RECROSS - REGAN

THE COURT: Counsel.
MR. SMART: Thank you, Your Honor.

RECROSS-EXAMINATION

BY MR. SMART:

Q Mr. Regan, as I understand your notes here --
A Can we clear some of this stuff off first so I have a place to put my --
Q Sure. Is that enough?
As I understand your notes, you've got a date that references the date of the project or the date of the document on the left-hand side, correct?
A That's right.
Q And then you've got a reference which says what the document is.
A That's true.
Q Correct? And then you've got a description of the project.
A A very brief description.
Q Then you've got a description of the cost, correct?
A And a breakdown, yes.
Q None of those references has any reference to who designed the project, correct?
A No, I didn't get in and do a complete set of notes on each one. This was just to refresh my memory.
Q And some of these projects that Mr. Hagens asked you ¶

about, for instance October, 1991, $63,000 project to regrade and improve the top of the levee from Lower Hopper Road I-5 Bridge downstream, first of all, that's down below the Burlington Northern Bridge, correct?
A That's right.
Q It doesn't have much to do with flood levels in the Nookachamps.
A Yes.
Q It wouldn't have anything to do with flood levels in the Nookachamps in 1990 if it was a 1991 project.
A No.
Q You're talking about 1991, right?
A You asked me if it had anything to do with flood levels in Nookachamps.
Q It wouldn't have any relevance to this case.
MR. HAGENS: Objection, Your Honor, there's a '95 flood as well, Your Honor.
THE COURT: That's fine.
Q Wouldn't have anything to do with damages caused in 1990, which is what this case is about?

A That's right.
Q This next one, that's October of 1991 as well, again, Lower Hopper Road Keyway Project couldn't possibly have anything to do with flood levels in the Nookachamps in 1990, could it? ¶

A That's right.
Q Same with October 21st, 1991, strengthening of levee project in Avon Bend.
A That's right.
Q That couldn't have anything to do with damages caused in 1990.
A Not in 1990.
Q Now, did you ever make a determination, did you ever review any document which said who the specific engineer was that designed any of these projects?
A Never saw a document with an engineer's seal on it.
Q So the answer to my question is you didn't research that, correct?
A I've looked at a lot of documents, but I never saw a document with an engineer's seal on it.
Q And are any documents that you reviewed that specifically had profiles of levees, other than this 1955 document that you say was not sufficient for you to determine how high it was?
A There was a number of -- we looked at during my deposition. We had them all on the table at your office.
Q And do you remember who the engineer was on any of those?
A I don't remember right offhand.
Q Again, I was somewhat confused by your testimony because I think you've testified two different ways, so let's ¶

get it straightened out.
With respect to Exhibit 989, do you have that one in front of you?
A These are all 500s.
Q Would you turn to page 25, which is the discussion concerning flood levels in the Nookachamps that Mr. Hagens asked you about.
A Exhibit --
Q 989. I think I actually turned it to the page for you.
A That's 989, right.
Q Now, Mr. Hagens asked you a question whether or not the Corps of Engineers actually determined what the flood levels were in the Nookachamps without the project for various floods, do you remember that testimony?
A That's right.
Q And your testimony was that they had never done that; is that right?
A I did not say that.
MR. HAGENS: I'll object, Your Honor. That was not the witness's testimony.

MR. SMART: That was my understanding, and let's get it cleared up.

Q So it's your testimony that with respect to work done for the 1979 lower levee project that was never built and with respect to the public hearings that you ¶

attended for that project, the Army Corps did, in fact, determine what the levels would be in the Nookachamps area for a whole range of floods stemming from the 1975 flood all the way through the hundred year flood; is that right?

A That's correct, with existing conditions being as they sat with the levees in place as of --

Q 1979?

A '79.

Q Or shortly before, because you couldn't remember whether or not they were surveyed 1975 or 1979 or sometime in between, right?

A It was in between.

Q Okay. And these are the heights that you determined right here, correct?

A Those are the heights that were determined with the existing conditions, yes.

Q In fact, those were -- that was the information that was specifically given to the residents at that time, correct?

A Definitely.

Q All right. So when they asked what the heights were, you had the answer because the Army Corps did, in fact, determine what those heights were, correct?

A With the existing condition, yes. ¶

THE CLERK: Exhibit 990 marked.

Q Showing you Exhibit 990, can you identify that, sir?

A This is an a Memorandum for Field Reconnaissance of Nookachamps Area on Skagit River, Washington, by the Corps of Engineers, dated 2 February, 1979.

Q Let me do it this way if I could.

MR. SMART: Could I have it remarked, Sally? Unfortunately I've given him my copy.

Thank you.

Q And the date, sir, again?

A Two February 1999.

Q Was this an Army Corps document relating a field reconnaissance on the Nookachamps area on the Skagit that was performed by your Army Corps personnel in conjunction with the 1979 lower levee project?

A I believe it was.

Q Okay.

A Accomplished by a Mr. Yang.

Q And Mr. Yang is the same person who wrote Exhibit 907, correct? That was this document?

A I'd have to see it. I don't remember the number.
Q 907 was admitted yesterday, and that was a similar report, where he collected information from residents in the Nookachamps, including Barbara Austin; is that right? ¶

A That's right.
MR. SMART: I'll offer 990 Your Honor.
MR. HAGENS: No objection, Your Honor.
MR. ANDERSON: No objection, Your Honor.
THE COURT: 990 will enter.
(Whereupon, Defendant's Exhibit No. 990 was admitted into evidence.)

Q All right. Now, the purpose of 990 was to collect the information that was used to answer the questions of the residents in 989, correct?
A The memo for record came before 989.
Q That's right. So, in other words, the Army Corps had to go out and collect the information from people in the Nookachamps to determine how high the water was prior to the time so they could answer the questions of the residents in the public meeting; is that right?
A That's not really what it states here. It states, "Upon verbal request from Vernon Cook of Design Branch, a mini task force was organized for the purpose of collecting field information and study possible alternatives to alleviate possible induced damages that could be caused by the proposed Skagit River project at and downstream of the Nookachamps area."
Q Okay. Mr. Cook was the project manager, correct? ¶

A He was project manager.
Q So prior to the time you finished up the design memorandum and prior to the time you could answer questions of the residents about what the effects of the project would be, Mr. Cook determined that you had to send a task force or mini task force out to collect the information, correct? Is that what happened?
A No. This document -- there was a public meeting in the fire station up there where the people were saying hey, we need to have protection of some sort. It is the Nookachamps people.
Q Yeah.
A And this is a result of that, to get the -- we came out with Alternative 3E, I believe, early on that didn't have any works, flood control works, in the Nookachamps area. We went back and reviewed it and made this field trip, did some more engineering studies, and came out with the final 3E, which included some flood control works in the Clear Lake area.

Q Okay. Thank you for clarifying that.
So should I understand, then, that after the General Design Memorandum random was finished, finished in its -- with various proposals, there were questions raised by the residents in the Nookachamps and then the Army Corps organized a mini task force specifically to ¶

go out and collect information to address the concerns of the people in the Nookachamps and answer their questions, such as these questions that were asked and answered in the public hearing.
A Well, that's true.
Q Okay. Now, let's take a look at 9 90 if we could, please. First of all, I have to be careful not to cut off my margins here. The verbal request was made by Vernon Cook from the dine branch. He's the project manager, correct?
A That's what I read.
Q And then the field reconnaissance study was undertaken by Don Thompson from Economics, Bob Newbill, Foundations and Materials, Wayne Wagner from Hydraulics -- is he somebody that worked for you?
A Yes.
Q So, again, you didn't go on this reconnaissance either, you sent one of your employees, right?
A That's correct.
Q Glen Stevens from Hydrology, Jack Morris from Real Estate, and Simon Yang, Civil Design?
A Yes.
Q Those are all individuals that made up the task force?
A I know all of them.
Q They were the task force, correct? ¶

A For this field trip.
Q And what they did was they went out and they collected specific information from the Nookachamps residents as to how high the water had been from previous floods, correct?
A Correct. That's basically what it is, yes.
Q And in paragraph three it says, "Mr. Don Nelson of the Skagit County" -- strike that. Mr. Nelson went along with the group, correct? If you look at paragraph four.
A I believe he did. It doesn't specifically say that. "As told by local residents and Mr. Don Nelson."
Q Okay. Mr. Nelson was there as purpose of a guide to make sure that the task force got to the correct areas, correct?
A That would have been one of his functions.
Q In fact, the report says, "Guided by Mr. Don Nelson, a number of local residents were visited by the reconnaissance team," right?
A Correct.

Q "Their views of the flood problems and solutions, as well as historical flood information, were sought."
A That's true.
Q That's the residents, correct?
A Oh, yeah.
Q Now, Mr. Nelson didn't live in the Nookachamps, did he? ¶

A I don't know where Mr. Nelson lives.
Q But, in any event, he was there for a guide and to provide whatever information he could to assist the Army Corps task force who was studying the levee project and proposed solutions, correct?
A Right. He was the flood control engineer for Skagit County. That was his job.
Q He didn't have the answers, obviously, so they had to call in the task force of the Army Corps, correct?
A I don't believe the Army Corps would just have Mr. Nelson tell them how to build a structure. They bring in their own personnel, and ask Mr. Nelson, along with everybody else.
Q You would agree that a task force made up of Mr. Don Thomson, Mr. Bob Newbill, Wayne Wagner, Glen Stevens, Jack Morris and Simon Yang would have substantially greater expertise in the business of deciding what solution should be addressed than Don Nelson, the Skagit County flood control engineer.
A I'm sure these folks have a broader spectrum of knowledge than Mr. Nelson, but Mr. Nelson has a focused knowledge of the Nookachamps.
Q Not as focused as the people who live there, correct?
A I don't believe he did, because as flood control engineer he should know quite a bit about flood control ¶

and flood problems in the Nookachamps area.
Q All right. Now, first of all, if you turn to page two of the document, the task force went to visit Mr. Moore; is that correct?
A That's what it says.
Q And Mr. Moore lives on Swan Road?
A Uh-huh.
Q Near Nookachamps Creek, correct?
A That's what it says.
Q And the task force determined that there was a benchmark elevation of 39.62 feet for high water in 1975; isn't that right?
A Benchmark does not mean high water mark. Benchmark is a -- is a known point on the ground that is recorded, and it is an elevation that you would take off from to determine high waters, or any other elevation that you needed. It's not a -- it doesn't say high water mark.
Q I see. Okay. That's a good point.
Based on the benchmark, okay, the determination

was made that the 1975 flood reached an elevation of 39 feet at Swan Road, correct?
A That's what it says here.
Q And could you point out Swan Road for the jury, please, on that.
A Runs right across the valley here. ¶

Q Okay.
A Across the low point of the Nookachamps area.
Q So you knew by this collection of data that, based on an actual observation, that the flood height reached three nine feet in 1975 at Swan Road, correct?
A That's right.
Q And then the task force visited Mr. Gadbois, correct?
A That's right.
Q And Mr. Gadbois is a plaintiff in this case, correct?
A That's right.
Q Can you point out Mr. Gadbois's property for the jury, please.
A He's right in this area here, the flood area.
Q So that's right next to Swan Road, correct?
A Appears that it goes -- Swan Road goes right through it.
Q All right. And the document indicates that Mr. Gadbois -- well, why don't you read it for us, paragraph b there, please.
A "Mrs. Gadbois was interviewed at the Gadbois meat business located on the east side of Mud Lake Road about a thousand feet northwest of the T-intersection with Swan Road. She indicated that the '75 high water reached within two inches of the road in front of their business and was on the porch of Mr. Gadbois, Sr.'s house located southwest of the T-intersection. Field ¶

checks of these elevations points confirmed high water marks observed on the power pole along the Swan Road."
Q Now, all right. After that the task force visited Mrs. Ward, correct?
A That's right.
Q Would you read what the task force found about Mrs. Ward.
A "Mrs. Ward indicated that during the '75 high water there was seven inches of water on the concrete ground floor slab of the house, which was estimated -- which has an estimated elevation of 39 feet. It has elevated living spaces on the second floor level. However, the horse barn had about two and a half feet of water. Based on this information and a field level check, the 1975 high water elevation as located was estimated to be 39.6 feet. The house is well flood-proofed against an estimated hundred year flood. Photographs of the house were taken."
Q All right. I take it then that what the task force

found by visiting Mrs. Ward, another resident, who is not a plaintiff in this case, was that she had taken steps to flood-proof her house against a hundred year flood, but even so, they could determine from high water marks that the 1975 flood had reached an elevation of 39.6 feet. ¶

A It's estimated to be about 39 feet, right.
Q When the Army Corps estimates something, they estimate just as close as they can get it?
A I would say that.
Q The people who were out on this task force were experts in performing this kind of work?
A There was no surveyors on this list. I'll tell you how it was surveyed. It was surveyed, they went out and did some rough survey elevations. It's not a survey in mark. That's why they say approximate.
Q Well --
A It's probably close, it's probably close.
Q Within -- within how many inches, let's say.
A Within three or four inches, plus or minus.
Q Within three or four inches, this much, you believe this information is accurate?
A I would say that's right.
Q All right. Then the task force went and visited Mr. Ken Johnson, right?
A That's right.
Q Mr. Ken Johnson was a former plaintiff in this case and a member of the Skagit County Flood Control Advisory Committee?
A Yes.
Q He's also a diking commissioner? ¶

A I believe he was.
Q Mr. Johnson's farm, we earlier indicated, was located in this area right here?
A It's right in the bend there, right.
Q All right. Would you read to the jury, please, what the task force found about Mr. Johnson's farm.
A "Discussion with Mr. Ken Johnson on his dairy farm revealed that in the 1951 flood his father had housed the cattle on the second floor of the barn."
Q Let me stop you there. Why would they do that?
A Get them out of the water.
Q Is that because the barn flooded?
A Certainly would have to assume that.
Q Okay. Continue on.
A Or expected to be flooded, one or the other.
Q Continue on then, please.
A "Since then the herd required to operate a viable dairy farm has grown steadily from the maximum number of 80 head that Mr. Johnson's father owned to the present herd

of 300, with 150 milk cows, 130 of which are being milked. This increase in herd size also precludes the possibility of neighboring farms assisting each other by providing temporary shelter or high ground during floods. Besides, the moving of cattle during floods is extremely difficult and causes unrest and a loss of milk ¶

production. Each relocation takes about a week. During the 1975 high water, Mr. Johnson had accommodated the cows on high ground near the machine shed and on the front lawn of his house. He felt that was needed" -- excuse me. "He felt what was needed was some simple milking facility with concrete slab and overhead shelters to accommodate milking each cow at least once every 24 hours to avoid damage to cow's health and capacity for future milk production. A cattle pad of one and a half to two acres in size will be needed to accommodate 300 cows during a flood, based on the minimum need of the" -- excuse me, "the 50 square feet per cow or 8-foot by 16-foot space per three cows.

Q Okay. Let me stop you there. I take it then that the size of the herd on the Johnson dairy farm had increased from 80 head to 300 head between 1951 and 1975; is that correct?

MR. HAGENS: Your Honor, which may be true, but it's well beyond the scope of the direct examination.

THE COURT: I tend to agree with that.

MR. SMART: Well, Your Honor, it's tied in with this business of the elevations, which are in the very next sentence.

Q Why don't you --

THE COURT: If you say so. Maybe you should do ¶

the tying in, because I don't understand what --

MR. SMART: The point, Your Honor, is that the reason why these farmers know where the high water marks are is because they're very concerned about the cattle, and the cattle barn is the mark -- you can see -- let me tie it in this way.

MR. HAGENS: Then I have an objection as to relevancy, because we're talking about the induced flooding caused by the existing levee system, not about what's happening out there in the flood plain. This whole case focuses on that area, and here again we're talking about total flood height, not about the part that causes our client the problem, Your Honor, so I have a relevancy objection as well then, Your Honor.

THE COURT: Counsel.

MR. SMART: Your Honor, Mr. Hagens specifically brought up Exhibit 989 on his redirect-examination and specifically asked the witness about the water levels that were determined in the information given by the

Army Corps in 1979 to the residents, and the purpose for this examination is to determine how the Army Corps got that information and who they got it from, which are the very plaintiffs in this case, so that's highly relevant to --

THE COURT: Move ahead with it. ¶

Q Okay. Could you read the next sentence there, starting with "Mr. Johnson."
A "Mr. Johnson indicated the high water level on the milk barn (see photographs). Based on this information and contour map, available natural ground elevation near the milk barn is about 39 feet. High water elevations were estimated to be 41.7 feet for the 1951 high water and 39.8 feet for 1975.
Q So let me stop you just there for a second, please. Based on the task force sent out by the Army Corps in 1979, they were given specific elevation of 41.7 feet for the height of the high water in 1951, correct?
A That's right.
Q So that when you testified earlier in answer to my questions about whether or not you had any information concerning the high water in 1951, you answered that it couldn't be determined. I take it that that answer did not include information that could be derived from the Army Corps field report of Mr. Yang; is that correct?
A This is one point, yes.
Q Well --
A There may be another point or two on here, but I -- my understanding of your question is throughout the valley.
Q Oh, no. My question was very clear, sir. My question was, was there any way for you to determine what the ¶

heights of the water were in 1951, and you told me, did you not, sir, that it would be impossible. And, in fact, we had Exhibit 981, where I specifically asked you about the 1951 flood and you answered for all of these various properties it was not known. Didn't you answer that question that way?
A I answered it that way, right.
Q But, in fact, the Yang report had specific information from which you could determine at least some points at some properties in the Nookachamps very precisely and, in fact, your Army Corps people did, and the task force, go out there and determine these heights with -- well, to a degree of accuracy of three or four inches, correct?
A You're probably right, yes.
Q Now, let's continue on if we could, please. Immediately after that the task force identified that the estimated water levels were 42.5 feet for a hundred year flood without the project, correct?

A That's right.
Q Forty-four feet for a hundred year flood with the project?
A That's right.
Q Now, what else did Mr. Johnson say? Continue reading if you would, please, sir. ¶

A Okay. About the middle, where it starts out, "Mr. Johnson also," is that where you want me to start reading?
Q Yes.
A "Mr. Johnson also indicated that the 1975 high water came within two and a half feet of the first floor of his house, but various essential machinery and facilities such as electric pumps, water heaters, furnaces, et cetera, were all above the 1951 high water level which is the level of protection he would prefer."
Q Okay. Let me stop you there. When Mr. Johnson said that he would prefer a level of protection above a certain level, is that protection from the project that he's talking about?
A I don't know what he's talking about. He'd like to be protected by something, some means is what I would gather from that.
Q But, in any event, the task force collected information that Mr. Johnson knew what the high water level was in 1951 and had made some sort of determination about what level of protection that he would prefer?
A That's right. That's right.
Q Continue on, if you would, please, sir.
A I lost my place here. Okay.
"Mr. Johnson also discussed flood history of the ¶

area. He indicated that during the 1975 high water only one home had water in the first -- in the first floor and in 1951 three homes had flooding of the first floor that was consistent with the field observations that most homes were floodproofed to at least a ten-year event. He had also rejected the idea of a ring diking around the farm facility since it will be costly, involving extensive diking and offer little security due to constant fear of breaching of the dike which would be disastrous. He echoed opinion of some of the other locals -- local residents that the Burlington Northern Bridge was a major bottleneck."
Q So the task force acquired information that at the Johnson property, located here, in 1951, three homes had flooded over the level of the first floor and one home in 1975 had flooded; is that correct?
A I believe -- I don't know where the homes are that he means here. They could have been anyplace. I don't know. He didn't state where they were, but he did say

one in three.
Q And then the task force visited the Austin's property.
A That's true.
Q The Austin's property is up in this area.
A That's right.
Q Here, correct? ¶

A That's correct.
Q In Clear Lake. And its elevation is approximately the same elevation as the Stakkeland property, is it not?
A I can't say that.
Q Do you know?
A I'd have to look at the map.
Q Sure. Go ahead.
A It's not on here. It's on the other sheet.
Q Let me get it for you.
A The Clear Lake area is a contour that runs basically around northwest of Clear Lake, elevation 40. The Austin's property is down -- I believe it's those little black spots on there. It could be -- it would be less than 40 but -- about 35. It's somewhere in that area.
Q Between 35 and 40?
A That's right.
Q All right. Now, what did the task force determine from Mr. and Mrs. Austin?
MR. HAGENS: Your Honor, I'm going to renew my relevancy objection. They're not plaintiffs in the case. I'm not saying she might not come and testify, but this seems to be wide of what I was -- asked this witness about, Your Honor.
MR. SMART: Your Honor, again, Mr. Hagens specifically brought up the question and answers ¶

regarding Nookachamps Creek and the local residents in Exhibit 989, which is the public meeting for the 1979 proposed project. This document is the information and where the information came from that led to the Corps's response to the Austins.
THE COURT: You may proceed.
MR. SMART: Thank you.
Q Go ahead, if you would, please, sir, and read paragraph e.
A "Mr. and Mrs. Don Austin told about having three inches of water in their house in '51 and in 1921 water was up to the window sills (about two feet of water in the house.)"
Q Let me stop you there again. Two feet of water in the Austin house, which is in this location right here, in the 1921 flood?
A That's what it says.
Q And that's much higher than the elevation of any flooding in either 1975 or 1990, correct?

A It may well be.
Q Well, did you ever --
A It is here, but they talk about the elevation of the house. I've been in their house and it appeared to me that it may have been raised. I can't say that for sure. I didn't ask them, but it appeared the house was ¶

up high.
Q Well --
A I can't say that, you know, in 1921 was the house at the same elevation it is in 1990.
Q But you told me in answer to my questions concerning Exhibit 981, one, that it would be impossible to determine any of these elevations for a flood back in 1921 or 1951, and yet you had this specific information with specific benchmarks on a house from the Austins because your task force went out and secured it, didn't you?
MR. HAGENS: I'm going to object to the form of the question. The exhibit to which he referred, if I may have it, dealt with Halverson, DeVries and Stakkeland, Your Honor. Didn't deal with Mrs. Austin, didn't deal with Mr. Johnson, and now he's asking questions about three others and saying, well, there was information there, you should have had it with respect to these folks.
MR. SMART: I'm getting to that, Your Honor.
MR. HAGENS: I think that is misleading. I object to the question as lack of foundation.
THE COURT: Counsel, my understanding is you are going back to the same people that have been referenced in that public meeting. ¶

MR. SMART: Exactly. And the point here, Your Honor --
THE COURT: Apparently you're outside that scope at this point.
MR. SMART: The point here, Your Honor, it's very easy to determine, just by taking an elevation at the Stakkeland property and comparing it to the high water mark at the Austin property, to get an elevation --
THE COURT: All that may be well and good. It's a scope objection and I'm sustaining it.
Q Why don't you go on, Mr. Regan, and tell what you learned from the Austins.
A "In 1975 the water level was at the third of the four concrete block steps leading from the walk to the porch (about one foot below the floor of the house or two feet above the walk and five feet above the field to the west of the house.) They told about hearing the roar of the water coming up the east fork of the Nookachamps Creek at the Highway 9 bridge which is a serious constriction

point. Mrs. Austin realized they're in the flood area but still like their house and surroundings."

Q I take it they indicated they didn't want to move; is that right?

A I believe that would be a fair conclusion to draw from this. ¶

Q Okay. And would you then -- finish reading the information concerning the paragraph and what the Austins' concerns were.

A Okay. "The Austins' main concern about the Skagit levee project are, one, will the project increase flood levels on their property by leaving off other former outlets that could have offered relief to their area (e.g. Samish and Burlington area.)" And goes on and says, "(Burlington dikes were breached, offering some relief in 1951 high water." And, two, "She is concerned about what frequency flood would they begin to sustain induced damages."

Q And that's induced damages by the project, correct?

A I believe that's what she means.

Q Okay.

A "She shared with other local residents the misconception that the two feet of additional water we," meaning the Corps I believe, "projected for the hundred year flood can be expected for all flood events. She also had questions about the accuracy of our study methods and prediction of high water levels. More study of the possible induced damages -- more study of the possible induced damage water levels for various flood events is urged by this reconnaissance team. Team members also suggested that due to his familiarity with the area, Don ¶

Nelson of the Skagit County engineer's office could provide additional input. Therefore he should be asked to review these field notes."

Q All right. And then, based on the information collected, did the Army Corps then go back and answer these questions in a written form as a result of the public -- or at the public meeting in July of 1979? Referring to 989.

A I believe that's right.

Q Okay. Now, one other point, sir, that can be answered I think by this particular document, and that's this. You earlier indicated, I think, what the storage capacity of the Ross and Baker Lake Dams is, didn't you?

A Indicate --

Q The storage capacity?

A I didn't get into storage capacity.

Q Isn't it on the order of two or 300,000 acre feet?

A I can't say that. I don't know.

Q Is that -- did you ever investigate it?

A It could be in that order, I agree, but it could be out of that order a little bit, too.
Q Which way? Could be more?
A Could be less. I don't know.
Q In any event, the Nookachamps/Clear Lake area only has 35,000 acre feet of storage; is that right? ¶

A That's correct.
Q And you reported that to these residents, correct?
A Well, this 35,000 acre feet of storage that floods, right.
Q Okay.
A It varies by what flood you've got, of course.
Q But with the dams on the upriver storage, they can be controlled so you can use as much of it as you have capacity for, correct?
A They go through an operating procedure where they try to maximize the use of it, right.
Q Now, you said you had been in the Austins' house?
A Yes, I have.
Q Was that for purpose of doing work on this particular case?
A Yes.
Q Did the Austins verify that they had told the Army Corps of Engineers this information that's contained in 990 and 989?
A I don't believe that they told me that. I've seen this document before.
Q Did you never ask them then what the specific flood levels were that were experienced in their property or the surrounding area?
A Right. They showed us where the 1990 flood was. ¶

Q Excuse me. I didn't mean to interrupt.
A Yeah. They pointed. It was very obvious. They pointed it out on the wall. There it was, a stain.
Q Let's talk about the 1975 flood, did you ask them where the 1975 flood levels were?
A Yes.
Q Did you ask them where the 1951 flood levels were?
A No, we were not interested in '51. There was not data -- to come up with an elevations in the '51 flood to do us any good.
Q How do you know if you didn't ask them?
A I believe '51 was discussed but we never really got -- and used that, I guess is what I'm saying.
Q That's right. There was data out there that you could have gone to get, but you weren't interested it at that time?
A There wasn't enough of it.
Q How do you know if you didn't ask?
A We did ask.

Q Well, did you --
MR. HAGENS: I think he ought to be allowed to finish his answer, Your Honor. He said he did ask.
Q That was the answer to the question.
A We did survey it.
Q You did ask. Did you write down the information ¶

anywhere?
A No.
Q It's not even in your notes, is it?
A I don't believe so.
Q So you didn't make any effort then to determine, on a Nookachamps-wide basis, what the flood levels were from the 1951 flood by going and talking to the residents who might have lived through it, did you?
A No.
Q But that's something that residents who moved in there could do. They could go talk to old timers who lived through the 1951 flood and find out where the high water was.
MR. HAGENS: Objection as to lack of foundation as to what residents could or couldn't do. Calls for speculation.
THE COURT: It does call for speculation.
MR. SMART: Mr. Hagens has asked that question on numerous occasions.
MR. HAGENS: I didn't ask that question.
THE COURT: It calls for speculation.
Q Let me ask you this way, sir. Do you have an opinion whether or not a prospective purchaser could ask other residents, old-time residents, about what the water levels were in order to find out where they were on any ¶

of these pieces of property?
A I don't see why they couldn't. We all talk to each other.
Q And that's exactly what the Army Corps did when it went out -- when the mini task force went out there to conduct the survey is they asked the old timers where the water was.
A That's true.
Q At least for 1990 and 1975?
A That's true.
Q And you asked about 1951, but simply didn't write down the information?
A That's right.
MR. SMART: No further questions, Your Honor.
THE COURT: Mr. Anderson?

RECROSS EXAMINATION

BY MR. REGAN:
Q Mr. Regan, yesterday counsel asked you about some of the Corps of Engineers studies that have been done and the

fact that they have to be sponsored by local government.
A That's right.
Q And you indicated that the county and the State of Washington sponsored these studies.
A My understanding of the Corps project, a local sponsor has to be identified. He has to ask. The local sponsor ¶

for the -- for the General Design Memo project, the 1979 General Design, was the Skagit County. They asked for it.
Q That's right. The 1979 General Design Memorandum dealt with structural proposals on the Skagit River?
A A project, yes.
Q A project to build levees?
A A structural project, yes.
Q Previous efforts by the Corps of Engineers had also involved structural proposals, the 19 -- I think it was '65 or '63.
A '62, '63, Avon Bypass. Right. That was a structural proposal.
Q 1930s Army Corps of Engineers involved structural proposals for the Avon Bypass?
A It started in the thirties and culminated in the sixties on Avon Bypass, yes.
Q The 1967 study, this was in Exhibit 512, the Flood Plain Information Study, was requested by the State of Washington, Department of Conservation?
A That's a study. That's right, that's a study.
Q That doesn't include any structural proposals, does it?
A No, this is information. This is providing anyone who wants to read it information on floods as the ground sits the day the work was done. ¶

MR. SMART: Your Honor, I don't know where we're going with this and I don't want to unfairly restrict Mr. Anderson, but it's clearly outside the scope of redirect.
MR. ANDERSON: I don't think that's correct at all, Your Honor. Mr. Hagens yesterday asked if the -- who -- that the Corps of Engineers had to have a sponsor. The witness testified that they did have to have a sponsor. I think I'm entitled to inquire of him, if he says that the State sponsored something, what it is the State sponsored.
MR. SMART: There's no dispute whatsoever who the sponsor was. The document's been testified to two or three times.
THE COURT: I'll allow it.
Q The 1967 study was a flood information study, it was to advise of the flood hazard, not to proposed any structural projects.
A Absolutely right.

Q Are you aware of any other studies or the things similar to the General Design Memorandum that the State sponsored?
A For all my time with the Corps I can't remember anything the State has sponsored.
Q So the 1967 Flood Plain Information Study is the only ¶

thing that you can recall or that you're aware of that the State sponsored?
A Right. An information study, right. That's the only thing I can remember.
MR. ANDERSON: That's all I have, Your Honor.
A Thank you.
THE COURT: All right.
MR. HAGENS: One question, Your Honor, if I might.

REDIRECT EXAMINATION

BY MR. REGAN:
Q Do you have to have the old people before you can ask them about the flood history of a region?
A Somebody has to know them, right.
MR. HAGENS: That's all I have, Your Honor.
THE COURT: All right, counsel.
MR. SMART: None here, Your Honor.
THE COURT: Mr. Regan, you may step down.
THE COURT: Rather than revving up another witness for three or four minutes, we'll just take our break at this point. We have a civil presentation at one o'clock, so we'll be reconvening at 1:30, so I'd ask you to be back in the jury room, if you could, by 1:25 and we'll start up again then.
All right. Thank you. ¶

(Noon recess was taken.)

AFTERNOON SESSION

(Whereupon, the following occurred in the presence of the jury:)

THE COURT: Counsel, just a moment, before we start, we're going to get the juror's note pads. All right, sir, if you'd step forward, please.

MR. HAGENS: Dr. Mutter.

DOUGLAS G. MUTTER called in behalf of the plaintiff, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HAGENS:

Q Would you state your name, and spell it, please, and also --

THE COURT: Actually just one moment. We're just handing out the last of the pens.

Q Would you please state your name, spell it for the Court Reporter, and your business address.

A My name is Douglas Gerald Mutter, M-u-t-t-e-r. And my business address is 16300 Christenson Road, Suite 350, Tukwila, Washington.

Q And by whom are you currently employed?

A I'm employed by Northwest Hydraulic Consultants.

Q Before we get into your role in the firm, can you tell the jury a little bit about your firm. For instance, how many offices does it have? ¶

A We have two offices in the western United States, Seattle and Sacramento, California, two in western Canada and two overseas.

Q And how long has your company been in business?

A Since 1972.

Q How many employees does it have?

A Approximately 75.

Q And does it have any specialities?

A Our firm is focused on hydraulic engineering, hydrology, hydraulics, river engineering and sedimentation. That's all we do.

Q And can you tell us a little bit about the 70 employees, what do they do?

A Well, there are approximately 15 principals in the firm who are specialists in various areas that I just mentioned, river engineering or sedimentation, for

example. And they're supported by staff engineering professionals, and also technicians and clerical staff, so we do work at a variety of levels in the firm.

Q Okay. And can you give the jury some idea of your clients, the clients you've served over the years, Dr. Mutter?

A Certainly. We do a considerable amount of work for government of one sort or another, in particular the U.S. Army Corps of Engineers, Federal Emergency ¶

Management Agency. We do some legal work, State of Washington, for example, and the Justice Department, U.S. Justice Department, as well as counties and local governments.

Q And what is your role at the firm?

A Well, I wear two hats. I'm a specialist in one of our areas of interest, river engineering, and I'm also involved in management with the firm.

Q And what's your role in management position?

A I manage the U.S. operations of our company, which amounts to the northwest and California offices that I mentioned.

Q Has your company received any awards or commendation from any of the governmental clients?

A We have. We've been fortunate enough to be commended for our work by both the Army Corps and FEMA.

Q And have you qualified as an expert in hydraulic engineering in the past?

A Yes.

Q And you were retained in this litigation by plaintiffs; is that correct?

A That's correct.

Q Can you give the jury some idea of your educational background. How does one become a hydraulic engineer, for instance? ¶

A Well, I can describe the path I took. Received a Bachelors and Masters Degree at the University of Alberta, undergraduate degree in civil engineering and a Master's Degree in -- also in civil engineering, with a specialty in hydraulics, river engineering. PhD at Colorado State University, also in civil engineering, with a specialty in river engineering and sediment transport, and all of my experience has been in the same field, water resources in one way or another.

Worked first as a government employee with the Water Resources Agency, Provincial Government, and for the past 20 some years I've worked with Northwest Hydraulics on river engineering-type work, flood plain studies and so on.

Q Are you a licensed civil engineer?

A Yes, I am.

Q Have you ever taught hydraulics at any college or university?
A As a graduate student, yes.
Q At where?
A Colorado State and University of Alberta, both.
Q When did you join the company, Northwest Hydraulics?
A 1973.
Q And your capacity when you joined the company?
A I was a junior engineer. ¶

Q And your current capacity?
A I'm President of the U.S. corporation subsidiary that operates in the U.S..
Q Do you recall approximately when you were contacted by plaintiffs, or attorneys for the plaintiffs in this case, do you recall?
A Almost five years ago. I believe it was April of 1992.
Q Okay. And were you subsequently retained?
A I was, yes.
Q By the way, did the Skagit County try to retain you as well in this litigation?
A Yes, they did.
Q And were you subsequently retained by plaintiffs in this case? You were hired in this case to look at the various problems they asked you to look at?
A Yes, I was.
Q What was the financial arrangement? Would you basically tell the jury what the financial arrangement was?
A We were hired on a time and materials basis and an hourly fee.
Q What were you asked to do?
A We were asked to investigate the flood event of November, 1990, in the Skagit River, and to offer a technical opinion as to whether or not the levee system along the Skagit River affected flood levels in the ¶

Nookachamps area.
Q Okay. And were there any restrictions or limitations on your assignment?
A No. We were asked for an independent opinion, essentially.
Q Were you given a free hand in how you went about assessing the impact of the existing levee system in Skagit County?
A I would say so.
Q Will you tell the jury a little bit what you did in furtherance of that assignment. What are some of the first things that you did in furtherance of that assignment?
A Well, initially reviewed the complaint to make sure we understood the issue, what was being asked of us. We assembled all the available information, historical

information, government reports, all of the documents that had been produced in the legal case from both plaintiffs and defendants that we could review to get the background on the case. We made a preliminary assessment, a manual calculation or estimate as to what the effect of the levees on flood levels in the Nookachamps might be.

Q Why don't you just stop there for a moment. Explain to the jury what you did in that regard. ¶

A Well, using approximate methods, let's call them, Empirical methods and manual calculations, we estimated the depth of flow in the Skagit River for the 1990 peak discharge rate both with and without the levee system, and admittedly this was an estimate, but it allowed us to determine within reasonable limits whether to expect that there was an effect from the levees or not and whether it be justified to proceed and work with more sophisticated approaches to fine-tune our estimate.

Q What did your preliminary calculations reveal?

A My own estimate was that the effect could be as great as four feet.

Q This was a mathematical calculation, was it?

A That's correct.

Q You indicated you reviewed documents that had been produced in the case by both parties. Did you review any depositions that had been produced?

A Yes.

Q Have you continued to review documents and depositions as they've become available?

A Yes.

Q Did you review the General Design Memorandum that was put together by the Army Corps of Engineers in 1979?

A Yes.

Q Now, you said you assembled some historical data. Over ¶

what period of time was this historical data assembled, that is it covered what period of time?

A Well, it began from the turn of the century. I believe the earliest reports that I reviewed were created in the early 1920's, but they covered a period of time back to the turn of the century and, of course, we reviewed data right up to the present day.

Q What was the purpose of of reviewing this historical data?

A Primarily to get a feel for the background, how the system works, how the Skagit River behaves during a flood, and what changes have taken place over time.

Q All right. Have you reviewed the flood level reports as well?

A Yes.

Q And what data do you turn to for that, to determine, you

know, what the history of flooding has been in the region?
A Primarily we got that information from published records from the U.S. Geological Survey.
Q People in your field typically rely upon that data?
A Yes, that's correct.
Q Okay. Did you conduct any kind of field investigation or surveys as part of your assignment?
A We did both. We made a site reconnaissance to make sure ¶

we were familiar with the area and to visit with various of the plaintiffs to hear their descriptions of what occurred in November, 1990, and subsequent to that we also made our own field surveys of high water marks and some other interesting --
Q When you say an field survey, is this getting transoms out and taking survey measurements, or is it just visual observations?
A No. We used leveling equipment and actually determined elevations of a limited number of high water marks.
Q Okay. And then did you construct a -- what is called an a numerical model?
A Yes.
Q And can you tell the jury a little bit -- kind of give them an overview of what was involved there.
A Well, quite simply, a numerical model in this case was a computer program which embodies the rules of engineering, hydraulics and mathematics, and allows us to predict flood levels and patterns using the computer model.
Q Go ahead.
A It has some basic data that we use to construct it, and we impose some flow conditions, for example, and it's capable of computing and telling us what the elevations of the water surface would be at various points in the ¶

study area.
Q Okay. And will it also tell you what the differences are at various points with and without certain topographical adjustments?
A Yes, that's correct.
Q Is this a commonly accepted methodology by hydraulic engineers?
A Yes, it is.
Q Have you used it in other assignments?
A Yes.
Q Is this state of the art approach or the best hydraulic engineers can do these days, or is it something less than that?
A It's -- the particular approach that we took is quite sophisticated.
Q Okay. So you've given them an overview. Then did you

also undertake to present the results of that work on a graphic basis?
A Yes, we summarized the results. As I mentioned, we computed results at a large number of points in the study area, so we summarized those both graphically and in a tabular fashion.
Q How long did it take to put this model together, can you tell the jury that?
A We worked for, I would estimate, between 500 and a ¶

thousand hours over a period of perhaps six months to assemble the model.
Q And the data that went into the computer was acquired from where?
A A variety of sources. For example, we used topographic mapping produced by U.S. Geological Survey and the U.S. Army Corps of Engineers. They also furnished levee profile surveys.
Q Who's they?
A I'm sorry, the U.S. Army Corps of Engineers.
Q What about the surface roughness, that sort of data, if any, was that included in the computer model?
A That was included in the computer model, and that was something we estimated using engineering judgment.
Q Maybe you ought to give the jury a quick -- we'll come back to this in quick detail in a moment, but maybe you ought to give the jury a quick overview of what surface roughness is all about.
A Certainly. Surface roughness is actually quite simple. It's about what it sounds like. When water is attempting to flow in the river channel or over the flood plain, it encounters resistance, something that tries to prevent it from flowing downstream, and you can imagine if the surface texture is very rough or if there's a lot of vegetation in place, then the water ¶

would have a difficult time moving downstream. If it's very smooth, then it would find it easier to move downstream.
There is a parameter or series of parameters that engineers estimate and use to describe this roughness which translates to the resistance of flow, so it's one of the basic parameters of the model.
Q And how did you put the downstream conditions into the model that you folks prepared? Where did you get the information for that?
A The downstream condition which we imposed as a boundary condition, so-called, was provided by the U.S. Geological Survey records at the gauging station at the Riverside Bridge vicinity.
Q That's in Mount Vernon?
A It is.

Q Did you put any -- well, let's call it rating curve information? Maybe you ought to stop and tell the jury what a rating curve is, but was that information used at all in your computer modeling?
A That essentially furnished the downstream boundary conditions, and it's, very simply, a relationship between the rate of flow going downstream, how many cubic feet per second we're going downstream and how high the water level got, and that's a relationship ¶

study by USGS by field measurements. They go out and use meters to make measurements and establish this curve.
Q Okay. So you did a review of the historical data. You did some preliminary work to determine if the model was justified. You reviewed all those preliminary historical documents, did you not?
A Yes.
Q And did you then arrive at a number of opinions relative to how the hydraulics affect or the levees affect the Nooachamps/Clear Lake area?
A Yes, I did.
Q Would you give the jury an overview of your opinions in that regard.
A Very well. In my work on this case I came to five basic opinions I'd like to share with you. The first is that, in my opinion, the existence, the presence of the Skagit County levee system caused flood levels in the Nookachamps area to be higher than they would have been if the levee system weren't there.
In the November 25th, 1990, flood event, my analysis indicates that flood levels were higher as a result of the presence of the levees by amounts ranging from a foot and a half to four feet, depending on the location in the study area. ¶

Q Depending upon the plaintiff's location, you're talking about?
A Yes, that's correct. My second opinion is that this occurrence, this effect that the levee has had on flood levels in the Nookachamps, is not something that happens just once, it's not a rare occurrence. In fact, by my analysis, it's occurred 15 to 20 times in the last 50 years, and it's clearly something that recurs and is chronic. It can be expected to occur again in the future. It's my opinion if the levees didn't exist, during significant flood event the flow, rather than being confined in a narrow corridor between levees, would be allowed to spread out on the valley floor of the Skagit River and would flow at shallow depth resulting in lower flood levels than occur in the present day.

It's my opinion that the local run-off, such as from Nookachamps Creek, for example, and other local drainages was very small in relation to the amount of water that was going down the Skagit River itself and the local drainage had essentially no effect on flood levels in the Nookachamps area.

And, finally, it's my opinion that the Skagit County levee system has, over time, undergone a great many changes and improvements that have strengthened it ¶

with respect to it's ability to withstand erosion and seepage such that it's much less prone today to collapse or to be eroded than it was in years past.

In my opinion, had these improvements not been made to the levee system and had flood fight activities not been carried out in November, 1990, the 25th of November, in my opinion it's more likely than not that the levee system would have failed either through erosion or collapse and there would have been a subsequent lowering of flood levels up and down the Skagit River that would have reduced the flood impact to residents up and down the river, including plaintiffs in the Nookachamps area.

Q Okay. Let's go to your very first opinion, that the levee system caused the 1990 flood levels in the Nookachamps to be higher by amounts ranging from one and a half to four feet. And the basis of that opinion is what, Dr. Mutter?

A The basis of that opinion is essentially our modeling analysis.

Q Okay. And to -- I wonder if we can just maybe, in a perhaps a little bit more detail -- how do you put the topographical information into the computer that generates this result, for instance?

A We furnished between four and five thousand points in ¶

the study area elevation information so you can picture -- actually 48 hundred points on the ground throughout the study area, which we furnished the computer program information about the elevation of the topography.

Q Okay. And what about the levee profile as such, what was the source for that data?

A That came from two sources. I think I mentioned earlier one was topographic mapping provided by the Army Corps of Engineers, as well as specific top of levee profile survey.

Q Okay. And the resistance data, I think you mentioned that there was some data on that. Can you be a little bit more specific as to the source of that information as it went into the computer model.

A That information came from engineering judgment. We observed the appearance of the river channel and flood

plains and, based on experience, estimated the roughness values.
Q Okay. And was that up and down the river, or just certain locations? Where did you estimate those values?
A It was estimated at essentially every point in the study area in the model.
Q And what was the study area of the model?
A It extended, as we mentioned, from the downstream limit, was somewhat downstream, slightly downstream of the ¶

Riverside Bridge. It actually extended down to the Big Bend area and extended upstream beyond Sedro Wooley, beyond the Highway 9 Bridge.
Q And those were the points that you put in the topographical area?
A In the entire reach between those two appointments, that's correct.
Q The rating curve data, the source for this, the hydraulic data that showed you the relationship between flow and elevations, again, where did you get that data?
A We obtained that directly from U.S. Geological Survey.
Q Did you also have to map out the plaintiffs' locations as best you understood therm?
A Yes.
Q Where did you get that data?
A That came from plat maps and street maps, essentially.
Q Okay. What did you do with the model once you had it constructed? Did you undertake to calibrate it at all?
A Yes, we did.
Q Would you explain to the jury what your calibration procedure was to assure yourselves that this model was going to produce accurate results?
A Well, again, the purpose of the model is to predict water surface elevations and flow directions, flow patterns, and what we did was simulate something that ¶

was known, something that had been observed, mainly the 1990 flood event, so we imposed -- having constructed the model, we imposed the known 1990 flood discharge and compared the computer model's predictions of water surface elevations with high water marks that had been observed during and after the flood event to make sure that we were within reasonable agreement of what had actually been observed in the field.
Q Did you also run '75, 1975 event through as a form of calibration?
A Yes, we did. Well, the first step simulating the 1990 event was the calibration, and I should explain that there was tuning involved in adjusting the roughness values we spoke of earlier until there was adequate agreement between the model's predictions and what was observed in the field, but, having done that, it's a

standard procedure to test the reliability of the model by applying another flood, which we used the 1975 flood discharge, and hands-off retuning the model, seeing how -- what kind of job it did at predicting water surface elevations from 1975, and we found it did an adequate job of that also.

Q The idea of doing that is what kind of a check on the accuracy of your model?

A That's correct, to build confidence that the model was ¶

reliable.

Q Okay. And so you compare the results of the model with the known statistical information that you get from the USGS and for the 1975 flood; is that correct? In part anyway?

A Actually we compared the results of the 1975 verification run, the check run, with high water marks that had been observed by the Army Corps of Engineers in 1975.

Q Okay. And did you find that they matched or didn't match?

A We found that they matched adequately.

Q Okay. And then -- okay. Having done the preliminary calculation to estimate the flow, having done this model that took you six months and 500 to a thousand hours to put together, and having calibrated the model as you've told the jury, what did you do with the model after that?

A Well, we had let's call it a base line condition, a simulation of the 1990 flood event for existing conditions as they were observed on the 25th of November. We modified the model to remove the levee system only to see what the effect of removing the levees would be on flood levels in the Skagit River, so we had a second lower water surface solution that we ¶

could compare directly with the 1990 existing condition and determine what the impact of the levees was on flood levels in 1990.

Q Okay. Let me see if I understand. You removed the levee system from the Skagit -- from the levee system, Exhibit 199, from the flood plain, so to speak; is that correct or incorrect?

A Removed all of the levee system, wherever it happened to be.

Q Okay. And then that gave you another output; is that correct?

A That's correct.

Q So you had an output showing with levees and an output showing without levees; is that correct?

A That's correct.

Q And then -- that gave you a comparative analysis, did it

not?
A Yes.
Q You gave both those outputs to the defendant, did you not?
A Yes.
Q Now, did you then prepare some kind of a visual and tabular data that you could use to help the jury understand the difference between the condition with levees and the condition without levees, and as that ¶

might affect the plaintiffs?
A Yes, I did.
THE CLERK: Exhibit 210 marked.
Q Is this the exhibit that you prepared to contrast the with and without conditions of the levees?
A Yes, it is.
Q And it's, in fact, a summary of your computer print-out; is that correct?
A That's correct.
Q The two runs you gave to the defendants and compare here?
A Yes.
Q And it has the plaintiffs' locations on here in numerical order, does it not?
A Yes.
Q Has other critical data relating to the flood plain in the area in which the plaintiffs reside?
A It has landmarks, yes.
Q And does this data -- is this -- by the way, is this essentially the same data that you provided in the form of other charts to the defendants?
A It is essentially.
Q Was there some change or -- by reason of any more recent data you received?
A We revised some of the presentation because of survey information we received from Skagit County in the last ¶

four to six weeks.
Q Did you change your model at all?
A No.
Q So this is the refined, then, version contrasting the two computer runs that you earlier gave the defendants; is that right?
A Exactly right.
MR. HAGENS: We'll offer Exhibit 210.
MR. SMART: Voir dire the witness, Your Honor?
THE COURT: All right.
MR. SMART: Showing you Exhibit 210, Mr. Mutter, you never gave this to Skagit County, did you?
THE WITNESS: No.
MR. SMART: In fact, this wasn't even prepared until about a week ago, right?
THE WITNESS: It was prepared prior to that.

MR. SMART: Two weeks ago maybe?
THE WITNESS: More than that, but that hasn't been --
MR. SMART: Approximately the start of the case?
THE WITNESS: Pardon?
MR. SMART: It was prepared approximately the start of the trial; is that correct?
THE WITNESS: In the last few weeks. I can't recall exactly. ¶

MR. SMART: And, in fact, when you say you gave information to the county, what you're talking about is that when you were subpoenaed for a deposition, you brought certain information with you, correct?
THE WITNESS: No. We provided information in digital form and you requested hard copy output plots, which we furnished to you directly.
MR. SMART: Yeah, at your deposition.
THE WITNESS: That's correct.
MR. SMART: Which is the time you and I first met, correct?
THE WITNESS: I believe that's right.
MR. SMART: You didn't meet with somebody else from the county prior to time that time, did you?
THE WITNESS: No.
MR. SMART: So if I further understand, this document has been -- has changed information that was presented in your deposition by additional topographic information that you say you recently got within the last three or four weeks.
MR. HAGENS: I object. This seems to be examining on the exhibit itself.
MR. SMART: I'm asking what the document shows.
MR. HAGENS: I'll offer Exhibit 210, as I have offered it. ¶

THE COURT: Counsel, that last question I think was beyond the scope of voir dire of the witness.
MR. SMART: Well, specifically, Your Honor, the witness, in response to Mr. Hagens' question, said, when Mr. Hagens asked him if it was the same, he said no, it had been altered by some recently altered data, so the answer to whether or not it is a comparison of information which was previously disclosed in deposition would possibly be inaccurate. That's the purpose of my question as to what this document shows, and that's the purpose of voir dire is to find out what the document shows.
THE COURT: That question didn't go to that issue, as far as I read it.
MR. SMART: Let me ask -- see if I can phrase it correctly. This document shows recent information that

was not presented at your deposition because it has included certain topographical information that you have recently acquired within the last three or four weeks, correct?

THE WITNESS: No, that's not correct.

MR. SMART: What is the purpose -- what is -- what does the document contain by way of that recent topographical information?

THE WITNESS: Nothing. ¶

MR. HAGENS: We'll offer the exhibit at this time, Your Honor.

MR. SMART: And I have an objection, Your Honor, since we have never seen it before the start of this trial, it wasn't produced in deposition, and it's a different document and different information than previously identified.

THE COURT: Counsel, did I understand your earlier questions, are you saying that it's -- you're offering it for substantive and illustrative?

MR. HAGENS: Absolutely, a summary of his -- of his computer model that the jury can understand. They're not going to understand numbers. This is the only thing it can understand. It took hours and hours to create, and he's testified it's a comparison of the two prior charts that they asked be produced, and were produced for them over a year ago, together with the computer data.

THE COURT: Mr. Anderson?

MR. ANDERSON: I have no objection, Your Honor.

THE COURT: 210 will be admitted then.

(Whereupon, Plaintiff's Exhibit No. 210 was admitted into evidence.)

Q (By Mr. Hagens) Okay. Dr. Mutter, do you want to come ¶

down here and -- we have a pointer here somewhere that lost its tip. Maybe if you can get over here.

THE COURT: Knowing Snohomish County as I do, it probably lost its tip about 1967, so we're talking about archival instruments. That's certainly among them. We'll break down and get you a new one before the trial is over.

Q I'm also putting this on the overhead.

MR. HAGENS: Your Honor, I have a copy of the exhibit for the Court's use.

THE COURT: Although you will recall, Mr. Hagens, that they finally hooked me up to the overhead, so I have that.

MR. HAGENS: If this helps a little bit --

THE COURT: I appreciate it. Thank you.

Q Okay, Dr. Mutter, maybe you can explain to the jury in a little more detail what this Exhibit 210 depicts.
A I'd be happy to.

We mentioned earlier that we had two separate computer runs that showed the water surface elevation throughout the study area, and the study area -- perhaps we could focus on that to begin with. This corridor we see here is the main channel of the Skagit River. We have some landmarks which include State Road 20, State Road 9, Burlington Northern Railway Bridge, Interstate ¶

5, Mount Vernon, Burlington, Sedro Wooley, so we have then two separate computer aanalyses, sets of solutions for water surface elevations in this region, one without the levees, one with the levees.
Q This is the existing levees now?
A That's correct. It's somewhat difficult to go point by point and determine the difference in the elevation as a result of taking out the levees and to visually make sense of that, so what we did was compute for you the difference in water surface elevation caused by the levees and then we've presented the differences here by zone.

So, for example, in this large blue zone in here, it's my opinion that water surface elevation throughout the zone is approximately two feet higher as a result of the levees. In the reddish zone here, for example, it's our opinion that the levees would cause flood levels in the November, '90, flood to be approximately five feet higher. They actually varied smoothly, they didn't go in steps, the depth of the increase as a result of the levees by five, four, three and so on. It would have been five feet here, 5.1 here, 4.9, but in order to show you in as simple a fashion as possible, we indicated whole zones of equal foot increments of effect of the levees in 1990. ¶

Q Okay. And you notice it starts at like a half a foot and ends down here at nine feet. Is that -- can you explain what that progression might mean to you, for instance, as a hydraulic engineer?
A Well, the primary bottle neck, if you will, is the levee system where it's at its narrowest, and that's where the greatest impact is. The levees cause the greatest rise in water surface elevation at that downstream location, 9, 8, 7 feet, and that effect tapers off in the upstream direction, and it's at its least effect up near Sedro Wooley where it's perhaps a half foot in rise, so that the strongest effect of the levees is at the downstream end and the weakest effect is at the upstream end.
Q And no plaintiffs live down in this 9, 8, 7, 5 area. In fact, you don't get to see plaintiffs until we get to

the four foot level.
A That's correct.
Q Now, the individual numbers on here are -- go through 1 to 60 something; is that correct?
A One through 68, I believe.
Q And they show at least the properties of the existing plaintiffs, I guess, and some that were former plaintiffs, those approximate locations?
A Yes.
Q And then you've also attempted to show in here -- can ¶

you tell the jury what this is, this wavy line that borders on the northwesterly side of your chart meandering through Highway 20? Can you tell the jury what that is?
A That's Gages Slough. It's a remnant of the Skagit River, a former channel, which has filled in through sediment deposition during the years and it's now simply a large Marshy slough area.
Q Okay. And do you know if this area, in fact, drained any significant water during the 1990 event, either the 1990 events?
A I think it probably did not. I'm not sure.
Q Okay. But in years past had it, do you know? Can you tell by looking, your review of the documents and historical data, whether in years past that had?
A I'm sure that it has historically. It has provided a flood nuisance to residents in the Burlington area because it has created flood water in the past.
Q So a more serious situation in the past; is that correct?
A That's probably accurate.
Q Now, the white areas, you have a -- one area marked Clear Lake. What are the white areas in your graphic presentation of your computer result?
A Those are high spots, essentially.
Q Okay. Now, while we've got you in front of the map ¶

there, I wonder if you'd take a moment and perhaps explain where the river -- we also have this exhibit admitted in evidence as well if it helps you, Dr. Mutter, it's Exhibit 199.
I wonder if you'd just take a moment to tell the jury or describe from these exhibits, 199 and 210, where the flood waters would go if there were no levees.
A Well, as I mentioned in one of my basic conclusions, if there were no levees, the water would -- rather than being confined by the corridor as we see -- rather than being confined by these narrow corridors, the flow would fan out. In fact, this entire delta was created in earlier times by the channel moving pretty much wherever it felt like, and it would be free to do so again. Flow would fan out over the delta at very shallow depth.

Q Okay.
A At higher flows there's always the possibility of diversions from even as far upstream as the Sterling area, the Samish Basin and Padilla Bay. That's happened historically also.
Q When you say historically, can you give the jury some idea what you mean by that? You mean prior events of greater magnitude?
A Its pre-developed case. It's happened recently enough that we know there's still physical signs that this has ¶

happened, but it hasn't happened in a major way since modern civil civilization, since the turn of the century.
Q Back to your results here, when you did your modeling here and came up with this graphic computer presentation of the amount of water caused by the existing levee system, did you leave in, like, the Burlington Nothern Railroad Bridge?
A Yes.
Q Did you leave in Highway 20?
A Yes.
Q And did you leave in -- well, all the civil works in this area?
A We left everything in the model except for the Skagit County levee system, which we removed in its entirety.
Q So if there was a structure like I-5 or Burlington Northern Bridge or Highway 20, was that left in the model?
A Yes.
Q Why don't you resume the stand then, Dr. Mutter.
I did want to ask you what the accuracy is of this, plus or minus within how many inches or feet?
A Well, the different results that we see portrayed on the chart are quite accurate. I would estimate them to be accurate within one or two-tenths of a foot. ¶

Q Okay. And did you also, as part of your work, prepare a table that shows on a per plaintiff basis the location and the difference in water elevations with and without levees?
A Yes, we did.
Q And that was, again, just a straight comparison of the two model results; is that correct?
A That's correct.
THE CLERK: Exhibit 211 marked.
Q I'm going to hand you Exhibit No. 211 and ask if you can identify it.
MR. SMART: Do you mind if I grab one of those for Mr. Anderson?
MR. HAGENS: Didn't I give him one?
MR. SMART: No.

MR. HAGENS: If I've got an extra.
MR. HAGENS: Sorry, Glenn, did I leave you out?
MR. ANDERSON: I'm not sure what happened.
Q Can you identify that, Dr. Mutter?
A Yes, this is the summary of results that we produced, showing the difference in water surface elevations would and without levees in 1990 at each of the plaintiff's locations.
Q And this is using the same computer model that you've used on Exhibit 210; is that correct? ¶

A Yes.
Q So this is just a computer printout of the varied differences between the two; is that correct?
A At the specific locations of plaintiff's properties, that's correct.
MR. HAGENS: We'll offer Exhibit 211, Your Honor.
MR. SMART: Voir dire, Your Honor?
THE COURT: All right.
MR. SMART: Do I understand correctly that this document 211 simply shows which zone these properties are in?
THE WITNESS: No.
MR. SMART: Is there anything about this document that shows exactly where the plaintiff's residence is within the zone?
THE WITNESS: Yes. Each plaintiff's property is numbered on the zone map, as you call it.
MR. SMART: And would it be correct that the -- that there are variances in topography with respect to each plaintiff's property?
THE COURT: Counsel, you need to -- we need to limit the voir dire specifically to the admissibility of this document.
MR. SMART: Yes. That's what I'm getting at, Your Honor. ¶

THE COURT: I think the last question wasn't getting us there, so I'd like you to move on.
MR. SMART: Let me rephrase it. The number in the right-hand corner, is that right, is that supposed to be at a specific location on the property?
THE WITNESS: Yes.
MR. SMART: And which location is that supposed to be at?
THE WITNESS: I'm sorry, I don't follow the question.
MR. SMART: There's a elevation listed in the right-hand column, correct?
THE WITNESS: Yes.
MR. SMART: The question is, where on the plaintiff's property is that number supposed to

represent?
THE WITNESS: I'm sorry, I don't have a copy of the table.
The number in the right-hand column is not an elevation. Again, it's the difference in the two water surface elevations.
MR. SMART: I understand. The question is, where on the plaintiff's property is that difference in water surface elevation supposed to be represented?
THE WITNESS: Essentially anywhere. ¶

MR. SMART: But don't the properties vary in topography?
MR. HAGENS: Your Honor, this seems to get into --
THE COURT: Counsel, this doesn't go to admissibility.
MR. HAGENS: We'll again re-offer the exhibit, Your Honor.
MR. SMART: I'll object, Your Honor. The witness can't testify where it is.
THE COURT: You're certainly free to inquire about that. That's very legitimate cross-examination, but as far as the admissibility -- 211 will be admitted.

(Whereupon, Plaintiff's Exhibit No. 211 was admitted into evidence.)

Q (By Mr. Hagens) I'll leave that in front of you and we'll put 211 up on the screen. That's as big as we can -- a big overview, and we'll zoom in to take a look at one or two of them.
That's about as good as I can get this equipment to work.
Let's go through this exhibit. Do you have it in your hand there, Dr. Mutter? ¶

A Yes, I do.
Q Now, you've got all the plaintiffs listed on this Exhibit 211 in alphabetical order; is that correct?
A Yes.
Q Starting with Albe and going all the way to Erling Ytgard at the bottom, he's number six; is that right?
A Yes, sir.
Q In the next column you have the address. Is that the mailing address, as best as you were able to find it?
A Yes.
Q And then you've got the city indicated, and then you have -- at the far right-hand column, it says 1990 Flood Level Rise at Property Due to Levees, and what does that column designate?

A Those numbers indicate the difference in water surface elevations, flood levels, which we computed with and without the levee system.
Q Okay. And you've done that alphabetically for each and every plaintiff on the chart; is that correct?
A Yes.
Q And there are several on, here like Number 8 after Bramlett, that were deleted. Are these former plaintiffs then?
A Yes, that's correct.
Q So the n/a's would reflect former plaintiffs; is that ¶

correct?
A Yes.
Q And the accuracy of these calculations in terms of plus or minus how many feet is, again, what?
A Plus or minus one or two-tenths of a foot.
Q So if a plaintiff were to testify that they -- for instance, Mr. Albe, was to testify that he had two feet of water on his property and if the table shows that the 1990 flood level rise at property due to levees was 3.3, those 2.2 feet that Mr. Albe testified to, would those be caused by the levees or something else?
MR. SMART: Object to the form of the question, Your Honor.
MR. HAGENS: I'm just trying to help the jury understand how to use and interpret the exhibit.
MR. SMART: I think he's confused. He misspoke himself concerning the numbers and how they might operate. I think it's a confusing question for the record.
Why doesn't counsel rephrase it, because it's internally inconsistent.
MR. HAGENS: I didn't intend it to be. Let me try again.
Q Your exhibit, Plaintiff's Exhibit 211, shows 3.3 feet of 1990 flood level rise at property due to levees. ¶

If Mr. Albe were to testify that he had two feet in his home of flood waters, what portion of that would be caused by the levees, if any?
A All of it.
Q And if he were to testify that he had three feet in his home, what portion of that would be caused by the levees?
A All of it.
Q And if he had four feet, if he testifies -- gets on the stand and says he has four feet or five feet, how much of that would be caused by the levees?
A Only the top 3.3 feet.
Q And that would be true for each and every plaintiff up and down this table; is that correct?
A Yes.

Q By the way, you're conscious that Skagit County retained a hydraulic engineer; is that right?
A Yes, I'm aware of that.
Q You reviewed his deposition?
A Yes.
Q Did he disagree with any of these calculations, to your knowledge?
A Not to my knowledge.
Q Did he even do this type of a calculation?
A Certainly not in terms of differences, no.
Q Okay. Did he have the computer capacity to be able to ¶

do that, to your knowledge?
A He used the same model, same software that I did, but didn't put it to this use.
Q You mean he didn't undertake to isolate and identify the amount of flooding or flood elevations caused by the levees?
A No, he didn't.
Q Okay. Let's go to one other question before we leave this exhibit.
Does the fact that plaintiffs' properties received this flooding that you've described in Exhibit 210, does that provide any kind of of benefit or relief to other peoples protected by the levees in Skagit County? Does the fact that it operates as a storage area -- does that have any benefit to Skagit County?
A Well, in principle, there's no difference between storing water in the Nookachamps area or storing at a flood control project upstream. There would be some reduction in the peak discharge downstream, so there would be relief in that sense.
Q When you say some reduction in the peak discharge downstream, what do you mean, the flood level would be less because this is operating to some extent as a holding area or storage area?
A Essentially, yes. ¶

Q And did you also see historical documents where the area was called a holding area or reservoir area from time to time?
A I've seen descriptions like that, yes.
Q And is there any other -- does this area act as -- provide any pressure, for instance, to get the Skagit flows downriver?
A Well, it does do that. If levels were lower in the Nookachamps area, there would be no way to pass as much flow down through the levees unless they were set back or opened up in some way, so they do provide additional energy -- higher flood levels in the Nookachamps area to provide energy to force water down.
Q Is that like a water tower, in terms of stored energy

behind the levees?
A I guess you could say that. It provides the potential energy which ultimately is converted into flow energy or kinetic energy.
Q That does what?
A That motivates the flow to go downstream through the levee system.
Q Okay. Let's talk about your second opinion. In the past 50 years there's been, I don't know, let's say 15, 20 events have occurred where the levee system caused water to be higher in the Nookachamps. And that, ¶

therefore, the flooding of the plaintiffs' experiences has been re-occurring and chronic. First of all, do you know at what point the Nookachamps begins to flood in terms of cfs measurements?
A Well, there have been various estimates made over the years, but they range from, I'd say, 60,000 to 80,000 cfs, something in that order.
Q Okay. And when you talk about probability of reoccurrence, let's take like a 25 year flood, okay -- let's just take a moment and go over that.
Twenty-five year flood has what probability of reoccurrence, Dr. Mutter?
A A 25 year flood has a four percent annual chance of occurring.
Q And that's computed simply by dividing 25 into 100; is that correct?
A Yes.
Q And a one -- a flood that occurs every ten years would have ten a pen percent chance of occurring because you divide it into 100 ten times; is that correct?
A That's correct.
Q Then is the magnitude of the event -- by the way, do you recall what the approximate magnitude of the November 24-25, 1990, event was?
A Again, there is a range of estimates, but it's generally ¶

accepted as a 25 to 30 year event.
Q How many cfs was that event, just to try to refresh everybody's recollection here?
A The peak discharge on November 25th was 152,000 cfs.
Q Measured by whom?
A U.S. Geological Survey.
Q Okay. And was that an event that was characterized as a 25 year event, or was it characterized as some other type of event?
MR. SMART: Objection. By whom?
MR. HAGENS: If you let me finish the question I might be able to --
THE COURT: Go ahead.
Q Was that event characterized as a 25 year event by any

governmental organization?
A Yes, I believe the Corps of Engineers settled on a 25 year characterization.
Q They start out at some higher number and then ultimately arrive at that number. Do you know how, historically, that worked?
A I recall their describing it as a 30 year event at one point. It was described by the National Weather Service and other agencies as other than 25 year, but I believe as time wore on the estimates sort of honed in on a 25 year return period. ¶

Q Okay. And that was the November 24-25 event at 152,000 cfs; is that correct?
A 152,000, yes.
Q Is that something that's going to happen only once every 25 years? Can the residents, our clients, rest assured that this is only going to happen like once every 25 years?
A No, that's not correct.
Q Explain to the jury why that's so.
A Well, we've explained that in any given year there's a four percent chance that that flood could occur, the discharge could be 152,000 cfs or greater. And statistical theory tells us, we know that, then over a 25 year period there is a 65 percent, roughly, chance that one of those events will occur. Sadly, some engineer back a few decades ago tried to make this abstract concept of probability, their four percent in this case, more understandable by discussing it in terms of a return period, but the 25 years has nothing to do with an once in 25 year concept. That's simply misleading.
Q That's just a raw probability, isn't it?
A Yes.
Q In fact, it could happen any number of times in one year you could experience a 25 year happening? ¶

A That is correct.
Q And, indeed, you have, at our request, prepared a chart that shows the number of events above 80,000 cfs as -- measured at the Riverside gauge in Mount Vernon, have you not?
A Yes.
THE CLERK: 212 marked.
Q Can you identify that for the record, please.
A This is a graph that I produced that shows the floods that have occurred since 1945 that had a magnitude greater than 80,000 cfs.
Q Okay. And how did you prepare the graph?
A Well, I have the discharge records from the U.S. Geological Survey and I examined those to determine

those occasions when the flow was greater than 80,000 cfs, and simply graphed them.

MR. HAGENS: We'd offer Exhibit 212, Your Honor.

MR. SMART: Voir dire, please, Your Honor.

THE COURT: All right.

MR. SMART: Did all the information for this document come from the USGS?

THE WITNESS: Yes, sir.

MR. SMART: And how did you get that?

THE WITNESS: We obtained the information from a ¶

vendor by CD ROM computerized version of it, but it's published by the U.S. Geological Survey.

MR. SMART: Is it correct to say you got into the USGS data base through the CD ROM, and it's published for anybody who wants to use that data base?

THE WITNESS: That's true, and we have hard copies also that we can use to verify these numbers.

MR. SMART: And am I correct in interpreting the document that the '51 refers to 1951 flood that's above 140,000 cfs?

THE WITNESS: Yes, that's correct?

MR. SMART: And these are the 1990 floods over here?

THE WITNESS: Yes.

MR. SMART: And the document indicates that the first flood above 140,000 --

MR. HAGENS: Your Honor, this is not proper --

MR. SMART: I'm trying to figure out what the document says.

MR. HAGENS: Your Honor, he's asking questions about the exhibit.

THE COURT: Sustained. That's fine.

MR. SMART: The blue lines show the magnitude of the flood in thousands of cubic feet per second; is that correct? ¶

THE WITNESS: Yes, that's correct.

MR. SMART: I don't have any objection, Your Honor.

MR. ANDERSON: No objection, Your Honor.

THE COURT: 212 will be admitted then.

(Whereupon, Plaintiff's Exhibit No. 212 was admitted into evidence.)

MR. HAGENS: I'll give it to the witness so he can explain what this is all about. Here again, this is always an experiment for me.

Q (By Mr. Hagens) We have the exhibit in evidence now. Can you tell the jury what this exhibit depicts, Dr. Mutter?

A This -- perhaps I'm being redundant, but this indicates each of the episodes in the past -- since 1945 when the Skagit River had a flow equal to or greater than 80,000 cfs, which is the discharge that my analysis shows the levees begin to affect flood levels in the Skagit River. At flows greater than 80,000 cfs, they -- the Skagit County levees cause flood levels to be higher upstream than they would be without the levee, so this indicates the episodes since 1945 when, in my opinion, the levees would have influenced flood levels.
Q And you've got two events in 1990, and what events were those? ¶

A Those are the -- the most recent event is the November 25th, 1990 event, and the one to its left happened approximately two weeks earlier. They were separate events, but both very large.
Q The 1995 event, was that the November 30th, 1995, event?
A That's correct.
Q I see you have 1951 and '75 in here, that's correct?
A Yes.
Q Is it generally accurate to say the larger event, the more levee-induced flooding the plaintiffs would receive?
A That's a fair statement.
Q And, conversely, the smaller the flood, the less levee-induced flooding they would receive; is that correct?
A Yes.
Q While we're on that subject, did you, in all the documents you reviewed, did you come across any document from the Corps of Engineers, from Skagit County, from any source whatsoever, that undertook to quantify or measure the amount of flooding that was being caused by the existing levee system as opposed to some new proposed levee system?
A No.
Q Now, having reviewed this exhibit and prepared it, in ¶

point of fact, your opinion is what about -- insofar as demonstrating whether or not flooding is a re-occurring or chronic situation in the Nooachamps/Clear Lake area?
A Well, this analysis tells me that -- I think I count 18 occasions when the Skagit County levee system caused flood levels to be higher to some extent in the Nookachamps area in a period of approximately 50 years. That tells me that this is something that happens relatively frequently, and recurs and is an ongoing condition.
Q Is it likely to happen in the future?
A Asolutely.
Q Let's go on then to your third opinion, that without the

levees, the 1990 flood would have spread over a broad flood plain with less flooding in the Nookachamps area. What's the basis for that opinion?

A Well, two things. The historical descriptions of the site prior to the development of levees indicates that that's the way major floods used to occur. Flood would fan out at shallow depth all over the valley floor, and it makes sense geomorphically.

Q Geomorphically, can you put that in some more layman's words.

A Effluvial geomorphology is the study of rivers and how they form their own boundaries and patterns, they ¶

rearrange their beds and their banks and so on, but scouring, eroding, depositing sediment, and this setting is very typical of a delta area where flow has the ability to fan out in very shallow depth all over the delta, so there's the historical behavior and the historical descriptions that were available to me that are consistent with what I would expect. Also, we've computed what the flood levels would be in the absence of levees, and we know what the topography is out there and we could see that it would, in fact, spread out very broadly across the flood plain.

Q But in contrast to that it does what?

A In its present state?

Q Yes , the levees in place, the existing levees.

A In contrast to that, it's now confined to a narrow corridor between the levees.

Q Does that narrow corridor back the water up onto some of our client's property during these significant events?

A Well, it certainly would at all of the events that I've indicated on this Exhibit 212.

Q Okay. So it's a matter of degree, not kind, is that correct, when you're talking about the amount of flooding on the plaintiffs' property?

A That's correct.

Q Let's go on to opinion number 4, the local run-off from ¶

the Nookachamps Creek and other local drainage did not significantly affect flood levels on plaintiffs' property in 1990. What's the basis of that opinion, Dr. Mutter?

A The flow from Nookachamps Creek itself was not measured by USGS. There was a gauging station there up through 1978 but which is no longer active, so we didn't have measurements, but we know from prior study that the flows to be expected from that drainage area, which is a few square miles, would be very small in relation to the 3,000 square mile drainage area of the Skagit River. So I think it's that simple. The flows coming off the local drainages could be very small compared to Skagit

River flows and simply wouldn't influence the flood levels.

Q Maybe you can come here and show the jury on this Exhibit 199, just to reacquaint them with where this Nookachamps Creek is, if you can plot it out on Exhibit 199.

A This shows -- I need to use the pointless end here. This is Nookachamps Creek main stem. The basin is an area something like this. It's -- what used to be gauged on the east fork, which is actually two separate locations, but in this approximate vicinity, the gauging area upstream at that point was about three square ¶

miles, so we're looking probably at a ten square mile area, or something on that order.

Q In the Nookachamps Creek area?

A In the Nookachamps Creek, and ultimately into the Skagit River.

Q Okay. And during significant flood events such as the two that happened in '90 and the one that happened in '95, what direction does the Nookachamps flow?

A Actually flows two directions, depending on the circumstances. Early on local run-off from the Nookachamps Creek would have the flow going downstream into Nookachamps Creek and into the Skagit River. When larger floods approach in the Skagit River, however, and flood levels go up in the Skagit, the flow can actually proceed in the opposite direction and go upstream on Nookachamps Creek.

Q That's what happened in the events of 1990 and again in '95; is that correct?

A That's correct.

Q Resume the stand, Dr. Mutter. Your fifth opinion and final opinion was that improvements to the levee system have increased its strength and reduced the likelihood of levee failure. Had these improvements not been made, the levees would have failed in 1990. Such failure would have provided ¶

flood relief for the Nookachamps area. What's the basis of that opinion, Dr. Mutter?

A There are several. The basis was my knowledge of improvements that were made to the levee system by Skagit County that prevented seepage through the levee or erosion of the levee.

Q What is your knowledge of improvements by Skagit County? What did you review in that regard?

A Reviewed documentation of the projects that was produced by Skagit County, and they were mostly in the form of grant applications to Department of Ecology of projects that were to be built, and also deposition testimony of Skagit County staff and diking district

staff.
Q And can you give us some of the names of the depositions that you reviewed?
A Oh, Mr. Nelson and Mr. Brookings at the county, Mr. Anderson with Diking District 20, Mr. Mapes with Diking District 12.
Q Did you also review some of the actual project records, a sampling of those, actual projects that were done?
A A sampling, yes.
Q And can you tell the jury how you many reviewed there?
A Perhaps a dozen.
Q Okay. And can you give the jury an idea of what these ¶

projects were.
A Well, they varied. Some of them involved the construction of a keyway, which was essentially a cut-off wall on the riverside of the levee so if the levee were aligned in this fashion there would be a cut-off wall excavated down beneath the levee to prevent seepage underneath the levee. To obtain a similar result, some of the projects put ballast on the back side of the levee, making the seepage path longer by adding material to the back side of the levee. Some of the levees were broadened to achieve the same purpose. Some of the construction projects involved placement of riprap on the riverside of the levee to protect them against erosion.
Q Okay. And these projects were during what period of time?
A The ones I looked at that I sampled were in the early eighties through early nineties, that time frame.
THE COURT: Okay. Actually, counsel, we'll take our afternoon recess at this point.
MR. HAGENS: Thank you, Your Honor.
THE COURT: All right. We'll take our afternoon break.
(Recess was taken.)
¶

AFTERNOON SESSION

(Whereupon, the following occurred in the presence of the jury:)

THE COURT: Counsel, just a moment, before we start, we're going to get the juror's note pads. All right, sir, if you'd step forward, please.

MR. HAGENS: Dr. Mutter.

DOUGLAS G. MUTTER called in behalf of the plaintiff, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HAGENS:

Q Would you state your name, and spell it, please, and also --

THE COURT: Actually just one moment. We're just handing out the last of the pens.

Q Would you please state your name, spell it for the Court Reporter, and your business address.

A My name is Douglas Gerald Mutter, M-u-t-t-e-r. And my business address is 16300 Christenson Road, Suite 350, Tukwila, Washington.

Q And by whom are you currently employed?

A I'm employed by Northwest Hydraulic Consultants.

Q Before we get into your role in the firm, can you tell the jury a little bit about your firm. For instance, how many offices does it have? ¶

A We have two offices in the western United States, Seattle and Sacramento, California, two in western Canada and two overseas.

Q And how long has your company been in business?

A Since 1972.

Q How many employees does it have?

A Approximately 75.

Q And does it have any specialties?

A Our firm is focused on hydraulic engineering, hydrology, hydraulics, river engineering and

sedimentation. That's all we do.
Q And can you tell us a little bit about the 70 employees, what do they do?
A Well, there are approximately 15 principals in the firm who are specialists in various areas that I just mentioned, river engineering or sedimentation, for example. And they're supported by staff engineering professionals, and also technicians and clerical staff, so we do work at a variety of levels in the firm.
Q Okay. And can you give the jury some idea of your clients, the clients you've served over the years, Dr. Mutter?
A Certainly. We do a considerable amount of work for government of one sort or another, in particular the U.S. Army Corps of Engineers, Federal Emergency ¶

Management Agency. We do some legal work, State of Washington, for example, and the Justice Department, U.S. Justice Department, as well as counties and local governments.
Q And what is your role at the firm?
A Well, I wear two hats. I'm a specialist in one of our areas of interest, river engineering, and I'm also involved in management with the firm.
Q And what's your role in management position?
A I manage the U.S. operations of our company, which amounts to the northwest and California offices that I mentioned.
Q Has your company received any awards or commendation from any of the governmental clients?
A We have. We've been fortunate enough to be commended for our work by both the Army Corps and FEMA.
Q And have you qualified as an expert in hydraulic engineering in the past?
A Yes.
Q And you were retained in this litigation by plaintiffs; is that correct?
A That's correct.
Q Can you give the jury some idea of your educational background. How does one become a hydraulic engineer, for instance? ¶

A Well, I can describe the path I took. Received a Bachelors and Masters Degree at the University of Alberta, undergraduate degree in civil engineering and a Master's Degree in -- also in civil engineering, with a specialty in hydraulics, river engineering. PhD at Colorado State University, also in civil engineering, with a specialty in river engineering and sediment transport, and all of my experience has been in the same field, water resources in one way or another.
Worked first as a government employee with the

Water Resources Agency, Provincial Government, and for the past 20 some years I've worked with Northwest Hydraulics on river engineering-type work, flood plain studies and so on.

Q Are you a licensed civil engineer?

A Yes, I am.

Q Have you ever taught hydraulics at any college or university?

A As a graduate student, yes.

Q At where?

A Colorado State and University of Alberta, both.

Q When did you join the company, Northwest Hydraulics?

A 1973.

Q And your capacity when you joined the company?

A I was a junior engineer. ¶

Q And your current capacity?

A I'm President of the U.S. corporation subsidiary that operates in the U.S..

Q Do you recall approximately when you were contacted by plaintiffs, or attorneys for the plaintiffs in this case, do you recall?

A Almost five years ago. I believe it was April of 1992.

Q Okay. And were you subsequently retained?

A I was, yes.

Q By the way, did the Skagit County try to retain you as well in this litigation?

A Yes, they did.

Q And were you subsequently retained by plaintiffs in this case? You were hired in this case to look at the various problems they asked you to look at?

A Yes, I was.

Q What was the financial arrangement? Would you basically tell the jury what the financial arrangement was?

A We were hired on a time and materials basis and an hourly fee.

Q What were you asked to do?

A We were asked to investigate the flood event of November, 1990, in the Skagit River, and to offer a technical opinion as to whether or not the levee system along the Skagit River affected flood levels in the ¶

Nookachamps area.

Q Okay. And were there any restrictions or limitations on your assignment?

A No. We were asked for an independent opinion, essentially.

Q Were you given a free hand in how you went about assessing the impact of the existing levee system in Skagit County?

A I would say so.

Q Will you tell the jury a little bit what you did in

furtherance of that assignment. What are some of the first things that you did in furtherance of that assignment?

A Well, initially reviewed the complaint to make sure we understood the issue, what was being asked of us. We assembled all the available information, historical information, government reports, all of the documents that had been produced in the legal case from both plaintiffs and defendants that we could review to get the background on the case. We made a preliminary assessment, a manual calculation or estimate as to what the effect of the levees on flood levels in the Nookachamps might be.

Q Why don't you just stop there for a moment. Explain to the jury what you did in that regard. ¶

A Well, using approximate methods, let's call them, Empirical methods and manual calculations, we estimated the depth of flow in the Skagit River for the 1990 peak discharge rate both with and without the levee system, and admittedly this was an estimate, but it allowed us to determine within reasonable limits whether to expect that there was an effect from the levees or not and whether it be justified to proceed and work with more sophisticated approaches to fine-tune our estimate.

Q What did your preliminary calculations reveal?

A My own estimate was that the effect could be as great as four feet.

Q This was a mathematical calculation, was it?

A That's correct.

Q You indicated you reviewed documents that had been produced in the case by both parties. Did you review any depositions that had been produced?

A Yes.

Q Have you continued to review documents and depositions as they've become available?

A Yes.

Q Did you review the General Design Memorandum that was put together by the Army Corps of Engineers in 1979?

A Yes.

Q Now, you said you assembled some historical data. Over ¶

what period of time was this historical data assembled, that is it covered what period of time?

A Well, it began from the turn of the century. I believe the earliest reports that I reviewed were created in the early 1920's, but they covered a period of time back to the turn of the century and, of course, we reviewed data right up to the present day.

Q What was the purpose of reviewing this historical data?

A Primarily to get a feel for the background, how the system works, how the Skagit River behaves during a

flood, and what changes have taken place over time.
Q All right. Have you reviewed the flood level reports as well?
A Yes.
Q And what data do you turn to for that, to determine, you know, what the history of flooding has been in the region?
A Primarily we got that information from published records from the U.S. Geological Survey.
Q People in your field typically rely upon that data?
A Yes, that's correct.
Q Okay. Did you conduct any kind of field investigation or surveys as part of your assignment?
A We did both. We made a site reconnaissance to make sure we were familiar with the area and to visit with various ¶

of the plaintiffs to hear their descriptions of what occurred in November, 1990, and subsequent to that we also made our own field surveys of high water marks and some other interesting --
Q When you say an field survey, is this getting transoms out and taking survey measurements, or is it just visual observations?
A No. We used leveling equipment and actually determined elevations of a limited number of high water marks.
Q Okay. And then did you construct a -- what is called an a numerical model?
A Yes.
Q And can you tell the jury a little bit -- kind of give them an overview of what was involved there.
A Well, quite simply, a numerical model in this case was a computer program which embodies the rules of engineering, hydraulics and mathematics, and allows us to predict flood levels and patterns using the computer model.
Q Go ahead.
A It has some basic data that we use to construct it, and we impose some flow conditions, for example, and it's capable of computing and telling us what the elevations of the water surface would be at various points in the study area. ¶

Q Okay. And will it also tell you what the differences are at various points with and without certain topographical adjustments?
A Yes, that's correct.
Q Is this a commonly accepted methodology by hydraulic engineers?
A Yes, it is.
Q Have you used it in other assignments?
A Yes.
Q Is this state of the art approach or the best hydraulic

engineers can do these days, or is it something less than that?

A It's -- the particular approach that we took is quite sophisticated.

Q Okay. So you've given them an overview. Then did you also undertake to present the results of that work on a graphic basis?

A Yes, we summarized the results. As I mentioned, we computed results at a large number of points in the study area, so we summarized those both graphically and in a tabular fashion.

Q How long did it take to put this model together, can you tell the jury that?

A We worked for, I would estimate, between 500 and a thousand hours over a period of perhaps six months to assemble the model.

Q And the data that went into the computer was acquired from where?

A A variety of sources. For example, we used topographic mapping produced by U.S. Geological Survey and the U.S. Army Corps of Engineers. They also furnished levee profile surveys.

Q Who's they?

A I'm sorry, the U.S. Army Corps of Engineers.

Q What about the surface roughness, that sort of data, if any, was that included in the computer model?

A That was included in the computer model, and that was something we estimated using engineering judgment.

Q Maybe you ought to give the jury a quick -- we'll come back to this in quick detail in a moment, but maybe you ought to give the jury a quick overview of what surface roughness is all about.

A Certainly. Surface roughness is actually quite simple. It's about what it sounds like. When water is attempting to flow in the river channel or over the flood plain, it encounters resistance, something that tries to prevent it from flowing downstream, and you can imagine if the surface texture is very rough or if there's a lot of vegetation in place, then the water would have a difficult time moving downstream. If it's very smooth, then it would find it easier to move downstream.

There is a parameter or series of parameters that engineers estimate and use to describe this roughness which translates to the resistance of flow, so it's one of the basic parameters of the model.

Q And how did you put the downstream conditions into the model that you folks prepared? Where did you get the information for that?

A The downstream condition which we imposed as a boundary

condition, so-called, was provided by the U.S. Geological Survey records at the gauging station at the Riverside Bridge vicinity.

Q That's in Mount Vernon?

A It is.

Q Did you put any -- well, let's call it rating curve information? Maybe you ought to stop and tell the jury what a rating curve is, but was that information used at all in your computer modeling?

A That essentially furnished the downstream boundary conditions, and it's, very simply, a relationship between the rate of flow going downstream, how many cubic feet per second we're going downstream and how high the water level got, and that's a relationship study by USGS by field measurements. They go out and ¶

use meters to make measurements and establish this curve.

Q Okay. So you did a review of the historical data. You did some preliminary work to determine if the model was justified. You reviewed all those preliminary historical documents, did you not?

A Yes.

Q And did you then arrive at a number of opinions relative to how the hydraulics affect or the levees affect the Nookachamps/Clear Lake area?

A Yes, I did.

Q Would you give the jury an overview of your opinions in that regard.

A Very well. In my work on this case I came to five basic opinions I'd like to share with you. The first is that, in my opinion, the existence, the presence of the Skagit County levee system caused flood levels in the Nookachamps area to be higher than they would have been if the levee system weren't there.

In the November 25th, 1990, flood event, my analysis indicates that flood levels were higher as a result of the presence of the levees by amounts ranging from a foot and a half to four feet, depending on the location in the study area.

Q Depending upon the plaintiff's location, you're talking ¶

about?

A Yes, that's correct. My second opinion is that this occurrence, this effect that the levee has had on flood levels in the Nookachamps, is not something that happens just once, it's not a rare occurrence. In fact, by my analysis, it's occurred 15 to 20 times in the last 50 years, and it's clearly something that recurs and is chronic. It can be expected to occur again in the future. It's my opinion if the levees didn't exist, during significant flood event the flow, rather than

being confined in a narrow corridor between levees, would be allowed to spread out on the valley floor of the Skagit River and would flow at shallow depth resulting in lower flood levels than occur in the present day.

It's my opinion that the local run-off, such as from Nookachamps Creek, for example, and other local drainages was very small in relation to the amount of water that was going down the Skagit River itself and the local drainage had essentially no effect on flood levels in the Nookachamps area.

And, finally, it's my opinion that the Skagit County levee system has, over time, undergone a great many changes and improvements that have strengthened it with respect to it's ability to withstand erosion and ¶

seepage such that it's much less prone today to collapse or to be eroded than it was in years past.

In my opinion, had these improvements not been made to the levee system and had flood fight activities not been carried out in November, 1990, the 25th of November, in my opinion it's more likely than not that the levee system would have failed either through erosion or collapse and there would have been a subsequent lowering of flood levels up and down the Skagit River that would have reduced the flood impact to residents up and down the river, including plaintiffs in the Nookachamps area.

Q Okay. Let's go to your very first opinion, that the levee system caused the 1990 flood levels in the Nookachamps to be higher by amounts ranging from one and a half to four feet. And the basis of that opinion is what, Dr. Mutter?

A The basis of that opinion is essentially our modeling analysis.

Q Okay. And to -- I wonder if we can just maybe, in a perhaps a little bit more detail -- how do you put the topographical information into the computer that generates this result, for instance?

A We furnished between four and five thousand points in the study area elevation information so you can picture ¶

-- actually 48 hundred points on the ground throughout the study area, which we furnished the computer program information about the elevation of the topography.

Q Okay. And what about the levee profile as such, what was the source for that data?

A That came from two sources. I think I mentioned earlier one was topographic mapping provided by the Army Corps of Engineers, as well as specific top of levee profile survey.

Q Okay. And the resistance data, I think you mentioned

that there was some data on that. Can you be a little bit more specific as to the source of that information as it went into the computer model.

A That information came from engineering judgment. We observed the appearance of the river channel and flood plains and, based on experience, estimated the roughness values.

Q Okay. And was that up and down the river, or just certain locations? Where did you estimate those values?

A It was estimated at essentially every point in the study area in the model.

Q And what was the study area of the model?

A It extended, as we mentioned, from the downstream limit, was somewhat downstream, slightly downstream of the Riverside Bridge. It actually extended down to the Big ¶

Bend area and extended upstream beyond Sedro Wooley, beyond the Highway 9 Bridge.

Q And those were the points that you put in the topographical area?

A In the entire reach between those two appointments, that's correct.

Q The rating curve data, the source for this, the hydraulic data that showed you the relationship between flow and elevations, again, where did you get that data?

A We obtained that directly from U.S. Geological Survey.

Q Did you also have to map out the plaintiffs' locations as best you understood therm?

A Yes.

Q Where did you get that data?

A That came from plat maps and street maps, essentially.

Q Okay. What did you do with the model once you had it constructed? Did you undertake to calibrate it at all?

A Yes, we did.

Q Would you explain to the jury what your calibration procedure was to assure yourselves that this model was going to produce accurate results?

A Well, again, the purpose of the model is to predict water surface elevations and flow directions, flow patterns, and what we did was simulate something that was known, something that had been observed, mainly the ¶

1990 flood event, so we imposed -- having constructed the model, we imposed the known 1990 flood discharge and compared the computer model's predictions of water surface elevations with high water marks that had been observed during and after the flood event to make sure that we were within reasonable agreement of what had actually been observed in the field.

Q Did you also run '75, 1975 event through as a form of calibration?

A Yes, we did. Well, the first step simulating the 1990

event was the calibration, and I should explain that there was tuning involved in adjusting the roughness values we spoke of earlier until there was adequate agreement between the model's predictions and what was observed in the field, but, having done that, it's a standard procedure to test the reliability of the model by applying another flood, which we used the 1975 flood discharge, and hands-off retuning the model, seeing how -- what kind of job it did at predicting water surface elevations from 1975, and we found it did an adequate job of that also.

Q The idea of doing that is what kind of a check on the accuracy of your model?

A That's correct, to build confidence that the model was reliable. ¶

Q Okay. And so you compare the results of the model with the known statistical information that you get from the USGS and for the 1975 flood; is that correct? In part anyway?

A Actually we compared the results of the 1975 verification run, the check run, with high water marks that had been observed by the Army Corps of Engineers in 1975.

Q Okay. And did you find that they matched or didn't match?

A We found that they matched adequately.

Q Okay. And then -- okay. Having done the preliminary calculation to estimate the flow, having done this model that took you six months and 500 to a thousand hours to put together, and having calibrated the model as you've told the jury, what did you do with the model after that?

A Well, we had let's call it a base line condition, a simulation of the 1990 flood event for existing conditions as they were observed on the 25th of November. We modified the model to remove the levee system only to see what the effect of removing the levees would be on flood levels in the Skagit River, so we had a second lower water surface solution that we could compare directly with the 1990 existing condition ¶

and determine what the impact of the levees was on flood levels in 1990.

Q Okay. Let me see if I understand. You removed the levee system from the Skagit -- from the levee system, Exhibit 199, from the flood plain, so to speak; is that correct or incorrect?

A Removed all of the levee system, wherever it happened to be.

Q Okay. And then that gave you another output; is that correct?

A That's correct.
Q So you had an output showing with levees and an output showing without levees; is that correct?
A That's correct.
Q And then -- that gave you a comparative analysis, did it not?
A Yes.
Q You gave both those outputs to the defendant, did you not?
A Yes.
Q Now, did you then prepare some kind of a visual and tabular data that you could use to help the jury understand the difference between the condition with levees and the condition without levees, and as that might affect the plaintiffs? ¶

A Yes, I did.
THE CLERK: Exhibit 210 marked.
Q Is this the exhibit that you prepared to contrast the with and without conditions of the levees?
A Yes, it is.
Q And it's, in fact, a summary of your computer print-out; is that correct?
A That's correct.
Q The two runs you gave to the defendants and compare here?
A Yes.
Q And it has the plaintiffs' locations on here in numerical order, does it not?
A Yes.
Q Has other critical data relating to the flood plain in the area in which the plaintiffs reside?
A It has landmarks, yes.
Q And does this data -- is this -- by the way, is this essentially the same data that you provided in the form of other charts to the defendants?
A It is essentially.
Q Was there some change or -- by reason of any more recent data you received?
A We revised some of the presentation because of survey information we received from Skagit County in the last four to six weeks. ¶

Q Did you change your model at all?
A No.
Q So this is the refined, then, version contrasting the two computer runs that you earlier gave the defendants; is that right?
A Exactly right.
MR. HAGENS: We'll offer Exhibit 210.
MR. SMART: Voir dire the witness, Your Honor?
THE COURT: All right.
MR. SMART: Showing you Exhibit 210, Mr. Mutter,

you never gave this to Skagit County, did you?
THE WITNESS: No.
MR. SMART: In fact, this wasn't even prepared until about a week ago, right?
THE WITNESS: It was prepared prior to that.
MR. SMART: Two weeks ago maybe?
THE WITNESS: More than that, but that hasn't been --
MR. SMART: Approximately the start of the case?
THE WITNESS: Pardon?
MR. SMART: It was prepared approximately the start of the trial; is that correct?
THE WITNESS: In the last few weeks. I can't recall exactly.
MR. SMART: And, in fact, when you say you gave ¶

information to the county, what you're talking about is that when you were subpoenaed for a deposition, you brought certain information with you, correct?
THE WITNESS: No. We provided information in digital form and you requested hard copy output plots, which we furnished to you directly.
MR. SMART: Yeah, at your deposition.
THE WITNESS: That's correct.
MR. SMART: Which is the time you and I first met, correct?
THE WITNESS: I believe that's right.
MR. SMART: You didn't meet with somebody else from the county prior to time that time, did you?
THE WITNESS: No.
MR. SMART: So if I further understand, this document has been -- has changed information that was presented in your deposition by additional topographic information that you say you recently got within the last three or four weeks.
MR. HAGENS: I object. This seems to be examining on the exhibit itself.
MR. SMART: I'm asking what the document shows.
MR. HAGENS: I'll offer Exhibit 210, as I have offered it.
THE COURT: Counsel, that last question I think ¶

was beyond the scope of voir dire of the witness.
MR. SMART: Well, specifically, Your Honor, the witness, in response to Mr. Hagens' question, said, when Mr. Hagens asked him if it was the same, he said no, it had been altered by some recently altered data, so the answer to whether or not it is a comparison of information which was previously disclosed in deposition would possibly be inaccurate. That's the purpose of my question as to what this document shows, and that's the purpose of voir dire is to find out what the document

shows.
THE COURT: That question didn't go to that issue, as far as I read it.
MR. SMART: Let me ask -- see if I can phrase it correctly. This document shows recent information that was not presented at your deposition because it has included certain topographical information that you have recently acquired within the last three or four weeks, correct?
THE WITNESS: No, that's not correct.
MR. SMART: What is the purpose -- what is -- what does the document contain by way of that recent topographical information?
THE WITNESS: Nothing.
MR. HAGENS: We'll offer the exhibit at this ¶

time, Your Honor.
MR. SMART: And I have an objection, Your Honor, since we have never seen it before the start of this trial, it wasn't produced in deposition, and it's a different document and different information than previously identified.
THE COURT: Counsel, did I understand your earlier questions, are you saying that it's -- you're offering it for substantive and illustrative?
MR. HAGENS: Absolutely, a summary of his -- of his computer model that the jury can understand. They're not going to understand numbers. This is the only thing it can understand. It took hours and hours to create, and he's testified it's a comparison of the two prior charts that they asked be produced, and were produced for them over a year ago, together with the computer data.
THE COURT: Mr. Anderson?
MR. ANDERSON: I have no objection, Your Honor.
THE COURT: 210 will be admitted then.
(Whereupon, Plaintiff's Exhibit No. 210 was admitted into evidence.)

Q (By Mr. Hagens) Okay. Dr. Mutter, do you want to come down here and -- we have a pointer here somewhere that ¶

lost its tip. Maybe if you can get over here.
THE COURT: Knowing Snohomish County as I do, it probably lost its tip about 1967, so we're talking about archival instruments. That's certainly among them. We'll break down and get you a new one before the trial is over.
Q I'm also putting this on the overhead.
MR. HAGENS: Your Honor, I have a copy of the exhibit for the Court's use.

THE COURT: Although you will recall, Mr. Hagens, that they finally hooked me up to the overhead, so I have that.

MR. HAGENS: If this helps a little bit --

THE COURT: I appreciate it. Thank you.

Q Okay, Dr. Mutter, maybe you can explain to the jury in a little more detail what this Exhibit 210 depicts.

A I'd be happy to.

We mentioned earlier that we had two separate computer runs that showed the water surface elevation throughout the study area, and the study area -- perhaps we could focus on that to begin with. This corridor we see here is the main channel of the Skagit River. We have some landmarks which include State Road 20, State Road 9, Burlington Northern Railway Bridge, Interstate 5, Mount Vernon, Burlington, Sedro Wooley, so we have ¶

then two separate computer analyses, sets of solutions for water surface elevations in this region, one without the levees, one with the levees.

Q This is the existing levees now?

A That's correct. It's somewhat difficult to go point by point and determine the difference in the elevation as a result of taking out the levees and to visually make sense of that, so what we did was compute for you the difference in water surface elevation caused by the levees and then we've presented the differences here by zone.

So, for example, in this large blue zone in here, it's my opinion that water surface elevation throughout the zone is approximately two feet higher as a result of the levees. In the reddish zone here, for example, it's our opinion that the levees would cause flood levels in the November, '90, flood to be approximately five feet higher. They actually varied smoothly, they didn't go in steps, the depth of the increase as a result of the levees by five, four, three and so on. It would have been five feet here, 5.1 here, 4.9, but in order to show you in as simple a fashion as possible, we indicated whole zones of equal foot increments of effect of the levees in 1990.

Q Okay. And you notice it starts at like a half a foot ¶

and ends down here at nine feet. Is that -- can you explain what that progression might mean to you, for instance, as a hydraulic engineer?

A Well, the primary bottle neck, if you will, is the levee system where it's at its narrowest, and that's where the greatest impact is. The levees cause the greatest rise in water surface elevation at that downstream location, 9, 8, 7 feet, and that effect tapers off in the upstream direction, and it's at its least effect up near Sedro

Wooley where it's perhaps a half foot in rise, so that the strongest effect of the levees is at the downstream end and the weakest effect is at the upstream end.

Q And no plaintiffs live down in this 9, 8, 7, 5 area. In fact, you don't get to see plaintiffs until we get to the four foot level.

A That's correct.

Q Now, the individual numbers on here are -- go through 1 to 60 something; is that correct?

A One through 68, I believe.

Q And they show at least the properties of the existing plaintiffs, I guess, and some that were former plaintiffs, those approximate locations?

A Yes.

Q And then you've also attempted to show in here -- can you tell the jury what this is, this wavy line that ¶

borders on the northwesterly side of your chart meandering through Highway 20? Can you tell the jury what that is?

A That's Gages Slough. It's a remnant of the Skagit River, a former channel, which has filled in through sediment deposition during the years and it's now simply a large marshy slough area.

Q Okay. And do you know if this area, in fact, drained any significant water during the 1990 event, either the 1990 events?

A I think it probably did not. I'm not sure.

Q Okay. But in years past had it, do you know? Can you tell by looking, your review of the documents and historical data, whether in years past that had?

A I'm sure that it has historically. It has provided a flood nuisance to residents in the Burlington area because it has created flood water in the past.

Q So a more serious situation in the past; is that correct?

A That's probably accurate.

Q Now, the white areas, you have a -- one area marked Clear Lake. What are the white areas in your graphic presentation of your computer result?

A Those are high spots, essentially.

Q Okay. Now, while we've got you in front of the map there, I wonder if you'd take a moment and perhaps ¶

explain where the river -- we also have this exhibit admitted in evidence as well if it helps you, Dr. Mutter, it's Exhibit 199.

I wonder if you'd just take a moment to tell the jury or describe from these exhibits, 199 and 210, where the flood waters would go if there were no levees.

A Well, as I mentioned in one of my basic conclusions, if there were no levees, the water would -- rather than being confined by the corridor as we see -- rather than

being confined by these narrow corridors, the flow would fan out. In fact, this entire delta was created in earlier times by the channel moving pretty much wherever it felt like, and it would be free to do so again. Flow would fan out over the delta at very shallow depth.

Q Okay.

A At higher flows there's always the possibility of diversions from even as far upstream as the Sterling area, the Samish Basin and Padilla Bay. That's happened historically also.

Q When you say historically, can you give the jury some idea what you mean by that? You mean prior events of greater magnitude?

A Its pre-developed case. It's happened recently enough that we know there's still physical signs that this has happened, but it hasn't happened in a major way since ¶

modern civil civilization, since the turn of the century.

Q Back to your results here, when you did your modeling here and came up with this graphic computer presentation of the amount of water caused by the existing levee system, did you leave in, like, the Burlington Northern Railroad Bridge?

A Yes.

Q Did you leave in Highway 20?

A Yes.

Q And did you leave in -- well, all the civil works in this area?

A We left everything in the model except for the Skagit County levee system, which we removed in its entirety.

Q So if there was a structure like I-5 or Burlington Northern Bridge or Highway 20, was that left in the model?

A Yes.

Q Why don't you resume the stand then, Dr. Mutter.

I did want to ask you what the accuracy is of this, plus or minus within how many inches or feet?

A Well, the different results that we see portrayed on the chart are quite accurate. I would estimate them to be accurate within one or two-tenths of a foot.

Q Okay. And did you also, as part of your work, prepare a ¶

table that shows on a per plaintiff basis the location and the difference in water elevations with and without levees?

A Yes, we did.

Q And that was, again, just a straight comparison of the two model results; is that correct?

A That's correct.

THE CLERK: Exhibit 211 marked.

Q I'm going to hand you Exhibit No. 211 and ask if you can

identify it.
MR. SMART: Do you mind if I grab one of those for Mr. Anderson?
MR. HAGENS: Didn't I give him one?
MR. SMART: No.
MR. HAGENS: If I've got an extra.
MR. HAGENS: Sorry, Glenn, did I leave you out?
MR. ANDERSON: I'm not sure what happened.

Q Can you identify that, Dr. Mutter?

A Yes, this is the summary of results that we produced, showing the difference in water surface elevations would and without levees in 1990 at each of the plaintiff's locations.

Q And this is using the same computer model that you've used on Exhibit 210; is that correct?

A Yes. ¶

Q So this is just a computer printout of the varied differences between the two; is that correct?

A At the specific locations of plaintiff's properties, that's correct.

MR. HAGENS: We'll offer Exhibit 211, Your Honor.
MR. SMART: Voir dire, Your Honor?
THE COURT: All right.
MR. SMART: Do I understand correctly that this document 211 simply shows which zone these properties are in?
THE WITNESS: No.
MR. SMART: Is there anything about this document that shows exactly where the plaintiff's residence is within the zone?
THE WITNESS: Yes. Each plaintiff's property is numbered on the zone map, as you call it.
MR. SMART: And would it be correct that the -- that there are variances in topography with respect to each plaintiff's property?
THE COURT: Counsel, you need to -- we need to limit the voir dire specifically to the admissibility of this document.
MR. SMART: Yes. That's what I'm getting at, Your Honor.
THE COURT: I think the last question wasn't ¶

getting us there, so I'd like you to move on.
MR. SMART: Let me rephrase it. The number in the right-hand corner, is that right, is that supposed to be at a specific location on the property?
THE WITNESS: Yes.
MR. SMART: And which location is that supposed to be at?
THE WITNESS: I'm sorry, I don't follow the question.

MR. SMART: There's a elevation listed in the right-hand column, correct?
THE WITNESS: Yes.
MR. SMART: The question is, where on the plaintiff's property is that number supposed to represent?
THE WITNESS: I'm sorry, I don't have a copy of the table.
The number in the right-hand column is not an elevation. Again, it's the difference in the two water surface elevations.
MR. SMART: I understand. The question is, where on the plaintiff's property is that difference in water surface elevation supposed to be represented?
THE WITNESS: Essentially anywhere.
MR. SMART: But don't the properties vary in ¶

topography?
MR. HAGENS: Your Honor, this seems to get into --
THE COURT: Counsel, this doesn't go to admissibility.
MR. HAGENS: We'll again re-offer the exhibit, Your Honor.
MR. SMART: I'll object, Your Honor. The witness can't testify where it is.
THE COURT: You're certainly free to inquire about that. That's very legitimate cross-examination, but as far as the admissibility -- 211 will be admitted.

(Whereupon, Plaintiff's Exhibit No. 211 was admitted into evidence.)

Q (By Mr. Hagens) I'll leave that in front of you and we'll put 211 up on the screen. That's as big as we can -- a big overview, and we'll zoom in to take a look at one or two of them.
That's about as good as I can get this equipment to work.
Let's go through this exhibit. Do you have it in your hand there, Dr. Mutter?
A Yes, I do. ¶

Q Now, you've got all the plaintiffs listed on this Exhibit 211 in alphabetical order; is that correct?
A Yes.
Q Starting with Albe and going all the way to Erling Ytgard at the bottom, he's number six; is that right?
A Yes, sir.
Q In the next column you have the address. Is that the mailing address, as best as you were able to find it?

A Yes.
Q And then you've got the city indicated, and then you have -- at the far right-hand column, it says 1990 Flood Level Rise at Property Due to Levees, and what does that column designate?
A Those numbers indicate the difference in water surface elevations, flood levels, which we computed with and without the levee system.
Q Okay. And you've done that alphabetically for each and every plaintiff on the chart; is that correct?
A Yes.
Q And there are several on, here like Number 8 after Bramlett, that were deleted. Are these former plaintiffs then?
A Yes, that's correct.
Q So the n/a's would reflect former plaintiffs; is that correct? ¶

A Yes.
Q And the accuracy of these calculations in terms of plus or minus how many feet is, again, what?
A Plus or minus one or two-tenths of a foot.
Q So if a plaintiff were to testify that they -- for instance, Mr. Albe, was to testify that he had two feet of water on his property and if the table shows that the 1990 flood level rise at property due to levees was 3.3, those 2.2 feet that Mr. Albe testified to, would those be caused by the levees or something else?
MR. SMART: Object to the form of the question, Your Honor.
MR. HAGENS: I'm just trying to help the jury understand how to use and interpret the exhibit.
MR. SMART: I think he's confused. He misspoke himself concerning the numbers and how they might operate. I think it's a confusing question for the record.
Why doesn't counsel rephrase it, because it's internally inconsistent.
MR. HAGENS: I didn't intend it to be. Let me try again.
Q Your exhibit, Plaintiff's Exhibit 211, shows 3.3 feet of 1990 flood level rise at property due to levees.
If Mr. Albe were to testify that he had two feet ¶

in his home of flood waters, what portion of that would be caused by the levees, if any?
A All of it.
Q And if he were to testify that he had three feet in his home, what portion of that would be caused by the levees?
A All of it.
Q And if he had four feet, if he testifies -- gets on the stand and says he has four feet or five feet, how much

of that would be caused by the levees?
A Only the top 3.3 feet.
Q And that would be true for each and every plaintiff up and down this table; is that correct?
A Yes.
Q By the way, you're conscious that Skagit County retained a hydraulic engineer; is that right?
A Yes, I'm aware of that.
Q You reviewed his deposition?
A Yes.
Q Did he disagree with any of these calculations, to your knowledge?
A Not to my knowledge.
Q Did he even do this type of a calculation?
A Certainly not in terms of differences, no.
Q Okay. Did he have the computer capacity to be able to do that, to your knowledge? ¶

A He used the same model, same software that I did, but didn't put it to this use.
Q You mean he didn't undertake to isolate and identify the amount of flooding or flood elevations caused by the levees?
A No, he didn't.
Q Okay. Let's go to one other question before we leave this exhibit.
Does the fact that plaintiffs' properties received this flooding that you've described in Exhibit 210, does that provide any kind of benefit or relief to other peoples protected by the levees in Skagit County? Does the fact that it operates as a storage area -- does that have any benefit to Skagit County?
A Well, in principle, there's no difference between storing water in the Nookachamps area or storing at a flood control project upstream. There would be some reduction in the peak discharge downstream, so there would be relief in that sense.
Q When you say some reduction in the peak discharge downstream, what do you mean, the flood level would be less because this is operating to some extent as a holding area or storage area?
A Essentially, yes.
Q And did you also see historical documents where the area ¶

was called a holding area or reservoir area from time to time?
A I've seen descriptions like that, yes.
Q And is there any other -- does this area act as -- provide any pressure, for instance, to get the Skagit flows downriver?
A Well, it does do that. If levels were lower in the Nookachamps area, there would be no way to pass as much

flow down through the levees unless they were set back or opened up in some way, so they do provide additional energy -- higher flood levels in the Nookachamps area to provide energy to force water down.

Q Is that like a water tower, in terms of stored energy behind the levees?

A I guess you could say that. It provides the potential energy which ultimately is converted into flow energy or kinetic energy.

Q That does what?

A That motivates the flow to go downstream through the levee system.

Q Okay. Let's talk about your second opinion. In the past 50 years there's been, I don't know, let's say 15, 20 events have occurred where the levee system caused water to be higher in the Nookachamps. And that, therefore, the flooding of the plaintiffs' experiences ¶

has been re-occurring and chronic. First of all, do you know at what point the Nookachamps begins to flood in terms of cfs measurements?

A Well, there have been various estimates made over the years, but they range from, I'd say, 60,000 to 80,000 cfs, something in that order.

Q Okay. And when you talk about probability of reoccurrence, let's take like a 25 year flood, okay -- let's just take a moment and go over that.

Twenty-five year flood has what probability of reoccurrence, Dr. Mutter?

A A 25 year flood has a four percent annual chance of occurring.

Q And that's computed simply by dividing 25 into 100; is that correct?

A Yes.

Q And a one -- a flood that occurs every ten years would have ten a pen percent chance of occurring because you divide it into 100 ten times; is that correct?

A That's correct.

Q Then is the magnitude of the event -- by the way, do you recall what the approximate magnitude of the November 24-25, 1990, event was?

A Again, there is a range of estimates, but it's generally accepted as a 25 to 30 year event. ¶

Q How many cfs was that event, just to try to refresh everybody's recollection here?

A The peak discharge on November 25th was 152,000 cfs.

Q Measured by whom?

A U.S. Geological Survey.

Q Okay. And was that an event that was characterized as a 25 year event, or was it characterized as some other type of event?

MR. SMART: Objection. By whom?
MR. HAGENS: If you let me finish the question I might be able to --
THE COURT: Go ahead.
Q Was that event characterized as a 25 year event by any governmental organization?
A Yes, I believe the Corps of Engineers settled on a 25 year characterization.
Q They start out at some higher number and then ultimately arrive at that number. Do you know how, historically, that worked?
A I recall their describing it as a 30 year event at one point. It was described by the National Weather Service and other agencies as other than 25 year, but I believe as time wore on the estimates sort of honed in on a 25 year return period.
Q Okay. And that was the November 24-25 event at 152,000 ¶

cfs; is that correct?
A 152,000, yes.
Q Is that something that's going to happen only once every 25 years? Can the residents, our clients, rest assured that this is only going to happen like once every 25 years?
A No, that's not correct.
Q Explain to the jury why that's so.
A Well, we've explained that in any given year there's a four percent chance that that flood could occur, the discharge could be 152,000 cfs or greater. And statistical theory tells us, we know that, then over a 25 year period there is a 65 percent, roughly, chance that one of those events will occur. Sadly, some engineer back a few decades ago tried to make this abstract concept of probability, their four percent in this case, more understandable by discussing it in terms of a return period, but the 25 years has nothing to do with an once in 25 year concept. That's simply misleading.
Q That's just a raw probability, isn't it?
A Yes.
Q In fact, it could happen any number of times in one year you could experience a 25 year happening?
A That is correct. ¶

Q And, indeed, you have, at our request, prepared a chart that shows the number of events above 80,000 cfs as -- measured at the Riverside gauge in Mount Vernon, have you not?
A Yes.
THE CLERK: 212 marked.
Q Can you identify that for the record, please.
A This is a graph that I produced that shows the floods

that have occurred since 1945 that had a magnitude greater than 80,000 cfs.

Q Okay. And how did you prepare the graph?

A Well, I have the discharge records from the U.S. Geological Survey and I examined those to determine those occasions when the flow was greater than 80,000 cfs, and simply graphed them.

MR. HAGENS: We'd offer Exhibit 212, Your Honor.

MR. SMART: Voir dire, please, Your Honor.

THE COURT: All right.

MR. SMART: Did all the information for this document come from the USGS?

THE WITNESS: Yes, sir.

MR. SMART: And how did you get that?

THE WITNESS: We obtained the information from a vendor by CD ROM computerized version of it, but it's ¶

published by the U.S. Geological Survey.

MR. SMART: Is it correct to say you got into the USGS data base through the CD ROM, and it's published for anybody who wants to use that data base?

THE WITNESS: That's true, and we have hard copies also that we can use to verify these numbers.

MR. SMART: And am I correct in interpreting the document that the '51 refers to 1951 flood that's above 140,000 cfs?

THE WITNESS: Yes, that's correct?

MR. SMART: And these are the 1990 floods over here?

THE WITNESS: Yes.

MR. SMART: And the document indicates that the first flood above 140,000 --

MR. HAGENS: Your Honor, this is not proper --

MR. SMART: I'm trying to figure out what the document says.

MR. HAGENS: Your Honor, he's asking questions about the exhibit.

THE COURT: Sustained. That's fine.

MR. SMART: The blue lines show the magnitude of the flood in thousands of cubic feet per second; is that correct?

THE WITNESS: Yes, that's correct. ¶

MR. SMART: I don't have any objection, Your Honor.

MR. ANDERSON: No objection, Your Honor.

THE COURT: 212 will be admitted then.

(Whereupon, Plaintiff's Exhibit No. 212 was admitted into evidence.)

MR. HAGENS: I'll give it to the witness so he can explain what this is all about. Here again, this is always an experiment for me.

Q (By Mr. Hagens) We have the exhibit in evidence now. Can you tell the jury what this exhibit depicts, Dr. Mutter?

A This -- perhaps I'm being redundant, but this indicates each of the episodes in the past -- since 1945 when the Skagit River had a flow equal to or greater than 80,000 cfs, which is the discharge that my analysis shows the levees begin to affect flood levels in the Skagit River. At flows greater than 80,000 cfs, they -- the Skagit County levees cause flood levels to be higher upstream than they would be without the levee, so this indicates the episodes since 1945 when, in my opinion, the levees would have influenced flood levels.

Q And you've got two events in 1990, and what events were those?

A Those are the -- the most recent event is the November ¶

25th, 1990 event, and the one to its left happened approximately two weeks earlier. They were separate events, but both very large.

Q The 1995 event, was that the November 30th, 1995, event?

A That's correct.

Q I see you have 1951 and '75 in here, that's correct?

A Yes.

Q Is it generally accurate to say the larger event, the more levee-induced flooding the plaintiffs would receive?

A That's a fair statement.

Q And, conversely, the smaller the flood, the less levee-induced flooding they would receive; is that correct?

A Yes.

Q While we're on that subject, did you, in all the documents you reviewed, did you come across any document from the Corps of Engineers, from Skagit County, from any source whatsoever, that undertook to quantify or measure the amount of flooding that was being caused by the existing levee system as opposed to some new proposed levee system?

A No.

Q Now, having reviewed this exhibit and prepared it, in point of fact, your opinion is what about -- insofar as ¶

demonstrating whether or not flooding is a re-occurring or chronic situation in the Nookachamps/Clear Lake area?

A Well, this analysis tells me that -- I think I count 18 occasions when the Skagit County levee system caused flood levels to be higher to some extent in the Nookachamps area in a period of approximately 50 years. That tells me that this is something that happens

relatively frequently, and recurs and is an ongoing condition.

Q Is it likely to happen in the future?

A Absolutely.

Q Let's go on then to your third opinion, that without the levees, the 1990 flood would have spread over a broad flood plain with less flooding in the Nookachamps area. What's the basis for that opinion?

A Well, two things. The historical descriptions of the site prior to the development of levees indicates that that's the way major floods used to occur. Flood would fan out at shallow depth all over the valley floor, and it makes sense geomorphically.

Q Geomorphically, can you put that in some more layman's words.

A Effluvial geomorphology is the study of rivers and how they form their own boundaries and patterns, they rearrange their beds and their banks and so on, but ¶

scouring, eroding, depositing sediment, and this setting is very typical of a delta area where flow has the ability to fan out in very shallow depth all over the delta, so there's the historical behavior and the historical descriptions that were available to me that are consistent with what I would expect. Also, we've computed what the flood levels would be in the absence of levees, and we know what the topography is out there and we could see that it would, in fact, spread out very broadly across the flood plain.

Q But in contrast to that it does what?

A In its present state?

Q Yes, the levees in place, the existing levees.

A In contrast to that, it's now confined to a narrow corridor between the levees.

Q Does that narrow corridor back the water up onto some of our client's property during these significant events?

A Well, it certainly would at all of the events that I've indicated on this Exhibit 212.

Q Okay. So it's a matter of degree, not kind, is that correct, when you're talking about the amount of flooding on the plaintiffs' property?

A That's correct.

Q Let's go on to opinion number 4, the local run-off from the Nookachamps Creek and other local drainage did not ¶

significantly affect flood levels on plaintiffs' property in 1990. What's the basis of that opinion, Dr. Mutter?

A The flow from Nookachamps Creek itself was not measured by USGS. There was a gauging station there up through 1978 but which is no longer active, so we didn't have measurements, but we know from prior study that the

flows to be expected from that drainage area, which is a few square miles, would be very small in relation to the 3,000 square mile drainage area of the Skagit River. So I think it's that simple. The flows coming off the local drainages could be very small compared to Skagit River flows and simply wouldn't influence the flood levels.

Q Maybe you can come here and show the jury on this Exhibit 199, just to reacquaint them with where this Nookachamps Creek is, if you can plot it out on Exhibit 199.

A This shows -- I need to use the pointless end here.

This is Nookachamps Creek main stem. The basin is an area something like this. It's -- what used to be gauged on the east fork, which is actually two separate locations, but in this approximate vicinity, the gauging area upstream at that point was about three square miles, so we're looking probably at a ten square mile ¶

area, or something on that order.

Q In the Nookachamps Creek area?

A In the Nookachamps Creek, and ultimately into the Skagit River.

Q Okay. And during significant flood events such as the two that happened in '90 and the one that happened in '95, what direction does the Nookachamps flow?

A Actually flows two directions, depending on the circumstances. Early on local run-off from the Nookachamps Creek would have the flow going downstream into Nookachamps Creek and into the Skagit River. When larger floods approach in the Skagit River, however, and flood levels go up in the Skagit, the flow can actually proceed in the opposite direction and go upstream on Nookachamps Creek.

Q That's what happened in the events of 1990 and again in '95; is that correct?

A That's correct.

Q Resume the stand, Dr. Mutter.

Your fifth opinion and final opinion was that improvements to the levee system have increased its strength and reduced the likelihood of levee failure. Had these improvements not been made, the levees would have failed in 1990. Such failure would have provided flood relief for the Nookachamps area. ¶

What's the basis of that opinion, Dr. Mutter?

A There are several. The basis was my knowledge of improvements that were made to the levee system by Skagit County that prevented seepage through the levee or erosion of the levee.

Q What is your knowledge of improvements by Skagit County? What did you review in that regard?

A Reviewed documentation of the projects that was produced by Skagit County, and they were mostly in the form of grant applications to Department of Ecology of projects that were to be built, and also deposition testimony of Skagit County staff and diking district staff.
Q And can you give us some of the names of the depositions that you reviewed?
A Oh, Mr. Nelson and Mr. Brookings at the county, Mr. Anderson with Diking District 20, Mr. Mapes with Diking District 12.
Q Did you also review some of the actual project records, a sampling of those, actual projects that were done?
A A sampling, yes.
Q And can you tell the jury how you many reviewed there?
A Perhaps a dozen.
Q Okay. And can you give the jury an idea of what these projects were. ¶

A Well, they varied. Some of them involved the construction of a keyway, which was essentially a cut-off wall on the riverside of the levee so if the levee were aligned in this fashion there would be a cut-off wall excavated down beneath the levee to prevent seepage underneath the levee. To obtain a similar result, some of the projects put ballast on the back side of the levee, making the seepage path longer by adding material to the back side of the levee. Some of the levees were broadened to achieve the same purpose. Some of the construction projects involved placement of riprap on the riverside of the levee to protect them against erosion.
Q Okay. And these projects were during what period of time?
A The ones I looked at that I sampled were in the early eighties through early nineties, that time frame.
THE COURT: Okay. Actually, counsel, we'll take our afternoon recess at this point.
MR. HAGENS: Thank you, Your Honor.
THE COURT: All right. We'll take our afternoon break.
(Recess was taken.)