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Box 117
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Case # 4993

File # 117

4368

IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT

WASHAKIE COUNTY, STATE OF WYOMING

IN RE:	)	
	)	
THE GENERAL ADJUDICATION	)	
OF RIGHTS TO USE WATER	)	
IN THE BIG HORN RIVER	)	Civil No. 4993
SYSTEM AND ALL OTHER	)	
SOURCES, STATE OF WYO-	)	
MING.	)	

BEFORE: The Honorable TENO RONCALIO, Special Master Presiding.

~~FILED~~

2/25 19 81

Margaret V. Hampton CLERK

DEPUTY

~~VOLUME 10~~

BE IT REMEMBERED that on this 9th day of February, 1981, Federal Building, Courtroom 3, Cheyenne, Laramie County, Wyoming, the above-entitled matter came on for trial before the Honorable Teno Roncalio, Special master Presiding, whereupon the following proceedings were had, to wit:

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

ORIGINAL

APPEARANCES

FOR THE STATE OF WYOMING:	MR. MICHAEL D. WHITE Special Assistant Attorney General 2900 Energy One Building 717 17th Street Denver, CO 80202
FOR THE UNITED STATES OF AMERICA:	MS. REGINA SLEATER Attorney at Law Land and Natural Resources Division Federal Building Cheyenne, WY 82002
	MR. TOM ECHOHAWK Attorney at Law Land and Natural Resources Division 1961 Stout Street Denver, CO 80294
	MR. JOSEPH MEMBRINO Attorney at Law U.S. Department of Justice Washington, DC 20006
FOR THE ARAPAHOE TRIBE:	WILKINSON, CRAGUN & BARKER 1735 New York Ave., N.W. Washington, DC 20006 BY: MR. R. ANTHONY ROGERS
FOR THE SHOSHONE TRIBE:	SONOSKY, CHAMBERS & SACHSE 200 M. Street, N.W. Washington, DC 20006 BY: MR. HARRY SACHSE

APPEARANCES

FOR THE STATE OF WYOMING:	MR. MICHAEL D. WHITE Special Assistant Attorney General 2900 Energy One Building 717 17th Street Denver, CO 80202
FOR THE UNITED STATES OF AMERICA:	MS. REGINA SLEATER Attorney at Law Land and Natural Resources Division Federal Building Cheyenne, WY 82002 MR. TOM ECHOHAWK Attorney at Law Land and Natural Resources Division 1961 Stout Street Denver, CO 80294 MR. JOSEPH MEMBRINO Attorney at Law U.S. Department of Justice Washington, DC 20006
FOR THE ARAPAHOE TRIBE:	WILKINSON, CRAGUN & BARKER 1735 New York Ave., N.W. Washington, DC 20006 BY: MR. R. ANTHONY ROGERS
FOR THE SHOSHONE TRIBE:	SONOSKY, CHAMBERS & SACHSE 200 M. Street, N.W. Washington, DC 20006 BY: MR. HARRY SACHSE

THE SPECIAL MASTER: Appearances, please, on this February 9th.

(No response.)

THE SPECIAL MASTER: Appearances, please.

MR. ECHOHAWK: Tom Echohawk for the United States.

MR. MEMBRINO: Joseph Membrino for the United States.

MS. SLEATER: Regina Sleater for the United States.

MR. SACHSE: Harry Sachse for the Shoshone Tribe.

MR. ROGERS: Tony Rogers for the Arapahoe Tribe.

MR. WHITE: Michael D. White for the State of Wyoming.

THE SPECIAL MASTER: All right, Ms. Sleater, proceed.

MS. SLEATER: Your Honor, at this time the United States would like to call Mr. Al Kersich, and Tom Echohawk, associated in this case with us, will be presenting the witness.

THE SPECIAL MASTER: Thank you.

Would you raise your right hand, please.

ALBERT KERSICH

having been first duly sworn, was examined and testified as follows, to wit:

DIRECT EXAMINATION

BY MR. ECHOHAWK:

Q Would you please state your name.

A A. T. Kersich.

Q Mr. Kersich, where do you reside?

A Billings, Montana.

Q And what is your current occupation?

A I'm the president and principal in charge of the water resources section of H.K.M. and Associates.

Q And Mr. Kersich, how long have you been president of H.K.M.?

A Approximately six years.

Q And would you give us a general -- the general size of H.K.M.?

A Well, we vary from month to month, but it's about 100 employees on a year around basis.

Q Mr. Kersich, how long have you been with H.K.M. or its predecessors?

A Since about, it will be 25 years in March.

Q Mr. Kersich, would you give us a brief overview of your work experience prior to the time

you joined H.K.M.

A Prior to joining H.K.M. I'd been employed by the Bureau of Reclamation at various times, both during my coop training in college -- I went to the Coop Engineering University, and I was with the Bureau at that time during my training periods. And then I was in the service, and then I went back to the Bureau for about a year, a year and a third, a quarter, something like that.

Q What were your general duties when you were employed with the Bureau of Reclamation?

A During my Coop periods I spent training periods within the various areas of the Bureau such as irrigation designs section, the quality control construction management, aerial photography, land classification, things of this nature; 90-day training periods in each of those sections. Afterwards, when I came back from the service, I was with both -- I was with the Yellowstone District Office which was headquartered in Billings, and eventually moved to Cody, Wyoming. And during that time I was involved in some of the investigation work being done on the Clarks Fork River Project for hydroelectric development and eventual damming,

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potential damming of Clarks Fork Irrigation Development down below.

Q Would you give us a brief background, educational background.

A Yes. I have a Bachelor of Science Degree in Civil Engineering from the University of Detroit, and received that degree in June of 1952.

Q Mr. Kersich, do you have any professional registrations?

A Yes, I am a registered professional engineer in Montana, Wyoming, North Dakota, Utah and New Mexico. I also hold a certificate from the National Council of Engineering Examinors as to my qualifications.

Q And are you a member of any professional societies?

A Yes. I am a member of a number of professional societies, including American Society of Civil Examiners, the American Society of Agricultural Examiners, the International Conference of Irrigation and Drainage, the National Council of Engineering Examinors, which I serve now as president elect of that particular group, There's some others I'm sure I forgot.

END TAKE

* * * * *

Q (By Mr. Echohawk) Mr. Kersich, would you please explain your duties with the National Council of Engineering Examiners?

A Okay. As president-elect this year, I'm the officer in charge of the Committee on Uniform Exam Qualifications for Professional Engineers, and basically the National Council's primary responsibility is to furnish an exam for professional engineers of the various state boards, to the roughly 50 jurisdictions that we have now.

And, as part of our effort this year, we are involved in the upgrading of the examination process and the development of a new scoring process for equating the exam to determine the minimum competency level for engineers.

Q Mr. Kersich, what is your involvment in the case that we are involved in now?

A My particular involvment in this case is that of the team leader on the soils effort or the determination of the irrigability of lands involved within the various study lands.

Q Is that irrigability?

A Correct.

Q Would you please define irrigability or irrigable

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as used in this particular study is defined as those lands that can sustain long-term irrigation.

Q Mr. Kersich, how does the determination of irrigability fit in the overall scheme that the United States is putting forward?

A Basically, the claim is being developed on a three-pronged approach. There are soils or the determination of the irrigability of lands, which is the base that the agricultural engineer would study to develop or design various irrigation systems and determine costs of those systems, and then the final approach, of course, is the economics or the projected returns from those lands and a comparison of the returns versus the costs or the final determination of irrigability.

Q Mr. Kersich, have you ever been involved in a situation where a similar approach such as this as you have just described has been used?

A Yes, I have.

Q And where is that?

A The name of that case is Arizona versus California.

Q And what's the status of that litigation?

A That is in litigation. There are two more weeks of testimony slated and then the testimony will be

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completed and Special Master Tuttle then intends to have a report to the Supreme Court on that by July of 1981 for whatever would be the next term of the Court.

THE SPECIAL MASTER: What is this Special Master's name?

MR. ECHOHAWK: Tuttle.

THE WITNESS: Albert Tuttle, sir.

MR. ECHOHAWK: And I think he's a senior judge of that circuit.

THE SPECIAL MASTER: Are you asking him or telling him?

MR. ECHOHAWK: No, I'm letting you know.

Q (By Mr. Echohawk) Mr. Kersich, what was your responsibility in the preparation of that case?

A My responsibility in that case was as the agricultural engineer. I was involved in the design of the various systems and the costing of those systems and then worked with the economist on the determination of the irrigability.

Q Have you ever used a similar approach in any of your other work?

A Well, this is the basic approach that we're using in our other Indian Reservations, the one that I

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described here on Wind River, yes.

MR. WHITE: Your Honor, could I ask the witness to speak up just a little bit?

THE WITNESS: I'm sorry.

MR. WHITE: I didn't mean to interrupt, but it sure would be helpful.

THE WITNESS: Okay. Just wave and I'll speak up.

Q (By Mr. Echohawk) Mr. Kersich, would you please describe for us your duties as the principal in charge of the Water Resources Division of H.K.M.?

A Okay. There I'm involved in everything and in various capacities on various jobs. Some jobs I'm involved in the procurement of the work, the development of the scope of the work, the drafting of the contract provisions, the setting up of all the repayment provisions, which is an important part of my work.

On other jobs I work as a consultant to other teams that are in the office. For example, I may be brought in to be a devil's advocate, for example, or on a review of a design being completed by some other people, or I may actually check computations.

I go to the field many times, and we have what we call a plan-in-hand review. I'm involved in that where we actually take our plans before they are completed, go to the field, review the circumstances that are controlling our designs and whether our designs are the answer to those circumstances.

And in some jobs I just get right down and do the work.

Q And what type of people are employed within the Water Resources Division?

A Within the Water Resources Division we have civil engineers, agricultural engineers, hydrologists, civils with a basic interest in hydraulics. We have geologists; we have geotechnical engineers; we have people with experience in hydrographic studies for water rights determinations.

We have land classifiers. We have soils scientists, and as an adjunct to the Water Resources section, we have a chemical and physical testing laboratory where we can test materials and chemically test materials, things of this nature.

Q Mr. Kersich, would you give us kind of a brief

overview of the type of work that the Water Resources Division does at H.K.M.?

A We have a number of contracts with various Indian Reservations on projects similar to this one here. We have worked for private clients, private farmers, irrigation districts, conservation districts.

In Montana conservation districts are an arm of the State. They are set up under State law. We have worked for industrial clients. We have done work for both Intake Water Company, which is a wholly-owned subsidiary of Tenneco, and Gulf Oil, and we have done work for the State of Montana on water reservation hearings, irrigation projects, redesign of dams, and dam safety programs. I think --

Q In the various aspects of the work that you've described, is a portion of that work soils related?

A Yes, the work for one of our industrial clients had a reconnaissance or land classification with it. We have done land classification studies on our BIA work on Reservations, and we have done -- it really isn't land classification work when you work for a private farmer because normally you are

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talking about a small project, 1,000 or 2,000 acres, but we have done the attendant work that's required to do the engineering.

Q How about for your industrial clients?

A Yes, I thought I had mentioned that, but we did do a reconnaissance land study as part of the water rights request for one of our industrial clients.

Q Why don't we get into a little more of the BIA work that you have done on the various Indian Reservations? Would you give us the names of the Reservations that you have worked on or are working on?

A Okay. Not including Wind River Reservation, we have also worked on the Crow Reservation, where we have done a similar study. We have been responsible for the determination of irrigability of soils and the evaluation of storage sites for potential reservoirs.

On the Northern Cheyenne Reservation we have done the evaluation of the soils for arability as well as the hydrology and the preliminary determination of potential storage sites.

We have done some work in New Mexico on

Jicarilla Apache Reservation, and there we were responsible for the arability studies on soils in conjunction with BIA. They had done quite a bit of work prior to us becoming involved, so we went in and reviewed their work and did our work on additional lands.

There we also are involved with the agricultural engineering. We are doing the conveyance and project irrigation designs ourselves, and in that particular instance the economists are working as a subcontractor to us for the determination of irrigability.

Water availability, I don't know whether I mentioned that, but hydrology and water availability are a portion of those studies also.

And on the Fort Berthold Reservation we have done some semi-detailed land classifications. to develop a block of land that could be used for an eventual irrigation project.

Q Now, on the Crow and Northern Cheyenne Reservations, you said you did some determinations there of arability. Would that be land classification work?

A That's correct, a similar program to what we

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are talking about here on Wind River.

Q What level of study?

A It's called modified semi-detailed.

Q Do you recall the acreage amounts involved each of those instances?

A I think our screening process eventually got us down to about 200,000 acres, and then we did our more intensive level of study on that 200,000 acres, and I'm not sure of the exact figures of the arability, but it was about 100,000, I think.

Q Which Reservation was that?

A This was Crow.

Q And how about Northern Cheyenne?

A Northern Cheyenne is a much smaller Reservation. I believe our study was around 50,000 acres, and We're probably down around 30,000 on determination of arable lands out of that.

Q What was your involvment or what is your involvment in the Crow and the Northern Cheyenne and Jicarilla Apache?

A Primarily the same as this. I was involved in the development of the study program, field office and land sections of that program, the land standards that we are going to classify the lands

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to, and in the review of the work that's been performed todate, I have been involved in a field review and various office reviews of that, of the determinations made by the land classifiers in the field.

* * * * *

End 2

Q (By Mr. Echohawk) (Continued) Are those three projects on-going or are they completed?

A Those are all on-going. They're going very slowly, as a matter of fact. There's been quite a bit of time spent getting to where we're at today and no final conclusions have been reached yet on any of those.

Q Okay. You mentioned earlier that you were involved in Arizona vs. California. How many reservations are involved in that?

A There are five, sir.

Q Would you name those?

A Yes. Beginning at Needle, California, we have the Fort Mojave Reservation, Chemehuevi -- don't ask me to spell that, please -- the Colorado River Indian Reservation, The Fort Yuma Reservation and Cocpah Indian Reservation.

Q You stated that when you did the --

THE SPECIAL MASTER: Just a minute. If he can't spell them we better find somebody who can for the reporter.

THE WITNESS: Tom, I think knows how.

(Off-the-record discussion.

THE WITNESS: I'll check on those, sir,

and give her the correct spellings.

Q (By Mr. Echohawk) I believe I asked you this; you were involved in agricultural design on that?

A That's correct. My job was as an ag engineer.

Q And would you call yourself an ag engineer then?

A Yes.

Q Mr. Kersich, in the design of agricultural systems for those reservations, were you involved in soils work at all?

A Yes, I was.

Q And how so?

A Well, my job was to review the soils work that had been completed by another consultant and see whether it gave us the information that we required for the design of various systems on those reservations. And as a consequence, it was necessary for me to meet with the consultant, first of all, read his report that was issued to the BIA. He worked directly for BIA. My job was to read the report, review it, determine if there were any questions, which there were. Then later I met with the soils consultant personally in his office and at that time we reviewed the data

that he had accumulated, but had not been put in a report, such things as logs, chemical testing data, physical testing data such as analyses. After that, after further discussions, why we did develop a new program, where we did go back to the field and did some additional visual observations, chemical testing, soils testing, things of this nature.

Q Why was it necessary to do additional work there?

A Well, we needed more information in some areas. One step I forgot is that we actually went out on the reservation with the people that were involved in the study and viewed the plans that we were going to work on. Sometimes you don't get all the information on the logs or the aerial photographs, and so we were able to stand there and discuss it, discuss the limitations and deficiencies, see if they were correctable or possibly decide we couldn't work or change classifications in some instances.

Q Mr. Kersich, in that situation did you always agree with the classification assigned to the various parcels?

A No, sir.

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Q And what would happen when there was not an agreement?

A A big argument -- no, we would sit down and discuss it. Many instances it resulted in additional field work, additional laboratory work and in some instances a final determination was that there was a change in classification.

Q So in your opinion you think it's important for the agricultural engineer to have close relations with the soils program?

A Yes, very much so.

Q Why?

A There's an awful lot of things you have to worry about in the ag engineering portion, and you have to understand how the land classifier many times arrived at his opinion, and how he delineated the deficiencies in his mind at least. And knowing that you can do a much better job then of designing your systems to meet any deficiencies or to cover lands you may have either overlooked or are not giving due weight. So I think the two have to have very good rapport and there has to be an understanding of what each one is doing and how it fits into the total plan.

kersich-direct-echohawk

Q Mr. Kersich, were you able to have some input into the formulation of land classification standards used in Arizona vs. California?

A Original land classification standards were those that had been derived for the trial in the sixties, as I recall. Those standards were used, and then there was some modifications of those standards, and I was involved in the modification of the standards, yes.

THE SPECIAL MASTER: These are all still on the California lands.

THE WITNESS: No, sir. These lands are in three states. There's a small portion of lands in Nevada, the largest portion of lands under consideration are in Arizona, and the second largest grouping would be those in California.

THE SPECIAL MASTER: Right.

THE WITNESS: The Colorado River separates California and Arizona.

Q (By Mr. Echohawk) Mr. Kersich, I show you what has been marked as United States Exhibit WRIR C-34. Would you please describe for us what that is.

A Yes. This is a resume that I prepared for myself. It covers my education, registration and experience

to date and the various work efforts that I've been involved with.

MR. ECHOHAWK: I might note that on page 2 there is the correct spelling of the Chemehuevi Reservation.

Q (By Mr. Echohawk) Mr. Kersich, is United States Exhibit WRIR C-34 accurate?

A Yes, it is.

Q Mr. Kersich, how does land classification work relate to agricultural engineering?

A Agricultural engineering is the designing of systems, primarily -- both irrigation and drainage, and this is work upon land, and land classification studies are used as the basis for determining the arability or whether the lands can sustain irrigation, so it's the base of what you do your design work on.

Q I'm not sure whether I asked you this a minute ago, I'll try it again. Is it important to have the agricultural engineer involved in the determination of arabilty?

A Yes, I think so.

Q And why?

A Simply because many of the parameters that are

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used by the land classifier to establish the arability of lands are used in the design of these systems. For example, texture, surface texture, knowing what type the land surface textures are. The ag engineer can make a determination of infiltration rates and applications rates. And as you go through a set of land classification standards, there are some portions in each of those parameters that are of concern to the agricultural engineer, so you know what a person is going to look for or how it relates to his parameters, it makes it more simple and more concise as far as your design work.

Q Are-you, as an agricultural engineer, able to make arability determinations then?

A I am, predicated on the input I have to the program, yes.

THE SPECIAL MASTER: May I hear that last end of the last question? "Are you, as an agricultural engineer" qualified to what?

(Thereupon the last question
(was read back as follows: " Q
(Are vo u, as an agricultural
(engineer, able to make arability
(determinations then?"

THE SPECIAL MASTER: And your answer?

(Thereupon the last answer
(was read back as follows: " A
(I am, predicated on the input
(I have to the program, yes."

THE SPECIAL MASTER: May I ask this: Does that include the economic feasibility of projects? Are you concerned solely with the land classifications?

THE WITNESS: At this point in time, sir, I'm talking just merely about the determination of whether the land is arable or not.

THE SPECIAL MASTER: All right, fine.

THE WITNESS: The economics haven't come into it yet.

Q (By Mr. Echohawk) You said, I believe, predicated on your input into the program; is that right?

A Yes, that's correct.

Q Would you elaborate a little more on what your input into the program is?

THE SPECIAL MASTER: I thought he said other inputs not his. That's the reason I asked the question.

THE WITNESS: What I meant is my own personal input, sir, into the program.

THE SPECIAL MASTER: That determines your ability to pass judgment on the arability,

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is your own research and not others?

THE WITNESS: No, no. That's what I'm getting to. It's the total review of the program. It's really a four-step process, the way I've designed it. If I might, if I might, I might explain it. Right now the first thing I feel, it's very necessary to have some input into land classification standards to make sure the parameters they use for determining arability of land in the field are those which I can use in my design work later on.

Secondly, I think it's terribly important to have input into the actual field and lab program so that we know what level of effort is going into the field work, how the information is being reported so it can be utilized by people in the office; what chemical information is gained and how it is reported also.

Thirdly, as an ag engineer in this particular instance I feel it's important to have input into the type of people that are working on the project. For example, in our office I made the final determination of who is going to be involved in the field land classification effort, what their

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qualifications might be, and actually I interviewed all of the people personally to determine their qualifications.

And finally, and most importantly, is that I'm involved in the final review where we take the work that's been accomplished by the people in the field and some of those people as well as other land classifiers in our firm, drainage engineers and others are involved in final determination of land classification. So my opinion is predicated on the opinion of these people plus any information that they have given me during the final review process.

Q (By Mr. Echohawk) Mr. Kersich, would you give us an overall general description of how you and HKM went about determining the arable lands in this case?

A Well, the first thing that we do is compile all the available information, but a number of studies completed within this area not over each piece of ground we were interested in, but on adjacent tracts, things of this nature. So we compiled from the Bureau of Reclamation, from the State of Wyoming, from anybody that had done work in the

area, we tried to develop a backlog of all that information, get some idea of the level of studies, the results of those studies, the methods under which those studies were conducted.

The second thing is take the reservation as one large element, one large land tract and go through a screening process to develop study areas that we could financially handle.

THE SPECIAL MASTER: What do you mean that "you could financially handle"?

THE WITNESS: Right, from the amount of money and the time that we had, sir.

THE SPECIAL MASTER: Your budget of the program?

THE WITNESS: To actually go in the field and put the level of effort in and it wasn't reasonable to expect to put the same level of effort on every acre of ground, and therefore we tried to select those areas which were most -- displayed the capabilities potentially of having the most chance of being declared arable. So we screened the reservation and developed study areas. At that point, really simultaneously, we developed land standards predicated on

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discussions with other people who had been involved in the area, land classification standards were then developed. We went to the field and coordinated our office and laboratory program. Those were, the results of those programs were long and noted on various aerial photographs, things of this nature. Then eventually all that information was put together and a final determination of arability was made.

* * * * *

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Q. (By Mr. Echohawk) Mr. Kersich, would you give us a little more detail on the initial process of screening through the lands?

A. Here again we started out with basic information. We had the study that had been completed by the BIA in 1962, a very low-intensity reconnaisance level study.

After reviewing that study we selected characteristics that were noted in that study that we could use in the screening process.

Some of the things we were concerned about were soil texture, so we had textures that would be applicable to farming; depth to barrier, because of drainage problems in the area, we established the criteria that covered that predicated on the 1962 study; water holding capacity, which would give you some idea of the texture of the soil as well as the amount of times you would have to irrigate that so your level of management would be reasonable; the hydraulic conductivity for the measure of how fast water flows laterally through soils --

THE SPECIAL MASTER: Was any distinction made between these studies and that which would come from

central pivot irrigation from deep wells as distinguished from surface irrigation?

THE WITNESS: As far as the water source at this point in time, sir, we didn't pay any attention. We were looking at land characteristics only.

A. (By the Witness) And the final one was slope, and we took a percentage of slope that we felt would be reasonable for the various types of systems that we placed on it.

That resulted then in reducing the land base that we were studying from the Reservation boundary less the withdrawal area, or about two and a half million acres, roughly down to 490,000 acres.

Q. (By Mr. Echohawk) Mr. Kersich, I direct your attention to what has been marked as United States Exhibit WRIR C-34. Maybe this exhibit will assist you in explaining the screening process.

A. Okay. This exhibit is entitled, "Study Area Land Base Map, Wind River Indian Reservation, Wyoming," and the Reservation outline is depicted in this broad black line, and within that

we have various areas colored in green, and some of those areas are further enclosed by a red border, and what this amounts to is that we screened the entire Reservation, and the lands colored in green are lands which met the five screening criteria I mentioned previously.

In other words, the slope was 20 percent or less. It has textures that fell within the ranges that we were looking for. The depth to barrier was at least 36 inches or greater.

This isn't the final design yet, but this was all the information that was available to us at the time of the screening, so all these areas enclosed in black and colored in green are lands which would have met the minimum screening criteria.

Okay. Now, it became quite obvious that some of those lands were rather high. Cropping patterns would have been very limited. Also the availability of water was a problem, and the study eventually -- we reviewed these areas and tried to set up study areas contained within these red boundaries that had a reasonable chance of meeting the irrigability criteria so there was some additional work done where we looked at distance, lift, cost, things

of that nature that you might get into, and then further confined our studies or intensive level studies to those areas that are bounded in red.

Q And how many of these study areas did you come up with?

A Okay. We eventually wound up with six study areas, and they are Owl Creek, located on the northern boundary of the Reservation; the North Crow Heart area, which is located north of the withdrawal area, and starting here at Crow Heart -- Crow Heart is up in here (indicating); the Big Horn Flats, which is due south of North Crow Heart; the South Crow Heart area, which is on the south side of the Wind River; and the Arapahoe area, which is located between the Little Wind and the Big Wind, as I recall.

Q Is there one additional study on the east side?

A Yes, I'm sorry. There's one here on the east side of the Wind River called the Riverton East.

Q Mr. Kersich, after the screening process was done and you arrived at the six study areas, I believe you mentioned that you developed some land classification standards. Would you give us a little better description as to how that was done?

A. Well, we were fortunate in this area in that the Bureau of Reclamation had done a considerable amount of work on land classification studies. They had done work in 1947, '48, in the '50's, some in the '60's, and some in the '70's, actually.

So we obtained copies of those land classification studies that they had used to determine arability, and we studied them. We actually discussed how those standards had been developed by people like Ray Pasco, who had been the regional soils scientist during part of this time.

We discussed them with the people who are now -- Tom Casey, who I believe is now the regional soils scientist, and we talked to some of the BIA people involved in irrigation management on the Reservation.

We actually went out and spent some time on the Reservation and looked at some of the irrigation systems they currently used, whether they were using sprinklers or not, which they were beginning to use or had been using, and from that we eventually sat down and developed a dual system of standards that would cover both sprinkler and gravity

irrigation.

Q. Mr. Kersich, who at HKM was involved in setting up these land classification standards?

A. Basically again this was a team effort. I was involved as the ag engineer and had the ag engineering input. Chick Smith, who is our chief land classifier and who had been with the Bureau of Reclamation -- had been with the Bureau of Reclamation for about 26 years on similar type work was involved. Mr. Ross Waples, who is a soils scientist and land classifier was involved. Robert Toedter, who had been with the Bureau of Reclamation as a drainage engineer and had been working with me for about four years, was involved in the drainage aspects of it, and Ron Billstein was involved since Ron is the head of the Water Resources section.

Q Could you give us a little more detailed description of Mr. Toedter's background?

A Yes, Bob Toedter is an agricultural engineer. I believe he graduated from the University of Idaho, and he spent considerable time with the Bureau of Reclamation. I can't remember the exact time, but roughly eight years, I'd say, working in drainage engineering and primarily in the

Columbia River Basin and over in North Dakota on the Garrison Project on the drainage studies there and then eventually transferred to the regional offices as a drainage engineer and then eventually went to work for H.K.M., and his work with H.K.M. has basically been in the field of drainage and irrigation management.

Q Mr. Kersich, why is it important to have individuals with these various backgrounds involved in the formulation of land classification standards?

A Well, I don't think that one person knows it all. I think it's too complex to just go off and depend on one person's opinion, and each one of us have a little different view of what we want to know about the project and so on, and I think it's good to get all the people together and get their collective thoughts and develop a set of standards rather than to depend on just one person.

Q Can you give us an example of one characteristic that's considered in these land classification standards and how each of these individuals would have some input into that?

A Well, let's talk about Bob Toedter, for example.

Bob Toedter would be concerned about the hydraulic conductivity of soils. If the soils are real tight and the water takes a long time to travel through the soil, that would reflect on the amount of drainage that he would have to put in an area to keep the root zone free of water.

Another thing he would be concerned about would be the depth to barrier, and that's another design consideration. If barrier is close to the surface, the attendant economics would be different than if it was much deeper, and his input resulted in the drainage portion of the specifications where we discussed having a minimum hydraulic conductivity of one-tenth of an inch per hour and a distance to barrier of six feet, and this was put in with another economic consideration of drain spacing that if those resulted in a drain spacing which was less than 200 feet, we would automatically discard the lands and not certify them as irrigable, and you can go through each portion of this and the input of the soil scientist or the land classifier would relate to such portions of this standard.

Q And how does your background as an agricultural

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engineer contribute to the formulation of land classification standards?

A Some of the things I'm concerned about are texture, infiltration rates. I wanted to know how the soil will accept the water so that I have some idea of what I would expect from evaporation losses, what type of application rates I should use. The depth of soils and the water holding capacity gives me some idea of the irrigation scheduling that's required, the number of times that you'd have to get back on the land to be able to keep your root zone properly filled.

I'm concerned about the drainage. They work together with our work because deep percolation is a function of drainage, that water that gets away that the crop can't use.

Those are just some. Salinity and alkalinity would be of concern to me.

Q And why would that be of concern?

A Well, if we get drainage problems, we can't get the water out fast enough. If it's toxic, if it's full of salts, the various salts that are toxic to plants, we're going to have poor yields and we are not going to be able to afford the

systems that we are designing there.

Q Mr. Kersich, are the plant classifications standards that were developed by H.K.M. based on large projects or small project development?

A Well, you normally need land classification standards for large projects because you have contiguous blocks of land, one of the problems that can affect lands in different ways and, therefore, you develop the standards based on the idea that they are going to be irrigated as a large project.

Q Now, in the formulation of the land classification standards, was all the work done in the office?

A No, no, sir. We went out and talked -- as I mentioned previously, we had talked to people in the field. We had talked to people in the Riverton office of the Bureau of Reclamation.

We actually went out in the field. Mr. Waples and Mr. Smith both went out and reviewed the effects of some of the other land classification work that had been done and got some idea how the land was responding to irrigation.

Mr. Toedter did go to the field and look at some of the drainage work that had been completed

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in the Riverton area and discussed in depth the drainage problems in that particular area, and that was some of the input that brought in -- I was out in the field, of course, and had a chance to see the type of systems that were being used, the methods of irrigation, and all of us were certainly interested in the cropping patterns that were developed in the area.

* * * * *

end 4

Q (By Mr. Echohawk) (Continued) Mr. Kersich, I show you what has been marked as United States Exhibit WRIR C-36. Would you please identify those.

A Yes. This exhibit is entitled Table 2, Land Classification Standards Wind River Indian Reservation, Wyoming 3-79.

Q Mr. Kersich, are these the standards that were formulated by you and the others at HKM?

A They are.

Q Would you please give us a brief description of how these classifications -- these standards were or how they're used?

A Yes. First of all, we set up four potential classes of land, lass 1 being the class of land or the type of land which would have the least deficiencies, potentially no deficiencies and would provide the best returns.

Class 2 lands were lands which exhibited some type of deficiency, possible slope or something of this nature which might make it more expensive to bring into production.

Class 3 then had more deficiencies, and finally Class 4 was the class which had the most deficiencies but would still be arable under

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limited cropping patterns.

THE SPECIAL MASTER: What relationship is there of these four classes of irrigable lands to the four classes of irrigable lands long used in and classified by the Bureau of Reclamation?

THE WITNESS: They're isimilar, sir.

Q (By Mr. Echohawk) Do the standards developed by HKM parallel the ones used by the Reclamation?

A That's right. We try to keep them as close as possible except for updating for more modern methods, things of this nature.

I might just say then that the various parameters that we're looking for are located on the left-hand portion of each sheet,and the level or the acceptability parameter are shown then under the class. For example, if I might give one, Class 1 soil would normally be the lands which would have the deepest topsoil, have the most waterholding capacity. For example, if you're examining soil depth to clean sand, gravel or cobbles under Class 1, we would require that 36 inches of fine sandy loams or 42 inches of sandy loams are textural classes that the land classifier can identify.

Q Mr. Kersich, are these classification standards broken down into three main areas?

A Yes.

Q What are they?

A We're concerned about the soil, topography and drainage. And under drainage, it is both surface and subsurface. And I've been talking mostly about subsurface drainage.

MR. ECHOHAWK: Your Honor, I offer what has been marked as United States Exhibit WRIR C-36 into evidence.

THE SPECIAL MASTER: All right. 36 A, B, C or is this all 36?

MR. ECHOHAWK: Just 36. It should have been stapled together.

MR. WHITE: May I inquire of the purpose of the offer; is it for the truth of the contents or to illustrate the standards used or what is the purpose of the offer?

MR. ECHOHAWK: Both the truth of the contents and that these are the standards that they used.

MR. WHITE: Could I have just a moment, I'd like to voir dire on this?

THE SPECIAL MASTER: Of course. You're offering 36 only?

MR. ECHOHAWK: That's correct.

THE SPECIAL MASTER: Yes, Mr. White.

MR. WHITE: Would the Tribes counsel want to voir dire on this?

MR. ROGERS: No, I was on another matter.

MR. ECHOHAWK: Do you want the podium, Sandy?

MR. WHITE: Yes, please.

THE SPECIAL MASTER: While Mr. White is getting his voir dire, let me ask a question or two.

THE WITNESS: Yes, sir.

THE SPECIAL MASTER: Your designing engineer work to which you have alluded includes engineering for a source of water for these specific lands?

THE WITNESS: You mean in the past, sir?

THE SPECIAL MASTER: No, sir.

THE WITNESS: Under this project here?

THE SPECIAL MASTER: Yes.

THE WITNESS: No, we're not doing any of the engineering with regard to water sources.

THE SPECIAL MASTER: Question two, did

an actual irrigation project ever get constructed and results, successful operation from any of the various programs you've worked on on the other reservations or other matters which are contained in your Exhibit 34 which you testified to?

THE WITNESS: Not on reservations. These have been mostly litigation work. We have done private work for individuals or for irrigation districts that resulted in irrigation, yes, sir.

THE SPECIAL MASTER: Are you familiar with expantion of irrigation districts on the Pole Mountain Reservoir or -- I mean the Pole Cat Bench?

A On Pole Cat Bench, I have a familiarity with that because that's one of the projects I worked on back in the late'50's for the Bureau of Reclamation, but that's been a long time ago.

THE SPECIAL MASTER: Are you familiar with the Eden Valley, Farson or Big Sandy Reclamation area of western Wyoming?

THE WITNESS: No, sir.

THE SPECIAL MASTER: Promblems in alkalinity, salinity and the failure over the decades and decades?

THE WITNESS: No, sir, I'm not familiar

with that particular project.

THE SPECIAL MASTER: Okay, go ahead, Mr. White.

VOIR DIRE EXAMINATION

BY MR. WHITE:

Q Mr. Kersich, are you absolutely certain that WRIR C-36 were the standards which you used throughout your arability analysis?

A These were the final standards, sir.

Q Were all your determinations of arability based on those standards or were other standards used during earlier parts of your studies?

A We had a sentence or two in the other standards that eventually came out and these were the standards that the final determination was made on, to the best of my knowledge, and I used these in my final review.

Q Do you recall your deposition on January 6th of this year?

A Yes, sir, I do.

Q I hand you what's been marked as Plaintiff's Exhibit WRIR SK-2 and ask you if you recognize that?

(Brief pause.

Q Do you recognize those?

A Yeah, I'm just checking them, okay? May I have a minute, please?

Q You bet.

(Brief pause.

A Yes, I recognize them.

Q Are those the standards which I just handed you being Exhibit SK-2 identical to C-36?

A No, there is one difference.

Q And what is that difference?

A It's under Class 3, there's a sentence that says on the WRIR SK-2 that says "There must be at least 2 inch per hour permeability in the top two feet when SAR exceeds twenty."

THE SPECIAL MASTER: Where are you reading from, which page?

MR. WHITE: First page, Your Honor.

THE WITNESS: I'm --

THE SPECIAL MASTER: You're not reading under drainage, you're under soil and texture?

THE WITNESS: I'm reading under alkalinity of soil.

THE SPECIAL MASTER: Which column?

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THE WITNESS: Under class 3, sir.

THE SPECIAL MASTER: All right, thank you.

Q (By Mr. White) I believe you've marked that out on SK-2 during your deposition; is that correct?

A That's correct.

Q How about the footnotes on the third page, those are different aren't they? Doesn't footnote 2 in C-36 apply to something besides drainage?

A That's correct.

Q Doesn't footnote 2 in SK-2 apply to drainage?

A Wait a minute. The footnotes are exactly the same in the two.

Q Look where they appear in the text.

A Subsurface hydroconductivity under WRIR C-36 has footnote 3 and soil depth to barrier has footnote 3, yes. There was an error there that I didn't mark.

Q Which one is correct?

A The 3 is correct, yes, sir.

Q So it should be 3?

A That's correct.

Q I notice on page 2 under class 3 for gravity, irrigation pattern and field size there's a footnote 2 on SK-2. Is that the same, does that

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appear appropriately on C-36? Do you want to have a 2 there instead of 3 or is that correct?

A I'm confused.

Q I'm sorry. Let's start over again on C-36.

A Okay.

Q Class 3.

A Yes.

Q Gravity irrigation pattern of field size, there's a footnote 2.

A Um-hum.

Q Should that be footnote 2 or footnote 3?

A It should be footnote 2.

Q Okay. So we ought to jettison the footnotes in the narrative portion or in the tabular portion on SK-2 and adopt the footnotes that are in C-36?

A Let me say that C-36 is final land classification standards that were used.

Q Did you change the standards that Mr. Toedter developed?

A What do you mean?

Q Did you change the land classification standards that Mr. Toedter developed?

A He didn't develop any land standards on his own; he used the land classification standards in his kersich-voir dire-white

determinations that are shown in WRIR 36.

Q I hand you what's been marked for identification as Plaintiff's Exhibit WRIR SK-3.

Why don't we go ahead and turn to the last page. Do you see footnote 4 there?

A Yes, I do.

Q Was that or was that not included in your land classification standards?

A I believe on the undeveloped lands that was not included. I'd have to check that, but to my knowledge, it was not simply because these standards were being, I believe when he gave his deposition, he was modifying these standards for use on those lands which had a historic record of irrigation. And I'd have to check his deposition to make sure he wasn't talking about that particular thing at the time this was put in.

Q You're welcome to check the deposition. I'm just curious to know whether or not you did or did not have a drainage requirement for Class 4 lands because that's what the footnote says, no drainage requirement is necessary for these lands.

A Well, the thing that puzzles me about this at the same time is that it says we still show the same

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parameters for the hydraulic conductivity and depth to barrier, and I'd have to feel that we used those in the final determination of any class 4 lands that were put in the undeveloped lands program, sir.

* * * * *

Q. (By Mr. White) So the final standards which you used then, which are C-36, did not include Footnote 4; is that correct?

A. To the best of my knowledge, they did not on the undeveloped lands.

Q. How would you find out for sure?

A. Well, I guess I would have to talk to Bob Toedter about that.

Q. I see on the top of C-36 there's a date with the numbers 3-79. Is that the date on which those were adopted or not? Is that March, '79?

A. Yes, I think that would be the date that these were finally --

Q. So these weren't changed since that time?

A. To my knowledge, no.

Q. Who would know for sure?

A. Well, it would have to be me, but no one has discussed any changes of these standards with me.

Q. So it's your testimony then that these are the standards that were adopted in March of '79 and have not since then changed; is that correct?

A. Yes.

Q. Now, would you please take a look at Footnote 2 of C-36? During your previous testimony you have

gone to great pains to distinguish between irrigable : and arable.

THE SPECIAL MASTER: He has? I didn't know that.

MR. WHITE: I'm sorry. Maybe I should ask him if he did that.

THE SPECIAL MASTER: Would you do that, please?

Q (By Mr. White) Is there any difference between irrigable and arable?

A. Yes, there is from my definition, yes.

Q And has your investigation that you've described during your testimony so far applied to arable land?

A. Arable land.

Q A-r-a-b-l-e?

A. That's correct.

Q And could you explain to the Court very quickly the difference between arable and irrigable land?

A. From my standpoint?

Q For the purposes of your studies.

A. Arable is a determination of lands which physically and chemically sustain long-term irrigation.

Irrigable are those lands that meet the tests of economics and design and the other portions of the

study that we are talking about.

Q. So arable is the large base that you begin with and then after the application of engineering and economic determinations it's reduced to irrigable?

A. Irrigable, that's right.

Q. Now, I see in Footnote 2 you have the word irrigable. Why is that irrigable rather than arable?

A. That's a mistake on my part.

Q. Should that be arable?

A. That's correct.

Q. So where the word irrigable appears, both times in Footnote 2, that should be arable, or only on the first time?

A. Arable.

Q. Both times?

A. We are trying to block up lands that can be reviewed for irrigability -- wait a minute. Maybe I misspoke. Could I read that again?

Q. That's why I asked you about the both times that it appeared.

A. Well, irrigable at this point might suffice. If you have a small portion of arable land that's located in land that's presently being irrigable or being irrigated or would be irrigated, you may

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attach this to it. The final determination would not necessarily be mine in this instance.

Q. So it would be irrigable rather than arable in Footnote 2?

A. Yes, to give it the broadest definition of the term, I would say yes.

Q. And you still use the irrigable concept when you apply Footnote 2 to the irrigation pattern and field size for gravity irrigation for class 3?

A. We talk about five-acre minimum size there, and if we are adding five acres on to something as a little extension or something, yes, it could be determined. If the other portion is determined irrigable, then we know the land is there and if it's possible to pick it up, it might be picked up.

Q. So you made irrigability determinations as well as arability determinations?

A. Not from the standpoint of --

Q. Or did you made irrigability determinations as well as arability determinations in the application of these standards with respect at least to class 3 lands?

A. Not really from an economic or engineering sense, more from a sense that if we had a large tract of land with a small adjacent piece to it, it may

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have been left as arable so that the final determination could be made by the ag engineer and the economist.

Q. But in order to make Footnote 2 work, you made a determination of irrigability; is that correct?

A. No, that's not what I said, and I think if -- if you have, as the designer -- let me look at it from the way I would look at it, okay?

Q. Yes.

A. If I were designing an engineering project and I had a large block of land here that it turns out to be serviced and if there were some arable lands located continguous to it that were small, I would look at those then -- I would want to have that knowledge so I could look at those and determine whether they are worthwhile putting a system on, and that's the interpretation that we made to try and assist him in his final determination.

Q. Let's see if I have it straight then. You made determinations with respect to irrigability only with respect to adjacent lands in order to apply Footnote 2; is that correct?

A. That's correct.

THE SPECIAL MASTER: Do you want to take a

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little break?

MR. WHITE: I'm just about done, Your Honor, and you may rule on this one.

Q (By Mr. White) And as I understand your testimony, you would need to check with Mr. Toedter with respect to whether or not you had drainage requirements for class 4 lands as shown on --

A. That's correct.

MR. WHITE: Your Honor, we would reserve any objections which we might have until Mr. Kersich is able to talk with Mr. Toedter and find out about the drainage requirements for class 4 lands.

THE SPECIAL MASTER: Any other voir dire?

MR. ROGERS: None, Your Honor.

THE SPECIAL MASTER: Who said that?

MR. ROGERS: I did, Your Honor.

THE SPECIAL MASTER: All right. With the reservation of the offering, Exhibit WRIR C-36 is admitted. I understand there's a reservation for some further inquiry regarding the matters on which the voir dire was conducted.

Mr. Echohawk?

MR. ECHOHAWK: Would this now be an appropriate time for a break?

THE SPECIAL MASTER: All right. If you would like one, we'll have a ten-minute break.

(Thereupon a 10-minute (recess was had.

* * * * *

Q (By Mr. Echohawk) (Continued) Mr. Kersich, before we go any further, I think there's some things we need to clear up. In working on this project with the land classification work, is that generally the whole area that you worked on is just the land classification?

A Primarily the work I did in this project was involved with land classification, yes.

Q What I'm getting at is you or anyone else at HKM did not design the irrigation designs to fit the arable lands, did they?

A We have done no irrigation design, no.

Q And you've done none of the final economic determination; is that right?

A None of the final -- none of the final economic determinations are being done by anyone in our office.

Q Okay. Now, also there was a question raised by Mr. White as to the difference between how you all have used the term "irrigable" and "arable". Maybe you could probably clear that up as to how that term has been used in the past by HKM.

A Well, those terms sometimes have been used

interchangeably. What we tried to do on this project to make sure there was a distinction in what we were trying to show and what other people were trying to show was declare that those lands that are capable of sustaining irrigation, subject to further review then by other persons would be called arable lands. Then when the results of the ag, econ and the ag engineering were completed, those lands would be called irrigable lands.

Q Mr. Kersich, after the land classification standards were formulated, what would be the next step?

A One of the next steps was to develop some kind of symbol or shorthand code that the land classifiers could use to identify the lands in the field and to be able to mark their notes down in a reasonably clear manner.

Q Mr. Kersich, I show you what's been marked as United States Exhibit WRIR C-37. Mr. Kersich, I ask you to identify Exhibit C-37, please.

A C-37 is entitled Figure 1 the map symbol code, and underneath it it has a numerator and denominator. The numerator defines the class that is put on the land and any soils, topography or drainage deficiencies. And the class, by the way, is for

both gravity and sprinkler.

The denominator gives you the soil types and the top twelve inches and the next three feet. The drainage deficiency, if any, topography, if any, and soil deficiency, if any. This can be used then to identify what the land classifiers saw, what the chemical results are, at least an alert to some chemical problems if they showed up and so on.

Q Where are those map symbols used?

A They're used in the -- first of all in the field by the person actually classifying the land, and that time he places a preliminary class on the particular tract that he's reviewing. Along with that he notes if there are any deficiencies under either soils, topography or drainage. And then if it's possible for him to ascertain the deficiencies he notes that in the denominator as well as the texture of soil that he's viewed and this is the beginning of the surface of going down up to ten feet, although the textures we refer to here cover basically the top four feet or the root zone.

Q Where were the symbols recorded?

A They're recorded on the aerial photographs that

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he's using at the time he's classifying the lands.

Q Now, in this land classification program field work, can you give us the list of people that were involved in that program from HKM?

A Yes. We hired some people that had retired from the Bureau of Reclamation. One of them was Lyle Olson, Reed Hanson. We had Chick Smith from our office, we had Ross Waples from our office. They're full-time employees with us, and another fellow by the name of Richard Oper, who is a soils trainee.

Q Mr. Kersich, do you know how umuch experience in land classification work Mr. Hanson has?

A Mr. Hanson has in excess of thirty years of classification experience. He began with the Bureau about thirty some odd years ago.

Q That would be the Bureau of Reclamation?

A Yes, Bureau of Reclamation.

Q And once again, how much experience, land classification experience did Mr. Smith have?

A Mr. Smith had twenty-six years with the Bureau, and he's had about four more years with us.

Q And how much land classification experience did Mr. Waples have?

A Mr. Waples has one year with the Bureau of Reclamation, and then about four or five years with us, I can't remember exactly.

Q How about Mr. Olson?

A Mr. Olson has somewhere between thirty-five and forty years of land classification experience.

Q Mr. Kersich, when was the field work conducted?

A Done over two field seasons. It was done in the late summer and fall of 1978, and then it began sometime in the summer of 1979 and continued through the late fall or early winter of '79, I can't remember exactly.

Q Can you give us briefly what was involved in the field program? What type of work did they do?

A Basically their work was to take aerial photographs and various equipment -- or that a land classifier takes, go out in the field, go on the tracts, visually observe the tracts, determine rough boundaries of particular areas that they considered to be worth studying. Then they would put down the various auger holes to various depths. They would determine the soils profile from those holes. They put down further probes where the -- they might have a question about whether the land form or the

land profile, soils profile was the same. In some instances they samples the auger holes that they drilled and samples were sent to the labs then for review and testing. Finally they noted any potential defects or if there was a need further in their finds, further investigations by drainage people, they would note that on there, either their log form or many times with a d which is the symbol for drainage, and that would be on the aerial photograph. Then they would assign a preliminary classification to that particular tract that they were on at that time.

Q Mr. Kersich, what was the level of detail of the land classification study?

A We call it modified semi-detailed study.

Q What does that mean?

A There are three levels of classification intensity that the Bureau of Reclamation uses, and just for simplicity is it all right if I just call it Bureau instead of talking about WPRS because they were the Bureau at the time we were working.

THE SPECIAL MASTER: You're testifying.

THE WITNESS: Sure, okay. And those are reconnaissance and the semi-detailed and

detailed. We tried to get to the semi-detailed level of intensity. Each of them by their name has a little more work involved in doing, in field work, a little more lab work for the type of level of investigation. Semi-detailed is described in the Bureau manual, I don't recall all the different definitions, but they require so many holes be drilled and that the traverse that the land classifier makes is spaced about a half a mile apart. There's a certain scale of mapping, and one of the reasons we called ours modified is that the scale of maps or aerial photographs that we were able to obtain to do this project were different than what the Bureau would call for. Semi-detailed, they, I believe they use five inches to the mile and we were only able to obtain four inches to the mile photographs at that time.

So a semi-detailed is a relatively high level of intensity, more than a reconnaissance but still not as much, as much information is gathered under a detailed study. A detailed study, from the Bureau, from my understanding, are normally used for definite planned reports,

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Q Mr. Kersich, you mentioned that when the land classifiers were in the field they would record certain information on the aerial photos.

A That's correct.

Q Would they also record information elsewhere?

A Yes. They were furnished log forms, and these log forms they would put down the soils profile that they had examined, the results of their examination, the position of the tract with regards to where it sits on a terrace or where it sits on a creek bottom, river bottom, things of this nature, any potential problems they may have for surface and subsurface drainage both. There's a field test they conducted to determine texture that gives them some idea of the amount of clay that might be present which might alert them to drainage problems.

They record the color of the soil. All this information is placed on a log form.

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Q. (By Mr. Echohawk) Mr. Kersich, I show you what's been marked as United States Exhibit C-38. Would you describe that exhibit for us?

A. WRIR Exhibit C-38 is a soil texture triangle that was used by the land classifiers to determine textures, and it's a graphic representation of the different sizes of particles that may be located in a soils matrix, and it's a method of identifying those soils by common names, the development, its origin and source, what was -- it was developed by the United States Department of Agriculture for us in this type of work, any type of soils work.

Q. So whenever we are referring to the various textures such as sand or loamy sand, that information is basically derived from the soils triangle?

A. Well, if you know the percentages of soil in the sample that you are considering, know the percentage of silt, know the percentage of clay, you could locate your triangle and determine textural classification, yes.

Q. Mr. Kersich, I show you what's been marked as United States Exhibit C-39. Will you please describe for us what that exhibit is?

A. Yes, Exhibit C-39 is a composite of a number of aerial photographs put together into one township, and this particular township happens to be Township 4 North Range 2 West, the unit -- this particular township is located in the North Crow Heart Unit, and on there there is certain information that was put on by the land classifier.

The legend is supplied on the lower right-hand corner of that particular exhibit that explains what some of the marks are, what the notations are on each particular section within that township.

Q. The particular markings on the aerial photographs were put on there by whom?

A. The land classifier.

Q. Mr. Kersich, I show you what's been marked United States Exhibit C-40. Would you please describe for us what that is?

A. Exhibit 40 is a copy of one of our log sheets, and this particular log sheet relates to Section 13, Township 4 North, Range 2 West, and so you could find the location of this hole by examining C-39.

THE SPECIAL MASTER: You said "find this hole," did you say?

THE WITNESS: Yes, this is a log of a hole that was drilled by Mr. Olson in Section 13, Township 4 North, Range 2 West, sir.

Do you want me to locate that on there?

Q. (By Mr. Echohawk) Which is depicted on United States Exhibit C-39?

A. That's correct.

Q. Yes, if you want to explain where that is on there.

A. Okay. This hole -- this is Section 13. The location of the hole in the field is found up here (indicating), and it shows a number 4, and it's circled by two small circles.

If you look at the legend, that indicates that that's a log that was made by one of the HKM classifiers, and that particular sample was -- and that particular hole was sampled. In other words, samples were taken and sent to the lab for analysis.

THE SPECIAL MASTER: How many holes per township were made like this?

THE WITNESS: I don't have the record per township right here with me, sir. I do have -- we drilled a total of 671 holes. We had 357 holes which were five feet or less, 197 which were five

to ten feet, and then we had 117 holes which were 33 feet or less.

A. (By the Witness) Then the information that the land classifier developed in the field was put on here. One of the first things he was concerned about was slope, so he made a note here that the slope of this particular parcel went from three to seven percent, was a predominant gradient, but some was under.

To give you some idea what the surface was, it was gently undilating and rolling. There was alluvium and alluvial sand at the foot of a slope. The surface drainage was medium.

In other words, there was some surface drainage there, no particular problems.

Those surface fragments weren't of any concern so we didn't show anything about that. The present land use was sagebrush and grasses.

Then, as I said, he drilled the hole, and as he went through different textures, he would assign a depth of that particular texture so that he had --

THE SPECIAL MASTER: Was that a pounding well or a drilling rig or rotary --

THE WITNESS: This is a hand auger, a land

classifier's auger. It's about eight inches in height , as I recall. It has a six-foot rod, and you muscle power it down.

A. (By the Witness) All right, so then this particular hole he logged to 60 inches, and he had loam from zero to eleven inches. He had fine sandy loams from eleven to 24 inches. From 24 to 40 inches, he had fine sandy loam, and from 40 to 60 inches he had fine sandy loam.

There were some changes in the colors, and these colors would be used primarily, from my standpoint at least, to determine if we had any potential drainage problems there.

He analyzed the structure of the soil, how the soil was aggregated, and in this particular instance it was in the first -- for example, in the first eleven inches, it was weak structured granular to platey. The consistency of the soil when wet -- he takes a small sample in sand, and he wets it down to determine the consistency of the soil and the texture, and the consistency was nonplastic, and it was slightly sticky.

In other words, it didn't have very much in it from his standpoint.

The lime efflorescence he determines by taking a ten percent solution of hydrochloric acid, dropping some on the soil sample and seeing how it burns it or effloresces.

From his standpoint, the surface permeability was slower although he had slowed to -- and I don't get what the next number should be here.

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A (Continued) On the lower left-hand corner he had sample numbers that were assigned or put on the sample sacks; the soils are put in sacks for identification for lab work. The lab work -- it was worked up in the lab and then the results of that lab work are reported on this log here on the lower -- on the left-hand side of the sheet and in this first 11 inches, for example, the soil had a ph of 8.6 under a one to five dilution we call it, and 7.8 under a calcium chloride solution. This is just two different ways of determining the ph of the soil or the acidity of the soil. Settling volumes which are used to determine amount of sodium that might be present to give you problems were indicated underneath the ph's and so, for example, in the first 11 inches that particular sample of soil had a settling volume of 21.

The electroconductivity, which is a test of the salts that might be present in the soil, are reported on the right-hand side of the log. If you go down, there was just a trace of salt in the upper zones. As we get into it, more salts were present. Then what they call a sodium absorption

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ratio test was run to determine the ratio of sodium to magnesium and calcium and what potential problems, if any, might result there.

THE SPECIAL MASTER: Is that what the figure 4.3 on the bottom --

THE WITNESS: That's correct, that's the sodium absorption ratio, yes.

Q (By Mr. Echohawk) Mr. Kersich, is the standard soil profile log used by H.K.M. in their various land classification work?

A Yes, it is.

Q Were these type of logs filled out on all holes drilled on the Reservation?

A No. As I said before, in some instances probes were made to just ascertain that the information that had been collected on the log was similar and that there had been no change, no large change in soil profile or any of this type of thing.

Q And were all these soil profile logs subsequently sent on to the agricultural engineer that designed the irrigation system?

A Copies of these profiles and township maps that are on Exhibit C-39 were sent to the agricultural engineer.

Q Mr. Kersich, were any infiltration tests run of the various lands within the six study areas?

A Yes, we made 11 infiltration tests and there were -- an infiltration test, if I might define it, is a test made to determine the capability of the surface soils to absorb water. That's information the Ag engineer needs.

Q What, were the results of those tests then sent onto the agricultural engineer?

A Yes, they were.

Q Okay, you mentioned in, I think it is, the third section of this land classification standard that deals with the topic of drainage; was specific work done by H.K.M. concerning drainage?

A Yes, we had a specific program that was developed to give us answers as to the problems with internal drainage, and let me differentiate at this point, that when I'm talking about drainage there are two types of drainage and we've got the surface drainage, the lay of the land type of things, things of this nature and then we've got to worry about the internal drainage, the problem with the soil getting -- soil profile getting full of water. And for what I'll be describing now, will be the

internal drainage.

Q Okay. Now the drainage work done by H.K.M. is just -- is that merely an input into the land classification standard?

A Yes.

Q H.K.M. did not design any actual drainage systems, did they?

A No.

Q Could you describe for us what type of work went into this, into the drainage considerations?

A Basically what we wanted to do was to determine what the hydraulic conductivity of the soils were and what the depth to barrier is. And depending on information given to us by the land classifier, the drainage engineer went out in the field and drilled various areas to determine where a barrier might be. And now when we talk about barrier, we are not talking about just a rock formation, we are talking about something which may have a hydraulic conductivity one-tenth or less of the weighted average of the soils above it. So if you were to, in a soils profile for example, have a sand, sandy loams or loamy sands, then all of a sudden come upon a clay layer or a loamy -- or a

clayey loam and find though that's it's hydraulic conductivity was less than one-tenth or less than the materials above, we consider that a barrier, it inhibited the flow of water.

So he did two things then, he drilled holes some as I said were land classification estimates, some were his review of the geological maps of areas that indicated there may be some problems, and some based on his own knowledge of land forms on this type of work to try to determine where the barrier was.

Now, he didn't get to barrier at all times, sometimes he got to barrier very quick. In other words, he found there were sandstone barriers, things of this nature which occurred and created a serious problem. Then the other thing that he did along with this, he logged each hole. Each one of these holes was logged and they were drilled by the way, with a power auger. We are talking about a different drilling e-

THE SPECIAL MASTER: A power auger or a power drill?

THE WITNESS: Power drill. We refer to them as an auger because they are auger-type drills.

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A But anyway. They were all logged and he determined the textures that might be potential problems for him. Later on we went back and tested a number of different soils textures for hydraulic conductivities and, I believe, we ran 22 hydraulic conductivity tests and that test is a field test where you drill the hole, you isolate the particular zone that you're concerned about and then you put water in the hole because in this particular project we didn't have, as I recall, I don't recall one log that we had a groundwater problem. In other words, there isn't any groundwater out there within the distance we were checking. So then the hydraulic conductivity tests were taken and certain hydraulic conductivities were assigned to various soils classifications.

Q Soils classifications?

A I mean soils textures. One thing, each of the holes where we textured, as I recall, we did a mechanical analysis to confirm the textures.

Q Now, was there any drain spacing analysis run?

A Yes, and --

Q And why was that necessary?

A Well, earlier I testified about there were three

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things we were concerned about with drainage: Number one we were concerned about depth to barrier, the hydraulic conductivity and the potential spacing of drains and the drain spacing is primarily an economic factor. So for these specifications we used a minimum drain spacing of 200 feet. In other words, if our log or our studies of an area indicated that we had a hydraulic conductivity fairly low, a depth to barrier where the barrier was fairly high, then we would need drain spaces closer than 200 feet. Then we threw that land out as potentially arable. It wasn't given any further consideration then.

THE SPECIAL MASTER: You threw it out because it was not potentially arable?

THE WITNESS: Oh, let me -- may I say that --

THE SPECIAL MASTER: You just said we threw it out as potentially arable.

THE WITNESS: Yes, we didn't consider it any further as far as arability. It was not arable.

THE SPECIAL MASTER: Very good.

Q (By Mr. Echohawk) Now, Mr. Kersich, does that cover generally all of the work done in the drainage portion of the land classification?

A Other than the work that would have been done in the office where these results would have been then plotted against the various land classifications to see whether drainage was indeed a problem, and if it was the classification may have been changed.

Q You mentioned that previously, that certain soils were sent to the laboratory for work on certain samples. Could you please briefly describe for us the testing program?

A Okay. We have five basic tests that we used in this endeavor. Number 1, we were concerned about the ph or the acidity of the soil, whether it is acid or basic, and Number 2 we were concerned about the electroconductivity which was a test of the salts that were present. Number 3, we had what I call sodium absorption ratio, we determined a ratio of those salts, you make a ratio of the sodium versus the calcium and magnesium and that will give you some idea of the permeability problems you may get into. The forth test -- that is the forth one, I believe, was settling volumes and this is a test that is used to determine the amount of fines and the

dispersable sodium that you might have present in a soil matrix and a final test that we did, a mechanical analysis which determined the particle size of the matrix and what texture it is actually.

Q Mr. Kersich, where were the laboratory tests run?

A They were run in our own laboratory in Billings.

Q Would you, in your opinion, say that that's a reliable lab?

A Yes.

Q And how do you know that?

A Well, one of the things we do to -- I had done a this project, I ran some samples, I took samples from the samples that we kept -- we keep all of those samples until the project is completed. I we randomly selected some samples and I had them retested and basically it is just quality control.

Q Mr. Kersich, were the results of the laboratory tests sent to the agricultural engineer?

A Yes, and they were also placed on the bar forms that I described previously.

Q Mr. Kersich, now let's see, we have accumulated the field data for the land classification, the drainage information, and the laboratory data.

what was done with all of this information?

A Basically, the first place the information went was to the land classifier to Chick Smith, as Chick served as our chief of party on this particular project, and then a review was made of the particular classifications that person had placed on tracts predicated on all of the other information that had been developed. At that point in time, changes may have been made in boundaries or lands classed -- the land class may have went up, it may have went down, or it may have went to nonarable.. This was all put on these particular -- it was put on the photographs and these township plats that I referred to previously. After that, then the results were as I said, mapped and tabulated. We planimetered the various tracts and then tabulated the class 1, 2, 3, 4, soils and then finally there was additional reviews that were ongoing through the summer of '80 and this fall, where we went out and checked some of the results of the land classifier's work and reviewed the maps and tried to make sure that the maps, that the information we had collected represented the information that was out in the field.

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Q And were you personally involved in any of the review process?

A Yes, I was.

Q And how so?

A Well, I went through all of the logs, I went through the maps, I went out in the field with, in this particular instance, Ross Waples because Chick was having some other problems and I even put down a half dozen or so probes myself to see whether the information was accurately represented on the logs.

Q And what was done with the information once the land classification was finally arrived at?

A Well, basically we arrived at what is a final concensus of everyone's opinion on these various tracts, a final classification was established and that information then in final form, was all put together and sent to the agricultural engineer for work in his designs.

* * * * *

END

MR. ECHOHAWK: Your Honor, could we take a brief recess so I could get two larger maps?

THE SPECIAL MASTER: Very well.

MR. ECHOHAWK: They're just out in the hallway.

(Thereupon a five-minute (recess was taken.

THE SPECIAL MASTER: Proceed.

Q. (By Mr. Echohawk) Mr. Kersich, I direct your attention to the large maps leaning against the wall there. I think those are United States Exhibit WRIR C-41 and 42. Would you please describe those exhibits for us.

A. WRIR C-41 is an exhibit entitled Arable Sprinkler Lands in Selected Study Areas. What's depicted on this particular exhibit is the outline of the Reservation, the outline of the study areas, the lands that were found to be arable within each study area predicated on sprinkler irrigation and the classification of the various tracts of lands. The classification can be determined by looking at the legend in the lower left-hand corner where Class 1 lands are depicted in yellow, Class 2 lands are green, Class 3 lands are in blue and Class 4 lands are in brown.

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WRIR Exhibit C-42 is entitled Arable Gravity Lands in Selected Study Areas, and basically they portray lands that were found arable under gravity methods of irrigation in each study area.

THE SPECIAL MASTER: Would you distinguish for me on each two of these exhibits, distinguish what constitutes a piece of land that you determine is arable on C-41 that's sprinkler land and make it different from that land that was classified as arable land on the gravity exhibit 42.

THE WITNESS: Okay, sir. One -- they were classified under two sets of standards, there were a dual set of standards. And the standards for sprinkler irrigation, for example, in the slope are more relaxed, it's easier to irrigate deeper lands with sprinkler systems than it is with a gravity system, and consequently lands were found arable in many instances under sprinkler irrigation that were not arable under gravity irrigation because they might have been too steep.

Now, to put this in relationship, as I recall, without looking at the standards directly under gravity, I believe we could go only up to about an eight percent slope maximum. Let me check that

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if I might.

That's correct. Class 3 and 4 lands we had a maximum slope of eight percent. Under sprinkler application we had a maximum percentage of 20 percent under those lands. So let's say that the soil characteristics were reasonable, there were no chemical problems, there were no drainage problems. The only difference was the slope of the ground, if it exceeded eight percent it may have met the sprinkler classification.

THE SPECIAL MASTER: Did you input from other specialists, bear on whether or not there was any water under the lands that you think are sprinkler arable?

THE WITNESS: No, sir, not at this time.

THE SPECIAL MASTER: It doesn't do very much for strengthening your exhibits, in my opinion.

THE WITNESS: These are two different questions.

THE SPECIAL MASTER: I appreciate that.

Q. (By Mr. Echohawk) Mr. Kersich, perhaps we should clear up this point.

A. Okay.

Q. Now, in the land classifications that are reflected on exhibits, I think they are 41 and 42, your

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determination of arable lands based on sprinkler standards, now, is that land classification only?

A. That's land classification only, that's correct.

Q. And as far as a subsequent determination of irrigability that is to be made on certain parcels, that was not done by you, was it?

A. That's correct.

Q. And such things as method of obtaining water or getting water to the land was information or a topic addressed by an additional expert for the United States?

A. That's correct. Water availability, method of application, things of this nature are addressed by others.

Q. So it's only whether or not the lands will support or sustain long-term irrigation?

A. That's the question here, yes. This is the answer to the question.

Q. Is that the only thing that you address on your arables -- arability determination?

A. Within the study areas, that's correct, yes. We established study areas, that's correct.

Q. Mr. Kersich, have you prepared a report as a result of the land classification work done on

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the six study areas that we've discussed today?

A. Yes, I have.

Q. Mr. Kersich, I think you have a copy of United States Exhibit C-43.

A. Yes, I do.

Q. Would you please identify that for us.

A. This is a report entitled Land Classification of North Crow Heart Unit, South Crow Heart Unit, Big Horn Flats Unit, Riverton East Unit, Owl Creek Unit and Arapahoe Unit. And it's the report of the work that we accomplished, the description of the methodology and the tabulation of the results.

Q. Mr. Kersich, does land classification that's reflected within this report, Exhibit C-43 and on the maps contained therein, is this land classification work only on undeveloped lands?

A. This is correct. This study only covers those lands which are trust lands and have not been irrigated or are not being irrigated. These lands are basically in raw range form at this time.

Q. Mr. Kersich, do you know whether or not later on in this trial testimony will be presented regarding land classification of areas that have been

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irrigated in the past?

A. There will be, yes.

Q. So there will be additional land classification information presented?

A. That's correct.

Q. Mr. Kersich, I direct your attention to Exhibit, United States Exhibit C-43. I believe there's two tables located near the back that would be found on page 26 and 27, I think.

MR. WHITE: Your Honor, I would object to the witness testifying from the exhibit until it's been offered and admitted. If he is doing it just to identify what it is, I have no objection.

THE SPECIAL MASTER: Let's hear what the question is going to be.

Q. (By Mr. Echohawk) Mr. Kersich, would you please indicate what information is reflected on Table 7 found on page 26?

THE SPECIAL MASTER: Go ahead.

THE WITNESS: Okay?

THE SPECIAL MASTER: Yes, he can tell us what he thinks it is.

THE WITNESS: All right. This exhibit or this table is called or defined as arable lands by class,

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and there are two methods that we identify classes.

THE SPECIAL MASTER: You can't go into methodology -- you can tell what it is -- until we get it admitted.

THE WITNESS: All right, sir.

THE SPECIAL MASTER: Just tell what it is like you were asked.

THE WITNESS: And it shows the total that we found in the various classes under each system of irrigation.

Q. (By Mr. Echohawk) That would be sprinkler and gravity?

A. Sprinkler and gravity, that's correct.

Q. And that shows the total for each method?

A. It shows a total by unit and then eventually the total for each method, yes.

Q. And I direct your attention to table 8 found on page 27. Would you tell us what is found on that table.

A. Okay. On Table 8, it's entitled Summary of Arable Lands by Class. It's broken down into gravity systems, additional sprinkler and total arables.

Now, additional sprinkler are those lands which we have found to be, that weren't covered by

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any gravity system but could be irrigated by sprinkler system. So -- And then the final right-hand columns are the total arable lands by class by unit and eventually we come to a total of arable lands of all the units that we were considering under this study.

* * * * *

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Q (By Mr. Echohawk) Within Table 7 and 8, do those reflect the acreage results of your land classification studies?

MR. WHITE: Objection, Your Honor. Testifying from the exhibit, not telling what it is.

THE SPECIAL MASTER: Well, is there a column on these exhibits regarding total acreage?

THE WITNESS: Yes, there are.

THE SPECIAL MASTER: All right. What they contained is --

Q (By Mr. Echohawk) Mr. Kersich, found in the back of the report I believe are a series of maps; is that correct?

A That's correct.

Q And what type of maps are those?

A These maps are smaller versions of the various exhibits we have been discussing.

We have a map, for example, of the North Crowheart Unit that shows the locations of the class of lands within that unit under gravity land classification. We would have a similar map that would show the location and the various classes we put on the land for the sprinkler classification system for the North Crowheart

Unit, and then we can go through each one of the units that are described on the large exhibits and a copy of what appears on that appears in scale here showing the location of the lands within the unit and the classification of those particular lands.

Q And this information is broken down by particular study area such as the North Crowheart Unit?

A That's correct. They are by study area and by both gravity -- there's a map for gravity and a map for sprinkler system classification.

Q Mr. Kersich, I direct your attention to United States Exhibit C-44. Would you please describe for us what this exhibit is?

A C-44 is a depiction of the North Crowheart area, gravity land classification map. It is basically a large scale blowup of the information that would appear on C-42, which is entitled, "Arable Gravity Lands(In Selected Study Areas)."

This is taking the North Crowheart area out by itself. It's locating the arable lands on that map and then breaking down the arable lands by the various classes that were placed upon it, 1, 2, 3, or 4.

THE SPECIAL MASTER: You say 1, 2, 3, or 4 in classes. I see that the yellow is Class 1; is that right?

THE WITNESS: Yes.

THE SPECIAL MASTER: And the green is Class 2; is that right?

THE WITNESS: That's correct.

THE SPECIAL MASTER: Those that you have painted in as blue you call Class 3; is that right?

THE WITNESS: That's right, sir.

THE SPECIAL MASTER: Show me some Class 4 on that map. You are going to have to have a magnifying glass? Now, you are going to go up and point to some minute sections right here?

THE WITNESS: No sir, just this one right here (indicating).

THE SPECIAL MASTER: Would you call that a minute section?

THE WITNESS: Yes sir, but it wasn't here and there.

THE SPECIAL MASTER: What is the percentage of that land to the rest of the land --

THE WITNESS: There's six acres there that is Class 4.

THE SPECIAL MASTER: What is the total acreage on that exhibit, 46,649? Six of which is 4, and you give it the benefit of a separate classification and put it on the map?

THE WITNESS: We weren't sure where this particular boundary was at the time we were out classifying lands and at the time there was a large block of --

THE SPECIAL MASTER: I don't care for your classifications. The exhibit speaks for itself.

Q (By Mr. Echohawk) Mr. Kersich, Exhibit C-44, is that merely an enlargement of the individual map contained in the back of the report?

A That's correct.

Q And similar maps have been prepared on this same scale; is that correct?

A Similar maps have been prepared for each unit, yes.

Q And for gravity and sprinkler?

A And for gravity and for sprinkler.

Q Now, Mr. Kersich, before we offer United States Exhibit C-43 into evidence, I direct your attention to I believe it's Page 22. Do you have a correction to be made on Page C-22?

A Yes, I do. At the top of the page in the second

line there's a figure of 84,579 undeveloped acres. That figure should be corrected to 84,469.

Q Mr. Kersich, in the past couple of weeks have you conducted a final review process of the maps and the areas that were classified --

A Yes, I have.

Q And were certain corrections to those maps and classifications given to the State of Wyoming?

A To the best of my knowledge, they were, yes.

Q Now, is there one additional correction that was probably not given to the State of Wyoming?

A That's correct.

Q And is that in the Arapahoe Unit?

A That's in the Arapahoe Unit.

Q Could you please tell us what that correction is and point out where it is?

A Okay. In the review process we found one piece of land that had been included as arable of 110 acres, and in my determination, it was not arable and, therefore, we changed the totals to reflect 110 acres less in that particular unit and removed that parcel from our maps and our exhibits.

Q Mr. Kersich, then each of the maps prepared by HKM reflecting the overall reservation and each

individual unit, do they reflect the acreages and the classifications for each?

A Well, at the scale we are working, they are as close as possible to the actual acreages, yes.

Q Are these acreage figures accurate to the best of your knowledge?

A To the best of my knowledge, they are, yes.

Q Do they reflect the land classifications done by the people at HKM Associates working under you?

A Yes, they do.

Q Do these maps and tables reflect your professional opinion regarding arable lands depicted thereon?

A Yes, they do.

MR. ECHOHAWK: Your Honor, I move United States Exhibits 34,35, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, --

THE SPECIAL MASTER: You lost me after 44. I haven't seen 45, 46, 47, and 51 yet.

MR. ECHOHAWK: Excuse me. My mistake.

THE SPECIAL MASTER: I would kind of like to make sure we have got what we have. Why don't you go back to the beginning, Tom, and I'll drop each one as you talk about it? It began with 34.

MR. ECHOHAWK: 34 would be the resume.

THE SPECIAL MASTER: Okay. 34.

MR. ECHOHAWK: And 35 would be the map entitled, "Study Area Land Base," the large map that was --

THE SPECIAL MASTER: That's behind there?

MR. ECHOHAWK: That's right.

THE SPECIAL MASTER: All right. Exhibit 35.

MR. ECHOHAWK: I believe 36 was admitted.

THE SPECIAL MASTER: 36 was the three-page land classification study, and that was admitted.

MR. WHITE: I think it was admitted subject to some reservation.

THE SPECIAL MASTER: Okay, two items in it, okay.

MR. ECHOHAWK: 37 would be the single sheet showing the map symbols.

THE SPECIAL MASTER: The map symbol code.

MR. ECHOHAWK: 38 would be the soil triangle. 39 would be the composite aerial photograph.

THE SPECIAL MASTER: Yes. You don't have copies of these except as they are contained in the jacket of 43; is that right?

MR. ECHOHAWK: That's right.

THE SPECIAL MASTER: Okay, Tom. Go ahead.

MR. ECHOHAWK: Exhibit 40 would be the individual soil log.

THE SPECIAL MASTER: All right.

MR. ECHOHAWK: Exhibit 41 would be the large map there leaning against the wall entitled, "Arable Sprinkler Lands, Selected Study Areas."

THE SPECIAL MASTER: 41 and 42. I see 42 is arable gravity lands.

MR. ECHOHAWK: Right, Exhibit 43 would be the report entitled, "Land Classification of North Crowheart Area, South Crowheart Area, Big Horn Flats, Riverton East, Owl Creek, and Arapahoe Units." And then Exhibit 44 that we identified is the large individual map of the North Crowheart gravity.

THE SPECIAL MASTER: Okay. That's all that's been offered so far and identified.

Do you want the voir dire now?

MR. ECHOHAWK: What I need to do is we prepared individual exhibits such as this that have been numbered in sequence for each of the individual units for gravity and for sprinkler,

and those are the same maps that are found in the back of Exhibit 43. Did you want me to go through each one of those?

THE SPECIAL MASTER: Do you want to offer those now in evidence?

MR. ECHOHAWK: Yes, I do.

THE SPECIAL MASTER: Proceed. We'll have a --

MR. ECHOHAWK: Do you want me to identify each particular --

THE SPECIAL MASTER: I would like you to identify anything beyond 44.

MR. ECHOHAWK: All right. Exhibit 45 would be --

THE SPECIAL MASTER: And I would like to see it.

MR. ECHOHAWK: All right.

MR. WHITE: I think the witness ought to identify the exhibit if it's going to come in through him.

THE SPECIAL MASTER: I suppose he will if we give him a chance, but you're right.

Q (By Mr. Echohawk) Mr. Kersich, would you identify Exhibit 45 for us, please?

A Exhibit 45 is the North Crowheart area, sprinkler land classification map, and depicted on that is the boundaries of the North Crowheart study area and located within that map are various tracts of land that we classified and assigned a classification to.

The same legend is on this map that is on the others. The same color designation of each class of land is the same as on the others and the only difference is that this is the result of the sprinkler land classification program and the previous exhibit, 44, was the result under the gravity land classification program.

THE SPECIAL MASTER: Once again, I think I can comment on the fact you are in a rut. Once again, you end up in Class 4 where you still have six acres out of a total of 44, 382 acres. Why do you bother with a classification of 4?

THE WITNESS: Well, sir, engineers are precise, and I assumed that when we go out and do something, if we found it, we report it.

THE SPECIAL MASTER: Engineers are precise, but land is land, and there's massive amounts and also textures, and you are testifying as an expert

that there are 2,555 acres of land that fit the definition and the criteria of Class 3 land as you have described what it is in your exhibits and you offered for evidence?

THE WITNESS: Yes.

THE SPECIAL MASTER: And yet you insist that none of that could be Class 4 lands under your class for distinction? You want reasonable men to believe that?

THE WITNESS: That's the results of the work that we did in the field, sir.

THE SPECIAL MASTER: Okay. I hear what you say. Go ahead.

MR. ECHOHAWK: May we have Exhibit 46?

THE SPECIAL MASTER: Reasonable men and women, since this is a society -- take that out, please. We have enough troubles in the record.

A (The Witness) This map is entitled, "South Crowheart Area, Gravity Land Classification Map." It depicts the South Crowheart study area, and located within that study area it shows the location of tracts that are irrigable, and again the land is classified as 1, 2, 3, or 4. The same color scheme is used to denote the various classes of land on the legend

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and within the tracts.

Q (By Mr. Echohawk) And this is Exhibit C-46?

A Right, it's entitled C-46, WRIR C-46.

MR. ECHOHAWK: Could we have Exhibit C-47?

A (The Witness) This is a map that -- this exhibit is entitled WRIR C-47. It's the South Crowheart area and it depicts the lands that were classified in the sprinkler classification system -- basically, it depicts the same as the other map or the other exhibit, the previous exhibit. It shows the study area outlined, and it shows the lands that were deemed arable under the sprinkler land classification system, and those lands are colored by the class that was assigned to the lands.

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Q Could we have Exhibit C-48? Would you please describe our exhibit for us?

A Exhibit C-48 is an exhibit of the Big Horn Flats study area and it is the gravity -- it is the results of the gravity lands classification program within that study area. It contains the tracts of lands located where they were examining the area -- or where they are located in the area and the various colors are used again to describe the class of lands or the results of the classification program and the class of lands.

Q Exhibit C-49?

A Exhibit C-49 is the Big Horn Flats study area once more. It is the sprinkler land classification results. Again, it depicts study areas and it depicts the lands found within those areas to be arable and the classification of the lands or the class of lands is found by the same color legend that we had used previously.

Q Would you please describe United States Exhibit C-50 for us?

A Exhibit C-50 is entitled Riverton East. It is the Riverton East study area, it is the results of the gravity land classification system study

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within that area. The lands that have been judged arable have been located within the area and the class that was assigned to them by us, again, is by the same color scheme that we used on the other exhibits.

Q Would you please describe for us United States Exhibit C-51?

A C-51 is the Riverton East area. Again, it's the results of the sprinkler lands classification study. The tracts of land found arable are located within that area. And the classification assigned to each tract of land is as per the color methods for identification that we used previously.

THE SPECIAL MASTER: Would you lift that last one again? Let's look again for a minute, please.

Yeah. Thank you for that.

Q Exhibit C-52.

A Exhibit C-52 is the Owl Creek area study area, and it's the sprinkler land classification map for that area. It depicts the lands that were declared arable or deemed arable in the area and they are described by classification by the same color system used on the other exhibits.

Q Mr. Kersich, was there a gravity land classification map prepared for the Owl Creek study area?

A No, there was not.

Q Why not?

A Simply because we didn't find any land that met the land classification standards as far as gravity systems.

Q All right. Would you please describe Exhibit C-53, please?

A C-53 is the Arapahoe area. It's the results of our gravity land classification study. It depicts the study area located within that study area, the various tracts of land found arable under those standards and the classification of the lands is given the same color scheme that I described on the other exhibits.

Q And finally, would you describe Exhibit C-54 for us?

A C-54 is the Arapahoe area also. It is the results of the sprinkler land classification study. It depicts the area, the outline of the area, and it gives the location of tracts of land within that area that were found to be arable and the

classification of those lands is given by the same color system that we used on the other exhibits.

THE SPECIAL MASTER: I am going to find it difficult to abstain from commenting on the fact that if all of the irrigable by sprinkler lands which you have testified, which from earlier evidence of other experts we find in the alluvium of the Wind River, were to be irrigated by the sprinkler systems that you say they can be, because they are arable, the river will be dried up in a matter of a few decades, if not at most a century or so. Because the testimony is that in order to stay alive and be charged, the alluvium of the Wind River must have a live river in its -- passing down. Without the live river, it dries up the alluvium; and if all of this were to be put under sprinkler system, to which you have testified, there will be no more Wind River. I know that's not your department, although you do say it is arable and the irrigable lands, but I've got to pull all this together in my little head one of these months and I'll welcome from all parties some evidence assimilation of certain expertise now

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coming into this case.

MR. SACHSE: Your Honor, may I -- I suppose the time will come soon when the Tribes are able to voir dire on these, but I wanted to -- I suppose this is -- perhaps I should wait to voir dire. I have a comment I want to make and a question.

MR. ECHOHAWK: Would you --

THE SPECIAL MASTER: Tom wants you to wait.

MR. ECHOHAWK: I have some further questions.

THE SPECIAL MASTER: I could not resist making that observation. The trial is coming to an end, thank God, and we're coming into the integration of these very important evidences and sooner or later we have to have those things, I know.

MR. SACHSE: May I respond on your observation? I just wanted to respond to your observation. I think there is a misunderstanding that, as I understand Mr. Kersich's testimony, and I hope this will be straightened when he says something is possible by sprinkler irrigation, that does not infer that it would be irrigated from groundwater. A great deal of sprinkler irrigation is done from surface diversions.

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THE SPECIAL MASTER: Well, that is an important matter.

MR. SACHSE: There has been no assumption that sprinkler means groundwater --

THE SPECIAL MASTER: My first question this morning was, on a center pivot sprinkler, and there's only one kind of center pivot sprinkler that I know of in this day in society, that is a deep well with a pump in it that pumps -- now, if that's in error, we better correct it right now.

MR. ECHOHAWK: Your Honor, perhaps through the witness --

THE SPECIAL MASTER: All right, Mr. Witness, would you clarify what I just said?

THE WITNESS: Sure.

THE SPECIAL MASTER: Or correct it.

THE WITNESS: The water source for the center pivot sprinkler can be ditches, it can be gravity diversion from the river, anything of this nature.

THE SPECIAL MASTER: All right.

THE WITNESS: In fact, most of them, what they are, as a matter of practice in the Wyoming area, there are some that I saw out there a week

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ago, not quite a week ago, that were irrigated from wells, wells located right along side the ditch. So I expect what they are really doing is drawing water right out of that ditch, but they are drawing it through groundwater methods, but I would say of all of the work we have done, and we have done about 10,000 acres of sprinkler lands, there are only two, about 1,200 acres that we irrigated from groundwater, the rest of them were from pumping like a source like the Yellowstone River, if you're familiar with our country up there at Hysham we pump out of the river there, pump about 190 feet to the bench located directly above the river and then canal the water to various pumps where we pressurize it or pump it back through a pipe and up through a pivot.

THE SPECIAL MASTER: Then you again pump it for the sprinkler --

THE WITNESS: Yes, sir, that's right.

THE SPECIAL MASTER: That's called efficient irrigation?

THE WITNESS: Well, the type of lands that they are using there is very good land.

THE SPECIAL MASTER: We'll come to that.

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THE WITNESS: And the returns are there, sir.

THE SPECIAL MASTER: I suppose the economics is in the crop and its yield.

THE WITNESS: That's correct.

THE SPECIAL MASTER: All right. I'm glad we're going to enter this because it eliminates one area of conflict in my mind, and that was that I heretofore I had always felt that a center pivot sprinkler, in Wyoming, was groundwater only -- was groundwater only and not surface water, and you have made that distinction that that's not necessarily so. It can be either.

THE WITNESS: It can be either.

THE SPECIAL MASTER: All right. Thank you all for that.

MR. ECHOHAWK: Your Honor, perhaps it would help me if we went ahead and took the lunch break now and then I could see if there's anything else I need before we turn it over to Mr. White.

THE SPECIAL MASTER: All right. Is 1:30 still satisfactory for the lunch break?

MR. ECHOHAWK: That's fine.

THE SPECIAL MASTER: All right. We'll stand in recess until 1:30.

(Morning session recessed at (11:54 a.m.

end 12