whether a partial modification could be completed in about four weeks and Mr. Schwenzfeier said it could be, but it would be strictly an interim proposition.

It was agreed that we will have to accept an interim solution and follow up with a permanent solution.

Mr. Schwenzfeier said he had no ventilation in mind on this. Mr. Schaffner asked if he should have and Mr. Schwenzfeier replied that he did not think so.

Mr. Harris asked whether we are going to do something that will require ventilation. If we douse with water and restack we will not need ventilation. If we use pressurized water, we will need ventilation. He does not feel it should be the same operation as we are doing now (man swabbing). He thinks we can use running water to get them clean enough.

Mr. Schaffner asked Mr. Harris whether in his mind we are going far enough to strip under water and put in a rinse tank.

Mr. Schaffner to Mr. Schwenzfeier: You are stripping plates under water and discharging into a tank on the first floor of the Be metal plant chemical section on an interim basis. This presumes, I take it, that we are now in a position to handle the rewashing of sludge products currently in the Be metal plant.

Mr. Schwenzfeier replied that this seems to be the case, with the one exception of the tankage; we have only one tank free at the moment for doing this repulping and that means that when this tank is full and additional sludge is produced, it may be kept in drums until the tank is empty.

Mr. Harris said there is a possibility in the event that we are short of tanks that we could install a tank outside for the interim solution as a holding tank.

Mr. Schwenzfeier thinks we can and this might be a necessary part of the interim solution and might also be a part of the permanent solution.

Mr. Harris thought that whatever we do on an interim basis, we should be thinking in terms of having enough tankage to handle the job on a pretty firm basis.

Mr. Schwenzfeier said he believed we have a 750-gal. tank which could be rubber-lined. The rubber lining of this tank body might run the overall time to six weeks.

Mr. Schaffner asked Mr. Schwenzfeier for a committal on how much design time would be required for the interim step. Mr. Schwenzfeier said this should not take more than a week.

It was agreed that we should pursue two courses: (1). Move on the long range centrifuge problem to replace the Sparkler filters as such and (2). Proceed immediately on an interim program involving the stripping of the Sparkler plates under water, and then procure and install sufficient

tankage to handle the storage and repulping requirements. The tankage required in the interim also would probably be required and used in the long range program.

Interim	6 - 8 weeks	\$5,000.00 (of which \$1,500-\$2,000 is recoverable for future job)
Permanent	16 - 40 weeks	\$50,000.00

Mr. Velten said we have been running through a list of items where we will have either permanent, temporary or immediate answers. I want the total number of dollars of this over-all thing and the total requirement time-wise with respect to a few other things that must also go on. I must know these over-all requirements.

Mr. Schaffner said the long range solution involved here will be presented to Mr. Velten in the form of J-orders, with detailed labor, material costs, etc., and will be justified economically and healthwise.

Mr. Schwenzfeier said that our engineers have prepared a detailed layout of doing this using a Bird machine. That particular job would get into another item -- repiping.

Dr. Quigley said that Mr. Eisenbud approves of permanent connections with rubber pipe or hose.

Mr. Schwenzfeier said this is not a simple job when you get into the engineering.

## 2. PEBBLE LEACHER - BALL MILL

Mr. Schaffner read from his reply to Mr. Thomas' recommendations.

Mr. Velten said they have our request for \$13,000 for this piece of machinery. This quantity of money requires that he must go to New York for approval, and he cannot do so without complete information on the entire unit.

Mr. Harris said there was a possible alternate solution; that is, that we take the melts crusher in its present state and in one way or another combine the pebble leacher and ball mill to get direct discharge. The handling of the damp material from the pebble leacher into the ball mill is a very sloppy, dirty situation.

Mr. Harris said his original statement was we would leave the melts crusher where it now stands. The man who enters it has a fresh air mask and is protected to a certain extent. It can be operated on an interim basis. The other operation is dirty and should be changed. That is only an interim solution.

Discussed raising the pebble leacher above the ball mill. Mr. Botts telephoned Mr. Littlejohn and he said the pebble leacher could not be put above the ball mill unless we cut through the roof.

Mr. Harris said there should be ventilation on the filter cake when dumping the leacher cake into the ball mill. If they are together this can be done more easily.

Mr. Schmeidler said he believes this matter needs a more detailed survey.

Mr. Harris said there are a lot of contingent things that don't show up, such as dirty operation and spreading of fluoride and cannot help but show contamination.

Mr. Harris asked why the melts must be filtered. This is done to keep the magnesium fluoride and beryllium pebbles together to feed to the ball mill and to recover the water-soluble beryllium fluoride. From the leacher it goes to the Buchner funnel and from there a man shovels it manually into the ball mill. At one time we used a screen and the magnesium fluoride crystals went through the screen and left the beryllium inside the screen, but about a pound a run of beryllium metal was fine enough to go through the screen.

It was suggested that the material be cold leached instead of hot leached, but this would not be much better. The bottom is generally dry and puffs up a little bit.

Mr. Smith suggested a screw (and go to right angle) for transporting the solids from the leacher funnel.

Mr. Harris read the following air analyses:

Unload the pebble leacher 33, 6, 15, 20, 10, 5

Load the pebble leacher 30, 13, 11, 15, 14, 14  
32, 9, 10, 35

Mr. Harris said the point is loading of the leacher is essential to control because you have dry material; on the other operation you have the man digging in with a shovel.

There should be ventilation for loading the leacher and some kind of enclosed mechanical method for discharge of the leacher and discharge of the ball mill.

Summation: Ventilation on the charging of the melts into the pebble leacher should be completed within 30 days.

The studies on the possible handling of material from the Buchner to the ball mill should be completed within the same period.

The decision on the new pebble leacher-ball mill combination will be held in abeyance pending:

- a. Complete estimate of cost and installation
- b. Is dependent upon construction changes coming up in the plant
- c. Depending on having information on (a) and (b), overall cost as related to all items required between now and the end of the FY.

Smith to Harris: I take it from what you said you do not think we are taking a great risk between now and when we get the solution. Harris said not if we get interim control to do what we think we can do. I hope we do not get into serious trouble. Even if orders were placed today, nothing could be done for six months.

Jobs to be done: Provide ventilation for loading pebble leacher  
Provide ventilation for discharge of pebble leacher  
Provide ventilation for discharge of ball mill — some kind of enclosed mechanical method — Harris said this would not be an extensive job and the design could be prepared by F. Thomas

2. FERRIC LIQUOR - BALL MILL (Cont'd)

Interim Solution	6 - 3 weeks	\$5,000.00
Permanent Solution	16 - 40 weeks	\$20,000.00

3. DISCHARGE OF SALT BIRD

Mr. Harris said he saw two things on the discharge of the salt Bird that should be changed.

1. Modify slide gate to eliminate dribble of salt
2. Hopper should be ventilated

Mr. Botts suggested that a slide gate could be installed on a slope, so that when it was pulled out it would be inside a housing.

Mr. Harris suggested that the scale be moved from its present location to directly under the discharge, thereby eliminating one operation.

These are all minor changes and it was decided that Mr. Botts could come up with a solution to this problem.

6 - 8 weeks     \$500.00

4. DISCHARGE THREE FLUORIDE FURNACES

Mr. Harris said the present arrangement of the high-frequency fluoride furnace discharge has reasonably good control. He suggested that the covered drum be allowed to set within the hood for a specified period to permit the fluoride to cool.

This is not the case with the gas-fired fluoride furnaces. They are designed in the old-fashioned manner in a box with an enclosure around the casting wheel and an enclosure around the entire unit. Mr. Schwenzfeier recommended elimination of the large room and installation of a small tower-like affair for each of the two furnaces; these should be small enough to prevent the individual from entering the enclosure.

Mr. Harris read the following air analyses:

Changing feed barrel	.8, .5, .2, .6, .8
Loosening discharge of furnace	.4, .4
Changing barrel of BeF <sub>2</sub>	77

The man performing this operation always wears a respirator.

Mr. Schwenzfeier said he noticed yesterday that we have a severe contamination problem. Everything enclosed in the house is filthy and white. It needs washing. We will probably have to provide a man with a rubber suit and chemox mask and wash this area.

Production should be taken into consideration when planning these modifications, as each of the furnaces represents 25% of our production capacity, and ten days (more or less) would probably be required to carry out the changes.

FOUNTAIN BLISS

The present procedure is to blow hot air up through pebbles. Instead of this we should be sucking the air through the pebbles so that the system would at all times be under a negative pressure. With the present system beryllium contaminated air will be discharged into the room in the event that there is any leak at all in the piping.

Mr. Velton said he thought Botts had taken care of this.

Mr. Schaffner said that this project would be completed by Saturday night (March 24th).

3. VACUUM CASTING

Mr. Schaffner said we recognized that vacuum casting ventilation has been inadequately and incompletely engineered and if we get into vacuum casting something will have to be done. Mr. Schwenzfelder said this project will require considerable re-design work.

Mr. Harris said it was unjustifiable to have an installation and to have been essentially piloting that installation to full production without giving a lot of thought to how it should be ventilated.

Mr. Velton said Brush has been vacuum casting when they had material, which within the last two months has been very little and there are other production problems connected with the unit to get it working. There is no sense in going through engineering or ventilation when we are going to change the insides.

Mr. Harris said work could have been done on the cold and vacuum enclosure.

Mr. Schwenzfelder said we are considering throwing the existing furnace out completely and putting in a completely new furnace. We have done some work on the ventilation of the vacuum enclosure.

Dr. Quiley said this unit was cleaned once by Flavell, two days before he got sick.

Mr. Harris said he saw no reason for going through Mr. Schaffner's answer to Mr. Harris' recommendations at this time. We will have to go over your comments one by one and talk them out.

Mr. Smith said the operation really has not been studied and we do not know what the problem is. The obvious course of operation is to follow operation closely and if we do get into trouble, we are in a position to shut down for some time if we have to. Obviously, we do not want to do this but we can take some remedial time if we have to.

Possibly \$5,000.00

9. REDUCTION FURNACES

Primarily it is the pouring cycle and changing of pots that gives the trouble. The Brush Engineering Department has worked on the pressure furnace whenever possible to make this a pressure furnace not completely enclosed. The throat design and enclosure devices should be changed so the pots can be changed quickly and neatly. The same steps should be applied to the open pot furnace.

There is some consideration being given to combining into one unit, if possible, the tube filling chamber and the actual furnace charging. The general idea is to have a magnesium hopper and beryllium fluoride hopper with the two running into the furnace.

10. BERYLLIUM OXIDE FURNACES

Beryllium oxide is pneumatically conveyed out of the furnace to a collector and into drums. A man has to look to see if the drum is full.

A concentration of milligrams per cubic meter has been obtained on this operation.

Mr. Dotts said a work order has been written and the work is now under way. We are correcting the situation as recommended by F. Thomas.

11. REVIEW AIR CLEANING NEEDS AND VENTILATION PIPING

Mr. Harris said it was his impression that determining a satisfactory way of handling effluents will depend on corrosion and the quantity of Be.

If the concentration is low, it will be unnecessary to provide air cleaning.

If we have a problem of losing Be and want to reclaim it, it will be necessary to clean it.

If we have a problem of discharging Be, even if unrecoverable, it will be necessary to clean it.

We can do complete evaluation on air cleaning. You have F. Thomas, the Harvard Air Cleaning Group and the Brush Air Sampling Group.

Harvard is to give Brush all the assistance they can. They have submitted their first report, which goes into two major problems -- the sulfating mill and beryllium oxide batch furnaces.

It will not be a recommendation from us but a suggestion for your guidance.

Mr. Schwensfolar said we are doing study work on our own. Mr. Botts has two quotations on certain new air cleaning equipment. Throughout the plant we have wet gas cleaners that do not retain moisture. The Hudson Fog Filter has been quoted at approximately \$7,000.00, and a suitable venturi Pease-Anthony type gas washer was quoted by the Chemical Construction Company at approximately \$9,000.00. The entire cost of installing a suitable gas washer on the sulfating mill

USA 009238

11. REVIEW AIR CLEANING NEEDS AND VENTILATION PIPING (Cont'd)

will probably be between \$15,000.00 and \$20,000.00.

Mr. Harris said he was sure Harvard could help us because they have done considerable experimental work on this.

Mr. Botts said Harvard did come down here and suggested that we use a venturi-type scrubber on the sulfating mill.

Mr. Harris believed it would be more economical to replace the piping.

Mr. Schwenzfeier said it would not because we have already replaced piping with a more corrosion resistant material--sewer tile. It has been leaking a little bit and we are unable to repack the joints because of the weather.

Mr. Harris said that throwing any large amount of sulfuric acid up the stack is likely to leach out the stack.

Mr. Schaffner said we had a 175' stack in Lorain and our average expenditure for pointing up the stack inside and outside every year (generally in July and August) cost an average of about \$800 to \$1,000 with professional chimneologists. This would probably cost about \$700-\$800 now.

Mr. Schwenzfeier said in Lorain we had ten times as much sulfuric acid passing up the stack.

Mr. Volten said vent piping replacement program is underway on a maintenance basis. Air cleaning on a couple of special J-orders. General discussion indicates there is a lot more of the capital type of money in that respect and are we talking about something relatively soon.

Mr. Schaffner said within the month of April.

Mr. Volten said about \$30,000.00 of capital type money, \$5,000 to \$10,000 in a month.

One stack sample is being analyzed now. The permanent stack sampler has been in operation for the past week. Mr. Harris stated that it was important that we get this information as he has a strong suspicion that the governing factor on how much we can throw away will be economics and not health. Ventilation piping is under way on a maintenance basis.

12 months            \$30,000.00

12. DRUM INVENTORY STORAGE CONTROL

Various means of storing of hydroxide were discussed, e.g., storing in solution, underground tank storage, storage in drums in covered storage area, etc.

Mr. Harris said our present practice of storing barrels all over the plant gives the appearance of sloppy housekeeping.

Mr. Velten said that he must have a list of all foreseeable medical problems so that he could allow for them budgetwise.

Mr. Schwenzfeler said in connection with this list, keep in mind the fact that fabrication located in Cleveland is a part of this plant and will be here at Luckey.