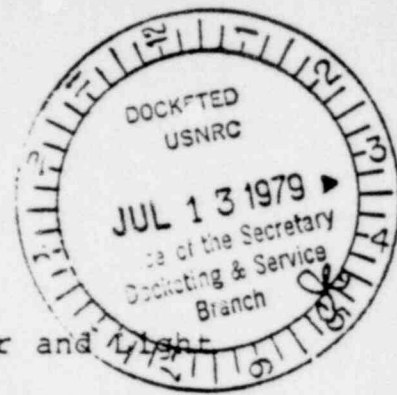


RELATED CORRESPONDENCE

PREPARED TESTIMONY OF MICHAEL L. DARLAND
SKAGITONIANS CONCERNED ABOUT NUCLEAR PLANTS



Evacuation Planning in the Manner of Puget Sound Power and Light Company, Skagit Nuclear Power Plant Project Units 1 & 2

Q: Please state your name and address.

A: My name is Michael L. Darland. My address is 2021 102 Place SE, Bellevue, Washington, 98004.

Q: Mr. Darland, what business are you in?

A: I am in the business of transportation and land use planning. I'm a private consultant.

Q: Would you please give me a brief statement of your professional qualifications.

A: Yes. I have an undergraduate degree in general studies with the primary course emphasis in Psychology and Sociology with minor studies in Economics and Political Science. I have a Masters degree in Urban and Regional Planning, and I have been engaged in the field of transportation planning since 1968.

Q: Could you be more specific about your background in transportation planning.

A: Yes. I first was employed as a transportation planner in 1968 in a private consulting firm. Subsequent to that time I worked in the midwest--Dayton, Ohio--as a transportation planner and a mass transportation planner for a period of approximately two years in the two-county regional transportation planning agency. Subsequent to that I went to Washington DC and was employed by the United States Department of Transportation, the Urban Mass Transportation Administration. My responsibilities there were

as a technical representative in charge of the technical studies for the Urban Mass Transportation Administration in 17 states and Puerto Rico. Subsequent to that time, which was for a period of approximately two years, I returned to the Pacific Northwest wherein I was in charge of regional transportation planning, I was the director of the Transportation Planning Division at the Puget Sound Council of Governments wherein my duties included all of the transportation planning in the counties of King, Pierce, Snohomish and Kitsap for highways, mass transportation and air transportation planning. Subsequent to that time, after a period of approximately four years, I formed my own consulting practice, and I have been engaged in that for a period of about three and a half years. I do transportation planning work for local governments, state government agencies, private sector individuals, developers, etc.

Q: Have you prepared a statement of your professional qualifications?

A: Yes. I have attached a copy to this document and it is labeled Exhibit 1.

Q: Were you requested to render a professional opinion on the feasibility of evacuating the area within ten miles of the proposed Skagit nuclear facility.

A: Yes.

Q: Do you have a basis for rendering such an opinion?

A: Yes. That basis would include my knowledge of the Skagit County area and its road system, the general character of the area and typical land use relationships, a background in transportation and movement of persons from both a practical and theoretical

basis and further the data and materials discussing the need for the time dimensions, population, data and forecasts and the transportation system characteristics further form the basis for that professional opinion.

Q: Are you familiar with the requirements for emergency evacuation plans.

A: Are you referring to the requirements for evacuation as discussed for construction and licensing or for the prevention of deaths and injuries as set forth in the December, 1978, report for state and local government emergency response plans.

Q: Did you consider both of these sets of requirements in rendering your professional judgment?

A: Yes I did. I can't cite page and paragraph from those requirements without having them in my hand to refresh my memory, but I did consider both of those in my rendering of professional judgment.

Q: How did those documents affect the judgment that you are rendering here?

A: Which document are you referring to--the licensing for construction and operation or the other document?

Q: Let's start first with the US Nuclear Regulatory Commission's document on construction permits and operating permits.

A: OK.

Q: What are the elements you considered in these requirements for emergency plans as you understand them?

A: Well, the specific focus I put on the requirements is the preliminary safety analysis report requirement that there be

sufficient information to assure the compatibility of proposed emergency plans with facility design features, site layout and site location with respect to such considerations as access routes surrounding population distributions and land use. My particular focus was on the access routes surrounding population distributions and land use. I should mention that the area in which I considered the feasibility of evacuation was related to the information provided in the environmental impact statement by Puget Sound Power & Light with the emphasis placed on those areas for which the US Environmental Protection Agency's plume exposure protective action guides (PAG's) of five REM whole body and 25 REM thyroid could be reached within eight hours after the onset of the accident basis used in that report. I should mention at this point that in my review of the environmental impact statement, particularly volume 10, I noted a change in the figure numbers 13.3.1 and 13.3.2 in volume 10 and the same figures as cited in the testimony of James A. Martin, Jr. from the office of the Nuclear Reactor Regulation.

Q: You noted a difference. What was the difference?

A: There appears to be a difference in the time within which the loss of coolant accident for a whole body dose and a thyroid dose would actually reach the low population zone outer boundary, which in the case of this particular plant is four miles based on the information available to me; I'm not sure just why there were those changes, but nonetheless, it was these PAG's that I was using to review the data on population land use and transportation and access facilities to the site.

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Q: Did you limit yourself to the low population zone?

A: No. I considered the area out to a ten mile distance from the site based on my review of the data contained in the document entitled Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Lightwater Nuclear Power Plants, with a publication date of November, 1978. That document is identified with the numbers and letters NURG-0396 EPA 520/1-78-016.

Q: Why did you consider this document also in your evaluation in rendering your professional judgment?

A: Well, by necessity an evacuation implies a certain time dimension, and I wanted to make sure in my own mind that whatever times were used as a basis for evacuation had some relationship to the nature of the problem for which people were being evacuated.

Q: Did you make any of your judgments or conclusions based on the effects that would occur to the people if they were not evacuated?

A: No, I took the word and the judgment of the people who have expertise in that area about the effects that would be rendered on the people who would be exposed as for example in the information relating to a "Class 9" accident and specifically the core melt through and atmospheric accident classes based on the information in that document particularly at pages I-44 through I-52 wherein statements and data are provided showing the relative effects of evacuation strategies among seven different strategies. There are three evacuation strategies wherein they speak to one hour delay times, three hour delay times and five

hour delay times, and I was using that information that is the hours of delay time from the time of an event and trying to relate those times to the evacuation of people in that low population zone and the further ten mile radius from the proposed nuclear power plant.

Q: Did you draw any conclusions in your assessment of the evacuation potential for the affected area?

A: Yes. But I would need to set out at this time the order in which I reviewed the information and to try to categorize the various factors that went into this evaluation. I'd say there were about five parts to this answer. The first deals with the underlying population projections of the areas defined by the low population zone and the ten mile zone around the nuclear site. The second would be the evaluation of existing studies by Puget Sound Power & Light and the expert witnesses testifying on their behalf. Third would be the state highway study of Sign Route 20. That report is entitled Legislative Study State Route 20, Interstate 5 to Sedro Woolley, Skagit County, June 1978, and it was prepared for the Legislative Transportation Committee of the 1977 legislature prepared by the Washington State Transportation Commission, Department of Transportation. Fourth, consideration was my own evaluation of various pieces of data and information from Puget Sound Power & Light's previous studies accomplished by the county and the regional planning agency. And then the fifth would be my general conclusions regarding the evacuation plan.

Q: Well alright, let's start with what you have on the population projections.

A: OK. Since the first order problem is to remove the people from the areas which would be affected, either the low population zone or, in looking further out, the ten mile zone, I felt it was the first order of business to get a current understanding of what the existing population is in the area and to check that population against the population forecast contained in the Puget Sound Power & Light environmental impact statement and also to check those numbers against the numbers being used in the testimony of the transportation experts that are testifying on behalf of Puget Sound Power & Light.

Q: Did you have some reason to believe that the current population data and forecasts are not correct?

A: Well I was aware that between 1970 and 1977 in Mt. Vernon, for example, that the city's population grew 25% and that a lot of that growth was out College Way which could potentially come within the ten mile zone, and that there has been growth to the north of Sedro Woolley and in the Burlington area, so I thought I ought to examine that before I spent any time on reviewing the specific plans in terms of the ways that people would get out is to first ascertain how many people were there. And further, I had recently completed a study in the whole of Skagit County in estimating the number of dwelling units and the population throughout the county, and I completed that study in November of 1978 for the Skagit Regional Planning Council. In that study I developed information from Continental and General Telephone

companies on the number of residential telephone connections to be able to estimate dwelling units and population, so I felt since that was more recent data than anything else would necessarily have had to my knowledge in the county that it was worth examining.

Q: How did you perform your analysis of the population?

A: Well, first I obtained the data from the environmental impact statement of Puget Sound Power & Light wherein they discuss the demographics and land use in population fairly extensively in narrative, tabular and graphic form. I used the Puget Sound Power & Light graphics which set forth a detailed breakdown for population by a ring and sector analysis. They take the specific site and they have a series of concentric rings which emanate out in one mile increments and then a final increment which encompasses the area from five miles to ten miles from the center of the two reactors. I overlaid this ring and zone format on the dwelling unit analysis that I had done for that portion and the entirety of the county also and confined my analysis to a comparison of population in 1978 and the underlying 1970 census population which was the basis of the Puget Sound Power & Light analysis and the basis for their projections.

Q: Did you find any difference between the population data used in the Puget Sound Power & Light analysis of the area and the work that you completed in November of 1978.

A: Yes, I did.

Q: Would you describe that for me please.

A: Well, the analysis involved quite a few calculations and I put

together several tables to display the results, but essentially the current estimated population within four miles of the center of the nuclear facility. The current 1978 population is 2,303 persons. That compares to the 1,563 that were in the four mile ring as set forth by Puget Sound Power & Light, and it compares to the year 2020 estimated population by Puget Sound Power & Light, which was 2,526.

Q: In other words, the current estimated population for the area is almost that estimated for the year 2020.

A: Yes. I have, however, given a range of population figures in the computation that I did to account for the fact that these data in my survey were developed from telephone connections and, of course, not every household in the area that I examined would necessarily be connected to a telephone.

Q: Did you do any projections of what the population might be within a four mile radius of the nuclear power plants by the year 2020 given the rate of growth in the area since 1970 to 1978?

A: Yes I did; however, I put a high and a low estimated range there. The high range would put in a total of approximately 21,876 persons within four miles of the plant by the year 2020 and the low range would put 6,438 persons within four miles of the low population zone of the Puget Sound Power & Light plant.

Q: In other words, even your lowest population estimate would be over 3 1/2 times that estimated by Puget Sound Power & Light for the four mile low population zone. Is that correct?

A: Yes, that is correct.

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- Q: When you evaluated the overall ten mile zone, what did you find?
- A: Well, I found similar differences in the estimates between the population forecast by Puget Sound Power & Light and the existing 1978 population.
- Q: Do you mean that population growth in the area seems to be occurring faster than originally anticipated by Puget Sound Power & Light?
- A: In my opinion based on the results of my evaluation that is the case. .
- Q: Could you be more specific.
- A: Yes. Within the entire ten mile zone around the center line of the two nuclear power plants, the 1970 population was 16,072. My current 1978 estimate is 19,347, and that compares to the year 2020 population of 26,466.
- Q: Did you do any population projections to validate the year 2020 population projects by the Puget Sound Power & Light Company?
- A: Yes, I did. I did those, however, on the basis of ranges as I did in the four mile area, and if I use the current growth rate at the high estimate level, I can find as many as 70,458 population in that zone as compared to Puget Power's 26,466. Or if I use the absolute low rate of projection of population I would find that for the ten mile limit we would be 552 less than that projected by Puget Sound Power & Light.
- Q: What conclusion did you reach?
- A: Well, my conclusion is that the high estimate that I used based on the current growth rate between 1970 and 1978 would be too high. On the other hand, I feel that the low growth rate which

I used a .96 annual compound rate would be much too low, and, therefore, I believe that the actual rate for the ten mile zone is likely to approach 35,000 to 40,000 people.

Q: Would you say that the work you have done here would represent a definitive study of what the population forecast would be?

A: No, I would not consider it a definitive study, however, I would say that with all my experience in planning both land use and transportation, I would say that the rate of growth that we have seen relative to the projections be sufficient to warrant further in depth evaluation consideration before proceeding on the assumption of the population data contained in the environmental impact statement.

Q: What do you mean by that?

A: Well, the numbers seem to indicate that the population is going to be at a much higher level both within the four mile and the ten mile evacuation zones, and, therefore, I would want to be a lot more assured, if I were talking about the means of moving people out of that area, just how many people we're talking about moving out of the area. In other words, I have read testimony provided by Puget Sound Power & Light's experts on transportation which contains much lower figures on which estimates of evacuation are being based. The obvious implication there is that one has bad input data on which to base judgments of evacuation and most of the analyses are based on either the population densities and the size of the area and the number of access roads or the capacity of various roadways assuming so many persons per car. All the analysis that I reviewed today has a very, very strong

probability and in fact it is my judgment that the estimates tremendously understate what is actually on the ground today let alone what might be there in the future.

Q: In summary, then, based on your study and analysis of Puget Sound Power & Light population data, it's your opinion that the data being utilized by the transportation experts testified on behalf of Puget Sound Power & Light in the matter of an evacuation plan basically understates not only the existing population in the four and ten mile limits of the plan, but also has a very strong probability of understating the population that will be within those zones by the year 2020. Is that correct?

A: Yes, that is correct.

Q: You stated previously that you evaluated existing traffic and evacuation studies prepared by Puget Sound Power & Light Company, is that correct?

A: Yes, that is correct.

Q: What did you find in the evaluation of those studies?

A: Well, there were several. I'll speak first to the testimony prepared by James A. Martin, Jr., on behalf of the US Nuclear Regulatory Commission entitled Evacuation Planning and the Matter of Puget Sound Power & Light Company (Skagit Nuclear Power Project, Units 1 & 2). My overall impression of the traffic portions of this plan is that it follows none of the principals, practices or logic of any transportation analysis with which I am familiar based on my previous experience.

Q: Could you be more specific?

A: Well, the first thing I comment on starts on page 6 in one of Mr. Martin's answers, and wherein he states that the egress road capacities are abundant relative to the total population in these areas, and he immediately proceeds to say that the egress road capacities are at least 45,000 to 75,000 persons per hour, respectively. His estimate of capacities were taken off of theoretical calculations of the number of vehicles that could run over an undefined and theoretical transportation surface based on that theoretical computation and the auto occupancy he comes up with number relating to 45,000 and 75,000 persons per hour.

Q: Do you differ with those observations?

A: Yes, I do differ with them, and a previous consultant testimony on the evacuation of the low population zone in testimony of July 24, 1975, on behalf of Puget Sound Power & Light indicates at page 3 of that testimony that based on the "Highway Capacity Manual--1965" published by the Highway Research Board of the National Academy of Sciences, Special Report 87, that the practical two-way capacity for SR 20 is 1650 vehicles per hour in two directions, and it is 1350 vehicles per hour for the other evacuation routes which would also include SR 9. In my opinion, that figure for two directional traffic under normal operating non-emergency conditions comes much closer to the number of vehicles that could be carried on these various routes than the estimated 2500 vehicles per hour per lane that is assumed by James A. Martin, Jr., in his testimony. However, when we are talking about the actual direction in which

people are going to travel, I think we ought to realize that since we are talking about two directional traffic that the principal flow or flow out of the area will be on the order of 825 vehicles per lane per hour or 675 per hour on the other routes other than SR 20. Thus, under the best of circumstances, Mr. Martin's estimates are three times that of the information provided in the testimony of James W. McIsaac on two directional traffic capacity of the evacuation routes. It may be the case since the direction of flow at times by emergency vehicles and those returning to remove people from their homes--workers off the site--will be of a minor nature and, therefore, it is possible that we could see in the Skagit County up to perhaps 1000 vehicles per hour, at least on SR 20. This would square with the observations of the studies conducted by Hans & Sell, as quoted by James A. Martin, Jr., where the average of up to 1100 cars at the low end per lane per hour were observed. Unfortunately, textual matter isn't provided there to allow one to understand where and in what types of conditions that number of cars per lane per hour were observed, but it would be my opinion that that would be in areas typical to Skagit County where one was dealing with rural roads. To give you an example, the South Skagit Highway, one of the so-called feeder routes to Sign Route 9 and Skagit County was recently discussed in an environmental impact statement on the proposed glacier corruption center which was prepared on March 28, 1929. And, for example, it states on page 20 of that document that South Skagit Highway does not meet Skagit County road design minimum standards for roads having

average daily traffic volumes (ADT) in excess of 100 vehicles per day. And I want to emphasize that--that's 100 vehicles per day. In other words, this is one of the roads which is going to be able to feed a tremendous number of vehicles according to the assumptions in the testimony of James A. Martin, Jr.; whereas it's true that the road can carry more vehicles than that except expense and the risk of accidents and traffic problems which could ultimately result in complete blockage or stoppage of the road. You'll find that many of the so-called feeder roads other than State Route 20 and State Route 9 are again at the minimums or just barely above the minimums for carrying traffic volumes of up to even 1000 vehicles at their maximum. Just in summary, basically what we are dealing with in the Skagit County area is a very rudimentary road network system that is not built to carry heavy volumes of traffic. As I mentioned previously, one of the assumptions in the previous testimony in 1975 in the matter of traffic, the operating assumption was that the capacities would be higher on these roads, nowhere near the levels assumed by the latest testimony of Mr. Martin, but that the capacity would be high given that there would no opposing traffic, that is all the cars would be driving out of the area. Indications from information provided in the Skagit County EIS, these meet of some different conclusions.

Q: What are those different conclusions?

A: Well, under section transit population within four miles, which is at page 2.1-7, there is a discussion which moves to the subsequent page of 2.1-9 wherein in the last paragraph it states

of the 495 employed persons who reside within the LPZ, 388 work outside of the area. It states that these people work in Sedro Woolley, Burlington, Mt. Vernon and Anacortes. Should there be an event during the time which these persons are outside the of LPZ, it is highly likely that many of these people will attempt to return to evacuate members of their family who may be otherwise without transportation or means to evacuate the area. Further, it is my opinion that this number of 388 employed outside of the area is probably low given the increase in population of the area. Unless some guarantee could be made that there will be absolutely no return traffic on any of the roadways and that all traffic will be flowing out of the LPZ zone or the ten mile zone, is an unrealistic assumption that one travel lane in the direction of the event will be left open and thereby allow a larger number of vehicles than would ordinarily be expected by any transportation planning design standards to flow out of the area at the rates indicated in either Mr. McIsaac's testimony or the testimony of Mr. Martin.

Q: Were there other matters that you noted in Mr. Martin's testimony that you would like to comment on.

A: Yes. At page 7 wherein he states that it should be obvious that if everyone in these areas were warned simultaneously and left immediately the road capacities are such that at speeds as low as 5 mph, everyone could be out of the ten mile area within about two hours. Well, as I stated previously, his assumptions on roadway capacities are clearly not supportable either by previous testimony of Mr. McIsaac, my own professional judgment

or in any standard or normal practice in the transportation planning field. But more to the point, transportation planning and the forecasting of what people can and will do is not a matter of looking at an area and counting the number of roads and assuming that everyone can get out of it because there is a certain number of roads. There is a whole history and procedure built up of assigning traffic to roadway networks, one understands what the trip generation rates would be, and in this case it would have trips being attracted out of the area what the network speeds and capacities are possible impediments that would exist and what assignments one would make of that traffic and what difficulties in the network one would encounter. This is a very long and drawn out process, but it is sufficient in the state of the art of allow reasonable forecasts, assuming the inputs are good, to be made of what will actually occur on a roadway network. It's not at all in my experience or the experience of anyone involved in transportation planning to my knowledge carried out the fashion as suggested here in this testimony. On another subject within that testimony is mention of a model by a Dr. Houston. I'm not familiar with this model, and I believe that the equation here for the model that is in the appendix is not even fully stated, so it's difficult to ascertain exactly what was used to calculate the actual evacuation time, but assuming, just for the purposes of assuming, that Dr. Houston's model had some relationship to reality, then it would be the case that it would take up to six hours to evacuate the portions of the areas within five miles and up to

ten hours to evacuate the areas within ten hours. And bear in mind that all of these calculations were done with population data which, as I have stated earlier, understate what is not on the ground and is likely to be on the ground within 2020. So that is bound to raise those estimates, just using Dr. Houston's model. But in my opinion, if the standard transportation modeling procedure were applied to this problem and the networks correctly defined as to their potential capacities the bottle-necks which would occur in all the traffic management strategies that this six to ten hours would very much understate the realistic situation following the notice to evacuate. Finally, one last comment on the analysis, in the appendix on page 3 there is a further discussion of the report by Hans & Sell. In it the population densities within five and ten miles are discussed. Here the number of about 75 persons per square mile indicate a general evacuation time of about 8 1/2 hours each. Actually, plotting on the graph using the LPZ five mile zone, the actual evacuation time if Hans & Sell were correct, would be about 9.2 hours. I think it is important to recognize that the Hans & Sell data has a negative correlation co-efficient of -0.71 and a standard deviation of 1.5 hours. And I believe that the further and more detailed studies were conducted. It would be found that one of the larger contributing factors other than warning times for evacuation would be the lack of capacity and the lower design standards of roadway networks to evacuate the population from more rural and less densely populated areas. This consideration on the quality and capability of the road

networks must be very strongly considered in the capability to evacuate persons from the Skagit Valley area in both the five and the ten mile zones.

Q: In summary then, in your opinion, do the existing studies of transportation, both those conducted in 1975 and the most recent testimony provided by Mr. Martin demonstrate to you that the evacuation of the population in the LPZ and the ten mile zone can be carried out in a short order within two to six hours or on the order described therein.

A: Based on what I am aware of in terms of roadway capacities and population in both the LPZ zone and the ten mile radius, yes, the population could eventually be evacuated from the area.

Q: What do you mean eventually evacuate it?

A: Well, based on the study performed by Mr. McIsaac, to my knowledge there is no specific mention of the time required for evacuation on the roadway networks simply a statement that it can be evacuated. In the study by Mr. Martin, he indicated between two and six hours, and maybe using the Hans & Sell data it would take 8.5 hours. At this point, my judgment is that while the population could be evacuated, the operant question is in what time period. Until adequate studies using traditional proven and sound transportation planning methodologies, no answer currently exists as to the time frame within which the population could be moved.

Q: In your judgment, why do you bring the time frame question into this.

A: Well, let's start with the preliminary safety analysis report as

contained in volume 10 docket numbers STN-50-522/523 of Puget Sound Power & Light. Starting at page 13.3-8, it stated that the assessment of a side emergency and a general emergency is based essentially on the same procedures and that the general emergency is characterized by offsite consequences. It states there that the total time required to identify this type of accident, predict projected doses and determine appropriate measures is estimated at 15 minutes. And then a secondary assessment would be made by direct surveys, and the time required is estimated to be between 30 minutes and one hour for that secondary assessment. And it further states on page 13.3-8A that the time to notify the population at large is estimated at 1/2 to one hour.

Q: What is the import of that statement?

A: Well, basically you have two alternative situations. Under alternative one you would have these actions taking place in series, and under alternative two you would have them in parallel. And, given an event and a 15 minute assessment time, then up to one hour of a field assessment and then up to one hour of population notification you could find two hours and 15 minutes having elapsed before the population was on the way out of the area. Under alternative two, if all of these events were collapsed in the parallel at the minimum, you would have a half hour fall in the preliminary assessment, the secondary field assessment, and the population being notified; and you could within the half hour have them mobilized or take up the one hour to do it; and I would imagine that the actual practice would

somewhere in between that hour and two hour 15 minute period.

Q: How does this relate to your review of the emergency evacuation plan?

A: Well, in my judgment, if I were to conduct the transportation analysis for this area in the manner in which it is traditionally conducted, then it would be my first order priority to conduct a successful evacuation. That would be the base line that I would wish to establish.

Q: What do you mean by a successful evacuation?

A: I mean by that an evacuation which would minimize the kind of effects as described in the task force report on radiological emergency response plans at page I-48 wherein it's demonstrated that within a one hour delay time that fatalities as well as injuries are being experienced within both the five and ten mile radial intervals, and that is that evacuation delay time is increased, and the maximum they show here is at a five hour delay time when substantial deaths and injuries are beginning to occur. And it's my judgment that one would as a planner or professional trying to assess this problem take every effort to first of all understand and establish in a sound and technical manner what the probabilities were or what the opportunities were to experience to fatalities, and then work from that point on out to determine the various scenarios that would be associated with an event.

Q: What do you mean by scenarios?

A: Well, what I mean by scenarios relates to first of all the various radio corridors in which a plume might be traveling

under both daytime and nighttime conditions, because that would affect both the daytime and nighttime populations. I haven't gotten into that with respect to labor force, the 2000 visitors that would be at the visitors center, the number of vacation and holiday tourists and recreationalists that would be on the road, the school populations which would be at risk and a variety of factors of that nature, but also I think it would be important to establish what the various time windows were for evacuation, and to set those out as constraints so that one would assess given the knowledge of a plan and the time it would take to warn the population, and then from that point forward to begin to calculate the actual evacuation time. And with each hour that were exceeded in the evacuation time to begin to determine the actual number of fatalities and/or injuries that would be incurred. Then with that overall background, and that just describes a part of it, I haven't tried to design the total process for assessing this, rather just look at the work that's been done today, it would be possible then to determine what measure actually should be taken.

Q: But in your opinion at this time, with what you know of the requirements set up for the construction licensing and the operating licensing and from what you know of the standards set forth in the subsequent reports you mentioned of 1978 publication date, do you believe that the population could be evacuated against those guidelines in a time frame as set forth in the testimony of Mr. Martin?

A: No, I do not.

Q: By the way, you previously mentioned a study that was conducted by the Washington State Department of Transportation on State Route 20 in June of 1978.

A: Yes, I did.

Q: Was there something you wish to point out in that document.

A: Yes, this study was done as a legislative study to determine the need for improving the need for transportation capacity in one of the corridors that would be required for evacuation in the unlikely event of a major nuclear problem. And I would like to quote from page 12 of that document in the section that describes alternate plans. In reference to that corridor of the document states "congestion is the most undesirable aspect of the existing route. Heavy local traffic mixes with through traffic to the detriment of both. Except for the Ria Vista and Gaul Street sections, the route is only two lanes wide. There are two at grade railroad crossings, two traffic signals, and abundant cross streets and driveways. To make a bad situation worse, traffic volumes are expected to double by the year 2000."

Q: Am I to understand that that is the current traffic situation and that the situation is expected to double?

A: Yes.

Q: Did that study consider the population data and information which you recently developed on behalf of the Skagit Regional Planning Commission as related to additional population and traffic growth in the area?

A: To my knowledge, no it did not consider that additional growth fully.

Q: Is there anything else about that report you would like to discuss?

A: Well, at page 29 of that report there is information on accident data as it relates to the history of accidents for the section of SR 20 from the eastern city limits of Sedro Woolley to I-5.

Q: How many accidents were there?

A: There were 624 accidents total in the period from 1971 to 1976.

Q: Are those higher than the state average?

A: Generally no, they are about at the state averages, but they are in some respects higher than the state averages. I believe they are higher from the section from the eastern city limits of Burlington to I-5. While I'm on the subject of roadways in the vicinity of I-5--while some of these roadways and intersections are beyond the ten mile limit, they're only beyond the limit in a theoretical sense in that the traffic backups on, for example, old SR 99 or Riverside Drive and College Way, for example, is a tremendous traffic problem at this time. Traffic is extremely backed up in normal operating situations. And the traffic situation is similarly bad in the I-5 Burlington area, all of which leads me to believe, although it has not yet been analyzed in any information I've seen produced by Puget Sound Power & Light, but under an evacuation situation, these areas would cause bottlenecks which would create a backup back into the ten mile zone. And one other factor that has not been considered here is the fact that if an evacuation notice were released,

it's my belief that people other than those immediately in the ten mile boundary would also be on the roadways evacuating the area and not wondering if they were a tenth of a mile outside it, but this practice would add to the demands on the roadway facilities. For an event that would have a plume traveling in the direction of Mt. Vernon. And it may be the case, although I would have to see data on the Three Mile Island event, that people not even potentially in the direction of the plume would be evacuating just to minimize any chance of risk.

Q: Then it's your opinion that there would be traffic other than that from the immediate area that would be also on the roadways which would have to be taken into consideration.

A: Yes, definitely.

Q: Mr. Darland, from your knowledge from the Skagit Valley area, are a lot of the households within the four mile area within easy reach of vehicles or by foot in terms of notifying the people of an emergency or an event if they had to be personally notified.

A: Well, my knowledge of the local area would probably be more specifically confined to the south side of the river as it would relate to actually physically notifying people. And again this gets to one of the seasonal questions of whether it's a daytime or nighttime event, but television reception is very bad in that part of the valley, and a lot of people don't use their TV sets very frequently. There are a lot of vacation homes and homes down at the ends of the lanes and roads where unless there were some sort of a siren or means of notifying people like an air

1115 082

raid, then personal notification would be very chancy, and there would be a lot of people who would not be easily notified.

Q: Is there anything else that you would like to offer on the matter of evacuation?

A: There is much, much more that I could enter based on my knowledge of the area that would relate.

1115 083

Michael L. Darland
President
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B.A., General Studies, University of Washington
M.A., Urban and Regional Planning, University of Washington
Studies Certificate, Community Development, Cornell University

Current Responsibilities:

President, The Tranpln Company
President, The Consortium
Vice President and Director, Summersun

Past Positions:

Director, Transportation Planning, PSCOG
Division Representative, U.S. Department of Transportation, Urban
Mass Transportation Administration (UMTA), for 17 states and
Puerto Rico
Project Director, Urban Corridor Demonstration Program (Dayton, Ohio)
Director, Mass Transportation Planning, Montgomery-Greene County
Transportation Planning Program (Dayton, Ohio)
Transportation Planner, Clark, Coleman and Rupeiks
Urban Planner, U. S. Department of State, Peace Corps (Peru)
Vice Chairman, Bellevue Planning Commission (Bellevue, Washington)
Board of Directors, Bellevue Chamber of Commerce
Chairman, Transportation Committee, Bellevue Chamber of Commerce

Professional Emphasis:

- o Systems planning and modal integration
- o Operational planning and implementation
- o Multi modal planning in air, highway transit and ferry systems
- o Comprehensive land use and site planning studies
- o Integration and management of diverse technical and semi-technical skills
- o Project development, management, presentation and implementation in public and private sector
- o Development of demonstration projects securing extra-regional funding and project support
- o Policy development for federal agencies and elected officials of federal, state and local government, resulting in legislation affecting the transportation environment

Current Major Project Experience:

Bellevue Gateway Land Use Study and Site Planning
Skagit County Transit Feasibility Study
Traffic and Impact Studies - The CHG Corporation

1115 084

Other Major Project Experience:

Intermodal Coordination Improvements - Washington State Ferry Systems
In-terminal Signing Program - Washington State Ferry System
Study Design for High Occupancy Vehicle Lanes and Metering on
I-405 and I-90 (Bellevue, Washington)
Everett Transit-Everett School District Transportation Consolidation
Study (Everett, Washington)
Project Director, cross-Sound ferry passenger origin and destination
study
Project Manager and Technical Director, 1980 Seattle/King County
transit plan
Project Director, 1990 transportation system plan, Puget Sound region
Project Director, 1990 air transportation systems plan, Puget Sound
region
Project Director, Snohomish County mass transportation study
Project Director, Trident regional transportation study
Project Director, national transportation study for the Office of
the Governor for the Puget Sound region
Project Director, I-90 impact analysis, Washington State highway
system
Project Director, Phases I and II of the I-90 substitution and
withdrawal study
Project Director, urban corridor demonstration project (Dayton, Ohio)
Planner-in-Charge, new town development (Ilo, Peru)
Project Planner, transit studies
Traffic analysis studies for major commercial developments in
Bellevue, Kirkland and Lynnwood, Washington
Spokane Transit Improvement Study, Spokane, Washington