CPCo's
Proposed Transcript Corrections

LINES IN QUESTION

Wednesday, November 17, 1982

TR	Line	
09013	23	about tech spec or soils minulation. So, basically, issues
09051	12	as a whole. They would hang up over duct banks and such.

Thursday, November 18, 1982

TR	Line	
09303	11	not very electrically conductive. It is basically

Friday, November 19, 1982

TR	Line	
09581	9	increase this building's response beyond what they had

Monday, November 22, 1982

TR	Line	
09831	3	is coming from. It is just that there is a reduction to
09831	5	that reduction is not in the sand because it is free for
09922	17	The lowering or the fine pond could be done concurrently
09942	11	call a guillotine cut, which was available to the same
09942	12	Bechtel
09978	7	Q I see, so you do not anticipate a catch base --

Monday, December 6, 1982

TR	Line	
10268	15	piezometer up so that it will redirect correctly so that
10268	16	it does have an affect somewhere else. This would be of
10269	18	slow or if the piezometer hasn't level or if it seems

Tuesday, December 7, 1982

TR	Line	
10420	15	is there and which, I'd say, the structure has had to step.
10422	22	building started to settle without apparent motivation.
10526	6	indicate it to be 1.2 inches.
10545	6	Q Perhaps it's clear in your mind, but it's not clear in my mind.
10545	7	A The settlements that occur came from
10573	6	occuring. The secondary consolidation would be much more
10573	7	of a part being caused by dewatering.

Wednesday, December 8, 1982

TR	Line	
10667	5	A (WITNESS SINGH) Particulary there are line bor-
10670	4	reached this square was with less permeability, so it
10673	19	A (WITNESS SINGH) Yes, I do.
10774	16	predicted by Dr. Peck by surcharging in adding the

Friday, December 10, 1982

TR	Line	
11166	18	MR. RINALDI: I think you should call that a draw
11187	12	A (WITNESS KANE) I think there is 18-19 questions

Consumers Power Company Proposed Transcript Corrections
Midland OM/OL

Monday, November 15, 1982

TR	Line	
08550	18	need for power issues or alternative energy source issues. We
08551	9	benefit analysis connected with the National Environmental Policy
08551	10	Act in either impending or future licensee proceedings for
08552	11	It is entitled "Non-fuel operation and maintenance
08552	23	MR.PATON: Is there a NUREG number?
08553	16	else that they would want to be taken up.
08555	5	MRS. SINCLAIR: I would like to yield any time to Ms. Billie Garde of GAP, who wishes to discuss how their
08555	9	if it is, did the Board indicate that it would take limited
08555	21	require a claim of surprise. And since she is here, I
08556	7	long do you think your statement would be if the Board
08579	21	integrity of the hearing process, and it's only
08580	9	Finally, as a point of personal knowledge,
08581	5	that as a matter of not so much personal knowledge -- I think
08585	12	bearing capacity of the footings on the diesel generator
08585	19	designated as a sigma sub N, normal stress. The ordinate
08585	20	on that draft should be given as Tau, the Greek letter Tau,
08585	23	that diagram should read Q-prime, which it does, is
08586	3	diagram, P-prime should equal sigma sub-one bar plus
08587	17	is 4.4 kips per square foot.
08587	22	takes the maximum sum of the dead loads plus live loads
08588	3	maximum value I could get from the Bechtel project was
08588	7	and that's how they arrived at the 4.4 kips per square foot.
08588	8	I had accounted for about a hundred percent of the
08588	9	live load, and what they found is that the actual live load going into
08588	10	the building is 25 percent of what they
08589	3	SSER, 4.4 kips per square foot?
08589	4	A The factors of safety were increased about
08590	7	to clarify that Dr. Hendron is referring to Supplement 2
08590	12	THE WITNESS: I was referring to 2-39 of
08590	24	A Bearing capacity relates to neither the pri-
08591	13	Normal practice for long term static loads is
08591	14	to design for a factor of safety of three. For short term
08591	24	account as far as the intended use of a diesel-generator
08592	6	monitoring and mapping programs and a displacement measur-
08594	11	right now, I want to know in your opinion, as an expert
08594	18	MR. STEPTOE: I object to the question because
08596	20	point of view. So Dr. Hendron has prevailed with respect
08597	25	capacity concerning a controversy, or conflict, between
08599	1	MR. STEPTOE: I don't recall any
08599	2	reference to quicksand in Mr. Gould's testimony. But if
08599	6	the diesel generator building footings that I know of.

TR	Line	
08600	9	ticular testimony because most of it is legible. However,
08602	7	load, static load and accident or earthquake loads,
08602	17	25 include static load plus live load plus an earthquake
08602	24	some computed factors of safety for a dynamic load corresponding to
08602	25	one and a half times the original SSE for the plant.
08603	14	Then if you consider static load, plus live load,
08603	15	plus one and a half times the SSE earthquake, that value of
08603	18	and the 2.4, are computed for the case that there is no
08603	19	dewatering system and the water level is up to its
08603	20	original elevation of +627. The real condition
08603	21	for the plant now is going
08603	22	to be dewatered to about elev. 600. The factor of safety for the best shear
08604	9	the dewatered condition.
08605	23	anisotropically consolidated shear strength test pre-
08605	25	safety of 2.37 is consistent with both anisotropically
08606	1	and isotropically consolidated tests shown in Figure 13.
08606	5	various samples for the initial density of the fill
08606	6	and initial water contents of the fill before any sur-
08606	8	in Figure 14 are from Corps of Engineer borings which
08606	19	it than -- is there a regulatory guide or anything like
08606	22	of any regulatory guide. It is something that has
08606	25	factor of 3 for dead load plus the real expected live
08608	6	settlements. The factor of safety of two is permitted to
08608	17	A At the factor of safety of one, I would say that the
08608	22	body -- I don't think in the case of this particular structure,
08608	23	that it would necessarily mean failure, that is a
08609	3	increase of foundation punching with an increase in loading
08609	4	at a factor of safety of about one and a half.
08609	17	The Corps of Engineer borings were taken
08609	19	they could be taken; the set of shear strength
08609	20	parameters determined from those samples are shown in
08609	21	Figure 14. Those samples were obtained as close as was physically possible
08609	24	which were taken in the area of the diesel generator building,
08610	1	From information obtained on those samples, which is one
08610	2	of the reasons why I gave the charts on the results of those
08610	4	density of the soil was and what the water content of the soil
08610	5	was. We know that the undrained shear strengths property --
08610	9	from densities taken from the soil sampling.

TR	Line	
08611	4	the soils, these type of soils primarily, are a function
08611	10	that is why I included the shear strength data in
08611	13	density of 116 pounds per cubic foot, and
08611	15	That is one of the reasons why I worked out two sets of
08612	1	in Figure 14 are more representative of what the fill is
08612	16	figure of 116 and 122 pcf.
08613	1	clarify again why 2.37 is less reliable? You gave a very
08614	2	we may apply the principle stresses that now exist
08614	3	under the foundation during the application of
08614	4	the static load. We know that each element of soil under the
08614	5	foundation when we have a static laod is subjected to
08614	6	principal stresses which are different. In other words, we might have a lateral
08614	7	confining pressure of a half a kip per square foot, and a
08614	8	vertical confining pressure of 1 kip per square foot.
08614	9	There's an initial shear stress. That initial shear
08614	10	stress is caused by the initial static loads on the
08614	11	footing. And what we have done in the tests shown in this figure, and why it is
08614	14	the footing due to the static loads. That is, we have taken
08614	18	tests, you will get a little bit stronger undrained
08614	19	shear strength than you would in isotropically consoli-
08614	20	dated tests for the same initial effective stress,
08614	21	on the potential failure surface. So Figure 14 shows only the
08614	23	were conducted on the Corps of Engineers' specimens.
08615	1	A This is the stress path that soils under-
08615	2	neath the foundation have been subjected to, as closely as we can approximate
08615	7	imposed static load, plus live load, plus earthquake loads.
08615	12	volved here. q_t, for instance, looks like it is pressure
08615	20	that that second term is subtracted from q_t?
08617	1	THE WITNESS: In the paragraph above
08617	2	equation 4 on p. 10 is where I have defined q_t. q_t is basically
08617	3	the load per lineal foot along the wall divided by the
08617	10	pressure is taken as q_t minus D_f because that
08617	11	is the differential pressure between th soil under the footing and in the soil
08617	13	that causes the shear stress that would tend to let this
08617	15	smaller pressure out to the side which is D_f. But if those
08617	18	q_t minus gamma D_f would be zero.
08621	20	fine with the Staff. But, I am not trying to try the Appli-
08624	13	this testimony that you were given on bearing capacity
08625	5	contention or part of that contention is addressed.
08625	14	I don't think that is fair to Ms. Stamiris.
08631	15	different static loads and different combination which you

TR	Line	
08632	10	and the static loadings. That should be included already in the
08632	18	A I don't know how that was broken down.
08634	7	like this, and this does include the snow loads, and some-
08634	8	times wind loads as well. They could be assumed to be
08634	13	CHAIRMAN BECHHOEFER: Well, would an extreme wind
08634	14	load, like a tornado, be taken into account as an
08637	24	Dr. Hendron's testimony examines the effect if there
08638	3	factor of safety quoted in my testimony indicates the water - level
08638	4	was considered up to elevation +627. Computations were done for both the
08638	5	water level up where it was before any dewatering
08638	6	(elev. +627) and were done for the water level drawn down to below the failure surface considered in the
08638	13	MR. STEPTOE: That's correct. Mr. Paris
08639	3	end up with a different factor of safety. It's a little
08639	4	bit lower when the water level is up.
08639	11	accurately depicted the soil under the foundation, in the
08639	14	Figure 14 didn't relate to dewatering and no dewatering,
08640	23	operate under the dewatered condition, because the dewatering
08641	1	Now, the water level that I considered is clear up
08641	17	for the worst condition, even if that does happen, and
08641	20	above 2.00.
08642	5	until such time as the water reached 627 feet?
08642	11	your testimony that if the dewatering is perfectly working, the
08642	22	a bearing capacity failure involves. And then I said that the
08642	23	factor of safety of 1, that is when the footing really
08646	8	the dry density of those specimens, compared with the water
08647	11	down into cohesionless materials. We don't have a cohesive
08647	13	ing and the southside of the Turbine Generator Building. There was a hole
08647	14	advanced, and there was material bailed out of the bottom
08647	16	Material was bailed out of the bottom of the hole
08647	17	and this volume bailed out was replaced by material (saturated sand) running into
08647	19	up and out of the hole with the water being bailed out. It is something that can happen
08647	20	when you are advancing a hole in sand below the water table.
08648	17	are many other borings there that didn't encounter holes
08648	18	or voids. If one were to assume that in every case,

TR	Line	
08651	12	by the duct bank. And anytime I had ever heard of any boring
08651	13	encountering a void it was between the bottom of the footing
08652	1	that extended to all of the site wide soil placement and
08654	3	stratigraphy. And when I mentioned the stratigraphy
08654	6	And then, another boring and samples were taken right next
08654	7	to it to get the samples for tests. Those borings
08654	22	structure. If my memory does not fail me, the
08654	23	earlier borings numbered about 30.
08655	5	THE WITNESS: Also the plan view of the borings
08655	6	and test pits shwon in Figure B2, give you an idea of
08656	8	A If the soil is really cohesionless, a void would not
08657	5	the surface. If it is truly cohesionless, you cannot sustain
08657	6	a void at depth. It shows up at the surface in a little
08657	7	crater or a little subsidence bowl, which is why that one was
08657	8	so conspicuous.
08658	14	structure which is capable of bridging a void when it is
08660	12	A I think there is too much of a time correlation with
08660	13	the drilling of the hole and the development of the crater
08660	14	for it to be anything else --
08660	24	A To the extent you can be 100 percent sure of anything
08664	2	large shear displacements due to bearing loads which would
08664	3	disturb any structure. In the safety factor range we
08664	4	have, other structures would not be affected by bearing capacity considerations for the diesel generator building.
08664	8	A Not for the bearing capacity calculations because
08664	9	if you keep your factor safety high enough, those shear
08665	4	some question that the Staff had on Page 2-34 of SER about
08665	7	consistent with the measured settlements instead
08666	18	So if the mat is wider than the isolated footing
08666	19	the factor safety is higher with respect to bearing capacity
08667	2	say, Judge Bechhoefer, is comment that what Mr. Anderson
08667	3	or Dr. Anderson may have said, certainly is not in
08668	2	A Oh, yes. We considered the weight of the soil --
08669	13	dewatering as would be expected with the dewatering.
08670	9	MR. STEPTOE: I am not sure that the seismologist
08670	12	MR. STEPTOE: I have just one question to follow up with the
08670	18	THE WITNESS: As long as it is included it does not matter, but it
08671	6	were taken from the Corps of Engineer borings taken in the
08671	7	area of the diesel generator building. The data points
08671	16	consolidated tests along with anisotropically consolidated ones.

TR	Line	
08672	8	of the type of test more accurately represents the state of
08672	9	stress in the soil before the earthquake comes along. That is
08672	19	points that are in Figure 14, the points in Figure 13, and
08672	22	charge loading, there's enough safety there in the factors of
08672	24	Q So that you would say, assuming you used 2.37
08673	4	in all the assumptions that led up to those numbers.
08673	5	For those numbers, we have used a 4.86 kip per square foot
08673	6	load which we actually don't have. Our loads are lighter than
08673	7	that. Those numbers are also based on assuming that water level is
08673	8	at 627 when it is stipulated to be down between 600 to 595.
08673	9	All of those conservatisms are also in-
08673	17	have Dr. Hendron testify on seismic shakedown before Mr.
08674	5	have Dr. Hendron sponsor his seismic shakedown testimony.
08674	14	which has been prefiled on seismic shakedown in this
08676	14	evaluation of seismic shakedown at the diesel generator
08677	10	from the borings right in the immediate area of the diesel generator
08678	19	fill. And, in addition to that, those sands are deeper,
08681	7	north side of the building was lower than on the south side of
08682	1	and the shear stresses applied are higher as a ratio
08682	9	here.
08684	6	I'm not so sure it's fair to combine the DG numbers which
08684	18	shakedown settlements and some smaller ones. There's defi- nitely
08684	21	in computing means, standard deviations and so forth.
08685	8	sometime ago with regard to liquifaction and, how it is influenced by the
08685	9	magnitude of shear stress and the duration of shaking. As shaking goes on, you have a fall off of a
08685	10	peak shear stress or peak acceleration over a number of
08685	13	like a triaxial cyclic test where you're cycling a specimen under
08685	14	constant stress level and you found that you modeled the results quite well if
08686	16	density would then be higher.
08687	4	there's some shakedown due to the vibration of the Diesel
08687	5	generator motors, then you would not add that to what I
08687	14	THE WITNESS: It would be if we had curves,
08688	2	diesel engines are started up and read them in a con-
08689	14	depth which has been taken for the relative density in
08689	19	the effective stress at which the blow count was made from in
08689	22	in the calculations for that boring.

TR	Line	
08690	4	others where there was sand.
08691	12	words. Are the words partially saturated, which are seven
08691	18	table down due to dewatering so we would have the groundwater
08692	4	is the water that is held by the capillary forces.
08692	9	gives you another source of effective stress, and if you
08692	10	would attempt to take that into account the shakedown
08692	13	The test data which I used was for a dry
08694	6	this study as well.
08695	23	THE WITNESS: If you want to say that they're
08695	24	cohesionless sandy materials, to that extent they're the
08696	6	concerned. We've assumed the worst case as far as shake-
08697	16	THE WITNESS: In my judgment, it wouldn't because
08697	17	of the magnitude of the deformations we're talking about
08697	18	here, a quarter of an inch.
08697	19	DELETE
08698	9	I wouldn't expect any sharp gradients in the differentials.
08699	1	about here are not that high a strain from these tests
08699	21	THE WITNESS: No. No, I don't think a
08699	22	static surcharge will make a sand denser under a given
08699	24	JUDGE HARBOUR: But it does affect the clays?
08707	13	now. It should. So lengthen that arrow that designates
08709	18	Applicant's use of 1.5 times the FSAR response spectra
08710	9	not intended for the finding to apply to the borated water
08711	9	intended values in the testimony of Alan Boos and others
08716	15	sponsoring Sections 2.5.4.4.2 and 2.5.4.5.1.
08716	16	I should indicate that the first section, 2.5.4.4.2,
08717	25	using a .12g ground surface acceleration which
08718	9	seismic response test -- site specific response spectra
08718	11	whether it is adequate to site specific responses,
08719	4	admission of the Safety Evaluation Report, and it is
08719	10	end of that section which deals with how settlements are
08719	12	an open item in the Staff's view, and Applicant would not like to
08719	13	have it thought that we have waived any possible
08719	15	has nothing to do with bearing capacity.
08720	2	sumers Power have not reached agreement. It has nothing
08724	8	right time on cross-examination on bearing capacity.
08724	9	DELETE
08727	13	CHAIRMAN BECHHOEFER: I can not see how that is
08732	8	the part where you refer to Section 2.5.4.2, require
08733	5	All analyses that we check with respect to

TR	Line	
08735	7	MS. SINCLAIR: Do you know if bearing capacity
08735	14	not have a problem with bearing capacity at the diesel
08736	1	is not bearing capacity. It is settlement. We have other
08736	6	because that has nothing to do with bearing capacity
08736	13	answer so long as he doesn't get beyond the scope of bearing
08736	17	with respect to bearing capacity at the diesel generator
08736	19	respect to problems other than bearing capacity.
08739	3	A On page 2-44 of Supplement No. 2 in Section 2.5,
08742	7	plant starts operating, and it may be too late at that
08742	19	already made such a commitment, in our responses to our
08742	20	50.54(f) questions and NRC questions with respect to soil
08742	21	fill. So we will track that down and confirm that for you.

Consumers Power Company
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Tuesday, November 16, 1982

TR	Line	
08747	22	"Mr. Kane can answer the question if with 20-20
08747	24	been a better option in 1978" and they were
08747	25	referring to the diesel generator building.
98748	3	that must be addressed. When you are
08748	5	safety alone, it is my opinion that removal
98749	6	Palladino has severely criticized this approach of consider-
0875.	11	set out for the compaction of the fill in the first
08752	19	buildings on poorly compacted soil and that this would have
08753	21	CHAIRMAN BECHHOEFER: Those rate matters are not
08755	3	law is, but it's up to Michigan.
08755	18	testimony of Dr. Peck, that there
08755	25	do or should affect the NRC Staff's or the NRC's judgment
08759	14	vice date of the two reactors.
08766	1	inspectors, which is attendant to MPQAD taking over the
08769	15	hearings as soon as we can in the beginning of 1983, to use the
08774	21	decision, before we write an operating license instead.
08776	8	that the underpinning work is the pacing item. Now I
08777	12	that it has to getting this QC inspector
08777	24	work started and instead make an estimate of the
08778	6	date were still a valid one, we would have to compress
08785	11	stipulation than perhaps, the Diesel Generator Building
08787	11	with the information that was supplied to the Staff.
08797	10	composition of the soils. It accelerated consolidation,
08797	15	strength properties and their compressibility
08799	3	doing is the equivalent of what that is intended to do,
08804	10	little box and looking at bearing capacity in the iso-
08813	20	me to the I&E documents that recorded that information.
08814	15	bearing capacity conclusions.
08815	12	there are voids. On the supposition that there were voids...
08820	19	and to clear that obstruction it took a certain amount of time to
08828	9	being a concern but not being related to bearing capacity,
08836	12	reasonable and what's not reasonable. Where the heck is the
08836	13	plan of demarcation here on this thing?
08846	10	MR. MILLER: Well, with respect ot the service
08846	14	I am not yet in a position to say. I have to consider it, at
08859	1	Q And do you have any additions or corrections at this
08859	25	"Were 18" 1 and 2HCB-1 and -2.", insert
08871	9	such as a duct bank or something of that nature, and
08871	11	settlements with the general fill than occurred over the
08872	22	on the pipe, that's correct. We are measuring strain at these
08873	6	A We have proposed an operating plan -- technical
08873	12	Q But the FSAR reference that you just gave
08875	12	inspection was conducted on the borated water storage tank

TR	Line	
08877	13	a corrosion -- cathodic protection system.
08879	19	were observed, formed the path of lower resistance thus
08880	4	CHAIRMAN BECHHOEFER: Are those instructions
08880	8	they being followed?
08882	3	Q That was the basis for our confidence.
08882	7	A I cannot quantify it for you in linear footage.
08883	9	JUDGE HARBOUR: What is - before you went
08883	18	It acts in this context similar to the insulation on
08883	21	The stainless steel piping does not have
08884	15	fically addressed to the service water piping; the
08886	22	look at an integrated effects of the kind of things that
08889	6	respond to the knowledge of the questioner?
08890	22	is SCRE No. 12, you say?
08891	8	in the latest packet of information from Mr. Brunner,
08891	10	10th, that was included there as a final nonconformance
08891	11	report. I do not know whether that nonconformance
08891	12	report, in an incomplete form, had previously been sent to the
08892	14	example, it went in to Mr. Brunner, and Mr. Brunner
08903	6	coating and wrapping has a defect. And I'd like to ask you
08904	24	of the SCRE as reference a M&QS report, stainless steel
08912	10	standards for discharges to those kinds of waters. But
08912	11	I do not know the specific constituents of it.
08915	21	MR. MILLER: Judge Bechhoefer, lest it be
08916	8	ever been requested to address the overall issue of
08919	18	corrosion, did you take into effect or into your analysis,
08920	11	A I believe the cause of the corrosion was one
08922	10	dewatering levels will be below the elevation of the borated
08923	7	you end up with is the net effect, over a period of time,
08923	8	removal from the wall of the pipe.
08923	21	A No ma'am, not necessarily. The service water
08923	24	effect on the plant or its operation.
08925	24	Q Isn't there a procedure of using grinding
08926	10	basis of his prepared testimony. And in his capacity and
08926	11	the position he holds at Bechtel, he oversees that.
08926	24	probably go right to your main concerns that relates to
08929	21	were silica carbide and they are more expensive, a little
08929	23	Department chose not to use this silica carbide and
08933	20	at least four years to his knowledge.
08945	11	earlier, the general area of the fill settlement carrying
08945	15	fill, the shear zone to take place at the wall of the
08945	16	structure -- although whether it would be a discontinuous
08947	8	you just told me that it is factual but why is it
08947	15	to sink more than two and a half inches for its 40-year
08949	6	the back-hoeing process or settlement.
08950	8	it says this is for the pipe that's not being replaced.
08950	24	predicting that will sink? Is that back to the original
08951	4	flyash cement and the old fill, we consider

TR	Line	
08951	8	service water pump structure and the new fill condition
08951	12	So we have taken, at that interface between the
08951	18	you stated that strain gauges which you determined to be
08953	1	CHAIRMAN BECHHOEFER: On Page 14 there is a list of
08953	19	THE WITNESS: We are staking all the utility
08954	1	two types of fills by means of a material that goes
08954	13	compressibility of this material is such that the pipe
08956	15	Q Mr. Lewis, can you briefly explain your
08958	2	in the pipe leading that could conceivably be due to
08958	3	failure and loss of function of the pipe. Again, the
08965	3	that would not tend to float, if you will, with water
08965	4	levels if should rise. I would not expect to see any

Consumers Power Company
(Midland OM/OL)

Wednesday November 17, 1982

TR	Line	
08975	17	statement for S-3, and it seems -- I don't know how much
08977	10	NEPA. That statement is our order, so you have to focus
08977	21	conduct of these hearings so far deserve the Board's
08979	23	briefly, let me point out that Dr. Roger Staehle, an
08981	14	implications. The corrosion products can
08981	17	valves by gathering in the seat of valves.
08982	4	for consumers that ranges in the hundreds of
08982	5	millions of dollars."
08982	6	Unless t'ese kinds of issues are fully
08982	12	It was my nope that the discussion of
08982	19	I would hope this Board would allow
08982	24	plant in a realistic way.
08983	20	hundred-fold, and I would, on behalf of the company,
08985	11	put it in, whether it was Bechtel who put it in -- or a
08992	14	in camera. Maybe their identities could be protected that
08998	3	2.5.4.4.5.
08998	6	2. Also, Section 2.5.4.6.2, Section 2.5.4.7,
08998	14	change. It appears on Page 2-39. The second paragraph
08998	7	Section 2.5.4.8.
08999	19	resolve at the Tech Spec. time.
09001	4	of monitoring the pipes during -- underground piping, during
09001	21	settlement, strain and rattlespace of the underground
09002	3	I think the possibility of, after five years, of
09002	4	eliminating all settlement monitoring, is remote. But what I
09010	23	before the operating license is granted for this plant?
09012	12	intensified in the advanced stages of that review.
09031	9	excedence of the tech spec criteria be reported to the
09038	19	A (WITNESS KANE) Mr. Marshall, may I attempt to
09041	18	It is the Applicant's expectation that that pipe
09051	7	would settle along with the fill; and hence, there
09051	10	weight and all of this piping -- the piping and the duct
09054	25	soil settlement will be transformed to an equal torque
09055	19	A (WITNESS CHEN) Well the monitoring program is
09055	20	intended to pick up changes in longitudinal stress that is
09055	25	is no affect on the annulus clearance of the wall

TR	Line	
09058	4	the pipe leading to the valve pit. The correction is there is a
09060	21	dition where we would not be getting unacceptable settlements,
09062	7	the Borros Anchor which permitted us to view the amount of
09063	6	plots for the Borros anchors, and I think Mr. Lewis
09063	14	which will address the long term settlement time of the
09067	22	by the same Borros anchors that we have used to evaluate
09070	3	based on what I have seen of the Borros anchors and the
09071	2	pipe that's in the old fill and the pipe that's in the
09071	20	WITNESS CHEN: For the piping in the vicinity of
09073	25	think the Borros Anchors were installed and read.
09074	21	the point of time that the Borros Anchors were placed in
09074	24	inches of maximum settlement from when some Borros Anchors
09075	5	that you said, the Borros Anchors are already installed.
09076	9	measurements we get from the Borros anchors.
09077	4	crucial because our observance of the Borros anchors is
09078	14	Borros anchors and the behavior, it would not be a concern,
09084	22	washout, apparently, was much larger than what you are
09085	12	was put in for different soil settlement effects.
09086	11	affected by the settlement, and we feel we have
09088	2	is supported past the soft spot. I would say that it
09088	10	fill and we get to a point that indicates less than those
09088	12	that it is soft to where you'd have a problem.
09088	16	markers but that does not mean we think ther is bridging
09090	21	presents the subsurface information by the borings, if
09092	20	drain. What I want to know was what effect it will have
09093	25	due to frost heaving or to differential soil settlement
09085	3	proposed, do you have an opinion on whether the plan to
09098	3	inspector within 24 hours and he would be required to file a
09100	4	the proposed technical specifications.
09100	13	"If either the allowable strain average
09100	15	reached at a monitoring station, or 75 per-
09100	16	cent of the vertical settlement criteria is
09100	17	reached, a Special Report shall be prepared
09100	18	and submitted to the Commission pursuant to
09100	19	Technical Specification 16.6.9.2 containing
09100	20	an engineering evaluation of the situation and
09100	21	description of remedial actions. Initial
09100	22	notification shall be by telephone within 24
09100	23	hours and confirmed by telegraph, mailgram
09100	24	or facsimile transmission no later than

TR	Line	
09102	8	identified in Detail 1, Figure 2.11 of the SSER, page 2-37.
09102	9	The figure indicates that some of the lines were profiled,
09102	10	some have been rebedded, some have been verified, some are
09102	12	In addition, the rattle spaces that are going to
09102	18	diesel fuel lines inside the building were not in place
09104	6	are shown there. They are 8 inch 1HBC, 310 and 311
09104	9	five percent which is acceptable.
09104	13	will be 4 percent on ovality and .48 percent on strain.
09104	17	diesel generator building, the rattle spaces will be moni-
09104	20	1HBC 81 and 82, have been rebedded.
09105	2	The 8-inch, 2HBC, 310 and 311 lines will
09105	3	be rebedded and the 10-inch OHBC 27 and 28 lines
09108	22	Contention 4-C-f?
09111	2	capabilities for that line from the inside.
09112	5	direct testimony with respect to the other contentions,
09114	7	not required to be accounted for any of the code
09114	21	JUDGE HARBOUR: So it had free ends inside the
09115	12	Q listed pipes. There are some exceptions, but this is
09116	7	extends in the north-south direction directly north of
09116	8	8-inch 1HBC311.
09131	6	indicate the condensate lines were severed at the Turbine
09140	14	MS. LAUER: Judge Harbour, Mr. Paris should
09143	16	MS. STAMIRIS: Well, if it was determined, after
09148	7	Q I call your attention to Section 3.12.1
09149	1	"An independent check of the pipe wrapping
09149	9	anything, could have happened to these pipe wrappings.
09149	22	A Well, the service water and borated water from Borated water
09150	5	Dr. Weeks is here to testify on corrosion from the outside
09150	7	inside of the piping, extending outward. DELETE how does that
09150	8	DELETE LINE
09151	9	be liquid effluents from the Midland Plant, and it concerns
09151	10	some questioning about the piping carrying these corrosion
09152	4	A (WITNESS WEEKS) These are very small quantities.
09153	13	of radiation on corrosion processes unless the fluxes are
09153	24	cited them in my statement this morning. Dr. Roger Staehle,
09154	9	A (WITNESS WEEKS) I, without having Dr. Staehle's
09154	18	chemical plant or an oil plant, does become a matter of
09156	19	there's any leakage, could enter the radwaste system.
09157	11	an unstable phase. It is protected by a series of pro-
09157	23	in all the plants -- these get into the radwaste
09158	13	in this Table C-4, these corrosion and activation products,

TR	Line	
09161	11	A (WITNESS WEEKS) I would not say that you are. I was
09161	15	hydrogenions.
09161	16	From the point of view of hydrogen ions, both
09165	8	3-43. It talks about some pitting, and it says the utility
09166	20	Q In your last paragraph on Page 3-43, you talk
09167	18	zinc anodes that you talked about in your last paragraph.
09167	23	redundant, they would have the same effect. The zinc
09170	23	wires, not the galvanic protection --
09172	7	reports, and that's the later of the two that I reviewed,
09173	17	an analysis -- an analysis, reading from the abstract, was done at
09173	25	aggressive because of the extensive pitting -- highly
09175	8	and I believe it is on the first page of their SCRE 12,
09177	14	for the second sentence in Paragraph 1 of SCRE-12 that
09186	3	"Elevated chlorine concentration in por-
09187	3	affect the corrosion. When it reacts to form choride
09188	6	sodium hypochlorite form?
09180	11	added, if I read the footnote, as sodium hypochlorite.

Consumers Power Company
Midland OM/OL

Thursday, November 18, 1982

TR	Line	
09200	15	that issue, and to tell an uncounseled intervenor that we
09202	13	that we are deferring Contention 4 and therefore, Ms.
09202	16	going to issue a decision, a partial initial decision
09202	20	Mr. STEPTOE: There certainly has been no real restric-
09213	2	A (Continuing) "Coal tar saturated felt wrapping
09213	9	to the stainless steel piping in that area were heavily
09213	13	be conducive for, I guess I would claim, adequate cathodic
09220	6	a man with me here who is the site galvanic protection
09222	18	A I'm employed by Consumers Power Midland Plant
09223	25	tank farm area.
09224	1	Q That is near the borated water storage tank?
09226	22	coke breeze.
09227	2	THE WITNESS: Coke breeze is a by-product of
09236	2	not working are for reasons that are very obvious, that the
09236	3	anode lead has been disconnected, cut, because of digging
09237	17	She is asking him about the process, about the design process
09242	15	A Installation, I do not do that construction.
09251	24	that system off. So I am cognizant, or I am aware
09256	6	already in place with this coke breeze? Or are you
09256	8	they are and just having coke breeze for the new anodes
09256	17	know, replacing the anodes in coke breeze. If they had
09257	10	it, were the reason that you are going to coke breeze
09257	24	making a change to coke breeze, my next question was --
09259	17	breeze than with concrete?
09259	23	the witness's answer was that the coke breeze would pro-
09282	24	next to stainless steel pipe is just going off down a
09282	25	side road, which is not important. And we have had
09296	1	They looked into the boxes this morning, and the
09298	11	I guess I will be a part spokesman here -- is that we
09299	6	necessarily.
09299	8	things -- we see these items that are non-Q systems that
09301	4	Scott Woodby referred to, doing the job.
09302	7	what I would call an IR dropor voltage drop in the
09302	16	to have a significant effect on the performance of the
09303	12	cinder from burning coal. So it is like cinder ash.
09308	21	WITNESS COOK: Sure. A dark colored cylinder. It
09309	1	WITNESS COOK: Let's see, this paper is about eight and a half
09310	5	but they are not part of the cathodic system. It will
09310	12	fourteen and a half percent silicon cast iron.
09321	14	the defense in depth system that we have talked about
09321	18	in depth system, including the wrapping and so
09324	5	should you not place more emphasis on the worst possible
09324	8	MR. STEPTOE: Objection.
09324	21	condition exists at the present time.

TR	Line	
09325	4	make the pipe more cathodic, no. The current would have
09326	14	MR. STEPTOE: The cause of what, sir? The cause of
09326	20	WITNESS WEEKS: Well, if we are back into speculation
09326	21	again, sir, I have three thoughts that come to
09338	8	I did not make an attempt to look at every lug.
09343	16	environment and preventing its oxidation.
09366	14	all it says in the report. I am looking in the 1981
09373	8	to find out why the galvanic protection system affecting a
09377	20	the SCRE-12, which is Staff Exhibit 15 a project
09379	4	which is consistent with the second sentence in 3.12 which
09379	17	more -- what I am trying to drive at is what additionals
09393	25	phrase, "Bechtel Quality Control Inspectors",
09394	1	DELETE
09394	2	I am informed by my client, the people
09394	5	were not in the quality control department.
09395	10	ing in practice at the site at the present time -- or the
09397	11	MR. STEPTOE: We're looking into Ms. Stamiris' question
09398	1	for the service water pump structure as for the Harbour
09398	4	I would ask the service water pump structure panel
09398	14	MR. WILCOVE: Judge Bechhoefer, you just asked
09398	25	Dr. Harbour expressed the concern that, "We would like to
09399	2	be reliable as well as accurate. Large data gaps should
09399	4	with sand."
09400	20	These are extensometers which are a variation
09400	21	of LVDT which are installed on our walls to measure
09400	23	and I believe that is about all. We also have thermocouples
09401	10	extensometers as being five feet long, and they are
09401	16	using is actually state of the art. It is the best
09401	17	possible LVDT that can be bought for the project. We are
09402	2	tation collected?
09402	4	by the computer. The computer is automatically set
09402	5	to scan every hour, at which time it will
09402	6	run through the complete cycle of the electronic
09402	17	Q And this printout information goes to whom
09403	7	dures, procedure OP-40, which is obtaining, reducing and
09404	14	scans on the dial gauge reading until the system was back
09406	7	take the form of jacking additional loads into the piers
09406	8	and underpinning that has been installed to date.
09406	10	possible to jack additional loading into the piers?
09406	14	soil and the piers themselves to carry this load.
09406	16	capacity much beyond their rated limit.
09406	18	penetration area will be supported first by the grillage
09406	20	tip of the electrical penetration area and this grillage
09406	21	system which is supported on tiers and columns has been
09406	22	designed for a capacity of some 4,000 kips load.
09407	3	in a place where you did not have a pier to arrest the

TR	Line	
09407	6	sort might be required is in the mining of the tunnel
09409	6	this goes to their resident structural engineer who as
09409	7	defined specification C-200 has a trigger, if you will, for
09409	11	In the unlikelihood of a substantial movement defined
09409	15	correct the condition and there are provisions for follow-up
09410	2	Q In the more likely event that the movement is
09410	5	answer your question because it depends where one is
09410	13	limit, then this is highlighted and there are provisions,
09410	17	designers backed by the consultants to develop a plan of
09410	19	Q Mr. Boos, we have had some discussion about
09411	2	and a requalifying level which the witness referred to.
09412	17	of increased jacking force, could be instituted. The
09413	6	building for the construction condition and seek to determine
09413	7	in terms of deflections, what is the tolerable
09413	9	We calculate that and show it to the NRC for them
09413	13	Most of the time, we take half of that for the alert
09413	15	a very conservative analysis of -- the ability of a structure. So in
09413	16	reality, the structure can tolerate a lot more than what
09413	18	limits -- we do review them before we put out the criteria
09413	21	alert and action limits for deflections.
09414	1	critical locations in the building, using extensometers
09414	2	Once we have these measurements, we have our
09414	3	lengths. So with those, we get the strains. So the same
09414	10	physical meaning like, for example, we would settle for
09414	11	two-thirds of the yield strain for action limits
09414	13	remains as alert limit.
09417	2	set of figures. If it is okay, I am going --
09419	7	move toward each other, which is the worst possible
09419	14	FSAR SSE, or the 1.5 times the FSAR/SSE?
09419	17	structure for the larger earthquake whether there
09419	21	earthquake for this project, and if that is the case, the
09419	23	the reason being the Turbine Building is so flexible that at
09419	24	that frequency level, FSAR/SSE and site specific SSE our
09420	5	same reason. It is in such a frequency range that it isn't
09420	18	chipped back if it were necessary to provide additional
09420	25	on the figures at 659. I have two inches clearance between
09422	25	direction. So that we do have coverage of the building
09423	11	covering the entire plan dimension of the building.
09423	16	Applicant's Exhibit No. 27, the five pages of drawings, the
09424	10	numbers which appear in these tables and the SSER.
09424	21	is a difference, slowly so that we can all keep pace with
09426	10	Maybe this is the right time. I can point out why
09426	14	that time we hadn't finished the Turbine Building
09426	15	analysis, so the numbers given in the sketches are
09427	4	That would correspond to the sketches 2, 3
09428	4	-- is it a correct and accurate representation of what it

Consumers Power Company
Midland OM/OL

Friday, November 19, 1982

TR	Line	
09433	13	of the Staff's service water pump structure witnesses.
09435	4	Could welding at more distant locations have
09436	3	recommended inspection has been performed and we have
09439	18	to 5 of SCRE-12, is the statement that, since the failure
09444	19	was identified in the 1979 report that was separate from
09444	23	A Possibly not. Could you indicate what's the surface
09449	22	assume it could be the worst cause instead of the more
09459	17	leading anywhere, were not contributing to the record,
09469	24	steel pipe a green deposit was reported.
09470	17	a green deposit was reported.
09471	1	deposit, or the green deposit, which I attribute to
09473	19	A In conjunction with the failure analysis?
09477	6	structure testimony.
09479	25	determined to meet, the criteria for the construction
09481	1	MS. WEST: It is now one total paragraph, the
09482	9	"Base slab at -- and we add the word
09482	10	"Elevation 620 feet, 0 inches".
09482	12	have load combinations, the fourth one from the top, there
09483	10	co-sponsoring Sections 4.7, 4.7.1, 4.7.2, 4.7.3 and 4.7.4
09484	7	"one-half".
09485	16	word "seated".
09486	9	"Six deep seated benchmarks will be
09486	14	the south corners".
09488	13	A (WITNESS GOULD) Section 8.
09488	19	"O", which represents a blow count should be corrected to a number "40".
09489	8	table, the last line on the table, the units under "Coefficients of
09489	9	Consolidation" should read "centimeters squared,"
09491	2	Q Dr. Shunmugavel, I would like to direct your
09491	4	gives the acceptance criteria for the relative vertical dis-
09491	15	Q Do you have a comment on the conservatism of
09491	17	A (WITNESS SHUNMUGAVEL) Yes, I do. I do believe
09492	2	tion to the changes you made in the strain monitoring
09492	12	action level corresponds to two-thirds of yield strength
09492	16	Q Dr. Shunmugavel, if you do perform the calculations
09493	10	confirmed those areas to meet ACI 349.
09493	17	elements for various load combinations and points out to them
09493	23	due to the latter type of manual analysis which showed these changes.
09494	3	Q I'd now like to direct your attention to Figure SWP-13 in Volume 2 of your testimony.

TR	Line	
09495	11	designed for actual load, shear and moment. These loads do
09497	4	Q Are these the results of the latest structural
09497	6	A (WITNESS SHUNMUGAVEL) Yes. Unfortunately, the
09497	18	structure of one inch. By this number, we need a
09500	13	vice water pump structure or the circulating water intake
09501	25	What I'm referring to is basically the base slab--
09502	19	water intake structure is intended to be founded
09505	6	involved with the preparation of the FSAR so in terms of
09507	5	It seems irrelevant to me to whether the remedial
09515	5	OK. It may be answered.
09516	16	tendons are installed near the roof level of the building
09517	8	Figure SWP-14. They are anchored on the north end and
09519	18	.3 inches. That is far below the gap we have.
09519	19	Since they are not close anywhere to the actual
09521	8	doing any analysis like the one you have talked about for
09521	9	circulating water intake structure.
09527	11	with this fill that we're talking about that's
09527	17	connected to the underpinning or soil remedial measures.
09530	5	about the service water pump structure.
09530	21	that the crack patterns as well as the drifts exhibited
09531	8	has questions on the effect of the dewatering of the service
09533	16	a rather small or rather gentle, fairly uniform effect, if
09533	22	a perturbation, that it would be in the northerly
09535	4	July audit numbers, one of them was smaller and another one
09537	12	you will recognize that the deeper portion was founded in what
09537	18	shading here to try to differentiate to show you the
09538	6	so that generally, at least several feet exist here between
09538	8	the slope. Without going back to construction photos, it
09538	9	is hard to quantify, but it would be somewhere perhaps in
09540	16	MS. WEST: Mr. Boos, are these drawings you have
09540	17	made on the face of your copy of figure SWP-3?
09540	19	MS. WEST: Is it an adequate representation of the
09541	25	discuss surveying of the settlement markers. What type
09542	18	"read" finer than that, but the accuracy -- he has confidence
09543	6	MR. WILCOVE: Sequence, I'm sorry, the orders
09544	6	DELETE
09545	6	concrete placement was to give people an idea of the
09545	17	that will be constructed at El-585? Whoever can answer
09545	21	of removing shallow pockets of alluvial sand in order
09545	25	bracing of the excavation with sheeting, should the
09546	9	alluvial sand is encountered at that level -- a probe
09546	13	to extend below the adjacent pier, than sheet piling
09546	14	will be -- lightweight sheet piling adjacent to the
09548	14	Q Is it also .03 inches for the service water pump structure?

TR	Line	
09549	9	this full amount be applied to the bearing strata?
09550	4	a duct or other utility which precludes the placing of this
09550	5	extensometer in an overlap position, we may not do that
09550	8	Dr. Shunmugavel just said, that the intent is that they
09551	16	here would be gradual, as opposed to sudden, because of the
09553	14	as to the need for driving these fore poles ahead of the
09553	23	is being approached, as opposed to it actually being reached
09565	13	MR. WILCOVE: I have one more question, not
09566	16	see how that pier is jutted out the left, and that's the
09567	12	talked in terms of the structural or the geotechnical
09567	13	resident engineer, for instance. Are the field
09567	25	MR. WILCOVE: Thank you. Now I definitely
09568	15	in the FSAR were designed to a safe shutdown earthquake
09569	1	add to it, which is underpinning walls and the connectors,
09572	9	displacement numbers for the service water --
09577	6	A (WITNESS SHUNMUGAVEL) Let me answer that. If we
09577	13	being a light structure at low frequency it doesn't respond
09577	19	Q Is the difference between .5 and 1" sufficiently
09578	6	659 and the effect that the site specific earthquake would
09578	18	A (WITNESS SHUNMUGAVEL) That would be true for
09579	9	I said, no, because I need a clearance of .9 inches and
09581	8	A (WITNESS SHUNMUGAVEL) It so appeared, it did not
09581	20	For the Turbine Building along the north-south
09582	8	which is at or above ground level, that number is .4.
09582	17	Ms. West: No Redirect
09584	11	events or -- unplanned events I think is what the word
09585	4	That probably would absolutely have no effect on the ver-
09586	6	the resident structural engineer, depending where we
09586	11	So, again, I'm not trying to be uncooperative,
09586	14	to that degree that we have been able to -- in setting down
09586	15	an intensive meeting between all the parties involved,
09587	18	the alert and action limit, that within 24 hours -- it
09587	22	work with the consultant, to give us a second tier, if
09587	23	you will, of action
09588	1	But the overtier, the conservatism that we
09588	5	more knowledge, like Mr. Burke or Mr. Gould, like having
09591	18	description of increasing the jacking forces is
09591	21	aggressive movement of data, to attempt to arrest a movement.
09592	18	when you merely reach an alert level. But, I must say,
09592	24	and we, meaning the site manager's office, will notify the
09593	14	JOHN MATRA
09593	15	JOSEPH KANE
09593	16	FRANK RINALDI

TR	Line	
09596	7	this, and that would be Section 3.7. 3.8.3, 3.8.3.2,
09598	8	water pump structure, in the second line it says "and
09598	9	LVDTS."
09598	12	read "11 to 20 feet long."
09601	7	spelling, misspelled buoyancy force. Reverse the "o" and
09602	4	item with "for the initial jacking loads". The start of
09602	5	that Item No. 1 instead of beginning with "the pier will
09602	6	be lowered", make a lower case "p" on there and insert
09604	13	paragraph before the subtitle Dowels and Rock Anchor.
09605	5	SSER do you wish to sponsor?
09608	20	Q Sketch No. 2 -- that the gratings which jut out
09608	25	situation is that the grating is not a structural member.
09609	6	affect the structure. It would only damage the grating.
09609	7	QAnd that grating is made out of concrete?
09609	9	Q What is that grating made out of?
09609	22	a slight resistance; nothing to be concerned about. I
09609	25	grating.
09610	3	grating would give way if they do come in contact so as
09610	7	effect on the grating.
09610	12	type of component that the grating is. And the review
09610	13	would determine that the grating is not part of a
09611	10	if you were taking the gratings into account that there
09611	16	grating is not a structural member that would control
09614	19	Now, that grating will do nothing but absorb
09615	11	I mean, if that grating material was a very, very strong
09616	3	material those gratings are made of to be certain that
09616	20	the feet, which is a massive reinforced concrete structure,
09617	1	crush the box. In this case you will crush the grating
09618	2	JUDGE HARBOUR: That the grating has small
09619	23	any damage on the grating.
09619	24	The more the damage of the grating occurs in
09620	8	standard review plan, for example, is to satisfy that
09620	17	the integrity of the gratings during this situation.
09620	20	dimensions of those gratings?
09621	3	it be a relatively simple thing to look at those gratings
09621	23	walked on those gratings, I know those things
09621	25	would readily collapse. That's the word I used yesterday
09623	11	this, from the top to the bottom is inch and a half,
09625	6	us relative to the service water pump structure.
09630	21	Q At page 2-50 of the second supplement to the
09631	13	WITNESS POULOS: It is on page 2-50, strain and concrete.
09623	3	JUDGE HARBOUR: With a given page 2-50 --
09634	3	on these 0007 and 0014 values.
09634	14	in agreement on the new limits, .0007 and .0014 inc. per

Consumers Power Co.
(Midland OM/OL)

Saturday, November 20, 1982

TR	Line	
09646	22	Dr. Staehle which was the basis of some of the information
09650	3	I would make was that I am not sure that I followed Ms.
09650	23	this is through a motion to reopen the record,
09650	24	with the article to which Ms. Sinclair refers attached to
09651	2	if she found a corrosion expert who had some new important
09651	5	I would like to add, Ms. Stamiris, that I believe
09651	6	we have filed discovery requests of Ms. Stamiris which
09651	11	Ms. Sinclair did say to me after yesterday's -- or the
09652	3	to listening to that witness.
09656	7	Defense Council decision overrule the U.S. District
09654	23	flouting of the law of the land and the
09659	3	operative methods for the permanent
09678	1	to the environmental effect of the uranium fuel cycle in
09682	22	there has been no showing that it will not do so.
09686	9	the stand, I expect to talk about the Warren contentions on
09686	10	Monday and Tuesday. We have now presented evidence on
09686	12	should be entertaining those contentions, at this
09686	13	point, in light of recent precedent. I don't want to
09688	3	contention 4Cb
09690	10	A (WITNESS KANE) The fix for the service water
09690	16	the same elevation on the till.
09691	6	ferent soil settlements for that underpinning service water
09692	10	stability and the settlement of these retaining walls. The
09692	11	settlements that have occurred for the Category I wall have
09692	12	been small. The explorations that have been completed in
09692	16	with respect to the service water pump structure was not
09692	17	part of the soils settlement problem, because the settlements
09696	2	and shear in controlling locations which showed that the
09696	3	moment and shear at the chosen location were determined to be
09696	15	specific response spectra and remain acceptable for a
09700	1	matters covered yesterday such as grating or not. I think
09700	5	questions on the grating situation, and the other
09701	1	site specific response spectra for the underpinning
09705	18	designs, the two spectra designs. Is that correct, Mrs.
09709	1	the site specific response spectrum is going to be applied
09709	12	All Category I structures at the site.
09709	20	were a lot of wells located at the service water pump
09716	3	mation which is being developed by Structural Mechanics
09716	4	Associates, which is a consultant to Consumers, which shows
09716	9	spectra envelope is over the site specific spectra,
09717	4	frequency for one hertz and ten hertz, the 1.5 FSAR envelopes.

TR	Line	
09719	2	are needed for safe shutdown of the plant and those
09721	6	either that the fill has not settled significantly or that
09721	8	not follow the fill settlement.
09721	24	ment in the analysis for the forty year life operation.
09723	23	fill soils?
09723	25	founded on the glacial till and a portion which is founded
09724	3	not part of the overall soil settlement review because if
09724	4	settlement was small and because no l ose sands had been
09724	8	Q Mr. Kane, the fact that its settlement is small,
09724	10	settlement in the future or a potential for a cantilever
09724	15	we would not expect it to show settlement, significant
09724	16	settlement.
09726	7	MR. STEPTOE: -- or about the wall or is this
09731	16	competent glacial till.
09732	18	underpinning wall, which is now going to provide the
09737	10	the two walls. They are close together; am I correct?
09743	1	tables as well as for the boring figures, L-6 through L-9,
09743	18	A These figures show the location in plan view
09746	5	A Yes. Some additional borings, those required
09747	3	looked at, in how many borings are evidenced the sand
09747	8	isolated pockets or isolated cases?
09747	12	to the buried diesel fuel oil tanks?
09749	6	two parameters of seismic input, and they involve the
09749	9	Q Can you state what parameters were used in each
09749	12	of .19G and an earthquake magnitude of 6.0. Earthquake
09749	21	response is the 5.0 to 5.3, using 6.0, is conservative
09750	2	mean to say .19G rather than .1
09750	3	A I thought I said .19, yes.
09750	10	cycles of significant stress reversal, and the 5.0 to 5.3
09750	18	taking six cycles of an average cyclic stress ratio not
09751	10	for -- the site earthquake record providing the .19G.
09751	20	In this equation, we compute average express
09752	16	THE WITNESS: Cyclic shearing stress ratio.
09752	17	JUDGE HARBOUR: Was the same cyclic shearing
09753	11	A Absolutely; it could not be correct if that data
09764	19	listed to hundredths of a foot. East 524.39.

Consumers Power Company
(Midland OM/OL)

Monday, November 22, 1982

TR	Line	
09783	24	give you the pages. Page 2-35 and Page 2-42. The one most09786 10 be pipe?
09787	1	to do more with the actual installation of the walls. But
09787	3	a hydrological consideration.
09787	10	cate on page 2-4 is the input of the hydrologic engineer-
09787	11	ing engineer, 2-4.
09795	1	But if I were to have a loose layer strategically
09795	6	Q Do you know of any foundations of safety
09797	22	site specific response spectrum earthquake or could it
09798	4	Q Excuse me. Earthquakes that exceed the --
09799	18	continuous, that's significant?
09799	24	it has to move the soil around it, and unless it were also
09800	25	steepest gradient is going to be vertical seepage. In
09801	6	start to develop a mound where the gradient from the pipe
09801	7	break which would be vertical unless we had a clay layer that
09805	5	recognizing that is the design condition we are
09806	17	difference from penetrating a conduit; therefore,
09814	5	the water down will remove pore water and will lower the
09816	12	A Dewatering does cause the effect of buoyancy
09820	24	"Total settlements based on the adopted
09821	3	Units 1 and 2, respectively.
09821	4	"These estimated settlements include a supple-
09823	5	safety related structures that is being analysed in the seismic
09826	11	are, the basis of judgment, that's . . . the input into the
09827	11	very impervious and we have indications that it is under
09830	3	added to the cooling pond as a result of the emptying of the
09831	1	It is felt both those water tables are a reflection
09831	4	the impervious clay layer, which, when you get to the sand,
09831	6	seepage and it has a higher pressure than the clay.
09831	16	you will find that there is a discussion of the decay heat removal
09831	19	at that point, you bring on the decay heat removal system to com-
09832	10	would take 36 hours total to get the plant to cold shutdown.
09834	7	cool, what we call the core cooling system.
09835	11	pond and associated ground water in the plantfill area?
09835	13	refer to it as the aquifer or the upper ground water
09836	10	Q So at the present time, you know of no
09837	8	water move up from the lower zone into the upper ground
09837	12	pressure is higher in the lower ground water system.
09844	11	would both be influenced by the same source.

TR	Line	
09846	19	made an attempt to put a cut-off wall in you have also
09847	1	is, but I am aware of your objective of installing those
09866	5	on-site power simultaneously, and we are viewing the
09866	12	it apparently was abandoned. We did so based on the Board
09866	13	notification that we received from the Staff and the Appli-
09866	16	MS. STAMIRIS: Was that basis 3 still of Conten-
09866	21	Building. In this basis as well as in some of the other
09868	15	in its responses to interrogatories which may be linked
09869	21	CHAIRMAN BECHHOEFER: They are all bases.
09872	8	Miss Sinclair's contentions and Miss Stamiris' contentions,
09879	2	which include the resources that the company is prepared
09880	10	is an optimistic schedule to take five or maybe six days
09882	6	is going to take six months or six years, we are convinced that
09882	24	has supplied to Consumers Power Company their own estimates,
09883	3	to use before March 1st; that in fact, they do have those
09885	10	needs to know so that the Staff may pace its review.
09885	15	I think the Applicants have given the
09886	11	just dealing in the realm of the hypothetical completely at
09890	9	Comanche Peak case, dealing with the Board's sua sponte
09890	12	believe that virtually all of the substantive matters
09891	5	presentation, and perhaps more importantly for all the
09893	10	the cooling pond under the fill soils and the power block
09895	16	title -- but the Applicants have a motion with respect
09896	15	MR. MILLER: There was a request to admit.
09898	24	the word "submersible" is spelled wrong.
09901	20	on an analytical model, while this Staff had preferred a
09901	21	full rechange test to verify those numbers, and which we
09901	25	for recharge time.
09902	3	requiring. We knew that the more recharge time we had
09902	20	in order to maintain the water level in those two critical
09904	7	Ann Arbor office in June of 1979 and became involved with the
09912	1	less frequent basis than what we would have liked to have
09913	5	A I'm referring to FSAR Figure 2-457, which is a
09914	5	sand that we're pumping from is thicker. That's one of the
09916	7	the plant site, primarily, along the flood plain of the river
09916	17	are in the FSAR or the referenced document.
09916	18	Q In Section 2.4 someplace?
09917	5	data and the degree of hydaulic matching between the
09917	7	size analysis of the lacustrine sand, would I be correct
09918	3	Q Is there a total of three or how many are there?
09921	5	the impervious clay liner should be put in, in the bottom
09922	18	with the DNR Fish study. I am wondering if you have
09922	23	As a matter of fact, when they lowered the pond, I

TR	Line	
09923	11	and you hope it is doing its job versus an active one which
09923	15	an effective fix without internal observation
09923	16	similar to what we have now. We would have probably close moni-
09923	24	So you still have to rely probably on a series
09924	1	to maintain the site dewatering conditions.
09924	9	a pond liner or something fails, it is almost too late when
09924	11	with monitoring the operation of an active system, you go
09924	12	through the failure and you know what you can do about it.
09925	7	it totally impervious?
09928	3	with deep aquifer?
09930	1	and, I'm not so much interested in that, but its objective is
09930	9	confines of the power block area. Once you got the
09930	15	find its way to the ground, ground water by gravity,
09932	13	one or two of them would probably see it at some
09932	17	level radioactive water in a pipe from the Rad Waste
09935	5	reasons why we selected PVC or plastic well casing for the
09937	2	the testimony regarding the Langelier and Ryzener
09937	9	A Actually, I referenced those two indices on
09937	1[illegible]	FSAR in which this is discussed, so it may not have been as
09937	16	nonmechanistic failures of various piping, what would
09939	15	that was required for maintaining the liquefaction
09940	14	have a liquefaction of potential course. That is the
09940	18	THE WITNESS: It was right under the valve pit.
09941	3	reason we didn't sense the failure, most certainly, one of the
09942	20	so I don't know if it has been subjected to any settlement
09943	2	not the same as clay till?
09944	8	entire condensate tank would be emptied beneath the Diesel
09944	24	Building, you would still be below the liquefaction level.
09945	2	JUDGE HARBOUR: That's given on Page 34 of your
09945	20	quality monitoring program?
09947	2	waters and the sands, where as the hydraulic connection is
09949	11	a concrete box, it is flanged to allow discharge without
09950	1	A But those walls are designed to be retaining
09950	2	They are a whole line of walls to allow water to pass
09955	5	A Considering that no dewatering had been done since
09955	10	of the recharge test as taking place from February 1982
09956	1	pumps back on when the recharge test was over at the end
09961	23	fact that water levels did not rise, not only in that area
09961	25	side of the dike within the plant area -- had recharge
09962	1	been moving through there, that would have shown up in the
09963	1	after the liquefaction problem was found it was
09964	13	system in the fill, it was decided that the system was
09966	4	raises a ball of some sort, which is raised up and starts the
09966	13	hose or something, and that water which rises comes out
09968	4	A I am aware that pumps can have corrosion, sure.
09968	24	lated from the cooling pond if necessary?
09969	2	inch diameter drains that can be actuated to eliminate all
09970	9	Q It's the question 49, did you say?
09970	19	though there is another tech spec.

TR	Line	
09972	11	regardless of the dewatering system, the tech spec on the
09973	21	Q Well for 100 is just as good or better.
09978	1	flow to the system's catch basin, and I was just wondering
09978	7	Q I see, so you do not anticipate a catch basin --?
09979	9	sets of replacement parts in view of the fact that there is
09980	4	to round up the parts if you had to. It takes one to four days,
09980	14	Bechhoefer, he asked about a line break that occurred during
09980	22	bay for the deep seated benchmark. I think that is what
09981	10	had been installed by Woodward - Clyde. That was all installed.
09981	17	it took additional days to shut it off?
09981	20	thought that there was a period of time where everyone was
09984	7	Q Do you believe that it threw off the overall
09984	24	Q When I asked you whether or not it threw off --

Consumers Power Company
Midland OM/OL

Tuesday, November 23, 1982

TR	Line	
09995	17	from the Four Corners area or from Massachusetts or Dresden
09995	20	studies of Cooling ponds in Arizona and New Mexico or cli-
09996	10	concern with the responses that we were receiving was that it
09996	13	on Western data in preparing this thermal performance study
09996	17	litigated at the construction permit stage, and Mr. Marshall
09998	16	other places. Mine was this place, and no other.
10004	9	letter A. According to National Convention that letter A
10004	15	The specifications allowed the use of either
10004	2[illegible]	no evidence that the wrong grinding wheels have been used
10005	7	cause corrosion in the welds.
10005	10	mation that Ms. Sinclair has given us.
10005	21	used in that procurement system to make sure that the right
10006	9	nitrogen line which was one of the lines mentioned in SCRE-12
10006	16	Building. There is a header at that point and certain valves
10006	17	and at that location, where it is above ground in the Auxilia[illegible]
10007	4	detail if you need it on the function of the line.
10007	10	were this nitrogen line and the thiosulphate line, both of
10007	12	Now I did not investigate the report to see
10007	15	lines mentioned in SCRE-12 and I did not review either the 1979
10007	22	the galvanic protection system. That requires a listing that
10009	7	protected by the galvanic protection system or direct me to
10012	17	On Page 2-28 of the SER, there is a minor
10012	25	I think to better provide an explanation of
10024	1	The indication that was received from Consumers was
10037	5	MR. BRUNNER: I do not understand that Mr. Paris made
10038	19	about 598. The dewatering system is only going to lower
10039	8	knowledge of the way a well influences drawdown levels, areas
10039	12	pond.
10039	15	September 22nd, 1982 Saginaw News and Midland News
10039	16	regarding the problem with a drop in the water table in the
10039	22	cause a greater decrease some other place?
10040	25	Freeland which caused the wells to go dry there, and the
10042	18	dewatering which would be one of the OL contentions. I wonde[illegible]
10044	14	radiological activity in the water or due to chemicals that
10046	6	an effect on the lower acquifers some place on-site?
10046	11	to the area east of the plant through some exposed--Morrain,
10046	12	Morrain being cobbles and rocks and soil that
10049	13	between the permanent dewatering wells.
10050	11	the areas where they're pumping ground water -- and that's
10052	17	CHAIRMAN BECHHOEFER: Does it envelope --
10053	9	You will find curves of flow rate versus time for
10057	23	standing in the access shaft at the easterly unit in May
10065	24	ground water analysis tended towards an incrustation problem.
10066	5	there was any tendency at all it was towards incrustation
10066	7	affirmatively that there was an incrustation problem.
10073	8	east towards the plant fill, that that seepage would be
10073	9	intercepted by the relocated Bullock creek channel and come

TR	Line	
10074	2	some brine solution or something to that effect.
10074	7	effect, in general this is what it is, but for the most
10074	17	together with an explanation of why they are or are not
10076	10	the question, we believe it should be answered or we would
10079	6	the safe operation of the permanent dewatering system.
10080	25	were addressed in a certain section of the DES or FES?
10081	15	purpose for which we asked the question which you earlier
10089	1	confining layer, I don's see, based on the
10090	2	by a company called Canone (phonetic).
10094	6	I was aware that Canone was the initial contractor for the
10095	5	A (WITNESS HOOD) My understanding was that Canone
10096	13	contention of yours that's acceptable, and that I thought had
10105	18	was compacted by Canone, were you referring to the plant
10106	1	understanding is Canone was involved with both.
10106	24	My understanding that Canone was involved with both is
10113	14	there could be minor overtopping of the dikes; however, that
10115	2	Above elevation 614 the grass, as long as it's
10115	18	tention 4-D-3 and let me ask you to state your understanding
10118	23	The third item is failure of the pumping
10122	21	the cooling pond side. I am not aware of -- that it has
10122	22	been moved on the river side.
10124	10	the witness to clarify? I heard him say riprap moved.
10125	21	A I think in this instance, the design of the
10125	24	know for sure that that is the size rock that was used there,
10127	12	portion that was not protected by the backfill dike.
10127	14	riprap. It just kind of slid down on the slope of the
10136	3	CHAIRMAN BECHHOEFER: I would just as soon save
10136	6	MS. STAMIRIS: What I want to raise was a
10137	14	included in the nonconformance reports that we are already
10138	5	MR. BRUNNER: A duct is conduit.
10140	10	nonconformances, covers our obligation to keep the Board
10140	14	the required quality assurance program, I don't believe
10140	18	nonconformances, per se, although they may show information
10141	14	assurance documents created by MPQAD, this information
10141	15	that is being requested here could at best be cumulative
10144	11	charts show numbers of nonconformances. It would be

Consumers Power Company
Midland OM/OL

Monday, December 6, 1982

TR	Line	
10158	10	the Board or Mr. Paton is aware of when this SALP period
10158	12	going to have on that because, as we remember, the SALP
10158	17	six-month extension of the SALP period to a year and a half,
10158	22	Now if we are holding off on SALP to get the new
10158	25	doesn't mean that we should forget about that SALP period
10159	3	SALP report is going to come out and how he thinks that
10160	9	MS. STAMIRIS: Well I don't think this SALP
10160	20	presume the SALP period must have ended June 30, 1982.
10164	20	the most -- yet to be published inspection report.
10165	17	are attempting or assuming that of course we will hear
10184	14	enlightening but not necessarily be responsive to Ms.
10184	12	Dr. Peck's expertise in -- let's face it, Ms. Stamiris is
10185	21	used for making the observations of course have been deve-
10187	19	to know that settlements had occurred and appeared to be
10188	7	installed would be located in materials in which a response
10188	12	conclusions easier?
10193	8	MR. MILLER: He so testified.
10196	5	624 to 627.
10196	19	A The other reason was to have below water
10196	20	level as much of the plant fill beneath the building as
10196	23	A The effect of the surcharge on the submerged
10200	22	answer that if he knows. Briefly, are we being presented
10202	14	what the reasons for the deep borros anchors were in terms
10212	2	Q Would you consider those instruments?
10215	13	were read by optical levels in which the scatter was in
10222	6	of the dissipation of pore water pressure, that that type
10222	14	water in pores. I will ask it in clayey materials.
10222	16	gradual. It does take time for pore pressure to dissipate
10222	21	sipation of the pore water pressure would necessarily be
10222	22	slower than the dissipation of pore air pressure?
10222	25	pore pressure observation, indicating rapid dissipation of
10223	1	pore pressure, do you in that sentence mean to refer to air
10223	3	A What we were actually measuring was pore water
10223	6	pore air pressure?
10223	7	A It is extremely difficult to measure pore air
10224	1	Q Then, if you were referring to pore water pressure,
10224	2	how does this rapid dissipation of pore water pressure agree
10224	3	or disagree with a description of pore water pressure as
10224	8	which the pore pressure dissipates -- dissipated was quite
10227	8	I have an objection to the question. I am not cer-
10237	16	The data on which a curve in Appendix E are plotted,
10237	23	reasonable approximations for somewhat larger areas. So it
10238	4	But you can't relate a settlement of one point which is
10238	7	Q. But wasn't the explanation that you gave that
10243	10	increments in some places, and that the settlement curves

TR	Line	
10261	23	A No, that was the development of the pore
10263	4	two anomalies remained anomalies after Mr. Lenzini's
10263	5	review of the data. I believe we could do that. Piezometer 27 should
10263	11	If we look at the record on piezometer 27, on Figure A-7,
10266	11	piezometers. I would not, I think, feel that the
10271	10	A I wouldn't quite put it like that. Had I not
10271	12	the surcharging, I would not have recommended the surcharge.
10272	3	there to be a gap at some point, say between two relatively
10273	1	the soft spots will still be shielded and the hard spots
10274	10	snow load, snow and ice load which could exist for 24 hours
10276	4	live loads. There is a great tendency to think of live
10277	17	influence. One does not really compute settlements on the
10277	18	clay soils for earthquake forces. In that case, they
10279	10	you predict that the upper bound of the static settlement
10283	5	and we found out how much the dewatering settling
10295	14	the load the settlement curve follows a straight line on a
10295	15	semi-logarithmic plot with respect to time and used that
10297	1	As to whether one predicts more settlement than something
10301	22	Car Fork project which is mentioned on Page 16. That was
10302	7	Q And the one on Page 16, the Car Fork project.
10302	16	Q On Page 78 when you speak of the secondary
10302	17	consolidation of clay, what exactly do you mean is
10302	21	and significant excess in pore water pressures.
10306	4	think, would be indistinguishable from the settlements that
10309	9	textbook statements have to be, are general statements.
10321	21	secondary settlement that is not taken into account in
10321	25	the potential for the kind of secondary settlement that
10325	14	foot, whereas the stresses to which the materials are sub-
10325	25	grains -- and I would agree this can be a change in
10328	15	for the circumstances under which they pertain.
10334	19	had to go into the computations done again to make sure that
10335	5	Page A10 that shows some differences with respect to
10335	11	table on Page A30 which is a comparison of results for
10337	11	Q On Page A6 you talk about correction factors
10342	16	settlements in that second drawdown and you would not
10343	15	seismic event in that 1.5 inch secondary settlement that
10343	23	analysis if it has such negligible effects in the event it
10344	11	ability of the structure to withstand the safe shutdown earthquake.
10344	16	to adjourn for the day or do you want to start now?
10344	19	MR. PATON: Mr. Chairman what we would like to do

Consumers Power Company
Midland OM/OL

Tuesday, December 7, 1982

TR	Line	
10350	2	difficult to cross-examine before the staff's structural
10352	4	the manner in which these hearings are being conducted.
10352	8	relied on for his predictions, the Casagrande theory.
10352	20	and Appendix A, Section 2.
10352	23	Casagrande, four times on page 24 and at least three
10353	1	Casagrande theory. He also deleted all the Woodward
10353	4	according to the standard Casagrande theory.
10353	9	point to those as an example of reliance on the Casa-
10353	15	Casagrande theory; and therefore, it is Dr. Peck's best
10353	19	comings were on the Casagrande theory and I was pursuing
10354	10	that we got before. He did not ever rely on Casagrande,
10354	12	There was no reliance -- in fact, he was very critical
10354	15	The portions you have cited are the references
10354	16	to the particular type of instrument -- piezometer
10354	25	MS. SINCLAIR: All of these Woodward and Clyde
10356	4	is going on with respect to the examination by Ms.
10356	8	people are talking, which is a characteristic that Ms.
10356	17	on November 15th, was substituted. There was a substitution
10356	25	grande instructions that were used as a result - - were
10357	1	derived as a result of the NRC request for boring program,
10357	7	with NRC requirements with respect to the testimony and
10359	15	mosey along? Becuase I am not in any hurry.
10375	22	down, "irrespective of choice of limiting assumptions,"
10378	10	and certainly on behalf of the Applicant, we have been
10385	1	If the question is limited to the degree of
10385	3	settlements, I think that is well within the scope of
10387	22	settlement curve on a semi-load plus, we put in 4 borros
10394	7	represented this "straight line" as if it were derived by
10396	6	surveyors, and went to the structural engineers. Mr. Afifi
10399	1	MR. STEPTOE: Judge Bechhoefer, if I may presume
10399	7	fact a straight line drawn with a ruler but it is a surface
10399	12	curved slightly. It may not be exactly a straight
10407	6	Figure A25. Perhaps he could give us some conclusion
10409	20	attention should be directed to this A25 so as to be com-
10410	1	per log cycle. On Figure A25 it's something in the order
10410	7	settlements in this calculated - - in this plotted settlement,
10410	13	A25, from the addition associated with the ground water
10413	20	vative in that respect. And at most depths, the stresses
10415	13	show on both the arithmetic and the log plots.
10416	8	depths, the stress in the soil now is less than when the
10417	5	that sort of settlement would not occur again.
10419	13	of the building. A considerable part of that had occurred
10422	20	the placement, some excess pore pressures developed,
10423	4	and the pore pressure dissipates, and we know that eventually
10423	6	primary to secondary when the pore pressures are

TR	Line	
10424	12	THE WITNESS: Yes, I think so. A27, I think
10424	14	A25 would be better because it is along the
10424	17	complete because it starts at Day 10, you notice, on
10424	21	During that period, for one thing, excess pore
10425	2	really worked out the rate of dissipation of the pore
10427	15	approaches a horizontal asymptote whereas we always find
10428	12	that slope as due to dewatering; is that correct?
10429	3	So we have that effect of dewatering affecting a
10429	13	settlement log time curve up to that point,
10430	1	there seems to be reasonable agreement about
10430	2	the curves for which we have our data. Staff
10432	16	we came back to additional settlement totaling just
10432	22	be in the near proportion to the increase in hydrostatic
10436	22	do use in adjusting their networks and level
10437	25	is, the prediction which is based on the forecast does not
10438	15	high and end too low.
10444	2	the Applicant have any redirect?
10445	12	time -- before the first time that I appeared here.
10445	19	forth, I didn't have the benefit of this being eliminated by any
10447	11	and Piezometer 38 was destroyed 16 August, 1979.
10448	21	Testimony of Hari Singh", concerning the Diesel
10452	13	have a very little effect on the transmission of stresses
10452	22	There is very little effect, I would say, on
10455	4	handle these interactions. But there are, as far as I know, no
10457	17	on the cross walls in this figure, for example, so these
10460	17	The structure being a box containing
10460	22	directly to the soil so that the stiffness of the structure
10463	9	quite thick mass, several hundred feet of glacial till,
10464	8	THE WITNESS: I'm going to have to ask Ms.
10470	11	1.5 SSE or earthquake factor that you would expect no crushing
10470	12	of sand, is that correct?
10470	13	Well, you said virtually no crushing - -
10470	14	A Virtually none.
10470	15	Q -- of sand particles. But in response to an
10472	2	time curve and the disappearance of the excess pore
10479	5	of interest", has been thrown about extremely loosely,
10483	3	called "Testimony for ASLB Hearings, Midland Nuclear Power
10488	9	on the basis of the index properties and the
10491	14	additional borings and certain tests, they could make a
10492	13	removal of the surcharge and construction of the building
10495	3	MR. MILLER: With respect to soils, and certainly
10495	4	with respect to the structure itself, witnesses that are yet to

TR Line

10495 5 appear will be able to address the ability of the structure
10495 6 itself to withstand the seismic events.
10495 15 believe, from Ms. Stamiris and from Ms. Sinclair.
10496 4 Casagrande theory exists. Dr. Peck has testified just to the con-
10496 25 (COURT REPORTER HAS OMITTED A SECTION MR. MILLER QUOTED FROM DEC. 6 TRANSCRIPT at TR 10289)

"Q Dr. Peck, you seem to have relied entirely on Casagrande's theory for your longterm consolidation prediction, is that correct?

A No.

Q What other theories did you rely on?

A I didn't rely on any theory.

Q I think --

A I relied on a simply extrapolation of a time settlement curve that was established by observation.

Q I think in any mumber of instances you used a reference to Casagrande's theory.

MR. MILLER: Was that a question or --

BY MS. SINCLAIR:

Q Well, I'm asking you what theory did you use at arriving at your prediction?

A I answered the question.

Q A number of theories?

A I used no theories. I extrapolated on the basis of field observations.

Q Well, in what way did you use the Casagrande theory that you referred to?

A I don't even know what you mean by the Casagrande theory."

10500 9 ruling as to that.
10502 14 an objectionable object, I would like to
10502 16 objectionable, then I'll have to ask you more than two. The first
10505 5 which time there was a temporary point being read at a
10507 11 vast majority of the settlement measurements were taken on the
10525 12 settlements for shallow spread footings to be a half inch
10531 13 Q All right. Mr. Kane, at the bottom of Page 2-33
10532 13 MR. MILLER: It's part of Mr. Weidner's testimony.
10536 4 differential settlement that occurred from the time when
10540 1 If that evaluation is such that it causes us to alter any con-

TR	Line	
10541	19	it was done in a very informal manner. I was at the hearing
10547	12	for the HVAC intake fans and support, monorail, the exhaust
10548	14	The ninth item is the electrical raceways
10558	10	original geotechnical work was done by Dames & Moore.
10559	18	you are talking about a safety related structure.
10570	25	of settlements that is shown on Staff Exhibit 16 for the last
10575	4	there would be some - - I believe some excess pore pressures.
10576	13	we understand that the south side is predominantly clays
10578	2	of the diesel generators, will have a significant effect
10578	5	siginificat effect, and it is my recollection that a
10578	8	they are in operation, to evaluate that effect.
10578	18	settlement is to understand its effect on the structure,
10585	2	received from the Applicant other than the additional
10585	9	This is a question, which against my better judgment I allowed
10585	15	If the data he was given is wrong, then his conclusions
10586	4	understand how the surveying is conducted and to assure
10592	16	Applicant, in my opinion, would be unacceptable, and I

Consumers Power Company
Midland OM/OL

Wednesday, December 8, 1982

TR	Line	
10607	9	would say that this change is consistent with previ-
10613	7	to the Board, it's just that we'll address it in an SSER.
10621	18	which is entitled "Subject: Testimony for ASLB Hearings,
10627	21	test we found that the fill has settled in such a way
10627	22	that there is no chance of any future settlement more than the
10627	25	settlement for their analysis there is no chance for any
10628	8	and a redistribution of its stresses on the foundation soil
10629	9	A (WITNESS SINGH) In response to 50.54 F questions,
10631	5	asked me that certain settlements had been caused by surcharge
		right
10639	15	squared. Normally, all tests are done in laboratories in
10639	16	kilogram per centimeter or in tons per square foot.
10640	1	case, we have the load down under the Diesel Generator
10653	8	of one to two inches with differential settlement upper bound
		of about
10657	20	instrument to make an accurate reading.
10658	21	the zero date of January 26th, 1979. The plot itself fill
10658	22	day is January 26th, 1979. The first plot that is pointed
10660	14	the plant had been dewatered to a very low level for the
10660	19	to Elevation 580 or around about maybe 85. It is lower
10660	24	And another reason is that it hadn't been plotted on
10661	1	secondary one which had been plotted on the E-log P Curve,
10663	1	lots more than this. 40 years settlement is one and a
10668	20	loads were transmitted through the structure at some loca-
10668	25	soil was soft the surcharge loads weren't affected, it
10669	20	certain locations the soil has a high -- I'm sorry; the
10669	21	soil has a very low permeability. So at that location you
10669	24	minus 9 centimeters per second with the soil which has
10670	4	reached this area was with less permeability, so it
10677	10	answer. That is part of that rigidity.
10682	5	regarding the ten wells that are in question.
10682	6	Q. There are ten wells?
10682	18	recall the date, but that sounds about right.
10694	12	is very sincere and although she wants to ask a lot of
10699	4	different than some of the other testimony -- at the site, it
10701	7	the permanent water system piping, and the function of the
10701	8	galvanic corrosion protection system --
10701	17	And another is the capability to prevent or
10701	18	mitigating consequences of accidents, that could result
10702	5	in the system. For example, the service water system, it

TR	Line	
10716	8	alleviate a particular kind of corrosion.
10738	10	stand who did -- who was directly involved in authorship
10742	8	the second one which is Reference A, was prepared for
10742	11	first-class corrosion person.
10751	5	that there is no extent of very severe pitting
10760	8	is what I said. If the dog hadn't stopped, he would have
10765	4	they are going to do all of this extra tunneling and drifts.
10765	22	I would like to know for my own information about that. I
10773	7	the secondary compression. But based on -- when, I saw
10773	13	the soil. So I concluded that -- no excessive pore
10773	19	places, the secondary compression had not been achieved
10774	12	But, no settlement was calculated.
10775	12	performed a sufficient number of borings and that the bor-
10776	6	you, was the purpose of the surcharge loading at the
10779	8	A (WITNESS SINGH) Wells are different. Q(Mr. Mar[illegible] I would
10783	2	inserted [illegible]ng". So that this line would read: "Which
10783	12	accorda[illegible]ch the governing load equations.
10783	22	And I would like to add a comment here.
10785	3	would like to have added: "As supplemented by Reg Guide
10786	23	like to change the E' to E_{ss}, to be consistent with
10787	7	about the FSAR-SSE, is that correct?
10787	9	equation which we used to verify that our analysis on
10788	24	There has been discussion in these hearings about an FSAR
10789	7	not increased by 50 percent and was not the site specific response
10789	18	results of missile impact tests conducted over
10791	14	A And that came from our Geotechnical department.
10795	9	and it is also the opinion of the surveryor -- the chief
10795	21	Q Now, why was -- in some of this period -- there
10798	10	taking reading on this concrete wall outside the build-
10798	18	of these temporary settlement markers?
10799	17	discrepancy of .22 inches, of 22 hundredths of an inch.
10800	4	error appears at pages A20 through A23 of Attachment A
10800	7	MR. STEPTOE: A20 through A23. It's in Appendix
10801	21	Q -- in the prediction for 40 years made, as
10802	9	the spread of their findings.

Consumers Power Company
(Midland OM/OL)

Thursday, December 9, 1982

TR	Line	
10807	23	the structure into elements of finite size, each of these
10808	15	ments, the springs, and fed into the computer model by
10808	18	iterration, a final shape of the building
10809	6	During this process of iterration we got an appreciа-
10811	17	curvature depending on the stiffness of the structure.
10812	20	actual measured or predicted settlements and looking at
10812	21	the shape of the curve, you can see that we have a reverse
10812	23	Q Could you show where on figure 57 that reverse
10813	3	2.92, and then the next two values go down to 3.16 and to
10813	4	3.37. And then it is reversing again up to 3.24. Therefore,
10813	5	you can actually visualize the reverse curvature.
10814	5	deform it exactly to this shape.
10814	8	imaginery forces to deform the structure of this kind into
10814	10	Q Is that because of the rigidity of the structure you
10814	16	is, it is not sufficient to deform the building in this way,
10815	12	see also great distress on the top of the building.
10816	1	an analysis, using actual measured settlement values, with-
10816	2	out regard to any error band, requires fictious forces or
10816	7	priate to use the actual measured settlements as given in
10820	11	is heavily reinforced. And by evaluating and inspection, I
10822	3	audience, who is a structural engineer at Bechtel, that
10822	11	MR. STEPTOE: From center line to center line?
10822	12	THE WITNESS: Center line to center line.
10829	7	possible ponding on the roof because there is approximately
10829	8	a 12-inch curb on the roof. So it could be possible that
10829	9	the roof drains would not work and you would have 12
10829	17	assumed that 25 percent of the total live load and the
10832	15	or determining the maximum bearing pressure, the total
10832	16	100 percent snow lead and roof load, and 100 percent of the
10832	20	as the OBE, the SSE and the tornado, that it would not be
10833	1	the fogging from the cooling pond?
10833	8	A Yes.
10833	22	In other words, we used the OBE as 6 percent and
10834	2	within allowables.
10835	3	the building is capable of withstanding a seismic event 50 percent larger than
10835	4	the original SSE and remaining within the code
10835	5	allowable stresses. This has been achieved in this analysis.
10835	14	remain within the code allowables.
10835	21	Mechanics and Associates, using the SSRS. However, since
10836	18	So it may be in essence, just a straw in the wind,
10838	12	Q No, I am referring to .12g SSE.
10838	14	ring to the reanalysis or the original analysis?
10839	4	times the FSAR earthquake instead of FSAR earthquake if
10839	9	our notice that the SSRS earthquake, it came in, I believe
10839	10	in Mr. Tedesco's letter in December of 1980 which is

TR	Line	
10844	6	information regarding plant wide soil conditions prior to
10845	12	things, page 2 refers to the testimony of Mr. Keeley,
10845	16	Administration grade beam failure. I'm just not sure that
10847	15	However, I had some overview of
10853	20	is the same as Mrs. Stamiris', that the borings that were
10854	8	of the Administration grade beam, discovery of that problem.
10867	10	I want to pay attention to you and answer your
10871	18	MR. STEPTOE: I would like to state that Ms.
10871	22	She quotes at length from an individual who is not --
10874	12	a stiffer base; in other words, a building on rock versus
10874	24	A That you use springs from shear wave velocities,
10875	7	A Yes, I have seen the structure several times.
10877	2	A There are cracks which are due to the restraint
10877	15	and can carry a load of 60,000 pounds every 12 inches.
10880	1	JUDGE HARBOUR: That's fine. I think that the record should
10883	13	The live load has a load factor of 1.7, and I
10885	18	will crack at about 10 percent of its compressive strength.
10888	8	of getting the settlement values into the long-term soil
10888	9	springs. I am not sure what he was referring to when he
10889	14	were used in the finite element analysis to derive
10890	18	Initially when we analyzed the deflection, the
10891	21	center of rigidity of the building.
10893	16	structure are governed by the mean temperature, mean low
10893	17	temperature, and the air velocity which normally exists?
10893	20	book "Concrete Engineering" which recommends this particular
10893	23	taken into account the temperature conditions in this
10895	15	this dead-load to the live load?
10896	16	You would analyze the wall as a diaphram, or as a shear
10897	7	was a ledge formed under the footing so that the footing
10901	2	How much was in contact with this slab and how the working
10902	13	your testimony and the agreement which apparently has now
10903	18	testimony does go on to say something about ACI349,
10903	20	been done in ACI349 as supplemented by Regulatory Guide 1.142.
10903	22	is September 8th, 1982, which predates the stipulation.
10905	7	state temperature -- am I correct in assuming that this is not
10905	23	thickness requires a certain time to reach a steady state
10906	9	a steady state calculation.
10906	19	accident condition, and a very thorough analysis is
10906	21	a steady state flow.
10907	4	is in the building, what the ventilation system is provided,
10907	17	before a change in the steady state would take place. So
10909	10	minus 1/8th of an inch across the board or should it
10910	8	is not that accurate. I consider that we are falling within the
10910	17	talking about one of a thousandths, not one of a 25

TR	Line	
10912	4	considering all load combinations and combining all loads
10915	8	Also provided were the shear wave velocities for the
10916	2	the soil spring constants or soil springs used for the
10917	3	the structure in possible cantilever conditions and whether
10918	8	over a period of a few weeks, there was also, was there
10921	3	second column, the words, settlement, then parenthesis, seismic
10921	5	A Well, I would like to make a correction. I
10923	17	recall exactly the configuration, how many mils or what
10923	18	that particular gap is.
10925	14	introduced in response to question 15 and includes the
10926	10	page 46, starting with page 46, the five elements of the
10928	11	give the total history. All possible load equations which
10929	23	stresses independently, Ms. Stamiris.
10930	19	reflected the margin by which a measurement was off from the
10932	11	testified that the integrity and load bearing capa-
10933	14	We haven't drawn this line arbitrarily. This is
10933	15	the result of our analysis --we had four iterations
10936	8	stick of which the measuring points, the measured increments
10936	9	have a quarter inch-wide marks, not a nice
10937	1	least squares analysis to find the line which best fits
10937	3	the curve?
10937	11	on the north-west corner. So it is a very fine balancing
10938	4	whether this iterative process results in a line
10938	17	regression, and that's the starting point. We wanted
10939	8	A The basic input for the linear regression are
10939	12	A Well, these are actual measured points. They
10940	11	Building are calculated from deformations from the
10941	11	mean that we don't meet ACI 349.
10941	25	as amended by the Regulatory guide, and we did so and we
10942	5	could establish is 46.55 KSI, which is within the code
10943	21	existing at all, and then we varied the springs linearly
10945	18	duct bank, I used the term cantilever. I was not really
10948	3	by Bechtel.
10948	18	A (WITNESS SOZEN) Attachment 4.
10949	12	Q Do you have any corrections or additions you
10949	19	that the prefiled testimony of Dr. Sozen, including
10949	20	Attachment 4 which is written by Dr. Corley, be admitted
10952	18	consistent with but not identical to those values, are you
10953	6	in one role where one feeds in a load and gets out of
10953	15	impose certain external constrainst on it and see what
10954	16	if I look at these purported displacement measurements,
10954	21	very high stresses which would destroy it, which, as a
10956	3	when you stated that, you meant used in the fashion that
10956	15	of an inch is what I meant to say, not ten 1000ths of an

TR	Line	
10962	22	A (WITNESS SOZEN) It would be important in that
10967	6	are not of importance in relation to the strength of the
10967	10	are important insofar as they are reliable. And, I think,
10968	3	WITNESS SOZEN: If the structure were stiffer
10968	7	You know, one of the things that is quite obvi-
10968	9	this while the analyses indicated that there would have
10969	18	In other words, the spauling or bulging
10970	1	building, because of the shrinkage, its tendency to get
10970	2	shorter, its tendency to react to temperature stresses.
10970	3	So that a reinforced concrete structure would be cracked and
10970	5	ment that Mr. Weidner showed you that takes the tensile
10971	10	There would be very fine spauling cracks in the concrete.
10971	16	tensile cracking, but very fine spauling or spauling
10972	12	WITNESS SOZEN: ...There is no way. But, no, I do not
10972	14	stands, as it is founded, for future weakness in com-
10972	15	pression or in tension, for that matter.
10973	2	should redirect that question because --
10974	9	dimensions in there, it's just a qualitative representation
10975	22	isolation of the duct banks from the building.
10976	16	believe it. I would find it credible. I seldom expect
10978	13	conclude immediately that there is either something
10979	5	Q In a diagram or --
10980	13	Q Dr. Sozen, could you please turn to page 4.31
10980	20	WITNESS SOZEN: That's Figure 4.21?
10980	23	Q Would you say that that figure shows an increase
10981	9	A (WITNESS CORLEY) We showed all of the cracks
10981	11	cracks below 10 mils were omitted.
10982	17	for another comparison, there's another figure on page 4.17,
10982	18	Figure 4.9, for the same wall section. It must be at
10983	21	mapping to crack mapping, then the number could shift,
10984	24	of the concrete that occurs between the mappings.
10987	10	ther one crack was included or excluded does not make
10988	13	WITNESS SOZEN: No, it wouldn't make a differ-
10990	25	the actual settlement numbers?
10992	10	ments can be used, but only if they are precise enough for
10996	6	and one can forget those small differences.
10996	8	at issue, the structural setup does not forgive errors
10997	5	building, yes, I could believe that.
10999	24	ordinary norms of engineering in nuclear reactor design,
10999	25	in the design of buildings related to nuclear reactors.
11001	5	Q I believe that was it but I am not certain.
11001	7	risk in Midland, Michigan, I should think that all
11001	24	a large factor of safety in the seismic effects as to

TR	Line	
11002	5	inaccuracies that we are talking about, if all of it
11003	4	with a .12G earthquake? That's for the missile shield
11004	11	section, I would say in general that, for example, a
11004	12	crack width of about sixty 1,000ths of an inch, .06 inches,
11005	10	that any particular width is the final criteria.

Consumers Power Company
Midland OM/OL

Friday, December 10, 1982

TR	Line	
11015	6	setting schedules, is just now underway, as I told the Board
11016	15	MR. MILLER: Yes, if there was apparent reluctance
11020	19	resumption of construction.
11055	2	Q Dr. Sozen, yesterday at one point, Ms. Stamiris
11055	14	changes, that I have looked at them, I had studied them
11055	15	but at that point, I could not very well recall all the
11055	19	I may use poor English.
11055	21	Ms. Stamiris, who was asking you what would be
11055	24	ing failure in compression. I believe you stated that there
11056	3	concrete was approaching failure in tension.
11056	6	that I believe we were referring to a mode of structural
11056	9	limits, there could be compressive failure in the concrete
11056	23	deflection on the part of the building and compression
11057	5	have now the tensile failure at the bottom part of the
11057	6	structure first which would again be visible, with the
11057	22	above, all of which, I think in the event of such an
11058	24	Q Dr. Corley, are you aware that the staff in
11060	5	he recommended both displacement monitoring and crack monitor
11060	9	what it is they are requesting, and so we would like to defer this dis-
11061	23	to attribute the cracks to shear or bond failure
11062	1	Q On Figure 4.12, would you say that there is no
11062	2	evidence of shear cracking in the figure?
11062	4	crack that would imply the immence or even the existence
11062	6	Q And on page 4.16, do you see any evidence of
11062	10	the stresses are not normal, that is to say, vertical.
11063	6	In Figure 4.17, there is no crack that would
11063	12	In here you say that the tensile strength of concrete
11063	13	is 10 percent of the compressive strength; is that
11064	1	of crack development in concrete, so the figure of 10 percent
11064	12	A (WITNESS SOZEN) This is a general discussion of
11065	3	this Diesel Generator Building could float under and pos-
11065	6	has openings in the ends of it, so with water both inside
11066	4	service water pump structure cracking and we have to clear
11069	6	in all the crack widths in that length reaches 150 mils.
11069	15	The definitions of alert and action limits are
11069	16	similar to those described in the Staff's testimony in the
11070	11	you're looking for the cracks. We will redo those and submit it
11073	5	CHAIRMAN BECHHOEFER: Presumably, someone could
11077	24	change. I changed that word to results. But, at this
11082	25	previous A/E Brown and Root, so there was no relationship
11083	3	Southern Boiler & Tank Works, for the design and fabrica-
11083	4	tion of buried diesel fuel oil tanks for the Rancho Seco
11084	23	"furthermore."
11085	5	The answer to Question 18 should be modified, after the word

TR	Line	
11087	5	loading input and the load combinations for its assesment of the state
11087	22	future settlements, you will monitor the cracking to be
11087	23	sure there is not -- there is not undue stress on the
11088	2	this date, and assessed that the state of stress in these
11088	3	walls, as a result of dead load and settlements which has
11088	4	already occurred, using the crack widths over the length
11088	5	in which they occur to determine the stress in the
11091	6	I did say that we had found acceptable the proposal
11093	17	the stress resulting from this load on the structure.
11094	3	settlement value would predict very high stress. But
11094	4	indeed, the observation of the structure did not indi-
11096	1	testimony, the comment on that question.
11097	25	sented in the Applicant's testimony and in the field, we
11098	1	note that some venting has been provided. That is, there
11098	5	the Applicant for a tornado event is a conservative repre-
11125	23	engineers reviewed it in very great detail but they are
11130	5	Q Dr. Sozen stated something to the effect that a
11130	6	competent structural engineer without even doing the
11130	15	them to deformations and one could come up with an
11130	20	the reverse curvature that we have heard about
11131	13	deflections, that one was forcing the structure into --
11134	1	a slightly different edition --
11134	13	the structure was understressed or overstressed. Or,
11137	20	Q Second point. Mr. Rinaldi, it is the Staff's
11137	22	finite element analysis or those portions of Applicant's
11138	24	finite element analysis is consistent with sound
11140	24	A (WITNESS RINALDI) It is consistent with sound
11141	2	Q Under circumstances other than the
11141	6	approach could be used to establish compliance with
11142	5	that we are talking about which does not use actual measured
11142	8	respect to this case, but in general, the Staff considered it
11144	15	advisedly refer to as actual measured settlement
11144	18	use of the word "rejected". I believe the Staff
11144	22	that on page 10521 of this transcript of December 7th -- Mr. Rinaldi,
11145	21	question of whether the analysis is unacceptable was answered. I
11149	13	which appears on Figure 6-A of Mr. Wiedner's testimony is not acceptable -- is not
11150	1	WITNESS SCHAUER: Yes, if a finite element
11150	3	unreasonable results, it would not be acceptable.
11152	17	the study determined in this particular case, they
11153	9	Mr. Matra used, I believe they are in the Exhibit 30
11155	9	you talk about the increased seismic load was conservatively

TR	Line	
11162	22	monitoring recommendations which appear on page 4.33 --
11162	24	MR. STEPTOE: -- on 4.33 were not committed to in
11163	6	4.33. Now we're going to do what Staff has requested
11171	4	able to us for the actual settlements and the
11171	5	that the line which is indicated by the values
11171	6	in blocks which appears to be an almost straight
11171	26	equations to characterize a structure through its design life.
11178	3	witnesses, that the structure can't be deflected as
11178	7	Take the example which everybody is using, the book, and
11178	18	not only one. Suppose the same book is made hundred feet
11181	8	cracked reinforced concrete structure is very difficult to
11181	9	analyze in finite element. You have to consider the
11182	22	engineering judgment. To me, they're compatible and
11184	18	linear regression. Right now no more comparison is
11185	2	line. If there is a poor comparison then an adjustment is
11185	8	as close as you can to the linear regression analysis
11186	17	have good confidence in the measured settlement data.
11188	13	A (WITNESS SINGH) No, I don't.
11189	19	is no formula to calculate these stresses in steel accurately
11189	21	In my opinion, the approximation might
11190	3	Complex stress system means there's a tensile and
11191	11	in the room. I have only one question.
11192	12	Prior to today, did -- I will start again.
11193	11	evidence in the record from qualified witnesses to
11193	12	address all of the issues pertinent to the safety and the
11194	14	compacted adequately. What I would have done, I would have done
11196	3	testified that the crack analysis was not a normal
11198	11	another analysis, and it is my opinion, this is so because the
11198	13	analyzing cracked structures other than what has already
11200	18	the concrete structures, the cracked structures. If those
11200	21	off or 30 percent off, I don't know. The cracked
11200	25	If Applicant has used cracks, that is okay,
11202	25	last 4 years, I have not been active in the design of
11204	11	this prefiled testimony of Dr. W. Gene Corley,
11208	5	the service life. Can you tell me what kind of factors
11208	8	on the concrete wall crack repair?
11208	13	include the action of weather the possibility of
11208	16	affect durability, though abrasion is not a
11209	17	A I can answer answer that question. Yes, in
11209	24	include cracking. It would include evidence of spalling.
11211	9	Three-quarters of an inch more of differential
11224	24	properties for the walls and the floors to the extent that
11226	22	examples.
11227	20	new?