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November 6, 1989

Mr. Leslie G. McCraw
Vice Chairman
Fluor Corp.
3333 Michelson Drive
Irvine, CA 92730

Dear Les:

On November 2, Bill Humphrey and Jeff Zelms met me at the hotel at 7:00 A.M. We talked for some time about various aspects arising from the Partners' meeting October 31 and then drove to the airport where Larry Stoehr was waiting. Bill and Jeff then left to go to Herculeum in accordance with previously made arrangements. However, they offered to change those plans and go to Viburnum with Larry and me, but I decided this would not be necessary inasmuch as people there would be able to answer all the queries I might have about ore reserves, mine plans and the 1990 budget for capital expenditures. Larry and I landed at Viburnum around 9:00 A.M.

We spent the first hour or so with Gary Boyer and Bill Mount and then Bill Lane joined us, bringing ore reserve maps of the six operating SEMO mines. The principal question to be answered was why the 1990 grade of ore to be milled would be only 5.05% Pb versus actual grades milled in 1987 (5.75% Pb), in 1988 (5.96% Pb) and in the first nine months of 1989 (5.52% Pb). Gary then showed us the attached graphs which he had intended to present on October 31. The first graph (SEMO Geologic Ore Estimate - Pb E) shows the ore reserves at successively higher cut-off grades. In this regard, it should be remembered that, until the formation of Doe Run in 1986, the traditional cut-off grade was 2% Pb without regard to zinc and copper content. Beginning in 1987, however, a 4% "lead-equivalent" cut-off grade has been used as the market prices of zinc and copper rose so dramatically and as substantial tonnages of high-grade copper ore (2 - 5% Cu) were found at the Casteel Mine. The term "lead equivalent" means the lead content of a given sample plus the zinc content of that sample plus <u>twice</u> the copper content of the sample. For example, ore containing 5.2% Pb, 0.7% Zn and 0.4% Cu would have a "lead equivalent" value of

SEMO Geologic Ore Est. (Pb E)
(At Respective Cut-off Grade)
Million Tons
120
100
80
60
40
20
0
2% 4% 6% 8% 10% 12% 14% 16% 18% 20% 22% 24% 26% 28%
Dry Tons Ore
Pb/Zn/Cu = 1/1/1

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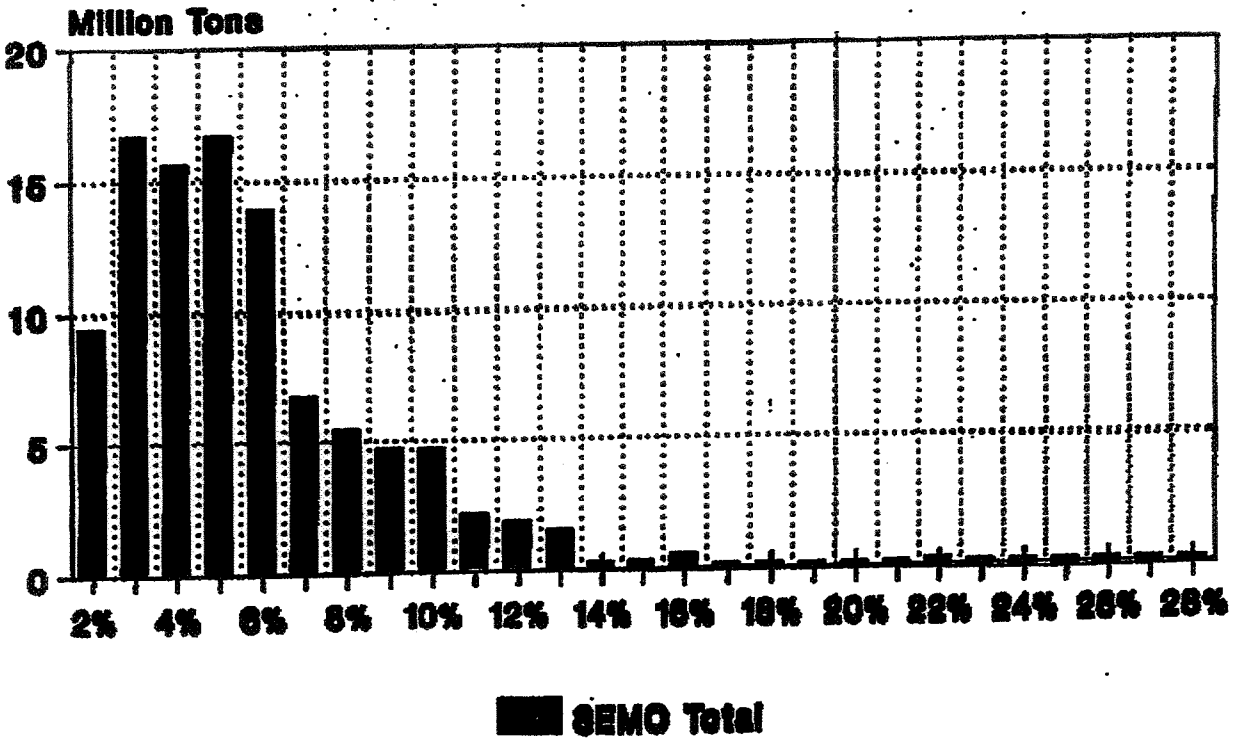
SEMO Geologic Ore Estimate
(By PbE Classification)



Pb/Zn/Cu = 1/1/2

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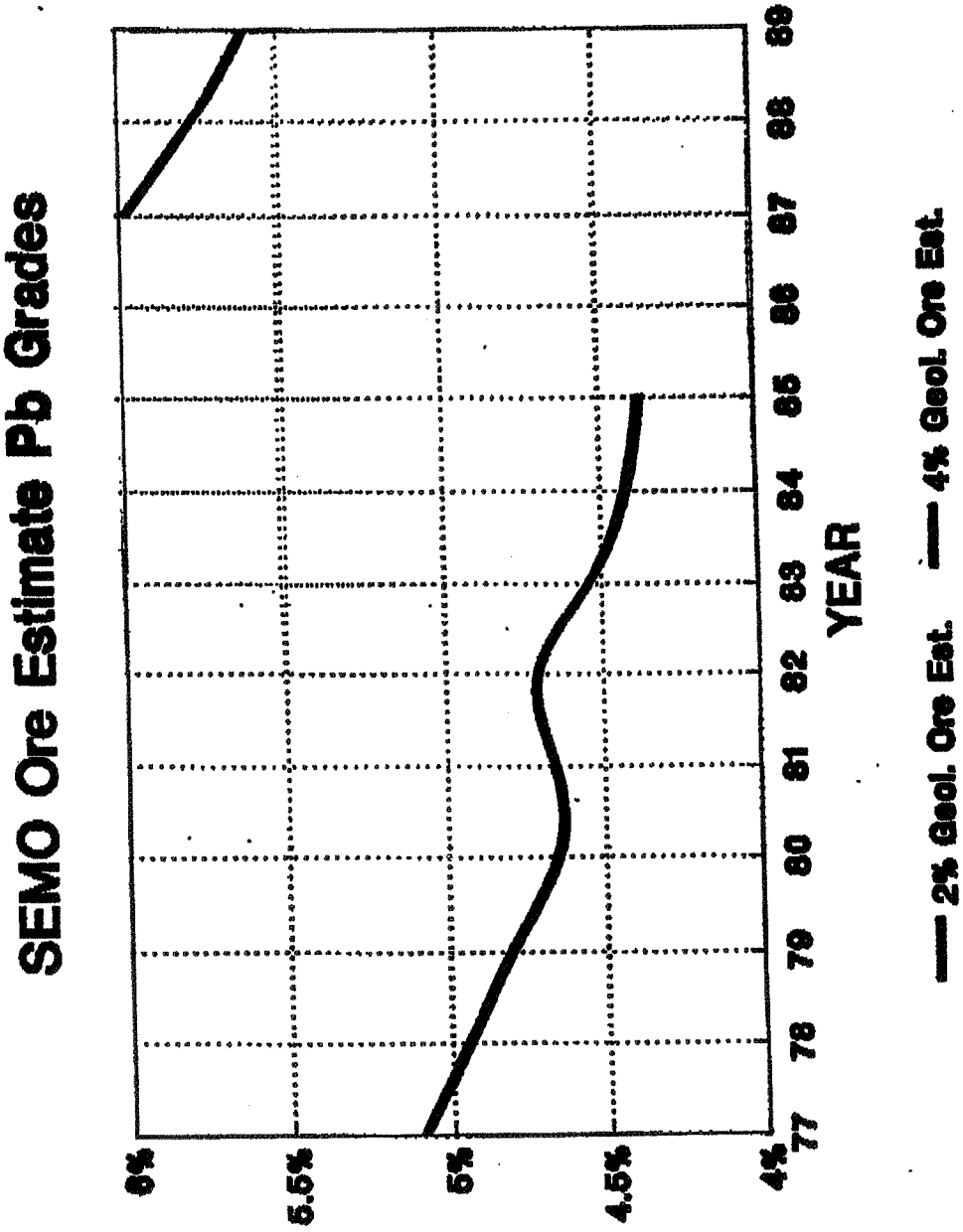

SEMO Ore Estimate Pb Grades
6%
5.5%
5%
4.5%
4%
77
78
79
80
81
82
83
84
85
86
87
88
89
YEAR
2% Geol. Ore Est.
4% Geol. Ore Est.

6.3% Pb-E. Thus, the graph shows a rapidly declining ore reserve tonnage as the Pb-E cutoff grade rises. At a 4.0% Pb-E cutoff, the reserve is in the order of 75-80 million tons versus 100 million tons at a 2.0% Pb-E cutoff. At a 6% Pb-E cutoff the reserve drops to about 40-45 million tons, and so on.

The second graph (SEMO Geologic Ore Estimate) is a bar chart showing the ore reserve tonnages at successively rising Pb-E cutoffs. Thus, there are about 9 million tons between the 2.0% and 3.0% Pb-E cutoffs, about 17 million tons between the 3.0% and 4.0% Pb-E cutoffs, about 16 million tons between the 4.0% and 5.0% Pb-E cutoffs and so on. The important point is that the bulk of the ore reserves fall between the 3% and 7% Pb-E cutoffs and there are very limited reserves above the latter cutoff.

The following tabulation can be derived from the two graphs:

Total Ore Reserves at	Millions of Tons
2% Pb-E cutoff	102
3% Pb-E cutoff	93
4% Pb-E cutoff	76
5% Pb-E cutoff	60
6% Pb-E cutoff	43
7% Pb-E cutoff	29
8% Pb-E cutoff	22
9% Pb-E cutoff	17
10% Pb-E cutoff	12
11% Pb-E cutoff	7
12% Pb-E cutoff	5
13% Pb-E cutoff	3
14% Pb-E cutoff	1

The latest official Geologic Ore Estimate is dated November 1, 1988 because that for November 1, 1989 will not be available until sometime next January. The following tabulation shows the mine-by-mine reserves as of November 1, 1988 at the 4.0% Pb-E cutoff:

Mine	Millions of Tons	% Pb	% Zn	% Cu
No. 28	4.7	5.05	0.48	0.41
No. 29	4.8	4.46	0.39	0.57
Casteel	14.7	4.13	0.87	0.80
Buick	17.7	6.18	1.45	0.10
Fletcher	16.8	7.21	0.79	0.20
Brushy Creek	16.4	5.15	1.24	0.16
Total	75.1	5.60	1.01	0.33

The corresponding figures for November 1, 1987 were 73.3 million tons @ 5.75% Pb, 1.07 Zn and 0.36 Cu. It should be noted that these reserve figures do not include existing pillars but do include pillars that will be left in areas yet to be mined. The reserve figures also include ore-bodies which are small and remote from the existing workings and which may be uneconomic to mind because of their remoteness and limited thickness.

The third graph (SEMO Ore Estimate Pb Grades) is an historical summary of ore reserve grades. For the years 1977 through 1985, the curve is based on a 2% Pb cutoff for St. Joe reserves. Then, in 1986 when the Doe Run partnership was being formed, there is a gap in the curve as the Buick reserves came into Doe Run. The curve for 1987, 1988, 1989 includes both St. Joe and Buick reserves, but at a 4% Pb-E cutoff. The jump in grade between 1986 and 1988 reflects the addition of the much richer Buick ore and the increase in the cutoff grade. However, the important point is to note the steady decline in the grade of the reserves with the exception of slight increases in 1981-82.

In looking at any of these ore reserve figures, it is also very important to remember that they do not include any allowance for dilution which is generally thought (but not in any quantifiable way) to be about 10%. Therefore, if one considers the grade of ore milled in recent years and allows for a 10% dilution during mine, the following tabulation indicates the grade of ore actually mined:

Year	Ore milled % Pb	Ore Mined % Pb	
1987	5.75	6.39	(5.75 + 0.9)
1988	5.96	6.62	(5.96 + 0.9)
1989 (9 mos)	5.52	6.13	(5.52 + 0.9)
1990 (budget)	5.05	5.61	(5.05 + 0.9)

Therefore, during the years 1987 through September 1989, the grade of ore mined has been significantly above the average grade of the reserves. The budget grade for 1990 will be about equal to the reserve grade as of November 1, 1988.

Notwithstanding the foregoing, the fact remains that some quite high grade ore exists at the Buick and Fletcher Mines, especially the latter. It has generally been from the Fletcher Mine that high grade ore has been extracted in recent years to offset the lower grades coming from the other mines. Gary Boyer and his mine planning group could probably take a higher proportion of mill feed from the Fletcher than is intended under their 1990 budget, but to do so will only exhaust those reserves even sooner.

The Buick reserves do not include some very high grade (plus 10% Pb) pillars there and SEMO is making a careful study of pillar extraction. However, you are aware that the Magmont (Cominco/Dresser) Mine suffered a very severe collapse when many pillars failed in the so-called Window Property of that mine. The collapsed area is surrounded on the south, east and north by Buick property and SEMO must take extreme care in any pillar extraction program. Even before pillar extraction is started, there are now areas in the Buick Mine just to the south of the Window Property where geostatistical data and a computer modelling program are indicating that ore left to be mined between existing pillars in certain areas cannot be extracted safely. Consequently, the Buick Mine is not a presently available source of high grade ore.

Another factor to be considered in future mine planning is that a substantial portion of the reserves is contained in small, narrow and thin orebodies, many of which lie at considerable distances from areas now being mined. The SEMO

staff had prepared (and expected to present on October 31) an ore reserve map for each of the six mines and these were shown to us on November 2. They demonstrate in a very striking way, how severe this problem is.

My own conclusion is that it would be imprudent for SEMO, in the face of the facts described above, to mine enough high grade ore at Fletcher or elsewhere to bring the 1990 mill feed grade up to, say, 5.50% Pb. However, it is difficult for me to convey adequately to you and others in Fluor the seriousness of SEMO's ore reserve and mine planning problems. Accordingly, I suggest that you call Bill Humhprey or Jeff Zelms and propose that Gary Power, Bill Mount and Bill Lane come to Irvine at the earliest possible date when you, Bob Guyett and, hopefully, Vince Kontny would be available to hear what they have to say. In two hours or less they could shed far more light on their problems than I can in a letter such as this.

Boyer

Later in the day, as we returned to St. Louis, Larry Stoehr reminded me of the ore grades shown for 1990 and beyond in the 1990 Strategic Plan which was issued last July. On page 26 of the S.P. the 1990 ore grade is given as 5.05% Pb and the ore to be mined as 4,898,824 tons, both of which are identical with the corresponding figures on page 33 of the 1990 Budget. His point is simply that the budget figures should not have surprised anyone. B.S.

Turning to SEMO's capital spending program for 1990, on November 2 we went through the numbers on pages 59-65 of the budget. Of these $2,151,000 is for the purchase of so-called low-profile mining equipment such as Getman scalers and charging tractors, roofbolter conversions and Reynolds ore haulage trucks. The low profile equipment is becoming increasingly necessary as the ore thicknesses along the outer margins of the orebodies decrease. You will be aware that the minimum mining height with existing equipment has been fourteen feet. However, in many areas now to be mined, it will be necessary to restrict mining heights to ten or twelve feet to avoid excessive dilution. Even at the present minimum mining height of fourteen feet this often means taking one foot above and one foot below a twelve foot thickness of ore (a 14% dilution).

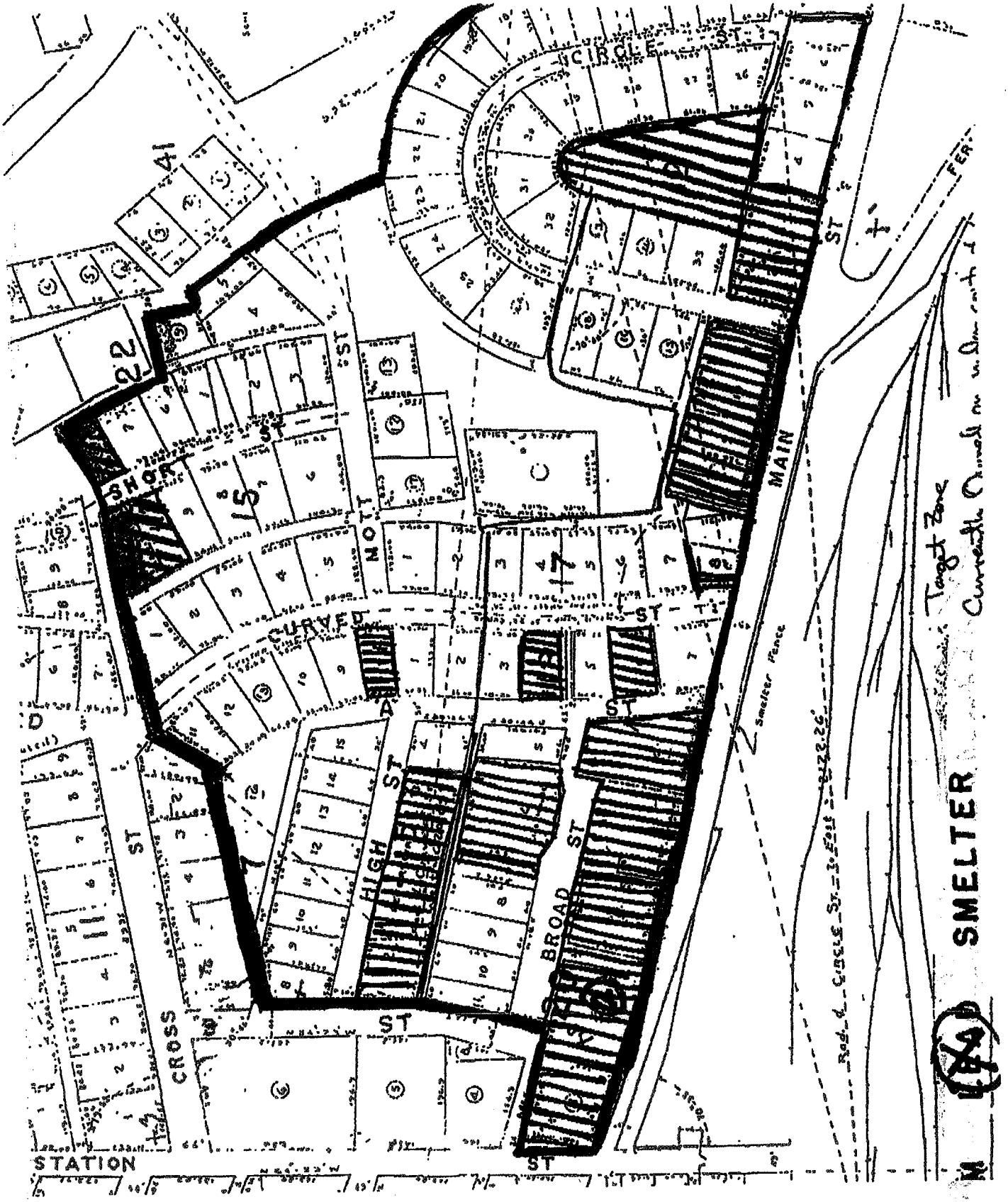
Another group of capital expenditures on pages 59-65 is for cost reductions in the four mills, principally Viburnum, Fletcher and Buick. These come to a total of $1,175,000 out of the $1,215,000 cost reduction total shown on page 59. By far the largest of these is $524,000 for engineering and upgrading the Fletcher flotation plant. As each of these projects is described in an AFE presented to senior management (and the Partnership Committee if over some limit), it will have to show the anticipated cost reduction and the resulting IRR. In other words, each will have to stand or fall on its own economic merits. Accordingly, I believe the cost reduction items in the capital budget seem reasonable. Nevertheless, I told both Gary Power and Bill Mount they must be prepared to re-evaluate their entire 1990 capital program because Fluor is going to insist that the budget presented on October 31 be significantly improved.

The meeting on November 3 with John FitzSimmons and Dan Vornburg was devoted largely to environmental problems and the related AFE's for revisions to the south end of the sinter plant and the replacement of No. 4 baghouse with an electrostatic precipitator (ESP) at a total cost of $9.1 million which is about one third of all the capital spending (company-wide) proposed for 1990.

Turning first to the ESP to replace No. 4 baghouse which is said in the AFE to be on the verge of physical collapse, we went out into the plant to have as close a look as possible while the baghouse is in operation; one cannot go into the cells housing the bags without shutting the whole sinter plant down, cooling the cells and purging them of SO_2 gas. From what could be seen by walking around the outside and going into the basement space between the cells, it was impossible for me to detect any serious evidence of imminent collapse. However, John FitzSimmons said the real problems are with the steel and concrete on the inside of the cells. Therefore, I suggested that he find some outsider with the proper qualifications to make an independent evaluation. Accordingly, he will try on November 6 to find such a person (probably from the Wheelabrator Co.) to make the necessary inspection, take pictures and write a report. When this has been done, the report should come to you via Jeff Zelms. However, you may wish to nominate someone from Fluor Daniel to make the inspection.

The need for the south end sinter plant revisions hinges on a complex array of environmental considerations. As Fluor was earlier advised, Doe Run, on June 21, 1989, received a formal Notice of Violation (NOV) from the Missouri Department of Natural Resources (DNR). The NOV speaks of "violations of the ambient air standard for lead dating from the second quarter of 1986." When I learned about the NOV, it came as a surprise because I have heard Dan Vornburg say on several occasions that the smelter was in compliance with the 1.5 micrograms per cubic meter EPA standard for ambient air except for occasional "excursions" (or exceedances). However, after the discussions on October 31 and November 3, it appears that the tenor of Dan's statements on this subject has been tailored to suit a particular audience on a "need to know" basis. While the subject is a very sensitive matter for Doe Run and one which Dan must handle accordingly, it raises questions as to who has the right as well as the need to know. In any case, it appears that anyone, whether an insider or otherwise, could go the the DNR and demand (under the Freedom of Information Act) access to the air monitor readings which Doe Run must submit quarterly.

Regardless of how the data are handled, it is now clear that an unacceptable number of excursions or exceedances has occurred and caused the State to issue its NOV. The detailed record is at the Herculaneum office and it gives rise to the AFE for revisions to the south end of the sinter plant. Attachment 1 to the AFE lists the 1987 lead emissions in tons per year and shows the reductions which the proposed revisions are expected to achieve (78% of the low level emissions). On November 3, Dan presented the following:


CIRCLE ST
MAIN ST
SHORT ST
MOTT ST
CURVED ST
HIGH ST
BROAD ST
CROSS ST
STATION ST
SMELTER
Target Zone
Smelter Fence

Relative Contribution of Scrubber Emissions (SE)
to High School Monitor Station
(1987 Baseline)

Source	Maximum with Existing Controls	Maximum with Additional Controls
Scrubbers	1.4 ug/M3	0.09 ug/M3
SP roof vent (SE & ESP)	0.354	0.04
Other fugitives	0.97	0.97
Main stack	0.01	0.01
	2.73*	1.11*
Reduction from sinter plant projects	0%	59%

*vs EPA lead standard of 1.5 ug/M3.

All this discussion gave rise to the question as to whether the $9.1 for ESP and sinter plant revisions might be better spent on buying all the properties in Herculaneum, locating the families elsewhere and returning the land to its pristine state. DRC has actually been purchasing property in Herculaneum for the last two or three years when it became available; the 1990 capital budget (page 70) shows $265,000 for this purpose. Prior to the formation of DRC, St. Joe had a similar program, although it was suspended in the 1980's when lead prices fell to very low levels. DRC has been paying an average of $38,000 per home and recently bought an empty lot for only $6,000. Thus, $265,000 will allow the purchase of seven homes per year. The attached map shows the "target area" of the town immediately adjacent to the smelter and the cross-hatched areas which are now owned by or under contract of sale to DRC.

The map makes clear how little of the target area is owned by DRC and that the target area is only a small part of Herculaneum. From the discussion on November 3, though, it appears that the idea of buying Herculaneum property on an all-out, rush basis is much too simplistic. Implementation of such an idea would almost certainly invite a major class action suit. As it is, when homes are bought by DRC, they are then rented out under a lease which has a clause stipulating that no children may live in the home (apart from occasional visitors). The EPA 1.5 ug/M3 lead standard is aimed at children because they are much more vulnerable than adults.

Vornburg warns that DRC now finds itself at another point of major decision. With cooperation between DRC and DNR in 1981, a State Implementation Plan (SIP) was developed to meet the EPA lead standard and DRC has since spent $3 million for pollution control facilities plus the increased operating costs which they entail to meet the SIP. Another $300,000 has been spent on monitoring stations. Now, in view of the NOV, DRC must decide whether to take the next steps (sinter plant revisions and ESP) which would satisfy the State or, in the alternative, decline to do so and let the EPA develop its own plan for compliance. Such an EPA plan could require either major production curtailments or a massive capital spending program. In 1987 the Bureau of Mines published Information Circular 9160 entitled Lead Reduction in Ambient Air which studied all the U.S. primary lead smelters and refineries. Their recommendation was to require every such facility to construct an airtight building or buildings over the plant and extract the fumes within it/them to a baghouse. IC 9160 estimated the capital cost for Herculaneum at $60.2 million (as of 1986) plus an additional $4.5 million in annual operating costs. In contrast to these EPA alternatives, FitzSimmons and Vornburg believe it is better by far to work with the State on a program which, over three years, will cost about $12 million (including the $9.1 million for sinter plant revisions and ESP).

According to FitzSimmons and Vornburg, such a program will satisfy not only the State but also EPA. When asked if other $10-15 million pollution control programs will arise farther down the road, their answer is "no"--as long as the

EPA allows the 1.5 ug/M3 lead standard to stand. One must bear in mind, however, that there are external and internal pressures on EPA to cut that standard by two thirds to 0.5 ug/M3. Beyond that, of course, there are those environmentalists who would ban lead smelting completely, regardless of the economic consequences, and dictate that lead needed for batteries, etc. be purchased from abroad.

My own recommendation to Fluor is that they accept the sinter plant and ESP AFE's proposed by the staff at Herculaneum. However, it is presumptuous of a simple-minded mining engineer to express an opinion on a subject of which he has so little personal knowledge and Fluor may wish to engage some organization with the requisite expertise to advise them. Perhaps DRC should have done this on their own initiative. Unfortunately, it appears now that there is an urgency to the matter which would preclude any major study by an outside group.

In the AFE for sinter plant revisions which was considered on October 31, there was a present value analysis (Attachment 4) dated October 22, 1989. The analysis showed future cost savings of $9,038,000 over ten years attributable to the sinter plant revisions and that these would have an NPV of $343,169 at a 10% interest rate. Attached is a similar analysis dated October 30, 1989, but a savings of $2.2 million arising from the plan to replace No. 4 Baghouse with ESP and a further $3.6 million savings in acid plant expense adjustments attributable to the ESP have been added. The result is a total savings of $14.838 million over ten years which would have an NPV of $2.165 million at a 10% interest rate. Both analysis are, of course, open to skepticism as to whether any or all of the projected savings will occur or if the magnitude of those savings will be as great as predicted. However, the analyses do indicate a potential economic benefit that would offset the initial investment.

Sincerely yours,

Paul W. Allen

Paul W. Allen
PWA:pje
Enclosures
CC V.L. Kontny
Robert Guyett
Wm. Humphrey
Jeff Zelms

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THE DOE RUN COMPANY
SOUTH-END SINTER PLANT REVISION & ESP
PRESENT VALUE ANALYSIS
30-Oct-89

	YEARS										
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTAL
	0	1	2	3	4	5	6	7	8	9	10	
FLOWS												
of Projects (SP REV & ESP)	(150,000)	(9,500,000)										(9,650,000)
gs on Future Replacements						350,000						350,000
illing Drum not required												1,022,000
Rubber #1 & #2 not required		1,022,000										1,636,000
Rubber #3 & #4 not required		1,636,000										330,000
ns Rolls not required						330,000						750,000
rrugated Rolls not required				750,000								400,000
ror belts - Annual Savings		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	1,000,000
ror Belts - Capital expense					1,000,000							500,000
rical modifications/repairs		250,000	250,000									2,170,000
ver Savings		217,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	450,000
		450,000										500,000
tural Repairs			500,000									2,200,000
ase (ESP Alternative)		2,200,000										3,600,000
Plant Expense Adjustments (ESP)			400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	(70,000)
ional costs of installation (SE REV)		(70,000)										
ALS	(150,000)	(3,755,000)	1,407,000	1,407,000	1,657,000	1,337,000	657,000	657,000	657,000	657,000	657,000	5,188,000
Present Value of Cash Flows @												
	10%	2,164,632										
	12%	1,776,010										
	14%	1,435,393										
	16%	1,135,896										

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