

NUCLEAR REGULATORY COMMISSION

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IN THE MATTER OF:

SECY-78-137

BRIEFING

Place - Washington, D. C.

Date - Wednesday, 17 May 1978

Pages 1-60

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444 North Capitol Street  
Washington, D.C. 20001

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
PUBLIC MEETING  
BRIEFING ON SECY-78-137

Room 1130  
1717 H Street, N.W.  
Washington, D.C.

Wednesday, 17 May 1978

The Commission met, pursuant to notice, at 1:45

p.m.

BEFORE:

DR. JOSEPH M. HENDRIE, Chairman

PETER A BRADFORD, Commissioner

VICTOR GILINSKY, Commissioner

ALSO PRESENT:

- S. CHILK
- D. BUNCH
- S. LEVINE
- M. MALSCH
- L. GOSSICK
- E. CASE
- H. DENTON
- R. BLOND

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## P R O C E E D I N G S

CHAIRMAN HENDRIE: If we can come to order.

The Commission meets this afternoon for a briefing by the Staff on assessment of relative differences in Class 9 accident risks and evaluations of alternatives to sites with high population densities.

Lee, you have Harold Denton with you and Marty and Darrell Bunch.

MR. GOSSICK: Mr. Denton would like to introduce the subject and he will give the briefing.

MR. DENTON: The paper concerns how the Staff treats coremelt accidents in doing assessment of sites with high population densities.

Just by way of background, the Staff's first exclusive consideration of coremelt accidents with regard to high population sites was in the Newbold Island case in 1973. As a part of our NEPA review, Mr. Munsing, who was Director of Regulation, informed if he would move to a site of lower population density -- he informed the applicant that he should move to a site of lower populatin density, the difference in population was about a factor of 10.

About a month later, the Staff developed guidance on population density around sites and has been following this guidance every since. So, since 1973, we have not had a site higher than this guideline for doing detailed

bw 1 assessments until last year, when the site came in that  
2 tripped the Staff's value, which required us to do a detailed  
3 look at alternative sites that might be available at lower  
4 population densities.

5 The Staff's paper described the approach that  
6 the Staff had taken in looking at the higher population  
7 density sites. What we want to do today is to briefly go  
8 through what is in the Staff's paper and the relationship  
9 between NEPA reviews and core melt accidents in relationship  
10 between what the Staff is presently doing in this area  
11 and other Staff papers that are being prepared.

12 The one point I did want to make is that these  
13 500 people per square mile value that has been used by the  
14 Staff to give a detailed consideration of population  
15 density has been tripped only once in four years, and it was  
16 the tripping of that value implication which has now been  
17 withdrawn that had led to the development of the material  
18 in the Staff paper case.

19 MR. CASE: Let me make it crystal clear. That does  
20 not mean that a site is unacceptable if it trips. It only  
21 means that you should do a more detailed evaluation of  
22 alternative sites.

23 CHAIRMAN HENDRIE: As best I can remember,  
24 Harold, that policy which mentioned the population, the  
25 trip-level population density, but it seems to me that that

bw 1 was our way of dealing with the reluctance of the Commission  
2 in those days to discuss the matter in any more detail. We  
3 managed to get, as I recall, the number thereby into the --

4 MR. DENTON: -- into the Standard Review Plan and  
5 various other places.

6 COMMISSIONER GILINSKY: And that didn't stop you.

7 CHAIRMAN HENDRIE: Even then at other times,  
8 who knows, even now the Staff has its business to conduct  
9 and manages to get it conducted. Please go on.

10 MR. BUNCH: You previously noted the title of the  
11 paper. It is rather long and complicated. It certainly --  
12 it touches on several complex and controversial issues.

13 (Slide.)

14 In substance, though, as Harold was indicated,  
15 the heart of the paper is fairly straightforward. Basically,  
16 is there a way that we can provide improved guidance in our  
17 NEPA reviews on alternative sites, particularly alternative  
18 sites with high-population densities. During the  
19 development of the paper we received a number of comments on  
20 the subject particularly dealing with possible policy  
21 implications in other areas, rather than the strict review  
22 of alternative sites, policy implications relating to the  
23 treatment of Class 9 accidents in the licensing process,  
24 possible implications in our siting reviews and the like.

25 COMMISSIONER GILINSKY: Why are you only dealing

bw

1 with Class 9?

2 MR. BUNCH: I will be discussing that in just  
3 a moment. The subject is really residual risks, all of  
4 the spectrum of risks are associated with reactor located  
5 in a given site.

6 MR. DENTON: We routinely include accidents 3 through 8,  
7 8 being design basis accident. 9 is shorthand for all  
8 accidents beyond design basis accidents, including those  
9 that lead to core melt.

10 MR. BUNCH: As I will discuss in a moment, the  
11 reason we have highlighted in the title ~~Class 9~~ accidents is  
12 that the great bulk of the reviews that we have done in the  
13 past in our environmental assessments have ~~treated~~ Class 9  
14 in only a very qualitative way. And recently because of the  
15 insights that have been developed in several cases, we  
16 thought perhaps more detailed evaluation was in order, and  
17 that is what we will be discussing in just a moment.

18 COMMISSIONER GILINSKY: I thought that we were  
19 considering Class 9 accidents in environmental reviews, as  
20 opposed to safety reviews.

21 MR. BUNCH: Only in a qualitative sense. There  
22 is an acknowledgement of the possible risks associated with  
23 Class 9 accidents.

24 MR. DENTON: Reference is made to the results of  
25 WASH-1400 and a general discussion of that, but not any

bw 1 detailed quantification of potential consequences.

2 MR. CASE: The boilerplate is the same, regardless  
3 of the site location, except where now the population  
4 density is about 500 persons per square mile.

5 COMMISSION GILINSKY: It is an acknowledgement of  
6 the possibility of a Class 9 accident and not much more.

7 MR. DENTON: Class 3 through 8 are tailored to  
8 fit the site and the meteorology of the plant and Class 9  
9 is described as --

10 COMMISSIONER GILINSKY: Is that because how our  
11 regulation is structured?

12 MR. DENTON: Yes.

13 MR. KELLEY: That has been challenged since the  
14 study.

15 MR. BUNCH: You may recall that in the memorandum  
16 of April 24 we were advised that you were reserving the  
17 judgment on the specific recommendations in the paper, pending  
18 a review of siting policy or a status report on the related  
19 papers on siting policy, and that is basically what we will  
20 be talking about today, if I might have the next viewgraph.

21 (Slide.)

22 As was indicated by Harold, the Staff and its  
23 safety reviews have always considered population density as  
24 a relatively important part of the review. Population  
25 density is basically shorthand for a way of characterizing

bw 1 risks associated with accidents. The perception being that  
2 all other things being equal, the consequences of accident  
3 release are going to be higher at a location with a greater  
4 population than with a lower population.

5 COMMISSIONER GILINSKY: Let me understand.  
6 Class 9 accidents or evaluations of Class 9 accidents play  
7 no role in the choice of sites for reactors at the present  
8 time; is that correct?

9 MR. BUNCH: No, sir. Not totally. In a recent  
10 Commission paper, I believe it is 111, we tried to  
11 articulate the current accident analysis practice. The  
12 numerical calculations that we do, do not include the  
13 kind of Class 9 accidents that are discussed in reports such  
14 as WASH-1400. There is a very large source term that involves  
15 basically a full release of ~~the fission~~ gases and a very  
16 substantial portion of the iodine. You wouldn't expect to  
17 get that kind of source term without that, but it is assumed  
18 that the containment is intact, and that the engineered  
19 safety features are effective in controlling and mitigating  
20 the consequences of those accidents. Because we do rely  
21 and give credit on engineered safety features to provide  
22 some containment of even very large source terms, we have  
23 had to use other devices, such as controls on population  
24 densities or special reviews in densely populated sites to  
25 assure that reasonable protection is afforded even for these

bw 1 more severe events.

2 So that is a long answer to say that when we  
3 look at the site, we look at how far that site is from  
4 centers of population. One of the things that we keep in  
5 mind is the possible implications that might be associated  
6 with a very large accident.

7 COMMISSIONER GILINSKY: Is that written down  
8 anywhere? Are there specific guidelines on it?

9 MR. BUNCH: There are no specific guidelines as  
10 such. The statements of consideration to 10 CFR Part 100  
11 do point out that the definition of a population center  
12 distance and their requirement to keep some distance between  
13 a reactor and a census of population is in part based on  
14 consideration of Class 9 accidents. Beyond that there are  
15 no specific guidelines.

16 MR. DENTON: We have not looked at the  
17 consequences of Class 9 for plants which fell within the  
18 envelope of the Standard Review Plan population density  
19 numbers. It was only this one case that fell without, that  
20 prompted us to take a hard look at how we should treat the  
21 consequences of core melt in Class 9 accidents, when it was  
22 outside the envelope.

23 MR. BUNCH: In any event, prior to the  
24 enactment of NEPA, We have relied on the Safety Review as  
25 the principal vehicle to consider the risks associated with

bw 1 sites that are located in fairly densely populated areas.  
2 Even then, there has been an acknowledgement that population  
3 density is just one of the very many factors that are  
4 important in the site selection process. With the  
5 enactment of NEPA the Staff has been able to develop and  
6 use a more structured approach toward the balancing of  
7 various environmental, economic and safety-related  
8 consideration in their siting reviews.

9 And as the top ~~bullet~~ indicates, there is on  
10 NEPA reviews, an attempt to perform such a balancing.

11 Now, as Harold just mentioned, when we have a  
12 proposed site that is in a relatively isolated area, we do  
13 not give particular weight to small differences in  
14 population between Site A and Site B, the alternate site  
15 and the proposed site.

16 Other factors, economic and environmental, have  
17 more weight than the NEPA review process. When we have such  
18 a situation such as arose in Newbold Island, where the size  
19 of the population was an important consideration, there are  
20 guidelines that are used to institute a special, more  
21 indepth review of all of the factors. Those guidelines are  
22 included in two of the enclosures to the SECY paper.

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1 I don't plan to go into them, except to note that  
2 there is a threshold value. If the population is in that  
3 vicinity or higher at the proposed site, then we do undertake  
4 a more detailed review.

5 Again, most of the sites that we have existing today  
6 are relatively isolated. More than 90 percent of the existing  
7 sites are in areas below the guideline values we use for a  
8 special review. As Harold indicated, there has only been one  
9 instance since these Newbold Island-related guidelines were  
10 developed that we have had an occasion to institute the special  
11 review processes because of population density considerations.  
12 They are not limits; they are just triggers or thresholds.  
13 When we get done with the review and the NEPA balancing, there  
14 has yet been no determination as to the acceptability of the  
15 site one way or the other.

16 COMMISSIONER GILINSKY: How do you compute that  
17 density? Is it simply the average density across that circle?

18 MR. BUNCH: Yes, sir. You compute it at various  
19 distances -- one mile, five miles, 10 miles, 20 miles, 30 miles  
20 -- and look at what the average density is in each circle out  
21 to a distance of 30 miles.

22 MR. CASE: If it trips any one, then you do the  
23 special review.

24 COMMISSIONER GILINSKY: You could have a city of a  
25 million 30 miles from there?

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MR. BUNCH: Yes, that is correct.

MR. DENTON: That is only one way we look. The other was weighing the density by meteorology, which gives a different way of looking at population. And then in this review of this detailed look, we used the same consequence modeling code that WASH-1400 used that went out to hundreds of miles, so we wouldn't stop if we saw a city that was on the fringe of 30 miles; we would use one of these other techniques to bring it in. If you do a screen, you do the 500 and it is well below, you can be sure there is not a site much better than that available in the populated parts of the country.

MR. BUNCH: Generally, with the 500-people-per-square-mile number, you can't stay within that value, if you have a city of 100,000 or more, say perhaps as close as 10 miles, to the facility, a large city with those guidelines are going to have to be somewhat removed from reactors.

With the application that we did receive that caused the trip levels to be exceeded, there was a need again to look at the pros and the cons of the various alternative sites, and accordingly, to try and figure out how much weight to give to population relative to the other factors that might be both advantageous and disadvantageous at the various sites.

That brings us specifically to the subject that is discussed in the paper, and our attempts to find better ways to assist in our determination of what kind of weight, what kind

sp3

1 of balancing process to undertake.

2 If I might have the next slide, please.

3 (Slide.)

4 Joe asked earlier about class 9 accidents and whether  
5 or not they are the only thing that we look at, and I answered  
6 no.

7 COMMISSIONER GILINSKY: Or whether you look at them  
8 at all.

9 MR. BUNCH: As was indicated in our NEPA reviews, we  
10 do discuss all classes of accidents, from the most likely to the  
11 least likely, in general terms. We discuss the reviews and  
12 assessments of the design basis accidents that appear in the  
13 safety evaluation reports, and we discuss, in qualitative  
14 terms the class 9 accidents, and make reference to the more  
15 detailed quantitative assessments that appear in WASH-1400.

16 They are not tailored on a site-specific basis to any  
17 degree, but there have been many instances where assessments  
18 have been made to try to determine the relative importance of  
19 class 9 accidents.

20 I think, as you have heard in previous discussions on  
21 WASH-1400, there is a general perception that after the plans  
22 have been designed to mitigate and safely accommodate all the  
23 more credible accidents, what residual risks are left are  
24 largely those associated with the very, very unlikely events  
25 that class 9 events --

sp4

1 COMMISSIONER GILINSKY: How does the overall risks of  
2 class 9 accidents compare with the lower classes?

3 MR. BUNCH: We have performed some analyses. There  
4 are more extensive analyses in the WASH-1400, and they indicate  
5 that the risks associated with the class 9 accidents might vary,  
6 say, in the range of 50 to a few hundred manrem a year, using  
7 the methodology of WASH-1400. These are from class 9 accidents.  
8 They are relatively small impacts.

9 MR. DENTON: They appear to be in the same range as  
10 the occupational exposure per year basis.

11 COMMISSIONER GILINSKY: How do they compare with  
12 the one through eight?

13 MR. DENTON: I think my view is the one through eight  
14 are somewhat less than the residual risk of class 9.

15 CHAIRMAN HENDRIE: That's the way I recall.

16 MR. DENTON: They are down an order of magnitude.

17 COMMISSIONER GILINSKY: We are screening it out on  
18 the basis of probability, even though the risk is computed to  
19 be greater from that source.

20 MR. BUNCH: I think it would be fairer to say that we  
21 looked at both probability and consequences, and we have a  
22 fair perception of the range of consequences that might be  
23 associated with class 9 accidents, and were convinced when we  
24 considered their probability that the risks are very low.  
25 Those numerical analyses that we have done support that view.

sp5

1           COMMISSIONER GILINSKY: We are saying, the risks are  
2 still greater than from the one through eight?

3           MR. BUNCH: They are both small numbers.

4           COMMISSIONER GILINSKY: That's fair enough, but I  
5 guess it is not immediately clear why you would use one for  
6 citing purposes and you wouldn't take into account the other  
7 which is larger.

8           MR. BUNCH: I am not sure I understand your question,  
9 sir.

10          MR. CASE: What he is saying is, you use it for  
11 citing purposes, the trip level, but once you get to do your  
12 NEPA evaluation, you only debit the class 1 through 8 risks;  
13 you don't quantify the class 9 risk for a particular site after  
14 you have gone through the site selection process.

15          MR. DENTON: The way I see it working is along this  
16 line. The Part 100 provides a specific way to assure that  
17 individual risks are low, given design basis accidents, and it  
18 prescribes the calculational method. It also has admonitions  
19 that where very large cities are involved, special consideration  
20 should be given. But it is easier to calculate design basis  
21 accidents because of the historical precedent for looking at  
22 them, and accidents that are beyond design basis, how systems  
23 performed wasn't known until 1400, or those types of techniques  
24 became available.

25                   1400 is still being looked at by the Lewis Committee

sp6

1 in certain facets. So we have not done detailed calculations,  
2 site-specific, except in these individual cases where they trip  
3 one of the staff citing guidelines to try to get a relative  
4 view of the difference between sites.

5 I think we still see an inability to be absolutely  
6 right in terms of calculating class 9 accidents. We think that  
7 the techniques that are available are good at looking at  
8 relative differences and choosing between sites.

9 MR. MALSCH: One problem has been that under Part 100  
10 which are the Commission citing guidelines from the safety  
11 standpoint, the reviews have always focused on the dose guide-  
12 line values in the part as the 25 rem whole body and 300 rem to  
13 the thyroid. Those are only associated with what Part 100  
14 refers to as credible accidents, which by definition are eight,  
15 not nine accidents.

16 In applying Part 100 to individual sites, the focus  
17 has been not on class 9 but on class 8.

18 COMMISSIONER GILINSKY: But credible means certain  
19 categories of accidents which we choose to consider.

20 MR. MALSCH: Because of probability reasons. The  
21 line between credible and incredible is based upon probability  
22 considerations, although the regulation doesn't specify a  
23 credibility number.

24 COMMISSIONER BRADFORD: Where is the line?

25 MR. MALSCH: It is not specified in the regulations.

sp7

1 Various staff guidelines have been developed to use in reviews.

2 MR. CASE: That is really the issue in the ATWS that  
3 we discussed earlier this morning: where do you draw the line.

4 MR. DENTON: The staff review has generally been  
5 deterministic. We say -- we determine many of the parameters  
6 such as SSEs in a deterministic mode and not a probablistic  
7 one. So anything that falls within the design basis accident  
8 envelope is looked at in a deterministic mode.

9 The issue here that we are raising is, how do we  
10 treat in NEPA environmental statements of alternative sites  
11 these residual risks associated with ones beyond design basis  
12 accidents?

13 I think the staff practice has been that for sites  
14 that had population densities within existing ranges, we relied  
15 on reference to 1400 as a generic treatment of what the  
16 residual risks were, but where the proposed sites exceeded the  
17 values, we have taken a hard look at alternative sites to  
18 those and have included in part of that evaluation an analysis  
19 of the potential consequences of class 9 accidents at those  
20 sites.

21 MR. BUNCH: If I might have backup viewgraph B-4,  
22 I think I might be able to finish the response to your  
23 question, Commissioner.

24 (Slide.)

25 As discussed in the paper, we did attempt to find

sp8

1 ways to better rank all sorts of residual accident risks in the  
2 NEPA review process. This indicates one such display where  
3 we just attempted to monetize everything and to get a rough  
4 figure of merit, if you would, of the relative differences  
5 between these sites.

6 The value of the numbers is not particularly important.  
7 They are small relative to other costs that were  
8 generally included in the NEPA review of alternative sites and  
9 associated environmental impacts.

10 What we are trying to do here, again, is recognize  
11 that with sites that were relatively densely populated areas,  
12 we wanted to make sure that the standard practice still had  
13 meaning and value. This particular evaluation was used to  
14 indicate to us, do we still think we are in the same ball park,  
15 and I think the conclusion from this type of analysis was, yes,  
16 we were for the particular site in hand. The accident risks  
17 were still very low in terms of differences from site to site.  
18 And in all cases, they seemed to be low.

19 So, again, all classes of accidents are taken into  
20 account in the NEPA reviews, and what we are talking about here  
21 is, there is some threshold where we have to look to see if  
22 our standard practice of treating things in a relatively  
23 qualitative way, and the cost-benefit evaluations deserves a  
24 little more rigor.

25 This particular example would appear to me to

sp9

1 indicate that at around the guideline values, perhaps it is not  
2 yet required, but nonetheless it did provide some indication.

3 MR. DENTON: This assumes that we have the same plant  
4 at each of those five sites, and using the techniques of 1400  
5 we calculated late cancers, manrem, early fatalities, monetized  
6 them all to give the common dollars, looked at cost of  
7 decontamination of land. So this is in terms, then, of the  
8 per-year residual risks from class 9 accidents at the sites,  
9 using WASH-1400 type methodology, which does show that the  
10 values monetized are small.

11 MR. SEGE: It also assumes WASH-1400 probabilities  
12 constant from site to site.

13 For example, the proximity of Edwards Arsenal and  
14 the possibility that that might affect probability of an  
15 initiating event or something else that might occur at some  
16 other site that would not be factored in.

17 MR. DENTON: This was not intended -- they would be  
18 covered in the other parts of the review. You are right,  
19 though. This is the same plant, the same probabilities at each  
20 site.

21 CHAIRMAN HENDRIE: This is the consequence model.

22 MR. DENTON: Yes.

23 MR. BUNCH: Yes, sir.

24 MR. CASE: The same model that the ACRS talked to  
25 you a week or so about.

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1 COMMISSIONER GILINSKY: This is a small point but  
2 you generally take these things out to three places.

3 MR. BUNCH: They ought not to be taken out of more  
4 than one place.

e-2

5 I might note: If you look at the left-hand  
6 column, you will see whether the proposed site is below or above  
7 the trips points. You will see that there are substantial  
8 differences in these five alternative sites from the standpoint  
9 of population. About a factor of 10 of the highest and lowest  
10 one might have expected because of this range of population  
11 densities to have a significant difference in the residual  
12 risks of accidents.

13 These kind of analyses take the other factors that  
14 are important in looking at the consequences of accidents,  
15 meteorology, the distribution of the population around the  
16 plant at various degrees, all the other things that can be taken  
17 into account, and wraps them altogether and comes out with an  
18 integrated assessment.

19 And these indicate that competing factors, such as  
20 the winds tend to blow away from the population centers,  
21 squeeze down the apparent differences between sites, and taken  
22 altogether, the population figures may be a little misleading.

23 So the answer, again, is, there is not a significant  
24 difference.

25 CHAIRMAN HENDRIE: That is one sort of consideration,

sp11 1 but the error of those -- on that consequent modeling is pretty  
2 large, isn't it?

3 MR. LEVINE: If I may, there are large errors,  
4 uncertainties, in the calculation indicated in WASH-1400.  
5 Furthermore, the model as designed is designed for calculating  
6 100 reactors as an ensemble and not per reactor. It is not  
7 designed for individual site calculations. It is probably good  
8 enough to 10 or 15 miles, because the Gaussian meteorological model is  
9 pretty accurate out there, so the early kind of results, the  
10 early health effects that you would see from large doses in  
11 close are probably better than the far-out doses.

12 On the other hand, the far-out doses are sort of  
13 manrem-dependent, and it doesn't matter very much. It is not  
14 clear how good the model is for far-out calculation, because  
15 one doesn't have downwind data, and the effects would have to  
16 be included in the model.

17 MR. BUNCH: The point here is not that the results  
18 are very accurate, are very precise. One of the good aspects  
19 of the crack model is that it can take the population, distri-  
20 bution, it can take meteorology to the extent that we are able  
21 to characterize it with all its limitations, and take them  
22 together, integrate them, and give you something that is more  
23 complete, a more complete picture. It still has limitations.

24 COMMISSIONER GILINSKY: Suppose we took Indian Point  
25 or Zion? What was the significance of these sites?

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1 MR. DENTON: These were the candidate sites that were  
2 originally proposed, as the most suitable site.

3 MR. CASE: Perryman was the one that tripped the  
4 500 persons per square mile. These were alternative to  
5 Perryman. This is a live case.

6 COMMISSIONER GILINSKY: I see.

7 MR. DENTON: Now, we have done this sort of thing  
8 for higher population sites. I think with regard to Newbold  
9 Island, about a factor of 10 for Newbold Island was  
10 site that prompted the --

11 COMMISSIONER GILINSKY: Isn't the risk, the WASH-1400  
12 risk, concentrated in a very small number?

13 MR. DENTON: In the higher population sites.  
14 Newbold Island --

15 COMMISSIONER GILINSKY: Like a handful of plants out  
16 of a hundred.

17 MR. DENTON: Yes, sir.

18 COMMISSIONER GILINSKY: Do we have numbers on that?  
19 Have we --

20 MR. BUNCH: On the relative --

21 COMMISSIONER GILINSKY: Yes. Have we done this for  
22 existing sites, this kind of analysis?

23 MR. DENTON: For Newbold Island the numbers turned  
24 out in dollar values, it was approximately a factor of 10 high,  
25 higher than these.

CHAIRMAN HENDRIE: The difference is significant, as

spl3

1 you move from site to site. The calculational method has a  
2 number of uncertainties in it. If you look at the absolute value  
3 of the numbers, I expect the uncertainties quoted in  
4 WASH-1400 apply, the factor of 5. How much error do I associate  
5 with the relative differences down the column? It seems to me  
6 that there is still an error of -- considerably involved --  
7 because the model was set up to treat the ensemble, and I don't  
8 know quite what it does when you put in one and crank one site  
9 and then crank on through to an end number and then go back and  
10 put in another site.

11 I think there are still some errors, but what are  
12 they factors of?

13 MR. CASE: I thought they told me, within a factor of  
14 2, it is not significant. A relative factor of 2 is not  
15 significant.

16 MR. DENTON: Yes, sir.

17 MR. BUNCH: I believe, if you look at the model just  
18 as a way of computing consequences from a given accidental  
19 release, you can see systematic differences between the sites.

20 I think, if you are careful about what -- the purpose  
21 and the application of the model, you ought to be able to dis-  
22 tinguish between sites, if you start seeing factors 3, 5, 10  
23 differences. There are still uncertainties, as Mr. Levine was  
24 pointing out. The assumptions as to the meteorological trans-  
25 port are fairly simple. If you find that there are differences

spl4

1 in the topography from site A to site B, that is not normally  
2 taken into account in these calculations, and you have to be  
3 very careful -- and if you see a difference between 2 and 3 --  
4 to see whether or not that is due to the assumptions you have  
5 made or due to the differences in the site.

6 So it is no better and probably no worse than a lot  
7 of other techniques that are used to discriminate between  
8 sites.

9 MR. DENTON: Then you have the other various indica-  
10 tors --

11 MR. CASE: It is better than raw population density.

12 MR. BUNCH: What this viewgraph shows is the same  
13 type of information comparing now a site that has a substantially  
14 higher population than the ones indicated in the previous view-  
15 graph.

16 The right-hand column is based on the Newbold Island  
17 population and just looks at six different kinds of consequences  
18 that are computed in the WASH-1400 consequence model.

19 Again, don't pay too much attention to the specific  
20 numbers, other than to note that of the five values for the  
21 left-hand side, there are some differences, although they are  
22 relatively small. The Newbold Island population was rather  
23 higher, considerably higher than any of these five, and now you  
24 begin to see differences that are more appreciable, and they  
25 generally run a factor of about 10 higher than the less densely

spl5

1 sites.

2 I personally would take these to indicate that the crack  
3 code can show some significant differences based on population  
4 density.

5 MR. DENTON: In all of these tables they have been nor-  
6 malized to 1 from Perryman. They are all in the basis of  
7 each parameter, compared to Perryman.

8 CHAIRMAN HENDRIE: Did I not read the figure right?  
9 Why is Newbold relatively low to Perryman in infant mortality?  
10 Is it close in population?

11 MR. BUNCH: Frankly, I don't know the answer to that.  
12 The population at Newbold Island is somewhat higher  
13 than in Perryman, than we would have expected.

14 CHAIRMAN HENDRIE: It is not in close, or is it?

15 MR. BUNCH: I believe it is about 100,000 people at  
16 Newbold Island, and these particular values.--

17 CHAIRMAN HENDRIE: Within what?

18 MR. BUNCH: Within 10 miles.

19 CHAIRMAN HENDRIE: But once you come down to a mile or  
20 two, that goes to zero effectively, or under five miles. I  
21 think that was one of what the applicant felt was a redeeming  
22 grace of that site, that even though the numbers were large, as  
23 you went out, that right around the plant within the several-mile  
24 range it was low. I wonder if that is the effect we are seeing  
25 here.

sp16

1 MR. BUNCH: That is possible. The difficult things in  
2 the code is when you get unusual results, such as this, results  
3 that you may not have expected. You have to go back and look  
4 at precisely what was the population distribution to confirm  
5 that in fact that is what would be predictable.

6 CHAIRMAN HENDRIE: Now, these are all cut off at 30  
7 miles.

8 MR. BUNCH: The consequence assessments are taken out  
9 to 500 miles. As Mr. Levine was pointing out, the manrems  
10 generally occur in a range of 30 to perhaps 200 miles or so.  
11 The principal source of that. And acute fatalities are in an  
12 area of perhaps a few miles out to perhaps 25 miles, as  
13 calculated.

14 So the estimates take into account the population out  
15 to very large distances.

16 CHAIRMAN HENDRIE: I am surprised at the manrem and  
17 the differences between that and Perryman.

18 Well, no matter. Onward.

19 MR. DENTON: I think, in doing this, we had some  
20 questions also about why we were getting these sorts of  
21 results, and we didn't use these results in our final comparison  
22 of sites.

23 CHAIRMAN HENDRIE: Perryman is southwest of the  
24 Newbold site, by what, maybe?

25 MR. BUNCH: I think about 12 miles or so.

spl7

1 CHAIRMAN HENDRIE: It's more than that, isn't it?  
2 Perryman is -- southwest of Perryman. But it is more like 30 or  
3 40, something like that.

4 MR. DENTON: You mean, upcreek?

5 CHAIRMAN HENDRIE: No, Newbold.

6 MR. DENTON: Yes, you're right.

7 MR. BUNCH: The populations that we are using --

8 MR. DENTON: North of Baltimore.

9 CHAIRMAN HENDRIE: Which is about how far away from  
10 Newbold? 50 miles?

11 MR. DENTON: At least that.

12 CHAIRMAN HENDRIE: On the other hand, as you start  
13 sweeping out the circles, the code runs out to 500 miles, at  
14 which place you have got the whole Mid Atlantic population for  
15 both sites. I am just surprised at a factor of 10 in manrem.

16 MR. LEVINE: That is an ensemble. Perryman is near  
17 the ocean, and we stop calculating over the ocean. There is no  
18 population density. Perryman, for instance, is a lot closer to  
19 the ocean than is Newbold.

20 MR. DENTON: It's about the same.

21 CHAIRMAN HENDRIE: But you sweep out the same popula-  
22 tion. You have got the center of a 500-mile circle that is  
23 placed 50 miles south then there is great population mass, and --

24 MR. BLOND: You are still dominated by the population  
25 in certain areas and by the probability of the wind blowing in

spl8

1 that direction. It is the combination of the events that you  
2 are indicating what is happening on that chart.

3 MR. LEVINE: Wind direction probability.

4 MR. BUNCH: I think this discussion should serve to  
5 indicate, when you start using results such as the crack code,  
6 you have to be very cautious about drawing too much meaning  
7 into the things, and in fact that was the comments offered by  
8 research, and they are included in our paper, and I believe  
9 both OPE and OGC noted that there were difficulties in direct  
10 application of these kinds of analyses, which we had also  
11 noted.

12 If I might have the fifth viewgraph, we can now turn  
13 to the related discussion on how these kinds of analyses might  
14 impact on whether activities related to siting policy.

15 (Slide.)

16 This was discussed in your letter of the 24th of  
17 April.

18 The first one is PRM 50-10. As the subject indicates,  
19 the rule-making proposed would be to require explicit considera-  
20 tion of class 9 accident risks whenever a new or novel siting  
21 or design approach was suggested.

22 This one is related to the SECY paper in the sense  
23 that they are talking about an unusual situation in the SECY  
24 paper, and we have indicated that we thought that we at least  
25 had to go back and see whether the standard practice was still

spl9

1 applicable.

2 It is a discretionary sort of thing, a trigger and  
3 approach that says, let's make sure that things are still as  
4 they appear to be.

5 The proposed rule-making goes rather beyond that and  
6 would require a mandatory and explicit analysis of class 9  
7 accidents under the defined conditions.

8 Now, the status of that action is that we have advised  
9 the petitioner that our response to the petition would await  
10 completion of the staff's liquid pathway generic study, and the  
11 petitioner may withdraw the proposed rule-making, since the  
12 liquid pathway study satisfies the intent of this petition, at  
13 least the remedy that he was seeking.

14 As I mentioned, SECY 137 is related to this in the  
15 sense that it accepts the thrust of the proposed rule-making as  
16 it relates to our NEPA site reviews.

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1           The next one is a proposed rulemaking to modify 10  
2 CFR Part 100 so as to provide explicit numerical population  
3 density criteria. A paper has been prepared for concurrence  
4 by Standards. There are basically four options to this paper.  
5 One of them is the obvious, to accept. One of them is to  
6 deny. One of them is to accept in part and say, yes, we think  
7 there may be value in putting numerical population density  
8 criteria into the regulations, but that such criteria ought  
9 to comport more closely with what the staff's current practice  
10 is. Our final option is to deny the petition, but to note  
11 that we do have ongoing activities related to our reassessment  
12 of Part 100, and that this particular action would be  
13 considered under that envelope of activities.

14           The next category of papers are those on general  
15 siting Policy. Standards has prepared a copy, a paper for  
16 concurrence. At this time, there are discussions taking place  
17 between Standards and NRR as to the appropriate scope and  
18 content of this paper.

19           There was a second formal paper, to consider  
20 alternatives to current policy, general policy statement, and  
21 that paper is being deferred pending resolution to the  
22 statement of current policy.

23           The SECY paper before you today would articulate one  
24 narrow aspect of our general siting review, that aspect  
25 dealing with our NEPA review of alternative sites.

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1 Papers on accident analysis for Part 1.00, siting  
2 assessments are also in preparation. I mentioned that SECY  
3 78-111 was completed. That is the paper on current practice.  
4 Standards has solicited comments from various staff members  
5 and officers on possible alternatives to current practices.  
6 It is currently scheduled for completion in July of 1978,  
7 although there may be some delay in that because of the  
8 activities in the other papers I mentioned.

9 Emergency planning. In earlier months, the staff  
10 has discussed the possible amendment to Part 50 to provide for  
11 emergency planning beyond the LPZ in certain instances. This  
12 paper, SECY 137, is not really related to the emergency  
13 planning, except to the extent that the analyses that we did  
14 in support of the paper provide some input as to the risk that  
15 might be considered in developing an emergency plan.

16 Finally, I have noted that the staff has under way a  
17 study activity, generic study activity to determine whether or  
18 not to update or otherwise dispose of the proposed annex that  
19 provides guidance on treating accidents in environmental  
20 statements. The NRR has developed a category, a task plan, to  
21 scope and schedule this effort. We expect it to be complete,  
22 hopefully, some time next year.

23 Now, if you have any questions on any of these, I  
24 can try to answer them. We have several members from  
25 Standards who can provide more detail should you request it.

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1 Standards who can provide more detail should you request it.

2 CHAIRMAN HENDRIE: Slide back up to that one which  
3 assigned some dollars to the five sites.

4 (Slide.)

5 CHAIRMAN HENDRIE: I wonder if this is going to be  
6 typical. That is, the proposition here is to say, look where  
7 population density for a proposed plant hits the trip line, we  
8 want to look more carefully at alternative sites than would  
9 otherwise be the case. And part of this more careful looking  
10 is a consideration of relative Class 9 risks for the original  
11 and alternative sites. If the results --

12 Now, in order to use that Class 9 element in the  
13 comparison, you have to find some way to reduce its effects to  
14 units which are compatible with the units in which other  
15 effects will be measured between the alternative sites. And  
16 what you have done here is to go to dollars, as is normal in  
17 these sorts of analyses, and used a consequence model from  
18 WASH-1400 as the tool to get there.

19 And it turns out that the difference between sites,  
20 even between over factors of ten in population out to 30  
21 miles, turn out to be within what people believe to be sort  
22 of the slop in the calculation.. The right-hand column says  
23 that these five sites are indistinguishable for Class 9  
24 purposes with regard to the differences between them due to  
25 the whole residuum of accidents with regard to Class 9. So

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1 for these five sites the Class 9 exercise is a wash. That is,  
2 it doesn't distinguish between these sites in any meaningful  
3 way.

4 MR. BUNCH: That is correct.

5 CHAIRMAN HENDRIE: Now, is there something special  
6 about this array of alternative sites, these five sites, that  
7 makes them come out that way? Or is this likely to be the  
8 general outcome for alternative sites?

9 MR. DENTON: I'd look at it in this light, that  
10 Perryman was just barely over the 500, just barely tripped.  
11 So it is not too far over the criterion that we were using as  
12 a ~~trip~~ that it says that at that level you are not apt to find  
13 sites that vary much with regard to residual Class 9. Of  
14 course, I took it as something of a confirmation, at least in  
15 this part of the country, of the 500 as the trip point.

16 Now, it doesn't say that if you found sites that  
17 were very isolated, as you can find in the Southeast or  
18 perhaps some section of the country, you might find more of a  
19 difference. But certainly in the Northeast I think this is  
20 representative of what it will be between sites, especially in  
21 a site which comes close to the 500 number. It doesn't get  
22 too far out of line from it.

23 COMMISSIONER GILINSKY: The 500 only applies from  
24 zero to 30 miles?

25 CHAIRMAN HENDRIE: Yes.

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1 MR. DENTON: It was picked based on looking all the  
2 way out to 100 and trying to find a number; and it was based  
3 on looking at different regions of the country and so forth.  
4 It is really a number derived for the Northeast U.S., which  
5 was the most densely populated.

6 CHAIRMAN HENDRIE: If you take the sites and plot  
7 the population within the circle of Radius R versus Radius I,  
8 you get a series of curves that go up like this. Some are low  
9 and rise; some rise fast and flatten. You get an array  
10 between the sites.

11 If you go to a large enough R, they all converge.  
12 And why is that? At R equals 3,000 miles, you have got the  
13 population of the United States, wherever the site is.

14 (Laughter.)

15 CHAIRMAN HENDRIE: And on a more reasonable scale  
16 for reactors in the eastern part of the country, by the time  
17 you get out around 40 or 50 miles for any site, almost any  
18 site in the eastern part of the country, you have begun to hit  
19 major metropolitan centers. And as you go on out, you just  
20 pick up more, and the population number just converges on sort  
21 of the population of the Northeast and the population of the  
22 Southeast. So that you don't get any distinction, really,  
23 between sites if you go way out, if you take large --

24 If you come in to small R and say we will only  
25 consider it within two miles, then you say, gee, wait a

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1 minute, that is getting too close to the plant. The effects  
2 clearly stretch further than that. And there are differences.  
3 30 was sort of a guess-and-by-God cutoff point taken about as  
4 far out as you could go and still see reasonable differences  
5 between the existing array --

6 COMMISSIONER GILINSKY: What is the relation of the  
7 30 miles to the radius in which there would still be effects  
8 in a Class 9 accident that would be expected to occur?

9 MR. DENTON: It is beyond the radius at which you  
10 would expect fatalities to occur. It is nowhere near as far  
11 out as you would expect man-rem doses to occur.

12 COMMISSIONER GILINSKY: Some of the man-rem -- in  
13 other words, would the 30 encompass the bulk of the event?

14 MR. DENTON: We have some studies ongoing to look  
15 at that. Perhaps someone in the audience knows the answer.

16 MR. LEVINE: What was the question?

17 MR. DENTON: What percentage of man-rem is picked up  
18 in certain distances with the crack code?

19 MR. BLOND: Between about 30 miles and 200 miles  
20 you pick up probably more than 90 percent of the man-rem.

21 COMMISSIONER GILINSKY: So 90 percent of the man-rem  
22 would be beyond the 30 miles.

23 MR. LEVINE: Yes.

24 MR. BLOND: On a risk basis, yes.

25 MR. CASE: But it is all constant anyway, because

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1 it is all essentially the same beyond 30 miles or maybe 50  
2 miles.

3 MR. LEVINE: May I say something about that chart?  
4 I think it is very germane. You are accepting that model as  
5 the correct model. I think there are reasons for questioning  
6 it. For instance, you made an observation about the totals  
7 being nearly the same. If you look at the constituents of the  
8 totals, you find it all comes from the man-rem. And as you  
9 point out, the man-rem are almost all the same, because in  
10 general the population is almost all the same in large  
11 distances.

12 However, you now have to examine the dollar values  
13 assigned, and they counted \$1,000 per man-rem and \$1 million  
14 per fatality. In fact, I think the \$1,000 per man-rem is  
15 probably high by two orders of magnitude. And if you change  
16 it, then you get a markedly different result. And in fact, if  
17 you forget about man-rem and just look at early fatalities,  
18 then you see significant differences.

19 So there are different ways to parcel this. And if  
20 you take into account life-shortening effects, as opposed to  
21 fatalities, you can then compare, make a comparison between  
22 the relative dollars in an early fatality and the relative  
23 dollars in a late fatality.

24 So one ought to examine this model more carefully,  
25 and one might be able to make more sense about how to judge

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1 differences in sites.

2 COMMISSIONER GILINSKY: The point I was going to  
3 make is a different one, is that we are using a criterion for  
4 whether or not to look at Class 9 accidents whose effects are  
5 beyond 30 miles. We are using a criterion which counts the  
6 population within the 30 miles. My question is: Why wouldn't  
7 we do it for every site? Do you follow me? In other words,  
8 why bring in the question of Class 9 accidents only in those  
9 cases where the population exceeds some limit in the zero to  
10 30 mile range when that isn't where the bulk of the effect of  
11 the Class 9 accident is anyway?

12 In other words, if we wanted to take into account  
13 Class 9 accidents, it would seem to me we would want to take  
14 them into account in all places.

15 MR. DENTON: I think you are asking two different  
16 questions. One is, in the NEPA analysis, why not take into  
17 account Class 9 accident consequences in every case?

18 COMMISSIONER GILINSKY: Yes.

19 MR. DENTON: I think that is -- the revision of Annex A  
20 is the category A task action plan, and it requires having a  
21 tool that is competent to get an accurate calculation on it.  
22 That is the category A that Del mentioned that we are redoing  
23 the ways that we calculate three through eight, to make sure  
24 that we are doing them consistently with nine. And we would  
25 hope that within a year we would have three through nine all

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1 done on a consistent manner on every case.

2 COMMISSIONER GILINSKY: You are proposing to do the  
3 Class 9 in certain cases?

4 MR. DENTON: We're only proposing to do it where it  
5 is different than the usual plan.

6 COMMISSIONER GILINSKY: Why limit it to those cases?

7 MR. BUNCH: If we look at monetizing or any of the  
8 other tests and we take into account both the calculated  
9 consequences and the calculated risks of abilities, the  
10 judgment we generally have is that the numbers are very low.  
11 The calculation is not particularly easy to perform. And  
12 simple economy says if we can conclude that the outcome is not  
13 going to influence the balancing between alternative sites in  
14 any significant way, it doesn't seem to me, at least, to be  
15 particularly beneficial to go through the exercise of a  
16 numerical calculation.

17 Even in this particular instance, it is not clear  
18 that if a future case came up, that there would be benefit in  
19 doing a specific crack calculation. I think we might well be  
20 able to say, yes, there are differences in Class 9 risks here  
21 versus one in a very isolated area. The sites are relatively  
22 homogeneous, the candidate sites here, and based on work such  
23 as has been done here, we have every expectation that if we  
24 did a calculation, it would only show, as in all the other  
25 cases, the risks are very low.

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gsh

1 CHAIRMAN HENDRIE: But you seem to think that  
2 they are significant enough to take into account.

3 MR. DENTON: Because there are choices between  
4 alternative sites; whereas, it might affect your choice  
5 between alternative sites; whereas, if it didn't affect the  
6 basic decision, if population density is low to begin with  
7 at the preferred site, then we would not learn information  
8 that would, say, go to other sites.

9 I think that we have looked on it as a decision --

10 COMMISSIONER GILINSKY: There may be other reasons  
11 for sites, for looking at one or another site, even though  
12 the population density is lower than the 500 per square mile.

13 MR. DENTON: We do that anyway. We look at other  
14 alternative sites from an environmental standpoint, but we  
15 don't give population particular weight, unless it gets  
16 high enough to warrant this detailed look at the different  
17 consequences.

18 COMMISSIONER GILINSKY: I don't see why you would  
19 attach more significance to that in the over 500 square mile --  
20 persons per square mile case than in the under 500 persons  
21 per mile case when the facts --

22 MR. CASE: This is just the minimum effects. The  
23 acute effects are much closer in than 30 miles.

24 COMMISSIONER GILINSKY: But you are lumping them  
25 altogether.

gsh 1 MR. CASE: That may not be the way to do it. Maybe  
2 you ought to look at each of the individual ones.

3 MR. DENTON: We have done it also separately, but  
4 we have tried to put them together to get a total fix. But  
5 we also look at each one of these parameters separately.

6 MR. BUNCH: As Chairman Hendrie pointed out, this  
7 particular graph is where we try to convert everything into  
8 numerical values so that we have a figure of merit to compare  
9 against other numerical values.

10 In the paper, we tabulated acute fatalities, other  
11 kinds of impacts that might be associated with the Class 9  
12 accident and looked at those separately.

13 As Mr. Case has pointed out, it is not completely  
14 obvious that this kind of lumping together provides you with  
15 all the right insights into comparison between the alternative  
16 sites.

17 MR. DENTON: The 30 miles was really a way to --  
18 that the staff thought would help differentiate when you  
19 could distinguish between sites with some -- more than a  
20 factor of 2.

21 In this case, it is barely distinguishable between  
22 the ones. And I think for the standard case, we have just  
23 referred to 1400 as being the best representation of Class 9  
24 residual risk, applicable to sites in general and applicable  
25 to any particular site that was not an exceptional one.

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1 MR. KELLEY: Aren't most of the fatalities going  
2 to be in the 30 mile?

3 MR. DENTON: Yes.

4 MR. KELLEY: Then that's a good reason.

5 CHAIRMAN HENDRIE: You are talking about something  
6 different. Harold and company here are talking about an  
7 additional element that they think it would be appropriate  
8 to use in comparing alternative sites.

9 What you are saying is, look, when you go ahead  
10 and try to total up the environmental costs of this plant,  
11 why don't you run through and take the n)ll range of Class  
12 9s?

13 The answer is they are trying to work out some  
14 reasonable computing machinery to be able to do that on a  
15 consistent basis through the whole list.

16 COMMISSIONER GILINSKY: The additional part is because  
17 the bulk of the Class 9 effects seem to be beyond the 30-mile  
18 limit.

19 MR. DENTON: For man-rem, that is true.

20 COMMISSIONER GILINSKY: If they weren't, then I  
21 would say what they are suggesting makes a lot of sense. In  
22 other words, they left out the Class 9. If you are getting  
23 over the 500 person per square mile limit, then you may have  
24 some population problems, so we are going to look a little  
25 more carefully.

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1 MR. CASE: If I had weighted acute deaths, a  
2 factor of 10 higher in cancers, a factor of 10 lower, it would  
3 admit that point and you would say fine. It depends on how  
4 much weight you want to assign to each one of these stands.

5 And Sol makes the point that we have weighted  
6 man-rem by a factor of 100 too high.

7 COMMISSIONER GILINSKY: You may think you have  
8 weighted fatalities too high, too.

9 MR. DENTON: I think the 500 served its purpose.

10 CHAIRMAN HENDRIE: Don't attack a policy which has  
11 been enormously useful in an almost totally informal way.

12 (Laughter.)

13 MR. BLOND: There is one other point that might be  
14 made and that would be that the population that you have got,  
15 or the -- excuse me -- the figure -- I just lost my point.

16 (Laughter.)

17 MR. CASE: 500 per person is good, maybe you were  
18 going to say.

19 MR. BLOND: No. A design basis accident in  
20 Class 3 through 8 accidents don't really given you any other  
21 merit that you can measure population in close at all because  
22 there is no facts that will essentially be generated by this.  
23 You need the Class 9 accident in order to make any evaluation  
24 of consequence.

25 CHAIRMAN HENDRIE: Population dependence.

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1 MR. BLOND: That's right. So it is the Class 9,  
2 the use of the Class 9 accident that is required to see  
3 what is going to be the effect on a population.

4 MR. DENTON: I would think that we would be  
5 revising this 500 number as a result of the actions that have  
6 been mentioned. It was developed before 1400 was available.  
7 And so it was based strictly on looking at population density,  
8 variances in the country and choosing a number based on  
9 what was available with regard to sites, rather than this  
10 detailed knowledge of where fatalities occur, man-rem occur,  
11 or decontamination costs occur.

12 I think that with the knowledge we have now got,  
13 we can go back and develop a much more sophisticated indicator  
14 of relative consequences. But in terms of its usefulness,  
15 it has resulted in proposed sites which have been in the low  
16 range of alternatives available in the applicant service  
17 region.

18 MR. MALSCH: One of the problems has been that the  
19 part 100 reviews have tended to focus on the doses at  
20 selected distances from essentially Class 8 accidents. As  
21 technology improved, that particular calculation didn't turn  
22 out to be useful in controlling other densely populated  
23 areas.

24 When part 100 was put out way back, 15 or so years  
25 ago, it was stated that it was intended that the Part continue

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1 Commission policy of keeping reactor sites away from dense populations.

2 So once the dose guideline value calculations didn't  
3 serve that purpose, the staff had to look to other kinds of  
4 methodologies to achieve what was thought to be the  
5 underlying purpose of the part; namely, to have some way of  
6 avoiding selling near-density populated areas. And this is  
7 just the latest in those.

8 MR. DENTON: Back in the days that we are discussing  
9 in '73, there was a continuing trend in applications to go  
10 to higher and higher populated, or more populated sites,  
11 with Newbold being the highest.

12 I think that step -- and when the line was drawn  
13 there and when the staff adopted criteria to determine that  
14 practice, now I think you are correct to question the  
15 relationship between that and what we now know about 1400.  
16 It is not the right way to present it.

17 CHAIRMAN HENDRIE: The simplicity of the trip point  
18 compensates for a lot of the objections that you might have  
19 because of this simplicity. It doesn't require much of a  
20 struggle at all to know whether you are in the ballpark or  
21 above or below.

22 There is a lot of advantage in that.

23 COMMISSIONER GILINSKY: If you are below in that  
24 limit, do you take population into account at all in  
25 assessing the advantages of alternative sites?

ash 1 MR. DENTON: No.

2 COMMISSIONER GILINSKY: You don't.

3 MR. DENTON: If it is below 500 --

4 CHAIRMAN HENDRIE: Is there a special case of that  
5 where one site or another has some peculiar evacuation  
6 properties?

7 MR. CASE: Yes, but I understood his question to  
8 be on the NEPA side. On the NEPA side, no.

9 MR. DENTON: Comparing most of our rackups of  
10 alternative sites, we include population, but we don't  
11 explicitly take it into account if it is below, if the  
12 proposed site is below the trip point.

13 COMMISSIONER GILINSKY: Suppose you were looking at  
14 a site which is below that trip point and you had these sorts  
15 of answers, calculations available. Would that as a practical  
16 matter affect your decision in any way? Would this affect  
17 these residual accident risks, weigh in the balance  
18 significantly?

19 MR. DENTON: I think at these levels and recognizing  
20 the uncertainty that is in them, we would tend to focus more  
21 on the environmental differences between the sites and  
22 differences like this.

23 COMMISSIONER GILINSKY: You are saying it wouldn't  
24 really amount to anything?

25 MR. DENTON: Not at this level. That is correct.

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1 COMMISSIONER GILINSKY: Why would it in the  
2 over 500 category?

3 MR. CASE: It might not either. It just says  
4 look and see. That is what the policy says.

5 CHAIRMAN HENDRIE: It didn't here as calculated  
6 for this array.

7 MR. DENTON: We had expected a bigger difference  
8 to turn out, based on the difference in the zero to 30 mile.

9 CHAIRMAN HENDRIE: On the other hand, I expect  
10 Raven's would still be perceptively different?

11 (Pause.)

12 Richard, you have been silent through all of these  
13 questions to this point.

14 COMMISSIONER BRADFORD: ~~Some things sink in slowly.~~

15 MR. BUNCH: That basically concludes the  
16 presentation we had planned today. The only final remark I  
17 would add is, again, there is a need in the NEPA reviews to  
18 consider and balance the various economic environmental  
19 safety issues associated with alternative sites. And we do  
20 so, as Harold was just pointing out.

21 What the substance of this discussion is, when we  
22 run into an unusual situation and we feel the need, and it is  
23 so suggested in our paper to take a look and make sure that  
24 we are still satisfied, at least from the population  
25 standpoint that there is no special need to take accident risks

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1 or give risks great weight in the overall balancing.

2 We have found this particular device to be helpful  
3 to us in that assessment. I am not sure that unless we have  
4 a different kind of ensemble of sites in the next alternative  
5 site review, that we would necessarily invoke this  
6 particular method. It does seem to have some aspects. As  
7 has been indicated several times in the discussions today,  
8 there are complications in it that have to be approached  
9 cautiously.

10 There are several activities underway to better  
11 understand the values and the limitations on the crack  
12 model in site specific evaluations and in evaluations of  
13 alternative sites.

14 COMMISSIONER GILINSKY: Is it your view that the  
15 use of this model is inappropriate in some way??

16 MR. LEVINE: This is a first effort. I don't want  
17 to be critical of it. But if one wants to use it on a more  
18 regular basis, one ought to do it more carefully.

19 You can get right out of the BEIR Report, for  
20 example, that a latent cancer fatality is worth somewhere  
21 between \$10 and \$1.00 per man-rem. And if you apply life  
22 shortening considerations, it is worth about a third of that.  
23 So it comes down to \$3 to \$30 a man-rem, or about \$10 a  
24 man-rem, because you only lose about a third of a life, and  
25 things like that.

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1                   And then I think that you want to weight those  
2 things, weigh the various factors, as opposed to just  
3 adding and see what you think about it. Then you might get  
4 some index --

5                   COMMISSIONER GILINSKY: But even if you reduce the  
6 man-rem by 100 --

7                   MR. LEVINE: Well, then, but the question is if they  
8 are all the same, still, or roughly all the same, you want  
9 to use those as part of your index or not. And then one has  
10 to think that through.

11                   How would you weight, again, the importance of  
12 early fatalities versus late fatalities on scales other than  
13 just life shortening, for instance?

14                   COMMISSIONER GILINSKY: These are vague indications.

15                   MR. LEVINE: You might want to look, for instance,  
16 at a large number of sites to see what kinds of variances  
17 you do get and convince yourself they are small or if they  
18 are large, you might find it a better way of combining the  
19 things together in a model to give you more useful guidance.

20                   I am not sure how important it is. I think there  
21 was a misstatement made earlier that the risks from accidents  
22 are not the same as those from routine effluent releases.

23                   I think that they are in terms of man-rem, at least,  
24 three orders of magnitude smaller from accidents than from --  
25 per year, than from a routine effluent release.

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1 MR. DENTON: I meant to say -- I thought they were  
2 comparable occupational exposure.

3 MR. LEVINE: Occupational exposure is about the  
4 same as routine effluent releases. I misunderstood.

5 COMMISSIONER GILINSKY: Comparing to the other  
6 accident categories.

7 MR. LEVINE: If you want to look at accidents and  
8 forget that, then the large accident end of the spectrum  
9 gives you

10 MR. DENTON: There is one other area where we use  
11 these numbers. That is in comparing the health effects of  
12 alternative energies. There we don't monitor them. We  
13 leave them in terms of health effects in comparing to coal.

14 MR. BUNCH: That concludes our remarks.

15 CHAIRMAN HENDRIE: Peter, have you developed any  
16 questions? I see that you have developed a puzzled look,  
17 if it is not quite verbalized yet.

18 There were assorted commentaries on the paper.  
19 Jim?

20 MR. KELLEY: I'll pass.

21 CHAIRMAN HENDRIE: You'll pass. Does OPE want a  
22 quarter's worth of the discussion here?

23 MR. SEGE: Yes, Mr. Chairman.

24 CHAIRMAN HENDRIE: Go ahead.

25 MR. SEGE: We have seen the great uncertainties

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1 surrounding these relationships which everybody in different  
2 terms has indicated a keen awareness of, the uncertainties  
3 about the difference in probabilities in accidents, the  
4 uncertainties -- the nature and magnitude of an accident  
5 that might occur, the different uncertainties regarding  
6 whether topographer emergency actions, population shifts  
7 over time, uncertainties and possible controversies about  
8 the gross simplification as applied to the results in terms  
9 of translation to dollar terms.

10 So the question, the basic question really arises,  
11 how much calculation such as this really adds to knowledge  
12 about a specific site?

13 Is that additional knowledge really real? Do we  
14 know precisely what the risks are in preparing these sites?  
15 Is that knowledge stemming from this case analyses primarily  
16 illusory?

17 If the knowledge is not that real, then the question  
18 occurs whether some sort of simple population guidelines that  
19 might exclude siting above certain population densities or  
20 generally permits siting below certain population densities  
21 and perhaps create a zone in between where there may be a  
22 presumption that could be overcome.

23 Whether the simple guidelines wouldn't do just as  
24 well as case calculations, on the basis that is now possible  
25 and actually proposed, whether it does not introduce possibly

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1     damaging illusions of knowledge, whether we don't possibly  
2     tend to gloss over things that don't happen to appear in  
3     the model of calculation.

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1 I am not suggesting an answer; I am suggesting  
2 a question regarding two ways one could go in terms of  
3 following some sort of guideline based on generic evaluation  
4 of Class 9 accident possibilities versus (inaudible) case.

5 There is an intuition which says that low population  
6 densities around reactor sites are better than high population  
7 densities. The consequence model calculations don't seem  
8 to correlate very strongly with that intuition, and it is  
9 not clear why, and it makes me somewhat uncomfortable that  
10 there is no such strong correlation but there is no clear  
11 showing that the intuition is likely to be wrong.

12 I would feel more comfortable if there were more  
13 of a correlation between results and the intuition that it is  
14 better to site in less densely populated sites.

15 Lastly, I have -- the question has been raised  
16 before in the course of the discussion as to whether it is  
17 really appropriate to confine Class 9 considerations to just  
18 the 500 population, but that there are other situations where  
19 it could be notably a situation in which the compensating  
20 containment design features which make it possible to, in a  
21 very small population zone, such as -- well, under a mile  
22 and whether in those cases not considering the Class 9  
23 possibilities might not result in an incomplete and perhaps  
24 misleading evaluation of the proposed site.

25 With this, I would like to leave the question whether

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1 the power of this analysis applied to individual cases is  
2 sufficiently strong for the intent and purposes and whether  
3 consideration of Class 9 accidents should properly be  
4 confined to just those cases of 500 and more population, or whether  
5 there aren't certain other situations, where consideration should  
6 be given to Class 9 accidents also in some sort of fashion.

7 COMMISSIONER GILINSKY: I would like to pursue this  
8 a little further because I don't think I was clear in what  
9 I said before.

10 We used the population density in a 30-mile circle  
11 to decide whether or not a site needs population standards  
12 of some sort.

13 MR. CASE: At varying distance.

14 COMMISSIONER GILINSKY: It is a little more  
15 fine grained but it goes out to 30 miles.

16 MR. CASE: Yes.

17 COMMISSIONER GILINSKY: So what we seem to be saying  
18 is that we care about what happens out to 30 miles. Now if  
19 a site goes over that limit, it seems to me we ought to use  
20 some method that applies to that 30-mile circle.

21 Now it is a separate question as to whether or not  
22 you ought to be looking beyond that circle. If you think you  
23 ought to be looking beyond that circle, I think you ought to  
24 be looking beyond it in every case.

25 But it seems to me that looking beyond it is not

gsh 1 the way to solve the problem within the circle.

2 MR. DENTON: Well, but --

3 COMMISSIONER GILINSKY: I don't know if that is  
4 any clearer.

5 MR. CASE: You are saying that there is a logical  
6 inconsistency in what we do.

7 COMMISSIONER GILINSKY: Not really, because what  
8 we are doing --

9 MR. BUNCH: We are doing an analysis using the  
10 Wash 1400 model. It turns out that that model turns its  
11 calculations out to 500 miles. We do perform assessments of  
12 the effects within that 30-mile area.

13 Typically, what you are going to be interested in  
14 are the early fatalities as you calculate them or -- what's  
15 the other figure of merit? There are about 6 or 7 principal  
16 ones that we use, some of which are more specific to the  
17 close in population. Clearly, using the criterion that  
18 refers to the close in population, one of the things you  
19 want to make sure of is those tests that can come out of the  
20 Wash 1400 type calculation will give you insight on the  
21 within 30-mile differences. You are going to look at it very  
22 carefully.

23 MR. DENTON: Let me go at it another way. I  
24 understand what you are saying. But basically, there are  
25 three decisions or recommendations the staff makes in the

gsh 1 environmental area. Do you need more power? How should you  
2 generate it? And when we compare how you generate it, we  
3 do include in that comparison of the health effects of  
4 generation all the health effects out to all the numbers  
5 of miles. And three, then, is where you build it.

6 So in looking at where you build it, we don't  
7 presently give detailed attention to population if we know  
8 by inspection that the population density is near the minimum  
9 that can be achieved in that service area.

10 That is what our standard review plan does, simply  
11 it assures us that we don't have to look hard because we are  
12 not likely to find sites that are a lot better than the one  
13 proposed if the one proposed is within this very simple  
14 criterion.

15 But when we look at alternatives of energy sources,  
16 we are including all of those health effects beyond 30 miles.

17 COMMISSIONER GILINSKY: But nothing ever comes of  
18 that analysis.

19 (Laughter.)

20 MR. DENTON: It is an important decision point. I  
21 think if it came out the same way, something would come of it.

22 COMMISSIONER GILINSKY: But when we get down to  
23 dealing with a reactor and deciding where to put it, we look  
24 out to 30 miles. That may or may not be the right thing to  
25 do, but in any case, that is what we do.

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1 Now if it goes over our limit --

2 CHAIRMAN HENDRIE: Wait. I don't think that's quite  
3 the right thing to say.

4 MR. DENTON: If it is within 500, we look at the  
5 normal part 100 indicators and we don't give detailed  
6 attention to trying to find better sites between 275 and  
7 310 people per square mile.

8 COMMISSIONER GILINSKY: Right. But if it goes over  
9 the 500, I would think we would want some kind of measure  
10 that applies to that 30-mile circle, some different test.

11 MR. DENTON: The first test that we used to have,  
12 tests that we used to have were nothing other than drawing  
13 on draft paper relative numbers of people, plotting where they  
14 lived, close and far out. Then we came up with the SPI  
15 index, which was a way of weighting people by meteorology  
16 but not by specific meteorology because it gets complicated  
17 and you get direction dependence. And we looked one time  
18 at weighting people in the 30-miles by the weather in each  
19 sector, but that is getting very complicated. And then when  
20 the crack code came along with all of its defects, it was a  
21 way of weighting all the population and the people and the  
22 weather.

23 CHAIRMAN HENDRIE: Even.

24 MR. DENTON: Even. It was the best way available  
25 at the time.

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1 MR. CASE: That is what we have been doing up  
2 until now. It is not perfect.

3 MR. BUNCH: I think your point is well taken, that  
4 of all of the things that might come out of such as  
5 assessment, we ought to make sure that the principal tests  
6 that are looked at are those that relate to the zero to 30  
7 miles.

8 It turns out that because this was a NEPA review  
9 and because we do monetize a lot of impacts that are  
10 associated with the various sites, we thought it would be  
11 useful to go the next step and try to monetize the residual  
12 risks, just to give people some additional perspective.

13 I think from the standpoint of making a comparison,  
14 it would be perhaps to be more helpful to key in on those  
15 that relate to the zero to 30 mile population differences.

16 CHAIRMAN HENDRIE: But if you don't monetize them,  
17 how do you compare the population effects with other aspects  
18 of the alternative sites?

19 MR. CASE: I think that you could still monetize  
20 them. But I think Vic is saying, he wonders whether you ought  
21 to monetize beyond 30 miles, because your basic assumption  
22 going in is they are all the same beyond 30 miles, so you  
23 don't worry about that. You only worry about things up to  
24 30 miles. And therefore, that is your assumption, then stick  
25 with it.

gsh 1           COMMISSIONER GILINSKY: There are two parts here.  
2 One is how you deal with the zero to 30 miles. And if you  
3 are prepared to go above that 500 limit, then I think that  
4 you ought to look more carefully within that circle. And  
5 there may be ways to distinguish sites. If you think you  
6 ought to be looking beyond that, I don't understand why you  
7 wouldn't look at those cases that exceed the limit.

8           It strikes me as being a separate question whether  
9 or not you go beyond the 30-mile circle. And if one decides  
10 that one ought to look beyond, I think that you ought to look  
11 beyond. I think that you ought to look in all cases.

12           I don't see why you are putting some and not others.

13           MR. CASE: I think that we are saying the same  
14 thing a little differently.

15           MR. MALSCH: You would have the same problem if you  
16 are worried about coal mine accidents in the absolute balance  
17 from a nuclear power plant. You would wonder if you could  
18 draw distinctions of up and beyond 30 miles.

19           COMMISSIONER GILINSKY: Harold was saying that in a  
20 lot of these other cases, in an absolute sense, it wouldn't  
21 amount to all that much. And if that is true, I suspect it  
22 is also true in the cases where the 500 person per square  
23 mile has been exceeded also.

24           MR. CASE: Yes.

25           MR. DENTON: Except for very high populated sites.

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1 That's true. As we said at the beginning, the Wash 1400  
2 study shows that most of the risk averaged together is due  
3 to those few sites at the high end.

4 CHAIRMAN HENDRIE: Any other questions?

5 (Pause.)

6 MR. KELLEY: I would like an informational comment.

7 The party tells me that this issue of Class 9, et  
8 cetera, it would be litigated before the appeal board. So you  
9 may get a decision from the appeal board fairly soon. It may  
10 be narrow focus. I don't know. But you may get something  
11 in your in-file before too long.

12 This has been a generic discussion today, but I  
13 just wanted to flag the fact -- as I understand it, the  
14 applicant claims that the staff can't look at Class 9 at  
15 all, and that is the issue.

16 CHAIRMAN HENDRIE: When you say relatively soon, is  
17 that days?

18 MR. MALSCH: That is, the oral argument has been  
19 scheduled for late next week before the appeal board.

20 MR. KELLEY: It might be mid-summer.

21 MR. MALSCH: Briefs have been filed by the staff,  
22 applicant and other parties.

23 CHAIRMAN HENDRIE: There are two recommendations in  
24 the staff paper which was in the commissioner action paper.

25 Would you prefer to lull this a while and then deal

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1 with the concurrent sheet basis rather than -- I feel a  
2 little reluctant to set up and take votes, I must say, at  
3 the moment, and, indeed, this afternoon's exercise was  
4 intended as a briefing to help focus the Commission's attention  
5 on these matters rather than as a decision session.

6 So I would say thank you very much for the  
7 briefing and discussion.

8 The Commissioners are admonished to keep it on their  
9 desks for actions as they feel able.

10 (Whereupon, at 3:20 p.m., the hearing was adjourned.)

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