ORIGINAL

UNITED STATES
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF: **DOCKET NO:** 50-346-ML

TOLEDO EDISON COMPANY, et al.

(Davis-Besse Nuclear Power Station)

LOCATION: SANDUSKY, OHIO **PAGES:** 1 - 259

DATE: TUESDAY, AUGUST 5, 1986

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

IN THE MATTER OF:	
TOLEDO EDISON CO., ET AL.	DOCKET NUMBER 50-346-ML
(DAVIS-BESSE NUCLEAR POWER STATION)	

SANDUSKY HIGH SCHOOL
ROOM 300
2130 HAYES AVENUE
SANDUSKY, OHIO

TUESDAY, AUGUST 5, 1986

THE HEARING IN THE ABOVE-ENTITLED MATTER CONVENED AT 9:30 A.M.

BEFORE:

JUDGE HELEN F. HOYT, CHAIRMAN
JUDGE J. R. KLINE
ATOMIC SAFETY AND LICENSING BOARD
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

APPEARANCES:

ON BEHALF OF LICENSEE, TOLEDO EDISON CO.:

JAY E. SILBERG, ESQ.
DAVID R.A. LEWIS, ESQ.
SHAW, PITTMAN, POTTS & TROWBRIDGE
1800 M STREET, N.W.
WASHINGTON, D.C. 20036

PRESENT:

TED MYERS, DIRECTOR OF LICENSING, TOLEDO EDISON CO.
KENNETH MAUER, LEGAL DEPARTMENT, TOLEDO EDISON CO.

ON BEHALF OF THE STATE OF OHIO, LEAD INTERVENOR:

ANTHONY J. CELEBREZZE, JR., ESQ.
ATTORNEY GENERAL OF OHIO

BY JACK A. VAN KLEY, ESQ.
SHARON SIGLER, ESQ.
ASSISTANT ATTORNEYS GENERAL
STATE OFFICE TOWER
30 EAST BROAD STREET, 17TH FLOOR
COLUMBUS, OHIO 43215

BY EDWARD LYNCH, ESQ.
ASSISTANT ATTORNEY GENERAL
O.D.N.R., DIVISION OF WILDLIFE
FOUNTAIN SQUARE, BUILDING C
COLUMBUS, OHIO 43224

ON BEHALF OF THE TOLEDO COALITION FOR SAFE ENERGY:

TERRY LODGE, ESQ.
TOLEDO, OHIO

ON BEHALF OF S.O.S. AND THE CONSUMERS LEAGUE OF OHIO:

GENEVIEVE COOK
ARNOLD GLEISSER
DOROTHY AUSTIN
CLEVELAND, OHIO

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- - -

JUDGE HOYT: THE HEARING WILL COME TO ORDER. THIS CASE DEALS WITH DOCKET 50-346-ML, MEANING MATERIAL LICENSE, FOR THE TOLEDO EDISON COMPANY, DAVIS-BESSE NUCLEAR POWER STATION, UNIT ONE.

THE ADMINISTRATIVE JUDGES PRESENT HERE THIS MORNING ARE JUDGE HELEN F. HOYT -- THAT'S ME -- AND JUDGE JERRY KLINE, WHO IS THE SCIENTIFIC ADVISOR IN THIS PROCEEDING. JUDGE KLINE IS AN ENVIRONMENTAL SCIENTIST.

THE LICENSEE, TOLEDO EDISON AND CLEVELAND ILLUMINATING ELECTRIC COMPANY -- CORRECTION -- THAT'S ILLUMINATING COMPANY -- FILED A REQUEST FOR APPROVAL OF A PROCEDURE FOR DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE ON JULY 14, 1983 AND SUBMITTED SUPPLEMENTAL INFORMATION TO THE COMMISSION, NUCLEAR REGULATORY COMMISSION, ON JULY 30TH, 1984, AND AGAIN ON JANUARY 29, 1985. REQUEST FOR APPROVAL WAS SUBMITTED PURSUANT TO 10 CODE OF FEDERAL REGULATIONS 20.302.

ON OCTOBER 9, 1985, THE U.S. NUCLEAR REGULATORY COMMISSION PUBLISHED IN THE FEDERAL REGISTER A NOTICE OF ISSUANCE OF AMENDMENT TO

FACILITY OPERATING LICENSE AND FINAL DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION AND OPPORTUNITY FOR HEARING. IN THIS NOTICE THE COMMISSION REACHED DECISIONS ON AMENDMENTS TO LICENSES OF SEVERAL NUCLEAR POWER REACTORS INCLUDING THE DAVIS-BESSE POWER STATION LOCATED IN OTTAWA COUNTY, OHIO, WHICH IS THE SUBJECT OF THESE HEARINGS WHICH ARE ABOUT TO BEGIN. IN THE NOTICE, THE COMMISSION MADE ENVIRONMENTAL ASSESSMENTS CONSIDERING THE IDENTIFICATION OF THE PROPOSED ACTION AND THE NEED FOR THE ACTION. IN IDENTIFYING THE PROPOSED ACTION, THE COMMISSION DESCRIBED IT AS FOLLOWS, AND I QUOTE:

"THE LICENSEE PROPOSES TO DISPOSE OF PERIODIC LOW-LEVEL RADIOACTIVE DREDGINGS FROM THE ON-SITE SETTLING BASINS ONTO LAND OWNED BY THE TOLEDO EDISON COMPANY. UNDER THE PROPOSED METHOD, TOLEDO EDISON WOULD CONTINUE THE CURRENT PRACTICE OF TRANSFERRING EACH YEAR APPROXIMATELY 1,000 CUBIC FEET OF RADIOACTIVELY CONTAMINATED SECONDARY-SIDE CLEAN-UP RESINS AND ABOUT 5,800 CUBIC FEET OF NONRADIOACTIVE WASTE FROM THE WATER TREATMENT FACILITY TO ON-SITE SETTLING BASINS. ABOUT SIX TIMES OVER THE REMAINING OPERATING LIFE OF THE FACILITY, THAT IS ABOUT ONCE EVERY FIVE

YEARS, THE SETTLING BASINS WOULD BE DREDGED AND THE REMOVED MATERIAL WOULD BE DISPOSED OF ON LAND, AT A MINIMUM THICKNESS OF TWO FEET, COVERED WITH FOUR INCHES OF CLEAN SOIL, AND SEEDED." END OF QUOTE.

ON THE NEED FOR THE ACTION, THE COMMISSION FOUND THAT THE OFF-SITE DISPOSAL AT A LICENSED RADIOACTIVE WASTE SITE WOULD REQUIRE THAT THE DREDGED RESINS BE FURTHER PROCESSED, PACKAGED AND TRANSPORTED TO THE DISPOSAL SITE. THESE EFFORTS WOULD RESULT IN A CERTAIN LEVEL OF PERSONNEL EXPOSURE TO RADIOACTIVE MATERIALS WHICH WOULD BE UNAVOIDABLE. THE COMMISSION FOUND THAT THE PROPOSAL COULD REDUCE TIME AND EFFORT OF PLANT PERSONNEL IN RADIATION AREAS AND BE LESS COSTLY THAN OFF-SITE DISPOSAL AT BURIAL SITES.

IN REACHING ITS DECISION ON THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION, THE COMMISSION CONSIDERED ITS STAFF'S REVIEW AND REACHED TWO CONCLUSIONS, AND I QUOTE:

ONE: "THE DOSES TO MEMBERS OF THE PUBLIC AS A RESULT OF EXPOSURE TO RADIATION FROM THE DISPOSED DREDGINGS WOULD BE WELL BELOW REGULATORY LIMITS AND VERY SMALL IN COMPARISON TO DOSES MEMBERS OF THE PUBLIC RECEIVE EACH YEAR FROM

EXPOSURE TO NATURAL BACKGROUND RADIATION. AT THE TIME OF DECOMMISSIONING OF THE NUCLEAR POWER PLANT, THE LAND ON WHICH THE SLUDGE IS DISPOSED IS CAPABLE OF BEING RELEASED FOR UNRESTRICTED USE."

SECOND: "THE LICENSEE HAS TAKEN APPROPRIATE STEPS TO ENSURE THAT OCCUPATIONAL DOSES WILL BE MAINTAINED AS LOW AS IS REASONABLY ACHIEVABLE AND WITHIN THE LIMITS OF 10 CODE OF FEDERAL REGULATIONS PART 20." END OF QUOTE.

THE COMMISSION THEN MADE ITS FINDINGS OF NO SIGNIFICANT IMPACT CONCLUDING THAT THE PROPOSED ACTION WILL NOT HAVE A SIGNIFICANT EFFECT ON THE QUALITY OF HUMAN ENVIRONMENT.

AFTER RECEIVING PETITIONS TO INTERVENE IN OPPOSITION TO THIS COMMISSION ACTION IN THE PERIOD FROM NOVEMBER 1985 TO FEBRUARY 1986, THE COMMISSION ON FEBRUARY 20TH, 1986 ISSUED AN ORDER STATING THAT -- AND I QUOTE -- "INTERESTED PERSONS SHOULD BE AFFORDED A HEARING UNDER SECTION 189A OF THE ATOMIC ENERGY ACT. IN MAKING AN INITIAL DISPOSITION OF THE PENDING HEARING REQUESTS, WE NOTE THAT IN OUR DECISION IN KERR-MCGEE CORP., A WEST CHICAGO RARE EARTHS FACILITY CASE, THE COMMISSION INDICATED THAT THERE WAS NO ENTITLEMENT TO A FORMAL TRIAL-TYPE HEARING UNDER EITHER THE

ATOMIC ENERGY ACT OR THE NUCLEAR REGULATORY COMMISSION REGULATIONS WITH REGARD TO MATERIALS LICENSING ACTIONS. FURTHER, NEITHER THESE PARTICULAR HEARING REQUESTS, NOR ANY OTHER INFORMATION NOW AVAILABLE TO US, GIVE US CAUSE TO EXERCISE OUR DISCRETION AND GRANT A FORMAL HEARING UNDER THE PUBLIC INTEREST STANDARDS OF 10 CFR 2.104(A) AND 2.105(A)(7) OR TO FIND DUE PROCESS CONCERNS REQUIRE THAT A FORMAL HEARING MUST BE CONVENED. THEREFORE, ONLY AN INFORMAL HEARING WILL BE INSTITUTED." END OF QUOTE.

ON FEBRUARY 25, 1986, BY A NOTICE IN THE FEDERAL REGISTER, I WAS APPOINTED PRESIDING OFFICER TO CONDUCT AN INFORMAL HEARING INTO THIS MATTER. BY MY ORDER OF MARCH 10, 1986, THE NOTICE OF THIS INFORMAL HEARING AND OPPORTUNITY TO BECOME A PARTY WAS ISSUED. ON MAY 29, 1986, MATTERS DESIGNATED TO BE ADDRESSED AT THE INFORMAL HEARING WERE SET OUT IN AN ORDER WHEREIN THE PROCEDURE WAS ESTABLISHED FOR FOUR PETITIONERS WHO HAD, IN MY OPINION, DEMONSTRATED STANDING TO INTERVENE AS GOVERNED BY 10 CFR 2.714(D) AND EXISTING AGENCY PRECEDENTS. THESE INDIVIDUALS ARE: THE STATE OF OHIO -- AND THE REQUEST SUBMITTED BY THE ATTORNEY GENERAL -- TOLEDO COALITION FOR SAFE ENERGY AND

SUSAN A. CARTER; WESTERN RESERVE ALLIANCE; AND SAVE OUR STATE FROM NUCLEAR WASTE, CONSUMERS LEAGUE OF OHIO, ARNOLD GLEISSER AND GENEVIEVE S. COOK. ALTHOUGH FOUR OTHER PETITIONS TO INTERVENE WERE CONSIDERED, THEY WERE DENIED BUT WILL BE PROVIDED TIME FOR REPRESENTATION OF THEIR POSITION UNDER OATH, IF THEY DESIRE. THE STATE OF OHIO WILL SERVE AS LEAD INTERVENOR IN THESE PROCEEDINGS.

THIS PROCEEDING, WHOSE HISTORY I HAVE SUMMARIZED, WILL BE CONDUCTED THROUGH TESTIMONY OF WITNESSES FROM THE LICENSEE AND INTERVENORS WHO WILL BE UNDER OATH. BEFORE WE BEGIN THE TESTIMONY, HOWEVER, I HAVE BEEN ASKED TO PROVIDE AN OPPORTUNITY FOR THE ATTORNEY GENERAL AND TWO MEMBERS OF THE STATE'S STAFF TO MAKE A PRESENTATION. THERE HAS BEEN NO OBJECTION TO THIS PROCEDURE, SO THAT WE WILL BEGIN THIS MORNING WITH THOSE OFFICIALS.

AT THE CONCLUSION OF THEIR PRESENTATION, THE LICENSEE, WHO MUST CARRY THE BURDEN OF PROOF, WILL PRESENT 13 WITNESSES FOR DIRECT EXAMINATION. CROSS-EXAMINATION BY THE ASSISTANT ATTORNEY GENERAL OF OHIO WILL FOLLOW. IF THE STATE, AS LEAD INTERVENOR, HAS NOT COVERED AN AREA OF

INTEREST OF THE INTERVENORS, THEN THEY MAY CHANNEL ADDITIONAL QUESTIONS TO THE ASSISTANT ATTORNEY GENERAL. BRIEF REBUTTAL QUESTIONS WILL BE PERMITTED LIMITED TO MATTERS DISCLOSED THROUGH CROSS-EXAMINATION. AFTER THE LICENSEE'S WITNESSES HAVE COMPLETED THEIR TESTIMONY, THE INTERVENORS WILL CALL THEIR WITNESSES AND THE LICENSEE WILL BE PERMITTED CROSS-EXAMINATION. IT IS MY INTENTION TO COMPLETE THE TESTIMONY AND CROSS-EXAMINATION IN THE TWO DAYS OF AUGUST 5 AND 6 FOR BOTH THE LICENSEE AND THE INTERVENORS.

AFTER THE ENTIRE CASE OF ALL PARTIES HAS BEEN PRESENTED, WE WILL HAVE LIMITED APPEARANCE STATEMENTS FROM MEMBERS OF THE PUBLIC IN TWO SESSIONS. FIRST, IN A NIGHT SESSION FROM 7:00 P.M. UNTIL 10:00 P.M. WEDNESDAY NIGHT, AUGUST 6, 1986, AND THE SECOND SESSION ON AUGUST THE 7TH FROM 9:30 A.M. THROUGH 5:00 P.M.

THE COMMISSION HAS PROVIDED IN ITS REGULATIONS THAT A PERSON WHO IS NOT A PARTY MAY, IN THE DISCRETION OF THE PRESIDING OFFICERS, BE PERMITTED TO MAKE A LIMITED APPEARANCE BY MAKING ORAL OR WRITTEN STATEMENTS OF HIS POSITION OF THE LICENSEES -- CORRECTION -- ON THE ISSUES. IN ORDER TO REAP FROM THESE ALLOTTED TIMES THE

GREATEST BENEFIT IN REACHING A DECISION ON THE MATTERS SET FOR HEARING, I HAVE SOME COMMENTS APPROPRIATE, HOPEFULLY, TO ACCOMPLISH THAT END FOR THOSE INDIVIDUALS WHO HAVE INDICATED OR WILL INDICATE THAT THEY WISH TO SPEAK.

THE FOCUS OF THE LIMITED APPEARANCES IS TO RECEIVE PUBLIC INPUTS. IT IS NOT MY FUNCTION NOR JUDGE KLINE'S TO RESPOND TO YOUR QUESTIONS WHICH ARE BETTER ADDRESSED TO THE N.R.C. PUBLIC LIAISON OFFICER, MR. RUSSELL MARABITO, OR PERHAPS TO THE PARTIES.

MR. MARABITO, I BELIEVE YOU ARE IN THE BACK OF THE ROOM, ARE YOU NOT? YES, SIR. THAT'S THE NUCLEAR REGULATORY COMMISSION REPRESENTATIVE. MR. MARABITO WILL BE HAPPY TO ANSWER ANY PROCEDURAL QUESTIONS.

I DO NOT BELIEVE THAT AS JUDGES WE CAN FAIRLY HEAR A CASE WHILE MAINTAINING A DIALOGUE ON MATTERS THAT ARE THE VERY ISSUES TO BE DECIDED, SO THAT WE WILL NOT RESPOND TO ANY QUESTIONS FROM INDIVIDUALS OR FROM THE PRESS.

IN ACCEPTING YOUR STATEMENTS THAT MAY ALERT US TO OTHER AND DIFFERENT DIMENSIONS THAN THAT RECEIVED IN THE EVIDENTIARY PHASE OF THESE HEARINGS, I MUST CAUTION YOU THAT THE LIMITED

APPEARANCE STATEMENTS ARE NOT EVIDENCE. WHAT THESE STATEMENTS ARE ARE REFLECTIONS OF THE PUBLIC CONCERN WHICH MAY GENERATE INQUIRY. IT IS MY INTENTION TO PROVIDE YOU WITH THE OPPORTUNITY TO BE HEARD. IT IS NOT MY INTENTION TO MISLEAD YOU INTO BELIEVING THAT EACH AND EVERY EXPRESSED CONCERN WILL BE ACTED UPON. THE OPPORTUNITY TO BE HEARD CANNOT AND DOES NOT ENSURE THAT YOU WILL RECEIVE SATISFACTION.

IN ANY LARGE GROUP, IT IS POSSIBLE TO PROVIDE THE OPPORTUNITY TO BE HEARD TO SOME OF THE MANY WHO MAY WISH TO GIVE THEIR UNSWORN TESTIMONY. FOR THOSE WHO MAY NOT HAVE THAT OPPORTUNITY, YOU MAY SUBMIT A WRITTEN STATEMENT TO ME, JUDGE HELEN F. HOYT, U.S. NUCLEAR REGULATORY COMMISSION, 1717 H STREET, NORTHWEST, WASHINGTON D.C. 20555. THE WRITTEN STATEMENTS WILL BE PLACED IN THE DOCKET FOR THIS CASE AND WILL BECOME PART OF THE RECORD THE SAME AS THE ORAL STATEMENTS THAT WILL BE RECORDED IN THESE HEARINGS.

YOUR ORAL STATEMENTS WILL BE LIMITED TO FIVE MINUTES. THESE ORAL-LIMITED APPEARANCE STATEMENTS ARE AN INFORMAL PROCEDURE, ALTHOUGH GIVEN IN A SETTING REQUIRING THAT THE STATEMENT DEAL WITH THE POSITION OF THE INDIVIDUAL ON THOSE

ISSUES SET FORTH AS THE SUBJECTS OF THIS PROCEEDING. THERE WILL BE NO CROSS-EXAMINATION AND THE RULES OF EVIDENCE ARE NOT ENFORCED. YOUR OWN COMMON SENSE SHOULD DICTATE WHAT IS APPROPRIATE IN A LIMITED APPEARANCE STATEMENT.

I HAD ONE OTHER COMMENT WHICH I'LL GIVE YOU, ALTHOUGH LOOKING AT THIS GROUP, I DON'T THINK IT IS NECESSARILY APPROPRIATE, AND THAT WAS THAT DISRUPTIVE CONDUCT WOULD NOT BE TOLERATED FOR IT NEITHER BENEFITS THE PROGRESS OF THE HEARING NOR PERMITS ANOTHER INDIVIDUAL HIS OR HER CHANCE TO MAKE A COMMENT. I DON'T THINK THAT ONE, HOWEVER, IS NECESSARY IN THIS SETTING.

THIS MORNING, TO BEGIN, WE'RE GOING TO START WITH THE TWO STATEMENTS OF THE MEMBERS OF THE STATE OF OHIO PRESENTATION. HOWEVER, I BELIEVE THE ATTORNEY GENERAL IS GOING TO ARRIVE A LITTLE LATER, SO THAT WE WILL RESERVE THE RIGHT TO CALL HIM WHEN HE ARRIVES.

IN ORDER TO NOT LOSE ANY OF THE TIME THAT WE SET ASIDE, AFTER YOUR TWO STATEMENTS HAVE BEEN COMPLETED -- AND I'M ADDRESSING THESE REMARKS TO THE STATE OF OHIO ATTORNEY GENERAL -- THEN WE WILL HAVE THE LICENSEE INTRODUCE A LARGE PANEL OF INDIVIDUALS WHO ARE SEATED TO MY LEFT OVER HERE SO

THAT THOSE WITNESSES' PRESENCE CAN BE PLACED IN THE RECORD AND NO TIME WILL BE LOST.

LET ME FIRST OF ALL TAKE THE APPEARANCES OF ALL THE COUNSEL WHO REPRESENT THE LICENSEE IN THIS CASE.

MR. SILBERG: REPRESENTING THE LICENSEE, TOLEDO EDISON COMPANY, MY NAME IS JAY SILBERG. I'M AN ATTORNEY WITH THE WASHINGTON D.C. LAW FIRM OF SHAW, PITTMAN, POTTS & TROWBRIDGE. WITH ME HERE TODAY IS MR. DAVID LEWIS OF THE SAME LAW FIRM, MR. KENNETH MAUER OF THE LEGAL DEPARTMENT OF TOLEDO EDISON COMPANY, AND SITTING TO MY LEFT, MR. TED MYERS, LICENSING MANAGER FOR THE TOLEDO EDISON COMPANY.

JUDGE HOYT: VERY WELL. AND REPRESENTING THE INTERVENORS, AND WE'LL START OFF WITH THE STATE OF OHIO AS THE LEAD INTERVENOR.

MR. VAN CLEY: STATE OF OHIO IS REPRESENTED BY THE OHIO ATTORNEY GENERAL'S OFFICE. MY NAME IS JACK VAN KLEY. TO MY RIGHT IS SHARON SIGLER, AND TO HER RIGHT IS EDWARD LYNCH.

JUDGE HOYT: THE NEXT GENTLEMAN?

MR. LODGE: I'M TERRY LODGE. I'M HERE REPRESENTING THE TOLEDO COALITION FOR SAFE ENERGY. I'M AN ATTORNEY AT LAW. AND ALSO

SUSAN CARTER. IN ANY EVENT, I AM REPRESENTING SUSAN CARTER OF THE TOLEDO COALITION FOR SAFE ENERGY. I'M A PRACTITIONER IN TOLEDO, OHIO.

JUDGE HOYT: THANK YOU, MR. LODGE. SIR?

MR. BIMBER: I'M RUSSELL BIMBER, A CHEMIST, AND I AM HERE AS A WITNESS TO ASSIST THE INTERVENORS.

JUDGE HOYT: ALL RIGHT. WE'RE NOT TAKING THE WITNESSES' APPEARANCES. WE'RE JUST TAKING THE REPRESENTATIVES' APPEARANCE.

MISS COOK?

MS. COOK: YES. WE ARE AN INTERVENING GROUP, TWO ORGANIZATIONS AND TWO INDIVIDUALS.

JUDGE HOYT: AND YOUR NAME IS?

MS. COOK: PARDON?

JUDGE HOYT: YOUR NAME? GIVE US YOUR NAME.

MS. COOK: YES. MY NAME IS GENEVIEVE COOK, AND TO MY RIGHT IS ARNOLD GLEISSER, AND WE ALSO ARE REPRESENTING S.O.S., WHO IS THE SAVE OUR STATE FROM RADIOACTIVE WASTE, AND ALSO THE CONSUMERS LEAGUE OF OHIO, AND THAT WILL BE REPRESENTED BY DOROTHY AUSTIN, WHO IS PROBABLY

HERE, AND MR. BIMBER IS OUR WITNESS.

JUDGE HOYT: WOULD YOU LIKE TO TAKE YOUR PLACE AT THE TABLE HERE? WE HAVE ONE CHAIR LEFT.

DOES THAT COMPLETE THE APPEARANCES? VERY WELL.

NOW WE'RE READY TO BEGIN WITH THE TWO STATEMENTS OF THE WITNESSES THAT YOU HAVE.

MR. VAN KLEY: ALL RIGHT.

MR. SOMMER: GOOD MORNING, YOUR HONOR.

JUDGE HOYT: GOOD MORNING, SIR.

MR. SOMMER: WHERE WOULD YOU LIKE US?

JUDGE HOYT: WE'RE GOING TO SIT YOU RIGHT HERE AT THE WITNESS TABLE AND ASK THAT THAT MICROPHONE BE BROUGHT OVER TO YOU.

MR. SOMMER: FINE.

JUDGE HOYT: I'M SORRY, SIR. MAY I FIRST SWEAR YOU IN?

(WITNESS SWORN.)

JUDGE HOYT: THANK YOU. PLEASE BE SEATED.

I BELIEVE THAT'S YOUR WITNESS.

MR. VAN KLEY: YES, IT IS, YOUR

HONOR.

JUDGE HOYT: ALL RIGHT. GO AHEAD. WOULD YOU INTRODUCE THE GENTLEMAN FOR US?

MR. VAN KLEY: YES. THE FIRST SPEAKER WILL BE THE DIRECTOR OF THE DEPARTMENT OF NATURAL RESOURCES, JOE SOMMER.

JUDGE HOYT: MR. SOMMER, DO YOU HAVE A STATEMENT YOU WANT TO READ?

THE WITNESS: YES, YOUR HONOR, I DO.

JUDGE HOYT: PLEASE PROCEED.

THE WITNESS: THANK YOU.

WHEREUPON,

JOSEPH J. SOMMER

WAS CALLED AS A WITNESS AND, HAVING BEEN FIRST DULY SWORN, TESTIFIED AS FOLLOWS:

DIRECT TESTIMONY

THE WITNESS: IN JANUARY, OHIO'S GOVERNOR RICHARD F. CELESTE ASKED THE NUCLEAR REGULATORY COMMISSION TO HOLD A PUBLIC HEARING TO SEEK INFORMATION ABOUT THE POTENTIAL ENVIRONMENTAL IMPACTS OF TOLEDO EDISON'S PLANS TO STORE LOW-LEVEL RADIOACTIVE WASTE ON-SITE AT DAVIS-BESSE, AS YOUR HONOR HAS JUST INDICATED.

ON BEHALF OF THE GOVERNOR AND THE OHIO

DEPARTMENT OF NATURAL RESOURCES, I WOULD LIKE TO THANK YOU AND THE NUCLEAR REGULATORY COMMISSION CHAIRMAN NUNZIO PALLADINO FOR CONVENING THIS HEARING AND GIVING THE STATE OF OHIO AND OTHER INTERESTED OHIOANS AN OPPORTUNITY TO COMMENT ON THIS PROPOSAL.

VERY FRANKLY, THE SKETCHY INFORMATION PROVIDED IN THE OCTOBER 9TH, 1985 FEDERAL REGISTER PAINTED A RATHER FRIGHTENING PICTURE FOR OHIOANS. SUDDENLY THE PUBLIC BECAME AWARE OF OPEN FIELD LAGOONS CONTAINING LOW-LEVEL RADIOACTIVE WASTE AND OTHER NONRADIOACTIVE SLUDGES FROM WATER TREATMENT PROCESSES. AND WE HAD NO IDEA WHAT CONTAMINANTS MIGHT BE IN THE PITS.

THE SCIENTIFIC JOURNALS AND NEWS MEDIA ARE FILLED WITH EXAMPLES OF FAILURE AFTER FAILURE OF LANDFILLS, LAGOONS AND IMPOUNDMENTS, THE RESULTS OF WHICH DEGRADE THE LOCAL GROUNDWATER SUPPLY TO THE POINT OF CONCERN FOR THE PUBLIC'S HEALTH. EXPERTS SUCH AS DR. JAY LEHR HAVE APPEARED BEFORE CONGRESS AND TESTIFIED THAT OVER FIVE PERCENT OF OUR GROUNDWATER IS ALREADY POLLUTED. THAT FIGURE MAY DOUBLE OR TRIPLE WITHIN THE NEXT FIVE YEARS AS MORE OF OUR PAST MISTAKES ARE DISCOVERED.

OHIO HAS SUFFERED ITS SHARE OF GROUNDWATER POLLUTION INCIDENTS, AND THE CELESTE ADMINISTRATION WANTS TO SEE SITING DECISIONS THAT AVOID OR MINIMIZE THE CHANCE OF ANY FURTHER ENVIRONMENTAL DISASTERS. IN THIS CASE, THE LAGOONS AND PROPOSED WASTE BURIAL SITES OF DAVIS-BESSE ARE WITHIN A MILE OF LAKE ERIE, A HALF MILE OF THE TOUSSAINT RIVER AND ADJACENT TO NAVARRE MARSH IN AN AREA THAT SUFFERED WIDESPREAD FLOODING IN NOVEMBER 1972.

IT IS DISTURBING TO NOTE THAT THE MAXIMUM LAKE LEVEL REACHED DURING THE 1972 STORM IS ONLY TWO FEET ABOVE THE PRESENT LAKE LEVEL. THERE HAVE BEEN AT LEAST 20 TIMES SINCE 1972 THAT WIND ACTION HAS RAISED THE LAKE LEVEL TO THOSE LEVELS, NORMALLY ONCE OR TWICE A YEAR.

IT IS SAFE TO SAY THAT OVER DAVIS-BESSE'S LIFETIME THE LAGOONS AND BURIAL CELLS WILL BE SITTING IN WATER AT ONE TIME OR ANOTHER, IF THEY ARE BUILT ON THE PROPOSED SITE. WHILE THEY MAY, OR MAY NOT, BE LEAKING INTO THE GROUNDWATER NOW OR IN THE FORESEEABLE FUTURE, WE FEAR THAT EVENTUALLY CONTAMINANTS WILL FIND THEIR WAY INTO THE GROUNDWATER.

THAT IS WHY WE ARE HERE TODAY, YOUR

HONOR.

THE STATE OF OHIO IS VERY PROUD OF OUR REVITALIZED LAKE ERIE. IT WAS NOT LONG AGO THAT IT WAS PRONOUNCED A DEAD LAKE. BUT TODAY, ERIE'S ECOLOGICAL RESOURCES ARE AN IMPORTANT CONTRIBUTOR TO OHIO'S ECONOMY AND RECREATION PLEASURE. MUCH OF THE 11.8 MILLION POUNDS OF FISH TAKEN FROM ERIE EACH YEAR SPAWN IN THE WESTERN BASIN OFF DAVID-BESSE.

RECREATION AND TOURISM ARE MAJOR INDUSTRIES. THE STATE ALONE HAS FIVE STATE PARKS, FOUR NATURE PRESERVES, TWO DISTRICT WATERCRAFT OFFICES, AND SEVERAL WILDLIFE AND FISHERIES FACILITIES ON LAKE ERIE, AND THE FEDERAL GOVERNMENT OPERATES THE CTTAWA WILDLIFE REFUGE LOCATED JUST DOWN THE ROAD FROM THE DAVIS-BESSE PROPERTY. ADD TO THIS THE EXTENSIVE INVESTMENTS OF LOCAL GOVERNMENTS AND BUSINESSMEN IN THIS AREA.

LAKE ERIE AND HER COASTAL WETLANDS ARE OHIO'S TREASURE, PROBABLY OUR GREATEST NATURAL RESOURCE. WE URGE THE N.R.C. AND TOLEDO EDISON TO DEFINE THE DAVIS-BESSE WASTE PROPOSAL TO MINIMIZE ENVIRONMENTAL RISKS, AND AS PART OF THIS PROCESS, TO CONSIDER LOCATING AT ANOTHER SITE FOR BOTH THE TEMPORARY STORAGE LAGOONS AND THE WASTE STORAGE

CELLS WHERE THE RISK OF POLLUTION IS SUBSTANTIALLY REDUCED. I CAN ASSURE YOU THERE ARE AREAS WHERE THE HYDROLOGY AND GEOLOGY ARE MORE APPROPRIATE FOR A LANDFILL. THE CURRENT SITUATION, WE FEEL, IS INTOLERABLE. WASTE LAGOONS ARE OPEN AND EXPOSED TO THE NATURAL ELEMENTS ON THE SHORELINE OF A LAKE WHICH REACHES RECORD-BREAKING LAKE LEVELS EVERY MONTH.

TOMORROW THE STATE OF OHIO WILL ARGUE THAT BOTH TOLEDO EDISON'S OCTOBER 9TH PROPOSAL AND THE JULY 19TH REVISION POSE TOO GREAT AN ENVIRONMENTAL RISK TO OUR ENVIRONMENTALLY SENSITIVE COASTAL WETLANDS AND GROUNDWATER SYSTEMS. ACCORDINGLY, YOUR HONOR, I AM CONFIDENT THAT WE CAN WORK TOGETHER TO DEVELOP A REMEDY WHICH MEETS BOTH OHIO'S AND TOLEDO EDISON'S NEEDS.

I THANK YOU FOR THE OPPORTUNITY TO APPEAR HERE THIS MORNING.

JUDGE HOYT: THANK YOU.

MR. VAN KLEY: YOUR HONOR, THE NEXT WITNESS WILL BE VIRGINIA AVENI. SHE'S A DEPUTY DIRECTOR WITH THE OHIO ENVIRONMENTAL PROTECTION AGENCY.

JUDGE HOYT: VERY WELL. I DID SWEAR YOUR WITNESS IN, ALTHOUGH I DON'T THINK THAT

WAS NECESSARY. IF YOU FEEL MORE COMFORTABLE MAKING A SWORN STATEMENT, I'M HAPPY TO DO SO.

GO AHEAD.

MS. AVENI: GOOD MORNING.

JUDGE HOYT: IF YOU'LL INTRODUCE YOURSELF, PLEASE.

THE WITNESS: THANK YOU, YOUR HONOR.

WHEREUPON,

VIRGINIA AVENI

WAS CALLED AS A WITNESS AND TESTIFIED AS FOLLOWS:

DIRECT TESTIMONY

THE WITNESS: MY NAME IS VIRGINIA AVENI AND I AM DEPUTY DIRECTOR OF THE OHIO ENVIRONMENTAL PROTECTION AGENCY.

MY AGENCY HAS A RESPONSIBILITY FOR PERMITTING AND REGULATING THE DISPOSAL OF SLUDGES AND SOLID WASTE IN THE STATE OF OHIO. THE PROFESSIONAL STAFF OF THAT DIVISION MAKE RECOMMENDATIONS TO ME FOR THE ISSUANCE AND DENIAL OF SOLID WASTE PERMITS TO INSTALL. I WOULD ADD THAT THE AGENCY'S POLICY IS TO SET INCREASINGLY HIGHER STANDARDS FOR BOTH THE GEOLOGY AND HYDROLOGY FOR SITING NEW LANDFILLS IN THE STATE.

OHIO ADMINISTRATIVE CODE CHAPTER 3734.31

FOR PERMITS TO INSTALL ESTABLISHES THE REQUIREMENT THAT THE OWNER/OPERATOR OF ANY PROPOSED NEW SOLID WASTE DISPOSAL FACILITY OBTAIN A PERMIT TO INSTALL FROM THE OHIO EPA DIRECTOR PRIOR TO COMMENCING CONSTRUCTION OF THE NEW LANDFILL.

THE OHIO EPA BELIEVES THAT THE MATERIALS DREDGED FROM THE SETTLING BASINS AT THE TOLEDO EDISON DAVIS-BESSE NUCLEAR GENERATING STATION ARE A SOLID WASTE AS DEFINED UNDER THAT RULE 3745.27.01(U). THEREFORE, THE PROPOSED LAND DISPOSAL OF THE DREDGED MATERIALS CONSTITUTES A SOLID WASTE DISPOSAL FACILITY, AND SUCH PERMIT TO INSTALL WOULD BE REQUIRED UNDER OHIO'S SOLID WASTE LAWS.

THE COMPLETE APPLICATION FOR PERMIT TO INSTALL WOULD NECESSITATE ADEQUATELY DEMONSTRATING THE HYDROGEOLOGIC SUITABILITY OF THE PROPOSED LANDFILL LOCATION INCLUDING DETAILED ENGINEERING PLANS FOR THE CONSTRUCTION OF THE LANDFILL AND INCLUDING DETAILED PLANS FOR THE ROUTINE OPERATION AND EVENTUAL CLOSURE OF THE LANDFILL FACILITY.

AS YET, TOLEDO EDISON HAS NOT SUBMITTED A PERMIT TO INSTALL APPLICATION FOR THE PROPOSED DISPOSAL OF THE DREDGED MATERIAL.

EACH PERMIT TO INSTALL APPLICATION WOULD

BE REVIEWED BY THE AGENCY FOR COMPLIANCE WITH THE PROVISIONS OF THE ADMINISTRATIVE CODE AND UNDER CHAPTER 3745.27, ALL SOLID WASTE DISPOSAL REGULATIONS.

THE OHIO EPA RULES ALLOW A SIX-MONTH PERIOD FOR THIS REVIEW FROM THE POINT IN TIME WHEN A COMPLETE APPLICATION -- AND MANY APPLICATIONS, I WOULD ADD, ARE NOT COMPLETE ON THE TIME OF THEIR FILING.

SINCE TOLEDO EDISON HAS NOT YET FILED AN APPLICATION FOR A SOLID WASTE LANDFILL P.T.I., IT WOULD NOT BE LAWFUL FOR TOLEDO EDISON TO PROCEED WITH THE DREDGING AND LANDFILLING OF THIS SOLID WASTE AT THE DAVIS-BESSE SITE.

A FINAL OHIO EPA PERMIT TO INSTALL MUST BE OBTAINED BEFORE ANY ENTITY CAN LAWFULLY PROCEED WITH THE DISPOSAL OF DREDGED MATERIAL AT ANY LOCATION WHICH HAS NOT PREVIOUSLY BEEN AUTHORIZED TO RECEIVE SUCH MATERIAL.

SERIOUS CONCERNS THAT THE AGENCY HAS WITH THIS PROPOSAL INCLUDE THE TECHNICAL DEFICIENCIES IN THE SPECIFICATIONS APPROVED BY THE NUCLEAR REGULATORY COMMISSION FOR THE PROPOSED LAND APPLICATION OF THE DREDGED MATERIAL AND THE INADEQUATE ASSESSMENT OF THE ADEQUACY OF THE

DAVIS-BESSE SITE FOR THE CONSTRUCTION OF A LANDFILL WHICH FORMS WITH MINIMUM HYDROGEOLOGIC REQUIREMENTS OF THE OHIO EPA. AN EXAMPLE OF THIS IS THE FOUR INCHES OF COVER AND SEEDING SPECIFICATIONS OF THE N.R.C. APPROVAL WHICH IS CLEARLY INADEQUATE WHEN CONTRASTED TO THE SPECIFIC -- TO THE BASIC SPECIFICATIONS ROUTINELY INCLUDED IN PERMITS TO INSTALL ISSUED BY OHIO EPA REQUIRING TWO FEET OF WELL-COMPACTED COVER MATERIAL WITH TOPSOIL AND SEEDING.

AT THIS POINT, OHIO EPA, AS I INDICATED, HAS NO PERMIT APPLICATION FOR THE SLUDGE DISPOSAL BEFORE THE AGENCY, AND ANY SUCH PERMIT APPROVAL MUST BE CONSISTENT WITH OHIO'S BOTH SOLID WASTE LAWS AND RULES.

IT IS OHIO EPA'S POSITION THAT WE AGREE WITH THE DEPARTMENT OF NATURAL RESOURCES AND REPRESENT THE STATE OF OHIO, AND WE WOULD URGE THE COMMISSION TO WITHDRAW ITS APPROVAL AND CONSIDER A MORE ALTERNATIVE AND MORE -- AN ALTERNATIVELY MORE APPROPRIATE SITE.

JUDGE HOYT: THANK YOU.

I DON'T BELIEVE THE NEXT WITNESS IS YET PRESENT.

MR. VAN KLEY: NO, HE'S NOT, YOUR

HONOR.

JUDGE HOYT: MR. SILBERG, YOU INDICATED THAT YOU WANTED TO GIVE AN OPENING STATEMENT. YOU WANT TO WAIT UNTIL AFTER THAT'S COMPLETED WITH?

MR. SILBERG: WE CAN INTRODUCE THE PANEL NOW.

JUDGE HOYT: VERY WELL. AND RESERVE YOUR OPENING STATEMENT UNTIL LATER?

MR. SILBERG: YES. PRIOR TO PROCEEDING WITH THE TESTIMONY, IF, INDEED, WE HAVE FINISHED THAT PROCESS AND THE ATTORNEY GENERAL IS NOT YET HERE, THEN I WOULD PROCEED WITH MY OPENING STATEMENT.

JUDGE HOYT: VERY WELL.

MR. SILBERG: AT THIS TIME, I WOULD ASK THE WITNESSES TO RISE AND BE SWORN IN, PLEASE.

(WITNESSES SWORN.)

MR. SILBERG: JUDGE HOYT, IN ACCORDANCE WITH AN AGREEMENT REACHED BETWEEN MYSELF AND COUNSEL FOR THE STATE AND REPRESENTATIVES FOR THE OTHER PARTIES, WE HAVE AGREED THAT THE WRITTEN TESTIMONY AND QUALIFICATIONS OF THIS PANEL CAN BE INCORPORATED

IN THE TRANSCRIPT AS IF READ AT THIS POINT WITHOUT THE NECESSITY FOR THE FORMAL LEGAL PROCEEDINGS OF AUTHENTICATION. THE WITNESSES' STATEMENTS WILL, OF COURSE, BE SUBJECT TO CROSS-EXAMINATION AFTER THE DOCUMENT IS INTRODUCED.

THERE ARE FOUR CORRECTIONS TO THE WRITTEN TESTIMONY PREVIOUSLY SUBMITTED TO THE -- TO YOURSELF AND TO ALL THE PARTIES.

JUDGE HOYT: HAS THIS CORRECTION BEEN CIRCULATED TO THE PARTIES HERE THIS MORNING?

MR. SILBERG: YES, THE PARTIES ARE AWARE OF THOSE CORRECTIONS. THEY HAVE BEEN WRITTEN ON THE COPIES WHICH ARE BEING PROVIDED TO THE REPORTER. I WILL JUST BRIEFLY GO THROUGH THOSE ON THE RECORD AT THIS TIME.

THE FIRST CORRECTION IS ON PAGE 48 AND THE ANSWER TO QUESTION 6-7, THE LAST SENTENCE IN THAT ANSWER. THE SENTENCE SHOULD READ AS FOLLOWS: "MOREOVER, EVEN IF THERE WERE COMMUNICATION, THE ONLY TIME THERE COULD BE COMMUNICATION IS DURING TIMES WHEN THE MARSH IS FLOODED WHEN THE DIRECTION OF FLOW WOULD BE FROM THE MARSH INTO THE BEDROCK, AND NOT FROM THE BEDROCK INTO THE MARSH." THE PHRASE WOULD BE ADDED IN THAT SENTENCE: "THE ONLY TIME THERE COULD BE COMMUNICATION IS DURING TIMES

WHEN THE MARSH IS FLOODED WHEN."

JUDGE HOYT: DOES EVERY ONE HAVE THAT CORRECTION?

I HAVE A SHAKING OF THE HEAD IN THE AFFIRMATIVE, SO I TAKE IT THAT'S BEEN DONE.

MR. SILBERG: THANK YOU. THE SECOND CORRECTION IS ON PAGE 49, TABLE 6-1, IN THE COLUMN ENTITLED "GLACIAL TILL DEPOSIT," THE SECOND NUMERICAL VALUE, WHICH STATES -- WHICH NUMBER 24 IS THE TESTIMONY, SHOULD BE 14. IT'S THE NATURAL WATER CONTENT PERCENT IN THE GLACIAL TILL DEPOSIT.

JUDGE HOYT: DOES EVERY ONE HAVE THAT CHANGE?

AGAIN, I HAVE AN INDICATION THAT THE PARTIES HAVE IT.

MR. SILBERG: ON PAGE 100, WHICH IS THE ANSWER TO QUESTION 18/19-2, ON THE FOURTH LINE OF THAT ANSWER THE WORD "INVERTED" SHOULD BE "CONVERTED." FOURTH LINE FROM THE TOP OF PAGE 100. I'M TOLD BY THE CHEMISTS THAT THAT'S A SIGNIFICANT DIFFERENCE.

JUDGE HOYT: DOES EVERY ONE HAVE THAT CHANGE?

AGAIN, THE PARTIES INDICATE THEY HAVE THAT. PROCEED.

MR. SILBERG: THANK YOU.

THE FINAL CHANGES ARE ON PAGE 102, THE ANSWER TO QUESTION 18/19-5, IN THE NEXT TO THE LAST SENTENCE, THE VALUE 32 OUNCES SHOULD BE 54 GRAMS, AND THE VALUE 36 OUNCES -- EXCUSE ME -- THE VALUE 16 OUNCES SHOULD BE 36 GRAMS. SO THE CHANGE WOULD BE FROM 32 OUNCES TO 54 GRAMS AND FROM 16 OUNCES TO 36 GRAMS.

JUDGE HOYT: DO THE PARTIES HAVE THAT CHANGE? YES, THE PARTIES INDICATE THEY DO.

MR. SILBERG: I WOULD ALSO NOTICE ONE OTHER MINOR SUBSTITUTION IN THE EXHIBITS WHICH ARE THE RESUMES OF THE WITNESSES BY LICENSEE. WE HAVE SUBSTITUTED A MORE COMPLETE RESUME FOR WITNESS RICHARD HETHERINGTON FOR THE RESUME WHICH WAS SUBMITTED IN THE TESTIMONY AS DISTRIBUTED ON JULY 19.

JUDGE HOYT: DO THE PARTIES HAVE THAT ADDITION?

MR. VAN KLEY: YES, YOUR HONOR.

JUDGE HOYT: VERY WELL.

WE HAVE A DIAGRAM OF THE WITNESSES THAT CONSTITUTE THE PANEL WITH THE NAME OF EACH ONE OF THE INDIVIDUALS. IF SOMEONE WOULD LIKE TO COPY THIS FROM THE COPY THAT HAS BEEN MADE FOR THE

BENCH HERE, WE WOULD BE HAPPY TO HAVE YOU DO THAT, AND RETURN IT INTACT.

MR. SILBERG: AT THIS TIME, I WOULD ASK YOUR HONOR TO ORDER THAT THE TESTIMONY ON EXHIBITS AS PROVIDED TO THE REPORTER BE INCORPORATED IN THE TRANSCRIPT AT THIS POINT AS IF READ AS THE WRITTEN TESTIMONY OF THE WITNESS PANEL.

JUDGE HOYT: THAT'S THE PREVIOUSLY DISTRIBUTED PORTIONS?

MR. SILBERG: YES.

JUDGE HOYT: AND WITH THE CORRECTIONS AS NOTED.

MR. SILBERG: YES, YOUR HONOR.

JUDGE HOYT: ANY OBJECTIONS?

MR. VAN KLEY: NO, YOUR HONOR.

JUDGE HOYT: VERY WELL. THE DOCUMENTS AS DESCRIBED BY COUNSEL WILL BE INCORPORATED IN THE RECORD AND ATTACHED AT THIS POINT.

NOW, WE HAVE NOT ASSIGNED ANY NUMBERS TO THAT PRESENTATION, MR. SILBERG. DO YOU WANT TO PERHAPS CHANGE THAT OR DO YOU JUST WANT TO INCORPORATE THAT AS A PACKAGE?

MR. SILBERG: I WOULD PREFER IT

JUST BE INCORPORATED IN THE TRANSCRIPT ITSELF AS A PACKAGE, IF THAT'S ACCEPTABLE.

(THE DOCUMENTS FOLLOW:)

July 19, 1986

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Administrative Judge

In the Matter of	)	
	)	
TOLEDO EDISON COMPANY, et al.	)	Docket No. 50-346-ML
	)	
(Davis-Besse Nuclear Power Station, Unit No. 1)	)	

LICENSEE'S TESTIMONY ON THE BURIAL OF VERY LOW LEVEL WASTE AT DAVIS-BESSE

I. Introduction

Q1. Please state your names, occupations, and addresses.

A1. [Dr. Bennett] My name is Dr. Gary F. Bennett. I am a Professor of Biochemical Engineering at the University of Toledo. My business address is the University of Toledo, Toledo, Ohio 43606.

[Mr. Bland] My name is J. Stewart Bland. I am a consultant and President of J. Stewart Bland Associates, Inc. My business address is P. O. Box 4154, Annapolis, Maryland 21403.

[Mr. Briden] My name is David Briden. I am the Chemistry and Health Physics Superintendent for the Davis-Besse Nuclear Station. My business address is Toledo Edison Company, 300 Madison Avenue, Toledo, Ohio 43652.

[Mr. Hendron] My name is David M. Hendron. I am a Vice President of Woodward Clyde Consultants, a firm that specializes in geotechnical engineering. My business address is 11 East Adams Street, Suite 1500, Chicago, Illinois 60603.

[Dr. Herdendorf] My name is Dr. Charles E. Herdendorf. I am a Professor of Zoology, Geology and Natural Resources at the Ohio State University, and I am the Director of the Center for Lake Erie Area Research. My business address is Center for Lake Erie Area Research, The Ohio State University, 484 W. 12th Avenue, Columbus, Ohio 43210.

[Mr. Hetherington] My name is Richard Hetherington. I am the Marketing Manager for Epicor, Incorporated. My business address is P. O. Box 598, Fort Washington, Pennsylvania 19034.

[Dr. Jackson] My name is Dr. William B. Jackson. I am a Professor Emeritus of Biological Sciences at Bowling

Green State University. My business address is Bowling Green State University, Bowling Green, Ohio 43403.

[Dr. Linnemann] My name is Dr. Roger E. Linnemann. I am Vice Chairman and Chief Medical Officer of Radiation Management Corporation and am also an Associate Clinical Professor of Radiology at the Univesity of Pennsylvania School of Medicine. My business address is Radiation Management Corporation, 3508 Market Street, Philadelphia, Pennsylvania 19104.

[Dr. Reutter] My name is Dr. Jeffrey M. Reutter. I am Associate Director of the Franz Theodore Stone Laboratory, Assistant Director of the Center for Lake Erie Area Research, and Adjunct Assistant Professor of Zoology and Natural Resources at the Ohio State University. My business address is the College of Biological Sciences, 484 West 12th Avenue, Columbus, Ohio 43210.

[Ms. Scott-Wasilk] My name is Jennifer Scott-Wasilk. I am the Envircnmental and Emergency Preparedness Manager for the Davis-Besse Nuclear Station. My business address is the Toledo Edison Company, 300 Madison Avenue, Toledo, Ohio 43652.

[Mr. Swim] My name is Theo S. Swim. I am the Civil/Structural Engineering Manager for the

Davis-Besse Nuclear Station. My business address in the Toledo Edison Company, 300 Madison Avenue, Toledo, Ohio 43652.

[Dr. Till] My name is Dr. John E. Till. I am a health physicist and President of Radiological Assessments Corporation. My business address is Route 2, Box 122, Neeses, South Carolina 29107.

[Mr. Wallace] My name is David M. Wallace. I am Lead Nuclear Projects Manager for the Davis-Besse Nuclear Station. My business address is the Toledo Edison Company, 300 Madison Avenue, Toledo, Ohio 43652.

Q2. Would each of you briefly describe your professional qualifications and expertise, and the subject of your testimony.

A2. [Mr. Briden] I hold a bachelor of science degree in chemistry from Upper Iowa University, and a master of science degree in radiological health from Temple University. I have 24 years experience in health physics, radiochemistry, and chemistry. My resume is attached as an exhibit to the written testimony. In this proceeding, I will provide background information on the waste to be buried at Davis-Besse, and on plant systems that produce and handle the waste.

[Mr. Swim] I am a civil engineer. I hold a bachelor of science degree in civil engineering from the University of Illinois. I am registered as a Professional Engineer in the State of Illinois, and I have 10 years' engineering experience. A summary of my professional qualifications is attached as an exhibit to the written testimony. My testimony will address the Presiding Officer's questions 1 and 2, on the location and configuration of the burial site. I will also discuss design features that protect the burial site against erosion, which is the subject of the Presiding Officer's question 5.

[Ms. Scott-Wasilk] I hold a B.S. degree in biology from Wayne State University, an M.S. degree in zoology from the University of Michigan, and an M.S. engineering sciences degree in environmental engineering from the University of Toledo. A summary of my professional qualifications is attached as an exhibit to the written testimony. I have been responsible for environmental monitoring at Davis-Besse since 1978 and will be responsible for monitoring the burial site once it is constructed. My testimony will address the Presiding Officer's question 3, which concerns the Navarre Marsh, and question 20, concerning how the burial site will be operated.

[Dr. Herdendorf] I am a limnologist. I hold bachelor of science and master of science degrees in geology from Ohio University, and a doctorate degree in zoology (limnology) from Ohio State University. I have been involved in the study of the Lake Erie area for approximately twenty years. A summary of my professional qualifications is attached as an exhibit to the written testimony. My testimony will address the Presiding Officer's question 3, concerning the Navarre Marsh, and questions 4 and 5, which relate to flooding and erosion.

[Mr. Hendron] I hold a bachelor of science degree in civil engineering from the University of Kentucky, and a master of science degree in soil and rock mechanics from the University of Illinois. I have twenty years' experience in the field of geotechnical engineering, and for the last seven years I have been involved in more than 25 moderate to large sized waste management projects throughout the United States. A summary of my professional qualifications is attached as an exhibit to the written testimony. In response to the Presiding Officer's questions 6 through 8, I will discuss the geology and hydrology at the burial site.

[Dr. Jackson] I hold a bachelor of arts and a master of arts degree in zoology from the University of Wisconsin, and a doctorate of science from the Johns Hopkins University School of Hygiene and Public Health. I have over thirty years' experience in environmental research and studies. A summary of my professional qualifications is attached as an exhibit to the written testimony. In this proceeding, I will discuss the terrestrial plants and animals at Davis-Besse, in response to the Presiding Officer's question 9 on endangered species.

[Dr. Reutter] I hold a bachelor of science and master of science degree in fisheries management, and a doctorate degree in biological limnology and fisheries biology from the Ohio State University. I have studied the aquatic ecology of Lake Erie for over a decade. A summary of my professional qualifications is attached to the written testimony. In response to the Presiding Officer's question 9 on endangered species, I will discuss aquatic biota.

[Mr. Bland] I hold a bachelor of science degree in physics and a master of science degree in nuclear science, both from the Georgia Institute of Technology. I have worked as a health physicist for twelve years. A

summary of my professional qualifications is attached as an exhibit to the written testimony. I will respond to the Presiding Officer's questions 10 through 16, which relate to dose calculations.

[Dr. Till] I hold a bachelor of science degree in engineering from the U.S. Naval Academy, a master of science degree in health physics from Colorado State University, and a doctorate degree in nuclear engineering from the Georgia Institute of Technology. I am a member of the National Council on Radiation Protection and Measurements and a member of the Radiation Advisory Committee to the U.S. Environmental Protection Agency. A summary of my professional qualifications is attached as an exhibit to the written testimony. I conducted a peer review of Mr. Bland's analyses and will so testify. I will also comment on whether the low levels of radioactivity in the waste would have an impact on biota.

[Dr. Linnemann] I hold a bachelor of arts degree, a bachelor of science degree, and a medical degree from the University of Minnesota. I performed my medical internship and residency at Walter Reed Army Hospital, where I specialized in radiology. I have been involved in the fields of radiology and health physics for over

twenty years. A summary of my professional qualifications is attached to the written testimony. I will discuss whether the doses calculated by Mr. Bland would have any appreciable effect on human health.

[Dr. Bennett] I earned a bachelor of science degree in chemical engineering from Queen's University in Kingston, Ontario, and master of science and doctor of philosophy degrees, also in chemical engineering, from the University of Michigan. I have taught chemical and biochemical engineering for approximately 20 years. I have been involved in numerous studies on water pollution control and hazardous wastes. A summary of my professional qualifications is attached as an exhibit to the written testimony. I will address the Presiding Officer's question 17, concerning the chemical content of the water supply treatment sludge.

[Mr. Hetherington] I hold a bachelor of science degree in chemistry from Temple University. I have been active in ion-exchange and water treatment fields for over forty years. I have authored numerous papers on ion-exchange technology and hold a number of patents relating to the application of ion-exchange resins. I am currently employed by Epicor, which provides the ion-exchange resins used at Davis-Besse. A summary of

my professional qualifications is attached. My testimony will address the Presiding Officer's questions 18 and 19. I will discuss whether the resins are chemically or biologically degradable.

[Mr. Wallace] I hold a bachelor of science degree in construction engineering from the Lawrence Institute of Technology, a masters in business administration from Eastern Michigan University, and am presently pursuing a Ph.D in education at the University of Toledo. I am a Professional Engineer registered in Ohio and six other states. A summary of my professional qualifications is attached as an exhibit to the written testimony. Along with Ms. Scott-Wasilk, I will address the Presiding Officer's question 20, concerning how the burial site will be operated.

Q3. Mr. Briden, would you please describe the waste to be buried at Davis-Besse?

A3. [Mr. Briden] The waste consists principally of water supply treatment sludge. This waste is discharged to a lined basin on the Davis-Besse site, where the waste settles to the bottom. Ion-exchange resins contaminated with very low levels of radioactivity are also discharged to the basin.

Q4. What is the water supply treatment sludge?

A4. [Mr. Briden] The Davis-Besse station has its own water supply treatment facility. The water supply treatment facility purifies lake water both for use in plant systems and for personal use. The sludge consists of silt, minerals, and other suspended solids removed from the lake water plus water treatment chemicals. It is not a toxic substance.

Q5. For what purpose are the resins in question used at the Davis-Besse plant?

A5. [Mr. Briden] They are used to demineralize the water in the secondary system.

Q6. What is the secondary system?

A6. [Mr. Briden] A Pressurized Water Reactor (PWR), like Davis-Besse, has two principal systems: the primary system and the secondary system. In the primary system, heat produced in the reactor is carried away by the circulating primary coolant (water). The coolant passes through steam generators, where the heat is transferred across tubes to water in the secondary system. The water in the secondary system turns to steam

which drives turbines. The turbines drive a generator which produces electricity. The physical separation between the primary system and the secondary system provides a barrier for the control of the radioactive material. The secondary system remains essentially non-radioactive.

Q7. Why is the secondary side water demineralized?

A7. [Mr. Briden] Strict water quality requirements must be maintained to ensure the continued efficient and reliable operation of the secondary system, particularly the steam generator tubes. Without the demineralization, mineral deposits could eventually build up in and corrode both the steam generators and the turbine.

Q8. Please describe the demineralization process.

A8. [Mr. Briden] Demineralization occurs in the Condensate Demineralizer System. The Condensate Demineralizer System consists of four vessels. Inside each vessel are perforated tubes which are coated with powdered ion-exchange resin. Water enters the vessel on the outside of the tubes, flows through the powdered resins to the inside of the tubes, and exits the vessel. The

coating of powdered resins is held in place by the pressure of the water flowing through the tubes.

The powdered ion-exchange resin consists of a mixture of anion and cation resins. The cation resin removes impurities with a positive valence. The anion resin removes impurities with a negative valence.

Q9. How do these resins become radioactively contaminated?

A9. [Mr. Briden] While the secondary system is separated from the radioactive primary system, primary to secondary system leakage can occur through the steam generator tubes. In March, 1981, Davis-Besse experienced its first (and to date only) steam generator tube leak. Prior to this event, there had been no primary-to-secondary leakage; the secondary side of the plant was not contaminated. After the leak, the plant was shut down and the leak repaired. During the leak clean-up period, the secondary-side clean-up resins contained levels of radioactive material that required offsite disposal as a radwaste. Since then, very low levels of radioactive contaminants have continued to accumulate on the Condensate Demineralizer resins. Much of this radioactive material is residual radioactivity introduced into the secondary system during

the tube leak. With time, the activity has continued to leach out of the system from initial tube leak deposits. An additional source of the activity is from very minor leaks or weeps in the steam generator experienced during system thermal expansions and contractions. These same thermal expansions and contractions could also contribute to the dissolution of the deposited radioactive material in the secondary system.

Q10. How often are the resins replaced?

A10. [Mr. Briden] The volume of resins injected into each Condensate Demineralizer vessel is small -- about 20 cubic feet. Because the volume is small, the resins are replaced weekly.

Q11. When resins are removed, where are they transferred?

A11. [Mr. Briden] The resins are transferred from the Condensate Demineralizer vessel to the Condensate Demineralizer Backwash Receiving Tank. If the resins satisfy predetermined criteria, they then are transferred from the Condensate Demineralizer Backwash Receiving Tank to the settling basin. The transfer is conducted as a water-resin slurry in approximately 10,000 gallons of water.

Q12. Describe the testing that is done before a batch of contaminated resins may be discharged to the settling basin.

A12. [Mr. Briden] Each batch of secondary-side resin is sampled and analyzed by gamma spectroscopy for radioactive material prior to being discharged to the settling basin. The level of activity of each radionuclide detected is quantified. If the radionuclide concentrations are higher than acceptable, the resins are not sent to the settling basin, but are treated as radwaste.1/

Q13. How radioactive is the waste in the settling basin?

A13. [Mr. Briden] The level of radioactivity in the waste in the settling basin is extremely low. Concentrations of radionuclides in the waste are lower than those levels permitted by the NRC in water discharged to the Lake. Granite is more radioactive.

1/ The limiting concentrations are discussed further below in response to the Presiding Officer's question 12.

II. Responses to the Presiding Officer's Questions

1. What Final Location on the Davis-Besse Site Has Been Selected For Waste Burial?

Q1-1. Please describe the location that Toledo Edison has selected for waste burial.

A1-1. [Mr. Swim] The burial ground will be located in the south central portion of the Davis-Besse site, approximately 2000 feet south of the switchyard and approximately 1200 feet east of State Route 2. The location is shown in Figure 1-1, which is attached to the written testimony.

Q1-2. Is this location final?

A1-2. [Mr. Swim] The location shown in Figure 1-1 is the one that Toledo Edison has selected and intends to use. The location, however, is contingent on its approval in this proceeding and on obtaining a Permit to Install (PTI) from the State of Ohio.

Q1-3. What is the justification for the location selected?

A1-3. [Mr. Swim] The location of the burial ground was chosen as an area that is unlikely to be

disturbed by any future construction on the Davis-Besse site. The burial site will be a minimum of 100 yards from any frequently occupied area. In accordance with Ohio requirements, the site will be over 1000 feet from any water well (not counting Toledo Edison's observation and monitoring wells), and will be located at least 200 feet from any stream or lake (including the drainage ditch to the east of the burial site). The burial ground will not be within a floodway.2/ In addition, the burial ground is situated in an area with favorable geologic conditions.

2/ A floodway is the channel of the water-course and those portions of the adjoining flood plains which are required to convey the regional 100 year flood. Ohio Admin. Code § 3745-27-01(F).

Davis-Besse Nuclear Power Station

Oak Harbor, Ohio

July, 1986

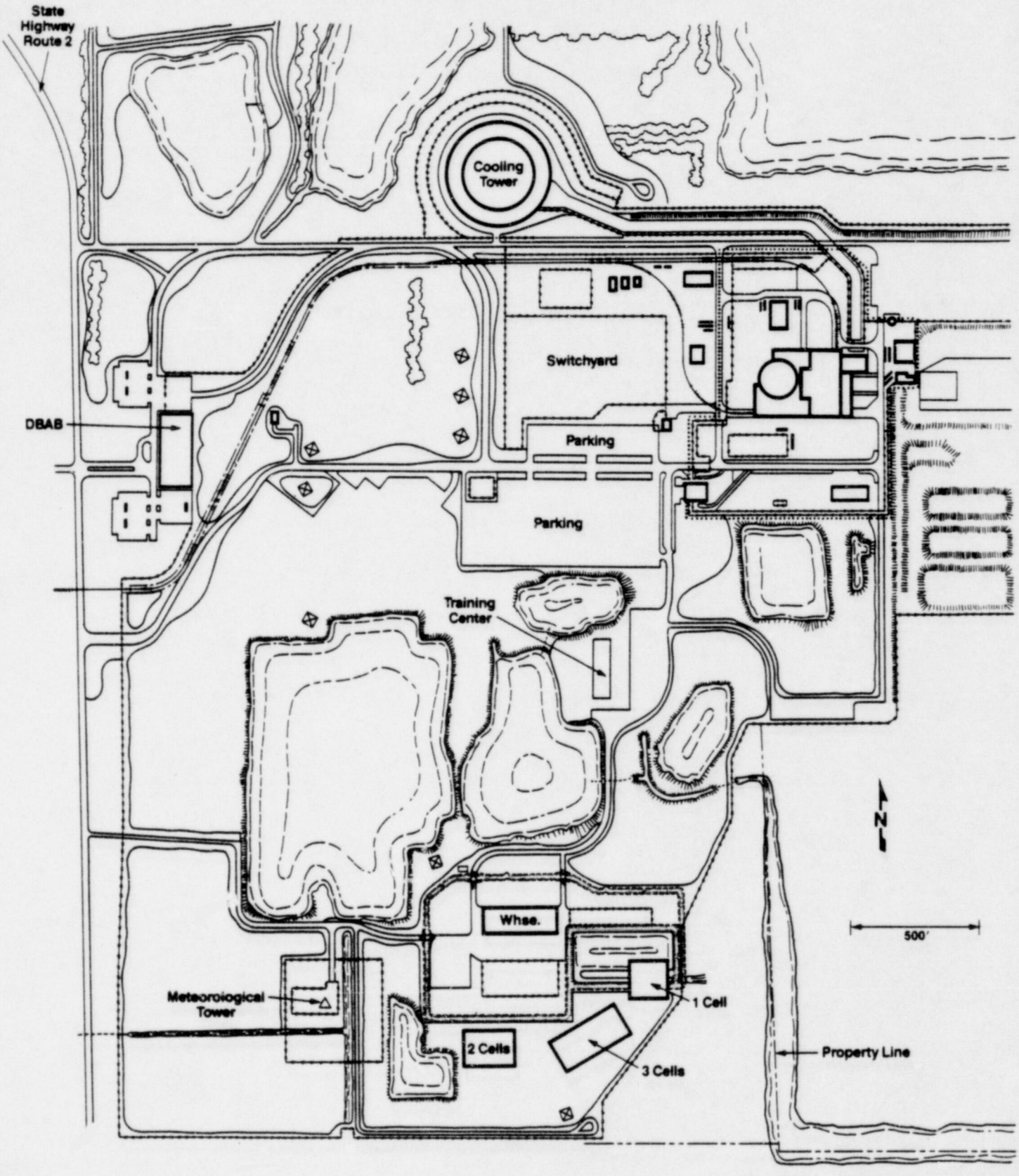


Figure 1-1

2. What Will Be the Dimensions of the Waste Burial Site in its Final Configuration (After 30 Years)?

Q2-1. How will the waste be buried?

A2-1. [Mr. Swim] Toledo Edison intends to empty the settling basin six times over the life of the plant. There will therefore be six lots of waste buried at the burial site. Each lot will be buried in a separately constructed square cell so as not to disturb previously buried lots.

To provide flood protection and to maintain a suitable distance between the waste and groundwater in the underlying aquifer, Toledo Edison intends to partially elevate the cells. The walls of the cells will be constructed to serve as dikes and will be rip-rapped. Toledo Edison also plans to equip each cell with a four-foot thick liner. From bottom to top, the liner will be composed of a 2-1/2 foot thick layer of compacted clay, a synthetic impervious membrane, a one foot layer of graded gravel for leachate collection, and a six inch layer of compacted clay. Each cell will be capped with a two to four foot thick cover consisting of a lower, compacted-clay

layer, a sand or gravel filter layer, and an upper layer of top soil.

Some cells will adjoin others. Where a new cell is constructed adjoining a pre-existing cell, the adjoining cells will share the dike between them.

The first three cells will be adjoining, and will be constructed in the center of the burial site. The next two cells will adjoin each other and will be constructed to the west of the first three cells. These two cells will not be connected to the first three because transmission lines pass between the two- and three-cell units. The last cell will be constructed next to the northeast corner of the first three cells. The layout is shown in Figure 2-1.

Q2-2. How was the layout determined?

A2-2. [Mr. Swim] The layout was effectively dictated by the siting criteria that I previously described and by the necessity of keeping unencumbered a maintenance corridor for the transmission lines passing overhead.

Q2-3. What are the dimensions of a typical cell?

A2-3. [Mr. Swim] The dimensions of a typical single square cell are illustrated in Figure 2-2. The inner base of the cell is approximately 45 feet x 45 feet, and is about 3 feet below land surface. From the base, the inner sides of the cells slope upward and outward at a 3:1 grade to the top of the surrounding dikes. The top of the cell (not including the cover) is approximately 98 feet x 98 feet, and is about 5-3/4 feet above land surface. From the top of the cell, the dikes slope downward and outward at a 3:1 grade to land surface. From toe of dike to toe of dike, each cell is 162 feet x 162 feet.

Q2-4. Please explain how you determined the dimensions of each cell.

A2-4. [Mr. Swim] The interior volume of the cell must encompass the volume of the lot of waste to be buried. This is the principal constraint. With this constraint, we designed the cells to minimize their area and the amount of earthwork needed to construct the cells. There were several additional constraints. First, the excavation

for the cell could not go below elevation 567 International Great Lakes Datum (IGLD). If the excavation were deeper, groundwater in the underlying aquifer, which is under pressure, might disturb the overlying sediments. With the cells having a four-foot thick liner, this constraint put the base of the cell at elevation 571 IGLD (over three feet below land surface). Second, slopes had to remain 3:1 or less to prevent erosion. Third, the top of the cell had to be above flood level, and we chose elevation 579 to 580 IGLD as a conservative height. Finally, we determined that making the cells square resulted in the minimal amount of earthwork. These constraints and considerations produced the dimensions shown on Figure 2-2.

Q2-5. What are the dimensions of the multicell units?

A2-5. [Mr. Swim] As I stated, when cells are adjoining, they are constructed to share the dike between them. Therefore, the dimensions of the multicell units are not simple multiples of the dimensions of a single cell. Taking this into consideration, the dimensions of the 3-cell unit will be approximately 395 feet by 162 feet, and the

dimensions of the 2-cell unit will be approximately 278 feet by 162 feet.

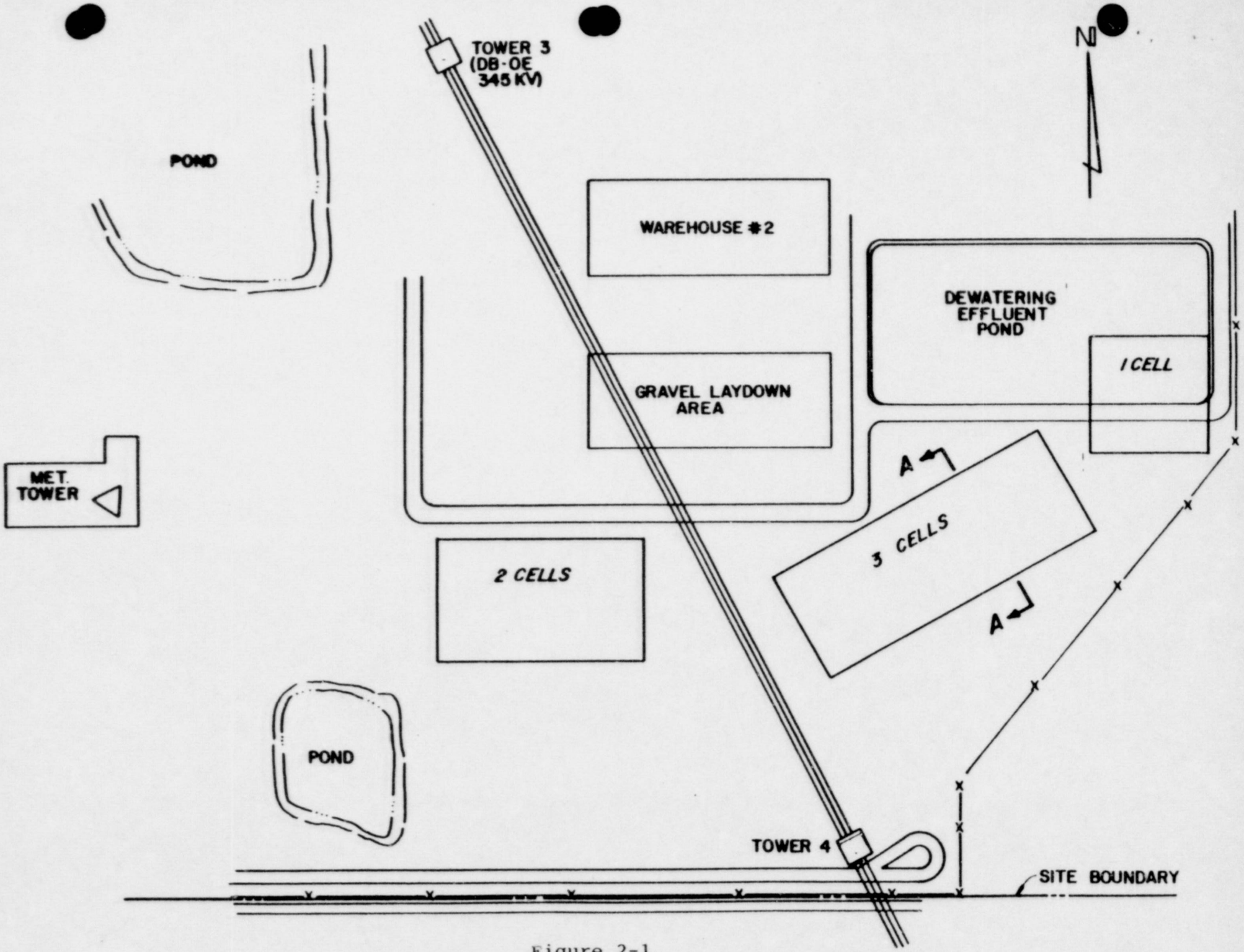
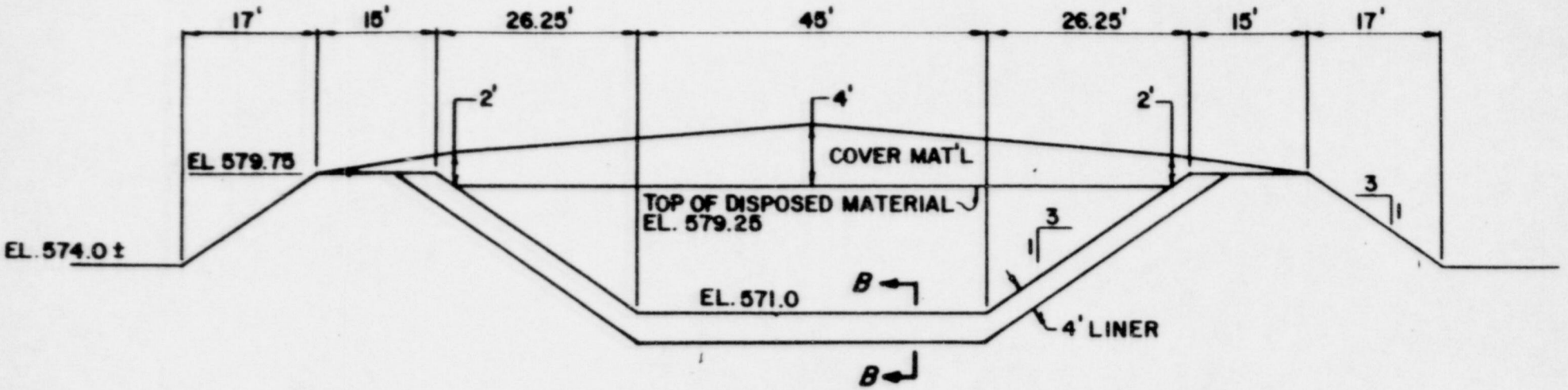
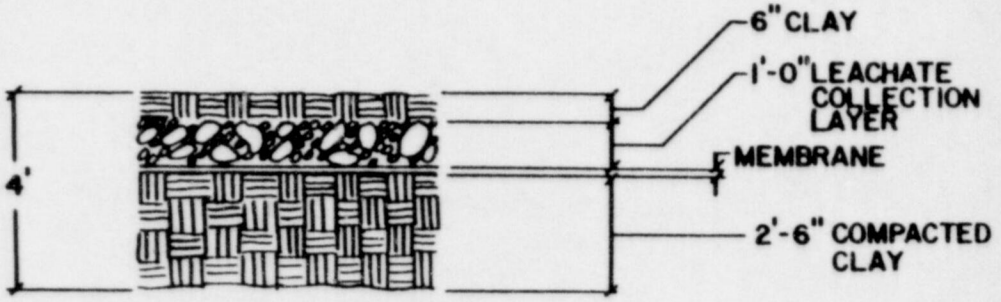

TOWER 3
(DB-OE
345 KV)
N
POND
WAREHOUSE #2
DEWATERING
EFFLUENT
POND
1 CELL
GRAVEL LAYDOWN
AREA
A
MET.
TOWER
3 CELLS
A
2 CELLS
POND
TOWER 4
SITE BOUNDARY

Figure 2-1



SECTION 'A-A'



SECTION 'B-B'

Figure 2-2

3. Is the Waste Burial Site Located Within the Bounds of the Navarre Marsh? Provide a Description of the Burial Site Relative to the Marsh.

Q3-1. What is the "Navarre Marsh"?

A3-1. [Ms. Scott-Wasilk] Originally, the Navarre Marsh referred to the marshland within the Navarre tract. The Navarre tract was 524 acres that was at one time a private hunt club and was subsequently acquired by the U.S. Fish and Wildlife Service. The bounds of the Navarre tract are shown in Figure 3-1.

In 1968, Toledo Edison acquired the Navarre tract from the U.S. Fish and Wildlife Service in exchange for the Darby Marsh (a marsh about eight miles to the southeast). As part of this transaction, Toledo Edison leased back to the U.S. Fish and Wildlife Service 447 acres of the Navarre tract, and also leased to the U.S. Fish and Wildlife Service 135 acres north of the site. Toledo Edison further agreed to allow the U.S. Fish and Wildlife Service to operate and control an additional 33 acres of the Navarre tract. Under these leases and agreements, the U.S. Fish and Wildlife Service now manages all the

marshland in the Navarre tract. This marshland, plus the 135 acres north of the site, are now called the Navarre Marsh unit of the Ottawa National Wildlife Refuge.

Q3-2. Is the burial site located within the bounds of the Navarre Marsh unit of the Ottawa National Wildlife Refuge?

A3-2. [Ms. Scott-Wasilk] No. The closest approach of the dike around the cell nearest to the Navarre Marsh unit will be approximately 400 feet west of the Navarre Marsh unit.

Q3-3. What is the biological definition of a marsh?

A3-3. [Dr. Herdendorf] A marsh is defined by the presence of aquatic plants (hydrophytes), which indicate that at some point during the growing season the soil was saturated. The three types of aquatic vegetation that determine the existence of a marsh are emergent (for example, cattails and bulrushes), floating leaf type (for example, water lily), and submerged (for example, water milfoil, coontail, or pond weed). Professor Milton W. Weller of the Department of Entomology, Fisheries and Wildlife at the University of

Minnesota in his book entitled Freshwater Marshes: Ecology and Wildlife Management,3/ defines freshwater marshes as follows:

> Any undisturbed low spot that will hold water of a few inches to a few feet over soil forms a suitable basin for the invasion of water-tolerant, rooted, perennial, soft-stemmed plants such as sedges, cattail, and bulrush. This basin is now a marsh, and it in turn attracts other forms of life. The term marsh is also applied to typical marsh vegetation that may be distributed as patches or strips along the shallow edges of lakes, seashores, or rivers.

Q3-4. Do any governmental agencies have definitions for what constitutes a marsh?

A3-4. [Dr. Herdendorf] Yes. All marshes are wetlands. The U. S. Army Corps of Engineers defines wetlands as prescribed in Executive Order 11990, signed by President Carter in May 1977, to be "those areas that are inundated or saturated by surface or ground water with a frequency and

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3/ M. W. Weller, Freshwater Marshes: Ecology and Wildlife Management 147 (University of Minnesota Press, Minneapolis, 1981).

duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."4/ For Lake Erie, the U. S. Army Corps of Engineers has established an elevation of 572.8 feet IGLD (which is the mean high water mark) as the demarkation between coastal marshes and terrestrial environments.

The U. S. Department of Interior, Fish and Wildlife Service defines wetlands as "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. . . . [W]etlands must have one or more of the following attributes: (1) at least periodically, the land supports predominantly hydrophytes [aquatic plants], (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil [i.e. bedrock] and is

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4/ 33 C.F.R. § 323.2(c). See also E. L. Horwitz, U. S. Council on Environmental Quality, Our Nation's Wetlands, an Interagency Task Force Report 70 (1978). The U.S. Environmental Protection Agency uses the same definition. 40 C.F.R. § 122.2(g).

saturated with water or covered by shallow water at some time during the growing season of each year." The term wetlands includes a variety of areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs.5/

Ohio State University, under contract to the U.S. Fish and Wildlife Service, has developed an inventory of all wetlands on the Great Lakes. Ohio State University also prepared an inventory of all wetlands along Lake Erie under contract to the National Oceanographic and Atmospheric Administration. This was published as Report No. 287 of the Center for Lake Erie Area Research, "Environmental Sensitivity Index (ESI) Maps for the Lake Erie System" by Fay and Herdendorf. As conservative criteria for wetlands, both inventories used those areas designated as marsh on the United States Geological Survey Lacarne topographic map and areas below elevation 575 (USGS) (equivalent to 573.5 IGLD).

5/ L. M. Cowardin, V. Carter, F. C. Golet, and E. T. LaRoe, U. S. Dept. Interior, Fish and Wildlife Service, Office of Biological Service, Classification of Wetlands and Deepwater Habitats of the United States, FWS/OBS-79/31, p.3 (1979).

Q3-5. Under any of these definitions, does the burial site fall within a marsh?

A3-5. [Dr. Herdendorf] No. On June 9, 1986, Dr. Richard T. Fisher, Botanist and Professor/Chairman Emeritus of the Department of Biological Sciences at Bowling Green State University, and I examined the burial site in order to characterize the type of vegetation present. The vegetation consisted primarily of grasses, shrubs, and other terrestrial plant types. The site did not contain the prevalent growth of hydrophytes typical of a freshwater marsh. The nearest area containing aquatic vegetation is 25 feet away along the fence line east of the area where the 1-cell waste burial unit will be built. Furthermore, the site is above elevation 574 IGLD, is therefore not a wetland or a marsh under the U.S. Army Corps of Engineers' definition, and was not mapped as marsh on the USGS Lacarne topographic map. As shown in Figure 3-2, the NOAA study determined that the burial site was outside the marsh area. Therefore, the burial site is not a marsh under any of the definitions properly used for this geographic area.

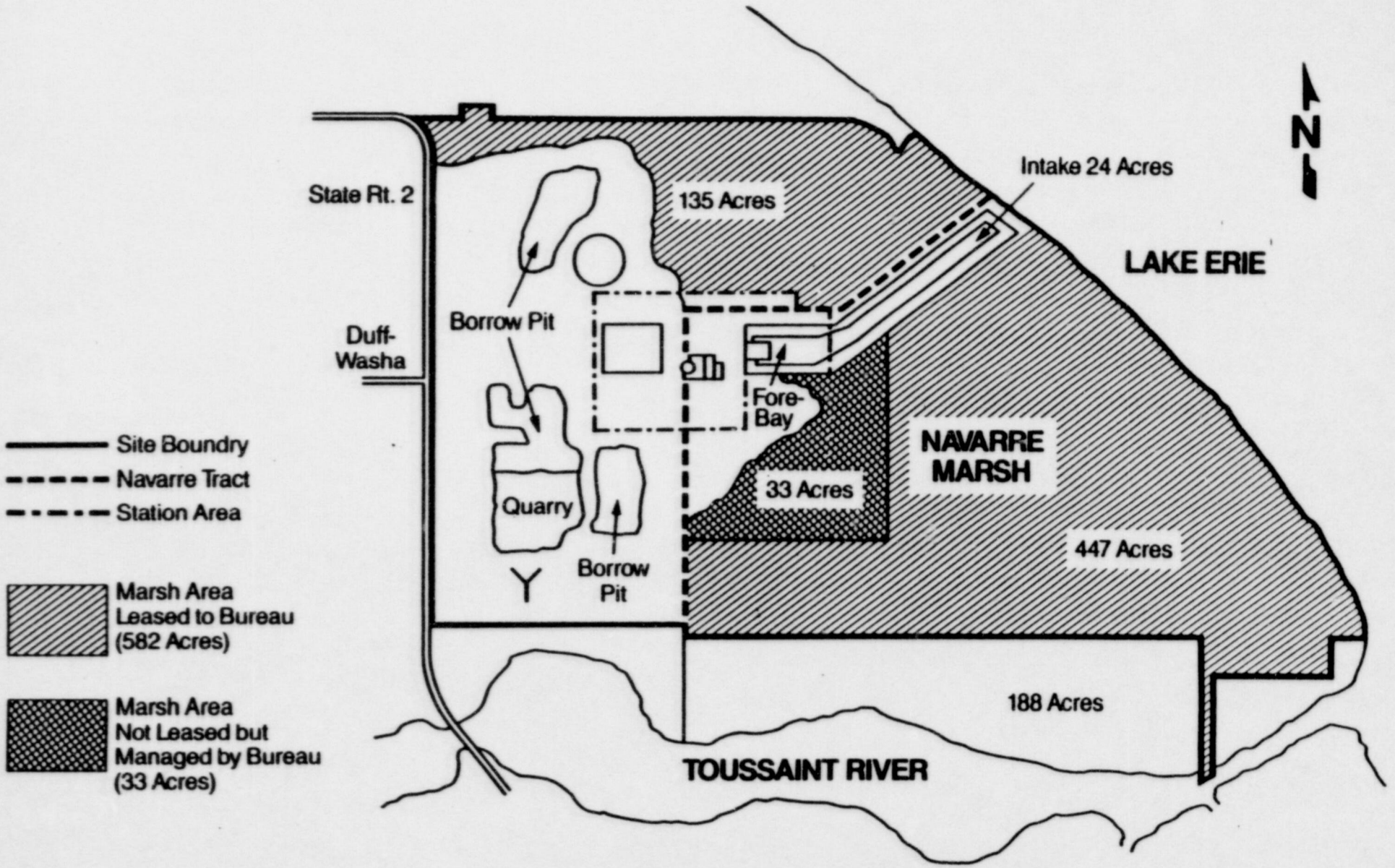

Figure 3-1

Total Site 954 Acres
Total Tract 524 Acres
Station Area 56 Acres

Figure 3-2

ESI MAP # 25

Lacarne, Ohio

4. What Is the Observed Flooding Frequency at the Waste Burial Site?

Q4-1. Please describe the evaluation of flooding at Davis-Besse and the burial site that has been conducted by Toledo Edison.

A4-1. [Dr. Herdendorf] The static water levels in the western basin of Lake Erie are affected by long term and annual cyclic variations in the mean monthly level from the mean low water level, and short period variations in the daily level from the monthly mean level due to wind tides and seiches. In conjunction with the NRC's licensing of the Davis-Besse plant, Toledo Edison investigated the subject of lake levels. The results of the investigation are presented in the Davis-Besse Final Safety Analysis Report.6/ For this proceeding, I re-examined data on lake levels and flooding, including the most recent data, to determine the likelihood of the burial site becoming flooded.

6/ Davis-Besse Nuclear Power Station, Final Safety Analysis Report, § 2.4.2.

Q4-2. What record of Lake levels exists?

A4-2. [Dr. Herdendorf] Water level records for Lake -- Erie have been gathered since 1860. Various planes of reference have been used during the period of record, and each of these reference planes has a correction factor which must be applied when converting to IGLD levels. Current lake levels are measured by the National Oceanic and Atmospheric Administration at a number of gauges positioned around the lake. The data obtained by NOAA is analyzed and published monthly by the U.S. Army Corps of Engineers.

The Davis-Besse site is located approximately midway between two lake level gauges -- one at Toledo and the other at Marblehead. Lake levels are not uniform across the Lake, but exhibit lengthwise and transverse variations due to wind tide and seiche. The maximum lake levels are observed at the west end of the Lake (that is, at Toledo Harbor), while the center of the Lake is a wind tide node (a point in the lake were no wind tide change in lake level occurs). The Davis-Besse site is located about 80% of the way from the wind tide node to Toledo, and wind

tide variations (storm surges) are therefore about 80% of those recorded at Toledo. Data from 1983 to 1986 (Table 4-2) shows this ratio to be 78.6%.

Q4-3. Has the burial site flooded in the past?

A4-3. [Dr. Herdendorf] The general area around the burial site has been observed flooded, but specific hydrological records of such events have not been maintained.

Q4-4. Historically, how many times do you estimate the burial area has flooded?

A4-4. [Dr. Herdendorf] To determine the past history of flooding at the proposed burial site, I analyzed water level records for Toledo Harbor for the last 50 years. I was assisted by Mr. James P. Byrne, Engineering Technician, Toledo Project Office, U.S. Army Corps of Engineers. I focused only on flooding events with a water level greater than 6.0 feet above low water datum (LWD) at Toledo. A level of 6.0 feet above LWD is equivalent to an elevation of 574.6 IGLD. Lesser floods could not have affected the burial site.7/

7/ Table 4-2 illustrates that a storm surge elevation of 574.6 at Toledo would have a storm surge elevation of 573.8 to 574.3 at

(Continued Next Page)

To determine whether floods above 574.6 IGLD at Toledo would have coincided with a flooding event at the burial site, I examined the storm surge associated with each flood at Toledo, multiplied it by 0.786 to reflect the lesser surge that would occur at Davis-Besse, and added the corrected surge to the mean monthly still water elevation at the time of the flood. This provided me an estimate of the lake level at Locust Point (where the Davis-Besse station is located) during each of the flooding events recorded at Toledo.

I also considered the avenue for flooding at the burial site. Because of existing protective dikes, flooding of the proposed burial site would occur indirectly, via the Toussaint River and drainage ditches. This causes flood waters at the site to lag considerably behind conditions on the open coast, by at least an estimate four hours. This estimate is based on the observation

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(Continued)

Davis-Besse. For my analysis, I used 574.3 IGLD (5.7 feet above LWD) as the minimum base elevation of the burial site.

that storm surges which reached a projected elevation of 574.52 (May 9, 1986) and 574.65 (June 17, 1986) at Locust Point and had durations of four hours (see Table 4-1) did not result in flooding of the burial site. I therefore determined that flooding events that resulted in a Lake level of 574.3 at Locust Point for over four hours were the ones that might have flooded the burial site. The results of my analysis are shown on Table 4-1. Flooding events which were calculated to have potentially resulted in flooding of the burial site are marked with an asterisk. There are an estimated 25 such events over the 50 year period examined. The total duration of flooding was probably less than the equivalent of 12 days, or about 2.4 days every ten years.

Q4-5. Did the water level for any of the floods exceed the elevation of the dikes which Toledo Edison intends to build around the waste disposal cells?

A4-5. [Dr. Herdendorf] No. The highest water level at the site is estimated at 576.05 IGLD (7.45 feet above LWD on April 8, 1974). Toledo Edison's design calls for dikes to elevation 579.75 feet IGLD, or 11.15 feet above LWD.

Q4-6. What is the likelihood that the burial site will be flooded in the future?

A4-6. -- [Dr. Herdendorf] The likelihood that the burial site will be flooded in the future depends upon the future level of Lake Erie and the probability and magnitude of storm surges raising the Lake above its still water surface. Any prediction of Lake level beyond the immediate future would be speculative. The U.S. Army Corps of Engineers, for example, only predicts Lake levels six months in advance.

However, the Lake mean water level for the month of June, 1986, was the highest level during the period since 1860, when the U.S. Army Corps of Engineers began to maintain records. At Toledo, the monthly average for June reached 573.72.

Flooding occurs from the storm surge which would raise the Lake level above its still water mark. Northeast storms generated by low-pressure systems passing south of the Lake shore are largely responsible for the wind setup (or storm surge) which raises water levels at the west end

of the Lake.8/ Severe storms can raise the still water surface of the Lake approximately 4.2 feet in the vicinity of Locust Point (April 27, 1966).

Professor Charles H. Carter of the Department of Geology, University of Akron, analyzed water level records for western Lake Erie storm surges which occurred during the period from 1939 to 1980.9/ The study included all storm events which caused the daily mean water level to exceed the monthly mean water level by one foot. Based on the 179 storm surges during that period, Professor Carter determined the following expected frequency and magnitude per year for storm surges at the western end of Lake Erie.

8/ C. H. Carter and D. E. Guy, Ohio Dept. Nat. Res., Div. of Geol. Survey. Rept. Invest. 115, Lake Erie Shore Erosion and Flooding, Erie and Sandusky Counties, Ohio: Setting, Processes and Recession Rates from 1877 to 1973 (1980).

9/ C. H. Carter, Frequency Magnitude, and Duration of Storm Surges at the West End of Lake Erie, Abst. 29th Conference on Great Lakes Research, International Assoc. Great Lakes Res., University of Toronto (1986).

Surge Height	Frequency
1-2 feet	1.5/year
2-3	2.0
3-4	0.6
Greater than 4	0.1

The number of storm surges per year ranged from 1 to 7, and duration ranged from 1 to 3 days. 85% of the storm surges lasted 1 day, 13% lasted 2 days, and 2% lasted 3 days. Based upon these data, occasional flooding of the burial site's base elevation could occur.

Q4-7. Would you expect the burial structure itself to be flooded?

A4-7. [Dr. Herdendorf] The cells themselves would not be flooded. As described earlier, the waste burial cells will be surrounded by dikes. The elevation of the dike portion of the burial structure would be at least 579.75 feet (IGLD). This is 3.7 feet above the estimated flood level of the highest storm on record (April 8, 1974) and 1.84 feet above the Lake level which would occur if the maximum historical surge took place at today's record still water levels.10/ Flood

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10/ The June 1986 still water level of 5.12 above LWD plus the maximum storm surge of 4.19 in April 1966 would yield on elevation of 577.91 IGLD.

waters would not penetrate the dikes.

The U.S. Army Corps of Engineers predicts the following maximum water levels at Locust Point:11/

Maximum Elev. (IGLD)		Feet Above LWD
10 yr-flood	574.8	6.2
50 yr-flood	575.7	7.1
100 yr-flood	576.0	7.4
500-yr-flood	576.7	8.1

Q4-8. If the base elevation of the burial site were to be flooded, wouldn't flood waters come in contact with the sides of the burial structure?

A4-8. [Dr. Herdendorf] Yes. However, I would not expect that such an event would cause any significant erosion to the burial structure.

Q4-9. Why not?

A4-9. [Dr. Herdendorf] First of all, the burial structure would not be exposed to any significant wave attack. In a storm which could create flooding of the burial site, waves would be coming towards the site from the northeast. However, the marsh

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11/ U.S. Army Corps of Engineers, Report on Great Lakes Open-Coast Flood Levels, Plate 4 (Feb. 1977).

area and the outer marsh dikes, which are rip-rapped, would absorb the brunt of storm's waves. I would not expect any significant waves to reach the burial site. Wave heights near the burial site would also be limited by the physical properties of waves. The maximum wave height in shallow water is given by the equation

$$H = 0.78(z)$$

where H is the wave height and z is the still water depth. Since the still water depth near the burial site would be small, even in a flooding situation, the wave height would also be small.

If flooding were to occur, I would expect that water levels would gradually rise around the base of the burial structure. This gradual rise would not be expected to cause significant erosion of the burial structure. It is worth noting that erosion along the Lake Erie shore generally does not occur in the absence of wave attack, even during severe storms. Erosion has typically occurred at bluff areas, which are undercut by wave action, not still water.

TABLE 4.1. LAKE ERIE FLOODING EVENTS FROM 1936 - 1986 WITH WATER LEVELS GREATER THAN 6.0 FT ABOVE LOW WATER DATUM AT TOLEDO, OHIO

DATE	PERIOD OF FLOODING TIME	HRS	MAX ELEV ABOVE LWD	TIME OF MAX	STILLWATER (MO MEAN ELEV)	SURGE HT	PROJECTIONS FOR LOCUST PT SURGE HT	PROJECTIONS FOR LOCUST PT MAX ELEV ABOVE LWD
				YEAR:1948				
1 Jan	1700-2000	4	6.40	1800	1.85	4.55	3.57	5.42
13 Apr	2100-2200	2	6.10	2100	3.00	3.10	2.44	5.44
				YEAR:1952				
22 Mar*	1600-2000	5	6.50	1700-1900	3.70	2.80	2.20	5.90
24 Apr	1000-1100	2	6.10	1100	4.13	1.97	1.55	5.68
30 Jun	2400	1	6.00	2400	4.18	1.82	1.43	6.00
				YEAR:1954				
29 Dec	1800-1900	2	6.30	1800	2.25	4.05	3.18	5.43
				YEAR:1955				
14 May	1100-1200	2	6.30	1100	3.57	2.73	2.14	5.71
				YEAR:1961				
14 Jun	1300	1	6.15	1300	2.87	3.28	2.58	5.45

TABLE 4.1 (CONTINUED)

DATE	PERIOD OF FLOODING TIME	HRS	MAX ELEV ABOVE LWD	TIME OF MAX	STILLWATER (MQ MEAN ELEV)	PROJECTIONS FOR LOCUST PT SURGE HT	SURGE HT	MAX ELEV ABOVE LWD
					YEAR:1966			
27 Apr*	0700-1300	7	7.07	1000	1.74	5.33	4.19	5.93
					YEAR:1969			
6 Jul	0840	1	6.01	0840	4.05	1.96	1.54	5.59
					YEAR:1972			
6 Apr	1200-1300	2	6.20	1200	3.45	2.75	2.16	5.61
13-14 Nov*	2200-1200	15	7.40	1000	3.53	3.87	3.04	6.57
					YEAR:1973			
31 Jan	1300-1400	2	6.43	1300	3.31	3.12	2.45	5.76
5 Feb	1500	1	6.00	1500	3.95	2.05	1.61	5.56
17 Mar	0600-0900	4	6.20	0800	4.31	1.89	1.48	5.79
8-9 Apr*	0900-1300, 1000-1800	14	8.07	1600	4.76	3.31	2.60	7.36
27 May	1500-1700	3	6.13	1200	4.64	1.49	1.17	5.81
29 Oct	1300-1400	2	6.10	1300	3.50	2.60	2.04	5.54

TABLE 4.1. (CONTINUED)

DATE	PERIOD OF FLOODING TIME	HRS	MAX ELEV ABOVE LWD	TIME OF MAX	STILLWATER (NO MEAN ELEV)	SURGE HT	PROJECTIONS FOR LOCUST PT SURGE HT	PROJECTIONS FOR LOCUST PT MAX ELEV ABOVE LWD
				YEAR:1974				
12 Mar*	0900-1400	6	7.10	1200	4.39	2.71	2.13	6.52
28-29 Mar*	1400-0800	19	7.15	1900	4.39	2.76	2.17	6.56
8 Apr*	0900-1600	8	8.27	1200	4.43	3.84	3.02	7.45
8 May	1300-1600	4	6.59	1500	4.75	1.84	1.45	6.20
19 May	1500	1	6.10	1500	4.75	1.35	1.06	5.81
23 Jun	1000-1100	2	6.10	1000	4.65	1.45	1.14	5.79
30 Nov	2000	1	6.00	2000	2.86	3.14	2.47	5.33
1 Dec*	0700-2400	18	6.90	1930	3.23	3.67	2.88	6.90
				YEAR:1975				
14 Mar*	0400-1400	11	7.92	0900	3.98	3.94	3.10	7.08
2 Apr*	1600-2400	9	6.66	2200	3.95	2.71	2.13	6.08
24-25 Sep*	1900-0200	8	6.64	2330	3.88	2.76	2.17	6.05
17-18 Oct*	1700-0800	16	7.00	0300	3.58	3.42	2.69	6.27
				YEAR:1976				
1-2 Mar*	2200-0300	6	6.84	2330	4.06	2.78	2.19	6.25
4 Apr	0600-0800	3	6.20	0700	4.39	1.81	1.42	5.81
24-25 Apr*	1500-2300, 0100-0500, 1000-1800	23	7.20	1400	4.39	2.81	2.21	6.60
6 May	2300-2400	2	6.10	2400	4.31	1.79	1.41	5.72

TABLE 4.1. (CONTINUED)

DATE	PERIOD OF FLOODING TIME	HRS	MAX ELEV ABOVE LWD	TIME OF MAX	STILLWATER (MO MEAN ELEV)	PROJECTIONS FOR LOCUST PT SURGE HT	SURGE HT	MAX ELEV ABOVE LWD
					YEAR:1977			
29 May	0300-0400	2	6.40	0300	3.46	2.94	2.31	5.77
5 Dec	1200-1500	4	6.66	1345	2.22	4.44	3.49	5.71
					YEAR:1978			
4 May*	1400-1800	5	6.40	1515	3.90	2.50	1.97	5.87
					YEAR:1980			
14 Apr*	0400-1300	10	8.08	0856	3.87	4.21	3.31	7.18
					YEAR:1982			
5-6 Apr*	1700-0300	11	7.36	0130	3.65	3.71	2.92	6.57
					YEAR:1983			
21 Mar	0400-0700	4	6.75	0545	3.13	3.62	2.85	5.98
28 Jun*	1100-1600	6	6.63	1400	4.09	2.54	2.00	6.09
11 Aug	2300-2400	2	6.10	2300	3.97	2.13	1.67	5.64

TABLE 4.1. (CONTINUED)

DATE	PERIOD OF FLOODING TIME	HRS	MAX ELEV ABOVE LWD	TIME OF MAX	STILLWATER (MO MEAN ELEV)	PROJECTIONS FOR LOCUST PT SURGE HT	SURGE HT	MAX ELEV ABOVE LWD
				YEAR:1984				
27-28 Feb	0700-1100	5	6.40	0900	3.09	3.31	2.60	5.69
28 Feb*	1700-0200	10	7.19	2245	3.09	4.10	3.22	6.31
29 Mar	0200-0400	3	6.20	0300	3.56	2.64	2.08	5.64
28 May*	1300-1800	6	6.99	1630	3.66	3.33	2.62	6.28
				YEAR:1985				
30-31 Mar*	1800-1300	20	7.90	0900	4.36	3.54	2.78	7.14
1 May	1500-1700	3	6.20	1700	4.76	1.44	1.13	5.89
2 May*	0400-1100	8	6.20	0800	4.76	1.44	1.13	5.89
11 Jun*	1300-1900	7	6.40	1600	4.63	1.77	1.39	6.02
22-23 Jul	2400-0200	3	6.00	0100	4.43	1.57	1.23	5.56
31 Jul	2400	1	6.00	2400	4.43	1.57	1.23	5.66
27-28 Nov*	2400-1200	13	6.83	0500	4.14	2.69	2.11	6.25
				YEAR:1986				
6-7 Feb*	1400-0900	20	7.64	0130	4.36	3.28	2.58	6.94
11 Mar	1400-1500	2	6.23	1400	4.52	1.71	1.34	5.86
12 Mar	1600-1900	4	6.20	1900	4.52	1.68	1.32	5.84
4 Apr	1700-1800	2	6.16	1800	4.82	1.34	1.05	5.87
14 Apr	1800-2000	3	6.37	1900	4.87	1.50	1.18	6.05
9 May	0700-1000	4	6.19	0900	4.91	1.28	1.01	5.92
5 June	2100	1	6.06	2100	5.15	0.91	0.72	5.87
17 June	0300-0600	4	6.29	0500	5.15	1.14	0.90	6.05
20 June	0300	1	6.08	0300	5.15	0.93	0.73	5.88

* Storms which likely resulted in flooding of the proposed burial site (Lake Erie elevation of 574.3 or greater at Locust Point for a period greater than 4 hours).

TABLE 4.1 (CONCLUDED)

EXPLANATION

All times given as Eastern Standard Time (EST). A level of 6.0 ft above Low Water Datum (LWD) is equivalent to an elevation of 574.6 (IGLD) or 576.1 (MSL). The U.S. Army Corps of Engineers (1977) ostimates that the water level during a flood-event will be approximately 0.3 to 0.4 feet lower at Locust Point than the level in Maumee Bay. Earlier records indicate that flooding events at 6.0 ft above LWD may also have occurred in 1913, 1917-1919, 1929, and 1930. Data in this table were compiled with the assistance of Mr. James P. Byrne, NOAA/USACOE water level gauge observer, Toledo Project Office, U.S. Army Corps of Engineers and Dr. Charles H. Carter, Professor of Geology, University of Akron.

TABLE 4.2. LAKE ERIE WATER LEVEL COMPARISON DURING STORM EVENTS AT TOLEDO AND MARBLEHEAD

DATE	TOLEDO			MARBLEHEAD			DIFFERENCE AT MARBLEHEAD		
	Max Elev	Time	Surge Ht (ft)	Max Elev	Time	Surge Ht (ft)	Surge Ht (ft)	Time (hrs)	Percent Lower
				YEAR:1983					
21 Mar	575.35	0545		N/A	N/A		-	-	-
28 Jun	575.23	1400	2.54	573.77	1300	1.08	1.46	1.0	42.5%
11-12 Aug	574.70	2300		N/A	N/A		-	-	-
				YEAR:1984					
28 Feb	575.00	0900		N/A	N/A		-	-	-
28 Feb	575.79	2245		N/A	N/A		-	-	-
29 Mar	574.80	0300		N/A	N/A		-	-	-
28 May	575.59	1630	3.33	574.13	1500	1.87	1.46	1.5	56.2%
				YEAR:1985					
31 Mar	576.50	0900	3.54	574.85	1100	1.89	1.65	2.0	53.4%
1 May	574.80	1700	1.44	574.17	1400	0.81	0.63	3.0	56.3%
2 May	574.80	0800	1.44	574.23	0700	0.87	0.57	1.0	60.4%
11 Jun	575.00	1600	1.77	574.33	1800	1.08	0.67	2.0	61.0%
22-23 Jul	574.60	0100	1.57	573.91	2400	0.88	0.69	1.0	56.0%
31 Jul	574.60	2400	1.57	573.85	2200	0.82	0.75	2.0	52.5%
28 Nov	575.43	0500	2.69	574.44	0500	1.77	0.99	0.0	65.8%
				YEAR:1986					
6-7 Feb	576.24	0130	3.28	574.80	2400	1.84	1.44	1.5	56.1%
11 Mar	574.83	1400	1.71	574.07	1300	0.95	-.76	1.0	55.5%
12 Mar	574.80	1900	1.68	574.03	1700	0.91	0.77	2.0	54.2%
4 Apr	574.76	1800	1.34	574.02	1900	0.60	0.74	1.0	44.8%
14 Apr	574.97	1900	1.50	574.05	2100	0.58	0.92	2.0	38.7%
9 May	574.79	0900	-	N/A	N/A		-	-	-
					mean		0.96 ft.	1.5 hr	53.8%

TABLE 4.2 (CONCLUDED)

EXPLANATION

This table shows the difference in Lake Erie water level, surge height, and time of maximum elevation at Marblehead and Toledo and the percent (%) of the total storm surge height recorded at Toledo which was experienced at Marblehead. A longitudinal storm surge (resulting from wind set-up of the lake surface down the long axis, N 67° E) at Marblehead must travel an additional 14.5 miles to reach Locust Point or an additional 31.5 miles to reach Toledo. This additional distance accounts for the approximately 1 ft difference in wind set-up between Marblehead and Toledo, with Toledo always being higher usually an hour or more later. The difference in maximum elevations for 1983 to 1986 storms ranged from 0.57 to 1.65 ft with a mean storm surge height at Marblehead being equivalent to 53.8% of the mean storm surge height at Toledo. Because Locust Point is approximately mid-way between Marblehead and Toledo, the anticipated difference in maximum elevations of storm surges would be 0.3 to 0.8 ft lower than Toledo or a mean surge height of 78.6% of the surge height at Toledo. Therefore a storm surge elevation of 574.6 ft (6.0 ft above LWD) at Toledo would have an elevation of approximately 573.8 to 574.3 at Locust Point.

5. What Soil Erosion From Storms Has Been Actually Observed At or Near the Disposal Site?

Q5-1. To what extent would flooding of the burial site cause soil erosion?

A5-1. [Dr. Herdendorf] As I have just explained, I would not expect flooding to cause any significant erosion of the burial structure.

Q5-2. What soil erosion has been caused at the burial site by past flooding?

A5-2. [Dr. Herdendorf] There are no records addressing soil erosion caused at the burial site by past flooding. On April 28 and June 9, I inspected the burial site to determine if past flooding events had caused any soil erosion. My examination of water level records for Toledo had indicated that the site may have flooded on a number of occasions during the last five years. During my inspection of the burial site, I found the land surface well vegetated. I found no surficial evidence of erosion.

Q5-3. What soil erosion has occurred in similar areas along Lake Erie?

A5-3. -- [Dr. Herdendorf] I know of no documented cases of soil erosion on well vegetated land due to flooding by Lake Erie of inland areas. Due to the slow rise of the water level, shallow depth, and minimal flow velocities in such areas, erosion of grassed surfaces would not be expected to occur.

Q5-4. What steps will be taken to minimize the possibility of erosion of the burial structure?

A5-4. [Mr. Swim] Grasses will be planted on the burial structure. The U.S. Soil Conservation Service has recommended that Toledo Edison use a mixture of Kentucky blue grass and Lidino white clover, and the Soil Conservation Service is preparing a protective vegetation design plan which Toledo Edison intends to follow.12/

In addition, the waste burial cells will be surrounded and protected by dikes. To prevent

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12/ Toledo Edison will not use fertilizer on the burial structure, since fertilizer could adversely affect the marshes nearby.

erosion of the dikes, the slopes of the dikes will be rip-rapped. Furthermore, there will be either a small graded stone layer or filter cloth under the rip-rap.

Q5-5. How effective will these steps be in minimizing the possibility of erosion?

A5-5. [Dr. Herdendorf] Vegetative cover is a well-recognized and effective method for preventing erosion. For example, the U.S. Department of Agriculture recommends seeding with local species of grass to handle run-off at speeds of 3 to 6 feet per second.13/ These velocities are greater than I would anticipate at the burial site. The rip-rapping of the dike slopes and the use of an inner graded stone layer or filter cloth are also a recognized and effective means to protect the dikes against erosion. I would expect these steps to be highly effective in preventing erosion.

13/ U.S. Dept. of Agriculture, Farmers' Bulletin 2171 "How to Control a Gully" (1973).

6. What Is the Direction of Groundwater Flow From the Burial Site Relating to Lake Erie, Navarre Marsh, and the Toussaint River?

Q6-1. Please describe the geologic formations underlying the burial site?

A6-1. [Mr. Hendron] Complete descriptions of geologic formations underlying the site are given in numerous documents prepared for the Davis-Besse site. In summary, the site is underlain from the ground surface by two primary glacial soil deposits. These glacial soil deposits are about fifteen feet thick in the area of the burial site, and they overlie a relatively flat-lying dolomite bedrock formation of Silurian geologic age.

The upper glacial soil deposit is a glaciolacustrine clay. The deposit consists of a relatively homogeneous plastic silty clay that contains minor amounts of silts and fine sands within the clay matrix. The topmost foot contains organic material and is referred to as topsoil within the area being considered for the land disposal site. The glaciolacustrine deposit is only partially saturated (i.e. the voids between the individual clay particles are only

partially filled with water). A summary of typical physical properties of the glaciolacustrine deposit in the area being considered for the land disposal site is given in Table 6-1.

The lower glacial soil deposit is a glacial till deposit. The deposit consists of a relatively homogeneous mixture of moderately plastic clay, silt, sands, and gravels. The overall matrix of the deposit is controlled by the high clay-silt content. Within the area being considered for the land disposal site, the glacial till deposit is also only partially saturated. A summary of average estimated physical properties of the glacial till deposit in the area being considered for the land disposal site is given in Table 6-1.

The upper 15 to 20 feet of the dolomite bedrock formation is a relatively pure massive dolomite. This upper layer is underlain to depths of several tens of feet by a laminated dolomite formation that contains subslant inverts of gypsum and anhydrite in addition to the dolomite.

Q6-2. In which of these formations does groundwater flow occur?

A6-2. [Mr. Hendron] Measurable groundwater flow in the area being considered for land disposal occurs only in the bedrock formation. The dolomite bedrock formation contains several systems of joints, fissures, and vugs. Weathering and solution have opened some of these systems. The dolomite formation is fully saturated and is relatively permeable (i.e. the formation can convey fluids in response to application of either a natural or man-made gradient) because of the higher permeability of the system of joints, fissures, and vugs. The dolomite formation is the uppermost regional groundwater aquifer underlying the Davis-Besse site.

The glacial soil deposits are only partially saturated and are highly clay rich. Consequently, these soils are highly impermeable (i.e. have a low hydraulic conductivity). The geologic studies conducted at Davis-Besse indicate that the glaciolacustrine deposit and the till deposit contain no systematic open joints, fissures, sand strata, or other non-uniformities that could serve as groundwater flowpaths. So far as can be

determined, neither the glaciolacustrine or till deposit are considered or used as an aquifer in the area. To the contrary, these deposits are an aquitard, confining the underlying artesian aquifer in the bedrock.

Q6-3. How were these geologic and hydrologic characteristics determined?

A6-3. [Mr. Hendron] The geologic and hydrologic characteristics of the glacial deposits and bedrock were determined through extensive investigations and studies of the Davis-Besse site for the siting and licensing of Units 1, 2, and 3. During these studies, hundreds of borings, test pits, probes, pump tests, and other direct field tests were made throughout the site area (including the area being considered for the land disposal site), and tens of thousands of man hours were expended to evaluate the data obtained. The studies also included discussions with State geologists and a thorough review of the already available information.

In addition, a study was recently undertaken within the boundaries of the site being

considered for the land disposal site. The investigations included five borings through the soil deposits, physical property testing of drive samples taken from the boreholes, and laboratory permeability testing of tube samples taken from the boreholes. Typical results of these tests are summarized in Table 6-1.

Q6-4. What is the direction of groundwater flow from the burial site?

A6-4. [Mr. Hendron] Groundwater flow occurs only in the bedrock that is found approximately 15 feet beneath the existing ground surface. There is no present measurable groundwater flow that occurs horizontally or vertically through the soil deposits that overlie the bedrock.

The gradient of groundwater in the bedrock is extremely small (1 to 2 ft/mile). As a result, the rate of flow of groundwater is so small that it is difficult to measure, and the precise direction of groundwater flow beneath the burial site cannot be determined reliably. However, groundwater flow can be determined on a larger scale. On a regional basis, groundwater most

probably discharges very slowly into Lake Erie several miles offshore when the bedrock outcrops in the lake and to a smaller extent into the Toussaint River where bedrock is probably intermittently exposed by erosion of the overlying soil deposits by the river. One would expect the same flow to occur beneath the burial site.

Q6-5. How was the regional direction of groundwater flow determined?

A6-5. [Mr. Hendron] Groundwater direction in the bedrock was determined through installation of and measurements in numerous monitoring wells throughout the Davis-Besse site area since 1968. The lack of groundwater flow through glacial soil deposits is established through physical measurements of soil properties, the analyses of bedrock groundwater contours in relation to physical site characteristics, and the results of long-term observation of the lack of water movement through clay soil excavations during construction of Unit 1 facilities.

Q6-6. Does groundwater under the burial ground flow toward the Navarre Marsh?

A6-6. -- [Mr. Hendron] Groundwater probably flows through the bedrock beneath the burial site toward the Navarre Marsh, in response to a very low gradient directed towards Lake Erie.

Q6-7. Does groundwater in the bedrock communicate with the Navarre Marsh?

A6-7. [Mr. Hendron] No, the glacial clay deposits separate the marsh from the bedrock and prevent communication. Moreover, even if there were communication, the direction of flow would be from the marsh into the bedrock, and not from the bedrock into the marsh.

Table 6-1

Summary of Typical Physical Properties of Glacial Soil Deposits in Land Disposal Area

Property	Glaciolacustrine Deposit	Glacial Till Deposit
Thickness Range, ft	5 to 8	9 to 12
Natural Water Content, %	24	24
Liquid Limit	50	33
Plastic Limit	23	17
Dry Unit Weight, lbs/ft^3	97 to 99	112 to 118
Permeability, cm/sec	Less than 10^{-9}	Less than 10^{-7}
Gradation		
% Gravel	0	3
% Sand	5	20
% Silt	30	33
% Clay	65	34

7. What Is the Depth to Bedrock of Unconsolidated Glacial Deposits at the Burial Site?

Q7-1. What is the thickness of the glaciolacustrine deposit?

A7-1. [Mr. Hendron] In the area of the burial site, the glaciolacustrine deposit is five to eight feet thick.

Q7-2. What is the thickness of the underlying glacial till?

A7-2. [Mr. Hendron] The thickness of the glacial till deposit in the area being considered for the burial site ranges from nine to twelve feet.

Q7-3. How were these thicknesses determined?

A7-3. [Mr. Hendron] The thicknesses were determined largely on the basis of the five most recent borings in the burial site area. These ranges agree very well with results of numerous other borings conducted at the site during previous studies.

Q7-4. What will be the distance between the bottom of the waste disposal cells and the top of the bedrock?

A7-4. [Mr. Hendron] The presently proposed bottom of the waste disposal cells (that is, the bottom of the liner) is to be at elevation 567. The

elevation of the top of bedrock is at elevation 560. The distance between the bottom of the waste disposal cells and the top of the bedrock will therefore be 7 feet.

8. What Is the Average Depth and Upper and Lower Range of the Water Table at the Disposal Site?

Q8-1. Please define the term "water table."

A8-1. [Mr. Hendron] The simplest definition of water table is the point of contact between the saturated and unsaturated geologic zones in the subsurface.14/ This definition is consistent with that in Ohio's Solid Waste Disposal Regulations, Ohio Administrative Code § 3745-27-01(AA).

Q8-2. Where in the formations under the burial site is the water table located?

A8-2. [Mr. Hendron] Calculations indicate that both the glaciolacustrine and glacial till deposits beneath the burial site are unsaturated. The bedrock deposit is saturated and water in the bedrock formation is confined. Consequently, the water table within the area being considered for the disposal site is the contact point between the glacial soil deposits and the top of the weathered bedrock zone. This contact generally occurs at approximately elevation 560.

14/ See R. Freeze and J. Cherry, Groundwater 39 (1979).

Q8-3. What will be the minimum distance between the bottom of the waste cells and the water table?

A8-3. --[Mr. Hendron] The present elevation of the bottom of the waste cells is elevation 567 and the elevation of the top of the water table is elevation 560. The distance between the bottom of the waste cells and the water table is 7 feet.

9. What Endangered Species of Plant or Animal Have Been Actually Observed on the Davis-Besse Site? What Critical Habitats for Endangered Species Exist on the Davis-Besse Site?

Q9-1. Please describe the investigations that have been conducted at the Davis-Besse site to determine the plants and animals on or in the vicinity of the site.

A9-1. [Dr. Jackson] From 1972 through 1980, environmental monitoring studies were conducted at the Davis-Besse site. As part of these studies, my associates and I studied terrestrial animal and plant communities at the site. Plant, mammal, and herpetile populations were examined. Bird populations were censused each season, and bird strikes at the cooling tower were monitored during spring and fall migration periods.

A9-1. [Dr. Reutter] Complementing Dr. Jackson's studies, Dr. Herdendorf and I conducted aquatic studies over the same nine-year period. The aquatic studies included a sampling program of fish and benthic organisms in Lake Erie near the site. A three-year

sampling program was conducted in the Navarre Marsh.

Q9-2. During these investigations, were any endangered species (plants or wildlife) found or observed on the Davis-Besse site?

A9-2. [Dr. Jackson] The 1974 environmental monitoring program at the Davis-Besse site found evidence of Chenopodium leptophyllum (slender goosefoot) near the current location of the cooling tower. This plant is now on the endangered species list prepared by the Division of Natural Areas and Preserves of the Ohio Division of Natural Resources, but is not on the Federal endangered species list. No plants or animals on the Federal endangered species list have been observed on the Davis-Besse site.

Q9-3. Has the slender goosefoot been found on the burial site?

A9-3. [Dr. Jackson] In June, 1986, a survey of the burial site was conducted by Dr. Richard T. Fisher, Botanist and Professor/Chairman Emeritus of the Department of Biological Sciences at Bowling Green State University.

Dr. Fisher found no evidence of the slender goosefoot, or of any other species listed on the State or Federal endangered species lists.

Q9-4. Have any endangered species been observed in Lake Erie in the immediate vicinity of the Davis-Besse plant?

A9-4. [Dr. Reutter] Four aquatic species on the State's endangered species list were found during the sampling program in Lake Erie: silver chub, silver lamprey, Great Lakes muskellunge, and lake sturgeon. Only one muskellunge and one sturgeon were found in eleven years of sampling.

Three benthic organisms listed by the State as "threatened" have been found in Lake Erie near the plant site. These are the deer toe clam, the knob shell clam, and the eastern sand shell clam.

No aquatic species on the Federal endangered species list have been found in this part of Lake Erie. No aquatic species on the Federal or State lists were found in the Navarre Marsh.

Q9-5. Would the construction or operation of the burial site have an adverse radiological effect on any of these species?

A9-5. [Dr. Till] The levels of radioactivity in the waste would have no discernible impact on aquatic species. Even if all the waste were deposited in the Lake at once, the radionuclide concentrations would be well below the maximum permissible concentrations for water in Part 20 of the NRC's regulations.15/ At these levels, the impact on aquatic species would be negligible.

Q9-6. Would the construction or operation of the burial site have any non-radiological impact on endangered or threatened aquatic species?

A9-6. [Dr. Reutter] There should be no such impact. Chemical analysis has shown the sludge to be below EPA EP toxicity limits. The only possible effect would be if the burial structure were somehow to be washed into Lake Erie. I can think of no mechanism which could cause this to happen. If the burial structure were somehow washed into

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15/ 10 C.F.R. Part 20, App. B, Table II, Column 2.

the Lake, there would be an increase in turbidity; but this would be insignificant in comparison to the turbidity resulting from the much greater amounts of soil which would be washed into the Lake from all other areas affected by the same postulated mechanism which caused the burial structure to be washed into the Lake.

Q9-7. Have any birds on the endangered species list been observed near the site?

A9-7. [Dr. Jackson] A bald eagle, which is on the Federal endangered species list, has been sighted over the Davis-Besse site on a few occasions. The nearest bald eagle nest is located approximately 1.5 miles south of the site.

Two birds on the State's endangered species list, the sharp-shinned hawk and the common tern, have been seen twice and several times, respectively.

The State of Ohio's petition for leave to intervene states that the American peregrine falcon, Kirtland's warbler, the King rail, and the upland sandpiper "inhabit the vicinity of the proposed burial site." The first two species are

on the Federal endangered species list while the latter two are on the State's endangered species list. None of these species was observed by our monitoring group at or near the Davis-Besse site. The peregrine falcon and the Kirtland's warbler do not nest in this area of Ohio.

Q9-8. Would the construction or operation of the burial site adversely affect the bald eagle, common tern or sharp-shinned hawk?

A9-8. [Dr. Jackson] The construction of the burial site would not remove or disturb any habitat for these species. The burial site is not a wooded area in which the hawk would exist, and it has no tall trees used for nesting by the eagle. The burial site will not be built on marsh, which could be used by the tern for feeding.

Operation of the burial site should similarly have no impact on these species. The disposal methods that Toledo Edison intends to use should prevent the waste from becoming biologically available (that is, it will remain immobile and unable to enter the food chain). If the waste were somehow mobilized, I still would

expect no effect. Birds are less sensitive to radiation than man, and as Mr. Bland's and Dr. Till's analyses have shown, the doses to man would be insignificant even if the waste were mobilized.

[Dr. Till] In fact, this is true for virtually all species. Man is the species most susceptible to adverse radiation effects. It is therefore generally assumed that if man is protected, so are all other species. Here, the radionuclide concentrations are too low to present any significant hazard to man, plant, or animal. Even if this waste were completely mobilized, the very low levels of radioactivity would have no observable environmental impact.

Q9-9. Have any terrestrial species on the endangered species list been observed at the Davis-Besse site?

A9-9. [Dr. Jackson] No. The spotted turtle, which is on the Ohio endangered species list, has been observed by others in marshes in the general area, but it was not observed by our monitoring group at the Davis-Besse site (including the Navarre Marsh).

Q9-10. Please define what is meant by the term "critical habitat."

A9-10. [Dr. Jackson] The term "critical habitat" for an endangered species is defined by Section 2 of the Endangered Species Act of 1973, 16 U.S.C. § 1532(5)(A), as:

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species.

Areas are designated as critical habitat by the U. S. Fish and Wildlife Service in accordance with the procedures set out in 50 C.F.R. Part 424. Areas presently designated as critical habitat are listed in 50 C.F.R. § 17.95.

Q9-11. Is the Davis-Besse site or any part of it a "critical habitat?"

A9-11. [Dr. Jackson] Neither the Davis-Besse site nor the surrounding area has been designated as critical habitat by the U. S. Fish and Wildlife Service. The burial site itself and the upland portion of the Davis-Besse site are not important to any species. The Lake Erie coastal marshland, including the Navarre Marsh, is important habitat for a number of species, and such marshland should be protected. However, I do not believe that the burial of waste at Davis-Besse would damage or have any adverse effect on the marsh.

10. What Will Be the Total Radionuclide Inventory of the Burial Site After 30 Years of Operation Under Expected Levels of Resin Contamination?

Q10-1. What is the present inventory of radionuclides in the settling basin?

A10-1. [Mr. Bland] Table 10-1 presents data for each batch of radioactively contaminated resins that has been discharged to the settling basin and includes the present inventory of each batch corrected for decay. Table 10-2 presents the cumulative radioactive levels in the settling basin.

As summarized in Table 10-2, a total of 0.0044 Curies has been sent to the settling basin. It is important to note that the radioactive material levels decrease with time due to the radioactive decay. As a result of decay, the total activity at present in the settling basin is 0.0031 Ci. Following decommissioning of the Davis-Besse site, Cs-137 will be essentially the only remaining radionuclide of the present inventory at about half of its current level.

Q10-2. What will be the total radionuclide inventory in the burial site at the expiration of the Davis-Besse operating license under expected levels of resin contamination?

A10-2. [Mr. Bland] Table 10-3 presents the expected activities in the burial site at termination of the Davis-Besse operating license (in 2011). The total expected activity is 0.013 Ci. This activity is essentially all cesium-137.

Q10-3. Explain how you calculated the total burial site inventory under expected levels of resin contamination.

A10-3. [Mr. Bland] I conservatively assumed that levels of activity in future resin batches will continue at previously measured levels (which were the result of a tube leak which is now repaired). I therefore took the present inventories in the settling basin as the inventories that would be produced and buried every five years. The expected radionuclide activities for each buried lot were decayed from the respective estimated burial date of each lot to the year 2011. The decayed activities of the lots were then summed.

Table 10-1

Calculated Settling Basin Resin Activity
as of April 1, 1986

			Initial Activity						Final Activity				
DATE	POL. (#)	VOLUME (ft3)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)	DIFF (4-1-86)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi
1-1-85	2	18	7.65E-2	-	-	-	-	454	7.43E-2	-	-	-	-
1-1-85	1	24	1.27E-1	-	-	-	-	454	1.23E-1	-	-	-	-
1-2-85	3	20	1.98E-1	-	-	-	-	453	1.92E-1	-	-	-	-
1-10-85	2	22	4.42E-1	9.78E-2	-	-	-	445	4.30E-1	6.49E-2	-	-	-
1-10-85	1	18	1.77E-1	-	-	-	-	445	1.72E-1	-	-	-	-
1-11-85	4	18	1.06E+0	1.68E-1	-	-	-	444	1.03E+0	1.12E-1	-	-	-
1-14-85	3	20	9.74E-1	1.56E-1	3.89E-2	-	-	441	9.47E-1	1.04E-1	1.46E-2	-	-
1-17-85	4	18	3.24E-1	4.36E-2	1.71E-2	-	-	438	3.15E-1	2.91E-2	6.48E-3	-	-
1-19-85	1	24	2.56E-1	-	-	-	-	436	2.49E-1	-	-	-	-
1-23-85	3	18	8.46E-1	1.40E-1	3.93E-2	3.28E-2	-	432	8.23E-1	9.39E-2	1.51E-2	2.81E-2	-
3-6-85	1	18	1.09E+1	2.40E+0	1.54E+0	2.25E+0	-	390	1.06E+1	1.67E+0	6.50E-1	1.96E+0	-
3-11-85	3	18	5.61E+0	-	-	-	-	385	5.47E+0	-	-	-	-
3-15-85	4	18	4.15E+0	7.75E-1	-	-	-	381	4.05E+0	5.46E-1	-	-	-
3-17-85	1	18	4.15E+0	-	8.46E-1	-	-	379	4.05E+0	-	3.65E-1	-	-
3-22-85	3,4	36	1.74E+1	2.74E+0	-	-	-	374	1.70E+1	1.94E+0	-	-	-
3-22-85	1	18	2.04E+0	-	-	-	-	374	1.99E+0	-	-	-	-
4-2-85	4	22	1.46E+1	1.77E+0	1.03E+0	-	-	363	1.43E+1	1.27E+0	4.59E-1	-	-
4-2-85	3	22	2.26E+1	3.45E+0	1.20E+0	-	-	363	2.20E+1	2.47E+0	5.37E-1	-	-
4-8-85	1	22	3.94E+1	5.68E+0	1.72E+0	-	-	357	3.86E+1	4.09E+0	7.78E-1	-	-
4-10-85	3	22	1.73E+1	2.24E+0	-	-	-	355	1.69E+1	1.61E+0	-	-	-
4-12-85	1	22	1.21E+1	-	-	-	-	353	1.19E+1	-	-	-	-
4-14-85	3	22	1.75E+1	3.08E+0	-	-	-	351	1.71E+1	2.23E+0	-	-	-
4-14-85	4	22	1.26E+1	2.33E+0	-	-	-	351	1.24E+1	1.69E+0	-	-	-
4-22-85	1	22	6.48E+0	-	-	-	-	343	6.34E+0	-	-	-	-
4-25-85	2	22	1.28E+1	2.98E+0	1.20E+0	-	-	340	1.25E+1	2.18E+0	5.65E-1	-	-
4-25-85	3	22	1.45E+1	2.60E+0	-	-	-	340	1.41E+1	1.90E+0	-	-	-
4-25-85	4	22	5.80E+0	-	-	-	1.85E+0	340	5.68E+0	-	-	-	6.63E
4-29-85	1	18	7.90E+0	-	-	-	-	336	7.73E+0	-	-	-	-
5-13-85	2	18	6.22E+0	-	7.75E-1	-	-	321	6.09E+0	-	3.80E-1	-	-
5-16-85	4	18	5.40E+0	-	-	-	-	318	5.30E+0	-	-	-	-
5-27-85	3	18	2.54E+0	-	1.78E+0	-	-	307	2.49E+0	-	9.00E-1	-	-
5-28-85	1	18	5.81E+0	-	-	-	-	306	5.70E+0	-	-	-	-
6-2-85	2	18	4.98E+0	-	-	-	-	302	4.89E+0	-	-	-	-
6-3-85	4	18	7.14E+0	1.44E+0	-	-	-	301	7.00E+0	1.09E+0	-	-	-
6-3-85	3	20	3.84E+0	-	-	-	-	301	3.77E+0	-	-	-	-
6-4-85	1	18	1.91E+1	-	-	-	-	300	1.88E+1	-	-	-	-
6-9-85	4	20	1.00E+1	-	-	-	-	295	9.84E+0	-	-	-	-
6-13-85	3	18	2.82E+0	-	-	-	-	291	2.77E+0	-	-	-	-
6-13-85	2	20	3.13E+0	-	-	-	-	291	3.07E+0	-	-	-	-
8-22-85	1,4	37	6.89E+0	-	-	-	-	221	6.80E+0	-	-	-	-
9-10-85	4	18	8.26E-1	-	-	-	-	202	8.15E-1	-	-	-	-

Table 10-1

Calculated Settling Basin Resin Activity
as of April 1, 1986
(continued)

			Initial Activity						Final Activity				
DATE	POL. (#)	VOLUME (ft3)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)	DIFF (4-1-86)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)
1-9-84	1,2	40	1.70E+0	-	-	-	-	811	1.61E+0	-	-	-	-
1-11-84	4	20	3.94E+1	5.60E+0	2.10E+0	-	-	809	3.74E+1	4.09E+0	3.49E-1	-	-
1-17-84	1	20	5.38E+1	9.20E+0	3.90E+0	-	-	803	5.11E+1	4.39E+0	6.56E-1	-	-
1-23-84	3	20	3.32E+1	7.00E+0	4.20E+0	-	4.20E+0	799	3.16E+1	3.36E+0	7.13E-1	-	1.68E-
1-25-84	1	20	2.34E+1	6.30E+0	2.20E+0	-	5.53E+1	797	2.22E+1	3.03E+0	3.75E-1	-	2.26E-
2-1-84	4	20	2.39E+1	8.02E+0	3.55E+0	-	-	789	2.27E+1	3.88E+0	6.16E-1	-	-
2-4-84	3	20	6.91E+0	-	2.71E+0	-	-	786	6.57E+0	-	4.74E-1	-	-
2-9-84	1	20	2.93E+1	8.29E+0	4.50E+0	-	-	781	2.79E+1	4.04E+0	7.94E-1	-	-
2-22-84	2	20	6.05E+0	-	-	-	-	768	5.76E+0	-	-	-	-
2-28-84	1	20	1.53E+1	4.07E+0	2.13E+0	-	-	762	1.45E+1	2.02E+0	3.92E-1	-	-
3-3-84	5	20	6.60E+0	-	-	-	1.30E+0	758	6.29E+0	-	-	-	7.78E-
3-6-84	3	20	2.57E+1	5.20E+0	3.10E+0	-	-	755	2.45E+1	2.60E+0	5.80E-1	-	-
3-3-84	4	20	5.70E+0	3.60E+0	-	-	-	758	5.43E+0	1.79E+0	-	-	-
3-16-84	4	20	1.25E+1	-	-	-	-	745	1.19E+1	-	-	-	-
3-19-84	3	20	3.33E+1	7.00E+0	2.90E+0	-	-	742	3.18E+1	3.54E+0	5.58E-1	-	-
3-17-84	1	20	7.50E+0	-	-	-	-	744	7.15E+0	-	-	-	-
3-12-84	2	20	1.09E+1	2.00E+0	1.40E+0	-	3.20E+0	749	1.04E+1	1.00E+0	2.65E-1	-	2.09E-
3-27-84	2	20	8.00E+0	-	1.40E+0	-	5.70E+0	734	7.64E+0	-	2.74E-1	-	4.32E-
3-24-84	1	20	2.55E+1	5.00E+0	-	-	-	737	2.43E+1	2.54E+0	-	-	-
5-8-84	3	20	4.73E+1	9.30E+0	-	-	-	692	4.53E+1	4.92E+0	-	-	-
5-16-84	4	20	1.04E+1	1.50E+0	1.20E+0	-	-	684	9.96E+0	7.99E-1	2.63E-1	-	-
5-15-84	2	20	-	5.10E+0	1.40E+0	-	-	685	-	2.72E+0	3.06E-1	-	-
5-11-84	1	20	2.87E+1	-	-	-	-	681	2.75E+1	-	-	-	-
4-29-84	3	20	6.60E+0	2.00E+0	-	-	-	701	6.31E+0	1.05E+0	-	-	-
4-23-84	4	20	7.10E+0	-	-	-	-	707	6.79E+0	-	-	-	-
5-31-84	2	20	6.42E-1	1.17E-1	3.02E-2	-	-	669	6.15E-1	6.33E-2	6.84E-3	-	-
6-13-84	1	20	1.61E-1	-	-	-	5.01E-2	656	1.55E-1	-	-	-	8.14E-
6-21-84	3	20	4.17E-2	2.67E-1	-	-	-	649	4.00E-2	1.47E-1	-	-	-
6-25-84	4	20	3.73E-1	-	4.95E-2	-	-	645	3.58E-1	-	1.18E-2	-	-
6-25-84	2	20	4.11E-2	-	-	-	-	645	3.95E-2	-	-	-	-
7-22-84	3	20	4.36E-2	-	-	-	-	617	4.20E-2	-	-	-	-
8-8-84	1	20	1.36E-1	-	2.50E-1	-	-	600	1.31E-1	-	6.60E-2	-	-
8-13-84	3	20	-	-	-	-	7.20E-2	595	-	-	-	-	2.13E
8-21-84	4	20	7.58E-2	-	-	-	-	587	7.30E-2	-	-	-	-
8-22-84	1	20	5.90E-2	-	2.47E-2	-	-	586	5.68E-2	-	6.74E-3	-	-
8-23-84	2	20	4.23E-2	-	-	-	-	585	4.08E-2	-	-	-	-
8-31-84	4	20	2.57E-2	-	-	-	-	577	2.48E-2	-	-	-	-
9-14-84	2	20	3.09E-2	-	-	-	-	563	2.98E-2	-	-	-	-
9-13-84	4	20	3.78E-1	1.06E-1	-	-	-	564	3.65E-1	6.28E-2	-	-	-
9-14-84	3	20	6.68E-2	-	-	-	-	563	6.44E-2	-	-	-	-
9-14-84	2	20	3.27E-1	7.90E-2	-	-	-	563	3.16E-1	4.71E-2	-	-	-
9-14-84	1	20	4.36E-1	1.05E-1	-	-	-	563	4.21E-1	6.28E-2	-	-	-

JSB ASSOCIATES

Table 10-1

Calculated Settling Basin Resin Activity
as of April 1, 1986
(continued)

DATE	POL. (#)	VOLUME (ft3)	Initial Activity Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)	DIFF (4-1-86)	Final Activity Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)
1-4-83	1	20	1.14E+1	-	6.40E+0	-	-	1181	1.06E+1	-	4.65E-1	-	-
1-14-83	3	20	1.28E+1	-	1.16E+1	-	-	1171	1.19E+1	-	8.62E-1	-	-
1-15-83	2	20	2.04E+1	-	1.00E+1	-	-	1170	1.89E+1	-	7.45E-1	-	-
1-17-83	5	20	2.22E+1	-	-	-	-	1168	2.06E+1	-	-	-	-
1-26-83	1	20	5.22E+1	1.36E+1	-	-	-	1159	4.85E+1	4.68E+0	-	-	-
1-27-83	1	20	2.41E+1	-	-	-	-	1158	2.24E+1	-	-	-	-
1-29-83	3	20	1.62E+1	-	-	-	-	1156	1.51E+1	-	-	-	-
3-9-83	2	20	1.47E+1	3.40E+0	8.00E+0	-	-	1117	1.37E+1	1.22E+0	6.70E-1	-	-
3-11-83	1	20	2.06E+1	8.20E+0	7.80E+0	-	-	1115	1.92E+1	2.94E+0	6.56E-1	-	-
3-16-83	3	20	1.02E+2	2.79E+1	1.65E+1	-	-	1110	9.49E+1	1.00E+1	1.40E+0	-	-
3-25-83	4	20	1.04E+1	-	-	-	-	1101	9.70E+0	-	-	-	-
3-31-83	3	20	1.70E+1	-	5.60E+0	-	1.54E+1	1095	1.59E+1	-	4.93E-1	-	3.40E-4
4-4-83	1	20	1.96E+1	-	1.13E+1	-	1.92E+1	1091	1.83E+1	-	1.00E+0	-	4.41E-4
4-9-83	3	20	7.50E+0	-	4.50E+0	-	-	1086	7.00E+0	-	4.04E-1	-	-
4-10-83	2	20	8.50E+0	-	7.80E+0	-	-	1085	7.94E+0	-	7.01E-1	-	-
4-19-83	4	20	1.34E+1	-	9.80E+0	-	8.90E+0	1076	1.25E+1	-	8.99E-1	-	2.37E-4
4-28-83	1	20	6.90E+0	-	4.20E+0	-	9.10E+0	1067	6.45E+0	-	3.93E-1	-	2.65E-4
5-2-83	3	20	1.41E+1	-	6.10E+0	-	7.10E+0	1063	1.32E+1	-	5.76E-1	-	2.15E-4
5-9-83	4	20	1.59E+1	-	4.50E+0	-	6.40E+0	1056	1.49E+1	-	4.32E-1	-	2.07E-4
5-12-83	2	20	1.78E+1	-	5.40E+0	-	5.40E+0	1053	1.67E+1	-	5.21E-1	-	1.80E-4
5-17-83	1	20	1.31E+1	3.70E+0	4.10E+0	-	7.10E+0	1048	1.23E+1	1.41E+0	4.00E-1	-	2.49E-4
5-26-83	2	20	5.10E+0	-	-	-	-	1039	4.78E+0	-	-	-	-
5-31-83	3	20	1.22E+1	-	-	-	-	1034	1.14E+1	-	-	-	-
6-9-83	4	20	4.50E+0	-	3.10E+0	-	-	1025	4.22E+0	-	3.19E-1	-	-
6-17-83	2	20	1.12E+1	4.70E+0	4.50E+0	-	-	1017	1.05E+1	1.84E+0	4.71E-1	-	-
6-22-83	3	20	5.87E+1	1.56E+1	1.11E+1	-	-	1012	5.51E+1	6.15E+0	1.17E+0	-	-
6-24-83	1	20	1.54E+1	4.50E+0	5.20E+0	-	-	1010	1.44E+1	1.78E+0	5.52E-1	-	-
6-30-83	4	20	6.70E+0	2.80E+0	3.70E+0	-	-	1004	6.29E+0	1.11E+0	3.98E-1	-	-
7-1-83	2	20	9.80E+0	-	4.50E+0	-	-	1003	9.20E+0	-	4.85E-1	-	-
7-2-83	1	20	6.40E+0	-	3.10E+0	-	-	1002	6.01E+0	-	3.35E-1	-	-
8-3-83	1	20	3.05E+1	5.80E+0	-	-	-	970	2.87E+1	2.38E+0	-	-	-
9-21-83	3	20	1.75E+1	5.60E+0	-	-	5.30E+0	921	1.65E+1	2.40E+0	-	-	6.43E-4
9-23-83	1	20	6.36E+1	1.67E+1	4.80E+0	-	-	919	6.00E+1	7.17E+0	6.24E-1	-	-
9-29-83	5	20	3.51E+1	1.19E+1	3.50E+0	-	3.10E+0	913	3.31E+1	5.14E+0	4.61E-1	-	4.07E-4
10-19-83	1	20	2.16E+1	8.60E+0	1.60E+0	-	-	893	2.04E+1	3.78E+0	2.20E-1	-	-
10-21-83	1	20	3.66E+1	1.12E+1	4.40E+0	-	-	891	3.46E+1	4.93E+0	6.09E-1	-	-
10-30-83	1	20	4.54E+1	1.40E+1	-	-	-	882	4.29E+1	6.22E+0	-	-	-
11-7-83	2	20	3.54E+1	1.31E+1	6.50E+0	-	-	874	3.35E+1	5.86E+0	9.34E-1	-	-
11-10-83	1,4	40	9.20E+0	-	-	-	-	871	8.71E+0	-	-	-	-
12-2-83	2	20	5.37E+1	1.37E+1	6.70E+0	-	-	849	5.09E+1	6.27E+0	1.02E+0	-	-
12-3-83	4	20	3.90E+1	1.06E+1	4.70E+0	-	-	848	3.70E+1	4.86E+0	7.15E-1	-	-
12-9-83	1	20	2.62E+1	1.30E+0	3.90E+0	-	4.70E+0	842	2.48E+1	5.99E-1	6.02E-1	-	1.24E-3
12-9-83	3	20	1.60E+1	-	3.10E+0	-	-	842	1.52E+1	-	4.78E-1	-	-
12-13-83	2	20	1.68E+1	4.50E+0	-	-	-	838	1.59E+1	2.08E+0	-	-	-

Table 10-1

Calculated Settling Basin Resin Activity
as of April 1, 1986
(continued)

			Initial Activity						Final Activity				
DATE	POL. (#)	VOLUME (ft3)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)	DIFF (4-1-86)	Cs-137 (uCi)	Cs-134 (uCi)	Mn-54 (uCi)	Co-60 (uCi)	Co-58 (uCi)
2-17-83	3	20	3.47E+1	7.80E+0	3.10E+0	-	-	834	3.29E+1	3.62E+0	4.87E-1	-	-
2-18-83	4	20	2.34E+1	4.90E+0	3.10E+0	-	-	833	2.22E+1	2.28E+0	4.88E-1	-	-
2-18-83	2	20	2.92E+1	6.60E+0	-	-	-	833	2.77E+1	3.07E+0	-	-	-
2-20-83	2	20	1.34E+1	3.30E+0	-	-	-	831	1.27E+1	1.54E+0	-	-	-
2-22-83	3	20	5.19E+1	7.30E+0	-	-	-	829	4.92E+1	3.40E+0	-	-	-
2-25-83	4	20	2.60E+1	5.20E+0	-	-	-	826	2.47E+1	2.43E+0	-	-	-
12-30-83	3	20	2.31E+1	6.10E+0	-	-	3.20E+0	821	2.19E+1	2.87E+0	-	-	1.03E-3
8-4-82	5	20	2.12E+1	-	3.75E+1	-	-	1334	1.95E+1	-	1.94E+0	-	-
8-5-82	5	20	2.91E+1	-	5.87E+1	-	-	1333	2.67E+1	-	3.04E+0	-	-
8-10-82	5	20	4.62E+1	-	-	-	-	1328	4.25E+1	-	-	-	-
8-15-82	5	20	6.74E+1	-	-	-	-	1323	6.20E+1	-	-	-	-
8-16-82	5	20	9.84E+1	2.90E+1	3.65E+1	-	-	1322	9.05E+1	8.59E+0	1.94E+0	-	-
8-16-82	5	20	1.71E+1	4.31E+0	3.69E+0	-	-	1322	1.57E+1	1.28E+0	1.96E-1	-	-
8-17-82	5	20	4.28E+0	-	-	-	-	1321	3.94E+0	-	-	-	-
8-20-82	5	20	2.46E+1	5.94E+0	1.01E+1	-	-	1318	2.26E+1	1.77E+0	5.41E-1	-	-
9-5-82	5	20	3.82E+1	8.21E+0	3.42E+1	-	-	1302	3.52E+1	2.48E+0	1.90E+0	-	-
9-11-82	5	20	4.20E+1	1.34E+1	4.58E+1	-	-	1296	3.87E+1	4.07E+0	2.58E+0	-	-
9-13-82	5	20	4.84E+1	1.31E+1	4.99E+1	-	-	1294	4.46E+1	3.98E+0	2.82E+0	-	-
9-22-82	5	20	1.14E+1	-	1.67E+1	-	-	1285	1.05E+1	-	9.63E-1	-	-
9-23-82	5	20	5.87E+0	-	1.29E+1	-	-	1284	5.41E+0	-	7.46E-1	-	-
9-24-82	5	20	9.46E+0	-	9.84E+0	-	-	1283	8.72E+0	-	5.70E-1	-	-
10-1-82	5	20	1.43E+1	-	1.62E+1	-	-	1276	1.32E+1	-	9.53E-1	-	-
10-5-82	5	20	2.62E+1	-	2.20E+1	-	-	1272	2.42E+1	-	1.31E+0	-	-
10-5-82	5	20	1.76E+1	-	1.60E+1	-	-	1272	1.62E+1	-	9.50E-1	-	-
10-6-82	5	20	1.30E+1	-	1.19E+1	-	-	1271	1.20E+1	-	7.08E-1	-	-
10-8-82	5	20	1.08E+1	-	1.34E+1	-	-	1269	9.97E+0	-	8.01E-1	-	-
10-19-82	5	20	-	-	6.93E+0	-	-	1258	-	-	4.24E-1	-	-
10-23-82	5	20	7.22E+0	-	7.42E+0	-	-	1254	6.67E+0	-	4.59E-1	-	-
11-10-82	5	20	4.27E+1	1.31E+1	1.77E+1	-	-	1236	3.95E+1	4.20E+0	1.14E+0	-	-
11-10-82	5	20	3.40E+1	1.12E+1	1.28E+1	-	-	1236	3.14E+1	3.59E+0	8.23E-1	-	-
11-12-82	5	20	6.51E+1	1.78E+1	2.51E+1	-	-	1234	6.02E+1	5.72E+0	1.62E+0	-	-
12-2-82	5	20	3.44E+1	-	2.45E+1	-	-	1214	3.19E+1	-	1.65E+0	-	-
12-4-82	5	20	4.27E+1	1.15E+1	1.73E+1	-	-	1212	3.95E+1	3.77E+0	1.17E+0	-	-
12-4-82	5	20	5.49E+1	1.78E+1	-	-	-	1212	5.08E+1	5.84E+0	-	-	-
12-8-82	5	20	2.71E+1	-	9.80E+0	-	-	1208	2.51E+1	-	6.71E-1	-	-
12-17-82	5	20	4.35E+1	-	-	-	-	1199	4.03E+1	-	-	-	-
12-17-82	5	20	4.16E+1	1.37E+1	1.61E+1	-	-	1199	3.86E+1	4.55E+0	1.12E+0	-	-
TOTALS			2.94E+3	5.27E+2	7.84E+2	2.29E+0	1.67E+2		2.77E+3	2.21E+2	6.34E+1	1.99E+0	1.04E-1

NOTES: 1. Polisher notation #5 only indicates that the subject polisher was unidentified.

2. Resin volumes for 1982, 1983, and 1984 are estimated.

JSB

Table 10-2

Total Radioactive Material Content in Basin

Nuclide	Half-Life	Total Activity (Ci)*		
		Undecayed	Decayed Activity** At Present (4/1/86)	Decayed Activity** At Termination of OL (2011)
Mn-54	313 d	7.8E-04	6.3E-05	---
Co-58	70.8 d	1.7E-04	1.0E-07	---
Co-60	5.27 y	2.3E-06	2.0E-06	7.4E-08
Cs-134	2.06 y	5.3E-04	2.2E-04	5.0E-08
Cs-137	30.2 y	2.9E-03	2.8E-03	1.6E-03
Sr-90 (correlated)	28.6 y	1.4E-06	1.4E-06	7.4E-07
TOTAL		4.4E-03	3.1E-03	1.6E-03

* Totals based on measured radioactive material levels and volumes prior to discharge to basin.

** Basin inventory considering radioactive decay since input to basin.

Table 10-3

Projected Cumulative Radioactive Material
at Termination of Operating License

Radionuclide	Total Expected Activity (μCi)
Mn-54	6.4E+01
Co-58	0.1
Co-60	4.1
Cs-134	2.7E+02
Cs-137	1.3E+04
Sr-90 (correlated)	6.3
Totals	1.3E+04 (0.013 Ci)

11. What Is the Estimated Dose to an Individual Standing on Covered Basin Dredgings After 30 Years of Operation Under Expected Levels of Resin Contamination?

Q11-1. What dose would an individual receive if, after expiration of the Davis-Besse operating license, the individual stood directly atop the covered burial site?

A11-1. [Mr. Bland] The estimated dose an individual would receive if he stood directly on top of the last constructed burial cell at the expiration of the Davis-Besse operating license 24 hours per day for an entire year would be 0.007 mrem. If the individual stood on top of earlier constructed cells, the dose received would be less, since the inventory of those cells would have decayed more.

Q11-2. What methodology was used to calculate this dose?

A11-2. [Mr. Bland] I used the radiation shielding and dose calculational methods of ISOSHLD. ISOSHLD was developed by Battelle Northwest Laboratories to provide a calculational method for accurately approximating radiation attenuation and build-up for various shield materials. The methodology

employed in the calculations is point kernel integration. This technique consists of dividing the source volume into a sufficient number of small discrete volumes that may then be approximated as point sources for calculating radiation attenuation and build-up. Integration over the source to determine the total dose is obtained by summing the dose contribution from all of the differential source volumes. This technique is used throughout the industry and government for calculating radiation shielding attenuation and doses.

Q11-3. Please explain the assumptions that were made in calculating this dose.

A11-3. [Mr. Bland] I assumed that the burial site will have a two-foot thick soil cover, which coincides with the minimum thickness specified in Toledo Edison's design of the burial ground. I used the soil density value measured in borings at the burial site (2 gm/cm^3). I used the radionuclides concentrations listed in Table 11-1 as the concentrations in the last-constructed burial cell. The concentrations listed in Table

11-1 are the average concentrations recently measured in the settling basin. As I just stated, I assumed that the individual would stand directly on top of the burial ground 24 hours per day, 365 days per year.

Table 11-1

Limiting Concentration in Resin Discharges
and Current Basin Concentrations

Nuclide	Limiting Concentration* (μCi/ml)	Sampling Data Current Measured Basin Concentrations (μCi/ml)
Mn-54	6.2E-04	8.9E-08
Co-58	3.0E-03	2.1E-08
Co-60	5.4E-05	3.2E-07
Cs-134	1.1E-04	5.7E-07
Cs-137	1.0E-04	6.2E-06
Sr-90 (correlated)		3.1E-09

* The limiting concentration is the maximum allowable concentration in resins discharged to the settling basin. The sum-of-fractions rule is applied to determine the limiting concentration for a mixture of radionuclides. Calculated values from Table 2 of report "Disposal of Low-Level Radioactively Contaminated Secondary-side Clean-up Resins in the On-Site Settling Basins at the Davis-Besse Nuclear Power Station," May 1983.

12. What Criteria Will Be Used to Decide Whether Resins Will Be Buried On Site or Transported to a Licensed Burial Site in the Event That Resins Become Contaminated at Higher Than Expected Levels (From Steam Generator Tube Leaks or Ruptures, For Example)?

Q12-1. Please describe the criteria that govern whether a batch of resins may be discharged to the settling basin?

A12-1. [Mr. Bland] As previously discussed, each batch of spent resin is analyzed before it can be discharged to the settling basin. If radionuclide concentrations exceed established limits, the spent resins are not discharged to the basin but are instead treated as radwaste and processed for offsite disposal. The maximum concentrations allowed in resin batches discharged to the settling basin are listed on Table 11-1. These concentrations apply to the resin batches before they are mixed with the water treatment sludge. If more than one radionuclide is identified, the sum of the fractions rule is used to ensure that the cumulative concentration also meets the established limit.

Q12-2. How were these criteria derived?

A12-2. [Mr. Bland] An evaluation of feasible release scenarios and environmental transport and exposure pathways was performed to assess the radiological limits of resin burial. The concentration limits were chosen so that, under the feasible release scenarios and environmental transport and exposure pathways evaluated, the dose to any member of the public would be negligible (less than 1 mrem).

Q12-3. What is done with resins that do not satisfy the criteria for discharge to the settling basin?

A12-3. [Mr. Briden] The resins are pumped to either of two Condensate Polishing Demineralizer Hold-up Tanks. From these tanks, the resins are pumped to radwaste disposable steel liners. The resins within the liner are processed by dewatering to ensure a waste form acceptable for disposal. The liner is appropriately packaged to meet Federal radwaste transportation and disposal requirements. The liner is then shipped as radwaste for burial at a licensed low-level radwaste burial site, normally to Barnwell, South Carolina.

13. What Is the Estimated Upper Limit of Radionuclide Inventory That Could Exist After 30 Years, Under the Above Criteria?

Q13-1. What is the maximum radionuclide inventory that could exist in the burial ground when the Davis-Besse operating license expires?

A13-1. [Mr. Bland] The maximum activity of each radionuclide in the burial ground at the termination of the Davis-Besse operating license is set forth in Table 13-1. The total maximum activity is 0.036 Ci. and again is almost entirely attributable to cesium-137.

Q13-2. Please explain how this maximum inventory was calculated.

A13-2. [Mr. Bland] I determined that the average concentration of past resin discharges to the settling basin (which were used to estimate total expected activity) is 0.37 of the limiting concentration. I therefore multiplied the total expected activities in the burial ground in the year 2011 (listed on Table 10-3) by the reciprocal of 0.37, which is 2.7. This calculation produced the maximum activities that would result if all resin discharges contained the limiting (i.e. maximum allowable) radionuclide concentrations.

Table 13-1

Projected Maximum Cumulative Radioactive Material
at Termination of Operating License

Radionuclide	Maximum Total Activity (μCi)
Mn-54	1.7E+2
Co-58	0.27
Co-60	1.1E+1
Cs-134	7.3E+2
Cs-137	3.5E+4
Sr-90 (correlated)	1.7E+1
Totals	3.6E+4

14. What Is the Estimated Upper Limit of Dose to the Whole Body for an Individual Standing on the Burial Site that Could Exist After 30 Years Under the Above Criteria?

Q14-1. What is the maximum whole body dose due to direct exposure that an individual would receive if, after expiration of the Davis-Besse operating license, he stood directly atop the burial site?

A14-1. [Mr. Bland] The maximum whole body dose due to direct exposure that an individual would receive if, after expiration of the Davis-Besse operating license, he stood directly on top of the burial site 24 hours per day, 365 days per year, would be 0.02 mrem.

Q14-2. What methodology was used to calculate this maximum dose?

A14-2. [Mr. Bland] I used the ISOSHLD methodology, which I have previously described.

Q14-3. Please describe the assumptions you made in calculating this maximum dose due to exposure.

A14-3. [Mr. Bland] I assumed that the individual stood over the last constructed burial cell 24 hours per day for a year. I used the maximum

radionuclide concentrations, which I calculated by multiplying the expected concentrations in the last cell by 2.7.16/ To evaluate the shielding effect of the soil cover, I assumed that the cover would be 2 feet thick, which is the minimum thickness under Toledo Edison's design, and I used the soil density measurement obtained in borings at the burial site.

16/ The basis for the factor of 2.7 is explained in my response to question 13-2.

15. Why Has Sr-90 Not Been Included in Licensee's Assessments?

Q15-1. Has Sr-90 been included in the inventory calculations in your testimony?

A15-1. [Mr. Bland] Yes.

Q15-2. Has Sr-90 been included in the dose calculations in your testimony?

A15-2. [Mr. Bland] Yes. The radioactive decay of Sr-90 is not accompanied by any gamma radiation or x-rays. Therefore, it does not contribute to the direct exposure doses. However, Sr-90 does contribute an internal dose if ingested or inhaled and has been considered in evaluating the ingestion pathway doses presented later in this testimony.

Q15-3. Why was Sr-90 not included in Toledo Edison's previous assessments?

A15-3. [Mr. Bland] Sr-90 was not included because of its negligible contribution to both the total activity and the doses. We have examined the Sr-90 levels in this particular waste stream, and Sr-90 comprises only 0.04 percent (0.0004) of the total

activity. Its abundance and dose contribution are negligible compared with that of Cs-137.

16. What Would Be the Total Estimated Whole Body Dose Equivalent for an Individual Through the Food Ingestion Pathway That Could Result From the Final 30-Year Inventory of Radionuclides Including Sr-90? Provide Estimates for Expected Levels and Upper Limits of Radionuclide Inventory After 30 Years.

Q16-1. Assuming that resin discharges to the settling basin contain expected levels of radionuclides, what would be the total estimated whole body dose equivalent for an individual for the food ingestion pathway after termination of the Davis-Besse operating license?

A16-1. [Mr. Bland] Assuming expected levels of resin contamination, the total estimated whole body dose rate for the food ingestion pathway would be 0.31 mrem/year.

Q16-2. What methodology was used to calculate this ingestion pathway dose?

A16-2. [Mr. Bland] I used the environmental transport modeling of U.S. Nuclear Regulatory Commission Regulatory Guide 1.109 coupled with effective total body dose conversion factors derived from Publication 30 of the International Commission on Radiological Protection.

Q16-3. Please explain any assumptions you made in calculating this food ingestion pathway dose?

A16-3. [Mr. Bland] I assumed that an individual grew all his fresh vegetables in soil contaminated with waste from the last burial cell. I assumed that the vegetables are grown in a mixture of contaminated waste and soil in equal proportions. This assumption follows the guidance in NUREG/CR-3585, "De Minimis Waste Impacts Methodology" (Feb. 1984). I then used the soil-to-plant transfer factors specified in NRC Regulatory Guide 1.109.

Q16-4. Did you evaluate any other food ingestion pathways?

A16-4. [Mr. Bland] Yes, I evaluated doses attributable to the ingestion of geese that might graze on the burial site. I assumed that the geese graze on grass grown directly on waste from the last cell. For simplicity and conservatism, I assumed that the flesh of the geese would accumulate radionuclide concentrations equal to the concentration in the vegetation. I then postulated that an individual would consume 14 kilograms (30 pounds) of such goose flesh per year. The total

whole body dose equivalent from this scenario is 0.025 mrem.

I also evaluated the whole body dose to an individual who drank contaminated lake water and consumed fish from the Lake. For this analysis, I postulated that some catastrophic mechanism transferred the entire burial site inventory to the Lake at one time and that all the sludge dissolved. I then calculated the total body dose to an individual using the Davis-Besse Off-Site Dose Calculation Manual (ODCM) which the NRC has reviewed and approved. The ODCM is based on the NRC's Regulatory Guide 1.109 methods adapted to the specific features of the Davis-Besse site. In accordance with this methodology, I applied a 10:1 near field dilution factor to address the immediate dispersion in the lake environment. An additional dilution of 5.7:1 was applied to determine the resultant radionuclide material concentration at an assumed beach well, conservatively postulated to be located at the southeast boundary of the Davis-Besse site. I used individual consumption rates of 21 kg/year of fish and 730 liters/year of water. The resultant

total body dose (assuming expected levels of resin contamination) would be 0.1 mrem. Due to dissipation of the release, this dose would be received only in the first year after the postulated release. Doses in subsequent years would be orders of magnitude smaller.

Q16-5. Can one add up the ingestion pathway doses for vegetables, fowl, fish, and water to arrive at a total dose?

A16-5. [Mr. Bland] No. One could add the food ingestion pathway doses for vegetable and fowl consumption. One could not, however, receive the total body dose equivalent for vegetable and fowl consumption and the total body dose due to ingestion of fish and drinking water. Both scenarios postulated to determine these doses could not occur simultaneously. Either the waste remains in the burial ground, in which case the dose due to vegetable ingestion applies, or the waste is released to the Lake, in which case the dose due to ingestion of fish and water applies.

Q16-6. What would be the whole body dose equivalent for an individual through the food ingestion pathway if one assumes that the radioactivity in the waste is at the maximum possible level?

A16-6. [Mr. Bland] The maximum total body dose equivalent for food ingestion (vegetables) would be 0.85 mrem per year. The maximum total body dose equivalent due to ingestion of goose flesh would be 0.07 mrem per year. The alternative maximum total body dose due to ingestion of fish and drinking water would be 0.3 mrem. The 0.3 mrem total body dose due to ingestion of fish and drinking water would be received only in the first year and due to dissipation would not recur.

Q16-7. How were these maximum ingestion pathway doses calculated?

A16-7. [Mr. Bland] These maximum doses were calculated using the same methods and assumptions I just described, except the radionuclide activities and concentrations in the burial site were assumed to be at those maximum levels calculated by multiplying expected levels by 2.7.

Q16-8. Dr. Till, have you reviewed Mr. Bland's analyses?

A16-8. [Dr. Till] Yes, I have.

Q16-9. Would you please describe your review?

A16-9. [Dr. Till] I read Mr. Bland's reports and his testimony, and I identified the methodologies and assumptions he used. I was familiar with all of the methodologies he chose. I double checked his external dose conversion factors and inhalation dose conversion factors, and I verified the bioaccumulation factors for radionuclide uptake by plants and aquatic biota. I verified Mr. Bland's estimate for Sr-90, comparing the estimate with a number of reported values. I then performed my own independent calculations and confirmed that radionuclides other than the six listed on Table 10-2 do not contribute to dose.

Q16-10. Do you agree with the results of Mr. Bland's analysis?

A16-10. [Dr. Till] I do. The agreement between our calculations is good.

Q16-11. Did Mr. Bland use acceptable methodology and assumptions in calculating doses?

A16-11. [Dr. Till] Yes. Mr. Bland used well-accepted methodologies. The assumptions he used were generally conservative, which would tend to overestimate actual doses.

Q16-12. Dr. Linnemann, would the doses calculated by Mr. Bland cause any appreciable health effect in an individual receiving such dose?

A16-12. [Dr. Linnemann] No. I would not expect any adverse health effects. Statistically, the probability of an adverse health effect from these doses is vanishingly small, about one in ten million.

Q16-13. Could you please explain the basis for your response?

A16-13. [Dr. Linnemann] The health effects induced by radiation have been studied for over 80 years. In 1929, the International Commission on Radiological Protection (ICRP) and the U.S. National Council on Radiation Protection and Measurements (NCRP), as these groups are now called, were formed. Since then, these two groups have

had data on the biological effects of radiation under almost continuous review. In addition, over the years, the issue has been examined by many scientists and has been addressed by a number of prestigious groups, including the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the National Academy of Sciences' Committee on the Biological Effects of Ionizing Radiation (the BEIR Committee).

Health effects induced by high levels of radiation are acute and well known. Doses of 200 rem or more delivered over a short period induce what is known as radiation sickness and depending on dose can be fatal.

Lesser exposures (from 10 rem to 100 rem) do not produce the symptoms of radiation sickness, but can increase the risk of cancer and of genetic abnormalities. Below 10 rem, it is difficult to find animal or human study populations that show effects of radiation. If effects occur, they are too small to be detected.

The study of these effects at any dose level is complicated by several factors. First, the

incidence of cancer or of a genetic abnormality is random; an individual exposed to radiation will usually not develop a cancer, nor are his offspring likely to suffer genetic abnormalities. Second, cancers and genetic effects are delayed effects when they do occur. Third, one cannot distinguish cancers or genetic abnormalities caused by radiation from those that occur spontaneously or as the result of some other agent. Nevertheless, for radiation protection purposes and for evaluation of potential health hazards, we assume that effects can occur at low doses and have developed statistical models of dose effect relationships. From statistical studies, the risk of an additional cancer or genetic damage per rem of exposure can be estimated. The most current risk estimates are those contained in the BEIR Reports.17/ The evaluations and results in the BEIR reports are consistent with the

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17/ Committee on the Biological Effects of Ionizing Radiation, Division of Medical Sciences, National Academy of Sciences, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation" (1980) ("BEIR III"); Committee on Biological Effects of Ionizing Radiation, Division of Medical Sciences, National Academy of Sciences, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation" (1972) ("BEIR I").

conclusions of the other leading scientific groups, particularly the ICRP (Report No. 26, 1977),18/ the NCRP (Report No. 43, 1975; Report No. 60, 1980),19/ and UNSCEAR (Report, 1977; Report, 1982).20/ The BEIR III risk estimates are presented in Table 16-1.

At very low levels of exposure (below 5-10 rem), health effects have not been observed or detected statistically, and may not occur. However, for the purpose of establishing standards, advisory and decisional organizations conservatively assume a linear relationship between dose and response, with no threshold. The "linear, no-threshold hypothesis" implies that there is some risk at any level of exposure. While this

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18/ International Commission of Radiological Protection, "ICRP Publication 26: Recommendation of the International Commission on Radiological Protection" (1977).

19/ National Council on Radiation Protection and Measurement, "NCRP Report No. 43: Review of Current State of Radiation Protection Philosophy" (1975); National Council on Radiation Protection and Measurement, "NCRP No. 64: Influence of Dose and Its Distribution in Time on Dose-Response Relationships for Low-LET Radiation" (1980).

20/ United Nations Scientific Committee on the Effects of Atomic Radiation, "Sources and Effects of Ionizing Radiation" (1977); United Nations Scientific Committee on the Effects of Atomic Radiation, "Sources and Biological Effects" (1982).

hypothesis is appropriate when setting standards for radiation protection, it almost certainly overestimates risk. It is known to be incorrect as to a number of radiation-induced health effects (such as cataracts, impaired fertility, and abnormal fetal development) for which experimental evidence has demonstrated that there is indeed a threshold dose below which the effect will not occur.21/ Furthermore, the hypothesis assumes that a dose delivered over a long period of time is as damaging as the same dose given over a short time and takes no account of the human body's ability to recover or repair radiation damage.

Notwithstanding the conservatism of the linear, no-threshold hypothesis, I have applied the BEIR III risk estimators to the doses that Mr. Bland calculated to place a statistical upper bound on resulting health effects. For simplicity, I rounded off to one mrem/year the dose rate a maximally exposed individual might receive from the burial ground. The risk to an individual of

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21/ BEIR III.

a fatal cancer from a continuous one mrem dose would be 1.58 in ten million per year (158 per million per rem x 0.001 rem). In contrast, the risk of a spontaneous cancer death would be about 10,000 times greater. The risk of a genetic abnormality would be about one-half of the cancer risk or about one chance in ten million that a parent so exposed would experience a live birth with a genetic abnormality. The normal genetic abnormality risk is about one in ten. Even if the entire population residing within 10 miles of the Davis-Besse plant22/ were to receive this dose (one mrem/year), I would not expect a single fatal cancer or genetic abnormality to occur.

A further illustration of a one mrem dose is obtained by comparing it with doses an individual would receive from other sources. This comparison is presented in Table 16-2. As one can see, the maximum dose attributable to the burial ground would be only one percent of the dose an individual would receive from natural background

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22/ The Davis-Besse USAR estimates the population within 10 miles of the plant to be approximately 15,000. Davis-Besse USAR, § 2.1.3.1.

radiation, is less than the additional dose a person would receive from living in a brick building, and is about the same as the annual dose a person receives from watching television.

Q16-14. In discussing the health effects attributable to radiation, the State of Ohio cited in its Petition to Intervene a report published by the U.S. Environmental Protection Agency and entitled "Radionuclides: Background Information Document for Final Rules."23/ How does the EPA's assessment of the risk of radiation-induced health effects compare with your own?

A16-14. [Dr. Linnemann] The EPA's estimates of cancer and genetic risks in the Background Information Document are based on the BEIR-III Report.24/ The risk estimators I used are also from the BEIR-III report, and are therefore consistent with the EPA's assessment.

23/ State of Ohio, Petition for Leave to Intervene (April 14, 1986) at 8.

24/ U.S. EPA, "Radionuclides: Background Information Document for Final Rules," Vol. I at 8-1, 8-2 (Oct. 1984).

Table 16-1

Risk Coefficients

Type of Risk	Radiation Life-Time Risk of Death per Million per Rem*	Spontaneous Risk, Deaths per Million per year**
All Cancers	158	1,800

Genetic Abnormalities***	Effect per Million Liveborn Offspring, Rem per Generation		Current Incidence, per Million Liveborn Offspring
	Geometric Mean	Range	
First Generation	19	(5-75)	107,100
All Future Generations	257	(60-1100)	---

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* BEIR III at 212.

** American Cancer Society, Cancer Facts and Figures (1984).

***BEIR III at 85 (based on average population exposure of 1 rem per 30 year generation). See U.S. EPA "Radionuclides," Vol. 1 at 8-49 (1984).

Table 16-2

Whole Body Exposures From Natural and Man-Made Sources

National Average Background in U.S.	102 mrem/yr*
Average Background Radiation in Ohio	100 mrem/yr**
Additional whole body dose from living in a brick house instead of a wooden house	20 mrem/yr***
Round trip flight from New York City to Los Angeles	1.9 mrem***
Diagnostic chest x-rays (series of 2-3 x-rays)	40 mrem***
Dental x-ray (per exposure)	2.9 mrem***
Exposure to color television set	1 mrem/yr***
Exposure to tritium dial watch	0.5 mrem/yr***

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* BEIR I, at 12.

** 50 Fed. Reg. 41265, 41266 (1985).

***UNSCEAR 1977, at 13, 51, 83, 99, 310, 319.

17. What are the Principal Chemical Components of the Nonradioactive Sludge That are Mixed With Radioactively Contaminated Resins?

Q17-1. Please describe the sludge that is discharged to the settling basin.

A17-1. [Dr. Bennett] The sludge that is discharged to the settling basin consists of impurities removed from the raw lake water together with chemicals used in and produced by the water treatment process (calcium hydroxide, sodium aluminate, and calcium carbonate). The sludge is mainly a suspension of inorganic solids in water.

Q17-2. What is the purpose of the water treatment process which results in the sludge?

A17-2. [Dr. Bennett] The purpose of the water treatment is to remove suspended solids and other dissolved impurities in the Lake water and prepare it for general site use -- both for use in plant systems and for personal use. The treatment removes materials which could deposit in the steam generators and on the condenser tubes and thereby reduce heat transfer efficiencies. The treatment also purifies the water to drinking water standards.

Q17-3. Please describe the water treatment system.

A17-3. [Mr. Briden] In the water treatment facility, Lake Erie water is first chlorinated. The chlorinated water is then delivered to two clarifiers. Chemical feeders are located in the vicinity of the clarifiers and provide lime for softening and sodium aluminate for clarification. Suspended solids, hardness, and other impurities precipitate out. Clarified water flows by gravity through two anthracite filters to a clearwell. The precipitate is removed from the clarifiers by blowdown, producing the sludge in question. From the clearwell, the clarified and filtered water is either pumped to the domestic water system, or is pumped through two activated carbon filters to demineralizers where it is further purified for use as primary and secondary makeup water.

Q17-4. How does the sludge compare with that produced by a typical municipal water treatment facility?

A17-4. [Dr. Bennett] The Davis-Besse sludge is fairly typical. Its principal solid constituent is calcium carbonate. The concentrations of heavy metals in the Davis-Besse sludge are in fact smaller

than that in sludge produced by Toledo's water treatment facility or the town of Oregon's water treatment facility.

Q17-5. What chemical analysis of the sludge has been performed?

A17-5. [Dr. Bennett] Samples were taken of the contents of the settling basin bottoms. Standard analytical procedures were used to determine the chemical and physical characteristics of the sample. These included atomic absorption (to determine presence and levels of heavy metals), gas chromatography/mass spectroscopy (for organic materials), chemical titration (alkalinity), evaporation/burning (solids).

Q17-6. Please describe the results of the analysis.

A17-6. [Dr. Bennett] Other than containing the water treatment chemicals themselves, the sludge consists of the impurities found in Lake Erie water in a concentrated form. Metals are present in a concentration that mirror the concentration in the Lake water. The settling basin bottom sample has a pH of 9, which is less than a pH of 10.0 reported on one occasion in Maumee Bay and only

slightly higher than the 8.8 reported in the Maumee River. The average pH in western Lake Erie is reported at 8.42. Rather than being detrimental, the pH of the settling basin bottoms is beneficial. At this pH level, the metals would exhibit close to their minimum solubility and maximum resistence to dissolution and leaching. The detailed results of the chemical analysis are set forth in Table 17-1.

Q17-7. Would the settling basin bottoms be characterized as hazardous under U.S. EPA regulations?

A17-7. [Dr. Bennett] The bottoms were tested in accordance with the extraction procedure (EP) toxicity tests called for in the U.S. Environmental Protection Agency's regulations implementing the Resource Conservation and Recovery Act, 40 C.F.R. Part 261, App. II. Comparing the results of the tests with the RCRA standards (40 CFR § 261.24) shows that the settling basin bottoms were well below the EP toxicity limits. See Table 17-1. Given the characteristics of the sludge and resins, the bottoms do not exhibit the characteristics of reactivity, corrosivity or ignitibility

as defined in the U.S. EPA regulations (40 CFR §§ 261.21, .22 and .23). Furthermore, water treatment sludge is not a listed hazardous waste listed in 40 C.F.R. Part 261, Subpart D. Therefore, the bottoms would not be considered as hazardous under U.S. EPA regulations.

Table 17-1

Analysis of Settling Basin Sludge
and of Raw Lake Water

Settling Basin Sludge
As Received (wet)

TEST PARAMETER	UNITS	TEST RESULT
SPECIFIC GRAVITY	--	1.14
pH @ 25°C	Std	8.80
DRY SOLIDS @ 104°C	%	20.6
VOLATILE SOLIDS	% of D.S.	6.21
ALKALINITY	mg/kg as $CaCO_3$	167000
PHOSPHORUS	mg/kg as PO_4	136
SULFATE	mg/kg	2970
ALUMINUM	mg/kg	3090
ARSENIC	mg/kg	2.5
BARIUM	mg/kg	400
CADMIUM	mg/kg	LT 0.05
CALCIUM	mg/kg	4360
CHROMIUM	mg/kg	4.57
COPPER	mg/kg	6.0
IRON	mg/kg	1930
LEAD	mg/kg	2.23
MAGNESIUM	mg/kg	466
MERCURY	mg/kg	LT 0.01
NICKEL	mg/kg	3.2
SELENIUM	mg/kg	LT 0.3

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
SILVER	mg/kg	1.3
ZINC	mg/kg	17.6
EP ARSENIC	mg/L	LT 0.004
EP BARIUM	mg/L	LT 10
EP CADMIUM	mg/L	LT 0.1
EP CHROMIUM	mg/L	LT 0.2
EP LEAD	mg/L	LT 0.2
EP MERCURY	mg/L	LT 0.004
EP SELENIUM	mg/L	LT 0.04
EP SILVER	mg/L	LT 0.2
EP LINDANE	mg/L	LT 0.001
EP ENDRIN	mg/L	LT 0.004
EP METHOXYCHLOR	mg/L	LT 0.01
EP TOXAPHENE	mg/L	LT 0.004
EP 2,4-D	mg/L	LT 0.01
EP 2,4,5-TP SILVEX	mg/L	LT 0.002

continued

Table 17-1 (cont.)

Settling Basin Sludge
Organic Priority Pollutants

TEST PARAMETER	UNITS	TEST RESULT
ACROLEIN	mg/kg	LT 0.004
ACRYLONITRILE	mg/kg	LT 0.001
BENZENE	mg/kg	LT 0.0003
BROMOFORM	mg/kg	LT 0.001
CARBON TETRACHLORIDE	mg/kg	LT 0.0004
CHLOROBENZENE	mg/kg	LT 0.0004
CHLORODIBROMOMETHANE	mg/kg	LT 0.0007
CHLOROETHANE	mg/kg	LT 0.0004
2-CHLOROETHYLVINYL ETHER	mg/kg	LT 0.0006
CHLOROFORM	mg/kg	298
DICHLOROBROMOMETHANE	mg/kg	LT 0.0004
1,1 DICHLOROETHANE	mg/kg	LT 0.0005
1,2 DICHLOROETHANE	mg/kg	LT 0.0002
1,1 DICHLOROETHYLENE	mg/kg	LT 0.0006
1,2 DICHLOROPROPANE	mg/kg	LT 0.0006
cis-1,3-DICHLOROPROPENE	mg/kg	LT 0.0006
trans-1,3-DICHLOROPROPENE	mg/kg	LT 0.0006
ETHYL BENZENE	mg/kg	LT 0.0008
METHYLENE BROMIDE	mg/kg	LT 0.0004
METHYL CHLORIDE	mg/kg	LT 0.0004
METHYLENE CHLORIDE	mg/kg	LT 0.0005

continued

Table 17-1 (cont)

TEST PARAMETER	UNITS	TEST RESULT
1,1,2,2-TETRACHLOROETHANE	mg/kg	LT 0.0007
TETRACHLOROETHYLENE	mg/kg	LT 0.001
TOLUENE	mg/kg	LT 0.0006
1,2-t-DICHLOROETHYLENE	mg/kg	LT 0.0004
1,1,1-TRICHLOROETHANE	mg/kg	LT 0.0003
1,1,2-TRICHLOROETHANE	mg/kg	LT 0.0009
TRICHLOROETHYLENE	mg/kg	LT 0.0008
TRICHLOROFLUOROMETHANE	mg/kg	LT 0.0003
VINYL CHLORIDE	mg/kg	LT 0.0004
2-CHLOROPHENOL	mg/kg	LT 0.08
2,4-DICHLOROPHENOL	mg/kg	LT 0.09
2,4 DIMETHYLPHENOL	mg/kg	LT 0.07
4,6 DINITRO-O-CRESOL	mg/kg	LT 0.3
2,4-DINITROPHENOL	mg/kg	LT 0.3
2-NITROPHENOL	mg/kg	LT 0.1
4-NITROPHENOL	mg/kg	LT 0.1
P-CHLORO-M-CRESOL	mg/kg	LT 0.1
PENTACHLOROPHENOL	mg/kg	LT 0.3
PHENOL	mg/kg	LT 0.05
2,4,6-TRICHLOROPHENOL	mg/kg	LT 0.1
ACENAPHTHENE	mg/kg	LT 0.04
ACENAPHTHYLENE	mg/kg	LT 0.04
ANTHRACENE	mg/kg	LT 0.04
BENZIDINE	mg/kg	LT 0.9
BENZO (a) ANTHRACENE	mg/kg	LT 0.04

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
BENZO (a) PYRENE	mg/kg	LT 0.08
BENZO (b) FLUORANTHENE	mg/kg	LT 0.08
BENZO (ghi)PERYLENE	mg/kg	LT 0.1
BENZO (k) FLUORANTHENE	mg/kg	LT 0.08
bis (2-CHLOROETHOXYMETHANE	mg/kg	LT 0.04
bis (2-CHLOROETHYL) ETHER	mg/kg	LT 0.05
bis (2-CHLOROISOPROPYL) ETHER	mg/kg	LT 0.1
bis (2-ETHYLHEXYL) PHTHALATE	mg/kg	0.43
4-BROMOPHENYL PHENYL ETHER	mg/kg	LT 0.1
BUTYL BENZYL PHTHALATE	mg/kg	LT 0.08
2-CHLORONAPHTHALENE	mg/kg	LT 0.04
4-CHLOROPHENYL-PHENYL ETHER	mg/kg	LT 0.06
CHRYSENE	mg/kg	LT 0.04
DIBENZO (ah) ANTHRACENE	mg/kg	LT 0.1
1,2-DICHLOROBENZENE	mg/kg	LT 0.04
1,3-DICHLOROBENZENE	mg/kg	LT 0.04
1,4-DICHLOROBENZENE	mg/kg	LT 0.06
3,3'-DICHLOROBENZIDINE	mg/kg	LT 0.09
DIETHYL PHTHALATE	mg/kg	LT 0.1
DIMETHYL PHTHALATE	mg/kg	LT 0.04
DI-n-BUTYL PHTHALATE	mg/kg	0.19
2,4-DINITROTOLUENE	mg/kg	LT 0.2
2,6-DINITROTOLUENE	mg/kg	LT 0.2
DI-n-OCTYL PHTHALATE	mg/kg	LT 0.04

continued

TEST PARAMETER	UNITS	TEST RESULT
1,2-DIPHENYLHYDRAZINE	mg/kg	LT 0.04
FLUORANTHENE	mg/kg	LT 0.04
FLUORENE	mg/kg	LT 0.04
HEXACHLOROBENZENE	mg/kg	LT 0.07
HEXACHLOROBUTADIENE	mg/kg	LT 0.1
HEXACHLOROCYCLOPENTADIENE	mg/kg	LT 0.3
HEXACHLOROETHANE	mg/kg	LT 0.1
INDENO (1,2,3-cd) PYRENE	mg/kg	LT 0.09
ISOPHORONE	mg/kg	LT 0.08
NAPHTHALENE	mg/kg	LT 0.04
NITROBENZENE	mg/kg	LT 0.05
N-NITROSO-DIMETHYLAMINE	mg/kg	LT 0.09
N-NITROSO-DI-n-PROPYLAMINE	mg/kg	LT 0.4
N-NITROSO-DIPHENYLAMINE	mg/kg	LT 0.09
PHENANTHRENE	mg/kg	LT 0.04
PYRENE	mg/kg	LT 0.04
1,2,4-TRICHLOROBENZENE	mg/kg	LT 0.07
ALDRIN	mg/kg	LT 0.3
ALPHA-BHC	mg/kg	LT 0.08
BETA-BHC	mg/kg	LT 0.1
GAMMA-BHC	mg/kg	LT 0.3
DELTA-BHC	mg/kg	LT 0.2
CHLORDANE	mg/kg	LT 0.5

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
4,4'-DDD	mg/kg	LT 0.08
4,4'-DDE	mg/kg	LT 0.1
4,4'-DDT	mg/kg	LT 0.2
DIELDRIN	mg/kg	LT 0.1
ENDOSULFAN I	mg/kg	LT 0.4
ENDOSULFAN II	mg/kg	LT 0.9
ENDOSULFAN SULFATE	mg/kg	LT 0.5
ENDRIN	mg/kg	LT 2
HEPTACHLOR	mg/kg	LT 0.5
HEPTACHLOR EPOXIDE	mg/kg	LT 0.5
TOXAPHENE	mg/kg	LT 0.6
ENDRIN ALDEHYDE	mg/kg	LT 0.6

LT - Less than. EP = U.S. EPA EP Toxicity procedure SW 846 Test Method 1310. Results expressed as mg/L in the EP Leachate.

Table 17-1 (cont.)

Raw Water

TEST PARAMETER	UNITS	TEST RESULT
pH @ 25°C	Std	7.39
TOTAL SOLIDS @ 104°C	mg/L	294
VOLATILE SOLIDS @ 550°C	mg/L	81
SUSPENDED SOLIDS @ 1[illegible]	mg/L	35
DISSOLVED SOLIDS @ 180°C	mg/L	190
ALKALINITY	mg/L as $CaCO_3$	97.2
CHLORIDE	mg/L	20.8
PHOSPHORUS	mg/L as PO_4	1.07
SULFATE	mg/L	53.9
ALUMINUM	mg/L	1.67
ARSENIC	mg/L	LT 0.002
BARIUM	mg/L	LT 0.5
CADMIUM	mg/L	0.007
CALCIUM	mg/L	39.5
CHROMIUM	mg/L	0.010
COPPER	mg/L	0.017
IRON	mg/L	2.38
LEAD	mg/L	0.006
MAGNESIUM	mg/L	9.00
MERCURY	mg/L	LT 0.0002
NICKEL	mg/L	0.009
POTASSIUM	mg/L	4.02

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
SELENIUM	mg/L	LT 0.04
SILVER	mg/L	LT 0.02
SODIUM	mg/L	10.3
ZINC	mg/L	0.094

continued

Table 17-1 (cont.)

Raw Water
Organic Priority Pollutants

TEST PARAMETER	UNITS	TEST RESULT
ACROLEIN	mg/L	LT 0.004
ACRYLONITRILE	mg/L	LT 0.001
BENZENE	mg/L	LT 0.0002
BROMOFORM	mg/L	LT 0.0008
CARBON TETRACHLORIDE	mg/L	LT 0.0004
CHLOROBENZENE	mg/L	LT 0.0002
CHLORODIBROMOMETHANE	mg/L	LT 0.0004
CHLOROETHANE	mg/L	LT 0.0005
2-CHLOROETHYLVINYL ETHER	mg/L	LT 0.006
CHLOROFORM	mg/L	LT 0.0002
DICHLOROBROMOMETHANE	mg/L	LT 0.0003
1,1 DICHLOROETHANE	mg/L	LT 0.0006
1,2 DICHLOROETHANE	mg/L	LT 0.0003
1,1 DICHLOROETHYLENE	mg/L	LT 0.0006
1,2 DICHLOROPROPANE	mg/L	LT 0.0004
cis-1,3-DICHLOROPROPENE	mg/L	LT 0.0003
trans-1,3-DICHLOROPROPENE	mg/L	LT 0.0004
ETHYL BENZENE	mg/L	LT 0.0005
METHYLENE BROMIDE	mg/L	LT 0.0004
METHYL CHLORIDE	mg/L	LT 0.0005
METHYLENE CHLORIDE	mg/L	LT 0.0005

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
1,1,2,2-TETRACHLOROETHANE	mg/L	0.0018
TETRACHLOROETHYLENE	mg/L	LT 0.0006
TOLUENE	mg/L	LT 0.0004
1,2-t-DICHLOROETHYLENE	mg/L	0.0005
1,1,1-TRICHLOROETHANE	mg/L	0.0003
1,1,2-TRICHLOROETHANE	mg/L	LT 0.0005
TRICHLOROETHYLENE	mg/L	LT 0.0005
TRICHLOROFLUOROMETHANE	mg/L	LT 0.0003
VINYL CHLORIDE	mg/L	LT 0.0004
2-CHLOROPHENOL	mg/L	LT 0.002
2,4-DICHLOROPHENOL	mg/L	LT 0.002
2,4 DIMETHYLPHENOL	mg/L	LT 0.002
4,6 DINITRO-O-CRESOL	mg/L	LT 0.006
2,4-DINITROPHENOL	mg/L	LT 0.007
2-NITROPHENOL	mg/L	LT 0.003
4-NITROPHENOL	mg/L	LT 0.003
P-CHLORO-M-CRESOL	mg/L	LT 0.002
PENTACHLOROPHENOL	mg/L	LT 0.006
PHENOL	mg/L	LT 0.001
2,4,6-TRICHLOROPHENOL	mg/L	LT 0.003
ACENAPHTHENE	mg/L	LT 0.001
ACENAPHTHYLENE	mg/L	LT 0.001
ANTHRACENE	mg/L	LT 0.001
BENZIDINE	mg/L	LT 0.0020
BENZO (a) ANTHRACENE	mg/L	LT 0.001

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
BENZO (a) PYRENE	mg/L	LT 0.002
BENZO (b) FLUORANTHENE	mg/L	LT 0.002
BENZO (ghi) PERYLENE	mg/L	LT 0.003
BENZO (k) FLUORANTHENE	mg/L	LT 0.002
bis (2-CHLOROETHOXYMETHANE	mg/L	LT 0.001
bis (2-CHLOROETHYL) ETHER	mg/L	LT 0.001
bis (2-CHLOROISOPROPYL) ETHER	mg/L	LT 0.003
bis (2-ETHYLHEXYL) PHTHALATE	mg/L	LT 0.001
4-BROMOPHENYL PHENYL ETHER	mg/L	LT 0.002
BUTYL BENZYL PHTHALATE	mg/L	LT 0.002
2-CHLORONAPHTHALENE	mg/L	LT 0.001
4-CHLOROPHENYL-PHENYL ETHER	mg/L	LT 0.001
CHRYSENE	mg/L	LT 0.001
DIBENZO (ah) ANTHRACENE	mg/L	LT 0.003
1,2-DICHLOROBENZENE	mg/L	LT 0.001
1,3-DICHLOROBENZENE	mg/L	LT 0.001
1,4-DICHLOROBENZENE	mg/L	LT 0.001
3,3'-DICHLOROBENZIDINE	mg/L	LT 0.003
DIETHYL PHTHALATE	mg/L	LT 0.002
DIMETHYL PHTHALATE	mg/L	LT 0.001
DI-n-BUTYL PHTHALATE	mg/L	LT 0.001
2,4-DINITROTOLUENE	mg/L	LT 0.005
2,6-DINITROTOLUENE	mg/L	LT 0.005
DI-n-OCTYL PHTHALATE	mg/L	LT 0.001

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
1,2-DIPHENYLHYDRAZINE	mg/L	LT 0.001
FLUORANTHENE	mg/L	LT 0.001
FLUORENE	mg/L	LT 0.001
HEXACHLOROBENZENE	mg/L	LT 0.002
HEXACHLOROBUTADIENE	mg/L	LT 0.002
HEXACHLOROCYCLOPENTADIENE	mg/L	LT 0.005
HEXACHLOROETHANE	mg/L	LT 0.003
INDENO (1,2,3-cd) PYRENE	mg/L	LT 0.003
ISOPHORONE	mg/L	LT 0.002
NAPHTHALENE	mg/L	LT 0.001
NITROBENZENE	mg/L	LT 0.001
N-NITROSO-DIMETHYLAMINE	mg/L	LT 0.002
N-NITROSO-DI-n-PROPYLAMINE	mg/L	LT 0.008
N-NITROSO-DIPHENYLAMINE	mg/L	LT 0.002
PHENANTHRENE	mg/L	LT 0.001
PYRENE	mg/L	LT 0.001
1,2,4-TRICHLOROBENZENE	mg/L	LT 0.001
ALDRIN	mg/L	LT 0.006
ALPHA-BHC	mg/L	LT 0.002
BETA-BHC	mg/L	LT 0.003
GAMMA-BHC	mg/L	LT 0.007
DELTA-BHC	mg/L	LT 0.005
CHLORDANE	mg/L	LT 0.0010

continued

Table 17-1 (cont.)

TEST PARAMETER	UNITS	TEST RESULT
4,4'-DDD	mg/L	LT 0.002
4,4'-DDE	mg/L	LT 0.003
4,4'-DDT	mg/L	LT 0.003
DIELDRIN	mg/L	LT 0.003
ENDOSULFAN I	mg/L	LT 0.0010
ENDOSULFAN II	mg/L	LT 0.0020
ENDOSULFAN SULFATE	mg/L	LT 0.0010
ENDRIN	mg/L	LT 0.0030
HEPTACHLOR	mg/L	LT 0.0010
HEPTACHLOR EPOXIDE	mg/L	LT 0.0010
TOXAPHENE	mg/L	LT 0.0010
ENDRIN ALDEHYDE	mg/L	LT 0.0010

continued

18. What Is the Rate of Biological or Chemical Degradation of Resins?

19. What Biological Hazards Are There from Resin Degradation That Have Been Published in the Scientific Literature or Are Known from Manufacturers' Tests?

Q18/19-1. Please describe the resins that are used in the secondary-side cleanup process at Davis-Besse?

A18-19-1. [Mr. Hetherington] The Davis-Besse secondary-side cleanup process uses three types of powdered ion-exchange resins supplied by Epicor, Inc. These are designated PD-1, PD-2 and PD-3. The Epicor resins used at Davis-Besse are essentially the same as those used for this purpose throughout the nuclear industry.

Q18/19-2. What is the chemical composition of the resins?

A18/19-2. [Mr. Hetherington] All three types are copolymers of styrene and divinylbenzene ("DVB"). PD-1 is aminated (treated with an amine) to form a quaternary ammonium group that is tightly held on to the copolymer. PD-1 is in the hydroxide form. PD-2 and PD-3

are sulphonated (treated with a sulphur compound such as sulphuric acid) to form a sulphonic acid group that is also tightly held on the copolymer. PD-2 is inverted to the ammonium form; PD-3 is in the hydrogen form. In all three forms, the DVB functions as a crosslinking agent, tying the linear chains of polystyrene together.

Q18/19-3. Would you expect these resins to be subject to biological degradation?

A18/19-3. [Mr. Hetherington] No. In my substantial experience with ion exchange resins, I have never seen any instance where biological degradation of resins has occurred. There have been numerous instances where bacterial growth has occurred in a resin bed. However, when that growth was removed, the resins have shown no signs of degradation. On a personal note, some 20 years ago I added similar ion exchange resins to a tomato patch in my back yard in view of a number of technical papers which recommended their use as synthetic soil. This spring, in turning over the soil,

I found the resins were still there, with no signs of any degradation.

Q18/19-4. Would you expect these resins to be subject to chemical degradation?

A18/19-4. [Mr. Hetherington] No. The resins are designed to be highly insoluble. They are extremely insoluble in water. Even in solvents and solutions used in the laboratory, DVB cross-linked resins are essentially insoluble. Decomposition can occur, but requires extremely powerful oxidizing solutions, such as boiling nitric acid or chromic-nitric acid.25/ One example of the insolubility of these resins is their use in municipal water treatment systems to treat drinking water. Specifications typically require that each cubic foot of resin treat at least one million gallons of water. Unless the resin were essentially insoluble, it would not be possible to meet this specification. The same volume of resin is present when the resins are replaced.

25/ Khym, Analytical Ion-Exchange Procedures in Chemistry and Biology (1974).

Q18/19-5. What other examples are there of the inert nature of the resins?

A18/~~19~~-5. [Mr. Hetherington] Several drugs listed in the United States Pharmacopeia and the Physicians Desk Reference are based on the same type of resins used in PD-1, PD-2, and PD-3. For example, sodium polystyrene sulfonate (manufactured by Sterling Drug Company's Breon Division under the name Kayexalate) and cholestryamine resin (manufactured by Mead Johnson under the name Questran) are both to be taken orally. The typical dose of Questran (a drug to prevent the formation of cholesterol) is 32 ounces per day, of which approximately 16 ounces are resins. The resin is therefore not only inert, but also non-toxic.

Q18/19-6. Would you expect that there would be any chemical reactions between the resins and the environment which might cause the release of radioactive materials from the resins?

A18/19-6. [Mr. Hetherington] No. Impurities which have been exchanged onto a resin may be

deliberately eluted (i.e. removed) from the resin by a regeneration process. This process requires the use of relatively strong acids or bases at concentrations in excess of one percent. For example, PD-2 and PD-3 are usually regenerated by using a 4% solution of sulphuric acid for periods of approximately 30 to 40 minutes. PD-1, on the other hand, is typically regenerated by using a 4% sodium hydroxide solution for periods of approximately 90 minutes. These concentrations and contact times are required to achieve significant elution.

It is highly unlikely that these concentrations would exist in the natural environment. I would not expect to find any significant levels of sulfuric or nitric acid in the environment. There are some moderately strong humic acids produced in soil by the decay of vegetation. However, there will not be decaying vegetation in the burial cells, nor is it likely that the vegetation covering the cell would produce significant amounts of humic acid. Moreover, the manner in which

the burial cells are constructed, as well as the packing characteristics of the resins, would prevent water containing ionizable salts and humic acid from percolating through the resins. Finally, one must remember that the resins are mixed with a very large volume of lime sludge. Even if water were able to percolate through the resin/sludge mixture, the alkalinity of this material would neutralize any strong acid.

The residual ion exchange capacity that remains on the resins even after they are discharged, provides further protection against elution of the radioactive ions. Typically, spent resins when they are discharged still retain about 40% of their ion exchange capabilities. Thus, the presence in the environment of ions with a greater affinity for the resins than the ions presently held on them would not be expected to cause leakage of ions from the resins.

Q18/19-7. Are the resins flammable?

A18/19-7. [Mr. Hetherington] PD-1, PD-2, and PD-3 are not combustible until moisture is removed. When moisture is removed, the resins will burn in flame at 230°C. It is estimated that auto ignition of pure resins will occur at 427°C (800°F).

At Davis-Besse, however, the resins will not be buried in pure form. It is my understanding that the resins are mixed with tens of thousands of cubic feet of water treatment sludge (which is predominantly calcium carbonate) and that the waste will be subsequently solidified by cement kiln dust. I cannot envision such a solidified mixture burning.

20. Describe the Licensee's Plans for Site Management During Operation, for Marking the Burial Site, and for Record Keeping at the Burial Site.

Q20-1. How will the waste burial be managed?

A20-1. [Mr. Wallace] Each time it becomes necessary to remove and bury settling basin bottoms, a project manager will be appointed. The project manager will be responsible for construction of the burial cell to be used, for removal of the bottoms from the settling basin and transportation of the bottoms to the constructed cell, and for the subsequent closure of the cell. The project manager will be assigned from the Nuclear Projects Division, Project Management Department, unless circumstances make it beneficial to choose a project manager from another division (for example, if a manager from another division has special expertise). After the cell is sealed and the burial project completed, the Environmental Monitoring Section will assume responsibility for monitoring the burial site and maintaining the cell.

Q20-2. Please describe how the burial project will be conducted?

A20-2. [Mr. Wallace] The burial project will be conducted in accordance with Davis-Besse procedure NMP-NP-401 RO, "Project Management." The project team will be composed of members of the various divisions with responsibility over aspects of the project. NMP-NP-401 brings all these divisions together under one project management and ensures an integrated, interdisciplinary approach to the project.

One of the first responsibilities of the project manager will be to develop a detailed project plan. The project plan will define the scope of the work to be done, project goals and objectives, the project team organization, method of implementation, schedule, and functional assignments. The project team will then commence implementing the plan. The actual construction of the cells and transportation of the waste will most likely be performed by contractors. In this case, the project team would prepare purchase order requests governing cell construction and waste transportation. The contractual documents

will provide the specifications for the work to be performed and will include quality controls. The project team will oversee the work to ensure it meets the specifications.

Q20-3. How will the burial cells be constructed?

A20-3. [Mr. Wallace] The specifications for the burial cells should be essentially the same as those described earlier by Mr. Swim. The project team will perform any further engineering that might be necessary (for example, to satisfy any additional design features that might be required by the Ohio Permit to Install).

Q20-4. How will the settling basin bottoms be handled?

A20-4. [Mr. Wallace] The project will be conducted in accordance with standard practice for waste burial. The precise procedures will be established by the project management team. Toledo Edison's present concept of operations is as follows:

The settling basin will first be dewatered, but not to an extent where the bottoms would dry out. A number of representative samples of the bottoms will be taken to define the content of

the bottoms. Then, vacuum trucks will be used to draw the bottoms out of the settling basin. These vacuum trucks are equipped with a suction pump which draws material into closed tanks on the trucks. This operation will be performed by a contractor licensed by the State of Ohio to haul waste. The vacuum trucks will transport the waste to the burial site. There, the waste will be mixed with a solidifying agent (cement kiln dust). The solidifying agent will cause the waste to set up. After the waste has solidified, the cell will be capped and the cover seeded.

Q20-5. Please describe the monitoring and maintenance that will be performed after burial.

A20-5. [Ms. Scott-Wasilk] The Toledo Edison Environmental Monitoring Section intends to monitor groundwater and to conduct periodic inspections of the cells. This program will be governed by written procedures.

The Environmental Monitoring Section's current plan is to monitor groundwater in four wells. One of the wells will provide background data, and the other three will be located in

directions of possible groundwater flow. Water in these wells will be sampled semi-annually for priority pollutants, pH, and radioactivity.

The Environmental Monitoring Section intends to inspect the cells and dikes semi-annually to ensure that cracking of the cover or erosion does not occur. If any significant deterioration of the cell is detected, it will be repaired. The cells and dikes will also be inspected after any significant flooding event.

Q20-6. What records will be kept pertaining to burial?

A20-6. [Mr. Wallace] Project records pertaining to the design and construction of the cells will be retained as NRC permanent records under the Davis-Besse Nuclear Records Program.

[Ms. Scott-Wasilk] The Environmental Monitoring Section will maintain a description of the waste in each cell, identified by type, volume, content, and date of burial. The location of each cell will be surveyed and recorded on a plat. In addition, all settling basin sampling data, all groundwater monitoring data and

reports, all burial site inspection reports, and all maintenance reports will be retained. These documents will be kept available for inspection and will be treated as NRC permanent records.

Q20-7. How will the cells be marked?

A20-7. [Ms. Scott-Wasilk] Signs will be posted to alert any persons in the area and to prohibit unauthorized access.

MR. SILBERG: AT THIS POINT, I WOULD ASK EACH OF THE WITNESSES TO INTRODUCE THEMSELVES.

WHEREUPON,

DR. GARY F. BENNETT, J. STEWART BLAND, DAVID BRIDEN, DAVID M. HENDRON, DR. CHARLES E. HERDENDORF, RICHARD HETHERINGTON, DR. WILLIAM B. JACKSON, DR. ROGER E. LINNEMANN, DR. JEFFREY M. REUTTER, JENNIFER SCOTT-WASILK, THEO S. SWIM, DR. JOHN E. TILL, AND DAVID M. WALLACE

WERE CALLED AS WITNESSES AND, HAVING BEEN FIRST DULY SWORN, WERE EXAMINED AND TESTIFIED AS FOLLOWS:

DIRECT EXAMINATION

BY MR. SILBERG:

Q. WOULD YOU PLEASE STATE YOUR NAMES, OCCUPATIONS AND ADDRESSES?

A. (DR. BENNETT) MY NAME IS DR. GARY F. BENNETT. I AM A PROFESSOR OF BIOCHEMICAL ENGINEERING AT THE UNIVERSITY OF TOLEDO. MY BUSINESS ADDRESS IS THE UNIVERSITY OF TOLEDO, TOLEDO, OHIO 43606.

A. (MR. BLAND) MY NAME IS J. STEWART BLAND.

I AM A CONSULTANT AND PRESIDENT OF J. STEWART BLAND, INCORPORATED. MY BUSINESS ADDRESS IS P.O. BOX 4154, ANNAPOLIS, MARYLAND 21403.

A. (MR. BRIDEN) MY NAME IS DAVID BRIDEN. I AM THE CHEMISTRY AND HEALTH PHYSICS SUPERINTENDENT FOR THE DAVIS-BESSE NUCLEAR STATION. MY BUSINESS ADDRESS IS TOLEDO EDISON COMPANY, 300 MADISON AVENUE, TOLEDO, OHIO 43652.

A. (MR. HENDRON) MY NAME IS DAVID M. HENDRON. I AM A VICE-PRESIDENT OF WOODWARD CLYDE CONSULTANTS, A FIRM THAT SPECIALIZES IN GEOTECHNICAL ENGINEERING. MY BUSINESS ADDRESS IS 11 EAST ADAMS STREET, SUITE 1500, CHICAGO, ILLINOIS 60603.

A. (DR. HERDENDORF) MY NAME IS DR. CHARLES E. HERDENDORF. I AM A PROFESSOR OF ZOOLOGY, GEOLOGY AND NATURAL RESOURCES AT THE OHIO STATE UNIVERSITY, AND I'M THE DIRECTOR OF THE CENTER FOR LAKE ERIE AREA RESEARCH. MY BUSINESS ADDRESS IS CENTER FOR LAKE ERIE AREA RESEARCH, THE OHIO STATE UNIVERSITY, 484 WEST 12TH AVENUE, COLUMBUS, OHIO 43210.

A. (MR. HETHERINGTON) MY NAME IS RICHARD HETHERINGTON. I'M THE MARKETING MANAGER FOR EPICOR, INCORPORATED. MY BUSINESS ADDRESS IS POST

OFFICE BOX 598, FORT WASHINGTON, PENNSYLVANIA 19034.

A. (DR. JACKSON) MY NAME IS DR. WILLIAM B. JACKSON. I AM A PROFESSOR EMERITUS OF BIOLOGICAL SCIENCES AT BOWLING GREEN STATE UNIVERSITY. MY BUSINESS ADDRESS IS BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN, OHIO 43403.

A. (DR. LINNEMANN) MY NAME IS DR. DOCTOR ROGER E. LINNEMANN. I'M A PHYSICIAN AND VICE-CHAIRMAN AND CHIEF MEDICAL OFFICER OF RADIATION MANAGEMENT CORPORATION. I'M ALSO AN ASSOCIATE CLINICAL PROFESSOR OF RADIOLOGY AT THE UNIVERSITY OF PENNSYLVANIA SCHOOL OF MEDICINE. MY BUSINESS ADDRESS IS RADIATION MANAGEMENT CORPORATION, 3508 MARKET STREET, PHILADELPHIA, PENNSYLVANIA.

A. (DR. REUTTER) MY NAME IS DR. JEFFREY M. REUTTER. I'M ASSOCIATE DIRECTOR OF THE FRANZ THEODORE STONE LABORATORY, ASSISTANT DIRECTOR OF THE CENTER FOR LAKE ERIE AREA RESEARCH, AND ADJUNCT PROFESSOR OF ZOOLOGY AND NATURAL RESOURCES AT THE OHIO STATE UNIVERSITY. MY BUSINESS ADDRESS IS THE COLLEGE OF BIOLOGICAL SCIENCES, 484 WEST 12TH AVENUE, COLUMBUS, OHIO 43210.

A. (MS. SCOTT-WASILK) MY NAME IS JENNIFER

SCOTT-WASILK. I'M THE ENVIRONMENTAL AND EMERGENCY PREPAREDNESS MANAGER FOR THE DAVIS-BESSE NUCLEAR STATION. MY BUSINESS ADDRESS IS THE TOLEDO EDISON COMPANY, 300 MADISON AVENUE, TOLEDO, OHIO 43652.

A. (MR. SWIM) MY NAME IS THEO S. SWIM. I'M THE CIVIL/STRUCTURAL ENGINEERING MANAGER FOR THE DAVIS-BESSE NUCLEAR STATION. MY BUSINESS ADDRESS IS THE TOLEDO EDISON COMPANY, 300 MADISON AVENUE, TOLEDO, OHIO 43652.

A. (DR. TILL) MY NAME IS DR. JOHN E. TILL. I AM A HEALTH PHYSICIST AND PRESIDENT OF RADIOLOGICAL ASSESSMENTS CORPORATION. MY BUSINESS ADDRESS IS ROUTE 2, BOX 122, NEESES, SOUTH CAROLINA 29107.

A. (MR. WALLACE) MY NAME IS DAVID M. WALLACE. I'M LEAD NUCLEAR PROJECTS MANAGER FOR THE DAVIS-BESSE NUCLEAR STATION. MY BUSINESS ADDRESS IS TOLEDO EDISON COMPANY, 300 MADISON AVENUE, TOLEDO, OHIO 43652.

MR. SILBERG: BEFORE WE PROCEED WITH THE TESTIMONY, IF THE ATTORNEY GENERAL HAS STILL NOT ARRIVED, I WOULD --

JUDGE HOYT: HE DOESN'T APPEAR TO BE ON STATION YET.

MR. SILBERG: I WOULD PROPOSE, IF

IT'S ACCEPTABLE, TO MAKE OUR BRIEF OPENING STATEMENT.

JUDGE HOYT: VERY WELL. I HAVE NO OBJECTION TO THAT, IF THAT DOES NOT INTERFERE WITH THE PRESENTATION.

MR. VAN KLEY: THAT'S FINE WITH US, YOUR HONOR.

MR. SILBERG: ALL RIGHT.

JUDGE HOYT, AS YOU'VE INDICATED, THE PURPOSE OF THIS HEARING IS TO REVIEW THE APPROVAL GRANTED BY THE N.R.C. STAFF OF THE PROPOSAL BY TOLEDO EDISON COMPANY TO BURY WATER TREATMENT SLUDGE AND RESINS WHICH ARE CONTAMINATED WITH VERY MINUTE QUANTITIES OF RADIOACTIVITY AT THE DAVIS-BESSE SITE.

TOLEDO EDISON ASKED THE N.R.C. TO APPROVE ON-SITE BURIAL IN JULY OF 1983. THAT REQUEST WAS BASED UPON THE N.R.C.'S SUGGESTION THAT VERY LOW LEVELS OF RADIOACTIVITY SHOULD NOT BE SENT TO OFF-SITE BURIAL GROUNDS.

THERE WERE A NUMBER OF REASONS FOR THAT SUGGESTION BY THE COMMISSION. THERE WAS A BELIEF THEN, AND IS NOW, THAT THOSE OFF-SITE BURIAL SITES SHOULD BE RESERVED FOR MATERIALS WITH SUBSTANTIALLY HIGHER LEVELS OF RADIOACTIVITY THAN

THE VERY, VERY LOW LEVELS THAT WE'RE TALKING ABOUT HERE TODAY. ALSO, THERE WAS A BELIEF THAT THE LIMITED ALLOCATIONS OF DISPOSAL SPACE AT THOSE OFF-SITE FACILITIES SHOULD NOT BE SPENT FOR MATERIALS WHICH COULD OTHERWISE BE SAFELY AND -- SAFELY DISPOSED OF AND DISPOSED OF IN AN ENVIRONMENTALLY APPROPRIATE MANNER. AND THE FINAL REASON FOR THAT N.R.C. SUGGESTION WAS A CONGRESSIONAL POLICY, UNITED STATES CONGRESS, THAT THE LOW-LEVEL BURIAL SITES WERE A NATIONAL ASSET AND THAT THE CAPACITY THEY HAD TO RECEIVE LOW-LEVEL WASTES SHOULD BE USED WISELY IN RESERVE FOR MATERIALS WHICH REQUIRED THAT NATURE OF TREATMENT.

IN OCTOBER OF 1985, THE N.R.C. APPROVED TOLEDO EDISON'S REQUEST. AS THE SPEAKERS FOR THE STATE INDICATED, TOLEDO EDISON STILL REQUIRES A STATE PERMIT, REGARDLESS OF THE OUTCOME OF THIS PROCEEDING, BEFORE WE CAN PROCEED WITH ANY ON-SITE BURIAL, AND WE INTEND TO APPLY FOR THAT PERMIT AT AN APPROPRIATE TIME FOLLOWING THE RESULTS OF THIS HEARING.

THE QUANTITIES OF RADIATION THAT ARE INVOLVED ARE VERY, VERY SMALL. INDEED, THEY ARE SO SMALL THAT IF THE RADIATION WERE IN LIQUID

FORM, IT COULD BE DISCHARGED TO THE LAKE IN ACCORDANCE WITH N.R.C. REGULATIONS AND TOLEDO EDISON'S LICENSE FROM THE N.R.C.

THE WATER TREATMENT SLUDGE, ON THE OTHER HAND, IS ESSENTIALLY IDENTICAL TO MUNICIPAL WATER TREATMENT -- TO SLUDGE WHICH IS GENERATED BY MUNICIPAL WATER TREATMENT PLANTS FOR TOWNS AND CITIES ALL ALONG LAKE ERIE.

LET ME TALK A MINUTE ABOUT THE TWO TYPES OF MATERIALS THAT WE WISH TO DISPOSE OF ON-SITE.

THE FIRST IS THE WATER TREATMENT SLUDGE. LIKE MANY FACILITIES, DAVIS-BESSE HAS A WATER TREATMENT PLANT. THE PURPOSE OF THAT SYSTEM IS TO PURIFY LAKE ERIE WATER SO THAT IT CAN BE USED WITHIN THE FACILITY FOR PERSONAL USE AS WELL AS FOR USE IN THE NUCLEAR PLANT. THE WATER TREATMENT SYSTEM REMOVES IMPURITIES WHICH ARE IN LAKE WATER. IT DOES THIS BY ADDING STANDARD CHEMICALS SUCH AS CALCIUM CARBONATE, AND THE RESULT OF THE PROCESS IS PURE WATER WHICH CAN BE USED FOR DOMESTIC PURPOSES. AND SLUDGE; SLUDGE CONTAINS THE WATER TREATMENT CHEMICALS PLUS THE IMPURITIES REMOVED FROM LAKE ERIE WATER. AND AS I MENTIONED, THAT SLUDGE IS ESSENTIALLY IDENTICAL TO THAT PRODUCED BY MUNICIPAL WATER TREATMENT PLANTS IN MANY CITIES

IN THIS AREA.

THE OTHER COMPONENT OF THE MATERIAL TO BE DISPOSED OF ARE THE RESINS WHICH ARE USED TO REMOVE IMPURITIES IN THE SECONDARY WATER -- SECONDARY WATER SYSTEM OF THE DAVIS-BESSE PLANT.

THE PRIMARY SYSTEM, THE PRIMARY WATER SYSTEM, IS THE WATER THAT CIRCULATES THROUGH THE NUCLEAR REACTOR ITSELF. THAT WATER SYSTEM IS PHYSICALLY SEPARATED FROM THE SECONDARY SYSTEM BY THE STEAM GENERATORS. STEAM GENERATORS SERVE TO TRANSFER THE HEAT FROM THE PRIMARY SYSTEM INTO THE SECONDARY SYSTEM.

THE RESINS THAT WE'RE TALKING ABOUT ARE USED TO REMOVE IMPURITIES WHICH ACCUMULATE IN THE SECONDARY SYSTEM, NOT IN THE PRIMARY SYSTEM, AND WE NEED TO REMOVE THOSE IMPURITIES BECAUSE IF THEY BUILT UP IN THE SECONDARY SYSTEM THEY COULD INTERFERE WITH THE EFFICIENCY OF THE PLANT OPERATION BY PLATING OUT, BY FORMING SCALE ON THE STEAM GENERATORS AND REDUCING THE EFFICIENCY OF HEAT TRANSFER FROM THE PRIMARY SYSTEM TO THE SECONDARY SYSTEM.

THE RESINS THAT ARE USED ARE VERY SIMILAR TO THOSE WHICH ARE USED IN HOUSEHOLD WATER SOFTENERS. THE RESINS THEMSELVES ARE INERT. THEY

ARE NONTOXIC. INDEED, THEY ARE A COMPONENT OF MEDICINES WHICH PEOPLE TAKE, INGEST IN SUBSTANTIAL QUANTITIES.

WHEN THE RESINS HAVE BEEN USED FOR SOME PERIOD OF TIME, THEIR EFFICIENCY DECREASES AS THE IMPURITIES BUILD UP ON THEM, AND THEY NEED TO BE REPLACED SO THAT THE EFFICIENCY OF THE IMPURITY REMOVAL SYSTEM CAN BE MAINTAINED.

AMONG THE IMPURITIES WHICH THE RESINS REMOVE FROM THE WATER ARE VERY, VERY LOW LEVELS OF RADIOACTIVITY. AT HIGHER LEVELS, IF THERE WERE TO BE HIGHER LEVELS, OF RADIOACTIVITY IN THE SECONDARY WATER, THE RESINS, AS REQUIRED BY PLANT PROCEDURES, WOULD BE DISPOSED OF AT OFF-SITE BURIAL FACILITIES AND WOULD NOT BE KEPT AT THE DAVIS-BESSE SITE.

EVERY RESIN BATCH, BEFORE IT'S DISCHARGED FROM THE WATER TREATMENT FROM THE DEMINERALIZER SYSTEM, IS ANALYZED TO DETERMINE JUST HOW MUCH RADIOACTIVITY IT CONTAINS AND WHAT TYPES OF ISOTOPES ARE CONTAINED IN IT. THOSE RESINS WHICH ARE DISCHARGED TO THE SETTLING BASINS AND WHICH WE WISH TO BURY ON-SITE HAVE VERY, VERY LOW LEVELS OF RADIATION.

AS I INDICATED, THE RESINS AND THE SLUDGE

ARE DISCHARGED TO ON-SITE SETTLING BASINS. THESE BASINS WILL EVENTUALLY FILL UP OVER TIME AND THEY NEED TO BE EMPTIED. THE ALTERNATIVES ARE TO BURY THEM ON-SITE OR TO SEND THEM OFF-SITE FOR DISPOSAL AT LOW-LEVEL WASTE FACILITIES.

AS I MENTIONED BEFORE, THE CONGRESSIONAL AND N.R.C. POLICY INDICATES THAT OFF-SITE BURIAL SHOULD BE RESERVED FOR MATERIALS WHICH ARE CONSIDERABLY MORE RADIOACTIVE THAN WHAT WE'RE DEALING WITH HERE TODAY. THERE IS ALSO A SUBSTANTIAL COST PENALTY, ADDITIONAL COSTS IF THIS MATERIAL WERE TO BE SHIPPED OFF-SITE.

FINALLY, BASED ON OUR ANALYSES, WE HAVE FOUND NO ENVIRONMENTAL JUSTIFICATION WHICH WOULD INDICATE THAT THEY SHOULD NOT BE BURIED ON-SITE. THE ON-SITE BURIAL PROCESS HAS BEEN THE SUBJECT OF EXTENSIVE ANALYSES OF THE RADIOLOGICAL ENVIRONMENTAL CONSEQUENCES, AND THE PRECAUTIONS WHICH TOLEDO EDISON PLANS TO TAKE, AND WHICH ARE DISCUSSED IN OUR TESTIMONY, ARE FAR GREATER THAN THE PRECAUTIONS TAKEN FOR SIMILAR WASTES HANDLED IN SIMILAR FACILITIES IN THIS VERY AREA. THE WASTES WILL BE STORED, WILL BE DISPOSED OF IN DIKED BURIAL CELLS. THESE CELLS WILL HAVE OUTER WALLS WHICH ARE COVERED WITH LARGE STONE RIP-RAP

TO PROVIDE PROTECTION AGAINST STORMS AND EROSION.

THE BURIAL CELLS WILL BE LINED TO PREVENT ANY WASTE FROM GETTING OUT AND ANY WATER FROM GETTING IN. THE LINER WILL BE TWO-AND-A-HALF FOOT COMPACTED CLAY LINER TOPPED BY AN IMPERVIOUS SYNTHETIC MEMBRANE TOPPED BY A ONE-FOOT GRAVEL DRAINAGE BLANKET TOPPED BY AN ADDITIONAL ONE-HALF FOOT OF COMPACTED CLAY. ON TOP OF THE BURIAL CELLS WILL BE A CAP COMPOSED OF TWO TO FOUR FEET OF COMPACTED CLAY TOPPED BY A SAND OR GRAVEL FILTER LEVEL TOPPED BY TOPSOIL WHICH IS THEN SEEDED AND VEGETATED TO PREVENT EROSION. THE TOPS OF THE CELLS WILL BE HIGH ENOUGH SO THAT THEY WILL BE ABOVE ANY CONCEIVABLE FLOOD LEVELS, AND THEY WILL BE GRADED TO PROVIDE FOR DRAINAGE SO THAT NO WATER CAN ACCUMULATE ON TOP OF THE CELLS.

AND FINALLY, THE SLUDGE IN THE RESINS THEMSELVES WILL BE SOLIDIFIED. THEY WILL NOT BE IN A LOOSE FORM, BUT THEY WILL BE SOLIDIFIED INTO A CONCRETE-LIKE MASS WHICH WILL FURTHER PROTECT AGAINST THE WASTE MIGRATING INTO THE ENVIRONMENT, AWAY FROM THE CELLS AND INTO THE ENVIRONMENT.

OUR ANALYSIS HAS SHOWN THAT THE SITE IS A VERY FAVORABLE LOCATION FOR THE CONSTRUCTION OF THESE BURIAL CELLS. UNDERNEATH THE BURIAL CELLS

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OUR ANALYSIS HAS SHOWN THAT THE SITE IS A VERY FAVORABLE LOCATION FOR THE CONSTRUCTION OF THESE BURIAL CELLS. UNDERNEATH THE BURIAL CELLS

ARE UNIFORM CLAY DEPOSITS, A HIGHLY IMPERMEABLE SOIL WHICH WOULD PREVENT WATER FROM PERCOLATING DOWN INTO THE GROUNDWATER EVEN IF IT COULD ESCAPE FROM THE CELLS. THERE ARE NO PATHS BY WHICH WATER CAN REACH THE WASTES OR WASTES CAN REACH THE WATER.

OUR ANALYSIS OF THE SITE IS BASED ON MANY YEARS OF GEOLOGICAL INVESTIGATION AT THE DAVIS-BESSE SITE PLUS SOIL BORINGS AT THE BURIAL LOCATION ITSELF. WE BELIEVE THAT THERE IS NO WAY FOR THE WASTES TO REACH THE ENVIRONMENT, THE ENVIRONMENT INCLUDING LAKE ERIE AND THE NAVARRE MARSH.

WE, OF COURSE, RECOGNIZE THE PRESENCE OF THE NAVARRE MARSH. INDEED, TOLEDO EDISON HAS A MAJOR RESPONSIBILITY FOR THAT MARSH THROUGH THE LEASES WHICH IT HAS GIVEN TO THE U.S. FISH AND WILDLIFE SERVICE. U.S. FISH AND WILDLIFE SERVICE MANAGES THE NAVARRE MARSH, BUT THE MARSH, INDEED, IS OWNED BY TOLEDO EDISON COMPANY AND WE ARE REQUIRED TO MAINTAIN PROTECTION OF THAT MARSH. INDEED, IT HAS BEEN PROTECTED FROM THE ENVIRONMENT, FROM THE STORMS, FROM THE WATER LEVELS, BECAUSE TOLEDO EDISON PURCHASED IT AND ASSURED THAT IT WOULD BE PROTECTED. WE HAVE

STUDIED THE MARSH FOR MORE THAN A DECADE AND WE HAVE DETAILED KNOWLEDGE OF THE ENVIRONMENT OF THE MARSH, ITS ECOLOGICAL SYSTEMS, THE BIRDS, FISH, WILDLIFE THAT INHABIT IT.

THE WASTES WILL BE ISOLATED FROM THE MARSH, AND NOT EVEN THE MOST DAMAGING STORMS WOULD BE ABLE TO RELEASE THEM; ALTHOUGH I WOULD NOTE IF SUCH A STORM OCCURRED, IT WOULD UNDOUBTEDLY CREATE GREAT DAMAGE ITSELF TO MARSHES ALL ALONG THE LAKE.

THE WASTES WHICH WILL BE STORED, WHICH WILL BE DISPOSED OF IN THESE BURIAL CELLS HAVE BEEN TESTED TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS AND THEY ARE NOT HAZARDOUS WASTES, AND, INDEED, WE BELIEVE THAT ANYTHING WHICH WOULD COME OUT OF THOSE CELLS, EVEN THOUGH WE CAN'T CONCEIVE THAT IT WOULD, WOULD MEET DRINKING WATER STANDARDS.

WE BELIEVE, BASED ON EXTENSIVE ANALYSIS, THAT NO HARM WOULD COME TO THE MARSH, NO HARM WOULD COME TO THE GROUNDWATER OR TO THE ENVIRONMENT. WE BELIEVE WE WILL DEMONSTRATE THAT HERE, AND WE WILL DEMONSTRATE IT AGAIN WHEN WE FILE OUR APPLICATION WITH THE STATE FOR A PERMIT TO CONSTRUCT THE BURIAL FACILITY.

TOLEDO EDISON IS CHARGED BY THE N.R.C. TO

PROTECT THE HEALTH AND SAFETY OF THE PUBLIC IN ALL OF ITS NUCLEAR-RELATED OPERATIONS. AT THE SAME TIME, WE ARE REQUIRED BY THE PUBLIC UTILITIES COMMISSION OF OHIO TO MINIMIZE THE COST OF OPERATING THE DAVIS-BESSE PLANT CONSISTENT WITH THE HEALTH AND SAFETY OF THE PUBLIC.

WE BELIEVE THAT OUR PROPOSED PLAN FOR DISPOSING OF THE RADIOACTIVE SLUDGE FROM THE DAVIS-BESSE SETTLING POND FULLY SATISFIES BOTH REQUIREMENTS WHILE PROTECTING THE AREA'S NATURAL RESOURCES.

SENDING THESE WASTES TO AN OFF-SITE BURIAL GROUND WOULD RESTRICT OUR CHOICES FOR COMMERCIAL DISPOSAL OF LOW-LEVEL WASTES IN THE FUTURE. AS THE N.R.C. BALANCES THESE CONSIDERATIONS IN THE HEARING, WE'RE CONFIDENT THAT THE EARLIER DECISION TO PERMIT ON-SITE BURIAL WILL BE REAFFIRMED AND THAT THE N.R.C. WILL CONTINUE TO ALLOW US TO PROCEED WITH OUR PLANS TO TREAT THESE WASTES IN APPROPRIATE MANNER, TO BURY THEM ON-SITE IN A WAY THAT PROTECTS THE ENVIRONMENT, THE LAKE AND THE MARSH.

TODAY WE WILL PRESENT A PANEL OF TOLEDO EDISON EXPERTS AND DISTINGUISHED CONSULTANTS WHO HAVE STUDIED THE GEOLOGY, HYDROLOGY AND

ENVIRONMENT OF THE SITE FOR MORE THAN A DECADE. WE BELIEVE THAT TESTIMONY WILL DEMONSTRATE THAT THE ON-SITE BURIAL PROPOSED IS THE BEST SOLUTION TO THE DISPOSAL OF THE SLUDGE AND THE RESINS.

THANK YOU, JUDGE HOYT.

JUDGE HOYT: STILL NO --

MR. VAN KLEY: YOUR HONOR, ATTORNEY GENERAL CELEBREZZE HAS ARRIVED.

JUDGE HOYT: VERY WELL. I'M GOING TO SUGGEST, MR. SILBERG, THAT WE GIVE FROM THE CRAMPED QUARTERS OVER HERE SOME TEMPORARY RELIEF TO YOUR WITNESSES, GET THE TESTIMONY OF THE ATTORNEY GENERAL, AND IMMEDIATELY FOLLOWING WE'LL BRING THEM BACK.

MR. SILBERG: FINE. GENTLEMEN?

JUDGE HOYT: WE WILL HAVE A BRIEF RECESS.

(RECESS TAKEN.)

JUDGE HOYT: THE HEARING WILL COME TO ORDER.

ALL THE PARTIES TO THE HEARING WHO WERE PRESENT WHEN THE HEARING RECESSED ARE AGAIN PRESENT.

AT THIS TIME, THE HEARING WILL TAKE A STATEMENT OF THE DISTINGUISHED ATTORNEY GENERAL OF

THE STATE OF OHIO. SIR?

WHEREUPON,

ANTHONY J. CELEBREZZE, JR.

WAS CALLED AS A WITNESS AND TESTIFIED AS FOLLOWS:

DIRECT TESTIMONY

THE WITNESS: THANK YOU, YOUR HONOR.

I APOLOGIZE FOR DISRUPTING THE PROCEEDINGS. I'VE FOUND THAT ONE OF THE BASIC LAWS OF PHYSICS IS YOU CAN'T BE IN TWO PLACES AT ONE TIME. AND I JUST BURNED THE ROAD UP GETTING UP HERE. THERE WERE A COUPLE OF SURPRISED HIGHWAY PATROLMEN BACK DOWN AROUND ROUTE 13 SOMEWHERE KIND OF WONDERING WHAT WENT BY THEM.

YOUR HONOR, I AM ANTHONY J. CELEBREZZE, JR., THE ATTORNEY GENERAL OF THE STATE OF OHIO.

I'M HERE BECAUSE I SHARE WITH MANY NORTHERN OHIO RESIDENTS A GRAVE CONCERN OVER THE PLAN TO BURY LOW-LEVEL NUCLEAR RADIOACTIVE WASTE AT THE DAVIS-BESSE NUCLEAR POWER STATION.

I'M HERE ON BEHALF OF THE STATE OF OHIO TO OBJECT TO THE BURIAL OF THE WASTES IN GENERAL, AND IN PARTICULAR TO THEIR BURIAL IN THIS AREA BECAUSE THE SITE IS ONLY 25 FEET FROM THE LAKE ERIE WETLANDS, WHICH ARE ONE OF THE MOST PRECIOUS

NATURAL RESOURCES OF THE STATE OF OHIO.

THERE ARE VARIOUS IMPORTANT FACTORS THAT HAVE TO BE CONSIDERED WHEN DISCUSSING THIS ISSUE.

I THINK WE MUST TAKE INTO CONSIDERATION THE NATURAL PHYSICAL CHARACTERISTICS OF THE LOCATION. BEING ADJACENT TO THE LAKE ERIE SHORELINE CREATES ITS OWN SPECIFIC PROBLEMS. INVESTIGATION INDICATES THAT THE DAVIS-BESSE SITE HAS LOW-RELIEF, ERODIBLE SHORE MATERIALS AND A HISTORY OF FLOODING. DIKES WOULD BE CAPABLE OF HOLDING THE NORMAL FLOODING AND EROSION, BUT IN THE EVENT OF A STORM SIMILAR TO THE 1972 STORM, THOSE DIKES COULD BE BREACHED.

THE PROBLEM IS OF SERIOUS CONCERN TO US BECAUSE OF THE WATER LEVEL PROBLEMS THAT ARE NOW OCCURRING ALONG THE SHORE REGION. THE MEAN ANNUAL LAKE LEVEL HAS RISEN SOME FOUR-AND-A-HALF FEET SINCE 1934. LONG-TERM AND ANNUAL CHANGES IN THE LAKE LEVEL ARE PRESENTLY PRODUCING FLOOD CONDITIONS ALONG LOW-LYING AREAS IN THE WESTERN PART OF THE LAKE. WASTE MATERIAL COULD EASILY BE DISPERSED OVER A WIDE AREA. THIS BY ITSELF IS A GOOD REASON TO AVOID ANY WASTE BURIAL AT THE SITE THAT'S BEING CONSIDERED.

THE COMPANY HAS MADE AN OVERSIMPLIFIED

PRESENTATION OF THE BURIAL SITE'S GEOLOGICAL STRUCTURE. CURSORY SITE STUDIES HAVE BEEN DONE WHICH WE BELIEVE ARE FLAWED AND SUPERFICIAL IN REGARD TO THE COMPANY'S GROUNDWATER PATH ASSESSMENT. THERE COULD BE AS MANY AS SIX DIFFERENT TILL DEPOSITS PLUS LAKE SEDIMENTS AT THE LOCATION BEING CONSIDERED. THE SEDIMENTS CAN VARY FROM IMPERMEABLE PURE CLAY TO COBBLE DEPOSITS SO POROUS THAT YOU COULD THREAD A GARDEN HOSE THROUGH THEM.

THE GEOLOGY OF THE SITE, I THINK, MUST BE WELL-KNOWN BEFORE WE CAN DETERMINE GROUNDWATER FLOWS AND WATER TABLE. I BELIEVE THAT THIS STUDY HAS NOT BEEN SATISFACTORILY COMPLETED AT THE PROPOSED SITE, AND THAT WITHOUT IT, WE'RE GAMBLING ON THE SAFETY OF THIS PARTICULAR PROPOSAL.

WE ALSO HAVE VERY GRAVE CONCERNS OVER THE PRESERVATION OF THE REGION AS ONE OF THE STATE'S WETLAND RESERVES. THE DAVIS-BESSE POWER STATION IS LOCATED IN THE MIDST OF EXTENSIVE, INVALUABLE STATE FISH AND WILDLIFE RESOURCES. BESIDES ITS PROXIMITY TO LAKE ERIE, IT'S ALSO NEAR AN ARRAY OF RIVERS, WETLANDS, WILDLIFE REFUGES, PARKS, WOODLANDS AND FARM AND RECREATIONAL AREAS.

IN PARTICULAR, THE SITE IS ADJACENT TO

THE NAVARRE MARSH, A NATURAL HABITAT FOR ENDANGERED FISH AND WILDLIFE SPECIES.

CHEMICAL AND/OR RADIOACTIVE CONTAMINATION COULD MIGRATE FROM THE DISPOSAL AREA INTO THE MARSH THROUGH FLOODING, THROUGH SURFACE WATER RUNOFF, OR THROUGH GROUNDWATER MOVEMENTS.

THE COMPANY DID NOT SPECIFICALLY INVESTIGATE THE POTENTIAL HARM TO THE FISH AND WILDLIFE RESOURCES OF THE GENERAL AREA OR TO THE SITE ITSELF AS A PREREQUISITE FOR THE LICENSING. A THOROUGH ENVIRONMENTAL IMPACT STUDY IS IMPERATIVE TO PROPERLY EVALUATE POTENTIAL ECOLOGICAL DAMAGE THAT WOULD RESULT FROM A WASTE BURIAL SITE AT THIS PARTICULAR PLACE.

WE HAVE LEARNED THE HARD WAY TOO MANY TIMES FROM HISTORY; AND HISTORY, ON THE OTHER HAND, IS A GREAT TEACHER. WE'VE FOUND OVER THE PAST SEVERAL DECADES THAT BURYING WASTES IN THE GROUND CAN NO LONGER BE TAKEN LIGHTLY. AT ONE TIME, THAT MAY HAVE BEEN THE ACCEPTABLE PROCEDURE FOR BURYING THOSE WASTES, BUT TOO OFTEN BURIAL OF WASTE HAS LATER PROVEN TO BE DETRIMENTAL TO THE HEALTH AND SAFETY OF THE CITIZENS OF THE STATE OF OHIO, AND IN MANY AREAS OF THIS STATE, WE'RE PAYING THE PRICE OF POLLUTION OF THE GROUNDWATER,

WHICH IS A VALUABLE RESOURCE OF THIS STATE.

OVER HALF OF THE CITIZENS OF THE STATE OF OHIO RELY ON GROUNDWATER AS THEIR SOURCE OF FRESH, POTABLE DRINKING WATER. A NATIONAL STUDY INDICATES THAT OVER FIVE PERCENT OF THE NATION'S GROUNDWATER IS ALREADY POLLUTED. WE MUST REALIZE THE SERIOUSNESS OF THIS ISSUE EACH AND EVERY TIME WE CONSIDER BURIAL OF ANY WASTE PRODUCTS, IN PARTICULAR, WHEN WE'RE DISCUSSING BURIAL OF NUCLEAR WASTE MATERIALS.

AT THE DAVIS-BESSE SITE, WATER LEVELS ARE IN A CONSTANT FLUX WITH NATURE. WE DON'T FEEL THAT THE STORAGE PROPOSAL IS FAIL-SAFE. WE BELIEVE THAT THERE IS A LIKELIHOOD POLLUTION WILL OCCUR TO THE GROUNDWATER AS RAINFALL OR OTHER SURFACE WATER PASSES THROUGH THE LANDFILL AND CARRIES CONTAMINANTS WITH IT AS IT PERCOLATES INTO THE GROUNDWATER. DURING CERTAIN SEASONS, THERE'S A POTENTIAL THAT THE LANDFILL COULD ACTUALLY BE SITTING IN THE GROUNDWATER.

THE COMPANY, I DON'T THINK, REALIZES FULLY NOR DO THEY FULLY UNDERSTAND THE GROUNDWATER PROBLEMS AT THE FACILITY. IT HAS DEMONSTRATED VERY LIMITED KNOWLEDGE OF THE GEOLOGY AND HYDROGEOLOGY OF THE PROPOSED DISPOSAL SITE. THE

COMPANY'S KNOWLEDGE IS BASED ON A FEW CURSORY SOIL BORINGS.

AS TO HAVING A BURIAL SITE AT THE FACILITY AT ALL, I REFER BACK TO THE ORIGINAL 1970 LICENSING HEARINGS, WHEN THE COMPANY PROMISED -- AND I'M QUOTING NOW -- "THERE WILL BE NO DISPOSAL OF SOLID WASTE AT THIS PARTICULAR FACILITY, NOR WILL THERE BE ANY DISPOSAL OF SOLID WASTE PERFORMED UNDER THE PROPOSED CONSTRUCTION PERMIT OR OPERATING LICENSE FOR WHICH WE HAVE APPLIED." CLOSE QUOTE.

AS ATTORNEY GENERAL OF THE STATE OF OHIO, I RESPECTFULLY REQUEST A DECISION THAT FORCES THE COMPANY TO KEEP ITS PROMISE. WE PROTEST THE BURIAL OF ANY WASTES AND IN PARTICULAR THE NUCLEAR WASTE AT THE DAVIS-BESSE FACILITY.

WE URGENTLY ASK THAT THE HEALTH AND WELL-BEING OF OHIO'S CITIZENS, AS WELL AS THE WELL-BEING OF AN ENVIRONMENTALLY IMPORTANT REGION TO THE STATE OF OHIO, BE PARAMOUNT IN ANY CONSIDERATION OF PROPOSED BURIAL OF THIS TYPE OF WASTE.

YOUR HONOR, I AGAIN THANK YOU FOR GIVING ME THE PRIVILEGE OF APPEARING. I APOLOGIZE FOR BEING LATE. AND WE'LL FOLLOW WITH INTEREST THE

PROCEEDINGS IN THIS HEARING. THANK YOU VERY MUCH FOR ALLOWING ME TO APPEAR.

JUDGE HOYT: THANK YOU.

WE HAD ONE ADDITIONAL REQUEST FROM REPRESENTATIVE WISE FROM -- I BELIEVE IT'S THE 19TH DISTRICT OF OHIO. IS THAT CORRECT, SIR?

MR. WISE: 85TH.

JUDGE HOYT: I'M SORRY. I SLIPPED.

WOULD YOU JUST GO AHEAD AND MAKE YOUR STATEMENT, THEN WE'LL GET ON WITH THE REST.

MR. WISE: THANK YOU. I APPRECIATE THE OPPORTUNITY TO MAKE THIS BRIEF STATEMENT.

WHEREUPON,

DWIGHT WISE

TESTIFIED AS FOLLOWS:

DIRECT TESTIMONY

MR. WISE: I AM REPRESENTATIVE OF THE 85TH DISTRICT, WHICH INCLUDES ALL OF SANDUSKY COUNTY AND THE NORTHERN PART OF SENECA COUNTY, INCLUDING TIFFIN.

AS STATE REPRESENT FOR THE 85TH OHIO HOUSE DISTRICT REPRESENTING OVER 110,000 CITIZENS IN SANDUSKY AND PART OF SENECA COUNTY, I VERY MUCH

APPRECIATE THE OPPORTUNITY TO GIVE INPUT HERE TODAY ON TOLEDO EDISON'S APPLICATION TO BURY LOW-LEVEL RADIOACTIVE WASTE AT THE DAVIS-BESSE PLANT. I WRITE IN OPPOSITION TO THE PROPOSED APPLICATION, NOT ONLY AS A STATE REPRESENTATIVE, BUT ALSO AS A CONCERNED RESIDENT OF NORTHWESTERN OHIO.

I BELIEVE I ECHO WHAT THE -- THE SENTIMENTS OF MOST OF THE RESIDENTS OF THIS AREA WHEN I SAY WE SIMPLY DO NOT HAVE ENOUGH INFORMATION ON THE FULL HEALTH AND ENVIRONMENTAL IMPACT OF THE PROPOSED BURIAL, NOR HAS SUFFICIENT TESTING BEEN DONE AT THE SITE TO DETERMINE WHETHER SUCH BURIAL IS AT ALL FEASIBLE AND SAFE FOR THE COMMUNITY. UNTIL MORE INFORMATION IS AVAILABLE, I URGE THAT THE N.R.C. POSTPONE ANY FURTHER CONSIDERATION OF THE APPLICATION.

THE INFORMATION THAT IS AVAILABLE TO DATE, HOWEVER, SUGGESTS THAT THE PROPOSED SITE IS NOT SUITABLE TO ENSURE WITH A REASONABLE DEGREE OF CERTAINTY THAT THE HEALTH OF THE RESIDENTS OF THE AREA, AS WELL AS THE ENVIRONMENT, WILL BE PROTECTED.

THE SHALLOW BEDROCK LOCATION, SUSCEPTIBLE TO FLOODING, PRESENTS A SERIOUS RISK TO

GROUNDWATER IN THE AREA AS WELL AS JEOPARDIZING OUR LAKE ERIE WATER SUPPLY. AT A TIME WHEN WE IN OHIO ARE MAKING GREAT STRIDES TOWARDS PROTECTING OUR WATER SUPPLY, UNDERTAKING MANY NEW INITIATIVES IN THIS AREA AND DEVELOPING COMPREHENSIVE PLANNING OF OUR MANY RICH WATER RESOURCES, IT IS VERY DISTURBING TO REALIZE THAT THESE EFFORTS CAN BE RETARDED AND THE PROGRESS THAT WE HAVE MADE CAN BE ELIMINATED BECAUSE OF THE PROPOSAL PRESENTLY BEING CONSIDERED. NOT ONLY IS THE HEALTH OF OUR CITIZENS ENDANGERED BY THIS PROPOSAL, BUT SO ARE THE RICH ENVIRONMENTAL TREASURES IN THE AREA. THE WETLANDS THAT WE ARE TRYING TO PROTECT AND PRESERVE IN NORTHWEST OHIO AND THE WILDLIFE HABITATS THEY PROVIDE WILL BE JEOPARDIZED BY THE BURIAL OF THIS RADIOACTIVE WASTE.

IN ADDITION, WE IN OHIO NO LONGER WISH TO BE A DUMPING GROUND FOR OTHER STATES' WASTE. IF THIS APPLICATION WERE TO BE APPROVED, I BELIEVE A POTENTIALLY DAMAGING PRECEDENT WOULD BE SET IN SENDING A MESSAGE THAT IT'S ACCEPTABLE IN OHIO TO BURY RADIOACTIVE WASTES. I BELIEVE THIS IS ESPECIALLY INAPPROPRIATE, GIVEN THE FACT THAT THE MIDWESTERN COMPACT ON LOW-LEVEL RADIOACTIVE WASTE IS PRESENTLY SEARCHING FOR AN APPROPRIATE SITE FOR

THE BURIAL OF WASTES GENERATED IN THE MIDWEST. I SHARE THE FEAR OF OTHERS IN THIS AREA THAT IF THIS APPLICATION WERE TO BE APPROVED, THAT IT WOULD ONLY BE A MATTER OF TIME BEFORE OTHER COMPANIES IN OTHER STATES STARTED SHIPPING THEIR WASTE HERE TO THE TOLEDO EDISON SITE.

FINALLY, THE RESIDENTS OF NORTHWESTERN OHIO, WHILE WE APPRECIATE THE OPPORTUNITY TO VOICE OUR OPINIONS, FEEL DISTRESSED THAT ALL OUR EFFORTS AT PROTECTING THE ENVIRONMENT IN OUR AREA FOR THE SAFETY OF OUR FAMILIES, FRIENDS AND NEIGHBORS CAN BE PUT IN DANGER THROUGH A PROCESS IN WHICH OUR INPUT IS LIMITED. WE ASK FOR GREATER INPUT IN THIS DECISION-MAKING PROCESS SINCE WE ARE THE ONES WHO WILL BE AFFECTED.

IN CLOSING, I STRONGLY URGE THAT TOLEDO EDISON'S APPLICATION TO DISPOSE OF RADIOACTIVE WASTE AT THE DAVIS-BESSE PLANT BE DENIED IN ORDER TO ADEQUATELY PROTECT THE HEALTH AND SAFETY OF OUR CITIZENS.

THANK YOU FOR THIS OPPORTUNITY TO ADDRESS THIS VERY IMPORTANT ISSUE, AND I DO APPRECIATE THIS VERY MUCH.

I'D JUST LIKE TO MAKE ONE ADDITIONAL COMMENT.

I DO REPRESENT SANDUSKY COUNTY AND SENECA COUNTY WHERE WE HAVE AT VICKERY, OHIO THE ONLY OFF-SITE HAZARDOUS WASTE DISPOSAL DEEP-WELL INJECTION SITE IN THE STATE OF OHIO. NOW, MANY COMPANIES HAVE DEEP-WELL INJECTIONS ON THEIR OWN SITE, BUT WE HAVE ONE AT VICKERY, AND IF ANYONE HAS FOLLOWED THAT SPECIFIC FACILITY AT ALL, YOU'RE MORE THAN AWARE OF SOME OF THE PROBLEMS WE HAVE HAD UP THERE, AND THAT'S MY CONCERN. AND I DO APPRECIATE THE CHANCE TO BE HERE AND EXPRESS OUR CONCERN, AND I THINK THAT WE ALL NEED TO BE INVOLVED WHEN A DECISION OF THIS MAGNITUDE IS MADE.

SO I WOULD LIKE TO LEAVE THIS LETTER WITH YOU, AND I REALLY DO APPRECIATE THE BREAK ON THE AGENDA AND THE CHANCE TO --

JUDGE HOYT: THANK YOU VERY MUCH.

PERHAPS THE PERSON IN THE REAR OF THE ROOM DIDN'T HEAR THE LAST PARAGRAPH OF MY OPENING STATEMENT, BUT I'LL READ IT AGAIN.

DISRUPTIVE CONDUCT WILL NOT BE TOLERATED FOR IT NEITHER BENEFITS THE PROGRESS OF THE HEARING NOR PERMITS ANOTHER INDIVIDUAL AN OPPORTUNITY TO MAKE THEIR COMMENT. THIS IS NOT A

CHEERING SESSION. THANK YOU.

IF YOU WANT TO TAKE YOUR WITNESSES BACK TO THEIR PLACES, AND WE'LL JUST REMOVE THAT BOARD.

MR. SILBERG: WILL THE WITNESSES KINDLY RETURN TO THE PODIUM?

IF WE MAY PROCEED.

JUDGE HOYT: YES. THE RECORD WILL REFLECT THAT THE WITNESSES AS PREVIOUSLY INTRODUCED BY MR. SILBERG HAVE AGAIN TAKEN THEIR PLACES ON THE ELECTIVE WITNESS STANDS, AND WE WILL PROCEED AT THIS TIME, SIR.

WHEREUPON,

DR. GARY F. BENNETT, J. STEWART BLAND, DAVID BRIDEN, DAVID M. HENDRON, DR. CHARLES E. HERDENDORF, RICHARD HETHERINGTON, DR. WILLIAM B. JACKSON, DR. ROGER E. LINNEMANN, DR. JEFFREY M. REUTTER, JENNIFER SCOTT-WASILK, THEO S. SWIM, DR. JOHN E. TILL, AND DAVID M. WALLACE

HAVING BEEN PREVIOUSLY DULY SWORN, RESUMED THE STAND AND TESTIFIED FURTHER AS FOLLOWS:

DIRECT EXAMINATION (CONTINUED)

BY MR. SILBERG:

Q. WOULD EACH OF YOU BRIEFLY DESCRIBE YOUR

PROFESSIONAL QUALIFICATIONS AND EXPERTISE, AND THE SUBJECT OF YOUR TESTIMONY. MR. BRIDEN?

A. (MR. BRIDEN) I HOLD A BACHELOR OF SCIENCE DEGREE IN CHEMISTRY FROM UPPER IOWA UNIVERSITY, AND A MASTER OF SCIENCE DEGREE IN RADIOLOGICAL HEALTH FROM TEMPLE UNIVERSITY. I HAVE 24 YEARS EXPERIENCE IN HEALTH PHYSICS, RADIOCHEMISTRY, AND CHEMISTRY.

MY RESUME IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

IN THIS PROCEEDING, I WILL PROVIDE BACKGROUND INFORMATION ON THE WASTE TO BE BURIED AT DAVIS-BESSE AND ON PLANT STEPS THAT PRODUCE AND HANDLE THE WASTE.

Q. MR. SWIM?

A. (MR. SWIM) I'M A CIVIL ENGINEER. I HOLD A BACHELOR OF SCIENCE DEGREE IN CIVIL ENGINEERING FROM THE UNIVERSITY OF ILLINOIS. I'M AN -- I AM REGISTERED AS A PROFESSIONAL ENGINEER IN THE STATE OF ILLINOIS, AND I HAVE TEN YEARS ENGINEERING EXPERIENCE.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

MY TESTIMONY WILL ADDRESS THE PRESIDING

OFFICER'S QUESTIONS ONE AND TWO ON THE LOCATION AND CONFIGURATION OF THE BURIAL SITE. I WILL ALSO DISCUSS DESIGN FEATURES THAT PROTECT THE BURIAL SITE AGAINST EROSION, WHICH IS THE SUBJECT OF THE PRESIDING OFFICER'S QUESTION FIVE.

Q. MISS WASILK?

A. (MS. SCOTT-WASILK) I HOLD A BACHELOR OF SCIENCE DEGREE IN BIOLOGY FROM WAYNE STATE UNIVERSITY, A MASTER OF SCIENCE DEGREE IN ZOOLOGY FROM THE UNIVERSITY OF MICHIGAN, AND A MASTER OF SCIENCE AND ENGINEERING SCIENCES DEGREE IN ENVIRONMENTAL ENGINEERING FROM THE UNIVERSITY OF TOLEDO.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

I HAVE BEEN RESPONSIBLE FOR ENVIRONMENTAL MONITORING AT DAVIS-BESSE SINCE 1978 AND WILL BE RESPONSIBLE FOR MONITORING THE BURIAL SITE ONCE IT IS CONSTRUCTED.

MY TESTIMONY WILL ADDRESS THE PRESIDING OFFICER'S QUESTION THREE, WHICH CONCERNS THE NAVARRE MARSH, AND QUESTION 20, CONCERNING HOW THE BURIAL SITE WILL BE OPERATED.

Q. DR. HERDENDORF?

A. (DR. HERDENDORF) I'M A LIMNOLOGIST. I HOLD A BACHELOR OF SCIENCE AND MASTER OF SCIENCE DEGREES IN GEOLOGY FROM OHIO UNIVERSITY AND A DOCTORATE DEGREE IN ZOOLOGY (LIMNOLOGY) FROM OHIO STATE UNIVERSITY. I'VE BEEN INVOLVED IN THE STUDY OF THE LAKE ERIE AREA FOR APPROXIMATELY 20 YEARS.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

MY TESTIMONY WILL ADDRESS THE PRESIDING OFFICER'S QUESTION THREE, CONCERNING THE NAVARRE MARSH, AND QUESTIONS FOUR AND FIVE, WHICH RELATE TO FLOODING AND EROSION.

Q. MR. HENDRON?

A. (MR. HENDRON) I HOLD A BACHELOR OF SCIENCE DEGREE IN CIVIL ENGINEERING FROM THE UNIVERSITY OF KENTUCKY AND A MASTER OF SCIENCE DEGREE IN SOIL AND ROCK MECHANICS, GEOTECHNICAL ENGINEERING, FROM THE UNIVERSITY OF ILLINOIS.

I HAVE 20 YEARS EXPERIENCE IN THE FIELD OF GEOTECHNICAL ENGINEERING, AND FOR THE LAST SEVEN YEARS I'VE BEEN INVOLVED IN MORE THAN 25 MODERATE TO LARGE SIZED WASTE MANAGEMENT PROJECTS THROUGHOUT THE UNITED STATES.

A SUMMARY OF MY PROFESSIONAL

QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

IN RESPONSE TO THE PRESIDING OFFICER'S QUESTION SIX THROUGH EIGHT, I WILL DISCUSS THE GEOLOGY AND HYDROLOGY AT THE BURIAL SITE.

Q. DR. JACKSON?

A. (DR. JACKSON) I HOLD A BACHELOR OF ARTS AND A MASTER OF ARTS DEGREE IN ZOOLOGY FROM THE UNIVERSITY OF WISCONSIN, AND A DOCTORATE OF SCIENCE FROM THE JOHN'S HOPKINS UNIVERSITY SCHOOL OF HYGIENE AND PUBLIC HEALTH. I HAVE OVER 30 YEARS EXPERIENCE IN ENVIRONMENTAL RESEARCH AND STUDIES.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

IN THIS PROCEEDING, I WILL DISCUSS THE TERRESTRIAL PLANTS AND ANIMALS AT DAVIS-BESSE IN RESPONSE TO THE PRESIDING OFFICER'S QUESTION NINE ON ENDANGERED SPECIES.

Q. DR. REUTTER?

A. (DR. REUTTER) I HOLD A BACHELOR OF SCIENCE AND MASTER OF SCIENCE DEGREE IN FISHERIES MANAGEMENT, AND A DOCTORATE DEGREE IN BIOLOGICAL LIMNOLOGY AND FISHERIES BIOLOGY FROM THE OHIO

STATE UNIVERSITY. I'VE STUDIED THE AQUATIC ECOLOGY OF LAKE ERIE FOR OVER A DECADE.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED TO THE WRITTEN TESTIMONY.

IN RESPONSE TO THE PRESIDING OFFICER'S QUESTION NINE ON ENDANGERED SPECIES, I WILL DISCUSS THE AQUATIC BIOTA.

Q. MR. BLAND?

A. (MR. BLAND) I HOLD A BACHELOR OF SCIENCE DEGREE IN PHYSICS AND A MASTER OF SCIENCE DEGREE IN NUCLEAR SCIENCE, BOTH FROM THE GEORGIA INSTITUTE OF TECHNOLOGY. I HAVE WORKED AS A HEALTH PHYSICIST FOR 12 YEARS.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

I WILL RESPOND TO THE PRESIDING OFFICER'S QUESTIONS 10 THROUGH 16, WHICH RELATE TO DOSE CALCULATIONS.

Q. DR. TILL?

A. (DR. TILL) I HOLD A BACHELOR OF SCIENCE DEGREE IN ENGINEERING FROM THE UNITED STATES NAVAL ACADEMY, A MASTER OF SCIENCE DEGREE IN HEALTH PHYSICS FROM COLORADO STATE UNIVERSITY, AND A

DOCTORATE DEGREE IN NUCLEAR ENGINEERING FROM THE GEORGIA INSTITUTE OF TECHNOLOGY. I AM A MEMBER OF THE NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS AND A MEMBER OF THE RADIATION ADVISORY COMMITTEE TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

I CONDUCTED A PEER REVIEW OF MR. BLAND'S ANALYSES AND WILL SO TESTIFY. I WILL ALSO COMMENT ON WHETHER THE LOW LEVELS OF RADIOACTIVITY IN THE WASTE WOULD HAVE AN IMPACT ON BIOTA.

Q. DR. LINNEMANN?

A. (DR. LINNEMANN) I HOLD A BACHELOR OF ARTS DEGREE AND BACHELOR OF SCIENCE DEGREE AND MEDICAL DEGREE FROM THE UNIVERSITY OF MINNESOTA. I PERFORMED MY MEDICAL INTERNSHIP AND RESIDENCY AT WALTER REED ARMY HOSPITAL, WHERE I SPECIALIZED IN RADIOLOGY. I HAVE BEEN INVOLVED IN THE FIELDS OF RADIOLOGY AND HEALTH PHYSICS FOR OVER 20 YEARS.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED TO THE WRITTEN TESTIMONY.

I WILL DISCUSS WHETHER THE DOSES

CALCULATED BY MR. BLAND WOULD HAVE ANY APPRECIABLE EFFECT ON HUMAN HEALTH.

Q. DR. BENNETT?

A. (DR. BENNETT) I HAVE A BACHELOR OF SCIENCE DEGREE IN CHEMICAL ENGINEERING FROM QUEEN'S UNIVERSITY IN KINGSTON, ONTARIO, A MASTER OF SCIENCE AND DOCTOR OF PHILOSOPHY DEGREES, ALSO IN CHEMICAL ENGINEERING, FROM THE UNIVERSITY OF MICHIGAN. I'VE TAUGHT CHEMICAL AND BIOCHEMICAL ENGINEERING FOR APPROXIMATELY 20 YEARS. I'VE BEEN INVOLVED IN NUMEROUS STUDIES ON WATER POLLUTION CONTROL AND HAZARDOUS WASTES.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

I WILL ADDRESS THE PRESIDING OFFICER'S QUESTION 17, CONCERNING THE CHEMICAL CONTENT OF THE WATER SUPPLY TREATMENT SLUDGE.

Q. MR. HETHERINGTON?

A. (MR. HETHERINGTON) I HOLD A BACHELOR OF SCIENCE DEGREE IN CHEMISTRY FROM TEMPLE UNIVERSITY. I HAVE BEEN ACTIVE IN ION-EXCHANGE AND WATER TREATMENT FIELDS FOR OVER 40 YEARS. I HAVE AUTHORED NUMEROUS PAPERS ON ION-EXCHANGE TECHNOLOGY AND HOLD A NUMBER OF PATENTS RELATING

TO THE APPLICATION OF ION-EXCHANGE RESINS. I AM CURRENTLY EMPLOYED BY EPICOR, WHICH PROVIDES THE ION-EXCHANGE RESINS USED AT DAVIS-BESSE.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED.

MY TESTIMONY WILL ADDRESS THE PRESIDING OFFICER'S QUESTIONS 18 AND 19. I WILL DISCUSS WHETHER THE RESINS ARE CHEMICALLY OR BIOLOGICALLY DEGRADABLE.

Q. FINALLY, MR. WALLACE.

A. (MR. WALLACE) I HOLD A BACHELOR OF SCIENCE DEGREE IN CONSTRUCTION ENGINEERING FROM THE LAWRENCE INSTITUTE OF TECHNOLOGY AND A MASTERS IN BUSINESS ADMINISTRATION FROM EASTERN MICHIGAN UNIVERSITY, AND AM PRESENTLY PURSUING A PH.D. IN THAT AT THE UNIVERSITY OF TOLEDO. I'M A PROFESSIONAL ENGINEER REGISTERED IN OHIO AND SIX OTHER STATES.

A SUMMARY OF MY PROFESSIONAL QUALIFICATIONS IS ATTACHED AS AN EXHIBIT TO THE WRITTEN TESTIMONY.

ALONG WITH MISS SCOTT-WASILK, I WILL ADDRESS THE PRESIDING OFFICER'S QUESTION 20, CONCERNING HOW THE BURIAL SITE WILL BE OPERATED.

Q. MR. BRIDEN, WOULD YOU PLEASE DESCRIBE THE

WASTE WHICH IS TO BE BURIED AT DAVIS-BESSE?

A. (MR. BRIDEN) THE WASTE CONSISTS PRINCIPALLY OF THE WATER SUPPLY TREATMENT SLUDGE. THIS WASTE IS DISCHARGED INTO A LINED BASIN ON THE DAVIS-BESSE SITE, WHERE THE WASTE SETTLES TO THE BOTTOM. ION-EXCHANGE RESINS CONTAMINATED WITH VERY LOW LEVELS OF RADIOACTIVITY ARE ALSO DISCHARGED TO THE BASIN.

Q. WHAT IS THE WATER SUPPLY TREATMENT SLUDGE?

A. THE DAVIS-BESSE STATION HAS ITS OWN WATER SUPPLY TREATMENT FACILITY. THE WATER SUPPLY TREATMENT FACILITY PURIFIES LAKE ERIE WATER BOTH FOR USE IN PLANT SYSTEMS AND FOR PERSONAL USE. THE SLUDGE CONSISTS OF SILT, MINERALS, AND OTHER SUSPENDED SOLIDS REMOVED FROM THE LAKE PLUS WATER TREATMENT CHEMICALS. IT IS NOT A TOXIC SUBSTANCE.

Q. FOR WHAT PURPOSES ARE THE RESINS IN QUESTION USED AT THE DAVIS-BESSE PLANT?

A. THEY ARE USED TO DEMINERALIZE THE WATER IN THE SECONDARY SYSTEM.

Q. AND WHAT IS THE SECONDARY SYSTEM?

A. A PRESSURIZED WATER REACTOR, LIKE DAVIS-BESSE, HAS TWO PRINCIPAL SYSTEMS, THE PRIMARY SYSTEM AND A SECONDARY SYSTEM. IN THE

PRIMARY SYSTEM, HEAT PRODUCED IN THE REACTOR IS CARRIED AWAY BY THE CIRCULATING PRIMARY COOLANT, WATER. THE COOLANT PASSES THROUGH STEAM GENERATORS, WHERE THE HEAT IS TRANSFERRED ACROSS TUBES TO WATER IN THE SECONDARY SYSTEM. THE WATER IN A SECONDARY SYSTEM TURNS TO STEAM WHICH DRIVES THE TURBINES. THE TURBINES DRIVE A GENERATOR WHICH PRODUCES ELECTRICITY. THE PHYSICAL SEPARATION BETWEEN A PRIMARY SYSTEM AND A SECONDARY SYSTEM PROVIDES A BARRIER FOR THE CONTROL OF RADIOACTIVE MATERIAL. THE SECONDARY SYSTEM REMAINS ESSENTIALLY NONRADIOACTIVE.

Q. WHY IS THE SECONDARY SIDE WATER DEMINERALIZED?

A. STRICT WATER QUALITY REQUIREMENTS MUST BE MAINTAINED TO ENSURE THE CONTINUED EFFICIENT AND RELIABLE OPERATION OF THE SECONDARY SYSTEM, PARTICULARLY THE STEAM GENERATOR TUBES. WITHOUT THE DEMINERALIZATION, MINERAL DEPOSITS COULD EVENTUALLY BUILD UP IN AND CORRODE BOTH THE STEAM GENERATORS AND THE TURBINE.

Q. WOULD YOU PLEASE DESCRIBE THE DEMINERALIZATION PROCESS?

A. DEMINERALIZATION OCCURS IN A CONDENSATE DEMINERALIZER SYSTEM. THE CONDENSATE

DEMINERALIZER SYSTEM CONSISTS OF FOUR VESSELS. INSIDE EACH VESSEL ARE PERFORATED TUBES WHICH ARE COATED WITH POWDERED ION-EXCHANGE RESIN. WATER ENTERS THE VESSEL ON THE OUTSIDE OF THE TUBES, FLOWS THROUGH THE POWDERED RESINS TO THE INSIDE OF THE TUBES, AND EXITS THE VESSEL. THE COATING OF POWDERED RESINS IS HELD IN PLACE BY THE PRESSURE OF THE WATER FLOWING THROUGH THE TUBES.

THE POWDER ION-EXCHANGE RESIN CONSISTS OF A MIXTURE OF ANION AND CATION RESINS. THE CATION RESIN REMOVES IMPURITIES WITH A POSITIVE VALENCE. THE ANION RESIN REMOVES IMPURITIES WITH A NEGATIVE VALENCE.

Q. AND HOW DO THESE RESINS BECOME RADIOACTIVELY CONTAMINATED?

A. WHILE THE SECONDARY SYSTEM IS SEPARATED FROM THE RADIOACTIVE PRIMARY SYSTEM, PRIMARY TO SECONDARY LEAKAGE CAN OCCUR THROUGH THE STEAM GENERATOR TUBES.

IN MARCH 1981, DAVIS-BESSE EXPERIENCED ITS FIRST AND, TO DATE ONLY, STEAM GENERATOR TUBE LEAK. PRIOR TO THIS EVENT, THERE HAD BEEN NO PRIMARY-TO-SECONDARY LEAKAGE; THE SECONDARY SIDE OF THE PLANT WAS NOT CONTAMINATED. AFTER THE LEAK, THE PLANT WAS SHUT DOWN AND THE LEAK

REPAIRED. DURING THE LEAK CLEAN-UP PERIOD, THE SECONDARY SIDE CLEAN-UP RESINS CONTAINED LEVELS OF RADIOACTIVE MATERIAL THAT REQUIRED OFF-SITE DISPOSAL AS A RADWASTE. SINCE THEN, VERY LOW LEVELS OF RADIOACTIVE CONTAMINANTS HAVE CONTINUED TO ACCUMULATE ON THE CONDENSATE DEMINERALIZER RESINS. MUCH OF THIS RADIOACTIVE MATERIAL IS A RESIDUAL RADIOACTIVITY MATERIAL INTRODUCED INTO THE SECONDARY SYSTEM DURING THE TUBE LEAK.

WITH TIME, THE ACTIVITY HAS CONTINUED TO LEACH OUT OF THE SYSTEM FROM THE INITIAL TUBE LEAK DEPOSITS.

AN ADDITIONAL SOURCE OF THE ACTIVITY IS FROM VERY MINOR LEAKS OR WEEPS IN THE STEAM GENERATOR EXPERIENCED DURING SYSTEM THERMAL EXPANSIONS AND CONTRACTIONS. THESE SAME THERMAL EXPANSIONS AND CONTRACTIONS COULD ALSO CONTRIBUTE TO THE DISSOLUTION OF THE DEPOSITED RADIOACTIVE MATERIAL IN A SECONDARY SYSTEM.

Q. HOW OFTEN ARE THE RESINS REPLACED?

A. THE VOLUME OF RESINS INJECTED INTO EACH CONDENSATE DEMINERALIZATION VESSEL IS SMALL, ABOUT 20 CUBIC FEET. BECAUSE THE VOLUME IS SMALL, THE RESINS ARE REPLACED WEEKLY.

Q. WHEN THE RESINS ARE REMOVED, TO WHERE ARE

THEY TRANSFERRED?

A. THE RESINS ARE TRANSFERRED FROM THE CONDENSATE DEMINERALIZER VESSEL TO THE CONDENSATE DEMINERALIZER BACKWASH RECEIVING TANK. IF THE RESINS SATISFY PREDETERMINED CRITERIA, THEY THEN ARE TRANSFERRED FROM THE CONDENSATE DEMINERALIZER BACKWASH RECEIVING TANK TO THE SETTLING BASIN. THE TRANSFER IS CONDUCTED AS A WATER-RESIN SLURRY IN APPROXIMATELY 10,000 GALLONS OF WATER.

Q. WOULD YOU PLEASE DESCRIBE THE TESTING THAT IS DONE BEFORE A BATCH OF CONTAMINATED RESINS MAY BE DISCHARGED TO THE SETTLING BASIN?

A. EACH BATCH OF SECONDARY SIDE RESIN IS SAMPLED AND ANALYZED BY GAMMA SPECTROSCOPY FOR RADIOACTIVE MATERIAL PRIOR TO BEING DISCHARGED TO THE SETTLING BASIN. THE LEVEL OF ACTIVITY OF EACH RADIONUCLIDE DETECTED IS QUANTIFIED. IF THE RADIONUCLIDE CONCENTRATIONS ARE HIGHER THAN ACCEPTABLE, THE RESINS ARE NOT SENT TO THE SETTLING BASIN, BUT ARE TREATED AS RADWASTE.

Q. HOW RADIOACTIVE IS THE WASTE IN THE SETTLING BASIN?

A. THE LEVEL OF RADIOACTIVITY IN THE WASTE IN THE SETTLING BASIN IS EXTREMELY LOW. CONCENTRATIONS OF RADIONUCLIDES IN THE WASTE ARE

LOWER THAN THOSE LEVELS PERMITTED BY THE N.R.C. IN WATER DISCHARGED TO THE LAKE. GRANITE IS MORE RADIOACTIVE, AND A WATCH WITH A RADIUM LUMINESCE DIAL IS SIGNIFICANTLY MORE RADIOACTIVE. THIS CAN BE OBSERVED IN THE FOLLOWING DEMONSTRATION.

THIS RADIATION DETECTION INSTRUMENT IS CURRENTLY READING BACKGROUND WHICH IS APPROXIMATELY 30 COUNTS PER MINUTE. THE TICKS THAT YOU WILL HEAR FROM THIS IS WHAT'S COMING FROM OUTER SPACE AND GENERALLY NATURALLY OCCURRING RADIOACTIVE MATERIALS WHICH MAKE UP THE CONSTRUCTION OF THIS ROOM.

I HAVE A SAMPLE OF SLUDGE THAT I COLLECTED FROM THE BASIN LAST THURSDAY AFTERNOON, AND IF WE PUT THE DETECTOR DIRECTLY OVER THE RESIN, YOU CAN SEE THAT IT CANNOT EVEN BE DETECTED. THIS DETECTOR WILL NOT SEE IT. IT'S EXACTLY THE SAME LEVEL AS NATURALLY OCCURRING BACKGROUND THAT'S OBSERVED WITH THIS DETECTOR. NO INCREASE AT ALL.

I MENTIONED THAT GRANITE WAS MORE RADIOACTIVE. THIS IS A PIECE OF GRANITE, AND IF WE PUT THE DETECTOR ON IT, YOU CAN SEE THAT THE COUNT RATE WILL RAISE TO APPROXIMATELY 100 COUNTS A MINUTE. THIS INCREASE IS APPROXIMATELY TWO TO

THREE TIMES GENERAL BACKGROUND.

I MENTIONED IF YOU HAVE A RADIUM DIOL LUMINESCE WATCH SUCH AS THIS ONE, IT WILL BE SIGNIFICANTLY MORE RADIOACTIVE. AS I BRING IT CLOSE, YOU CAN SEE THE COUNT GO UP AND HEAR IT.

MR. SILBERG: AT THIS TIME, WE'D LIKE TO -- WE HAVE A SERIES OF QUESTIONS AND ANSWERS THAT ARE ADDRESSED TO THE PRESIDING OFFICER'S FIRST QUESTION. THE FIRST QUESTION IS: "WHAT FINAL LOCATION ON THE DAVIS-BESSE SITE HAS BEEN SELECTED FOR THE WASTE BURIAL?"

DIRECT EXAMINATION (CONTINUED)

BY MR. SILBERG:

Q. MR. SWIM, WOULD YOU PLEASE DESCRIBE THE LOCATION THAT TOLEDO EDISON HAS SELECTED FOR WASTE BURIAL?

A. (MR. SWIM) THE BURIAL GROUNDS WILL BE LOCATED IN THE SOUTH CENTRAL PORTION OF THE DAVIS-BESSE SITE, APPROXIMATELY 2,000 FEET SOUTH OF THE SWITCHYARD AND APPROXIMATELY 1,200 FEET EAST OF STATE ROUTE 2. THE LOCATION IS SHOWN IN FIGURE 1-1, WHICH IS ATTACHED TO THE WRITTEN TESTIMONY.

Q. IS THIS LOCATION FINAL?

A. THE LOCATION AS SHOWN IN FIGURE 1-1 IS

THE ONE THAT TOLEDO EDISON HAS SELECTED AND INTENDS TO USE. THE LOCATION, HOWEVER, IS CONTINGENT ON ITS APPROVAL IN THIS PROCEEDING AND UPON OBTAINING A PERMIT TO INSTALL FROM THE STATE OF OHIO.

Q. WHAT IS THE JUSTIFICATION FOR THE LOCATION WHICH WAS SELECTED?

A. THE LOCATION OF THE BURIAL GROUND WAS CHOSEN AS AN AREA THAT IS UNLIKELY TO BE DISTURBED BY ANY FUTURE CONSTRUCTION ON THE DAVIS-BESSE SITE. THE BURIAL SITE WILL BE A MINIMUM OF 100 YARDS FROM ANY FREQUENTLY OCCUPIED AREAS. IN ACCORDANCE WITH OHIO REQUIREMENTS, THE SITE WILL BE OVER 1,000 FEET FROM ANY WATER WELL, NOT COUNTING TOLEDO EDISON'S OBSERVATION MONITORING WELLS AND WILL BE LOCATED AT LEAST 200 FEET FROM ANY STREAM OR LAKE, INCLUDING THE DRAINAGE DITCH TO THE EAST OF THE BURIAL SITE. THE BURIAL GROUND WILL NOT BE WITHIN A FLOODWAY. IN ADDITION, THE BURIAL GROUND IS SITUATED IN AN AREA WITH FAVORABLE GEOLOGICAL CONDITIONS.

Q. THE BOARD'S SECOND QUESTION WAS AS FOLLOWS: WHAT WILL BE THE DIMENSIONS OF THE WASTE BURIAL SITE IN ITS FINAL CONFIGURATION AFTER 30 YEARS?

MR. SWIM, HOW WILL THE WASTE BE BURIED?

A. TOLEDO EDISON INTENDS TO EMPTY THE SETTLING BASIN SIX TIMES OVER THE LIFE OF THE PLANT. THERE WILL THEREFORE BE SIX LOTS OF WASTE BURIED AT THE BURIAL SITE. EACH LOT WILL BE BURIED IN A SEPARATELY CONSTRUCTED SQUARE CELL SO AS NOT TO DISTURB PREVIOUSLY BURIED LOTS.

TO PROVIDE FLOOD PROTECTION AND TO MAINTAIN A SUITABLE DISTANCE FROM THE WASTE AND GROUNDWATER IN THE UNDERLYING AQUIFER, TOLEDO EDISON INTENDS TO PARTIALLY ELEVATE THE CELLS. THE WALLS OF THE CELLS WILL BE CONSTRUCTED TO SERVE AS DIKES AND WILL BE RIP-RAPPED. TOLEDO EDISON ALSO PLANS TO EQUIP EACH CELL WITH A FOUR-FOOT THICK LINER. FROM BOTTOM TO TOP, THE LINER WILL BE COMPOSED OF A TWO-AND-A-HALF FOOT THICK LAYER OF COMPACTED CLAY, A SYNTHETIC IMPERVIOUS MEMBRANE, A ONE-FOOT LAYER OF GRADED GRAVEL FOR LEACHATE COLLECTION, AND A SIX-INCH LAYER OF COMPACTED CLAY. EACH CELL WILL BE CAPPED WITH A TWO-TO-FOUR-FOOT THICK COVER CONSISTING -- EXCUSE ME -- WILL BE CAPPED WITH A TWO-TO-FOUR-FOOT THICK COVER CONSISTING OF A LOWER, COMPACTED-CLAY LAYER, A SAND OR GRAVEL FILTER LAYER, AND AN UPPER LAYER OF TOPSOIL.

SOME CELLS WILL ADJOIN OTHERS. WHERE A NEW CELL IS CONSTRUCTED ADJOINING A PREEXISTING CELL, THE ADJOINING CELLS WILL SHARE THE DIKE BETWEEN THEM.

THE FIRST THREE CELLS WILL BE ADJOINING AND WILL BE CONSTRUCTED IN THE CENTER OF THE BURIAL SITE. THE NEXT TWO CELLS WILL ADJOIN EACH OTHER AND WILL BE CONSTRUCTED TO THE WEST OF THE FIRST THREE CELLS. THESE TWO CELLS WILL NOT BE CONNECTED TO THE FIRST THREE BECAUSE TRANSMISSION LINES PASS BETWEEN THE TWO AND THREE CELL UNITS. THE LAST CELL WILL BE CONSTRUCTED NEXT TO THE NORTHEAST CORNER OF THE FIRST THREE CELLS. THE LAYOUT IS SHOWN IN FIGURE 2-1.

Q. HOW WAS THIS LAYOUT DETERMINED?

A. THE LAYOUT WAS EFFECTIVELY DICTATED BY THE SITING CRITERIA THAT I HAVE PREVIOUSLY DISCUSSED AND BY THE NECESSITY OF KEEPING UNENCUMBERED A MAINTENANCE CORRIDOR FOR THE TRANSMISSION LINES PASSING OVERHEAD.

Q. PLEASE GIVE US THE DIMENSIONS OF A TYPICAL CELL.

A. THE DIMENSIONS OF A TYPICAL SINGLE SQUARE CELL ARE ILLUSTRATED IN FIGURE 2-2. THE INNER BASE OF THE CELL IS APPROXIMATELY 45 FEET BY 45

FEET AND IS ABOUT THREE FEET BELOW LAND SURFACE. FROM THE BASE, THE INNER SIDES OF THE CELLS SLOPE UPWARD AND OUTWARD AT A THREE-TO-ONE GRADE TO THE TOP OF THE SURROUNDING DIKES. THE TOP OF THE CELL, NOT INCLUDING THE COVER, IS APPROXIMATELY 98 FEET BY 98 FEET AND IS ABOUT FIVE AND THREE-QUARTER FEET ABOVE LAND SURFACE. FROM THE TOP OF THE CELL, THE DIKES SLOPE DOWNWARD AND UPWARD AT A THREE-TO-ONE GRADE TO LAND SURFACE. FROM TOE OF DIKE TO TOE OF DIKE, EACH CELL IS 162 FEET BY 162 FEET.

Q. I'M SORRY. YOU SAID THAT THE DIKES SLOPE DOWNWARD AND UPWARD. DID YOU MEAN --

A. EXCUSE ME. I HAVE A CORRECTION. THE DIKES SLOPE DOWNWARD AND OUTWARD AT A THREE-TO-ONE GRADE-TO-LAND SURFACE.

Q. THANK YOU.

WILL YOU PLEASE EXPLAIN HOW YOU DETERMINED THE DIMENSIONS FOR EACH CELL?

A. THE INTERIOR VOLUME OF THE CELL MUST ENCOMPASS THE VOLUME OF THE LOT OF WASTE TO BE BURIED. THIS IS THE PRINCIPAL CONSTRAINT. WITH THIS CONSTRAINT, WE DESIGNED THE CELLS TO MINIMIZE THEIR AREA AND THE AMOUNT OF EARTHWORK NEEDED TO CONSTRUCT THE CELLS.

THERE WERE SEVERAL ADDITIONAL CONSTRAINTS. FIRST, THE EXCAVATION FOR THE CELL COULD NOT GO BELOW ELEVATION 567 INTERNATIONAL GREAT LAKES DATUM. IF THE EXCAVATION WERE DEEPER, GROUNDWATER IN THE UNDERLYING AQUIFER, WHICH IS UNDER PRESSURE, MIGHT DISTURB THE UNDERLYING SEDIMENTS. OH, EXCUSE ME. OVERLYING SEDIMENTS.

WITH THE CELLS HAVING A FOUR-FOOT THICK LINER, THIS CONSTRAINT PUT THE BASE OF THE CELL AT ELEVATION 571 I.G.L.D. SECOND, THE SLOPES HAD TO REMAIN THREE-TO-ONE OR LESS TO PREVENT EROSION. THIRD, THE TOP OF THE CELL HAD TO BE ABOVE FLOOD LEVEL, AND WE CHOSE ELEVATION 579 TO 580 I.G.L.D. AS A CONSERVATIVE HEIGHT. FINALLY, WE DETERMINED THAT MAKING THE CELLS SQUARE RESULTED IN THE MINIMAL AMOUNT OF EARTHWORK. THESE CONSTRAINTS AND CONSIDERATIONS PRODUCED THE DIMENSIONS SHOWN IN FIGURE 2-2.

Q. WHAT ARE THE DIMENSIONS FOR THE MULTICELL UNITS?

A. AS I STATED, WHEN CELLS ARE ADJOINING, THEY ARE CONSTRUCTED TO SHARE A DIKE BETWEEN THEM. THEREFORE, THE DIMENSIONS IN A MULTICELL UNITS ARE NOT SIMPLE MULTIPLES OF THE DIMENSIONS OF A SINGLE CELL. TAKING THIS INTO CONSIDERATION, THE

DIMENSIONS OF A THREE-CELL UNIT WILL BE APPROXIMATELY 395 FEET BY 162 FEET, AND THE DIMENSIONS OF A TWO-CELL UNIT WILL BE APPROXIMATELY 278 FEET BY 162 FEET.

Q. THANK YOU. WE WILL NOW PROCEED --

JUDGE HOYT: MR. SILBERG, LET ME DETERMINE IF THE REPORTER WOULD LIKE TO MAKE A CHANGE AT THIS POINT.

(RECESS TAKEN.)

JUDGE HOYT: MR. SILBERG.

BY MR. SILBERG:

Q. WE'LL NOW PROCEED TO THE THIRD QUESTION ASKED BY THE PRESIDING OFFICER, AND THAT QUESTION: IS THE WASTE BURIAL SITE LOCATED WITHIN THE BOUNDS OF THE NAVARRE MARSH? PLEASE PROVIDE A DESCRIPTION RELATIVE TO THE MARSH.

FIRST OF ALL, MRS. WASILK, COULD YOU TELL US WHAT IS THE NAVARRE MARSH?

A. (MS. SCOTT-WASILK) ORIGINALLY THE NAVARRE MARSH REFERRED TO THE MARSHLAND WITHIN THE NAVARRE TRACT. THE NAVARRE TRACT WAS 524 ACRES THAT WAS AT ONE TIME A PRIVATE HUNT CLUB AND WAS SUBSEQUENTLY ACQUIRED BY THE U.S. FISH AND WILDLIFE SERVICE. THE BOUNDS OF THE NAVARRE TRACT ARE SHOWN IN FIGURE 3-1.

IN 1968, TOLEDO EDISON ACQUIRED THE NAVARRE TRACT FROM THE U.S. FISH AND WILDLIFE SERVICE IN EXCHANGE FOR THE DARBY MARSH (A MARSH ABOUT EIGHT MILES TO THE SOUTHEAST). AS PART OF THIS TRANSACTION, TOLEDO EDISON LEASED BACK TO THE U.S. FISH AND WILDLIFE SERVICE 447 ACRES OF THE NAVARRE TRACT, AND ALSO LEASED TO THE U.S. FISH AND WILDLIFE SERVICE 135 ACRES NORTH OF THE SITE. TOLEDO EDISON FURTHER AGREED TO ALLOW THE U.S. FISH AND WILDLIFE SERVICE TO OPERATE AND CONTROL AN ADDITIONAL 33 ACRES OF THE NAVARRE TRACT. UNDER THESE LEASES AND AGREEMENTS, THE U.S. FISH AND WILDLIFE SERVICE NOW MANAGES ALL THE MARSHLAND IN THE NAVARRE TRACT. THIS MARSHLAND, PLUS THE 135 ACRES NORTH OF THE SITE ARE NOW CALLED THE NAVARRE MARSH UNIT OF THE OTTAWA NATIONAL WILDLIFE REFUGE.

Q. IS THE BURIAL SITE WITHIN THE BOUNDS OF THE NAVARRE MARSH UNIT OF THE OTTAWA NATIONAL WILDLIFE REFUGE?

A. NO. THE CLOSEST APPROACH OF THE DIKE AROUND THE CELL NEAREST TO THE NAVARRE MARSH UNIT WILL BE APPROXIMATELY 400 FEET WEST OF THE NAVARRE MARSH UNIT.

Q. DR. HERDENDORF, COULD YOU PLEASE GIVE US

THE BIOLOGICAL DEFINITION OF A MARSH?

A. (DR. HERDENDORF) A MARSH IS DEFINED BY THE PRESENCE OF AQUATIC PLANTS, HYDROPHYTES, WHICH INDICATES THAT AT SOME POINT DURING THE GROWING SEASON THE SOIL WAS SATURATED. THE THREE TYPES OF AQUATIC VEGETATION THAT DETERMINE THE EXISTENCE OF A MARSH ARE EMERGENT (FOR EXAMPLE, CATTAILS AND BULRUSHES), FLOATING LEAF TYPE (FOR EXAMPLE), WATER LILY), AND SUBMERGED TYPE (FOR EXAMPLE, WATER MILFOIL, COONTAIL OR POND WEED. PROFESSOR MILTON W. WELLER OF THE DEPARTMENT OF ENTOMOLOGY FISHERIES AND WILDLIFE AT UNIVERSITY OF MINNESOTA IN HIS BOOK ENTITLED FRESHWATER MARSHES. ECOLOGY AND WILDLIFE MANAGEMEN, DEFINES FRESHWATER MARSHES AS FOLLOWS.

I QUOTE. "ANY UNDISTRUBED LOW SPOT THAT WILL HOLD WATER OF A FEW INCHES TO A FEW FEET OVER SOIL THAT FORMS A SUITABLE BASIN FOR THE INVASION OF WATER-TOLERANT ROOTED, PERENNIAL SOFT-STEMMED PLANTS SUCH AS SEDGES, CATTAIL AND BULRUSH. THIS BASIN IS NOW A MARSH, AND IT IN TURN ATTRACTS OTHER FORMS OF LIFE. THE TERM MARSH IS ALSO APPLIED TO TYPICAL MARSH VEGETATION THAT MAY BE DISTRIBUTED AS PATCHES OR STRIPS ALONG THE SHALLOW EDGES OF LAKES SEASHORES, OR RIVERS." END QUOTE.

Q. DO ANY GOVERNMENTAL AGENCIES HAVE DEFINITIONS FOR WHAT CONSTITUTES A MARSH?

A. YES. ALL MARSHES ARE WETLANDS. THE U.S. ARMY CORP OF ENGINEERS DEFINES WETLANDS AS PRESCRIBED BY EXECUTIVE ORDER 11990 SIGNED BY PRESIDENT CARTER IN MAY OF 1977 TO BE, AND I QUOTE "THOSE AREAS THAT ARE INUNDATED OR SATURATED BY SURFACE OR GROUNDWATER WITH A FREQUENCY AND DURATION SUFFICIENT TO SUPPORT, AND THAT UNDER NORMAL CIRCUMSTANCES DO SUPPORT, A PREVALENCE OF VEGETATION TYPICALLY ADAPTED FOR LIFE IN SATURATED SOIL CONDITIONS. WETLANDS GENERALLY INCLUDE SWAMPS, MARSHES, BOGS, AND SIMILAR AREAS." END QUOTE. FOR LAKE ERIE, THE U.S. CORP OF ENGINEERS HAS ESTABLISHED AN ELEVATION OF 572.8 FEET IGLD, WHICH THEY DETERMINE THE MEAN HIGH WATER MARK AS THE DEMARKATION BETWEEN COASTAL MARSHES AND TERRESTRIAL ENVIORNMENTS.

THE U.S. DEPARTMENT OF INTERIOR DEFINES WETLANDS AS QUOTE, "LANDS TRANSITIONAL BETWEEN TERRESTRIAL AND AQUATIC SYSTEMS WHERE THE WATER TABLE IS USUALLY AT OR NEAR THE SURFACE OF THE LAND OR THE LAND IS COVERED BY SHALLOW WATER.

WETLANDS MUST HAVE ONE OR MORE OF THE

FOLLOWING ATTRIBUTES: ONE, AT LEAST PERIODICALLY, THE LAND SUPPORTS PREDOMINATELY HYDROPHYTES OR AQUATIC PLANTS. TWO, THE SUBSTRATE IS PREDOMINATELY UNDRAINED HYDRIC SOILS. AND, THREE, SUBSTRATE IS NONSOIL SUCH AS BEDROCK, AND IS SATURATED WITH WATER OR COVERED BY SHALLOW WATER AT SOME TIME DURING THE GROWING SEASON OF EACH YEAR." END QUOTE. THE TERM WETLANDS INCLUDES A VARIETY OF AREAS WITH HYDROPHYTES AND HYDRIC SOILS, SUCH AS THOSE COMMONLY KNOWN AS MARSHES, SWAMPS AND BOGS.

OHIO STATE UNIVERSITY, UNDER CONTRACT TO THE U.S. FISH AND WILDLIFE SERVICE, HAS DEVELOPED AN INVENTORY OF ALL WETLANDS ON THE GREAT LAKES. OHIO STATE UNIVERSITY ALSO PREPARED AN INVENTORY OF ALL WETLANDS ALONG LAKE ERIE UNDER CONTRACT TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION. THIS WAS PUBLISHED AS REPORT NUMBER 287 OF THE CENTER FOR LAKE ERIE AREA RESEARCH, ENTITLED ENVIRONMENTAL SENSITIVITY INDEX, ESI MAPS FOR THE LAKE ERIE SYSTEM" BY FAY AND HERDENDORF. AS CONSERVATIVE CRITERIA FOR WETLANDS, BOTH INVENTORIES USED THOSE AREAS DESIGNATED AS MARSH ON THE UNITED STATES GEOLOGICAL SURVEY LACARNE TOPOGRAPHIC QUADRANGLE

MAPS AND AREAS BELOW ELEVATION 575, BASED ON USGS ELEVATIONS, WHICH IS EQUIVALENT TO 573.5 IGLD.

Q UNDER ANY OF THESE DEFINITIONS, DOES THE BURIAL SITE FALL WITHIN THE MARSH?

A. NO. ON JUNE 9TH 1986 DR RICHARD T. FISHER, BOTANIST AND PROFESSOR/CHAIRMAN EMERITUS OF THE DEPARTMENT OF SCIENCES AT BOWLING GREEN STATE UNIVERSITY, AND I EXAMINED THE BURIAL SITE IN ORDER TO CHARACTERIZE THE TYPE OF VEGETATION PRESENT THE VEGETATION CONSISTED PRIMARY OF GRASSES SHRUBS AND OTHER TERRESTRIAL PLANT TYPES. THE SITE DID NOT CONTAIN THE PREVALENT GROWTH OF HYDROPHYTES TYPICAL OF FRESHWATER MARSHES. THE NEAREST AREA CONTAINING AQUATIC VEGETATION IS 25 FEET AWAY ALONG THE FENCE LINE EAST OF THE AREA WHERE THE 1-CELL WASTE BURIAL UNIT WILL BE BUILT.

FURTHERMORE, THE SITE IS ABOVE ELEVATION 574, IGLD IS THEREFORE NOT A WETLAND OR A MARSH UNDER THE U.S. ARMY CORP OF ENGINEERS' DEFINITION, AND WAS NOT MAPPED AS A MARSH ON THE USGS LACARNE TOPOGRAPHIC MAP AS SHOWN IN FIGURE 3-2, THE NOAA STUDY DETERMINED THAT THE BURIAL SITE WAS OUTSIDE THE MARSH AREA. THEREFORE, THE BURIAL SITE IS NOT A MARSH UNDER ANY OF THE DEFINITIONS PROPERLY USED

FOR THIS GEOGRAPHIC AREA.

Q. THANK YOU, DR. HERDENDORF.

NOW, MOVE ON THE TO THE PRESIDING OFFICER'S FOURTH QUESTION WHICH IS WHAT IS THE OBSERVED FLOODING FREQUENCY AT THE WASTE BURIAL SITE.

DR. HERDENDORF, WOULD YOU PLEASE DESCRIBE THE FLOODING IN THE BURIAL SITE THAT HAS BEEN CONDUCTED BY TOLEDO EDISON?

A. THE STATIC WATER LEVELS IN THE WESTERN BASIN ARE EFFECTED BY LONG TERM AND ANNUAL CYCLIC VARIATIONS IN THE MEAN MONTHLY LEVEL FROM THE MEAN LOW WATER LEVEL, AND SHORT PERIOD VARIATIONS IN THE DAILY LEVEL FROM THE MONTHLY MEAN LEVEL DUE TO WIND TIDES AND SEICHES.

IN CONJUNCTION WITH THE NRC'S LICENSING OF THE DAVIS-BESSE PLANT, TOLEDO EDISON INVESTIGATED THE SUBJECT OF LAKE LEVELS. THE RESULTS OF THE INVESTIGATIONS ARE PRESENTED IN THE DAVIS-BESSE FINAL SAFETY ANALYSIS REPORT.

FOR THIS PROCEEDING, I RE-EXAMINED DATA ON LAKE LEVELS AND FLOODING, INCLUDING IN THE MOST RECENT DATA, TO DETERMINE THE LIKELIHOOD OF THE BURIAL SITE BECOMING FLOODED.

Q. WHAT RECORD OF LAKE LEVELS EXIST?

A. WATER LEVEL RECORDS FOR LAKE ERIE HAVE BEEN GATHERED SINCE 1860. VARIOUS PLANES OF REFERENCE HAVE BEEN USED DURING THE PERIOD OF RECORD, AND EACH OF THESE REFERENCE PLANES HAS A CORRECTION FACTOR WHICH MUST BE APPLIED WHEN CONVERTING TO IGLD LEVELS.

CURRENT LAKE LEVELS ARE MEASURED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AT A NUMBER OF GAUGES POSITIONED ALONG THE LAKE. THE DATA OBTAINED BY NOAA IS ANALYZED AND PUBLISHED MONTHLY BY THE U.S. CORP OF ENGINEERS.

DAVIS-BESSE SITE IS LOCATED APPROXIMATELY MIDWAY BETWEEN TWO LAKE LEVEL GAUGES -- ONE AT TOLEDO AND THE OTHER AT MARBLEHEAD. LAKE LEVELS ARE NOT UNIFORM ACROSS THE LAKE, BUT EXHIBIT LENGTHWISE AND TRANSVERSE VARIATIONS DUE TO WIND TIDE AND SEICHE. THE MAXIMUM LAKE LEVELS ARE OBSERVED AT THE WEST END OF THE LAKE, THAT IS, AT TOLEDO HARBOR, WHILE THE CENTER OF THE LAKE IS A WIND TIDE NODE OR A POINT IN WHICH THE LAKE, IN THE LAKE WHERE NO WIND TIDE CHANGE OCCURS.

THE DAVIS-BESSE SITE IS LOCATED APPROXIMATELY 80 PERCENT OF THE WAY FROM THE WIND TIDE NODE TO TOLEDO, AND WIND TIDE VARIATION OR STORM SURGES ARE THEREFORE ABOUT 80 PERCENT OF

THOSE RECORDED AT TOLEDO. DATA FROM 1983 TO 1986 SHOWN IN TABLE 4-2 SHOWS THIS RATIO TO BE 78.6 PERCENT.

Q. HAS THE BURIAL SITE BEEN FLOODED IN THE PAST?

A. THE GENERAL AREA AROUND THE BURIAL SITE HAS BEEN OBSERVED FLOODED, BUT NO SPECIFIC HYDROLOGICAL RECORDS OF SUCH EVENTS HAVE BEEN MAINTAINED.

Q. HISTORICALLY, HOW MANY TIMES WOULD YOU ESTIMATE THAT THE BURIAL SITE HAS BEEN FLOODED?

A. TO DETERMINE THE PAST HISTORY OF FLOODING AT THE PROPOSED BURIAL SITE, I ANALYZED WATER LEVEL RECORDS FOR TOLEDO HARBOR FOR THE LAST 50 YEARS. I WAS ASSISTED BY MR. JAMES P. BYRNE, ENGINEERING TECHNICIAN, TOLEDO PROJECT OFFICE, U.S. ARMY CORPS OF ENGINEERS. I FOCUSED ONLY ON FLOODING EVENTS WITH A WATER LEVEL GREATER THAN 6 FEET ABOVE LOW WATER DATUM, OR LWD, AT TOLEDO. A LEVEL AT 6 FEET ABOVE LWD IS EQUIVALENT TO AN ELEVATION OF 574.6 IGLD. LESSER FLOODS COULD NOT HAVE AFFECTED THE BURIAL SITE.

TO DETERMINE WHETHER FLOODS ABOVE 574.6 IGLD AT TOLEDO WOULD HAVE COINCIDED WITH A FLOODING EVENT AT THE BURIAL SITE, I EXAMINED THE

STORM SURGE THAT WOULD OCCUR AT DAVIS-BESSE, AND ADDED THE CORRECTED SURGE TO THE MEAN MONTHLY STILL WATER ELEVATION AT THE TIME OF THE FLOOD. THIS PROVIDED ME WITH AN ESTIMATE AT THE LAKE LEVEL AT LOCUST POINT WHERE THE DAVIS-BESSE STATION IS LOCATED DURING THE EACH OF THE FLOODING EVENTS RECORDED AT TOLEDO.

I ALSO CONSIDERED THE AVENUE FOR FLOODING AT THE BURIAL SITE. BECAUSE OF EXISTING PROTECTING DIKES, FLOODING AT THE PROPOSED BURIAL SITE WOULD OCCUR INDIRECTLY, VIA THE TOUSSAINT RIVER AND DRAINAGE DITCHES. THIS CAUSES FLOOD WATERS AT THE SITE TO LAG CONSIDERABLY BEHIND CONDITIONS ON THE OPEN COAST BY AT LEAST AN ESTIMATED FOUR HOURS.

THIS ESTIMATE IS BASED ON THE OBSERVATION THAT STORM SURGES WHICH REACH A PROJECTED ELEVATION OF 574.52 ON MAY 9, 1986, AND 574.65 ON JUNE 17TH, 1986, AT LOCUST POINT, AND HAD DURATIONS OF FOUR HOURS, AND THESE ARE LISTED IN TABLE 4-1, DID NOT RESULT IN FLOODING AT THE BURIAL SITE. I THEREFORE DETERMINED THAT FLOODING EVENTS THAT RESULTED IN A LAKE LEVEL OF 574.3 AT LOCUST POINT FOR OVER FOUR HOURS WERE THE ONES THAT MIGHT HAVE FLOODED THE BURIAL SITE. THE

RESULTS OF MY ANALYSES ARE SHOWN ON TABLE 4-1. FLOODING EVENTS WHICH WERE CALCULATED TO HAVE POTENTIALLY RESULTED IN FLOODING OF THE BURIAL SITE ARE MARKED WITH AN ASTERISK. THERE ARE AN ESTIMATED 25 SUCH EVENTS OVER THE PAST 50 YEAR PERIOD, OVER THE 50 YEAR PERIOD EXAMINED. THE TOTAL DURATION OF FLOODING WAS PROBABLY LESS THAN EQUIVALENT OF 12 DAYS OR ABOUT 2.4 DAYS EVERY TEN YEARS.

Q. DID THE WATER LEVEL FOR ANY OF THE FLOODS EXCEED THE ELEVATION OF THE DIKES WHICH TOLEDO EDISON INTENDS TO BUILD AROUND THE WASTE DISPOSAL CELLS?

A. NO. THE HIGHEST WATER LEVEL AT THE SITE IS ESTIMATED AT 576.05 IGLD, WHICH IS EQUIVALENT TO 7.4 FIVE FEET ABOVE LOW WATER DATUM THAT OCCURRED ON APRIL 8TH, 1974. TOLEDO EDISON 'S DESIGN CALLS FOR DIKES TO AN ELEVATION OF 579.75 FEET IGLD OR 11.15 FEET ABOVE LOW WATER DATUM.

Q. DR. HERDENDORF, WHAT IS THE LIKELIHOOD THAT THE BURIAL SITE WILL BE FLOODED IN THE FUTURE?

A. THE LIKELIHOOD THAT THE BURIAL SITE WILL BE FLOODED IN THE FUTURE DEPENDS ON FUTURE LAKE LEVELS OF LAKE ERIE AND THE PROBABILITY AND

MAGNITUDE OF STORM SURGES ABOVE THE STILL WATER SURFACE. ANY PREDICTION OF LAKE LEVEL BEYOND THE IMMEDIATE FUTURE WOULD BE SPECULATIVE. THE U S. ARMY CORPS OF ENGINEERS, FOR EXAMPLE, ONLY PREDICTS LAKE LEVELS SIX MONTHS IN ADVANCE

HOWEVER, THE LAKE MEAN WATER LEVEL FOR THE MONTH OF JUNE, 198 WAS THE HIGHEST LEVEL DURING THE PERIOD SINCE 1860, WHEN THE U.S. ARMY CORPS OF ENGINEERS BEGAN TO MAINTAIN THE RECORDS. AT TOLEDO THE MONTHLY AVERAGE FOR JUNE REACHED 573.72.

FLOODING OCCURS FROM THE STORM SURGES WHICH WOULD RAISE THE LAKE LEVEL ABOVE ITS STILL WATER MARK. NORTHEAST STORMS GENERATED BY LOW-PRESSURE SYSTEMS PASSING SOUTH OF THE LAKE SHORE ARE LARGELY RESPONSIBLE FOR WIND SETUP OR STORM SURGES WHICH RAISE WATER LEVELS AT THE WEST END OF THE LAKE SEVERE STORMS CAN RISE THE STILL WATER LEVEL -- STILL WATER SURFACE OF THE LAKE APPROXIMATELY 4.2 FEET IN THE VICINITY OF LOCUST POINT. AND THIS OCCURRED ON APRIL 27 196

PROFESSOR CHARLES H CARTER OF THE DEPARTMENT OF GEOLOGY, UNIVERSITY OF AKRON ANALYZED WATER LEVEL RECORDS FOR WESTERN LAKE ERIE STORM SURGES WHICH OCCURRED DURING THE PERIOD 1939

THROUGH 1980. THE STUDY INCLUDED ALL STORM EVENTS WHICH CAUSED THE DAILY MEAN WATER LEVEL TO EXCEED THE MONTHLY MEAN WATER LEVEL BY ONE FOOT. BASED ON THE 179 STORM SURGES DURING THAT PERIOD, PROFESSOR CARTER DETERMINED THAT THE FOLLOWING EXPECTED FREQUENCY AND MAGNITUDE PER YEAR FOR STORM SURGES AT THE WESTERN END OF LAKE ERIE. TO REVIEW HIS FINDINGS, A STORM OF ONE TO TWO FEET WOULD HAVE A FREQUENCY OF 1.5 YEARS. A STORM --

Q. EXCUSE ME 1.5 PER YEAR?

A. PER YEAR, CORRECT. A STORM SURGE HEIGHT OF TWO TO THREE FEET WOULD HAVE A FREQUENCY OF TWO PER YEAR. A STORM SURGE HEIGHT OF THREE TO FOUR FEET WOULD OCCUR .6 PER YEAR. STORM SURGES GREATER THAN 4 FEET WOULD ONLY OCCUR .1 PER YEAR.

THE NUMBER OF STORM SURGES PER YEAR RANGE FROM 1 TO 7, AND THE DURATION RANGE FROM 1 TO 3 DAYS. 85 PERCENT OF THE STORM SURGES LAST 1 DAY, 13 PERCENT LASTED 2 DAYS AND 2 PERCENT LASTED 3 DAYS. BASED UPON THESE DATA, OCCASIONAL FLOODING OF THE BURIAL SITE'S BASE ELEVATION COULD BE EXCEPTED.

Q. WOULD YOU EXPECT THAT THE BURIAL STRUCTURE ITSELF TO BE FLOODED?

A. THE CELLS THEMSELVES WOULD NOT BE

FLOODED. AS DESCRIBED EARLIER, THE WASTE BURIAL CELLS WOULD BE SURROUNDED BY DIKES. THE ELEVATION OF THE DIKE PORTION OF THE BURIAL STRUCTURE WOULD BE AT LEAST 579.75 FEET AT IGLD. THIS IS 3.7 FEET ABOVE THE ESTIMATED FLOOD LEVEL FOR THE HIGHEST STORM ON RECORD WHICH OCCURRED APRIL 8TH, 1974, AND 1.84 FEET ABOVE THE LAKE LEVEL WHICH WOULD OCCUR IF THE MAXIMUM HISTORICAL SURGE TOOK PLACE AT TODAY S RECORD HIGH LEVELS. FLOOD WATERS WOULD NOT PENETRATE THE DIKE.

THE U.S. ARMY CORPS OF ENGINEERS PREDICTS THE FOLLOWING MAXIMUM WATER LEVELS AT LOCUST POINT: THIS IS BASED ON A FREQUENCY OF FLOOD FOR A PERIOD OF 10 -- A 10 YEAR FLOOD WITH AN ELEVATION OF 574.8, WHICH CONVERTS TO IGLD OF 6.2 FEET. A 50 YEAR FLOOD WOULD HAVE AN ELEVATION OF 575.7, WHICH 7.1 FEET ABOVE THE WATER DATUM. A HUNDRED YEAR FLOOD HAVE AN ELEVATION OF 576.0, WHICH IS 78.4 FEET ABOVE LWD, AND A 500 YEAR FLOOD WOULD REACH AN ELEVATION OF 576.7, WHICH IS 8.1 FEET ABOVE LWD.

Q. IF THE BASE ELEVATION OF THE BURIAL SITE WERE TO BE FLOODED, WOULDN'T THE FLOOD WATERS COME INTO CONTACT WITH THE SIDES OF THE BURIAL STRUCTURE?

A. YES. HOWEVER, I WOULD NOT EXPECT THAT SUCH AN EVENT WOULD CAUSE ANY SIGNIFICANT EROSION TO THE BURIAL STRUCTURE.

Q. WHY NOT?

A. FIRST OF ALL, THE BURIAL STRUCTURE WOULD NOT BE EXPOSED TO ANY SIGNIFICANT WAVE ATTACK. IN A STORM WHICH WITH WOULD CREATE FLOODING IN THE BURIAL SITE, WAVES WOULD BE COMING TOWARD THE SITE FROM THE NORTHEAST. HOWEVER, THE MARSH AREA AND THE OUTER MARSH DIKES, WHICH IS RIP-RAPPED, WOULD ABSORB THE BRUNT OF THE STORM WAVES. I WOULD NOT EXPECT ANY SIGNIFICANT WAVES TO REACH THE BURIAL SITE. WAVE HEIGHTS NEAR THE BURIAL SITE WOULD BE LIMITED BY THE PHYSICAL PROPERTIES OF WAVES. THE MAXIMUM WAVE HEIGHT IN SHALLOW WATER IS GIVEN BY THE EQUATION H EQUALS POINT 78 TIMES Z, WHERE H IS THE WAVE HEIGHT AND Z IS THE STILL WATER DEPTH. SINCE THE STILL WATER DEPTH NEAR THE BURIAL SITE WOULD BE SMALL, EVEN IN A FLOODING SITUATION, THE WAVE HEIGHT WOULD ALSO BE SMALL.

IF FLOODING WERE TO OCCUR, I WOULD EXPECT THE WATER LEVEL -- WATER LEVELS WOULD GRADUALLY RISE AROUND -- I WILL START THAT PARAGRAPH, AGAIN, PLEASE.

IF FLOODING WERE TO OCCUR, I WOULD EXPECT

THAT WATER LEVELS WOULD GRADUALLY RISE AROUND THE BASE OF THE BURIAL STRUCTURE. THIS GRADUAL RISE WOULD NOT BE EXPECTED TO CAUSE SIGNIFICANT EROSION OF THE BURIAL STRUCTURE. IT IS WORTH NOTING THAT EROSION ALONG THE LAKE ERIE SHORE GENERALLY DOES NOT OCCUR IN THE ABSENCE OF WAVE ATTACK, EVEN DURING SEVERE STORMS. EROSION HAS TYPICALLY OCCURRED AT BLUFF AREAS, WHICH ARE UNDERCUT BY WAVE ACTION, NOT STILL WATER.

Q. WE'LL NOW MOVE ON TO OUR RESPONSES TO THE PRESIDING OFFICERS FIFTH QUESTION, WHICH IS: WHAT SOIL EROSION FROM STORMS HAS BEEN ACTUALLY OBSERVED AT OR NEAR THE DISPOSAL SITE?

DR. HERDENDORF, TO WHAT EXTENT WOULD FLOODING OF THE BURIAL SITE CAUSE SOIL EROSION?

A. AS I HAVE JUST EXPLAINED, I WOULD NOT EXPECT FLOODING TO CAUSE ANY SIGNIFICANT EROSION OF THE BURIAL STRUCTURE.

Q. WHAT SOIL EROSION HAS BEEN CAUSED AT THE BURIAL SITE BY PAST FLOODING.

A. THERE ARE NO RECORDS ADDRESSING SOIL EROSION CAUSED AT THE BURIAL SITE BY PAST FLOODING; BUT ON APRIL 28TH AND JUNE 9TH, I INSPECTED THE BURIAL SITE TO DETERMINE IF PAST FLOODING EVENTS HAD CAUSED ANY SOIL EROSION. MY

EXAMINATION OF WATER LEVEL RECORDS FOR TOLEDO HAS INDICATED THAT THE SITE MAY HAVE FLOODED A NUMBER OF TIMES, ENOUGH OCCASIONS DURING THE PAST FIVE YEARS. DURING MY INSPECTION OF THE BURIAL SITE, I FOUND THE LAND SURFACE WELL VEGETATED. I FOUND NO SURFICIAL EVIDENCE OF EROSION.

Q. WHAT SOIL EROSION HAS OCCURRED IN SIMILAR AREAS ALONG LAKE ERIE?

A. I KNOW OF NO DOCUMENTED CASES OF SOIL EROSION ON WELL VEGETATED LAND DUE TO FLOODING OF LAKE ERIE OF INLAND AREAS. DUE TO THE SLOW RISE OF THE WATER LEVEL, SHALLOW DEPTH, AND MINIMAL FLOW VELOCITIES IN SUCH AREAS, EROSION OF GRASSED SURFACES WOULD NOT BE EXPECTED TO OCCUR.

Q. MR. SWIM, WHAT STEPS WOULD BE TAKEN TO MINIMIZE THE POSSIBILITY OF EROSION OF THE BURIAL STRUCTURE?

A. (MR. SWIM) GRASSES WILL BE PLANTED ON THE BURIAL STRUCTURE. THE U.S. SOIL CONSERVATION SERVICE RECOMMENDED THAT THE TOLEDO EDISON USE A MIXTURE OF KENTUCKY BLUE GRASS AND LIDINO WHITE CLOVER, AND THE SOIL CONSERVATION SERVICE IS PREPARING A PROTECTIVE VEGETATION DESIGN PLAN WHICH TOLEDO EDISON INTENDS TO FOLLOW.

IN ADDITION, THE WASTE BURIAL CELLS WILL

BE SURROUNDED AND PROTECTED BY DIKES. TO PREVENT EROSION OF THE DIKES, THE SLOPES OF THE DIKES WILL BE RIP-RAPPED. FURTHERMORE, THERE WILL BE EITHER A SMALL GRADED STONE LAYER OR FILTER CLOTH UNDER THE RIP-RAP.

Q. DR. HERDENDORF, HOW EFFECTIVE WILL THESE STEPS BE, WHICH MR. SWIM HAS JUST DESCRIBED, BE IN MINIMIZING THE POSSIBILITY OF EROSION?

A. (DR. HERDENDORF) VEGETATIVE COVER IS A WELL-RECOGNIZED AND EFFECTIVE METHOD FOR PREVENTING EROSION. FOR EXAMPLE, THE U.S. DEPARTMENT OF AGRICULTURE RECOMMENDS SEEDING WITH LOCAL SPECIES OF GRASS TO HANDLE RUN-OFF AT SPEEDS OF 3 TO 6 FEET PER SECOND. THESE VELOCITIES ARE GREATER THAN I WOULD ANTICIPATE AT THE BURIAL SITE. THE RIP-RAPPING OF THE DIKE SLOPES AND THE USE OF AN INNER GRADED STONE LAYER OR FILTER CLOTH ARE ALSO A RECOGNIZED AND EFFECTIVE MEANS TO PROTECT THE DIKES AGAINST EROSION. I WOULD ANTICIPATE THESE STEPS TO BE HIGHLY EFFECTIVE IN PREVENTING EROSION.

Q. I'LL NOW MOVE ON TO OUR RESPONSES TO THE PRESIDING OFFICER'S SIXTH QUESTION. THAT QUESTION STATES: WHAT IS THE DIRECTION OF GROUNDWATER FLOW FROM THE BURIAL SITE RELATING TO LAKE ERIE,

NAVARRE MARSH, AND THE TOUSSAINT RIVER, MR. HENDRON, WOULD YOU PLEASE DESCRIBE THE GEOLOGIC FORMATIONS UNDERLYING THE BURIAL SITE?

A. (MR. HENDRON) COMPLETE DESCRIPTIONS OF GEOLOGIC FORMATIONS UNDERLYING THE SITE ARE GIVEN IN NUMEROUS DOCUMENTS PREPARED FOR THE DAVIS-BESSE SITE. IN SUMMARY, THE SITE IS UNDERLAIN FROM THE GROUND SURFACE BY TWO PRIMARY GLACIAL SOIL DEPOSITS. THESE GLACIAL SOIL DEPOSITS ARE ABOUT 15 FEET THICK IN THE AREA OF THE BURIAL SITE, AND THEY OVERLIE A RELATIVELY FLAT-LYING DOLOMITE BEDROCK FORMATION OF SILURIAN GEOLOGIC AGE.

THE UPPER GLACIAL SOIL DEPOSIT IS A GLACIOLACUSTRINE CLAY. THE DEPOSIT CONSISTED OF A RELATIVELY HOMOGENEOUS PLASTIC SILTY CLAY THAT CONTAINS MINOR AMOUNTS OF SILTS AND FINE SANDS WITHIN THE CLAY MATRIX. THE TOPMOST FOOT CONTAINS ORGANIC MATERIAL AND IS REFERRED TO AS TOPSOIL WITHIN THE AREA BEING CONSIDERED FOR THE LAND DISPOSAL SITE. THE GLACIOLACUSTRINE DEPOSIT IS ONLY PARTIALLY SATURATED; THAT IS, THE VOIDS BETWEEN THE INDIVIDUAL CLAY PARTICLES ARE ONLY PARTIALLY FILLED WITH WATER. A SUMMARY OF TYPICAL PHYSICAL PROPERTIES OF THE GLACIOLACUSTRINE DEPOSIT IN THE AREA BEING CONSIDERED FOR THE LAND

DISPOSAL SITE IS GIVEN IN TABLE 6-1.

THE LOWER GLACIAL SOIL DEPOSIT IS A GLACIAL TILL DEPOSIT. THE DEPOSIT CONSISTS OF A RELATIVELY HOMOGENEOUS MIXTURE OF MODERATELY PLASTIC CLAY, SILT, SANDS, AND GRAVELS. THE OVERALL MATRIX OF THE DEPOSIT IS CONTROLLED BY THE HIGH CLAY-SILT CONTENT. WITHIN THE AREA BEING CONSIDERED FOR THE LAND DISPOSAL SITE, THE GLACIAL TILL DEPOSIT IS ALSO ONLY PARTIALLY SATURATED. A SUMMARY OF AVERAGE ESTIMATED PHYSICAL PROPERTIES OF THE GLACIAL TILL DEPOSIT IN THE AREA BEING CONSIDERED FOR THE LAND DISPOSAL SITE IS GIVEN IN TABLE 6-1.

THE UPPER 15 TO 20 FEET OF THE DOLOMITE BEDROCK FORMATION IS A RELATIVELY PURE MASSIVE DOLOMITE. THIS UPPER LAYER IS UNDERLAIN TO DEPTHS OF SEVERAL TENS OF FEET BY A LAMINATED DOLOMITE FORMATION THAT CONTAINS SUBSLANT INVERTS OF GYPSUM AND ANHYDRITE IN ADDITION TO THE DOLOMITE.

Q. WHICH OF THESE FORMATIONS DOES GROUNDWATER FLOW OCCUR?

A. MEASURABLE GROUNDWATER FLOW IN THE AREA BEING CONSIDERED FOR LAND DISPOSAL OCCURS ONLY IN THE BEDROCK FORMATION. THE DOLOMITE BEDROCK FORMATION CONTAINS SEVERAL SYSTEMS OF JOINTS,

FISSURES, AND VUGS. WEATHERING AND SOLUTION HAVE OPENED SOME OF THESE SYSTEMS. THE DOLOMITE FORMATION IS FULLY SATURATED AND IS RELATIVELY PERMEABLE; THAT IS THE FORMATION CAN CONVEY FLUIDS IN RESPONSE TO APPLICATION OF EITHER A NATURAL OR A MAN-MADE GRADIENT, BECAUSE OF THE HIGHER PERMEABILITY OF THE SYSTEM OF JOINTS, FISSURES AND VUGS. THE DOLOMITE FORMATION IS THE UPPERMOST REGIONAL GROUNDWATER AQUIFER UNDERLYING THE DAVIS-BESSE SITE.

THE GLACIAL SOIL DEPOSITS ARE ONLY PARTIALLY SATURATED AND ARE HIGHLY CLAY RICH. CONSEQUENTLY, THESE SOILS ARE HIGHLY IMPERMEABLE; THAT IS THEY HAVE A LOW HYDRAULIC CONDUCTIVITY. THE GEOLOGIC STUDIES CONDUCTED AT DAVIS-BESSE INDICATE THAT THE GLACIOLACUSTRINE DEPOSIT AND THE TILL DEPOSIT CONTAIN NO SYSTEMATIC OPEN JOINTS, FISSURES, SAND STRATA, OR OTHER NON-UNIFORMITIES THAT COULD SERVE AS GROUNDWATER FLOWPATHS. SO FAR AS CAN BE DETERMINED, NEITHER THE GLACIOLACUSTRINE OR TILL DEPOSIT ARE CONSIDERED OR USED AS AN AQUIFER IN THE AREA. TO THE CONTRARY, THESE DEPOSITS ARE AN AQUITARD, CONFINING THE UNDERLYING ARTESIAN ACQUIFER IN THE BEDROCK.

Q. MR. HENDRON, HOW ARE THESE GEOLOGIC AND

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HYDROLOGIC CHARACTERISTICS DETERMINED?

A. THE GEOLOGIC AND HYDROLOGIC CHARACTERISTICS OF THE GLACIAL DEPOSITS AND BEDROCK WERE DETERMINED THROUGH EXTENSIVE INVESTIGATIONS AND STUDIES OF THE DAVIS-BESSE SITE FOR THE SITING AND LICENSING OF UNITS 1, 2 AND 3. DURING THESE STUDIES, HUNDREDS OF BORINGS, TEST PITS, PROBES, PUMP TESTS AND OTHER DIRECT FIELD TESTS WERE MADE THROUGHOUT THE SITE AREA INCLUDING THE AREA BEING CONSIDERED FOR THE LAND DISPOSAL SITE, AND TENS OF THOUSANDS OF MAN-HOURS WERE EXPENDED TO EVALUATE THE DATA OBTAINED. THE STUDIES ALSO INCLUDE DISCUSSIONS WITH STATE GEOLOGISTS AND A THOROUGH REVIEW OF THE ALREADY AVAILABLE INFORMATION.

IN ADDITION, A STUDY WAS RECENTLY UNDERTAKEN WITHIN THE BOUNDARIES OF THE SITE BEING CONSIDERED FOR THE LAND DISPOSAL SITE. THE INVESTIGATIONS INCLUDED FIVE BORINGS THROUGH THE SOIL DEPOSITS, PHYSICAL PROPERTY TESTING OF DRIVE SAMPLES TAKEN FROM THE BOREHOLES, AND LABORATORY PERMEABILITY TESTING OF TUBE SAMPLES TAKEN FROM THE BOREHOLES. TYPICAL RESULTS OF THESE TESTS ARE SUMMARIZED ON TABLE 6-1.

Q. WHAT IS THE DIRECTION OF GROUNDWATER FLOW

FROM THE BURIAL SITE, MR. HENDRON?

A. GROUNDWATER FLOW OCCURS ONLY IN THE BEDROCK THAT IS FOUND APPROXIMATELY 15 FEET BENEATH THE EXISTING GROUND SURFACE. THERE IS NO PRESENT MEASURABLE GROUNDWATER FLOW THAT OCCURS HORIZONTALLY OR VERTICALLY THROUGH THE SOIL DEPOSITS THAT OVERLIE THE BEDROCK.

THE GRADIENT OF GROUNDWATER IN THE BEDROCK IS EXTREMELY SMALL, ONE TO TWO FEET PER MILE. AS A RESULT, THE RATE OF GROUNDWATER -- THE RATE OF FLOW OF GROUNDWATER IS SO SMALL THAT IT IS DIFFICULT TO MEASURE, AND THE PRECISE DIRECTION OF GROUNDWATER FLOW BENEATH THE BURIAL SITE CANNOT BE DETERMINED RELIABLY. HOWEVER, THE GROUNDWATER FLOW CAN BE DETERMINED ON A LARGER SCALE. ON A REGIONAL BASIS, GROUNDWATER MOST PROBABLY DISCHARGES VERY SLOWLY INTO LAKE ERIE SEVERAL MILES OFFSHORE WHEN THE BEDROCK OUTCROPS IN THE LAKE AND TO A SMALLER EXTENT INTO THE TOUSSAINT RIVER WHERE BEDROCK IS PROBABLY INTERMITTENTLY EXPOSED BY EROSION OF THE OVERLYING SOIL DEPOSITS BY THE RIVER. ONE WOULD EXPECT THE SAME FLOW TO OCCUR BENEATH THE BURIAL SITE.

Q. HOW WAS THE REGIONAL DIRECTION OF GROUNDWATER FLOW DETERMINED?

A GROUNDWATER DIRECTION IN THE BEDROCK WAS DETERMINED THROUGH INSTALLATION OF AND MEASUREMENTS IN NUMEROUS MONITORING WELLS THROUGHOUT THE DAVIS-BESSE SITE SINCE 1968. THE LACK OF GROUNDWATER FLOW THROUGH THE GLACIAL SOIL DEPOSITS IS ESTABLISHED THROUGH PHYSICAL MEASUREMENTS OF SOIL PROPERTIES, THE ANALYSES OF BEDROCK GROUNDWATER CONTOURS IN RELATION TO PHYSICAL SITE CHARACTERISTICS, AND THE RESULTS OF LONG-TERM OBSERVATION OF THE LACK OF WATER MOVEMENT THROUGH CLAY SOIL EXCAVATIONS DURING CONSTRUCTION OF UNIT 1 FACILITIES.

Q. DOES THE GROUNDWATER UNDER THE BURIAL GROUND FLOW TOWARDS THE NAVARRE MARSH?

A. GROUNDWATER PROBABLY FLOWS THROUGH THE BEDROCK BENEATH THE BURIAL SITE TOWARD THE NAVARRE MARSH, IN RESPONSE TO VERY LOW GRADIENT DIRECTED TOWARDS LAKE ERIE.

Q. DOES THE GROUNDWATER IN THE BEDROCK COMMUNICATE WITH THE NAVARRE MARSH?

A. NO, THE GLACIAL CLAY DEPOSITS SEPARATE THE MARSH FROM THE BEDROCK AND PREVENT COMMUNICATION. MOREOVER, EVEN IF THERE WERE COMMUNICATION, THE ONLY TIME THERE COULD BE COMMUNICATION IS DURING TIMES WHEN THE MARSH IS

FLOODED, WHEN THE DIRECTION OF FLOW WOULD BE FROM THE MARSH INTO THE BEDROCK, AND NOT FROM THE BEDROCK INTO THE MARSH.

Q. NOW, MOVING ON TO OUR RESPONSES TO THE PRESIDING OFFICER'S QUESTION 7. THAT QUESTION STATES: WHAT IS THE DEPTH TO BEDROCK OF UNCONSOLIDATED GLACIAL DEPOSITS AT THE BURIAL SITE?

MR. HENDRON, WHAT IS THE THICKNESS OF THE GLACIOLACUSTRINE DEPOSIT?

A. IN THE AREA OF THE BURIAL SITE, GLACIOLACUSTRINE DEPOSIT IS FIVE FEET TO EIGHT FEET THICK.

Q. WHAT IS THE THICKNESS OF THE UNDERLYING GLACIAL TILL?

A. THE THICKNESS OF THE GLACIAL TILL DEPOSIT IN THE AREA BEING CONSIDERED FOR THE BURIAL SITE RANGES FROM 9 TO 12 FEET.

Q. AND HOW WERE THESE THICKNESSES DETERMINED?

A. THE THICKNESSES WERE DETERMINED LARGELY ON THE BASIS OF THE FIVE MOST RESENT BORINGS IN THE BURIAL SITE AREA. THESE RANGES AGREE VERY WELL WITH RESULTS OF NUMEROUS OTHER BORINGS CONDUCTED AT THE SITE DURING PREVIOUS STUDIES.

Q. WHAT WILL BE THE DISTANCE BETWEEN THE BOTTOM OF THE WASTE DISPOSAL CELLS AND THE TOP OF THE BEDROCK?

A. THE PRESENTLY PROPOSED BOTTOM OF THE WASTE DISPOSAL CELLS, THAT IS, THE BOTTOM OF THE LINER, IS TO BE AT ELEVATION 567. AND THAT'S IGLD. THE ELEVATION OF THE TOP OF BEDROCK IS AT ELEVATION 560. THE DISTANCE BETWEEN THE BOTTOM OF THE WASTE DISPOSAL CELLS AND THE TOP OF THE BEDROCK WILL THEREFORE BE SEVEN FEET.

Q. PRESIDING OFFICER'S QUESTION 8 STATES AS FOLLOWS: WHAT IS THE AVERAGE DEPTH AND UPPER AND LOWER RANGE OF THE WATER TABLE AT THE DISPOSAL SITE?

FIRST, DR. HENDRON, WOULD YOU PLEASE DEFINE THE TERM WATER TABLE?

A. THE SIMPLEST DEFINITION OF WATER TABLE IS THE POINT OF CONTACT BETWEEN THE SATURATED AND THE UNSATURATED GEOLOGIC ZONES IN THE SUBSURFACE. THIS DEFINITION, IN FACT, IS VERY CONSISTENT WITH THAT IN OHIO'S SOLID WASTE DISPOSAL REGULATIONS, OHIO ADMINISTRATION CODE PARAGRAPH 3745-27-01 (AA).

Q. WHERE IN THE FORMATIONS UNDER THE BURIAL SITE IS THE WATER TABLE LOCATED?

A. CALCULATIONS INDICATE THAT BOTH THE GLACIOLACUSTRINE AND GLACIAL TILL DEPOSITS BENEATH THE BURIAL SITE ARE UNSATURATED. THE BEDROCK DEPOSIT IS SATURATED AND WATER IN THE BEDROCK FORMATION IS CONFINED. CONSEQUENTLY, THE WATER TABLE WITHIN THE AREA BEING CONSIDERED FOR THE DISPOSAL SITE IS THE CONTACT POINT BETWEEN THE GLACIAL SOIL DEPOSITS AND THE TOP OF THE WEATHERED BEDROCK ZONE. THIS CONTACT GENERALLY OCCURS AT ABOUT ELEVATION 560.

Q. WHAT WILL BE THE MINIMUM DISTANCE BETWEEN THE BOTTOM OF THE WASTE CELLS AND THE WATER TABLE?

A. THE PRESENT ELEVATION OF THE BOTTOM OF THE WASTE CELLS IS ELEVATION 567 AND THE ELEVATION OF THE TOP OF THE WATER TABLE IS ELEVATION 560. THE DISTANCE BETWEEN THE BOTTOM OF THE WASTE CELLS AND THE WATER TABLE IS SEVEN FEET.

Q. THANK YOU. THE NEXT QUESTION POSED BY THE PRESIDING OFFICER, QUESTION 9, STATES AS FOLLOWS: WHAT ENDANGERED SPECIES OF PLANT OR ANIMAL HAVE BEEN ACTUALLY OBSERVED ON THE DAVIS-BESSE? WHAT CRITICAL HABITATS FOR ENDANGERED SPECIES EXIST ON THE DAVIS-BESSE SITE?

DR. JACKSON, WOULD YOU PLEASE DESCRIBE THE INVESTIGATIONS THAT HAVE BEEN CONDUCTED AT THE

DAVIS-BESSE SITE TO DETERMINE THE PLANTS AND ANIMALS ON OR IN THE VICINITY OF THE SITE?

A. (DR. JACKSON) FROM 1972 THROUGH 1980, ENVIRONMENTAL MONITORING STUDIES WERE CONDUCTED AT THE DAVIS-BESSE SITE. AS PART OF THESE STUDIES, MY ASSOCIATES AND I STUDIED TERRESTRIAL ANIMAL AND PLANT COMMUNITIES AT THE SITE. PLANT, MAMMAL, AND HERPETILE POPULATIONS WERE EXAMINED. BIRD POPULATIONS WERE CENSUSED EACH SEASON, AND BIRD STRIKES AT THE COOLING TOWER WERE MONITORED DURING SPRING AND FALL MIGRATION PERIODS.

Q. DR. REUTTER?

A. (DR. REUTTER) COMPLEMENTING DR. JACKSON'S STUDIES, DR. HERDENDORF AND I CONDUCTED AQUATIC STUDIES OVER THE SAME NINE-YEAR PERIOD. THE AQUATIC STUDIES INCLUDED A SAMPLING PROGRAM OF FISH AND BENTHIC ORGANISMS IN LAKE ERIE NEAR THE SITE. THE THREE-YEAR SAMPLING PROGRAM WAS CONDUCTED IN THE NAVARRE MARSH.

Q. DURING THESE INVESTIGATIONS, WERE ANY ENDANGERED SPECIES, PLANTS OR WILDLIFE, FOUND OR OBSERVED ON THE DAVIS-BESSE SITE?

A. (DR. JACKSON) BACK TO THE 1974 ENVIRONMENTAL MONITORING PROGRAM AT THE DAVIS-BESSE SITE FOUND EVIDENCE OF CHENOPODIUM

LEPTOPHYLLUM, SLENDER GOOSEFOOT, NEAR THE CURRENT LOCATION OF THE COOLING TOWER. THIS PLANT IS NOW ON THE ENDANGERED SPECIES LIST PREPARED BY THE DIVISION OF NATURAL AREAS AND PRESERVES OF THE OHIO DIVISION OF NATURAL RESOURCES, BUT IS NOT ON THE FEDERAL ENDANGERED SPECIES LIST. NO PLANTS OR ANIMALS ON THE FEDERAL ENDANGERED SPECIES LIST HAVE BEEN OBSERVED.

Q. DR. JACKSON, HAS THE SLENDER GOOSEFOOT BEEN FOND ON THE BURIAL SITE?

A. IN JUNE, 1986, A SURVEY OF THE BURIAL SITE WAS CONDUCTED BY DR. T. RICHARD FISHER, BOTANIST AND PROFESSOR/CHAIRMAN EMERITUS OF THE DEPARTMENT OF BIOLOGICAL SCIENCES AT BOWLING GREEN STATE UNIVERSITY. DR. FISHER FOUND NO EVIDENCE OF THE SLENDER GOOSEFOOT OR ANY OTHER SPECIES LISTED ON THE FEDERAL OR STATE ENDANGERED SPECIES LISTS.

Q. DR. REUTTER, HAVE ANY ENDANGERED SPECIES BEEN OBSERVED IN LAKE ERIE IN THE IMMEDIATE VICINITY OF THE DAVIS-BESSE PLANT?

A. (DR. REUTTER) FOUR AQUATIC SPECIES ON THE STATE S ENDANGERED SPECIES LIST WERE FOUND DURING THE SAMPLING PROGRAM IN LAKE ERIE: SILVER CHUB, SILVER LAMPREY, GREAT LAKES MUSKELLUNGE AND LAKE STURGEON. ONLY ONE MUSKELLUNGE AND ONE STURGEON

WERE FOUND IN ELEVEN YEARS OF SAMPLING.

THREE BENTHIC ORGANISMS LISTED BY THE STATE AS THREATENED HAVE BEEN FOUND IN LAKE ERIE NEAR THE PLANT SITE. THESE ARE THE DEER TOE CLAM, THE KNOB SHELL CLAM, AND THE EASTERN SAND SHELL CLAM.

NO AQUATIC SPECIES ON THE FEDERAL ENDANGERED SPECIES LIST HAVE BEEN FOUND IN THIS PART OF LAKE ERIE. NO AQUATIC SPECIES ON THE FEDERAL OR STATE LISTS WERE FOUND IN THE NAVARRE MARSH.

Q. DR. TILL, WOULD THE CONSTRUCTION OR OPERATION OF THE BURIAL SITE HAVE ANY ADVERSE RADIOLOGICAL IMPACT ON ANY OF THESE SPECIES?

A. (DR. TILL) THE LEVELS OF RADIOACTIVITY IN THE WASTE WOULD HAVE NO DISCERNIBLE IMPACT ON AQUATIC SPECIES. EVEN IF ALL THE WASTE WERE DEPOSITED IN THE LAKE AT ONCE, THE RADIONUCLIDE CONCENTRATIONS WOULD BE WELL BELOW THE MAXIMUM PERMISSIBLE CONCENTRATION FOR WATER IN PART 20 OF THE NUCLEAR REGULATORY COMMISSION'S REGULATIONS. AT THESE LEVELS, THE IMPACT ON AQUATIC SPECIES WOULD BE NEGLIGIBLE.

Q. DR. REUTTER, WOULD THE CONSTRUCTION OR OPERATION OF THE BURIAL SITE HAVE ANY

NON-RADIOLOGICAL IMPACT ON THREATENED OR ENDANGERED AQUATIC SPECIES?

A. (DR. REUTTER) THERE SHOULD BE NO SUCH IMPACT. CHEMICAL ANALYSIS HAS SHOWN THE SLUDGE TO BE BELOW E.P.A. E.P. TOXICITY LIMITS. THE ONLY POSSIBLE EFFECT WOULD BE IF THE BURIAL STRUCTURE WERE SOMEHOW TO BE WASHED INTO LAKE ERIE. I CAN THINK OF NO MECHANISM WHICH COULD CAUSE THIS TO OCCUR. IF THE BURIAL STRUCTURE WERE SOMEHOW WASHED INTO THE LAKE, THERE WOULD BE AN INCREASE IN TURBIDITY; BUT THIS WOULD BE INSIGNIFICANT IN COMPARISON TO THE TURBIDITY RESULTING FROM THE MUCH GREATER AMOUNTS OF SOIL WHICH WOULD BE WASHED INTO THE LAKE FROM ALL OTHER AREAS AFFECTED BY THE SAME POSTULATED MECHANISM WHICH CAUSED THE BURIAL STRUCTURE TO BE WASHED INTO THE LAKE.

Q. DR. JACKSON, HAVE ANY BIRDS ON THE ENDANGERED SPECIES LIST BEEN OBSERVED NEAR THE SITE?

A. (DR. JACKSON) A BALD EAGLE, WHICH IS ON THE FEDERAL ENDANGERED SPECIES LIST, HAS BEEN SIGHTED OVER THE DAVIS-BESSE SITE ON A FEW OCCASIONS. THE NEAREST BALD EAGLE NEST IS LOCATED APPROXIMATELY ONE-AND-A-HALF MILES SOUTH OF THE SITE.

TWO BIRDS ON THE STATE'S ENDANGERED SPECIES LIST, THE SHARP-SHINNED HAWK AND THE COMMON TERN, HAVE BEEN SEEN TWICE AND SEVERAL TIMES, RESPECTIVELY.

THE STATE OF OHIO'S PETITION FOR LEAVE TO INTERVENE STATES THAT THE AMERICA PEREGRINE FALCON, KIRTLAND'S WARBLER, THE KING RAIL, AND UPLAND SANDPIPER QUOTE "INHABIT THE VICINITY OF THE PROPOSED BURIAL SITE." UNQUOTE.

THE FIRST TWO SPECIES ARE ON THE FEDERAL ENDANGERED SPECIES LIST WHILE THE LATTER TWO ARE ON THE STATE'S ENDANGERED SPECIES LIST. NONE OF THESE WERE OBSERVED BY OUR MONITORING GROUP AT OR NEAR THE DAVIS-BESSE SITE. THE PEREGRINE FALCON AND THE KIRTLAND'S WARBLER DO NOT NEST IN THIS AREA OF OHIO.

Q. WOULD THE CONSTRUCTION OR OPERATION OF THE BURIAL SITE ADVERSELY AFFECT THE BALD EAGLE, COMMON TERN OR SHARP-SHINNED HAWK, DR. JACKSON?

A. THE CONSTRUCTION OF THE BURIAL SITE WOULD NOT REMOVE OR DISTURB ANY HABITAT FOR THESE SPECIES. THE BURIAL SITE IS NOT A WOODED AREA IN WHICH THE HAWK WOULD EXIST, AND HAS NO TALL TREES USED FOR NESTING BY THE EAGLE. THE BURIAL SITE WILL NOT BE BUILT ON MARSH, WHICH COULD BE USED BY

THE TERN FOR FEEDING.

OPERATION OF THE BURIAL SITE SHOULD SIMILARLY HAVE NO IMPACT ON THESE SPECIES. THE DISPOSAL METHODS THAT TOLEDO EDISON INTENDS TO USE SHOULD PREVENT THE WASTE FROM BECOMING BIOLOGICALLY AVAILABLE; THAT IS, IT WILL REMAIN IMMOBILE AND UNABLE TO ENTER THE FOOD CHAIN. IF THE WASTE WERE SOMEHOW MOBILIZED, I WOULD STILL EXPECT NO EFFECT. BIRDS ARE LESS SENSITIVE TO RADIATION THAN MAN, AND AS MR. BLAND'S AND DR. TILL'S ANALYSES HAVE SHOWN, THE DOSES TO MAN WOULD BE INSIGNIFICANT EVEN IF THE WASTE WERE MOBILIZED.

Q. DR. TILL?

A. (DR. TILL) IN FACT, THIS IS TRUE FOR VIRTUALLY ALL SPECIES. MAN IS THE SPECIES MOST SUSCEPTIBLE TO ADVERSE RADIATION EFFECTS. IT IS THEREFORE GENERALLY ASSUMED THAT IF MAN IS PROTECTED, SO ARE ALL OTHER SPECIES. HERE, THE RADIONUCLIDE CONCENTRATIONS ARE TOO LOW TO PRESENT ANY SIGNIFICANT HAZARD TO MAN, PLANT, OR ANIMAL. EVEN IF THIS WASTE WERE COMPLETELY MOBILIZED, THE VERY LOW LEVELS OF RADIOACTIVITY WOULD HAVE NO OBSERVABLE ENVIRONMENTAL IMPACT.

Q. DR. JACKSON, HAVE ANY TERRESTRIAL SPECIES BEEN OBSERVED?

A. (DR. JACKSON) NO. THE SPOTTED TURTLE, WHICH IS ON THE OHIO ENDANGERED SPECIES LIST, HAS BEEN OBSERVED BY OTHERS IN MARSHES IN THE GENERAL AREA, BUT IT WAS NOT OBSERVED BY OUR MONITORING GROUP AT THE DAVIS-BESSE SITE, INCLUDING THE NAVARRE MARSH.

Q. DR. JACKSON, PLEASE DEFINE WHAT IS MEANT BY THE TERM QUOTE "CRITICAL HABITAT" UNQUOTE?

A. THE TERM CRITICAL HABITAT FOR AN ENDANGERED SPECIES IS DEFINED BY SECTION 2 OF THE ENDANGERED SPECIES ACT OF 1973, 16 U.S.C., PARAGRAPH 1532(5)(A).

(I), THE SPECIFIC AREAS WITHIN THE GEOGRAPHICAL AREA OCCUPIED BY THE SPECIES AT THE TIME THAT IT IS LISTED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 1533 OF THIS TITLE, ON WHICH ARE FOUND THOSE PHYSICAL OR BIOLOGICAL FEATURES (I) ESSENTIAL TO THE CONSERVATION OF THE SPECIES AND (II) WHICH MAY REQUIRE SPECIAL MANAGEMENT CONSIDERATIONS OR PROTECTION.

(II) SPECIFIC AREAS OUTSIDE THE GEOGRAPHICAL AREA OCCUPIED BY THE SPECIES AT THE TIME IT IS LISTED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 1533 OF THIS TITLE, UPON A DETERMINATION BY THE SECRETARY THAT SUCH AREAS ARE

ESSENTIAL FOR THE CONSERVATION OF THE SPECIES.

AREAS ARE DESIGNATED AS CRITICAL HABITAT BY THE U.S. FISH AND WILDLIFE SERVICE IN ACCORDANCE WITH THE PROCEDURES SET OUT IN 50 CFR PART 424. AREAS PRESENTLY DESIGNATED AS CRITICAL HABITAT ARE LISTED IN 50 CFR PARAGRAPH 17.95.

Q. IS THE DAVIS-BESSE SITE OR ANY PART OF IT QUOTE "CRITICAL HABITAT" UNQUOTE?

A. NEITHER THE DAVIS-BESSE SITE NOR THE SURROUNDING AREA HAS BEEN DESIGNATED AS CRITICAL HABITAT BY THE U.S. FISH AND WILDLIFE SERVICE. THE BURIAL SITE ITSELF AND THE UPLAND PORTION OF THE DAVIS-BESSE SITE ARE NOT IMPORTANT TO ANY SPECIES. THE LAKE ERIE COASTAL MARSHLAND, INCLUDING THE NAVARRE MARSH, IS IMPORTANT HABITAT FOR A NUMBER OF SPECIES, AND SUCH MARSHLAND SHOULD BE PROTECTED. HOWEVER, I DO NOT BELIEVE THAT THE BURIAL OF WASTE AT DAVIS-BESSE WOULD DAMAGE OR HAVE ANY ADVERSE EFFECT ON THE MARSH.

Q. PRESIDING OFFICER'S NEXT QUESTION, QUESTION 10, READS AS FOLLOWS: WHAT WILL BE THE TOTAL RADIONUCLIDE INVENTORY OF THE BURIAL SITE AFTER 30 YEARS OF OPERATION UNDER EXPECTED LEVELS OF RESIN CONTAMINATION?

MR. BLAND, WHAT IS THE PRESENT INVENTORY?

A. (MR. BLAND) TABLE 10-1 PRESENTS DATE FOR EACH BATCH OF RADIOACTIVELY CONTAMINATED RESINS THAT HAS BEEN DISCHARGED TO THE SETTLING BASIN AND INCLUDES PRESENT INVENTORY OF EACH BATCH CORRECTED FOR DECAY. TABLE 10-2 PRESENTS THE CUMULATIVE RADIOACTIVE LEVELS IN THE SETTLING BASIN.

AS SUMMARIZED IN TABLE 10-2, A TOTAL OF 0.0044 CURIES HAS BEEN SENT TO THE SETTLING BASIN. IT IS IMPORTANT TO NOTE THAT THE RADIOACTIVE MATERIAL LEVELS DECREASE WITH TIME DUE TO THE RADIOACTIVE DECAY.

AS A RESULT OF DECAY, THE TOTAL ACTIVITY AT PRESENT IN THE SETTLING BASIN IS 0.0031 CI. FOLLOWING DECOMMISSIONING OF THE DAVIS-BESSE SITE, CS-137 WILL BE ESSENTIALLY THE ONLY REMAINING RADIONUCLIDE OF THE PRESENT INVENTORY AT ABOUT HALF OF ITS CURRENT LEVEL.

Q. MR. BLAND, WHAT WILL BE THE TOTAL RADIONUCLIDE INVENTORY IN THE BURIAL SITE AT THE EXPIRATION OF THE DAVIS-BESSE OPERATING LICENSE UNDER EXPECTED LEVELS OF RESIN CONTAMINATION?

A. TABLE 10-3 PRESENTS THE EXPECTED ACTIVITIES IN THE BURIAL SITE AT TERMINATION OF THE DAVIS-BESSE OPERATING LICENSE IN YEAR 2011. THE TOTAL EXPECTED ACTIVITY IS 0.013 CURIES. THIS

ACTIVITY IS ESSENTIALLY ALL CC-137.

Q. WOULD YOU PLEASE EXPLAIN HOW YOU CALCULATED THE TOTAL BURIAL SITE INVENTORY UNDER EXPECTED LEVELS OF RESIN CONTAMINATION?

A. I CONSERVATIVELY ASSUMED THAT THE LEVELS OF ACTIVITY IN FUTURE RESIN BATCHES WILL CONTINUE AT PREVIOUSLY MEASURED LEVELS, WHICH WERE THE RESULT OF A TUBE LEAK WHICH IS NOW REPAIRED. I THEREFORE TOOK THE PRESENT INVENTORIES IN THE SETTLING BASIN AS THE INVENTORIES THAT WOULD BE PRODUCED AND BURIED EVERY FIVE YEARS. THE EXPECTED RADIONUCLIDE ACTIVITIES FOR EACH BURIED LOT WERE DECAYED FROM THE RESPECTIVE ESTIMATED BURIAL DATE OF EACH LOT TO THE YEAR 2011. THE DECAYED ACTIVITIES OF THE LOT WERE THEN SUMMED.

Q. WE'LL NOW MOVE ON.

JUDGE HOYT: I WONDER IF THIS IS NOT AN APPROPRIATE TIME FOR A NOON BREAK.

MR. SILBERG: THAT WOULD BE ACCEPTABLE.

JUDGE HOYT: YOU ARE AT THE HALFWAY POINT IN YOUR TESTIMONY. WE CAN GO OFF THE RECORD FOR A MOMENT.

- - -

(OFF RECORD)

- - -

JUDGE HOYT: VERY WELL. WE HAD A BRIEF DISCUSSION OFF THE RECORD CONCERNING THE TIMES FOR THE LUNCH NOON BREAK. THE CONSENSUS IS THAT WE WILL CONVENE AGAIN AT 11:30. THE HEARING IS IN RECESS.

- - -

A F T E R N O O N S E S S I O N

- - -

JUDGE HOYT: VERY WELL. THE HEARING WILL COME TO ORDER. LET THE RECORD REFLECT THAT ALL THE PARTIES TO THE HEARING WHO WERE PRESENT WHEN THE HEARING RECESSED ARE AGAIN PRESENT IN THE HEARING ROOM.

MR. SILBERG, IF YOU WILL PICK UP WHERE YOU LEFT OFF, WHICH I BELIEVE IS WITH THE QUESTION NUMBER 11 FROM THE LIST OF THOSE CONCERNS THAT WERE EXPRESSED IN THE ORDER.

MR. SILBERG: THANK YOU, JUDGE.

BY MR. SILBERG:

Q. QUESTION 11 STATES AS FOLLOWS: WHAT IS THE ESTIMATED DOSE TO AN INDIVIDUAL STANDING ON COVERED BASIN DREDGING AFTER 30 YEARS OF OPERATION UNDER EXPECTED LEVELS OF RESIN CONTAMINATION?

MR. BLAND, WHAT DOSE WOULD AN INDIVIDUAL RECEIVE IF, AFTER EXPIRATION OF THE DAVIS-BESSE OPERATING LICENSE, THE INDIVIDUAL STOOD DIRECTLY ATOP THE COVERED BURIAL SITE?

A. (MR. BLAND) THE ESTIMATED DOSE AN INDIVIDUAL WOULD RECEIVE IF HE STOOD DIRECTLY ON TOP OF THE LAST CONSTRUCTED BURIAL CELL AT THE EXPIRATION OF THE DAVIS-BESSE OPERATING LICENSE 24 HOURS PER DAY FOR AN ENTIRE YEAR WOULD BE 00.07 MREM.

LET ME CLARIFY THAT. 0.007 MREM. IF THE INDIVIDUAL STOOD ON TOP OF EARLIER CONSTRUCTED CELLS, THE DOSE RECEIVED WOULD BE LESS, SINCE THE INVENTORY OF THOSE CELLS WOULD HAVE DECAYED MORE.

Q. WHAT METHODOLOGY DID YOU USE TO CALCULATE THIS DOSE?

A. I USED THE RADIATION SHIELDING AND DOSE CALCULATIONAL METHODS OF ISOSHLD. ISOSHLD WAS DEVELOPED BY BATTELLE NORTHWEST LABORATORIES TO PROVIDE A CALCULATIONAL METHOD FOR ACCURATELY APPROXIMATING RADIATION ATTENUATION AND BUILD-UP FOR VARIOUS SHIELD MATERIALS.

THE METHODOLOGY EMPLOYED IN THE CALCULATIONS IS POINT KERNEL INTEGRATION. THIS TECHNIQUE CONSISTS OF DIVIDING THE SOURCE VOLUME

INTO A SUFFICIENT NUMBER OF SMALL DISCREET VOLUMES THAT MAY THEN BE APPROXIMATED AS POINT SOURCES FOR CALCULATING THE RADIATION ATTENUATION AND BUILD-UP. INTEGRATION OVER THE SOURCE TO DETERMINE THE TOTAL DOSE IS OBTAINED BY SUMMING THE DOSE CONTRIBUTION FROM ALL OF THE DIFFERENTIAL SOURCE VOLUMES.

THIS TECHNIQUE IS USED THROUGHOUT THE INDUSTRY AND GOVERNMENT FOR CALCULATING RADIATION SHIELDING ATTENUATION AND DOSES.

Q. WOULD YOU PLEASE EXPLAIN THE ASSUMPTIONS THAT YOU MADE IN CALCULATING THIS DOSE?

A. I ASSUMED THAT THE BURIAL SITE WILL HAVE A TWO-FOOT THICK SOIL COVER, WHICH COINCIDES WITH THE MINIMUM THICKNESS SPECIFIED IN TOLEDO EDISON'S DESIGN OF THE BURIAL GROUND.

I USED THE SOIL DENSITY VALUE MEASURED IN BORINGS AT THE BURIAL SITE, TWO GRAMS PER CUBIC CENTIMETER. I USED THE RADIONUCLIDES CONCENTRATIONS LISTED IN TABLE 11-1 AS THE CONCENTRATIONS IN THE LAST-CONSTRUCTED BURIAL CELL. THE CONCENTRATIONS LISTED IN TABLE 11-1 ARE THE AVERAGE CONCENTRATIONS RECENTLY MEASURED IN THE SETTLING BASIN. AS I JUST STATED, I ASSUMED THAT THE INDIVIDUAL WOULD STAND DIRECTLY ON TOP OF

THE BURIAL GROUND 24 HOURS PER DAY, 365 DAYS PER YEAR.

Q. PRESIDING OFFICER'S QUESTION NUMBER 12 STATES AS FOLLOWS: WHAT CRITERIA WILL BE USED TO DECIDE WHETHER RESINS WILL BE BURIED ON SITE OR TRANSPORTED TO A LICENSED BURIAL SITE IN THE EVENT THAT RESINS BECOME CONTAMINATED AT HIGHER THAN EXPECTED LEVELS FROM STEAM GENERATOR TUBE LEAKS OR RUPTURES, FOR EXAMPLE.

MR. BLAND, WOULD YOU PLEASE DESCRIBE THE CRITERIA THAT GOVERN WHETHER A BATCH OF RESINS MAY BE DISCHARGED TO THE SETTLING BASIN?

A. AS PREVIOUSLY DISCUSSED, EACH BATCH OF SPENT RESIN IS ANALYZED BEFORE IT CAN BE DISCHARGED TO THE SETTLING BASIN. IF RADIONUCLIDE CONCENTRATIONS EXCEED ESTABLISHED LIMITS, THE SPENT RESINS ARE NOT DISCHARGED TO THE BASIN BUT ARE INSTEAD TREATED AS RADWASTE AND PROCESSED FOR OFFSITE DISPOSAL.

THE MAXIMUM CONCENTRATIONS ALLOWED IN THE RESIN BATCHES DISCHARGED TO THE SETTLING BASIN ARE LISTED ON TABLE 11-1. THESE CONCENTRATIONS APPLY TO THE RESIN BATCHES BEFORE THEY ARE MIXED WITH THE WATER TREATMENT SLUDGE. IF MORE THAN ONE RADIONUCLIDE IS IDENTIFIED, THE SUM OF THE

FRACTIONS RULE IS USED TO ENSURE THAT THE CUMULATIVE CONCENTRATION ALSO MEET THE ESTABLISHED LIMIT.

Q. HOW WERE THESE CRITERIA DERIVED?

A. IN AN EVALUATION OF FEASIBLE RELEASE SCENARIOS AND ENVIRONMENT TRANSPORT AND EXPOSURE PATHWAYS WAS PERFORMED TO ASSESS THE RADIOLOGICAL LIMITS OF RESIN BURIAL. THE CONCENTRATION LIMITS WERE CHOSEN SO THAT, UNDER THE FEASIBLE RELEASE SCENARIOS AND ENVIRONMENTAL TRANSPORT AND EXPOSURE PATHWAYS EVALUATED, THE DOSE TO ANY MEMBER OF THE PUBLIC WOULD BE NEGLIGIBLE, LESS THAN ONE MREM.

Q. WHAT IS DONE WITH RESINS THAT DO NOT SATISFY THE CRITERIA FOR DISCHARGE TO THE SETTLING BASINS?

A. (MR. BRIDEN) THE RESINS ARE PUMPED TO EITHER OF TWO CONDENSATE POLISHING DEMINERALIZER HOLD-UP TANKS. FROM THESE TANKS, THE RESINS ARE PUMPED TO RADWASTE DISPOSABLE STEEL LINERS. THE RESINS WITHIN THE LINER ARE PROCESSED BY DEWATERING TO INSURE A WASTE FORM ACCEPTABLE FOR DISPOSAL. THE LINER IS APPROPRIATELY PACKAGED TO MEET FEDERAL RADWASTE TRANSPORTATION AND DISPOSAL REQUIREMENTS. THE LINER IS THEN SHIPPED TO A -- AS RADWASTE FOR BURIAL AT A LICENSED LOW-LEVEL

RADWASTE BURIAL SITE, NORMALLY TO BARNWELL, SOUTH CAROLINA.

Q. PRESIDING OFFICER'S QUESTION 13 STATES AS FOLLOWS: WHAT IS THE ESTIMATED UPPER LIMIT OF RADIONUCLIDE INVENTORY THAT COULD EXIST AFTER 30 YEARS, UNDER THE ABOVE CRITERIA?

MR. BLAND, WHAT IS THE MAXIMUM RADIONUCLIDE INVENTORY THAT COULD EXIST IN THE BURIAL GROUND WHEN THE DAVIS-BESSE OPERATING LICENSE EXPIRES?

A. (MR. BLAND) THE MAXIMUM ACTIVITY OF EACH RADIONUCLIDE IN THE BURIAL GROUND AT THE TERMINATION OF THE DAVIS-BESSE OPERATING LICENSE IS SET FORTH IN TABLE 13-1.

THE TOTAL MAXIMUM ACTIVITY IS 0.036 CURIE AND AGAIN IS ALMOST ENTIRELY ATTRIBUTABLE TO CESIUM-137.

Q. WOULD YOU PLEASE EXPLAIN HOW THIS MAXIMUM INVENTORY WAS CALCULATED?

A. I DETERMINED THAT THE AVERAGE CONCENTRATION OF PAST RESIN DISCHARGES TO THE SETTLING BASIN, WHICH WERE USED TO ESTIMATE TOTAL EXPECTED ACTIVITY, IS 0.37 OF THE LIMITING CONCENTRATION.

I THEREFORE MULTIPLIED THE TOTAL EXPECTED

ACTIVITIES IN THE BURIAL GROUND IN THE YEAR 2011, LISTED ON TABLE 10-3, BY THE RECIPROCAL OF 0.37, WHICH IS 2.7. THIS CALCULATION PRODUCED THE MAXIMUM ACTIVITIES THAT WOULD RESULT IF ALL RESIN DISCHARGES CONTAINED THE LIMITING, THAT IS MAXIMUM ALLOWABLE, RADIONUCLIDE CONCENTRATIONS.

Q. THE BOARD'S QUESTION 14 STATES AS FOLLOWS: WHAT IS THE ESTIMATED UPPER LIMIT OF DOSE TO THE WHOLE BODY FOR AN INDIVIDUAL STANDING ON THE BURIAL SITE THAT COULD EXIST AFTER 30 YEARS UNDER THE ABOVE CRITERIA?

MR. BLAND, WHAT IS THE MAXIMUM WHOLE BODY DOSE DUE TO DIRECT EXPOSURE THAT AN INDIVIDUAL WOULD RECEIVE IF, AFTER EXPIRATION OF THE DAVIS-BESSE OPERATING LICENSE, HE STOOD DIRECTLY ATOP THE BURIAL SITE?

A. THE MAXIMUM WHOLE BODY DOSE DUE TO DIRECT EXPOSURE THAT AN INDIVIDUAL WOULD RECEIVE IF, AFTER EXPIRATION OF THE DAVIS-BESSE OPERATING LICENSE, HE STOOD DIRECTLY ON TOP OF THE BURIAL SITE 24 HOURS PER DAY, 365 DAYS A YEAR, WOULD BE 0.02 MREM.

Q. WHAT METHODOLOGY DID YOU USE TO CALCULATE THIS MAXIMUM DOSE?

A. I USED THE ISOSHLD METHODOLOGY, WHICH I

HAVE PREVIOUSLY DESCRIBED.

Q. WOULD YOU PLEASE DESCRIBE TH ASSUMPTIONS YOU MADE IN CALCULATING THIS MAXIMUM DOSE DUE TO EXPOSURE?

A. I ASSUMED THAT THE INDIVIDUAL STOOD OVER THE LAST CONSTRUCTED BURIAL CELL 24 HOURS PER DAY FOR A YEAR. I USED THE MAXIMUM RADIONUCLIDE CONCENTRATIONS, WHICH I CALCULATED BY MULTIPLYING THE EXPECTED CONCENTRATIONS IN THE LAST CELL BY 2.7. I EVALUATED THE SHIELDING EFFECT OF THE SOIL COVER, I ASSUMED THAT THE COVER WOULD BE TWO FEET THICK, WHICH IS THE MINIMUM THICKNESS UNDER TOLEDO EDISON'S DESIGN, AND I USED THE SOIL DENSITY MEASUREMENT CONTAINED IN BORINGS AT THE BURIAL SITE.

Q. PRESIDING OFFICER'S QUESTION NUMBER 15 STATES AS FOLLOWS: WHY HAS STRONTIUM-90 NOT BEEN INCLUDED IN LICENSEE'S ASSESSMENTS?

MR BLAND HAS STRONTIUM-90 BEEN INCLUDED IN THE INVENTORY CALCULATIONS IN YOUR TESTIMONY?

A YES.

Q AND HAS STRONTIUM-90 BEEN INCLUDED IN THE DOES CALCULATIONS IN YOUR TESTIMONY?

A. YES. THE RADIOACTIVE DECAY OF STRONTIUM-90 IS NOT ACCOMPANIED BY ANY GAMMA

RADIATION OR X-RAYS THEREFORE IT DOES NOT CONTRIBUTE TO THE DIRECT EXPOSURE DOSES. HOWEVER, STRONTIUM-90 DOES CONTRIBUTE AN INTERNAL DOSE IF INJECTED OR INHALED AND HAS BEEN CONSIDERED IN EVALUATING THE INGESTION PATHWAY DOSES PRESENTED LATER IN THIS TESTIMONY.

Q WHY WAS STRONTIUM-90 NOT INCLUDED IN TOLEDO EDISON S PREVIOUS ASSESSMENTS?

A. STRONTIUM-90 WAS NOT INCLUDED BECAUSE OF ITS NEGLIGIBLE CONTRIBUTION TO BOTH THE TOTAL ACTIVITY AND THE DOSES. WE HAVE EXAMINED THE STRONTIUM-90 LEVELS IN THIS PARTICULAR WASTE STREAM, AND STRONTIUM-90 COMPRISES ONLY 0.04 PERCENT OF THE TOTAL ACTIVITY. ITS ABUNDANCE AND DOSE CONTRIBUTION ARE NEGLIGIBLE COMPARED WITH THAT OF CS-137.

Q. THE 16TH QUESTION POSED BY THE PRESIDING OFFICER STATES AS FOLLOWS: WHAT WOULD BE THE TOTAL ESTIMATED WHOLE BODY DOSE EQUIVALENT FOR AN INDIVIDUAL THROUGH THE FOOD INGESTION PATHWAY THAT COULD RESULT FROM THE FINAL 30-YEAR INVENTORY OF RADIONUCLIDES INCLUDING STRONTIUM-90?

PROVIDE ESTIMATES FOR EXPECTED LEVELS AND UPPER LIMITS OF RADIONUCLIDES INVENTORY AFTER 30 YEARS.

MR. BLAND, ASSUMING THAT RESIN DISCHARGES TO THE SETTLING BASIN CONTAIN EXPECTED LEVELS OF RADIONUCLIDES, WHAT WOULD BE THE TOTAL ESTIMATED WHOLE BODY DOSE EQUIVALENT FOR AN INDIVIDUAL FOR THE FOOD INGESTION PATHWAY AFTER TERMINATION OF THE DAVIS-BESSE OPERATING LICENSE?

A. ASSUMING EXPECTED LEVELS OF RESIN CONTAMINATION, THE TOTAL ESTIMATED WHOLE BODY DOSE RATE FOR THE FOOD INGESTION PATHWAY WOULD BE 0.31 MREM PER YEAR.

Q. WHAT METHODOLOGY DID YOU USE TO CALCULATE THIS INGESTION PATHWAY DOSE?

A. I USED THE ENVIRONMENTAL TRANSPORT MODELING OF U.S. NUCLEAR REGULATORY COMMISSION REGULATORY GUIDE 1.109 COUPLED WITH EFFECTIVE TOTAL BODY DOSE CONVERSION FACTORS DERIVED FROM PUBLICATION 30 OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION.

Q. PLEASE EXPLAIN ANY ASSUMPTIONS YOU MADE IN CALCULATING THIS FOOD INGESTION PATHWAY DOSE?

A. I ASSUMED THAT AN INDIVIDUAL GREW ALL HIS FRESH VEGETABLES IN SOIL CONTAMINATED WITH WASTE FROM THE LAST BURIAL CELL.

I ASSUMED THAT THE VEGETABLES ARE GROWN IN A MIXTURE OF CONTAMINATED WASTE AND SOIL IN

EQUAL PROPORTIONS. THIS ASSUMPTIONS FOLLOWS THE GUIDANCE IN NUREG/CR-3585, "DE MINIMIS WASTE IMPACTS METHODOLOGY" FEBRUARY 1984.

I THEN USED THE SOIL-TO-PLANT TRANSFER FACTORS SPECIFIED IN NRC REGULATORY GUIDE 1.109.

Q. DID YOU EVALUATE ANY OTHER FOOD INGESTION PATHWAYS?

A. YES, I EVALUATED DOSES ATTRIBUTABLE TO THE INGESTION OF GEESE THAT MIGHT GRAZE ON THE BURIAL SITE. I ASSUMED THAT THE GEESE GRAZE ON GRASSES GROWN DIRECTLY ON WASTE FROM THE LAST CELL.

FOR SIMPLICITY AND CONSERVATISM, I ASSUMED THAT THE FLESH OF THE GEESE WOULD ACCUMULATE RADIONUCLIDE CONCENTRATIONS EQUAL TO THE CONCENTRATION IN THE VEGETATION. I THEN POSTULATED THAT AN INDIVIDUAL WOULD CONSUME 14 KILOGRAMS, 30 POUNDS, OF SUCH GOOSE FLESH PER YEAR.

THE TOTAL WHOLE BODY DOSE EQUIVALENT FROM THIS SCENARIO IS 0.025 MREM.

I ALSO EVALUATED THE WHOLE BODY DOSE TO AN INDIVIDUAL WHO DRANK CONTAMINATED LAKE WATER AND CONSUMED FISH FROM THE LAKE. FOR THIS ANALYSIS, I POSTULATED THAT SOME CATASTROPHIC

MECHANISM TRANSFERRED THE ENTIRE BURIAL SITE INVENTORY TO THE LAKE AT ONE TIME AND THAT ALL THE SLUDGE DISSOLVED.

I THEN CALCULATED THE TOTAL BODY DOSE TO AN INDIVIDUAL USING THE DAVIS-BESSE OFF-SITE DOSE CALCULATION MANUAL ODCM, WHICH THE NRC HAS REVIEWED AND APPROVED. THE ODCM IS BASED ON THE NRC'S REGULATORY GUIDE 1.109 METHODS ADAPTED TO THE SPECIFIC FEATURES OF THE DAVIS-BESSE SITE.

IN ACCORDANCE WITH THIS METHODOLOGY, I APPLIED A 10 TO 1 NEAR FIELD DILUTION FACTOR TO ADDRESS IMMEDIATE DISPERSION IN THE LAKE ENVIRONMENT. AN ADDITIONAL DILUTION OF 5.7 TO 1 WAS APPLIED TO DETERMINE THE RESULTANT RADIONUCLIDE MATERIAL CONCENTRATION AT AN ASSUMED BEACH WELL, CONSERVATIVELY POSTULATED TO BE LOCATED AT THE SOUTHEAST BOUNDRY OF THE DAVIS-BESSE SITE.

I USED INDIVIDUAL CONSUMPTION RATES OF 21 KILOGRAMS PER YEAR OF FISH AND 730 LITERS PER YEAR OF WATER. THE RESULTANT TOTAL BODY DOSE, ASSUMING EXPECTED LEVELS OF RESIN CONTAMINATION, WOULD BE 1.1 MREM.

DUE TO DISSIPATION OF THE OF THE RELEASE, THIS DOSE WOULD BE RECEIVED ONLY IN THE FIRST YEAR

AFTER THE POSTULATED RELEASE. DOSES IN SUBSEQUENT YEARS WOULD BE ORDERS OF MAGNITUDE SMALLER.

Q. CAN ONE ADD UP THE INGESTION PATHWAY DOSES FOR VEGETABLES, FOWL, FISH AND WATER TO ARRIVE AT A TOTAL DOSE?

A. NO. ONE COULD ADD THE FOOD INGESTION PATHWAY DOSES FOR VEGETABLE AND FOWL CONSUMPTION. ONE COULD NOT, HOWEVER, RECEIVE THE TOTAL BODY DOSE EQUIVALENT FOR VEGETABLE AND FOWL CONSUMPTION AND THE TOTAL BODY DOSE DUE TO INGESTION OF FISH AND DRINKING WATER.

BOTH SCENARIOS POSTULATED TO DETERMINE THESE DOSES COULD NOT OCCUR SIMULTANEOUSLY. EITHER THE WASTE REMAINS IN THE BURIAL GROUND, IN WHICH CASE THE DOSE DUE TO VEGETABLE INGESTION APPLIES, OR THE WASTE IS RELEASED TO THE LAKE, IN WHICH CASE THE DOSE DUE TO INGESTION OF FISH AND WATER APPLIES.

Q. MR. BLAND, WHAT WOULD BE THE WHOLE BODY DOSE EQUIVALENT FOR AN INDIVIDUAL THROUGH THE FOOD INGESTION PATHWAY IF ONE WERE TO ASSUME THAT THE RADIOACTIVITY IN THE WASTE IS AT THE MAXIMUM POSSIBLE LEVEL?

A. THE MAXIMUM TOTAL BODY DOSE EQUIVALENT FOR FOOD INGESTION, VEGETABLES, WOULD BE 0.85 MREM

PER YEAR.

THE MAXIMUM TOTAL BODY DOSE EQUIVALENT DUE TO INGESTION OF GOOSE FLESH WOULD BE 0.07 MREM PER YEAR. THE ALTERNATIVE MAXIMUM TOTAL BODY DOSE DUE TO INGESTION OF FISH AND DRINKING WATER WOULD BE 0.3 MREM. THE 0.3 MREM TOTAL BODY DOSE DUE TO INGESTION OF FISH AND DRINKING WATER WOULD BE RECEIVED ONLY IN THE FIRST YEAR AND DUE TO DISSIPATION WOULD NOT RECUR.

Q. HOW ARE THESE MAXIMUM INGESTION PATHWAY DOSES CALCULATED?

A. THESE MAXIMUM DOSES WERE CALCULATED USING THE SAME METHODS AND ASSUMPTIONS I JUST DESCRIBED, EXCEPT THE RADIONUCLIDE ACTIVITIES AND CONCENTRATIONS IN THE BURIAL SITE WERE ASSUMED TO BE AT THOSE MAXIMUM LEVELS CALCULATED BY MULTIPLYING EXPECTED LEVELS BY 2.7.

Q. DR. TILL, HAVE YOU REVIEWED MR. BLAND'S ANALYSES?

A. (DR. TILL) YES, I HAVE.

Q. WOULD YOU PLEASE DESCRIBE YOUR REVIEW?

A. I READ MR. BLAND'S REPORTS AND HIS TESTIMONY, AND IDENTIFIED THE METHODOLOGIES AND ASSUMPTIONS HE USED. I WAS FAMILIAR WITH ALL THE METHODOLOGIES HE CHOSE. I DOUBLE-CHECKED HIS

EXTERNAL DOSE CONVERSION FACTORS AND INHALATION DOSE CONVERSION FACTORS, AND I VARIED THE BIOACCUMULATION FACTORS FOR RADIONUCLIDE UPTAKE BY PLANTS AND AQUATIC BIOTA.

I VERIFIED MR. BLAND'S ESTIMATES FOR STRONTIUM-90, COMPARING THE ESTIMATE WITH A NUMBER OF REPORTED VALUES. I THEN PERFORMED MY OWN INDEPENDENT CALCULATIONS AND CONFIRMED THAT RADIONUCLIDES OTHER THAN THE SIX LISTED ON TABLE 10-2 DO NOT CONTRIBUTE TO DOSE.

Q. DO YOU AGREE WITH THE RESULTS OF MR. BLAND'S ANALYSIS?

A. I DO. THE AGREEMENT BETWEEN OUR CALCULATIONS IS GOOD.

Q. DID MR. BLAND USE ACCEPTABLE METHODOLOGY AND ASSUMPTIONS IN CALCULATING THE DOSES?

A. YES. MR. BLAND USED WELL-ACCEPTED METHODOLOGIES. THE ASSUMPTIONS HE USED WERE GENERALLY CONSERVATIVE, WHICH WOULD TEND TO OVER ESTIMATE ACTUAL DOSES.

Q. DR. LINNEMANN, WOULD THE DOSES CALCULATED BY MR. BLAND CAUSE ANY APPRECIABLE HEALTH EFFECT IN AN INDIVIDUAL RECEIVING THAT DOSE?

A. (DR. LINNEMANN) NO. I WOULD NOT EXPECT ANY ADVERSE HEALTH EFFECTS. STATISTICALLY, THE

PROBABILITY OF AN ADVERSE HEALTH EFFECT FROM THESE DOSES IS VANISHINGLY SMALL, ABOUT ONE IN 10 MILLION.

Q. WOULD YOU PLEASE EXPLAIN THE BASIS FOR YOUR RESPONSE?

A. WELL, THE HEALTH EFFECTS INDUCED BY RADIATION HAVE BEEN STUDIED FOR OVER 80 YEARS. IN 1929, THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION, THE ICRP, AND THE U.S. NATIONAL COUNCIL ON RADIOLOGICAL PROTECTION AND MEASUREMENTS NCRP, AS THESE GROUPS ARE NOW CALLED, WERE FORMED.

SINCE THEN, THESE TWO GROUPS HAVE HAD DATA ON THE BIOLOGICAL EFFECTS OF RADIATION UNDER ALMOST UNDER CONTINUOUS REVIEW.

IN ADDITION, OVER THE YEARS, THE ISSUE HAS BEEN EXAMINED BY MANY SCIENTISTS AND HAS BEEN ADDRESSED BY A NUMBER OF PRESTIGIOUS GROUPS, INCLUDING THE UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION AND THE NATIONAL ACADEMY OF SCIENCES' COMMITTEE ON THE BIOLOGICAL EFFECTS OF IONIZING RADIATION, THE BEIR COMMITTEE.

HEALTH EFFECTS INDUCED BY HIGH LEVELS OF RADIATION ARE ACUTE AND WELL-KNOWN. DOSES OF 200

REM OR MORE DELIVERED OVER A SHORT PERIOD INDUCE WHAT IS KNOWN AS RADIATION SICKNESS AND, DEPENDING ON THE DOSE, CAN BE FATAL.

LESSER EXPOSURES, FROM 10 REM TO A HUNDRED REM, DO NOT PRODUCE THESE SYMPTOMS OF RADIATION SYMPTOMS, BUT CAN INCREASE THE RISK OF CANCER AND OF GENETIC ABNORMALITIES. BELOW 10 REM, THAT IS 10,000 MILLIGRAM, IT IS DIFFICULT TO FIND ANIMAL OR HUMAN STUDY POPULATIONS THAT SHOW EFFECTS OF RADIATION. IF EFFECTS OCCUR, THEY ARE TOO SMALL TO BE DETECTED.

THE STUDY OF THESE EFFECTS AT ANY DOSE LEVEL IS COMPLICATED BY SEVERAL FACTORS. FIRST, THE INCIDENCE OF CANCER OR OF GENETIC ABNORMALITYIS RANDOM; AN INDIVIDUAL EXPOSED TO RADIATION WILL USUALLY NOT DEVELOP A CANCER, NOR ARE HIS OFFSPRING LIKELY TO SUFFER ABNORMALITIES.

SECOND, CANCER IN GENETIC EFFECTS ARE DELAYED EFFECTS WHEN THEY DO OCCUR.

THIRD, ONE CANNOT DISTINGUISH CANCERS OR GENETIC ABNORMALITIES CAUSED BY RADIATION FROM THOSE THAT OCCUR SPONTANEOUSLY OR AS A RESULT OF SOME OTHER AGENT. NEVERTHELESS, FOR RADIATION PROTECTION PURPOSES AND FOR EVALUATION OF POTENTIAL HEALTH HAZARDS, WE ASSUME THAT EFFECTS

CAN OCCUR AT LOW DOSES AND HAVE DEVELOPED STATISTICAL MODELS OF DOSE EFFECT RELATIONSHIPS.

FROM STATISTICAL STUDIES, THE RISK OF AN ADDITIONAL CANCER OR GENETIC DAMAGE PER REM OF EXPOSURE CAN BE ESTIMATED. THE MOST CURRENT RISK ESTIMATES ARE THOSE CONTAINED IN THE BEIR REPORT. THE EVALUATIONS AND RESULTS IN THE BEIR REPORTS ARE CONSISTENT WITH THE CONCLUSIONS OF THE OTHER LEADING SCIENTIFIC GROUPS, PARTICULARLY THE ICRP, REPORT NUMBER 26, AND NCRP, REPORT NUMBER 43, AND REPORT NUMBER 60 AND UNSCEAR, REPORT, 1977.

THE BEIR III RISK ESTIMATES ARE PRESENTED IN TABLE 16-1.

AT VERY LOW LEVELS OF EXPOSURE, BELOW 5-10 REM, OR 5,000 TO 10,000 MILLIGRAM, HEALTH EFFECTS HAVE NOT BEEN OBSERVED OR DETECTED STATISTICALLY AND MAY NOT OCCUR. HOWEVER, FOR THE PURPOSE OF ESTABLISHING STANDARDS, ADVISORY AND DECISIONAL ORGANIZATIONS CONSERVATIVELY ASSUME A LINEAR RELATIONSHIP BETWEEN DOSE AND RESPONSE, WITH NO THRESHOLD

THE LINEAR, NO-THRESHOLD HYPOTHESIS IMPLIES THAT THERE IS SOME RISK AT ANY LEVEL OF EXPOSURE. WHILE THIS HYPOTHESIS IS APPROPRIATE WHEN SETTING STANDARDS FOR RADIATION PROTECTION

IT IS ALMOST CERTAINLY OVER ESTIMATES RISK IT IS KNOWN TO BE INCORRECT AS TO A NUMBER OF RADIATION-INDUCED HEALTH EFFECTS SUCH AS CATARACTS, IMPAIRED FERTILITY, ABNORMAL FETAL DEVELOPMENT, FOR WHICH EXPERIMENTAL EVIDENCE HAS DEMONSTRATED THAT THERE IS INDEED A THRESHOLD DOSE BELOW WHICH THE EFFECT WILL NOT OCCUR.

FURTHERMORE, THE HYPOTHESIS ASSUMES THAT A DOSE DELIVERED OVER A LONG PERIOD OF TIME IS AS DAMAGING AS THE SAME DOSE GIVEN OVER A SHORT TIME AND TAKES NO ACCOUNT OF THE HUMAN BODY'S ABILITY TO RECOVER OR REPAIR RADIATION DAMAGE.

NOTWITHSTANDING THE CONSERVATISM OF THE LINEAR, NO-THRESHOLD HYPOTHESIS, I HAVE APPLIED THE BEIR III RISK ESTIMATORS TO THE DOSES THAT MR. BLAND CALCULATED TO PLACE A STATISTICAL UPPER BOUND ON RESULTING HEALTH EFFECTS.

FOR SIMPLICITY, I ROUNDED OFF TO ONE MREM PER YEAR THE DOSE RATE A MAXIMALLY EXPOSED INDIVIDUAL MIGHT RECEIVE FROM THE BURIAL GROUND. THE RISK TO AN INDIVIDUAL OF A FATAL CANCER FROM A CONTINUOUS ONE MREM DOSE WOULD BE 1.58 IN 10 MILLION PER YEAR.

IN CONTRAST, THE RISK OF A SPONTANEOUS CANCER DEATH WOULD BE ABOUT 10,000 TIMES GREATER.

THE RISK OF A GENETIC ABNORMALITY WOULD BE ABOUT ONE-HALF OF THE CANCER RISK OR ABOUT ONE CHANCE IN 10 MILLION THAT A PARENT SO EXPOSED WOULD EXPERIENCE A LIVE BIRTH WITH A GENETIC ABNORMALITY. THE NORMAL GENETIC ABNORMALITY RISK IS ABOUT ONE IN TEN. EVEN IF THE ENTIRE POPULATION RESIDING WITHIN TEN MILES OF THE DAVIS-BESSE PLANT WERE TO RECEIVE THIS DOSE, ONE MREM PER YEAR, I WOULD NOT EXPECT A SINGLE FATAL CANCER OR GENETIC ABNORMALITY TO OCCUR.

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A FURTHER ILLUSTRATION OF ONE MREM DOSE IS OBTAINED BY COMPARING IT WITH DOSES AN INDIVIDUAL WOULD RECEIVE FROM OTHER SOURCES. THIS COMPARISON IS PRESENTED IN TABLE 16-2.

AS ONE CAN SEE, THE MAXIMUM DOSE ATTRIBUTABLE TO THE BURIAL GROUND WOULD BE ONLY 1 PERCENT OF THE DOSE AN INDIVIDUAL WOULD RECEIVE FROM NATURAL BACKGROUND RADIATION, IS LESS THAN THE ADDITIONAL DOSE A PERSON WOULD RECEIVE FROM LIVING IN A BRICK BUILDING, AND IS ABOUT THE SAME AS THE ANNUAL DOSE A PERSON RECEIVES FROM WATCHING TELEVISION.

Q. DR. LINNEMANN, IN DISCUSSING THE HEALTH EFFECTS ATTRIBUTABLE TO RADIATION, THE STATE OF OHIO CITED IN ITS PETITION TO INTERVENE, CITED A

REPORT PUBLISHED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND ENTITLED "RADIONUCLIDES: BACKGROUND INFORMATION DOCUMENT FOR FINAL RULES."

HOW DOES THE E.P.A.'S ASSESSMENT OF THE RISK OF RADIATION-INDUCED HEALTH EFFECTS COMPARE WITH YOUR OWN?

A. THE E.P.A.'S ESTIMATE OF CANCER AND GENETIC RISKS IN THE BACKGROUND INFORMATION DOCUMENT ARE BASED ON THE BEIR III REPORT. THE RISK ESTIMATORS I USED ARE ALSO FROM THE BEIR III AND ARE THEREFORE CONSISTENT WITH E.P.A.'S ASSESSMENTS.

Q. THANK YOU, DR. LINNEMANN.

QUESTION 17 POSED BY THE PRESIDING OFFICER STATES AS FOLLOWS: WHAT ARE THE PRINCIPAL CHEMICAL COMPONENTS OF THE NONRADIOACTIVE SLUDGE THAT ARE MIXED WITH RADIOACTIVELY CONTAMINATED RESINS?

PLEASE DESCRIBE THE SLUDGE THAT IS DISCHARGED TO THE SETTLING BASIN, DR. BENNETT?

A. (DR. BENNETT) THE SLUDGE THAT IS DISCHARGED TO THE SETTLING BASIN CONSISTS OF IMPURITIES REMOVED FROM THE RAW LAKE WATER TOGETHER WITH CHEMICALS USED IN AND PRODUCED BY THE WATER TREATMENT PROCESS, CALCIUM HYDROXIDE,

SODIUM ALUMINATE, AND CALCIUM CARBONATE. THE SLUDGE IS MAINLY A SUSPENSION OF THE INORGANIC SOLIDS IN WATER.

Q. WHAT IS THE PURPOSE OF THE WATER TREATMENT PROCESS WHICH RESULTS IN THIS SLUDGE?

A. THE PURPOSE OF THE WATER TREATMENT IS TO REMOVE SUSPENDED SOLIDS AND OTHER DISSOLVED IMPURITIES IN THE LAKE WATER AND PREPARE IT FOR GENERAL SITE USE, BOTH FOR USE IN PLANT SYSTEMS AND FOR PERSONAL USE.

THE TREATMENT REMOVES MATERIALS WHICH COULD DEPOSIT IN THE STEAM GENERATORS AND ON THE CONDENSER TUBES AND THEREBY REDUCE HEAT TRANSFER EFFICIENCIES.

THE TREATMENT ALSO PURIFIES THE WATER TO DRINKING WATER STANDARDS.

Q. MR. BRIDEN, WOULD YOU PLEASE DESCRIBE THE WATER TREATMENT SYSTEM?

A. (MR. BRIDEN) IN THE WATER TREATMENT FACILITY, LAKE ERIE WATER IS FIRST CHLORINATED. THE CHLORINATED WATER IS DELIVERED TO TWO CLARIFIERS. CHEMICAL FEEDERS ARE LOCATED IN THE VICINITY OF THE CLARIFIERS AND PROVIDE LIME FOR SOFTENING AND FOR SODIUM ALUMINATE AND FOR CLARIFICATION. SUSPENDED SOLIDS, HARDNESS, AND

OTHER IMPURITIESPERCIPITATE OUT.

CLARIFIED WATER FLOWS BY GRAVITY THROUGH TWO ANTHRACITE FILTERS TO A CLEARWELL. THE PRECIPITATE IS REMOVED FROM THE CLARIFIERS BY BLOWDOWN, PRODUCING SLUDGE IN QUESTION. FROM THE CLEARWELL, THE CLARIFIED AND FILTERED WATER IS EITHER PUMPED TO THE DOMESTIC WATER SYSTEM, OR IS PUMPED THROUGH TWO ACTIVATED CARBON FILTERS TO DEMINERALIZERS WHERE IT IS FURTHER PURIFIED FOR USE AS PRIMARY AND SECONDARY MAKEUP WATER.

Q. DR. BENNETT, HOW DOES THE SLUDGE COMPARE WITH THAT PRODUCED BY A TYPICAL MUNICIPAL WATER TREATMENT FACILITY?

A. (DR. BENNETT) THE DAVIS-BESSE SLUDGE IS FAIRLY TYPICAL. ITS PRINCIPAL SOLID CONSTITUENT IS CALCIUM CARBONATE. THE CONCENTRATIONS OF HEAVY METALS IN THE DAVIS-BESSE SLUDGE ARE IN FACT SMALLER THAN THAT IN THE SLUDGE PRODUCED BY TOLEDO'S WATER TREATMENT FACILITY OR THE TOWN OF OREGON'S WATER TREATMENT FACILITY.

Q. WHAT CHEMICAL ANALYSIS OF THE SLUDGE HAS BEEN PERFORMED, DR. BENNETT?

A. SAMPLES WERE TAKEN OF THE CONTENTS OF THE SETTLING BASIN BOTTOMS. STANDARD ANALYTICAL PROCEDURES WERE USED TO DETERMINE THE CHEMICAL AND

PHYSICAL CHARACTERISTICS OF THE SAMPLE.

THESE INCLUDED ATOMIC ABSORPTION TO DETERMINE THE PRESENCE AND LEVELS OF HEAVY METALS, GAS CHROMATOGRAPHY/MASS SPECTROSCOPY, FOR ORGANIC MATERIALS, CHEMICAL TITRATION, ALKALINITY, EVAPORATION/BURNING FOR SOLIDS.

Q. DR. BENNETT, WOULD YOU PLEASE DESCRIBE THE RESULTS OF THE ANALYSIS?

A. OTHER THAN CONTAINING THE WATER TREATMENT CHEMICALS THEMSELVES, THE SLUDGE CONSISTS OF THE IMPURITIES IN LAKE ERIE WATER IN A CONCENTRATED FORM. METALS ARE PRESENT IN A CONCENTRATION THAT MIRROR THE CONCENTRATION IN THE LAKE WATER.

THE SETTLING BASIN BOTTOM SAMPLE HAS A PH OF 9, WHICH IS LESS THAN A PH OF 10 REPORTED ON ONE OCCASION IN MAUMEE BAY AND ONLY SLIGHTLY HIGHER THAN THE 8.8 REPORTED IN THE MAUMEE RIVER.

THE AVERAGE PH IN WESTERN LAKE ERIE IS REPORTED AT 8.42. RATHER THAN BEING DETRIMENTAL, THE PH OF THE SETTLING BASIN BOTTOMS IS BENEFICIAL. AT THIS PH LEVEL, THE METALS WOULD EXHIBIT CLOSE TO THEIR MINIMUM SOLUBILITY AND MAXIMUM RESISTENCE TO DISSOLUTION AND LEACHING. THE DETAILED RESULTS OF THE CHEMICAL ANALYSES ARE FOUND IN TABLE 17-1.

Q. DR. BENNETT, WOULD THE SETTLING BASIN BOTTOMS BE CHARACTERIZED AS HAZARDOUS UNDER U. S. E.P.A. REGULATIONS?

A. THE BOTTOMS WERE TESTED IN ACCORDANCE WITH THE EXTRACTION PROCEDURE THAT THE E. P. TOXICITY TESTS CALLED FOR IN THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S REGULATIONS IMPLEMENTING THE RESOURCE CONSERVATION AND RECOVERY ACT, 40 CFR PART 261.

COMPARING THE RESULTS OF THE TESTS WITH THE RCRA STANDARDS, 40 CFR, PARAGRAPH 261.24, SHOWS THAT THE SETTLING BASIN BOTTOMS WERE WELL BELOW THE E. P. TOXICITY LIMITS. SEE TABLE 17-1 AGAIN. GIVEN THE CHARACTERISTICS OF THE SLUDGE AND RESINS, THE BOTTOMS DO NOT EXHIBIT THE CHARACTERISTICS OF REACTIVITY OR CORROSIVITY OR IGNITIBILITY AS DEFINED IN THE U.S. E.P.A. REGULATIONS, 40 CFR PARAGRAPHS 261.21, .22 AND .23.

FURTHERMORE, WATER TREATMENT SLUDGE IS NOT A LISTED HAZARDOUS WASTE LISTED IN 40 CFR, 261, SUBPART D. THEREFORE, THE BOTTOMS WOULD NOT BE CONSIDERED AS HAZARDOUS UNDER U.S. E.P.A. REGULATIONS.

Q. QUESTIONS 18 AND 19 WILL BE ANSWERED

TOGETHER. QUESTION 18 STATES: WHAT IS THE RATE OF BIOLOGICAL OR CHEMICAL DEGRADATION OF RESINS?

AND QUESTION 19 STATES: WHAT BIOLOGICAL HAZARDS ARE THERE FROM RESIN DEGRADATION THAT HAVE BEEN PUBLISHED IN THE SCIENTIFIC LITERATURE OR ARE KNOWN FROM MANUFACTURERS' TESTS?

MR. HETHERINGTON, WOULD YOU PLEASE DESCRIBE THE RESINS THAT ARE USED IN THE SECONDARY-SIDE CLEANUP PROCESS AT DAVIS-BESSE?

A. (MR. HETHERINGTON) THE DAVIS-BESSE SECONDARY-SIDE CLEANUP PROCESS USES THREE TYPES OF POWDERED ION-EXCHANGE RESINS SUPPLIED BY EPICOR, INC. THESE ARE DESIGNATED PD-1, PD-2, AND PD-3. THE EPICOR RESINS USED AT DAVIS-BESSE ARE ESSENTIALLY THE SAME AS THOSE USED FOR THIS PURPOSE THROUGHOUT THE NUCLEAR INDUSTRY.

Q. WHAT IS THE CHEMICAL COMPOSITION OF THE RESINS, MR. HETHERINGTON?

A. ALL THREE TYPES ARE COPOLYMERS OF STYRENE AND DIVINYLBENZENE. PD-1 IS AMINATED. BY AMINATED I MEAN TREATED WITH AMINE TO FORM QUATERNARY AMMONIUM GROUP THAT IS TIGHTLY HELD ON TO THE COPOLYMER. PD-1 IS IN THE HYDROXIDE FORM. PD-2 AND PD-3 ARE SULPHONATED AND TREATED WITH A SULPHUR COMPOUND TO FORM A SULPHONIC ACID GROUP.

PD-2 IS INVERTED TO THE AMMONIUM FORM; PD-3 IS HYDROGEN FORM. IN ALL THREE FORMS, THE DVB FUNCTIONS AS CROSSLINKING AGENT, TYING THE LINEAR CHAINS OF POLYSTYRENE TOGETHER.

Q. MR. HETHERINGTON, WOULD YOU EXPECT THESE RESINS TO BE SUBJECT TO BIOLOGICAL DEGRADATION?

A. NO. IN MY SUBSTANTIAL EXPERIENCE WITH ION EXCHANGE RESINS, I HAVE NEVER SEEN ANY INSTANCE WHERE BIOLOGICAL DEGRADATION OF RESINS HAS OCCURRED.

THERE HAVE BEEN NUMEROUS INSTANCES WHERE BACTERIAL GROWTH HAS OCCURRED IN A RESIN BED. HOWEVER, WHEN THE GROWTH WAS REMOVED, THE RESINS HAVE SHOWN NO SIGNS OF DEGRADATION.

ON A PERSONAL NOTE, SOME 20 YEARS AGO I ADDED A SIMILAR ION EXCHANGE RESINS TO A TOMATO PATCH IN MY BACKYARD IN VIEW OF THE NUMBER OF TECHNICAL PAPERS WHICH RECOMMENDED THEIR USE AS SYNTHETIC SOIL.

THIS SPRING, IN TURNING OVER THE SOIL, I FOUND THE RESINS WERE STILL THERE. YOU SEE THE LITTLE BEADS WITHOUT ANY DIFFICULTY, AND THERE WAS NO SIGNS OF DEGRADATION.

Q. WOULD YOU EXPECT THESE RESINS TO BE SUBJECT TO CHEMICAL DEGRADATION, THE RESINS THAT

ARE USED AT THE DAVIS-BESSE?

A. NO. THE RESINS ARE DESIGNED TO BE HIGHLY INSOLUBLE. THEY ARE EXTREMELY INSOLUBLE IN WATER. EVEN IN SOLVENTS AND SOLUTION USED IN THE LABORATORY. DVB CROSS-LINKED RESINS ARE ESSENTIALLY INSOLUBLE. DECOMPOSITION CAN OCCUR, BUT REQUIRES EXTREMELY POWERFUL OXIDIZING SOLUTIONS, SUCH AS BOILING NITRIC ACID OR CHROMIC-NITRIC ACID.

ONE EXAMPLE OF THE INSOLUBILITY OF THESE RESINS IS THEIR USE IN THE MUNICIPAL WATER TREATMENT SYSTEMS TO TREAT DRINKING WATER. SPECIFICATIONS TYPICALLY REQUIRE THAT EACH CUBIC FOOT OF RESIN TREAT AT LEAST ONE MILLION GALLONS OF WATER. UNLESS THE RESIN WAS ESSENTIALLY INSOLUBLE, IT WOULD NOT BE POSSIBLE TO MEET THIS SPECIFICATION. THE SAME VOLUME OF RESIN IS PRESENT WHEN THE RESINS ARE FINALLY REPLACED.

Q. ARE THERE OTHER EXAMPLES OF THE INERT NATURE OF THE RESINS?

A. SEVERAL DRUGS LISTED IN THE UNITED STATES PHARMACOPEIA AND THE PHYSICIANS' DESK REFERENCE ARE BASED ON THE SAME TYPE OF RESIN USED IN PD-1, PD-2, AND PD-3.

FOR EXAMPLE, SODIUM POLYSTYRENE SULFONATE

MANUFACTURED BY STERLING DRUG COMPANY'S BREON DIVISION UNDER THE SAME OF KAYEXALATE, AND CHOLESTRYAMINE RESIN MANUFACTURED BY MEAD JOHNSON UNDER THE NAME OF QUESTRAN ARE BOTH TO BE TAKEN ORALLY. THE TYPICAL DOSE OF QUESTRAN, A DRUG TO PREVENT THE FORMATION OF CHOLESTEROL, IS 54 GRAMS PER DAY, OF WHICH 36 GRAMS ARE RESIN. THE RESIN IS THEREFORE NOT ONLY INERT, BUT ALSO NON-TOXIC.

Q. MR. HETHERINGTON, WOULD YOU EXPECT THAT THERE WOULD BE ANY CHEMICAL REACTIONS BETWEEN THE RESINS AND THE ENVIRONMENT WHICH MIGHT CAUSE THE RELEASE OF RADIOACTIVE MATERIALS?

A. THE IMPURITIES WHICH HAVE BEEN EXCHANGED ONTO A RESIN MAY BE DELIBERATELY ELUTED; THAT IS REMOVED FROM THE RESIN BY A REGENERATION PROCESS.

THIS PROCESS REQUIRES THE USE OF A RELATIVELY STRONG ACIDS OR BASES OF CONCENTRATIONS IN EXCESS OF ONE PERCENT. FOR EXAMPLE, PD-1 AND PD-2 ARE USUALLY REGENERATED BY USING A 4 PERCENT SOLUTION OF SULPHURIC ACID FOR PERIODS OF APPROXIMATELY 30 DO 40 MINUTES. PD-1, ON THE OTHER HAND, IS TYPICALLY REGENERATED BY USING A 4 PERCENT SODIUM HYDROXIDE SOLUTION FOR PERIODS OF APPROXIMATELY 90 MINUTES. THESE CONCENTRATIONS AND CONTACT TIMES ARE REQUIRED TO ACHIEVE

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SIGNIFICANT ELUTION.

IT IS HIGHLY UNLIKELY THAT THESE CONCENTRATIONS WOULD EXIST IN A NATURAL ENVIRONMENT. I WOULD NOT EXPECT TO FIND ANY SIGNIFICANT LEVELS OF SULFURIC OR NITRIC ACID. THERE ARE SOME MODERATELY STRONG HUMIC ACIDS PRODUCED BY THE SOIL BY THE DECAY OF VEGETATION. HOWEVER, THERE WILL NOT BE DECAYING VEGETATION IN THE BURIAL CELLS, NOR IS IT LIKELY THAT THE VEGETATION COVERING THE CELL WOULD PRODUCE SIGNIFICANT AMOUNT OF HUMIC ACID.

MOREOVER, THE MANNER IN WHICH THE BURIAL CELLS ARE CONSTRUCTED, AS WELL AS THE PACKING CHARACTERISTICS OF THE RESINS, WOULD PREVENT WATER CONTAINING IONIZABLE SALTS AND HUMIC ACID FROM PERCOLATING THROUGH THE RESINS.

FINALLY, ONE MUST REMEMBER THAT THE RESINS ARE MIXED WITH A VERY LARGE VOLUME OF LIME SLUDGE. EVEN IF THE WATER WERE ABLE TO PERCOLATE THROUGH THE RESIN AND SLUDGE MIXTURE, THE ALKALINITY OF THIS MATERIAL WOULD NEUTRALIZE ANY STRONG ACID.

THE RESIDUAL ION EXCHANGE CAPACITY THAT REMAINS ON THE RESINS EVEN AFTER THEY ARE DISCHARGED, PROVIDES FURTHER PROTECTION AGAINST

ELUTION OF RADIOACTIVE IONS.

TYPICALLY, SPENT RESINS WHEN THEY ARE DISCHARGED STILL RETAIN ABOUT 40 PERCENT OF THEIR ION EXCHANGE CAPABILITIES. THUS, THE PRESENCE IN THE ENVIRONMENT OF IONS WITH A GREATER AFFINITY FOR THE RESINS THAN THE IONS PRESENTLY HELD ON THEM WOULD NOT BE EXPECTED TO CAUSE LEAKAGE OF IONS FROM THE RESINS.

Q. MR. HETHERINGTON, ARE THE RESINS FLAMMABLE?

A. PD-1 AND PD-2 AND PD-3 ARE NOT COMBUSTIBLE UNTIL MOISTURE IS REMOVED. WHEN MOISTURE IS REMOVED, THE RESINS WILL BURN IN A FLAME OF 230 DEGREES CENTIGRADE. IT IS ESTIMATED THAT THE AUTO IGNITION OF PURE RESINS WILL OCCUR AT 427 DEGREES CENTIGRADE.

AT DAVIS-BESSE, HOWEVER, THE RESINS WILL NOT BE BURNED IN A PURE FORM. IT IS MY UNDERSTANDING THAT THE RESINS ARE MIXED WITH TENS OF THOUSANDS OF CUBIC FEET OF WATER TREATMENT SLUDGE, WHICH IS PREDOMINANTLY CALCIUM CARBONATE, AND THAT THE WASTE WILL BE SUBSEQUENTLY SOLIDIFIED BY CEMENT KILN DUST.

I CANNOT ENVISION SUCH A SOLIDIFIED MISTURE BURNING.

Q. FINAL QUESTION POSED BY THE PRESIDING OFFICER. QUESTION 20 STATES AS FOLLOWS: DESCRIBE THE LICENSEE'S PLANS FOR SITE MANAGEMENT DURING OPERATION, FOR MARKING THE BURIAL SITE AND FOR RECORD KEEPING AT THE BURIAL SITE?

MR. WALLACE, HOW WILL THE BURIAL BE MANAGED?

A. (MR. WALLACE) EACH TIME IT BECOMES NECESSARY TO REMOVE AND BURY SETTLING BASIN BOTTOMS, THE PROJECT MANAGER WILL BE APPOINTED. THE PROJECT MANAGER WILL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE BURIAL CELL TO BE USED, FOR THE REMOVAL OF THE BOTTOMS FROM THE SETTLING BASIN AND TRANSPORTATION OF THE BOTTOMS TO THE CONSTRUCTED CELL, AND FOR THE SUBSEQUENT CLOSURE OF THE CELL.

THE PROJECT MANAGER WILL BE ASSIGNED FROM THE NUCLEAR PROJECTS DIVISION, AND PROJECT MANAGEMENT DEPARTMENT, UNLESS CIRCUMSTANCES MAKE IT BENEFICIAL TO CHOOSE, FOR EXAMPLE, IF A PROJECT MANAGER FROM ANOTHER DIVISION HAS SPECIAL EXPERTISE. AFTER THE CELL IS SEALED AND THE BURIAL PROJECT IS COMPLETED, THE ENVIRONMENTAL MONITORING SECTION WILL ASSUME RESPONSIBILITY FOR MONITORING THE BURIAL SITE AND MAINTAINING THE

CELL.

Q. MR. WALLACE, WOULD YOU PLEASE DESCRIBE HOW THE BURIAL PROJECT WILL BE CONDUCTED?

A. THE BURIAL PROJECT WILL BE CONDUCTED IN ACCORDANCE WITH DAVIS-BESSE PROCEDURE NMP-NP-401 RO, "PROJECT MANAGEMENT."

THE PROJECT TEAM WILL BE COMPOSED OF MEMBERS OF THE VARIOUS DIVISIONS WITH RESPONSIBILITY OVER ASPECTS OF THE PROJECT THAN. NMP-NP-401 BRINGS ALL OF THE DIVISIONS TOGETHER UNDER ONE PROJECT MANAGEMENT AND ENSURES AN INTEGRATED INTERDISCIPLINARY APPROACH TO THE PROJECT.

ONE OF THE FIRST RESPONSIBILITIES OF THE PROJECT MANAGER WILL BE TO DEVELOP A DETAILED PROJECT PLAN. THE PROJECT PLAN WILL DEFINE THE SCOPE OF THE WORK TO BE DONE, THE PROJECT GOALS AND OBJECTIVES, THE PROJECT TEAM ORGANIZATION, THE METHOD OF IMPLEMENTATION, SCHEDULE, AND THE FUNCTIONAL ASSIGNMENTS.

THE PROJECT TEAM WILL COMMENCE IMPLEMENTING THE PLAN. THE ACTUAL CONSTRUCTION OF THE CELLS AND THE TRANSPORTATION OF THE WASTE WILL MOST LIKELY BE PERFORMED MY CONTRACTORS. IN THIS CASE, THE PROJECT TEAM WOULD PREPARE PURCHASE

ORDER REQUESTS GOVERNING CELL CONSTRUCTION AND WASTE TRANSPORTATION.

THE CONTRACTUAL DOCUMENTS WILL PROVIDE THE SPECIFICATIONS FOR THE WORK TO BE PERFORMED AND WILL INCLUDE QUALITY CONTROLS. THE PROJECT TEAM WILL OVERSEE THE WORK TO ENSURE IT MEETS THE SPECIFICATIONS.

Q. HOW WILL THE BURIAL SITES ACTUALLY BE CONSTRUCTED?

A. THE SPECIFICATIONS FOR THE BURIAL CELLS SHOULD BE ESSENTIALLY THE SAME AS THOSE AS DESCRIBED EARLIER BY MR. SWIM. THE PROJECT TEAM WILL PERFORM ANY FURTHER ENGINEERING THAT MIGHT BE NECESSARY; FOR EXAMPLE, TO SATISFY ANY ADDITIONAL DESIGN FEATURES THAT MIGHT BE REQUIRED BY THE OHIO PERMIT TO INSTALL.

Q. MR. WALLACE, HOW WILL THE SETTLING BASIN BOTTOMS BE HANDLED?

A. THE PROJECT WILL BE CONDUCTED IN ACCORDANCE WITH STANDARD PRACTICE FOR WASTE BURIAL. THE PRECISE PROCEDURES WILL BE ESTABLISHED BY THE PROJECT MANAGEMENT TEAM. TOLEDO EDISON'S PRESENT CONCEPT OF OPERATIONS IS AS FOLLOWS:

THE SETTLING BASIN WILL FIRST BE

DEWATERED, BUT NOT TO THE EXTENT WHERE THE BOTTOMS WOULD DRY OUT. A NUMBER OF REPRESENTATIVE SAMPLES OF THE BOTTOMS WILL BE TAKEN TO DEFINE THE CONTENT OF THE BOTTOMS. THEN, THE VACUUM TRUCKS WILL BE USED TO DRAW THE BOTTOMS OUT OF THE SETTLING BASIN.

THESE VACUUM TRUCKS ARE EQUIPPED WITH SUCTION PUMP WHICH DRAWS MATERIAL INTO CLOSED TANKS ON THE TRUCKS. THIS OPERATION WILL BE PERFORMED BY A CONTRACTOR LICENSED BY THE STATE OF OHIO TO HAUL WASTE. THE VACUUM TRUCKS WILL TRANSPORT THE WASTE TO THE BURIAL SITE. THERE THE WASTE WILL BE MIXED WITH A SOLIDIFYING AGENT. THE SOLIDIFYING AGENT WILL CAUSE THE WASTE TO SET UP. AFTER THE WASTE HAS SOLIDIFIED, THE CELL WILL BE CAPPED AND THE COVER SEEDED.

Q. MS. WASILK, WILL YOU PLEASE DESCRIBE THE MONITORING AND MAINTENANCE THAT WILL BE PERFORMED AFTER BURIAL.

A. (MS. WASILK) THE TOLEDO EDISON ENVIRONMENTAL MONITORING SECTION INTENDS TO MONITOR GROUNDWATER AND CONDUCT PERIODIC INSPECTIONS OF THE CELLS. THIS PROGRAM WILL BE GOVERNED BY WRITTEN PROCEDURES.

THE ENVIRONMENTAL MONITORING SECTION'S

CURRENT PLAN IS TO MONITOR GROUNDWATER IN FOUR WELLS. ONE OF THE WELLS WILL PROVIDE BACKGROUND DATA, AND THE OTHER THREE WELLS WILL BE LOCATED IN DIRECTIONS OF POSSIBLE GROUNDWATER FLOW. WATER IN THESE WELLS WILL BE SAMPLED SEMI-ANNUALLY FOR PRIORITY POLLUTANTS PH, AND RADIOACTIVITY.

THE ENVIRONMENTAL MONITORING SECTION INTENDS TO INSPECT THE CELLS AND DIKES SEMI-ANNUALLY TO ENSURE THAT CRACKING OF THE COVER OR EROSION DOES NOT OCCUR. IF ANY SIGNIFICANT DETERIORATION OF THE CELL IS DETECTED, IT WILL BE REPAIRED. THE CELLS AND DIKES WILL ALSO BE INSPECTED AFTER ANY SIGNIFICANT FLOODING EVENT.

Q. WHAT RECORDS WILL BE KEPT PERTAINING TO THE BURIAL?

A. (MR. WALLACE) PROJECT RECORDS PERTAINING TO THE DESIGN AND CONSTRUCTION OF THE CELLS WILL BE RETAINED AS NRC PERMANENT RECORDS UNDER THE DAVIS-BESSE NUCLEAR RECORDS PROGRAM.

Q. MISS WASILK?

A. (MS. WASILK) THE ENVIRONMENTAL MONITORING SECTION WILL MAINTAIN A DESCRIPTION OF THE WASTE IN EACH CELL, IDENTIFIED BY TYPE, VOLUME, CONTENT AND DATE OF BURIAL. THE LOCATION OF EACH CELL WILL BE SURVEYED AND RECORDED ON A PLAT.

IN ADDITION, ALL SETTLING BASIN SAMPLING DATA, ALL GROUNDWATER MONITORING DATA AND REPORTS, ALL BURIAL SITE INSPECTION REPORTS, AND ALL MAINTENANCE REPORTS WILL BE RETAINED. THESE DOCUMENTS WILL BE KEPT AVAILABLE FOR INSPECTION AND WILL BE TREATED AS NRC PERMANENT RECORDS.

Q. AND FINALLY, MISS WASILK, HOW WILL THE CELLS BE MARKED?

A. SIGNS WILL BE POSTED TO ALERT ANY PERSONS IN THE AREA AND TO PROHIBIT UNAUTHORIZED ACCESS.

MR. SILBERG: JUDGE HOYT, THIS COMPLETES THE PRESENTATION OF OUR DIRECT TESTIMONY, AND THE PANEL ARE AVAILABLE FOR QUESTIONS AT THIS TIME.

JUDGE HOYT: WE WILL RECESS FOR FIVE MINUTES.

- - -

(RECESS TAKEN)

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JUDGE HOYT: ALL RIGHT. IF WE COULD HAVE ORDER, PLEASE. THE HEARING WILL COME TO ORDER. AT THE CONCLUSION OF THE PREVIOUS SESSION, I BELIEVE WE HAD AN INDICATION FROM MR. -- MR. SILBERG THAT THE WITNESSES WERE NOW READY FOR CROSS-EXAMINATION.

MR. SILBERG: YES, JUDGE.

JUDGE HOYT: AND I WILL REPORT, FOR THE RECORD, THAT ALL THE PARTIES ARE AGAIN PRESENT IN THE HEARING ROOM AND THAT THE WITNESSES HAVE TAKEN THEIR PLACE ON THE WITNESS STAND, AGAIN.

I BELIEVE WE HAVE STRUCTURED THIS HEARING FOR THE STATE OF OHIO TO BECOME THE LEAD INTERVENOR IN THIS CASE; AND, AS SUCH, WE WILL CALL UPON THE ASSISTANT ATTORNEY GENERAL, MR. JACK VAN KLEY TO START OFF THIS AFTERNOON, AND THEN ANY QUESTIONS THAT ARE NOT POSED BY MR., THE STATE OF OHIO AS THE LEAD INTERVENOR AND ARE NOT REPETITIOUS OF THOSE MATTERS COVERED BY THIS CROSS-EXAMINATION MAY BE ASKED BY ANY OF THE OTHER INTERVENORS IN THIS MATTER.

ALL RIGHT, SIR, ARE YOU READY TO BEGIN?

MR. VAN KLEY: THANK YOU, YOUR HONOR. THE WAY WE WOULD LIKE TO STRUCTURE THIS IS WE WOULD LIKE TO GO QUESTION BY QUESTION. WE WILL INDICATE FOR YOUR HONOR WHICH QUESTION WE ARE PROCEEDING WITH SO THAT IT WILL BE EASIER FOR YOU TO FOLLOW THE CROSS-EXAMINATION.

JUDGE HOYT: LET ME JUST ASK YOU, QUESTION BY QUESTION, YOU MEAN THOSE QUESTION

NUMBERS THAT THE -- AS THEY ARE ON THE PRE-FILE TESTIMONY OF THE LICENSEE OR ON THE 19 OR 20 QUESTIONS THAT WERE ASKED BY THIS PANEL?

MR. VAN KLEY: YES,

JUDGE HOYT: YES TO WHICH?

MR. VAN KLEY: WE WILL BE FOLLOWING THE ORDER IN TOLEDO EDISON'S TESTIMONY AS THEY PRESENTED IT TODAY. SO WE WILL START WITH THE INTRODUCTION AS PUT INTO THE DIRECT TESTIMONY.

JUDGE HOYT: ARE YOU CHALLENGING ANY OF THESE WITNESSES IN A VOIR DIRE FASHION OR JUST WANT TO ASK SOME QUESTIONS ABOUT THEIR GENERAL BACKGROUND?

MR. VAN KLEY: IN SOME SITUATIONS, I WILL BE ASKING A FEW QUESTIONS ABOUT GENERAL BACKGROUND: BUT I WILL BE DOING THAT WHEN I QUESTION THEM ABOUT SPECIFIC TESTIMONY THEY HAVE GIVEN TODAY.

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CROSS-EXAMINATION

BY MR. VAN KLEY:

Q. I WOULD LIKE TO FIRST START WITH THE INTRODUCTION, WHICH IS LABELED IN THE TESTIMONY AS Q, IT STARTS WITH Q-1, A-1 AND SO FORTH.

THE QUESTIONS THAT I HAVE I WOULD LIKE TO

DIRECT TO MR. BRIDEN SINCE HE PRESENTED THE TESTIMONY THAT I WANT TO QUESTION TOLEDO EDISON ABOUT.

FIRST OF ALL AS KIND OF A GENERAL QUESTION, MR. BRIDEN, EITHER YOU OR SOMEBODY ELSE MENTIONED LEAKS AND WEEPS IN THE SYSTEM. DO YOU REMEMBER, DO YOU RECALL THAT TESTIMONY -- WAS THAT YOU THAT GAVE THAT TESTIMONY?

A. YES.

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Q. WOULD YOU EXPLAIN TO THE HEARING EXAMINER AND TO THE OTHER FOLKS LISTENING HERE WHAT THOSE WEEPS AND LEAKS ARE?

A. THERE ARE $30,000 TUBES IN A STEAM GENERATOR, AND TUBES ARE SOMETIMES SUSCEPTIBLE TO SMALL LEAKS. A SMALL LEAK IS REFERRED TO AS A WEEP.

Q. SO THE WEEPS AND THE LEAKS THAT YOU ARE REFERRING TO ARE LEAKS OF RADIOACTIVE MATERIAL?

A. POTENTIALLY, YES.

Q. ALL RIGHT. NOW, I ASSUME THAT YOU DO NOT RULE OUT THE POSSIBILITIES THAT THESE WEEPS AND LEAKS WILL CONTINUE TO OCCUR, IS THAT CORRECT?

A. THAT'S A POSSIBILITY.

Q. IN FACT, IT'S A PROBABILITY, ISN'T IT?

A. YES.

Q. LET ME ASK YOU A FEW QUESTIONS ABOUT THE MECHANISM BY WHICH THE RESINS REACH THE SETTLING BASIN.

COULD YOU EXPLAIN WHAT THE MECHANISM IS BY WHICH THE RESINS LEAVE THE CONDENSATE DEMINERALIZER BACKWASH RECEIVING TANK AND GO TO THE SETTLING BASIN?

A. THERE IS A LINE WHERE WE PUMP THE RESINS OUT TO THE SETTLING BASIN. INSIDE THE TANK WE FLUFF UP THE RESINS WITH NITROGEN BATCH SYSTEM, MIX IT UP INTO A SLURRY, AND IT'S PUMPED OUT WITH A CONVENTIONAL PUMP TO THE SETTLING BASIN.

Q. THIS MATERIAL GOES THROUGH A PIPED IN SETTLING BASIN, DOES IT?

A. THAT'S CORRECT.

Q. NOW, THE RESIN THAT IS CONTAINED IN EACH BATCH IS 20,000 CUBIC FEET, AS I RECALL; IS THAT RIGHT?

A. NO. 20 CUBIC FEET.

Q. OH, 20 CUBIC FEET. ALL RIGHT. IS THAT HOW MUCH THE TANK HOLDS?

A. THE TANK CAN HOLD UP TO TWO BATCHES, WHICH WOULD BE 40 CUBIC FEET. WE TYPICALLY PUT IT OUT BATCH AT A TIME, 20 CUBIC FEET.

Q. ALL RIGHT. SO WHEN YOU PUT IT OUT A

BATCH AT A TIME, YOU MIX THAT WITH WATER?

A. YES.

Q. HOW MUCH WATER DO YOU MIX IT WITH BEFORE YOU SEND IT TO THE BASIN?

A. 10,000 GALLONS.

Q. WHEN IT GOES TO THE PIPE, IT RUNS INTO THE SETTLING BASIN, IS THAT CORRECT?

A. THAT'S ONE PATH IT CAN GO, THAT IS CORRECT.

Q. WHERE DOES THE PIPE ENTER THE BASIN?

A. THE PIPE ENTERS THE BASIN ON THE WEST END OF THE SOUTH SETTLING BASIN.

Q. WHAT HAPPENS TO THE LIQUID WHEN IT EMPTIES INTO THE POND ON THIS END OF THE BASIN?

A. THE LIQUID THAT GOES INTO THE POND ENTERS INTO A WEIR ON THE EAST END OF THE BASIN, WHICH FLOWS TO THE NORTH BASIN, AND WHEN A LEVEL REACHES A DESIGNATED LEVEL, IT IS PUMPED OUT AUTOMATIC PUMPS TO THE NORMAL STATION DISCHARGE.

Q. I ASSUME THAT THERE'S A PROCESS OF SETTLING THAT OCCURS IN THIS BASIN, IS THAT CORRECT?

A. IT SETTLES OUT IMMEDIATELY. WHERE THE PIPE GOES INTO THE BASIN YOU CAN SEE THE RESIN, AND IT FALLS OUT IMMEDIATELY AND IT MAKES A CLUMP

IN THE EAST END. THAT'S WHY IT HAS TO BE MOVED AT THIS TIME.

Q. IT FALLS IN THE EAST END OR THE WEST END?

A. RIGHT WHERE THE PUMP COMES IN AT THE EAST END -- I'M SORRY, WEST END, CORRECT THAT.

Q. WHERE DO THE WATER TREATMENT PLANT SLUDGES ENTER THE BASIN?

A. THEY ENTER -- THERE'S A T IN THE PIPE, AND THEY ENTER AT THE SAME POINT.

Q. HOW OFTEN ARE THE RESINS SENT TO THE SETTLING BASIN?

A. APPROXIMATELY ONCE A WEEK.

Q. AND HOW OFTEN ARE THE WATER TREATMENT SLUDGES SENT TO THE BASIN?

A. THAT CAN OCCUR THROUGHOUT THE DAY AS IT DEPENDS, AS THE SLUDGE BUILDS UP IN OUR WATER PLANT PRECIPITATORS.

Q. IS IT FAIR TO SAY THAT ON THE AVERAGE IT OCCURS EVERYDAY?

A. FROM THE WATER PLANT?

Q. YES.

A. YES.

Q. WHAT HAPPENS TO THE SLUDGE FROM THE WATER PLANT AS IT COMES INTO THE BASIN?

A. THE SAME THING HAPPENS. IT PRECIPITATES

OUT IN THE WEST END OF THE BASIN.

Q. NOW, IS THE SLUDGE -- AS THE MATERIAL FROM THE RESINS GOES INTO THE BASIN, IT SETTLES TO THE BOTTOM; IS THAT CORRECT?

A. YES.

Q. ALL RIGHT. AND LIQUID WATER DISCHARGES TO LAKE ERIE, IS THAT CORRECT?

A. THAT'S RIGHT.

Q. AND THE INTENDED PURPOSE OF USING THE SETTLING MECHANISM IS SO THAT MOST OF THE CONTAMINATION CAN SETTLE INTO THE BOTTOM WITH THE CLEANER WATER GOING INTO THE LAKE; IS THAT CORRECT?

A. THE SLUDGE AND THE RESINS SETTLE OUT. THE WATER WHICH GOES OUT TO THE LAKE IS CLEAR WATER, THAT IS RIGHT.

Q. SO THE MATERIAL THAT'S IN THE BOTTOM OF YOUR BASINS IS GOING TO HAVE A GREATER CONCENTRATION OF CONTAMINANTS IN IT THAN THE SLURRY IN THE TANK, IS THAT CORRECT?

A. THAT'S RIGHT.

Q. WHEN WAS THE LAST TIME THAT THE RESINS WERE SENT INTO THE SETTLING BASIN?

A. IT WOULD HAVE BEEN ABOUT JUNE 1985.

Q. JUNE 1985 IS THE LAST TIME THAT THE

RESINS WERE SENT FROM THE DEMINERALIZER TANK INTO THE SETTLING BASIN?

A. THAT'S CORRECT.

Q. DID YOU TAKE THE SAMPLE OF THE MATERIAL YOU RAN THE GEIGER COUNTER TEST TODAY?

A. DID I COLLECT THAT SAMPLE?

Q. YES.

A. YES, I DID.

Q. DID YOU PERSONALLY COLLECT IT?

A. YES.

Q. WHERE?

A. IT WAS OUT OF WHERE THE RESIN PILES UP IN THE WEST END OF THE BASIN.

Q. WOULD YOU BE MORE SPECIFIC AS TO HOW YOU TOOK THE SAMPLE?

A. THAT WAS COLLECTED ON A LONG POLE WITH A DIPPER ON THE END OF IT.

Q. ALL RIGHT. YOU DIPPED IT INTO THE SLUDGE; IS THAT RIGHT?

A. THAT'S RIGHT.

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Q. DID YOU DIP INTO THE SLUDGE OR DID YOU TAKE WATER WITH IT?

A. WHEN WATER COMES UP WITH IT -- OBVIOUSLY YOU ARE BRINGING IT THROUGH WATER, SO SOME OF IT WILL HAVE WATER IN IT. THE WATER IS DECANTED OFF

AND POURED OUT THE SLUDGE.

Q. MY QUESTION IS AIMED AT THE BOTTLE MATERIAL THAT YOU TOOK WITH YOU TODAY. DOES THAT CONTAIN JUST SLUDGE OR A MIXTURE OF SLUDGE AND WATER?

A. IT HAS SOME WATER IN IT. IT'S MOSTLY SLUDGE.

Q. DO YOU KNOW WHETHER THAT SLUDGE IS SLUDGE FROM THE RESINS AS OPPOSED TO SLUDGE FROM THE WATER TREATMENT PUMP?

A. IT'S A MIXTURE.

Q. WHEN THE MATERIAL FALLS INTO THE POND, IT LAYERS, IS THAT CORRECT?

A. TO SOME EXTENT, YES.

Q. HOW DEEP DID YOU GO INTO THE SLUDGE IN THE BOTTOM OF THE BASIN WHEN YOU TOOK YOUR SAMPLE?

A. ON THAT PARTICULAR ONE, IT WAS DOWN AROUND FOUR TO FIVE FEET.

Q. ALL RIGHT. AND HOW MUCH OF A CROSS SECTION, HOW DEEP OF A CROSS SECTION DID YOU GET IN YOUR SAMPLE?

A. ABOUT THE SAME. IT CAME THROUGH ABOUT A FOUR TO FIVE FEET AREA.

Q. WOULD YOU CONSIDER THAT TO BE A REPRESENTATIVE SAMPLE OF THE SLUDGE THAT'S IN THAT

POND?

A. IT'S TYPICAL. THE SAMPLES THAT WE HAVE COLLECTED WHERE WE DID ENSURE THAT WE HAD A CORE BORE ALL THE WAY THROUGH THE PILE REGISTERED THE SAME THING ON THAT TYPE OF A DETECTOR.

Q. YOU DIDN'T TAKE A CORE BORE, DID YOU?

A. WE HAVE TAKEN A LOT OF CORE BORES, YES.

Q. BUT THIS PARTICULAR JAR IS NOT A CORE BORE?

A. NO.

Q. THIS IS JUST A DIP SAMPLE?

A. CORRECT.

Q. AND THAT'S NOT A SCIENTIFIC SAMPLING METHOD, IS IT?

A. IT'S A METHOD.

Q. SO YOU CAN'T TELL ME WHETHER OR NOT THE MATERIAL YOU HAVE IN THAT JAR CONTAINS RESINS OR WHETHER IT MIGHT JUST CONTAIN WATER TREATMENT PLANT SLUDGE?

A. IT CONTAINS BOTH SLUDGE AND RESINS.

Q. ARE YOU AWARE THAT GRANITE CAN CONTAIN VERY HIGH LEVELS OF RADON?

A. YES, I AM.

Q. AND YOU ARE AWARE THAT RADON, OF COURSE, IS RADIOACTIVE?

A. CERTAINLY.

Q. ARE YOU AWARE THAT IN SOME PARTS OF THE COUNTRY THE RADON EMISSIONS FROM GRANITE HAS PRESENTED A VERY GRAVE HEALTH PROBLEM?

A. YES.

Q. SO JUST BECAUSE YOU HAVE STATED THAT GRANITE MIGHT HAVE MORE RADIATION THAN THE RESINS IS NO INDICATION IN ITSELF THAT THE RESINS ARE HARMLESS, IS IT?

A. THE SAMPLE OUT OF THERE IS TYPICAL OF SAMPLES THAT WE WOULD SEE IN THE ENVIRONMENT; GRANITE BEING ONE OF THEM.

THERE ARE OTHER SOURCES -- SHALE. THERE ARE MANY SOURCES OF RADIOACTIVITY OTHER THAN GRANITE. THAT WAS THE ONE SELECTED.

Q. I'M NOT ASKING ABOUT YOUR PARTICULAR SAMPLE OF GRANITE. I'M ASKING YOU ABOUT GRANITE IN GENERAL.

YOU MADE A STATEMENT IN YOUR TESTIMONY THAT THIS WASTE WAS LESS RADIOACTIVE THAN GRANITE. IT'S ON PAGE 15 OF YOUR TESTIMONY?

A. THAT'S CORRECT, WHICH IS NOT CONSIDERED TO BE A HARMFUL MATERIAL BECAUSE OF ITS HEAVY USE OF CONSTRUCTION IN MANY DIFFERENT PLACES.

Q. ISN'T IT TRUE, THOUGH, IN SOME PARTS OF

THE COUNTRY IT IS CONSIDERED TO BE A VERY HARMFUL MATERIAL BECAUSE OF ITS VERY HIGH RATE ON EMISSIONS?

A. IN SOMEPLACES, THAT'S TRUE.

Q. LET ME ASK YOU ABOUT THAT WATCH THAT YOU ARE WEARING.

HOW LONG HAVE YOU BEEN WEARING THAT WATCH?

A. I'VE HAD THIS WATCH FOR YEARS.

Q. DO YOU WEAR IT EVER DAY?

A. I CANNOT WEAR IT IN THE NUCLEAR POWER PLANT, THAT SHOULD BE OBVIOUS BY YOUR KNOWLEDGE, BECAUSE IT WOULD NOT GET PAST THE FRISKERS THAT WE'RE USING.

Q. THAT WATCH CONTAINS LEVELS OF RADIUM, IS THAT CORRECT?

A. CORRECT.

Q. THAT KIND OF WATCH IS NOT MADE ANYMORE, IS THAT CORRECT?

A. THAT S CORRECT.

Q. AND THE REASON THAT -- WHEN I TALK ABOUT THAT KIND OF WATCH, I'M REFERRING TO WATCHES WHICH HAVE HAD THEIR DIALS ILLUMINATED WITH RADIUM. IS THAT YOUR UNDERSTANDING?

A. YES.

Q. THEY ARE NOT MAKING THOSE TYPES OF WATCHES?

A. YES.

Q. BECAUSE IT HAS POSED A HEALTH PROBLEM, IS THAT CORRECT?

A. TO THE MAKERS OF THEM, YES.

Q. ISN'T IT ALSO CORRECT THAT IT HAS PRESENTED A HEALTH PROBLEM FOR THOSE WEARING THE WATCH?

A. NOT A HEALTH PROBLEM, NO.

Q. ARE YOU AWARE THAT IN THE PAST PEOPLE WHO HAVE BEEN WEARING THESE WATCHES WITH THE RADIUM ILLUMINATED DIALS HAVE DEVELOPED SKIN CANCER AS A RESULT?

A. I'M AWARE OF THAT.

MR. VAN KLEY: YOUR HONOR, I HAVE NO FURTHER QUESTIONS ON THE INTRODUCTORY PART OF THE ITEMS.

JUDGE HOYT: WE'LL PROCEED. DOES ANYONE ELSE HAVE ANY QUESTIONS ON THAT?

MR. LODGE: I HAVE A COUPLE ON THE INTRODUCTORY MATERIAL ONLY.

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CROSS-EXAMINATION

BY MR. LODGE:

Q. WAS THE DIP SAMPLE THAT YOU TOOK THE ONLY SAMPLE THAT YOU TOOK WHEN YOU WERE PREPARING FOR YOUR PRESENTATION TODAY?

A. NO, SIR.

Q. HOW MANY OTHERS DID YOU TAKE?

A. APPROXIMATELY 30 CORE BORE TYPE SAMPLES.

MR. SILBERG: COULD I GET A CLARIFICATION. ARE YOU REFERRING TO THE SAMPLE THAT HE PUT IN THAT JAR?

MR. LODGE: THE SAMPLE IN THE JAR.

JUDGE HOYT: LET'S PUT IT IN THE -- THE SAMPLE THAT WAS USED HERE TO DEMONSTRATE THE TESTIMONY EARLIER IN THIS HEARING.

MR. LODGE: YES.

BY MR. LODGE:

Q. DID YOU TAKE ANY OTHER SAMPLES ON THE SAME DAY THAT YOU TOOK THAT ONE?

A. NO, I DIDN'T.

Q. DID YOU TEST THAT ONE FOR ITS RADIATION LEVEL IMMEDIATELY AFTER REMOVING IT FROM THE BASIN?

A. ONLY WITH OUR SURVEY METERS.

Q. HAVE YOU PROCESSED IT IN ANY FASHION?

A. NO.

Q. WOULD YOU ACKNOWLEDGE THAT THE RADIATION OR THE RADIONUCLIDE CONTENT OF SAMPLES SUCH AS THAT MIGHT VARY CONSIDERABLY FROM LOCATION TO LOCATION IN A BASIN?

A. WHAT DOES CONSIDERABLY MEAN?

Q. BY A FACTOR OF TEN OR MORE?

A. NOT WITHIN A FACTOR OF TEN, NO.

Q. BY WHAT VARIATION?

A. TWO TO FIVE.

Q. WOULD YOU PUT THAT ON THE -- THAT SAMPLE THAT YOU BROUGHT WITH YOU TODAY, IS THAT ON THE LOW OR HIGH END OF SIMILAR SAMPLES YOU HAVE TAKEN?

A. OF THE NUMBER OF SAMPLES WE HAVE TAKEN WE FIND, REGARDLESS OF WHERE YOU GET IT, IT'S A TYPICAL SAMPLE NO MATTER WHERE YOU SEEM TO GET IT. WE HAVE HAD HAD A RANGE OF NUMBERS, AS I HAVE QUOTED OVER A PROXIMATE RANGE OF TWO DO FIVE.

Q. IS THAT CLOSER TO TWO OR CLOSER TO FIVE?

A. I CANNOT TELL YOU THAT. I DID NOT COUNT THAT ONE ON A GERMANE AND SYSTEM.

MR. LODGE: I HAVE NOTHING FURTHER.

JUDGE HOYT: ANYTHING ELSE?

ALL RIGHT. LET'S GO INTO THE NEXT AREA, MR. VAN KLEY.

MR. VAN KLEY: NEXT I WOULD LIKE TO MOVE ON TO QUESTION NUMBER 1, WHICH STARTS ON PAGE 16 OF THE DIRECT TESTIMONY. I WILL BE ADDRESSING MY QUESTIONS TO MR. SWIM SINCE HE WAS THE PERSON THAT PROVIDED THIS TESTIMONY.

JUDGE HOYT: MR. SWIM.

CROSS-EXAMINATION

BY MR. VAN KLEY:

Q. MR. SWIM, I'M GOING TO HAND YOU A COUPLE OF EXHIBITS. I'M GOING TO LET YOUR ATTORNEY LOOK AT THEM FIRST.

I'M GOING TO HAND YOU WHAT HAS BEEN MARKED AS STATE OF OHIO EXHIBIT A, WHICH IS A TOPOGRAPHICAL MAP OF THE AREA. WHAT I WOULD LIKE YOU TO DO, FIRST OF ALL, IS TO LOOK AT THAT EXHIBIT IN CONNECTION WITH STATE EXHIBIT B, WHICH IS FIGURE 1-1 FROM THE DIRECT TESTIMONY OF THE APPLICANT.

NOW, MY FIRST QUESTION I WOULD ASK YOU: WHAT IS THE AREA JUST RIGHT, ON FIGURE 1-1, TO THE CELL WHICH IS THE FURTHEST TO THE RIGHT ON THE DOCUMENT WHERE IT SAYS 1 CELL?

A. (MR. SWIM) YES, I DO.

Q. WHAT IS THE PROPERTY JUST TO THE RIGHT OF THAT CELL WHICH IS THE FURTHEST TO THE RIGHT ON

1-1?

A. CAN YOU CLARIFY YOUR QUESTION AS TO WHAT, WHAT IS THE PROPERTY TO MORE OF A DEFINITION.

Q. I'LL POINT IT OUT TO YOU. I'M LOOKING AT THE PROPERTY, WHAT APPEARS TO BE A TRIANGULAR SPACE OF PROPERTY JUST TO THE RIGHT OF THAT ONE CELL, AND I'M POINTING TO IT AT THIS POINT IN TIME?

A. I SEE THE AREA YOU ARE POINTING TO. MY QUESTION: WHEN YOU ASK ME TO DESCRIBE IT, WHAT TYPE OF DESCRIPTION?

Q. FOR EXAMPLE, IS IT A WETLAND?

A. I AM NOT A GEOLOGIST AND WOULDN'T BE ABLE TO GIVE YOU A PROPER CLASSIFICATION OF THE LAND AS FAR AS THAT DESCRIPTION GOES.

MR. SILBERG: MR. VAN CLAY, PERHAPS IF YOU WOULD ASK DR. HERDENDORF OR MISS WASILK, THEY WOULD THEY MIGHT BE ABLE TO GIVE YOU AN ANSWER TO THAT QUESTION?

MR. VAN KLEY: LET'S RESERVE THAT QUESTION TO SOMEBODY ELSE.

BY MR. VAN KLEY:

Q. LET ME POINT YOU TO WHAT APPEARS TO BE A BODY OF WATER TO THE RIGHT OF THE LAND THAT I JUST POINTED TO WHICH IS JUST TO THE RIGHT ON FIGURE

1-1 OF THE DESIGNATION PROPERTY LINE. DO YOU SEE THAT FIGURE OF WATER?

A. YES, I DO.

Q. WHAT IS THAT FIGURE OF WATER, PLEASE?

A. IT'S A DRAINAGE DITCH.

Q. IS THERE A NAME FOR THAT DRAINAGE DITCH?

A. NOT THAT I AM AWARE OF.

Q. WHERE DOES THAT DRAINAGE DITCH GO?

A. I PERSONALLY AM NOT AWARE OF EXACTLY WHERE THIS DRAINAGE DITCH ENDS UP. PERHAPS SOMEONE ON THE PANEL, THOUGH, IS FAMILIAR WITH THAT LOCATION.

Q. ALL RIGHT. LET ME ASK MISS WASILK.

I'M GOING TO GIVE YOU, FIRST OF ALL, FIGURE 1.1 WHICH HAS BEEN LABELED AS STAT OF OHIO EXHIBIT B, AND ASK YOU WHAT THE PROPERTY JUST TO THE RIGHT OF THE 1 CELL CONSTITUTES? IS THAT MARSHLAND?

A. (MS. WASILK) YES, IT IS.

Q. IT IS MARSHLAND?

A. IT'S WETLAND.

Q. HOW FAR IS THE NEAREST BOUNDARY OF THAT PIECE OF, THAT PIECE OF PROPERTY JUST TO THE RIGHT OF THE 1-CELL LOCATED IN FIGURE 1-1?

JUDGE HOYT: YOU ARE GOING TO

HAVE TO TURN YOUR HEAD. I DON'T THINK THE REPORTER CAN HEAR YOU.

MS. WASILK: AS WAS STATED IN THE TESTIMONY, IT'S APPROXIMATELY 25 FEET.

BY MR. VAN KLEY:

Q. NOW, WOULD YOU LABEL ON FIGURE 1-1 THE PROPERTY WHICH YOU HAVE JUST IDENTIFIED AS WETLAND, JUST PUT THE WORDS WETLAND. YOU CAN USE THIS MARKER ON THAT EXHIBIT.

ALL RIGHT. NOW, ARE YOU AWARE OF WHAT THE DITCH IS TO THE RIGHT OF THAT PIECE OF WETLAND?

A. (MS. WASILK) YES, I AM.

Q. WHAT IS THAT, PLEASE?

A. THAT IS A DITCH THAT EVENTUALLY DISCHARGES INTO THE TOUSSAINT RIVER.

Q. THAT DITCH CARRIES DRAINAGE FROM THE DAVIS-BESSE PROPERTY?

A. YES, IT CARRIES AREA RUN-OFF.

Q. DOES IT CARRY AREA RUN-OFF FROM THE BURIAL AREA?

A. I DON'T KNOW. I DON'T KNOW BECAUSE I HAVEN'T LOOKED SPECIFICALLY AT THE RUN-OFF CHARACTERISTICS OF THAT SITE IN RELATION TO THE DITCH. THAT'S ALSO NOT MY AREA OF EXPERTISE.

Q. WHO ELSE ON THIS PANEL WOULD KNOW THAT?
A. DR. HERDENDORF LOOKED AT THE RUN-OFF CHARACTERISTICS IN MORE DETAIL.
Q. LET ME ASK DR. HERDENDORF THAT QUESTION IF I CAN FIGURE OUT WHICH ONE HE IS.
JUDGE HOYT: WE'LL GIVE YOU THE PLAN AGAIN.
BY MR. VAN KLEY:
Q. MR. HERDENDORF, DO YOU KNOW WHETHER THE DRAINAGE DITCH TO THE RIGHT OF THE PROPERTY, NOW LABELED WETLAND, TAKES RUN-OFF FROM THE AREA WHICH IS PROPOSED TO CONTAIN THE BURIAL CELLS?
A. (MR. HERDENDORF) I THINK THE PRIMARY ROUTE OF DRAINAGE WOULD BE IN THE OPPOSITE DIRECTION TOWARDS THE MICROWAVE TOWER. I BASE THAT ON THE FACT THAT THAT'S WHERE THE FLOODING COMES IN. WHEN THE AREA DOES FLOOD, WATER RUNS IN TOWARD THE TOWER THEN BACK IN THIS DITCH.
MR. SILBERG: YOU SAID MICROWAVE TOWER?
THE WITNESS: METEOROLOGICAL TOWER. BASED ON THAT INFORMATION, I SUSPECT THAT THE LAND DRAINAGE IS NORMALLY IN THAT DIRECTION.
MR. SILBERG: WHEN YOU SAY THAT DIRECTION, ALSO COULD YOU CLARIFY THAT SO THE

RECORD IS CLEAR.

THE WITNESS: I SUSPECT THE PRIMARY DRAINAGE BASED ON THE FLOODING EVIDENCE WOULD BE IN A WESTERLY DIRECTION AND THEN IN A SOUTHERLY DIRECTION, EVENTUALLY ENDING UP IN THE TOUSSAINT RIVER.

BY MR. VAN KLEY:

Q. SO IT IS YOUR OPINION, THEN, THAT ANY RUN-OFF FROM THE AREA OF THE PROPOSED BURIAL CELLS WOULD RUN TO THE TOUSSAINT RIVER?

A. (MR. HERDENDORF) THAT'S CORRECT.

Q. JUST TO MAKE SURE THAT THE RECORD IS CLEAR AS TO THE DITCH WE'RE TALKING ABOUT, WOULD YOU LABEL THE DITCH, PLEASE, JUST PUT THE WORD DITCH ON IT.

A. (MS. WASILK) ARE WE TALKING ABOUT THE DITCH THAT DR. HERDENDORF IDENTIFIED AS NOT BEING THE LIKELY PATH?

Q. RIGHT, CORRECT. ALL RIGHT. NOW, LET ME HAND YOU WHAT HAS BEEN MARKED AS EXHIBIT A, AND I WILL ASK YOU IF YOU CAN TELL FROM THIS EXHIBIT WHAT THE LARGEST AREA IN RED IS?

A. (MS. WASILK) THE LARGEST AREA IN RED IS WHAT WE HAVE BEEN PREVIOUSLY DISCUSSING AS A WETLAND.

Q. THAT'S THE WETLAND WHICH IS -- THE EDGE OF WHICH IS 25 FEET FROM THE NEAREST CELL, IS THAT CORRECT?

A. YES, THAT IS.

Q. BY THE WAY, ON THIS EXHIBIT THERE ARE THREE SMALLER RED IDENTIFICATIONS WHICH ARE LABELED CELLS.

WOULD YOU AGREE THAT THOSE THREE CELLS ARE IN THE AREA WHICH TOLEDO EDISON HAS PROPOSED THE BURIAL OF THE WASTE TO BE?

A. THE LOCATION OF THOSE THREE CELLS LOOKS TO BE IN THE APPROXIMATE AREA OF THE CELLS IDENTIFIED ON OUR FIGURE 1-1.

JUDGE HOYT: COUNSEL, YOU ARE GOING TO GIVE US THREE COPIES OF EACH OF THESE DOCUMENTS THAT YOU HAVE BEEN REFERRING TO, AND PLEASE BE SURE THAT, FOR THE RECORD, THAT EACH OF THE DOCUMENTS THAT YOU HAVE HAD THE WITNESS MAKE NOTATIONS ON ARE RECORDED PRECISELY IN THE RED, AS YOU HAVE ON THE ORIGINALS HERE, SO THAT THE PERSONS EXAMINING THE RECORD WILL HAVE A COMPLETE AND UNDERSTANDABLE COPY AND THAT WILL GO ALONG WITH THE TESTIMONY THAT HAS BEEN PRESENTED.

ARE YOU SUBMITTING THESE INTO EVIDENCE AT THIS POINT OR WHY DO YOU HAND THEM TO ME?

MR. VAN KLEY: I WAS HANDING THEM TO YOU SO YOU COULD SEE WHAT SHE WAS TALKING ABOUT.

JUDGE HOYT: VERY WELL. I'LL RETURN THEM TO YOU THROUGH JUDGE KLINE.

BY MR. VAN KLEY:

Q. MISS WASILK, EARLIER IN YOUR TESTIMONY YOU STATED THAT THE BURIAL SITE WAS 400 OR SO FEET FROM THE MARSH, IS THAT CORRECT?

A. (MS. WASILK) THAT IS CORRECT.

Q. JUST NOW YOU HAVE REFERRED TO SOME WETLAND WHICH LIES IN BETWEEN NAVARRE MARSH AND THE BURIAL SITE; IS THAT CORRECT?

A. THAT IS CORRECT.

Q. DOES NAVARRE MARSH ADJOIN THE WETLAND AREA WE HAVE JUST BEEN REFERRING TO?

A. THE NAVARRE MARSH IS ON THE OPPOSITE SIDE OF A BARRIER DIKE. FROM THE WETLANDS WHICH WE ARE DISCUSSING, THEY ARE NOT CONTIGUOUS BECAUSE OF THE DIKE.

Q. BUT THEY ARE RIGHT TOGETHER, IS THAT CORRECT?

A. YES, THEY ARE NEXT TO EACH OTHER.

Q. IF YOU WOULD LOOK AT FIGURE 1-1 IN YOUR TESTIMONY, PLEASE -- I GUESS MR. SWIM PROBABLY

SHOULD ANSWER THIS QUESTION.

YOU'LL NOTICE A STRUCTURE WHICH IS LOCATED TO THE LEFT OF THE AREA WHICH IS DESIGNATED TWO CELLS. DO YOU SEE THAT STRUCTURE? IT'S BETWEEN THE AREA WHICH SAYS TWO CELLS AND THE AREA WHICH IS LABELED METEOROLOGICAL TOWER?

A. (MR. SWIM) I DO.

Q. COULD YOU TELL US WHAT THAT STRUCTURE IS?

A. IT'S A SMALL POND.

Q. ALL RIGHT. WHEN WAS THIS POND BUILT?

A. I DON'T HAVE THAT INFORMATION WITH ME.

Q. DO YOU KNOW WHETHER OR NOT IT WAS, WHETHER IT CAME INTO EXISTENCE AS PART OF THE CONSTRUCTION FOR UNIT ONE?

A. NO, I DON'T.

Q. DOES ANYBODY ON THE PANEL KNOW THE ANSWER TO THAT QUESTION? APPARENTLY NOBODY ON THE PANEL KNOWS THE ANSWER TO THAT QUESTION.

JUDGE HOYT: I BELIEVE THE WITNESS TESTIFIED HE DOESN'T HAVE THE INFORMATION WITH HIM.

COULD YOU OBTAIN THAT INFORMATION AND GIVE IT TO US TOMORROW MORNING?

MR. SWIM: YES, I COULD.

JUDGE HOYT: VERY WELL. WE WILL

RESERVE THE OPPORTUNITY TO EXAMINE THAT ISSUE.

BY MR. VAN KLEY:

Q. DOES ANYBODY ON THE PANEL KNOW HOW DEEP THAT POND IS --

JUDGE HOYT: THERE DOESN'T SEEM TO BE ANYBODY THAT'S RESPONDING. LET'S RESERVE ALL THOSE QUESTIONS ON THAT PARTICULAR POND ISSUE.

MR. SILBERG: COULD WE JUST GET AN IDENTIFICATION OF WHAT INFORMATION MR. VAN KLEY WOULD LIKE ON THAT POND.

JUDGE HOYT: I THINK THAT'S A FAIR QUESTION.

MR. VAN KLEY: I WAS GOING TO ASK ONE MORE QUESTION.

MR. SILBERG: WHAT WAS THE FIRST QUESTION?

MR. VAN KLEY: THE FIRST QUESTION WAS HOW IT CAME INTO EXISTENCE AND WHEN.

JUDGE HOYT: AND NOW THE OTHER QUESTION?

MR. VAN KLEY: THE NEXT QUESTION IS HOW DEEP IS IT. AND I WAS GOING TO FOLLOW UP WITH A QUESTION AS TO WHETHER IT HAS BEEN COMMUNICATED TO THE BEDROCK AQUIFER.

JUDGE HOYT: THOSE QUESTIONS

WILL BE RESPONDED TO TOMORROW MORNING BY YOU, MR. SWIM.

MR. SILBERG: WE WILL ATTEMPT TO GET THAT INFORMATION.

JUDGE HOYT: ARE ANY OF THE OTHER WITNESSES THAT MAY HAVE ACCESS TO THAT? WE'LL THROW IT OPEN TO WHOEVER BEST CAN RESPOND TO THAT.

BY MR. VAN KLEY:

Q. THE NEXT QUESTIONS WILL BE AIMED AT MR. SWIM.

STAYING ON FIGURE 1-1, IF YOU'LL LOCATE THE ONE CELL ON THAT FIGURE, YOU'LL SEE THAT IT APPARENTLY IS TRANSPOSED UPON A FIGURE OF ANOTHER STRUCTURE?

A. (MR. SWIM) YES, I SEE THAT.

Q. CAN YOU TELL ME WHAT THAT OTHER STRUCTURE IS?

A. IT'S A POND.

Q. WOULD YOU TELL ME WHAT THAT POND IS USED FOR?

A. AT PRESENT, IT DOESN'T SERVE ANY FUNCTION I KNOW OF.

Q. DO YOU KNOW HOW THAT POND CAME INTO EXISTENCE?

A. NO, SIR, I DON'T.

MR. VAN KLEY: ALL RIGHT. I'M GOING TO ASK THE SAME SERIES OF QUESTIONS ABOUT THIS, YOUR HONOR. MAYBE I SHOULD GENERALLY ASK THE PANEL WHETHER THEY KNOW THE INFORMATION. DOES ANYBODY ON THE PANEL KNOW HOW THAT POND CAME INTO EXISTENCE, WHAT IS IT USED FOR, HOW DEEP IS IT AND WHETHER IT IS COMMUNICATED TO THE BEDROCK AQUIFER, OR NOT DOES ANYBODY KNOW ANY OF THOSE QUESTIONS?

MR. SILBERG: I THINK MR. HENDRON CAN ANSWER SOME OF THOSE QUESTIONS.

BY MR. VAN KLEY:

Q. SIR?

A. (MR. HENDRON) MY NAME IS DAVE HENDRON. I WAS ON-SITE DURING THE UNIT 1 CONSTRUCTION, AND I BELIEVE THAT THIS POND WAS USED PRIMARILY FOR UNITS TWO AND THREE INITIAL CONSTRUCTION ACTIVITIES TO CIRCULATE GROUNDWATER EXTRACTED AS PART OF THE GROUNDWATER, THE BEDROCK DEWATERING OPERATION FOR CONSTRUCTION. I DON'T KNOW EXACTLY HOW DEEP IT IS, BUT THE POND WAS BUILT BY DIKING SOILS AROUND THE AREA, AND AS FAR AS I COULD DETERMINE, DOES NOT COMMUNICATE TO THE BEDROCK.

Q. AS FAR AS YOU CAN DETERMINE, IS IT NOW CONNECTED TO THE BEDROCK?

A. I WOULDN'T BELIEVE SO, NO.
Q. DOES THIS POND CURRENTLY CONTAIN WATER?
A. YES, IT DOES.
Q. COULD YOU TELL US HOW MUCH WATER IS CONTAINED IN THE POND?
A. NO, NOT WITH THE INFORMATION I HAVE AT HAND.
Q. YOU WERE AT THE SITE AND SAW THIS POND, IS THAT CORRECT?
A. THAT'S CORRECT.
Q. CAN YOU JUST GENERALLY DESCRIBE HOW HIGH THE WATER WAS IN COMPARISON TO THE SURFACE OF THE GROUND?
A. GENERALLY, I'D SAY THAT THE WATER IS WITHIN A FOOT OR SO OF THE GROUND SURFACE. THIS COULD BE CHECKED OUT.
Q. DO YOU KNOW WHAT THE ELEVATION OF THE GROUND SURFACE IS AT THAT POND?
A. I WOULD ESTIMATE ROUGHLY ELEVATION 575 IGLD.
Q. MR. HENDRON, IF YOU LOOK BACK AT FIGURE 1-1 YOU WILL SEE THAT THERE IS A, I DON'T KNOW HOW TO DESCRIBE IT, IT LOOKS LIKE SOMETHING IS COMING OUT OF THAT POND INTO THE WETLAND NEXT TO IT. DO YOU SEE WHAT I'M REFERRING TO?

A. YES.
Q. DO YOU KNOW WHAT THAT REPRESENTS?
A. YES.
Q. WOULD YOU TELL US, PLEASE?
A. THE OPERATION OF THIS POND INVOLVED AN INPUT OF WATER FROM THE DEWATERING SYSTEM UP NEAR THE NORTHEAST CORNER, AND THE WATER SIMPLY CIRCULATED FROM THAT POINT AROUND THE POND AND THROUGH A CHANNEL AND DISCHARGED INTO THE -- IT APPEARS DISCHARGED INTO THAT LOW AREA THAT'S BEEN IDENTIFY AS A WETLAND, AND THEN DOWN THE CHANNEL AND INTO THE RIVER.
Q. IS THIS DISCHARGE STILL OCCURRING?
A. NO.
Q. WHEN DID IT LAST OCCUR?
A. I DON'T KNOW THE EXACT DATE; BUT OVERALL, IT OCCURRED WHEN THE DEWATERING SYSTEM WAS SHUT DOWN SEVERAL YEARS AGO.
Q. DO YOU KNOW WHETHER OR NOT THE SURFACE OF THE WATER IN THIS POND FLUCTUATES ALONG WITH ANY MONITORING WELL WATERS THAT MIGHT BE AT THE SITE?
A. NOT THAT I'M AWARE OF, NO.
Q. MR. HENDRON, WOULD YOU TELL US HOW THE DEWATERING SYSTEM WORKED WHILE UNITS TWO AND THREE WERE BEING STARTED?

A. WELL, I WILL QUALIFY THIS STATING THAT I WAS NOT AT THE SITE DURING UNITS TWO AND THREE BUT WAS AT THE SITE DURING UNIT ONE CONSTRUCTION WHEN A SIMILAR DEWATERING OPERATION WAS UNDERTAKEN, AND MY DESCRIPTION WILL BE BASED ON MY OBSERVATIONS DURING UNIT ONE CONSTRUCTION.

THE DEWATERING WELLS WERE DRILLED INTO BEDROCK, FROM THE BEDROCK SURFACE TO A DEPTH OF ABOUT 40 OR 50 FEET, TYPICALLY, BELOW THE BEDROCK SURFACE. THESE WELLS WERE RELATIVELY LARGE DIAMETER WELLS. THE WELL DIAMETERS WERE FROM SIX TO TEN INCHES IN DIAMETER. AND THEY SIMPLY PUT A VACUUM PUMPING SYSTEM ON TOP OF THESE WELLS THAT WOULD REMOVE THE WATER, PUT IT IN A HEADER PIPE THAT WAS ROUTED TO THIS PARTICULAR POND. THE WATER WAS DISCHARGED INTO THE POND, AND THE COLLECTED HYDROGEN SULFIDE GAS, WHICH IS A -- WHICH IS A GAS THAT WE FIND IN THE GROUNDWATER AT THE SITE, CAME OFF; AFTER THE HYDROGEN SULFIDE GAS CAME OFF, THEN THE WATER WAS DISCHARGED.

Q. IN YOUR OPINION, HOW DOES THE POND WHICH WE'VE BEEN TALKING ABOUT, THE POND THAT -- A POND WHICH THE ONE CELL IS SUPERIMPOSED, HOW DOES THAT POND FILL WITH WATER?

A. I THINK THAT THIS POND -- PROBABLY THE

LEVEL IN THIS POND REMAINS FAIRLY STABLE; IF, FOR NO OTHER REASON, IT HAS A SET ELEVATION AT THE DISCHARGE END OF IT, AND THE WATER GETS IN THAT POND, I BELIEVE, PRIMARILY FROM RAINFALL.

Q. DO YOU KNOW WHERE THE MONITORING WELLS ON THE SITE ARE LOCATED?

A. WELL, I COULDN'T PUT ALL OF THEM ON THIS PARTICULAR MAP, BUT GENERALLY SPEAKING, I KNOW THE AREAS WHERE MONITOR WELLS OCCUR, YES.

Q. ALL RIGHT. WHY DON'T WE START WITH THE MONITORING WELLS THAT ARE LOCATED CLOSEST TO THE PROPOSED BURIAL SITE. WHY DON'T YOU TELL US WHICH IS THE CLOSEST WELL AND WHERE IS IT LOCATED?

A. I DON'T HAVE THAT -- THAT INFORMATION AT MY DISPOSAL RIGHT NOW.

Q. DO YOU KNOW APPROXIMATELY HOW CLOSE IT'S LOCATED?

A. I WOULD SAY THAT -- THE MONITOR WELLS WE'RE TALKING ABOUT ARE BEDROCK MONITOR WELLS. I WOULD SAY THAT THE CLOSEST MONITOR WELL MAY BE WITHIN A FEW HUNDRED FEET OF THE WELLS TO BE OR -- EXCUSE ME -- OF THE CELLS THAT ARE PROPOSED FOR CONSTRUCTION.

Q. ALL RIGHT. YOU STATED THAT -- DO YOU KNOW THE DEPTH OF THE WATER IN THAT DEWATERING

POND?

A. I DO NOT.

Q. ALL RIGHT. IS THERE ANYBODY ON THE PANEL THAT KNOWS THAT QUESTION?

(NO RESPONSE.)

MR. VAN KLEY: COULD WE GET AN ANSWER TO THAT TOMORROW, TOO?

MR. SILBERG: WE'LL TRY. I DON'T KNOW IF THAT INFORMATION IS READILY AVAILABLE. IF IT IS, WE'LL TRY TO GET IT.

JUDGE HOYT: YOU WANT THE DEPTH OF THE POND AS IT EXISTS --

MR. VAN KLEY: YES.

JUDGE HOYT: -- WHEN?

MR. VAN KLEY: AT THE PRESENT TIME.

JUDGE HOYT: VERY WELL.

MR. VAN KLEY: AND ALSO WHETHER IT IS COMMUNICATED WITH THE BEDROCK.

JUDGE HOYT: THAT'S AN ADDITIONAL FEATURE, MR. SILBERG. HE WANTS TO KNOW WHETHER IT'S CONNECTED WITH THE BEDROCK.

MR. SILBERG: I BELIEVE MR. HENDRON TESTIFIED THAT THAT WAS NOT HIS BELIEF.

JUDGE HOYT: MR. HENDRON, WAS

THAT YOUR TESTIMONY?

THE WITNESS: (MR. HENDRON) THAT WAS.

BY MR. VAN KLEY:

Q. I BELIEVE THAT WAS YOUR BELIEF, THOUGH. DO YOU KNOW THAT AS A FACT OR DO YOU JUST THINK THAT?

A. NO. I STATED THAT THAT WAS MY BELIEF SINCE I DON'T HAVE THE DATA IN HAND.

Q. SO YOU REALLY DON'T KNOW.

A. THAT'S WHAT I BELIEVE. I DON'T HAVE THE DATA IN HAND, YES.

JUDGE HOYT: WOULD YOU BE ABLE TO GET THE DATA IN HAND SOMETIME?

THE WITNESS: (MR. HENDRON) YES, I THINK -- I BELIEVE WE CAN.

JUDGE HOYT: OVERNIGHT?

THE WITNESS: (MR. HENDRON) YEAH.

JUDGE HOYT: GIVE IT YOUR BEST SHOT, MR. HENDRON.

ALL RIGHT. LET'S GO.

BY MR. VAN KLEY:

Q. OKAY. LET ME GO BACK TO MR. SWIM FOR A FEW QUESTIONS.

MR. SWIM, I PROBABLY SHOULD GIVE YOU SOME

OF THESE QUESTIONS ABOUT THE MONITORING WELLS SINCE YOUR TESTIMONY INCLUDED A REFERENCE TO THOSE MONITORING WELLS.

IF YOU LOOK AT PAGE 17 OF YOUR TESTIMONY, YOU STATED THAT THE SITE WILL BE OVER A THOUSAND FEET FROM ANY WATER WELL, NOT COUNTING TOLEDO EDISON'S OBSERVATION AND MONITORING WELLS.

GIVEN THE FACT THAT YOU MADE THIS TESTIMONY, DO YOU KNOW THE LOCATION OF THE MONITORING WELLS?

A. (MR. SWIM) I DON'T HAVE THAT INFORMATION WITH ME, NO.

Q. DO YOU KNOW HOW CLOSE THE CLOSEST MONITORING WELL IS TO THE BURIAL SITE?

A. NO, I DON'T.

Q. DO YOU KNOW HOW THE MONITOR WELLS WERE CONSTRUCTED?

A. I DON'T HAVE THAT INFORMATION WITH ME.

Q. OKAY. DO YOU KNOW WHETHER THE MONITORING WELLS WERE CEMENTED OR GROUTED?

A. NO, I DON'T.

JUDGE HOYT: ALL RIGHT. I THINK WE COULD GO THROUGH AN ENDLESS LIST. LET'S RESERVE THAT QUESTION ON MONITORING WELLS ALONG WITH THE OTHER INFORMATION THAT YOU'VE REQUESTED,

MR. VAN KLEY, UNTIL TOMORROW. THE PANEL -- AN APPROPRIATE MEMBER MAY HAVE THAT INFORMATION IN THE MATERIALS ELSEWHERE, CAN LOCATE IT OVERNIGHT, AND WE'LL TESTIFY ON THAT TOMORROW MORNING.

MR. SILBERG, WE'LL GIVE YOU SOME TIME ON REDIRECT TO GO THROUGH THAT.

MR. SILBERG: COULD WE JUST HAVE THOSE ITEMS OF INFORMATION PLAYED BACK?

JUDGE HOYT: WELL, THE REPORTER OR YOU WANT --

MR. SILBERG: MR. VAN KLEY CAN IDENTIFY THEM.

JUDGE HOYT: WILL YOU?

MR. VAN KLEY: SURE.

THE INFORMATION THAT IS NEEDED IS, FIRST OF ALL, THE LOCATIONS OF THE MONITORING WELLS, HOW FAR THEY ARE FROM THE BURIAL SITE. THE CONSTRUCTION OF THE MONITOR WELLS. FOR EXAMPLE, WHETHER IT'S STEEL OR PLASTIC CASING, WHETHER IT'S CEMENTED OR GROUTED. IF THEY ARE CEMENTED OR GROUTED, THE MECHANISM BY WHICH THEY HAVE BEEN CEMENTED OR GROUTED. ALSO, THE WATER LEVELS IN THESE MONITOR WELLS.

BU MR. VAN KLEY:

Q. ALL RIGHT. MR. SWIM, YOU'RE NOT A

GEOLOGIST, ARE YOU?

A. (MR. SWIM) NO, SIR.

Q. SO YOU'RE NOT REALLY COMPETENT TO GIVE GEOLOGIC TESTIMONY, ARE YOU?

A. NO, SIR.

MR. VAN KLEY: ALL RIGHT. THANK YOU. I HAVE NO FURTHER QUESTIONS, YOUR HONOR.

JUDGE HOYT: DO WE HAVE ANY OTHER QUESTIONS FROM THE OTHER INTERVENORS NOT COVERED BY MR. VAN KLEY?

MR. LODGE: YES, THERE IS.

JUDGE HOYT: ALL RIGHT, MR. LODGE.

CROSS-EXAMINATION

BY MR. LODGE:

Q. I NOTE IN YOUR TESTIMONY, MR. SWIM, THAT YOU INDICATE ON PAGE 17 THAT THE SITE WILL BE A THOUSAND FEET FROM ANY WATER WELL. IT'S MY UNDERSTANDING THAT THERE IS A PROPERTY LINE APPROXIMATELY 400 FEET AWAY. IS THAT A GOOD APPROXIMATION?

A. APPROXIMATELY.

Q. DO YOU HAVE ANY ASSURANCES THAT THERE WILL NOT BE ANY WATER WELL DEVELOPMENTS ON THE PROPERTY THAT IS NOT CONTROLLED BY THE LICENSEE?

A. NO, I DON'T.
Q. HAVE YOU SOUGHT ANY OR ARE ANY IN THE CONTEMPLATION OF TOLEDO EDISON?
A. EXCUSE ME. I DIDN'T CATCH THE FULL QUESTION.
Q. HAS TOLEDO EDISON CONTEMPLATED SECURING SOME KINDS OF EASEMENTS OR OTHER PROHIBITIONS ON ADJOINING PROPERTY TO ENSURE THAT THE 1,000 FOOT FIGURE YOU CITE WILL REMAIN CONSISTENT?
A. I DO NOT KNOW THE ANSWER TO THAT QUESTION.
MS. SCOTT-WASILK: MR. LODGE?
MR. LODGE: YES.
MS. SCOTT-WASILK: WE HAVE LOOKED AT THAT, AND AS YOU SAID, THE ELECTRIC COMPANY DOES HAVE THE OPTION OF EXERCISING CONDEMNATION RIGHTS.
BY MR. LODGE:
Q. HAS THAT BEEN CONTEMPLATED BEFORE THIS HEARING?
A. (MS. SCOTT-WASILK) YES.
MR. SILBERG: I'M SORRY. DO YOU MEAN THE EXERCISE OR THE POSSIBILITY OF EXERCISING?
MR. LODGE: THE POSSIBILITY OF EXERCISING.

MS. SCOTT-WASILK: WE HAVE LOOKED AT THAT AS ONE OF THE OPTIONS IF WE ARE FACED WITH THAT PARTICULAR SITUATION, AND WE DID LOOK AT THAT PRIOR TO THIS HEARING.

MR. LODGE: I HAVE NO FURTHER QUESTIONS.

JUDGE HOYT: VERY WELL. ALL RIGHT. MR. VAN KLEY?

MR. VAN KLEY: YOUR HONOR, FOR QUESTION NUMBER 2, SHARON SIGLER WILL BE HANDLING THE QUESTIONING ON BEHALF OF THE STATE.

JUDGE HOYT: VERY WELL. MISS SIGLER?

MS. SIGLER: YOUR HONOR, I'D LIKE TO ADDRESS THIS QUESTION TO MR. SWIM.

CROSS-EXAMINATION

BY MS. SIGLER:

Q. YOU HAD DESCRIBED IN YOUR TESTIMONY THE PROPOSED BURIAL CELLS, AND YOU MENTIONED THAT THERE'S GOING TO BE A SYNTHETIC IMPERVIOUS MEMBRANE THAT'S GOING TO LINE THE BOTTOM OF THE CELL?

A. (MR. SWIM) THAT'S CORRECT.

Q. AND CAN YOU DESCRIBE WHAT KIND OF MATERIAL THIS MEMBRANE IS GOING TO BE MADE OUT OF?

A. WE HAVEN'T SELECTED AN EXACT MATERIAL AS OF YET.

Q. WELL, THEN, YOU DON'T KNOW IF THE PROPOSED GRAVEL TO COVER THE MEMBRANE COULD PUNCTURE THIS MEMBRANE IN ANY WAY?

A. WELL, THE MATERIAL WE SELECT, WE'LL TAKE THAT INTO ACCOUNT.

Q. AND WILL YOU TAKE INTO ACCOUNT WHAT SORT OF DEGRADATION IT COULD BE SUBJECT TO AS WELL?

A. THAT'S CORRECT.

Q. HOW ABOUT ANY RETRO-COMPATIBILITY TEST TO DETERMINE IF THE WASTE IS COMPATIBLE WITH THE LINING?

A. YES, THAT'S ALSO ONE OF THE FACTORS WE'LL CONSIDER BEFORE WE SELECT.

Q. HAVE ANY -- ARE YOU GOING TO PERFORM ANY LEACHATE TEST TO DETERMINE HOW IT WILL AFFECT THE LINER?

A. WE DON'T HAVE ANY PLANS TO AT PRESENT.

Q. WHY IS IT THAT YOU'RE ONLY -- IN YOUR PROPOSAL, YOU HAVE ONLY ONE LAYER OF LEACHATE? IS THERE A REASON WHY THERE'S ONLY ONE LEACHATE LAYER?

MR. SILBERG: I'M SORRY. YOU MEAN A LEACHATE COLLECTION LAYER?

MS. SIGLER: RIGHT.

A. (MR. SWIM) FROM THE EXPERIENCE OF OUR CONSULTANTS WHO GAVE US THE PRELIMINARY DESIGN FOR THIS PIT, THAT WAS ALL THAT WAS RECOMMENDED.

Q. ARE THESE CONSULTANTS THAT DEAL PRIMARILY WITH TRADITIONAL LANDFILL TYPE SITUATIONS?

A. MR. HENDRON CAN PROBABLY ADD SOMETHING TO THAT SINCE HE WAS THE CONSULTANT.

A. (MR. HENDRON) I'LL TRY TO ANSWER YOUR QUESTION.

THE REASON THAT WE HAVE RECOMMENDED ONLY ONE LEACHATE COLLECTION LAYER IS REALLY TWOFOLD. ONE, IT'S NOT A HAZARDOUS WASTE. IT'S A NON-HAZARDOUS WASTE BY ALL DEFINITIONS.

SO IF WHAT YOU'RE ASKING IS -- MOST HAZARDOUS WASTE LANDFILLS NOW HAVE A DOUBLE LINER AS A DOUBLE LEACHATE COLLECTION SYSTEM REQUIREMENT.

THIS IS A NON-HAZARDOUS LANDFILL.

SECONDLY, THE OPERATION OF LEACHATE COLLECTION SYSTEM IS REALLY INTENDED TO CEASE AND DESIST AFTER SOME PERIOD OF TIME DURING THE OPERATION. AND WE EXPECT THIS DRAIN TO BE DRY SOMETIME AFTER THE OPERATION BEGINS, AND, THEREFORE, WE NEED NOT HAVE A SECOND DRAIN.

Q. ALL RIGHT. IS THERE A LEACHATE REMOVAL SYSTEM PLANNED OR PROPOSED?

A. (MR. SWIM) YES, THERE IS.

Q. AND HOW WILL THIS LEACHATE BE REMOVED?

A. WE HAVE NOT FINALIZED THE DESIGN ON THAT YET. PRELIMINARILY, WE ARE LOOKING AT HAVING A PIT FOR THE LEACHATE TO COLLECT AND A PUMP TO REMOVE IT AFTER IT'S BEEN TESTED.

Q. HOW WILL THE LEACHATE BE DISPOSED OF?

A. IT WILL FIRST BE TESTED, AND THE RESULTS OF THOSE TESTS WILL DETERMINE HOW THE LEACHATE IS TO BE DISPOSED OF.

Q. HAVE YOU MADE PLANS OF WHERE YOU'RE GOING TO DISPOSE OF IT, WHERE THE LEACHATE WILL BE DISPOSED OF?

A. UNDER WHAT CONDITIONS? WELL, DEPENDING ON -- IT DEPENDS ON THE RESULTS OF OUR TESTS.

Q. OKAY.

WHEN YOU -- YOU'VE BUILT -- WHEN YOU BUILD THE CELLS, WHEN YOU CONSTRUCT THE CELLS, HOW ARE YOU GOING TO PROTECT THE INTEGRITY OF ONE CELL WHEN YOU BUILD THE OTHER? WILL THE HEAVY MACHINERY IMPACT ON IT?

A. NO. THE CONSTRUCTION WILL TAKE PLACE FROM THE SIDE. THERE WON'T BE ANY MACHINERY

TRANSVERSANT ACROSS THE TOP OF THE CELL THAT HAS BEEN COMPLETED AS WE CONSTRUCT THE NEXT CELL.

Q. WON'T THERE BE VIBRATION FROM THE MACHINERY?

A. THERE WILL BE A SMALL AMOUNT OF VIBRATION.

Q. HOW ARE YOU GOING TO KEEP THE RIP-RAP ON THE SIDES FROM ROLLING AND GOING DOWN INTO THE NEW PIT YOU'RE DIGGING, NEW CELL?

A. WELL, THE RIP-RAP ON THE WALL THAT THEY SHARE WILL BE REMOVED DURING THE CONSTRUCTION OF THE -- ON THAT SIDE, IT WILL BE REMOVED DURING THE CONSTRUCTION OF THE ADJOINING CELL.

Q. COULDN'T THIS DAMAGE THE COVER?

A. YOU MEAN ON THE -- WHERE WE'VE REMOVED THE RIP-RAP?

Q. RIGHT.

A. THE REMOVAL OF THE RIP-RAP ITSELF WOULDN'T PHYSICALLY DAMAGE ANYTHING.

Q. HOW LONG DO YOU EXPECT CONSTRUCTION OF THE CELL TO TAKE?

A. MR. WALLACE COULD PROBABLY GIVE YOU A MORE ACCURATE DETERMINATION AS TO THE EXACT TIMEFRAME THAT WE'RE LOOKING AT.

A. (MR. WALLACE) I WOULDN'T ANTICIPATE IT

WOULD TAKE MORE THAN 90 DAYS.

Q. MORE THAN 90 DAYS?

A. (MR. WALLACE) NOT MORE THAN 90 DAYS.

Q. NOT MORE THAN 90 DAYS.

WHAT IF THERE WERE A STORM OR SOME OTHER KIND OF INCIDENT DURING THIS PERIOD WHEN THE OTHER -- THE RIP-RAP'S REMOVED FROM THE ONE CELL?

A. (MR. SWIM) WELL, WE INTEND TO HAVE THE OTHER THREE SIDES OF THE NEW DIKE IN PLACE BEFORE WE REMOVE THE RIP-RAP FROM THE ADJOINING WALL THAT THEY WILL SHARE SO THAT THAT AREA WILL BE PROTECTED FROM A FLOOD OR STORM BEFORE THAT RIP-RAP'S REMOVED.

Q. IN DETERMINING THE LAYOUT OF THE CELLS, YOU -- THEY WERE ESSENTIALLY DETERMINED BY, YOU SAID, THE NECESSITY OF KEEPING AN UNENCUMBERED MAINTENANCE CORRIDOR FOR THE OVERHEAD TRANSMISSION LINES?

A. THAT'S CORRECT.

Q. WHAT KIND OF MAINTENANCE ARE YOU DISCUSSING OR COMTEMPLATING?

A. I SPECIFICALLY DON'T KNOW THE EXACT TYPE OF ELECTRICAL MAINTENANCE THAT WOULD BE REQUIRED TO REPAIR A LINE BREAK OR ANYTHING ALONG THAT NATURE, OR TO STRING A NEW LINE, REPLACEMENT WIRE.

Q. IF IT SHOULD RAIN DURING THIS 90-DAY CONSTRUCTION PERIOD, HOW ARE YOU GOING TO KEEP THE RAIN WATER OUT OF THE CELLS?

A. WELL, THE RAIN WATER WON'T BE ABLE TO BE KEPT OUT OF THE CELLS DURING THAT PERIOD OF CONSTRUCTION.

Q. IT WILL GO IN THE CELLS DURING THIS PERIOD?

A. THE OPEN PERIOD, YES, IT WILL.

Q. WHAT HAPPENS TO THIS RAIN WATER?

A. WELL, THE RAIN WATER WILL HAVE TO BE REMOVED.

Q. DO YOU -- HAVE YOU PROPOSED HOW YOU'RE GOING TO REMOVE THAT?

A. (MR. WALLACE) THIS IS SURFACE WATER. WE'LL PROBABLY USE SOMETHING LIKE A PUMP AND PUMP IT OUT.

Q. WILL THIS MAKE THE MATERIALS IN THE CELL WET?

A. (MR. WALLACE) WHAT WAS YOUR QUESTION?

Q. WILL THIS SATURATE THE MATERIALS INSIDE THE CELL, THE RAIN WATER?

A. (MR. WALLACE) NOT IF THE CLAY IS PROPERLY PLACED AT THE TIME.

Q. AND IF IT'S NOT?

A. (MR. WALLACE) IT WILL BE PROPERLY PLACED.

Q. HOW WILL YOU REMOVE RAIN WATER FROM THE CELL THAT'S OPENED WHILE YOU'RE DOING CONSTRUCTION, THE CELL THAT YOU'RE CONSTRUCTING?

A. (MR. WALLACE) THERE WON'T BE A CELL THAT WOULD BE OPENED.

Q. THE ONE YOU'RE CONSTRUCTING, THE ONE YOU'RE DIGGING WILL BE OPENED. RAIN WILL GO IN THERE. HOW WILL YOU KEEP THE RAIN WATER OUT OF THE CONSTRUCTION?

A. (MR. WALLACE) YOU WON'T KEEP THE RAIN WATER OUT. THE RAINS WILL FALL IN THE CELL.

Q. AND WHAT KIND OF IMPACT WILL THAT HAVE ON THE CONSTRUCTION AND PUTTING MATERIALS IN?

A. (MR. WALLACE) VERY LITTLE. AS I SAID BEFORE, WHAT WE'LL DO IS WE'LL PUMP IT OUT AND CONTINUE TO WORK THE SOIL.

Q. CAN YOU GIVE ME SOME KIND OF DESCRIPTION OF WHAT HAPPENS WHEN THE CELL WILL AGE OVER TIME?

A. (MR. WALLACE) I'LL HAVE TO PASS THAT TO ONE OF THE SOILS MEN.

MR. SILBERG: I'M SORRY. COULD YOU TELL US WHAT KIND OF EFFECTS YOU'RE TALKING ABOUT?

MS. SIGLER: WELL, WHAT I'M TALKING ABOUT -- WILL THE CELL SETTLE OVER TIME? WILL IT DEVELOP CRACKS?

JUDGE HOYT: YOU FRAME ALL THESE QUESTIONS IN REFERENCE TO THE OPEN CELL, ARE YOU NOT?

MS. SIGLER: NO. NO. I'M SORRY. I SHOULD HAVE MADE THAT CLEAR.

BY MS. SIGLER:

Q. ONCE THE CELL IS COMPLETED, ONCE YOU'RE DONE, OVER A PERIOD OF TIME WHAT'S GOING TO HAPPEN TO THAT CELL?

A. (MR. HENDRON) I'LL TRY TO ANSWER THAT QUESTION.

TWO THINGS ABOUT THIS DESIGN ARE INTENDED TO MAKE SETTLEMENTS MINIMAL. THERE WILL BE SETTLEMENT, BUT ONE THING OBVIOUSLY IS WE ARE SOLIDIFYING THE WASTE TO A VERY STIFF CLAY, STIFF TO HARD CLAY CONSISTENCY, SO THE WASTE ITSELF WILL HAVE VERY, VERY SMALL SETTLEMENTS, AND I'M GOING TO ESTIMATE LESS THAN A QUARTER OF AN INCH OVER THE LONG PERIOD.

AND THE BASE OF THE WHOLE SYSTEM, NAMELY THE LINER SYSTEM AND THE WASTE ABOVE IT, IS FOUNDED ON THE GLACIAL TILL DEPOSIT, AND THE

GLACIAL TILL DEPOSIT IS A VERY INCOMPRESSIBLE SOIL DEPOSIT.

AND AGAIN, WE'RE TALKING SETTLEMENTS LESS THAN A QUARTER OF AN INCH FOR -- FOR THE PURPOSES OF THIS FORUM.

A TOTAL SETTLEMENT OF A HALF-AN-INCH OVER THE LENGTH OF TIME MAY TRANSLATE TO A DIFFERENTIAL SETTLEMENT ACROSS THE STRUCTURE OF A QUARTER OF AN INCH, HALF OF THAT TOTAL SETTLEMENT. AND THERE IS NO STRUCTURAL ELEMENT WITHIN THIS DESIGN THAT I KNOW OF THAT WOULD BE IMPACT BY THAT TYPE OF DIFFERENTIAL SETTLEMENT.

Q. WELL, DOESN'T CLAY CRACK OVER TIME?

A. ARE YOU TALKING ABOUT THE CLAY COVER?

Q. YES.

A. WHICH WOULD BE THE MOST SUSCEPTIBLE ELEMENT TO THE CRACKING.

IT DOES. WE HAVE A TWO-FOOT THICK MINIMUM THICKNESS COVER. THE MAXIMUM THICKNESSES OF THAT WILL BE IN THE ORDER OF THREE OR FOUR FEET.

WE ARE PROVIDING A VEGETATIVE COVER ON THAT, AND WE'RE ALSO PROVIDING A DRAINAGE LAYER ON TOP OF THAT, SO THAT WE WILL MINIMIZE THE PROBLEMS WITH CRACKING OF THE COVER OVER A LONG PERIOD.

AND AS WAS TESTIFIED EARLIER, THERE WILL BE A MAINTENANCE AND OPERATIONS PROGRAM IN THE LONGER TERM TO REPAIR CRACKS AND ANY DEFICIENCIES THAT ARE OBSERVED IN THIS COVER.

Q. THIS COVER, THE TOP COVER, IT'S TO BE HOW THICK? CAN YOU GIVE ME A THICKNESS OF EACH OF THE COMPONENTS OF THE COVER, THE TOPSOIL, THE CLAY, THE GRAVEL?

A. OKAY. I THINK THAT'S PART OF MR. SWIM'S TESTIMONY, AND AT THIS POINT I'D LIKE TO TURN IT OVER TO HIM, IF I COULD.

Q. ALL RIGHT.

A. (MR. SWIM) THE COVER WILL BE OF COMPACTED CLAY WHICH WILL RANGE FROM A THICKNESS OF TWO FEET TO A MAXIMUM OF APPROXIMATELY FOUR FEET OVER THE CENTER. ON TOP OF THAT THERE WILL BE SOME TOPSOIL WHICH WILL BE SEEDED.

Q. OKAY.

MR. SILBERG: EXCUSE ME, MR. SWIM. DID YOU OMIT THE SAND OR GRAVEL FILTER LAYER?

THE WITNESS: (MR. SWIM) YES, I DID, INADVERTENTLY.

JUDGE HOYT: LET ME ASK YOU, CAN I HAVE THAT DIAGRAM OF THE CONSTRUCTION OF THAT

CELL? I BELIEVE YOU GAVE COPIES OF IT TO THOSE OF US WHO WERE AT THE -- THAT'S THE ONE I'M LOOKING FOR.

MR. SILBERG: IT'S FIGURE 2-2 WHICH FOLLOWS PAGE 24. I'M SORRY. IT IS PAGE 24, ALTHOUGH IT'S NOT NUMBERED. NO. I'M SORRY. IT FOLLOWS PAGE 22 IN THE TESTIMONY.

JUDGE HOYT: NO, THAT'S NOT THE ONE. THAT'S NOT MY 22. I'VE GOT A DIFFERENT ONE.

MR. SILBERG: FIGURE 2-2.

JUDGE HOYT: YEAH. IT'S THE SECOND PAGE. THANK YOU.

MR. SILBERG: THAT SHOWS A CROSS SECTION OF THE BOTTOM COMPONENT OF THE LINER BUT DOES NOT SHOW A CROSS SECTION OF THE TOP CAP.

JUDGE HOYT: RIGHT. THAT MEMBRANE IS LISTED ON THE BOTTOM AS THE BOTTOM OF IT, ISN'T IT?

MR. SILBERG: YES.

JUDGE HOYT: ALL RIGHT.

THE WITNESS: (MR. WALLACE) THERE IS NO MEMBRANE ON THE TOP.

JUDGE HOYT: YEAH.

BY MS. SIGLER:

Q. CAN YOU TELL ME WHAT THE THICKNESS WILL

BE ON THE END WHERE IT'S JUST TWO FEET? CAN YOU TELL ME WHAT THE THICKNESS OF EACH LAYER WILL BE? HOW THICK THE GRAVEL LAYER, HOW THICK THE TOPSOIL WILL BE ON THE END, HOW THICK THE COMPACTED CLAY WILL BE, THE TWO FOOT?

A. (MR. SWIM) THOSE THICKNESSES HAVEN'T BEEN DESIGNED YET. WE HAVEN'T DETERMINED EXACTLY.

Q. SO ESSENTIALLY, THIS IS A BARE BONES PROPOSAL. THIS IS NOT YET A COMPLETED PROPOSAL THAT YOU'RE ADDRESSING HERE.

A. IT'S A PRELIMINARY PROPOSAL. IT'S NOT A FINAL, COMPLETED PROPOSAL. I WOULDN'T CALL IT A BARE BONES PROPOSAL, NO.

Q. THERE ARE SEVERAL ISSUES YET TO BE ADDRESSED INCLUDING --

A. THERE ARE SEVERAL ASPECTS YET TO BE DESIGNED, YES.

MS. SIGLER: I HAVE NO FURTHER QUESTIONS.

MR. LODGE: I HAVE A FEW.

JUDGE HOYT: ALL RIGHT.

CROSS-EXAMINATION

BY MR. LODGE:

Q. MR. SWIM, HAVE YOU CALCULATED THE VOLUME -- I GUESS YOU'D CALL IT THE CUBIC FOOT

CAPACITY -- OF EACH OF THESE CELLS?

A. (MR. SWIM) YES, WE HAVE.

Q. AND WHAT IS THAT CAPACITY, ASSUMING THEY'RE ALL GOING TO BE OF UNIFORM SIZE?

A. WELL, THE TOTAL VOLUME IS APPROXIMATELY 46,000 CUBIC FEET, AND THE VOLUME TO WHICH WE WILL PLACE THE MATERIAL INTO IT WILL BE APPROXIMATELY 42,000 CUBIC FOOT.

Q. IN YOUR OCTOBER 9TH -- OR IN THE OCTOBER 9TH, 1985 FEDERAL REGISTER NOTICE, IT INDICATED THERE WOULD BE ABOUT SIX DREDGINGS OVER THE LIFE OF DAVID-BESSE; CORRECT?

A. YES, I BELIEVE THAT'S CORRECT. I DON'T HAVE A COPY OF THAT IN FRONT OF ME.

Q. AND THAT THE VOLUME OF THE DREDGED MATERIAL'S ESTIMATED TO BE ABOUT 30,000 CUBIC FEET FOR A FIVE-YEAR PERIOD.

A. THAT'S -- IF YOU'RE READING THAT, I TAKE THAT AS BEING CORRECT.

Q. YOU WOULD ACCEPT THAT.

A. YES.

Q. IS THERE --

MR. LODGE: AND, YOUR HONOR, I WILL STOP IF I'M GETTING BEYOND THE PARTICULAR ISSUE WE'RE DISCUSSING.

Q. BUT I BELIEVE I RECALL SEEING SOMETHING IN THE TESTIMONY CONCERNING MIXING LIMEKILN DUST.

MR. BIMBER: CEMENT KILN DUST.

Q. CEMENT KILN DUST. PARDON ME.

A. THAT'S CORRECT.

Q. IS THAT FACTORED INTO YOUR PROJECTIONS OF THE CAPACITY YOU'RE GOING TO NEED?

A. YES, IT IS.

Q. DO YOU HAVE ANY IDEA AS TO WHAT APPROXIMATE PERCENTAGE THAT WOULD INCREASE THE VOLUME OF MATERIAL TO BE DUMPED?

A. THE INCREASE WILL BE MINIMAL.

Q. MORE THAN TEN PERCENT?

A. I WOULD SAY LESS.

Q. BETWEEN FIVE AND TEN PERCENT; WOULD THAT BE FAIR?

A. I WOULD GUESS THAT WOULD BE INACCURATE. PROBABLY LESS.

Q. HAVE YOU DONE ANY SMALL SCALE EXPERIMENTS TO MIX CEMENT KILN DUST WITH A SAMPLE OF THE SLUDGE MATERIAL?

A. WE'VE DONE SOME VERY SMALL SCALE TESTS, YES.

Q. AND IS THAT PERCENTAGE OR THOSE PERCENTAGES YOU'VE JUST QUOTED A RESULT OF THOSE

TESTS?

A. NO.

Q. SO YOU REALLY DON'T KNOW AT THIS POINT.

A. AT THIS POINT, I PERSONALLY DON'T HAVE HARD CONCRETE EVIDENCE, NO.

MR. LODGE: I HAVE NOTHING FURTHER.

JUDGE HOYT: VERY WELL. ALL RIGHT. LET'S MOVE ON TO THE NEXT SERIES OF QUESTIONS. THAT'S ON OUR QUESTION NUMBER THREE.

MR. VAN KLEY: YES, YOUR HONOR. I WILL BE HANDLING QUESTION NUMBER THREE.

JUDGE HOYT: ALL RIGHT.

MR. VAN KLEY: I'D LIKE TO DIRECT MY QUESTIONS TOWARDS MR. HERDENDORF SINCE HE GAVE THE TESTIMONY ON PART NUMBER THREE.

CROSS-EXAMINATION

BY MR. VAN KLEY:

Q. MR. HERDENDORF, IF YOU COULD TURN TO PAGE 28 OF YOUR TESTIMONY, YOU MADE A STATEMENT ON PAGE 28 CONCERNING THE SITE BEING ABOVE ELEVATION 574 I.G.L.D. YOUR CONCLUSION WAS THAT BECAUSE THE SITE IS ABOVE ELEVATION 574, IT'S NOT A WETLAND OR A MARSH UNDER THE CORPS OF ENGINEERS' DEFINITION; IS THAT CORRECT?

A. (DR. HERDENDORF) THAT IS CORRECT.
Q. OKAY. THE ELEVATION YOU'RE REFERRING TO IS COMMONLY KNOWN AS THE ORDINARY HIGH WATER MARK; ISN'T THAT RIGHT?
A. THAT IS CORRECT.
Q. ALL RIGHT. AND ORDINARY HIGH WATER MARK IS THE TERM WHICH DESCRIBES THE LIMIT OF THE CORPS' JURISDICTION UNDER THE NAVIGABLE SERVITUDE PORTIONS OF ITS JURISDICTION; ISN'T THAT RIGHT?
A. THAT'S TRUE, BUT ALSO IN CONVERSATIONS WITH THE TOLEDO OFFICE OF THE CORPS, THAT'S THE ELEVATION THAT THEY USE IN THE FIELD WHEN ADVISING PROPERTY OWNERS AS TO THE DEMARCATION LINE BETWEEN COASTAL WETLANDS AND THE TERRESTRIAL ENVIRONMENTS.
Q. BUT THE -- THERE CAN BE WETLAND WHICH IS ALSO ABOVE 574 WHICH IS ALSO UNDER CORPS OF ENGINEERS' JURISDICTION; ISN'T THAT CORRECT?
A. THAT IS CORRECT. THEIR JURISDICTION EXTENDS NO MATTER WHAT THE ELEVATION IS.
Q. ALL RIGHT. IT EXTENDS TO WETLANDS REGARDLESS OF THE ELEVATION; IS THAT RIGHT?
A. THAT'S CORRECT.
Q. SO YOUR STATEMENT AS YOU'VE WRITTEN IT ON PAGE 28 IS NOT QUITE ACCURATE THEN, IS IT?
A. I THINK I QUALIFIED THAT STATEMENT

EARLIER IN TERMS OF REGARDING IT AS COASTAL WETLAND OF LAKE ERIE, AND IN THAT VEIN, IT IS CORRECT.

Q. EVEN FOR COASTAL WETLANDS, IT DOESN'T MATTER WHETHER OR NOT IT'S ABOVE ELEVATION 574; IT'S WHETHER OR NOT IT'S A WETLAND. ISN'T THAT RIGHT?

A. THE CORPS IS STILL USING THAT ELEVATION AS EARLY AS A MONTH AGO WHEN I CHECKED WITH THEM.

Q. THEY'RE USING THAT ELEVATION TO DETERMINE WHETHER LAND'S A WETLAND OR NOT?

A. THIS MAY SEEM STRANGE, BUT THAT'S WHAT -- I WAS GIVEN THAT INFORMATION.

Q. I'M GOING TO HAND YOU AN EXHIBIT. THIS HAS BEEN MARKED AS STATE OF OHIO EXHIBIT NO. C. I WILL HAND YOU THIS EXHIBIT AND ASK YOU WHETHER OR NOT YOU CAN LOCATE THE BURIAL CELLS ON THIS EXHIBIT. THIS EXHIBIT HAS A DEMARCATION OF WETLANDS ON IT.

JUDGE HOYT: YOU HAVE THREE COPIES OF THAT, MR. VAN KLEY?

MR. VAN KLEY: I'M GOING TO HAVE HIM MARK IT WITH SOME MARKINGS, THEN WE'LL MAKE A FEW COPIES OF IT.

BY MR. VAN KLEY:

Q. ALL RIGHT. I'M HANDING YOU WHAT'S BEEN MARKED AS STATE OF OHIO EXHIBIT C. IF YOU CAN, WOULD YOU DRAW IN THE WETLAND -- THE LANDFILL CELLS ON THAT EXHIBIT. IF YOU CAN'T, LET ME KNOW.

A. I CAN ONLY DO IT VERY CRUDELY BY LOOKING AT ANOTHER ILLUSTRATION THAT WAS IN THE TESTIMONY.

Q. ALL RIGHT. BEFORE YOU TRY THAT, LET ME ASK ANOTHER MEMBER OF THE PANEL WHETHER HE OR SHE MIGHT BE BETTER QUALIFIED TO LOCATE THE LANDFILL CELLS. ANY VOLUNTEERS?

MR. SILBERG: THAT MAY NOT BE SOMETHING WHICH WE WOULD NECESSARILY WANT TO DO WITHOUT TAKING SOME TIME TO DO IT MORE CAREFULLY.

MR. VAN KLEY: ALL RIGHT. WELL, IF WE CAN HAVE THE STIPULATION THAT THEY WILL MARK IT AND RETURN IT, FOR EXAMPLE, TOMORROW, I WOULD BE HAPPY TO DO THAT.

JUDGE HOYT: WILL YOU DO THAT, MR. SILBERG?

MR. SILBERG: UH-HUH.

JUDGE HOYT: VERY WELL. WE'LL DO IT THAT WAY THEN.

MR. VAN KLEY: I WILL ENTRUST EXHIBIT C TO YOUR CARE THEN.

JUDGE HOYT: C FOR

IDENTIFICATION, MR. VAN KLEY.

MR. VAN KLEY: CORRECT, YOUR HONOR.

BY MR. VAN KLEY:

Q. MR. HERDENDORF, DO YOU KNOW OF ANY LANDFILL WHICH HAS CONTAINED RADIOACTIVE WASTE BEING SITED 25 FEET AWAY FROM A WETLAND?

A. (DR. HERDENDORF) NO, I DO NOT.

MR. VAN KLEY: THANK YOU. NO FURTHER QUESTIONS, YOUR HONOR.

JUDGE HOYT: VERY WELL. ANY QUESTIONS FROM THE OTHER INTERVENORS NOT COVERED BY MR. VAN KLEY ON QUESTION NUMBER THREE?

MR. LODGE: ONE MOMENT, YOUR HONOR, IF I MAY.

JUDGE HOYT: AFTER MR. LODGE, IF HE DOES HAVE A QUESTION --

MR. LODGE: YOUR HONOR, WE DO NOT.

JUDGE HOYT: VERY WELL. THEN WE'LL RECESS FOR APPROXIMATELY TEN MINUTES.

(RECESS TAKEN.)

JUDGE HOYT: WE WILL GO BACK ON THE RECORD. THE HEARING WILL COME TO ORDER. LET THE RECORD REFLECT THAT ALL THE PARTIES TO THE

HEARING WHO WERE PRESENT WHEN THE HEARING RECESSED ARE AGAIN PRESENT IN THE HEARING ROOM.

I BELIEVE COUNSEL FOR THE STATE OF OHIO WAS IN THE MIDST OF HIS EXAMINATION AND WILL BEGIN WITH QUESTION NUMBER THREE.

MR. VAN KLEY: I THINK WE'RE GOING TO QUESTION NUMBER FOUR.

JUDGE HOYT: I'M SORRY. WE FINISHED WITH QUESTION NUMBER THREE. WE'RE GOING TO QUESTION NUMBER FOUR. I STAND CORRECTED. THANK YOU.

MR. VAN KLEY: ALL RIGHT.

YOUR HONOR, WE'D LIKE TO GO TO QUESTION NUMBER FOUR, WHICH DEALS WITH THE FLOODING AT THE SITE. THE QUESTIONS WILL BE DIRECTED TOWARDS MR. HERDENDORF, WHO GAVE THE TESTIMONY FOR QUESTION NUMBER FOUR.

CROSS-EXAMINATION

BY MR. VAN KLEY:

Q. MR. HERDENDORF, I'D LIKE TO START WITH PAGE 31 OF YOUR TESTIMONY, WHERE UNDER QUESTION AND ANSWER 4-3 YOU STATE THAT THE GENERAL AREA AROUND THE BURIAL SITE HAS BEEN OBSERVED FLOODED.

COULD YOU PLEASE TELL US WHO MADE THESE OBSERVATIONS, WHEN AND WHERE?

A. (DR. HERDENDORF) YES. THIS IS INFORMATION THAT -- WELL, I PERSONALLY HAVE SEEN IT FLOODED MYSELF DURING THE EARLY '70 PERIOD, BUT NOT FROM THE STANDPOINT OF CONDUCTING ANY INVESTIGATION SPECIFICALLY AT THE SITE.

THE INFORMATION THAT I HAVE CONCERNING THE FLOODING WAS SUPPLIED TO ME BY CHARLES MCBELL, FORMERLY OF TOLEDO EDISON.

Q. ON HOW MANY OCCASIONS HAVE YOU PERSONALLY SEEN THE BURIAL SITE FLOODED?

A. I'VE ONLY SEEN IT FLOODED ON ONE OCCASION.

Q. DO YOU REMEMBER WHEN THAT OCCASION WAS?

A. I BELIEVE IT WAS 1972, NOVEMBER.

Q. THIS WAS THE LARGEST FLOODING EPISODE THAT HAS OCCURRED IN THAT AREA; IS THAT RIGHT?

A. 1972, NOVEMBER, AND APRIL 1974 ARE THE TWO LARGEST EVENTS WE'VE HAD.

Q. WHAT WAS THE NAME OF THE PERSON THAT YOU CONFERRED -- WITH WHOM YOU CONFERRED ABOUT THE OTHER FLOODING?

A. MR. CHARLES MCBELL.

Q. MCBELL.

A. CORRECT.

Q. ALL RIGHT. HE'S A TOLEDO EDISON

EMPLOYEE?

A. YES. I BELIEVE HE HAS -- HE HAD THE POSITION MR. SWIM NOW OCCUPIES.

MR. SILBERG: HE FORMERLY WAS A TOLEDO EDISON EMPLOYEE.

Q. ALL RIGHT. DID MR. MCBELL TELL YOU THE NUMBER OF OCCASIONS ON WHICH HE SAW THE SITE FLOODED?

A. NO. HE JUST INDICATED THAT IN THE EARLY '70'S HE HAD SEEN IT FLOODED.

Q. IF YOU WILL GO TO PAGE 32 OF YOUR TESTIMONY, IN THE FIRST PARAGRAPH OF THAT PAGE, YOU REFER TO A MEAN MONTHLY STILL WATER ELEVATION. DO YOU SEE THAT?

A. WHAT LINE ARE YOU REFERRING TO?

Q. SIXTH -- SEVENTH LINE DOWN. SEVENTH AND THE EIGHTH LINE.

A. OH, YES. ALL RIGHT.

Q. ALL RIGHT.

A. YES. OKAY.

Q. WOULD YOU SHOW US HOW YOU CALCULATE THE -- OR CALCULATED THE MEAN MONTHLY STILL WATER ELEVATION?

A. THE MEAN MONTHLY STILL WATER ELEVATION WAS PROVIDED TO ME BY THE U.S. ARMY CORPS OF

ENGINEERS, TOLEDO OFFICE.

Q. DO YOU KNOW WHAT DAYS ARE BEING AVERAGED TO GET THIS EQUATION?

A. I BELIEVE THEY PROBABLY AVERAGED AT LEAST HOURLY LEVELS, MAYBE EVEN SHORTER TERM. IT'S ON A COMPUTERIZED SYSTEM THAT AUTOMATICALLY UPGRADES IN -- WELL, HOURLY, CONTINUALLY UPGRADING THAT MONTHLY AVERAGE.

Q. WHAT'S THE TOTAL PERIOD OF TIME THAT IS BEING USED FOR THIS CALCULATION? IS IT 30 DAYS OR SEVEN DAYS OR WHAT?

A. I BELIEVE IT'S THE FULL CALENDAR MONTH.

Q. 30 DAYS.

A. NO. IT WOULD BE DEPENDING ON THE NUMBER OF DAYS IN THE PARTICULAR MONTH.

Q. ALL RIGHT. SO WHATEVER NUMBER OF DAYS THAT PARTICULAR MONTH HAS, THAT'S THE NUMBER OF DAYS THAT ARE USED?

A. YES.

Q. ALL RIGHT. ARE THESE THE 30 DAYS DURING THAT CALENDAR MONTH OR IS IT 30 DAYS BEFORE THE SURGE OR 30 DAYS AFTER THE SURGE?

A. WHEN WE CALCULATED THIS, WE USED THE PARTICULAR MONTH THAT THE EVENT OCCURRED IN.

Q. SO IF THE EVENT OCCURRED, LET'S SAY, JULY

31ST OR JULY 1ST OR JULY 15TH, YOU WOULD USE THE 30 DAYS OF JULY TO CALCULATE THE EQUATION?

A. THAT'S CORRECT.

Q. IN YOUR TESTIMONY YOU REFER TO FLOODING OCCURRING ON THE BURIAL SITE; IS THAT CORRECT?

A. THAT'S CORRECT.

Q. AND I THINK EARLIER YOU INDICATED THAT THIS FLOODING COMES FROM TOUSSAINT RIVER; IS THAT RIGHT?

A. THAT'S CORRECT.

Q. IS THAT ALL OF THE -- IS THAT THE SOLE SOURCE OF THE FLOODING, OR ARE THERE OTHER AREAS OF FLOODING THAT OCCUR?

A. THIS AGAIN IS INFORMATION THAT WAS PROVIDED TO ME BY MR. MCBELL HAVING OBSERVED THAT EVENT OCCUR.

Q. HOW FAR IS THE TOUSSAINT RIVER FROM THE BURIAL SITE?

A. I CAN'T GIVE YOU THAT WITHOUT SCALING IT OFF. I DON'T HAVE THAT NUMBER AVAILABLE.

Q. OKAY. I'M GOING TO HAND YOU STATE OF OHIO EXHIBIT MARKED AS EXHIBIT A. SEE IF YOU CAN USE THIS TO SCALE IT OFF.

JUDGE HOYT: YOU WANT TO SEE THIS, MR. SILBERG?

MR. SILBERG: NO. IT'S ALREADY BEEN --

A. (DR. HERDENDORF) THE SCALE ON THE PHOTOGRAPH IS ONE INCH EQUALS 945 FEET.

DO YOU WANT ME TO TRACE THE FLOOD PATH OR THE STRAIGHT, SHORTEST DISTANCE?

Q. JUST TRACE THE SHORTEST DISTANCE BETWEEN THE TOUSSAINT RIVER TO THE LANDFILL CELLS.

A. LOOKS TO BE ABOUT THREE-EIGHTHS OF AN INCH.

GOT A CALCULATOR? WORKS BETTER IF YOU TURN IT ON.

I GET ABOUT 354.75 FEET.

MR. SILBERG: THAT'S THE SHORTEST DISTANCE BETWEEN TWO POINTS?

THE WITNESS: (MR. HERDENDORF) THAT WAS THE SHORTEST DISTANCE I COULD FIND, AND THE MAP IS A LITTLE BIT HAZY, BUT -- IT LOOKS LIKE IT MIGHT BE IN FLOOD WHEN THAT WAS TAKEN, SO --

BY MR. VAN KLEY:

Q. SO THE CLOSEST DISTANCE BETWEEN THE LANDFILL CELLS AND THE TOUSSAINT RIVER IS APPROXIMATELY 354 FEET?

A. APPROXIMATELY, YES.

MR. SILBERG: MR. VAN KLEY, COULD

YOU PERHAPS INDICATE WHETHER THAT PICTURE INDICATES A FLOOD CONDITION, OR AT LEAST THE DATE OF THAT?

MR. VAN KLEY: ONE OF OUR WITNESSES WILL BE TALKING ABOUT THIS EXHIBIT AND WE'LL ADDRESS IT AT THAT TIME.

BY MR. VAN KLEY:

Q. MR. HERDENDORF, ARE YOU AWARE OF ANY FLOODING IN THE INTERIOR WHERE THE TOUSSAINT RIVER HAS ITS ORIGIN?

A. (DR. HERDENDORF) I'M AWARE OF FLOODING THAT HAS OCCURRED ALONG THE TOUSSAINT RIVER AT SOME WILDLIFE FACILITIES UPSTREAM IN THE TOUSSAINT. I DON'T BELIEVE IT'S NEAR THE ORIGIN, BUT IT'S -- IT'S STILL AT LAKE LEVEL EFFECTIVELY RATHER THAN NEAR THE ORIGIN.

Q. IT IS POSSIBLE, HOWEVER, FOR THERE TO BE SUBSTANTIAL RAINFALL TOWARDS THE INTERIOR WHERE THE TOUSSAINT RIVER IS COMING FROM AND THAT PRODUCE FLOOD LEVELS IN THE TOUSSAINT; IS THAT CORRECT?

A. YES, FLOODS CAN BE PRODUCED ON THE TOUSSAINT BY EXTENSIVE RAINFALL.

Q. ALL RIGHT. THE CALCULATIONS THAT YOU HAVE GIVEN US IN YOUR TESTIMONY ONLY ADDRESS THE

FLOODING FROM LAKE ERIE; IS THAT CORRECT?

A. THAT'S CORRECT.

MR. SILBERG: EXCUSE ME. WHAT CALCULATIONS ARE WE REFERRING TO NOW?

MR. VAN KLEY: I'M REFERRING TO ALL OF THE FLOOD TESTIMONY THAT HE HAS GIVEN US UNDER QUESTION FOUR.

MR. SILBERG: YOU MEAN THE FREQUENCY OF FLOODING?

MR. VAN KLEY: YES, THAT'S CORRECT.

A. (DR. HERDENDORF) YES. THE ANSWER TO YOUR QUESTION IS THAT THE CALCULATIONS I MADE WERE DEALING STRICTLY WITH LAKE ERIE FLOODING, NOT CONSIDERING THE STREAM.

IF I MIGHT ADD, THOUGH, I HAVE NEVER WITNESSED FLOODING OF THE STREAM OF THE MAGNITUDE THAT WAS CAUSED BY THE LAKE ITSELF, SO I BELIEVE THE CALCULATIONS I MADE WOULD BE MORE EXTREME THAN ANYTHING THAT COULD BE EXPERIENCED ON THE STREAM.

Q. NOW, WE'RE NOT TALKING ABOUT THE -- WE'RE TALKING ABOUT CALCULATIONS YOU MADE AS TO SETUP AND THAT TYPE OF THING, IS THAT RIGHT, NOT THE ACTUAL NUMBER OF TIMES THE SITE WILL FLOOD.

A. I THINK IF ONE TAKES A LOOK AT THE MAP

THAT WAS IN THE STATE TESTIMONY THAT SHOWS THE AREA OF FLOODING DURING THE 1972 STORM, I FEEL CONFIDENT IN SAYING THAT THAT KIND OF MAGNITUDE OF FLOODING HAS NOT OCCURRED DUE TO THE STREAM FLOOD SITUATION.

Q. LET ME DIRECT YOU TO TABLE 4.1, WHICH IS IN YOUR TESTIMONY. NOW, TABLE 4.1 JUST INCLUDE -- ONLY INCLUDES THE NUMBER OF PROJECTED TIMES THAT LAKE ERIE HAS FLOODED THE BURIAL SITE; IS THAT CORRECT?

A. THAT'S CORRECT.

Q. OKAY. SO TABLE 4.1 DOES NOT TAKE INTO ACCOUNT ANY FLOODING FROM THE -- CAUSED BY FLOODING ON THE INTERIOR OF THE TOUSSAINT RIVER.

A. YES. IT ONLY -- THE TABLE ONLY DEALS WITH LAKE ERIE EVENTS.

Q. LET ME ASK YOU A QUESTION ABOUT TABLE 4.2. TABLE 4.2 ONLY COVERS THE YEARS 1983 TO 1986. WOULD YOU TELL ME WHY YOU DIDN'T GO FURTHER BACK FOR TABLE 4.2?

A. FOR A VERY PRACTICAL REASON. THAT'S THE -- THE LARGEST DATA SET I HAD AT MY DISPOSAL AT OUR FIELD LABORATORY, PUT-IN-BAY, BUT I FELT THAT A THREE-YEAR PERIOD WAS SUFFICIENT TO UNDERSTAND THE RELATIONSHIP BETWEEN THE TWO

GAUGES.

Q. LET ME DIRECT YOU NOW BACK TO PAGE 37 OF YOUR TESTIMONY, AND ON A COUPLE OF OCCASIONS I'VE NOTED THAT YOU HAVE PHRASED YOUR TESTIMONY USING THE TERM "SIGNIFICANT WAVE ATTACK." FOR EXAMPLE, LOOK UNDER ANSWER A4-9.

A. CORRECT, YES.

Q. ALL RIGHT. I ASSUME THEN THAT THE BURIAL SITE WILL BE SUBJECT TO SOME WAVE ATTACK; IS THAT CORRECT?

A. IF THE AREA WERE TO BE FLOODED AND THERE WAS STANDING WATER AROUND THE BASE OF THE STRUCTURES, IT IS CONCEIVABLE THAT THERE WOULD BE SMALL AMOUNT OF WAVES GENERATED BY THE FETCH AVAILABLE, AND WAVES COULD BE CREATED.

Q. NO DIKE IS INDESTRUCTIBLE, IS IT?

A. I SUPPOSE NOT.

Q. ARE YOU AWARE THAT TOLEDO EDISON, WHEN IT WAS PROPOSING TO BUILD UNITS TWO AND THREE, ALSO PROPOSED TO ERECT A DIKE STRUCTURE BETWEEN THE MARSH AND UNITS TWO AND THREE TO PROTECT THE UNITS?

A. NO. I CAN'T -- I WASN'T INVOLVED WITH THAT PHASE OF UNIT TWO AND THREE. I DON'T KNOW THE SPECIFICS OF IT.

Q. ALL RIGHT. IS ANYBODY FROM THE PANEL AWARE OF THE ANSWER TO THE QUESTION I'VE JUST ASKED?

(NO RESPONSE.)

MR. VAN KLEY: APPARENTLY NO ONE IS AWARE OF THE ANSWER TO THE QUESTION I'VE ASKED, YOUR HONOR.

BY MR. VAN KLEY:

Q. GO BACK TO PAGE -- I GUESS YOU'RE STILL ON PAGE 37, AREN'T YOU?

A. (DR. HERDENDORF) CORRECT.

Q. OKAY. THE BURIAL SITE IS LOCATED IN THE 500-YEAR FLOODPLAIN; CORRECT?

A. NO. I BELIEVE IT'S WITHIN THE 100-YEAR FLOODPLAIN.

Q. WELL, IT WOULD ALSO BE WITHIN THE 500-YEAR FLOODPLAIN; ISN'T THAT RIGHT? IF IT'S WITHIN THE 100-YEAR FLOODPLAIN, IT'S ALSO IN THE 500-YEAR FLOODPLAIN BY ITS DEFINITION.

A. NO. 500-YEAR FLOODPLAIN WOULD BE AT A MUCH HIGHER ELEVATION. THAT MEANS THAT ONCE EVERY 500 YEARS IT WILL FLOOD, SO IT WOULD BE AT A HIGHER ELEVATION.

Q. OKAY. I GUESS YOU AND I ARE SORT OF CRISSCROSSING, NOT MEETING ON OUR INTENTS OF MY

QUESTION AND YOUR ANSWER.

ANY 500-YEAR FLOOD WOULD FLOOD THE BURIAL SITE; IS THAT CORRECT?

A. YES, THAT'S CORRECT.

Q. AND ANY 100-YEAR FLOOD WOULD ALSO FLOOD THE BURIAL SITE?

A. THAT'S CORRECT.

Q. AND ANY 50-YEAR FLOOD WOULD ALSO FLOOD THE BURIAL SITE?

A. THAT'S CORRECT.

Q. AND ALSO ANY 10-YEAR FLOOD WOULD FLOOD THE BURIAL SITE; IS THAT RIGHT?

A. PORTIONS OF THE SITE, NOT ALL OF IT.

Q. DO YOU KNOW HOW MUCH OF THE LAKEFRONT AT DAVID-BESSE HAS ARMORED DIKE?

A. I WOULD ESTIMATE 60 TO 70 PERCENT.

Q. SO THAT LEAVES 30 TO 40 PERCENT OF THE DIKES ARE NOT ARMORED.

A. THAT'S CORRECT.

Q. DO YOU KNOW TO WHAT DESIGN LEVELS, IN OTHER WORDS, STORM SEVERITY DESIGN LEVELS, THE DIKES ALONG THE TOUSSAINT RIVER WERE CONSTRUCTED?

A. I BELIEVE I HAVE A NOTE OF THAT, TO THAT EFFECT, IF I MAY LOOK AT IT HERE.

THE TOUSSAINT DIKES ARE BUILT TO I.G.L.D.

ELEVATION 578.

Q. DO YOU KNOW HOW MUCH OF A SETUP THOSE DIKES WERE DESIGNED TO WITHSTAND?

A. THE TOUSSAINT DIKES ARE INTERIOR DIKES IN TERMS OF THEY'RE NOT DESIGNED TO WITHSTAND THE FULL BRUNT OF LAKE ERIE FORCES.

Q. SO THEY'RE NOT DESIGNED TO WITHSTAND, FOR EXAMPLE, WIND ATTACK FROM LAKE ERIE?

A. THAT IS CORRECT. THEY'RE NOT DESIGNED TO TAKE THE OPEN -- OPEN WATER WAVE ATTACK THAT THE OUTER DIKES FRONTING THE COAST ARE.

Q. ISN'T IT TRUE THAT A WIND SETUP ON LAKE ERIE OF SIX TO EIGHT FEET IS NOT TOO UNLIKELY, IS NOT TOO IMPROBABLE IN THE FUTURE?

A. THAT IS VERY UNLIKELY. THE HIGHEST ON RECORD IS 4.2 FEET.

Q. THE LAKE IS AT HIGHER LEVELS NOW THAN IT WAS FORMERLY; ISN'T THAT RIGHT?

A. THAT IS CORRECT.

Q. IN YOUR TESTIMONY -- I BELIEVE IT'S PAGE 33 -- YOU STATED THAT THE SITE FLOODED 25 TIMES IN 50 YEARS?

A. THAT'S CORRECT.

Q. I WOULD LIKE TO DIRECT YOU BACK TO TABLE 4.1. AND I RECOGNIZE I'M KEEPING EVERYBODY VERY

BUSY JUST FOLLOWING FROM PAGE TO PAGE HERE.

IF YOU LOOK AT TABLE 4.1, ISN'T IT TRUE THAT -- WELL, LET ME START OFF BY ASKING THIS: AT THE RATE OF 25 TIMES IN 50 YEARS, THE BURIAL SITE WILL FLOOD ON THE AVERAGE ONCE EVERY TWO YEARS; IS THAT RIGHT?

A. YES, THAT'S CORRECT.

Q. AND EACH TIME THAT THE SITE FLOODS, THE LANDFILL CELLS ARE SITTING IN WATER; IS THAT RIGHT?

A. THAT'S CORRECT.

Q. WHEN THE FLOODING WATERS LEAVE THE SITE, THEY LEAVE BEHIND WET SOIL; IS THAT CORRECT?

A. YES.

Q. NOW, IF YOU WOULD LOOK AT TABLE 4.1, TABLE 4.1 OBVIOUSLY ENCOMPASSES 50 YEARS, RIGHT?

A. THAT'S CORRECT.

Q. NOW, LOOK AT THE LAST 15 YEARS IN YOUR CHART AND TELL ME HOW MANY TIMES THE BURIAL SITE HAS BEEN PROJECTED TO HAVE FLOODED IN THE LAST 15 YEARS. I BELIEVE THAT WOULD START WITH 1972.

A. INCLUDING 1972, WE HAVE 23 TIMES.

Q. ALL RIGHT. SO IN THE LAST 50 YEARS, THE SITE HAS FLOODED 25 TIMES, AND 23 OF THOSE TIMES HAVE OCCURRED IN THE LAST 15 YEARS; IS THAT RIGHT?

A. THAT'S CORRECT.
Q. ALL RIGHT. SO IF YOU'RE TO AVERAGE OUT THE NUMBER OF TIMES THE SITE HAS FLOODED, WOULDN'T IT BE MORE ACCURATE TO LOOK AT THE LAST 15 YEARS RATHER THAN 50 YEARS?
A. NO. IF YOU'RE GOING TO BE USING THIS AS A PREDICTIVE TOOL FOR THE FUTURE, ONE WOULD ATTEMPT TO GET THE LONGEST DATA BASE ONE CAN. AND SO I WOULDN'T SHORTEN IT TO 15 YEARS. IF WE LOOK AT THE LONG-TERM WATER LEVEL RECORDS, IT MAY BE THAT AFTER -- BY STATISTICALLY LOOKING AT THEM, WE WOULD BE EXPECTING THE LAKE TO BE DROPPING AND RETURNING TO A MORE NORMAL CONDITION.
Q. THERE IS NO INDICATION, HOWEVER, THAT THE LAKE IS RETURNING TO WHAT YOU REFERRED TO AS A NORMAL CONDITION, IS THERE?
A. THE LAKE IS STANDING RIGHT NOW APPROXIMATELY THREE FEET ABOVE MEAN, AND THE CLIMATIC CONDITIONS THAT WE'RE NOW EXPERIENCING ARE LIKELY TO CONTINUE AT THAT HIGH -- AT A HIGH LEVEL AT LEAST FOR THE NEXT SIX MONTHS.
Q. ISN'T IT TRUE THAT YOU REALLY CAN'T TELL WHETHER THE LAKE LEVEL IS GOING TO STAY AT ITS PRESENT LEVELS OR WHETHER IT WILL GO UP OR DOWN?
A. THE CORPS OF ENGINEERS WILL PREDICT SIX

MONTHS IN ADVANCE. THAT'S THE FARTHEST THEY CARE TO EXTEND THEIR PREDICTIONS, AND THAT'S PROBABLY A REASONABLE LENGTH OF TIME. BEYOND THAT, WE JUST DON'T KNOW WHAT THE RAINFALL IS GOING TO BE, WHICH IS THE PRIMARY INFLUENCING FACTOR.

Q. ISN'T IT TRUE THAT THE GOVERNMENT AGENCIES INVOLVED WITH FLOODING -- FOR EXAMPLE, THE GEOLOGIC SURVEY -- HAVE INDICATED THAT THEY BELIEVE THE LAKE WILL CONTINUE TO RISE?

A. NO. I THINK THE CORPS OF ENGINEERS ARE ACTUALLY PREDICTING A LOWER LEVEL FOR THE NEXT SIX MONTHS.

Q. FOR THE NEXT SIX MONTHS?

A. THAT'S CORRECT.

Q. ARE YOU AWARE OF A LETTER WHICH TOLEDO EDISON RECEIVED FROM REGION THREE OF THE N.R.C. WHICH PREDICTED THAT THE LEVELS WOULD REACH THEIR PEAK IN NOVEMBER OF '86?

A. NO, I HAVE NO KNOWLEDGE OF THAT.

Q. ACCORDING TO YOUR TABLE 4.1, THE SITE FLOODED TWO TIMES IN 1984; ISN'T THAT RIGHT?

A. CORRECT.

Q. IN 1985, IT FLOODED FOUR TIMES?

A. THAT'S CORRECT.

Q. AND NOW WE'RE HALFWAY THROUGH '86, AND

IT'S ALREADY FLOODED ONCE; ISN'T THAT RIGHT?

A. YES.

MR. SILBERG: EXCUSE ME. ARE WE TALKING ABOUT ACTUAL FLOODS OR CALCULATED FLOODS?

A. YEAH. I'M GIVING MY CALCULATIONS AND I'VE GIVEN YOU MY ASSUMPTIONS FOR MAKING THOSE CALCULATIONS. WHETHER OR NOT IT ACTUALLY FLOODED OR NOT, THERE IS NO EVIDENCE OTHER THAN EVIDENCE IN THE FIELD THAT INDICATES THERE WAS DEFINITELY NO EROSION IF IT DID FLOOD.

Q. YOU USE THE BEST INFORMATION AVAILABLE TO YOU TO MAKE THESE CALCULATIONS, THOUGH; ISN'T THAT RIGHT?

A. THAT'S CORRECT. THE ONLY WEAKNESS I CAN SEE IN THE CALCULATIONS IS THE FACT THAT I USED A FOUR-HOUR LAG TIME BECAUSE THAT'S THE BEST DATA BASE I HAD. IT MAY BE THAT THERE IS A LONGER LAG TIME. IF THAT IS TRUE, THAT MEANS THERE'D BEEN A LESS INCIDENCE OF FLOODING, WHICH IS QUITE LIKELY.

Q. ARE YOU AWARE OF ANY RADIOACTIVE WASTE LANDFILLS OR ANY SOLID WASTE LANDFILLS THAT ARE LOCATED IN A TEN-YEAR FLOODPLAIN?

A. I'M SORRY. THAT'S NOT MY FIELD AT ALL. I'M NOT FAMILIAR WITH THEM.

Q. ANYBODY FROM THE PANEL AWARE OF ANY

RADIOACTIVE OR SOLID WASTE LANDFILLS THAT HAVE EVER BEEN SITED IN A TEN-YEAR FLOODPLAIN?

A. (DR. JACKSON) I CAN CITE ONE KIND OF SITUATION WHICH IS PERHAPS ANALOGOUS IN WHICH HIGH-LEVEL RADIOACTIVE MATERIALS WERE AGGLOMERATED WITH SAND AND PUT INTO A CRATER ON THE OCEAN REEF IN DIRECT CONTACT WITH THE OCEAN WATER.

Q. WHAT KIND OF WASTE WAS THAT?

A. (DR. JACKSON) HIGH-LEVEL RADIOACTIVE WASTE.

Q. AND WHAT WAS THE HIGH-LEVEL RADIOACTIVE WASTE PUT IN?

A. (DR. JACKSON) IT WAS MIXED WITH CORAL, SAND AND CEMENT.

Q. HASN'T THAT METHOD OF DISPOSAL BEEN OUTLAWED?

A. NO. THIS WAS THE METHOD WHICH WAS DESIGNED AND APPROVED BY N.R.C.

Q. WHEN WAS IT APPROVED?

A. THIS WAS DONE ROUGHLY TEN YEARS AGO, AND IN RESPONSE TO THE FACT THAT THESE RADIOACTIVE WASTES COULD NOT BE DISPOSED OF AT SEA.

Q. ISN'T IT TRUE THAT THE N.R.C. NO LONGER ALLOWS ANY KIND OF RADIOACTIVE WASTE DISPOSAL AT SEA?

A. THESE WERE NOT DISPOSED OF AT SEA.
Q. WHAT WAS DONE WITH THEM THEN?
A. THEY WERE PUT INTO A CRATER ON THE REEF.
Q. YOU'RE TALKING ABOUT SOME KIND OF TEMPORARY STORAGE?
A. SEVERAL THOUSAND YEARS.
Q. AND THAT'S NOT DISPOSAL?
A. IT'S LONG-TERM ENTOMBMENT AND VERY MUCH THE SAME KIND OF TECHNIQUE THAT'S BEING PROPOSED HERE.

JUDGE KLINE: LET ME CLARIFY, DID YOU MEAN THAT THIS WAS APPROVED BY N.R.C. OR ITS PREDECESSOR, A.E.C.?

THE WITNESS: (DR. JACKSON) I THINK BY THE TIME IT WAS FINALLY PUT INTO PLACE, IT WAS N.R.C.

JUDGE KLINE: OKAY.

JUDGE HOYT: WHY DON'T WE ASK YOU A COUPLE OF QUESTIONS.

COUNSEL, ARE YOU GOING TO PLACE IN EVIDENCE, GIVE US A REFERENCE ANY FURTHER TO THE LETTER THAT YOU'VE REFERRED TO FROM THE REGION THREE OF N.R.C.?

MR. VAN KLEY: I CAN DO THAT IF YOU SO DESIRE, YOUR HONOR.

JUDGE HOYT: YES, I WOULD LIKE VERY MUCH TO SEE WHAT YOU HAVE REFERENCE TO.

MR. VAN KLEY: SURE. ALL RIGHT. I DON'T THINK I WOULD HAVE ANY MORE QUESTIONS ON THIS PARTICULAR QUESTION FOR YOU.

DR. HERDENDORF: I'D LIKE TO GO BACK, IF I COULD, AND COMPLETE THE ANSWER TO THAT QUESTION, IF I MIGHT.

I BELIEVE YOUR QUESTION DEALT WITH NOT JUST RADIOACTIVE WASTE. IT DEALT WITH OTHER HAZARDOUS MATERIALS BEING DISPOSED OF?

BY MR. VAN KLEY:

Q. I WAS REFERRING TO BOTH RADIOACTIVE WASTE AND SOLID WASTE.

A. (DR. HERDENDORF) I CAN THINK OF A NUMBER OF OTHER CASES WHERE MATERIAL HAVE BEEN DEEMED HEAVILY POLLUTED AS HAZARDOUS MATERIAL, HEAVY METAL, THAT ARE PLACED DEFINITELY WITHIN THE FLOOD ZONE, AND THIS WOULD BE VIRTUALLY EVERY HARBOR ALONG LAKE ERIE HAS A CONTAINED DIKE DREDGED DISPOSAL SITE. THESE MATERIALS ARE TOO HAZARDOUS TO BE PLACED IN OPEN LAKE DISPOSAL IN THE LAKE AND ARE PLACED BEHIND THESE STRUCTURES: TOLEDO, LORAIN, ASHTABULA'S BEING CONTEMPLATED, HURON.

Q. WHAT IS THE ORIGIN OF THESE WASTES?

A. THESE ARE MATERIALS THAT ARE DREDGED FROM THE NAVIGATION CHANNELS. THEY COME FROM A VARIETY OF INDUSTRIAL AND AGRICULTURAL SOURCES.

Q. ALL RIGHT. SO YOU'RE TALKING ABOUT THE DREDGE AND FILL OPERATIONS, FOR EXAMPLE, THE ARMY CORPS OF ENGINEERS?

A. THAT'S CORRECT.

Q. ALL RIGHT.

A. (MR. HENDRON) IF I MAY CONTRIBUTE AN ANSWER TO THE QUESTION THAT WAS RAISED, IF ANYONE OF THE PANEL HAS EXPERIENCE IN LOCATING LANDFILLS, I THINK AS A GENERIC TERM, WITHIN THE TEN-YEAR FLOODPLAIN -- WE'VE GOT SITES DOWN IN THE COASTAL REGIONS OF THE GOLF COAST REGION WHERE, IN FACT, THESE SITES ARE WELL WITHIN 100-YEAR FLOODPLAIN. WHETHER THEY'RE WITHIN A TEN-YEAR FLOODPLAIN OR NOT, I'D LIKE TO HAVE THE OPPORTUNITY TO MAKE SOME CALLS THIS EVENING TO REFRESH MY MEMORY, IF THAT'S OKAY WITH THE JUDGE

TYPICALLY THE DESIGN BEING PROPOSED AT THIS LANDFILL AT DAVID-BESSE IS VERY SIMILAR TO THE DESIGN CONCEPT THAT WE ARE REQUIRED TO DO IN THESE LANDFILLS, AND THAT IS TO PROTECT THE WASTE CELLS WITH REINFORCED DIKES SUCH AS THAT BEING PROPOSED TO ABOVE THE 100-YEAR FLOOD LEVEL.

JUDGE HOYT: YES, DOCTOR, IF YOU WILL DO THOSE CALCULATIONS OVERNIGHT AND LET US HAVE THE BENEFIT OF THAT, ALONG WITH SOME OF THE OTHER ANSWERS THAT WILL COME IN TOMORROW, WE WILL BE VERY GRATEFUL TO YOU.

MR. VAN KLEY: YOUR HONOR, CAN WE HAVE THE NAMES OF THOSE LANDFILL SITES NOW?

BY MR. VAN KLEY:

Q. DO YOU REMEMBER THE NAMES OF THEM?

A. (MR. HENDRON) WELL, THE ONE THAT I'M THINKING OF IS A HAZARDOUS WASTE LANDFILL DOWN IN CARLYSS, LOUISIANA THAT WAS PERMITTED -- I BELIEVE THE DATE OF PERMIT WAS 1980, BUT I COULD BE CORRECTED ON THAT. AND I DON'T KNOW WHAT THE FLOOD FREQUENCY WAS AT THAT SITE, BUT I BELIEVE IT WAS LESS THAN 100 YEARS, AND I WOULD REQUEST THE OPPORTUNITY TO GET A NUMBER ON THAT PARTICULAR SITE.

JUDGE HOYT: IS THAT THE ONLY ONE YOU HAD IN MIND?

THE WITNESS: (MR. HENDRON) THAT'S THE ONLY ONE THAT I PREFER TO NAME NOW, AND I MAY MAY BRING SOME ADDITIONAL LANDFILLS IN TOMORROW, BUT THAT ONE IN PARTICULAR IS ONE THAT I'D LIKE TO OFFER.

BY MR. VAN KLEY:

Q. HOW DO YOU SPELL CARLYSS?

A. (MR. HENDRON) IT'S CARLYSS, C-A-R-L-Y-S-S.

Q. DO YOU KNOW THE NAME OF THE COMPANY THAT'S PROPOSING THAT HAZARDOUS WASTE FILL?

A. WELL, THEY'RE OPERATING.

Q. ALL RIGHT. WHAT'S THE NAME OF THE COMPANY?

A. THE NAME OF THE COMPANY IS WASTE MANAGEMENT, INCORPORATED.

MR. VAN KLEY: I HAVE NO FURTHER QUESTIONS, YOUR HONOR.

JUDGE HOYT: ALL RIGHT. ANY QUESTIONS FROM THE OTHER INTERVENORS IN RELATION TO FOUR?

MR. LODGE: YES, YOUR HONOR.

JUDGE HOYT: ALL RIGHT, MR. LODGE.

CROSS-EXAMINATION

BY MR. LODGE:

Q. JUST TO CLARIFY, DOCTOR, YOUR DATA ON TABLE 4.1 IS FROM THE TOLEDO READING STATION, I GUESS, AT TOLEDO HARBOR; IS THAT CORRECT?

A. THAT'S CORRECT. IT'S THE NOAA GAUGING

STATION.

Q. DO YOU KNOW WHERE BAYVIEW IS, BAYVIEW, OHIO?

A. I THINK I KNOW OF THREE BAYVIEW, OHIO'S, BUT IF YOU CAN --

Q. DO YOU KNOW OF ONE IN ERIE COUNTY?

A. YES. NEAR THE BAY BRIDGE?

Q. OKAY. THAT'S --

A. THAT THE ONE?

Q. THAT WOULD BE SOMEWHERE BETWEEN SANDUSKY AND DAVIS-BESSE; IS THAT CORRECT?

A. WELL, MUCH CLOSER TO SANDUSKY.

Q. OKAY. HOW FAR FROM SANDUSKY?

A. I BELIEVE IT'S IN THE SANDUSKY CITY LIMITS. I'M NOT CERTAIN.

Q. HOW FAR WOULD YOU ESTIMATE BAYVIEW TO BE FROM THE DAVIS-BESSE SITE?

A. I WOULD GIVE YOU A VERY CRUDE ESTIMATE, MAYBE 20, 25 MILES.

Q. HOW FAR IS SANDUSKY FROM THE DAVIS-BESSE SITE?

A. 30 MILES.

Q. I'LL HAVE TO CHECK MY ODOMETER ON THE WAY BACK.

IN THE COURSE OF PUTTING TOGETHER YOUR

TESTIMONY, DID YOU REVIEW ANY DOCUMENTS, STUDIES OR PUBLICATIONS BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY CONCERNING THE -- THEIR DESIGNATIONS OF FLOODPLAIN AREAS?

A. YES, I HAVE SEEN THEIR DOCUMENTATION.

Q. DO YOU RECALL REVIEWING ANY DOCUMENTATION THAT MAY HAVE BEEN PUBLISHED OR FINALIZED IN 1985 CONCERNING BAYVIEW?

A. NO, I'VE NOT SEEN THAT SPECIFIC REPORT ON BAYVIEW.

Q. DO YOU RECALL REVIEWING ANY 1985 DATA ON HIGH WATER MARKS OR HIGH WATER MARK MEASUREMENTS FROM FEMA THAT WAS PUBLISHED IN 1985?

A. NO. I BELIEVE FEMA, THOUGH, RELIES UPON THE CORPS OF ENGINEERS AS THEIR TECHNICAL SOURCE RATHER THAN HAVING THEIR OWN EXPERTISE IN THIS AREA.

Q. DO YOU RECALL SEEING ANY REVISIONS OF ANY OHIO MUNICIPAL GOVERNMENTS 100-YEAR FLOODPLAIN LEVELS?

A. FOR WHAT YEAR?

Q. FOR 1985.

A. NO. I REVIEWED THE MOST RECENT INFORMATION FOR OTTAWA COUNTY AND DIDN'T SEE ANY THERE.

Q. IN REVIEWING YOUR TABLE 4.1 -- I'D LIKE TO SHARE WITH YOU SOME PROOFING THAT I'M PRIVY TO. I SEE -- AND CORRECT ME IF I'M WRONG -- THAT FOR THE YEARS 1936 THROUGH 1947, YOU SHOW NO FLOODING OF TOLEDO HARBOR MORE THAN SIX FEET ABOVE THE, I GUESS, LOW WATER DATUM.

A. THAT'S CORRECT.

Q. OKAY. AND THEN FOR THE PERIOD 1948 THROUGH '71, WHICH WOULD BE 23 YEARS, I COUNT EIGHT FLOODS OF MORE THAN SIX FEET BUT LESS THAN SEVEN FEET. IS THAT CORRECT?

A. I DIDN'T MAKE THE CALC, BUT I'LL TRUST YOU.

Q. OKAY. YOU WOULD ACCEPT THAT FROM YOUR DATA. AND I ALSO SEE 14 FLOODS FOR THE PERIOD OF, LET'S SAY, 1972 THROUGH -- YOUR DATA ENDS IN THE FIRST HALF OF 1986 -- 14 FLOODS OF MORE THAN SEVEN FEET INCLUDING THREE OF MORE THAN EIGHT FEET.

A. YES.

Q. YOU WOULD ACCEPT THAT?

A. YES.

Q. DON'T YOU SEE ANY KIND OF TREND IN THAT DATA?

A. VERY MUCH SO.

Q. AND WHAT IS THAT?

A. WE ARE EXPERIENCING A PERIOD OF ABNORMALLY HIGH WATER LEVEL RIGHT NOW IN WHICH THE AREA'S FLOODING MUCH MORE BECAUSE LAKE ERIE IS MUCH HIGHER THAN IT HAS BEEN IN THE HISTORIC PAST.

Q. BUT I TAKE IT FROM YOUR EARLIER TESTIMONY YOU DON'T KNOW HOW LONG A PERIOD THIS MAY BE; CORRECT?

A. WELL, LOOK AT IT THIS WAY. WE HAVE WATER LEVELS THAT GO BACK TO 1860. WE KNOW WHAT THE MEAN LEVEL IS FOR THAT PERIOD. WE KNOW WE'RE THREE FEET ABOVE THAT MEAN. THAT'S A FAIRLY LONG PERIOD OF RECORD. IF ONE -- IF ONE DOESN'T KNOW WHETHER WE'VE HAD A CLIMATIC CHANGE -- AND WE MAY HAVE HAD ONE -- BUT IF ONE -- IF WE'RE GOING THROUGH THE NORMAL KIND OF CYCLIC EVENTS THAT WEATHER DOES GO THROUGH, WE SHOULD EXPECT THAT WE SHOULD RETURN THEN TO THE MEAN. THAT'S A LONG PERIOD OF TIME ON WHICH THE MEAN WAS DETERMINED. AND IF I HAD TO LAY MONEY ON WHETHER OR NOT IT'S GOING TO STAY HIGH LOOKING AT 160 YEARS OF RECORD, I THINK I WOULD VOTE FOR IT RETURNING TO A LOWER PERIOD.

Q. SO WHAT YOU'RE SAYING IS IS YOUR LONG VIEW WOULD BE -- YOU CAN'T INFER, FROM DATA GOING BACK TO 1860, YOU CAN'T INFER, BUT YOU'RE SIMPLY

TAKING THE GAMBLE THAT THE LAKE LEVEL WILL DROP BACK TO A LOWER LEVEL?

A. I'M USING GOOD STATISTICAL PRACTICE IN SAYING THAT THE LAKE LEVEL WILL RETURN TO ITS MEAN.

Q. WAS THE MEASURING AS PRECISE OR STANDARDIZED IN 1860 AS IT WAS IN 1985?

A. I BELIEVE THAT THE LEVELING WAS GOOD ENOUGH TO PICK UP THESE MAJOR KINDS OF CHANGES. WE PROBABLY HAVE INCREASED OUR TECHNOLOGY IN COMPUTERIZATION, BUT I THINK THE LEVELS WERE ACCURATE TO THE LEVEL OF THE -- OF OUR DISCUSSION HERE.

Q. I TAKE IT THAT YOU'VE PROBABLY REVIEWED DATA IN INTERVENING YEARS BETWEEN 1860 AND THE EARLY '30'S, 1930'S; IS THAT ALSO CORRECT?

A. YES. THE TOLEDO GAUGE WAS NOT IN OPERATION ALL THE WAY BACK TO 1860. WE HAD A LAKE ERIE GAUGE AT CLEVELAND THAT GIVES US OUR MONTHLY MEAN BASE BACK AT THAT TIME.

Q. HAVE YOU -- DO YOU HAVE ANY RECALL OF SO LARGE AN INCREASE OVER, SAY, A 37-, 38-YEAR PERIOD ANYWHERE BETWEEN 1860?

A. THIS IS THE MOST ABNORMAL PERIOD THAT WE'VE EVER EXPERIENCED. THE ONLY EXCEPTION IS THE

EXTREMELY LOW PERIOD THAT MIRRORS THIS THAT WE HAD DURING THE DUST BOWL YEARS OF THE THIRTIES. THE WATER LEVEL THEN WAS EXTREMELY LOW AT THAT TIME AS IT IS HIGH NOW.

Q. IS THERE ANY MEANING YOU CAN SEE IN THE LENGTH OF CYCLES? IS THERE A CYCLICAL AFFECT? IS THAT YOUR ARGUMENT?

A. DEFINITELY THERE ARE CYCLES. THERE IS A LOT OF DEBATE AS TO WHAT THE PERIOD OF THOSE CYCLES ARE. YOU SEE EVERYTHING FROM ONE-YEAR, EIGHT-YEAR, 11-YEAR, 22-YEAR, 36-YEAR, EVEN ONE GENTLEMAN SUGGESTED A 99-YEAR PERIOD OF TIME. IT'S A LITTLE HARD TO VERIFY THAT.

THERE'S BEEN A LOT OF SPECULATION AND A LOT OF MODELING DONE ON LEVELS. AND NO, I'M NOT BASING MY ESTIMATES OR MY POSITION ON ANY PARTICULAR CYCLICAL MODEL. I DON'T KNOW WHEN IT'S GOING TO RETURN. I'M JUST SAYING STATISTICALLY IT SHOULD RETURN TO THE MEAN.

Q. HOW LONG WOULD IT TAKE TO RETURN TO THE MEAN IF YOU ASSUME NORMAL PRECIPITATION FOR THE REGION?

A. I WOULD SAY THAT IF WE RETURN TO NORMAL PRECIPITATION, WE WOULD BE LOOKING AT PROBABLY A YEAR OR MORE OF HIGHER LAKE LEVELS BECAUSE LAKE

SUPERIOR'S STANDING ABOUT ONE FOOT ABOVE AVERAGE RIGHT NOW. THAT MEANS THAT WE HAVE TO RETURN THAT LAKE SYSTEM TO ITS NORMAL CONDITIONS UNTIL WE CAN GET THOSE -- THAT ALL THE WAY FLUSHED THROUGH OUR SYSTEM. SO WE'RE NOT TALKING ABOUT A SHORT PERIOD OF TIME. WE'RE TALKING ABOUT MANY MONTHS.

Q. DOES YOUR DATA -- I TAKE IT YOUR DATA AND YOUR TESTIMONY DOES NOT INCORPORATE ANY FACTORING FOR LOCALIZED HIGH-VOLUME RAIN STORMS AND RUNOFF THAT MIGHT CAUSE LOCALIZED FLOODING; IS THAT CORRECT?

A. IT'S BEEN SHOWN THAT THE CONTRIBUTION OF RUNOFF WATER FROM LAKE ERIE -- TO LAKE ERIE FROM ITS OWN CONTRIBUTARY STREAMS IS A MINOR COMPONENT OF THE WATER LEVEL SITUATION IN LAKE ERIE. 95 PERCENT OF THE WATER ENTERING LAKE ERIE COMES IN VIA THE DETROIT RIVER, SO THAT WHAT HAPPENS LOCALLY IS NORMALLY A FAIRLY SMALL ASPECT.

THAT DOESN'T MEAN THAT YOU CAN'T HAVE LAND FLOODING ADJACENT TO THE CONTRIBUTARIES COMING IN. IT JUST MEANS THAT THE VOLUME OF WATER COMING IN FROM THE OHIO CONTRIBUTARIES, LET'S SAY, FORM A VERY SMALL COMPONENT OF THE LEVEL OF THE LAKE.

Q. IN YOUR RESEARCH IN PREPARATION FOR YOUR

TESTIMONY, DID YOU NOTE ANY JUNE 2ND, 1986 FLOODING? I DON'T FIND IT IN TABLE 4.1.

A. I'M TRYING TO SEE WHAT THE CUT-OFF DATE IS.

Q. IT'S THE END OF JUNE.

A. THERE WAS NOT AN EVENT THAT DATE.

Q. ACCORDING TO YOUR DATA AT TOLEDO.

A. YES. CORRECT.

Q. TURNING TO TABLE 4.1, COULD YOU EXPLAIN TECHNICALLY THE MANNER OF CALCULATING THE PERIOD OF FLOODING CATEGORY, PLEASE?

A. THE DURATION --

Q. YES.

A. -- OF THE FLOOD TIME?

Q. YES.

A. QUITE SIMPLY, LOOKING AT THE RECORDS FROM THE TOLEDO GAUGE, I NOTED THE TIME AT WHICH IT -- THE WATER LEVEL EXCEEDED SIX FEET ABOVE LOW WATER DATUM AND THE TIME THAT IT DROPPED DOWN BELOW, AND THAT SPAN OF TIME THEN IS INDICATED THERE AS THE PERIOD OF TIME GIVEN IN MILITARY TIME, AND THAT THEN IS THE DURATION OF THE FLOOD PERIOD. IT'S EXPLAINED IN TABLE TWO, THAT MAY BE OUT OF SEQUENCE WITH THE ACTUAL TIME OF OCCURRENCE AT LOCUST POINT, BUT THE DURATION SHOULD BE

APPROXIMATELY THE SAME LENGTH OF TIME.

MR. LODGE: NOTHING FURTHER.

JUDGE HOYT: VERY WELL. ARE YOU PREPARED TO GO INTO QUESTION FIVE?

MS. SIGLER: I'M GOING TO ADDRESS QUESTION NUMBER FIVE FOR THE STATE.

CROSS-EXAMINATION

BY MS. SIGLER:

Q. MR. HERDENDORF, YOU THOUGHT YOU WERE OFF THE HOOK, HUH?

A. (MR. HERDENDORF) I WAS HOPING.

Q. YOU STATED IN YOUR TESTIMONY THAT ON APRIL 8TH AND JUNE 9TH, YOU INSPECTED THE BURIAL SITE TO DETERMINE IF THERE HAD BEEN ANY SOIL EROSION; CORRECT?

A. THAT'S CORRECT.

Q. AND ARE YOU ACQUAINTED AT ALL WITH THE HISTORICAL USE OF THIS BURIAL SITE?

A. NO, I CAN'T SAY WITH ANY SPECIFICS THAT I AM. IT'S BEEN UNDER THE CONTROL OF THE TOLEDO EDISON COMPANY SINCE PROBABLY 19 -- LATE 1960'S, BUT I DON'T KNOW WHAT THE SPECIFIC USE HAS BEEN.

Q. ARE YOU AWARE THAT THE AREA'S BEEN FARMED, THERE HAVE BEEN CROPS GROWN ON THE AREA?

A. I ASSUME THAT SOMETIME IN ITS HISTORY IT

WAS PROBABLY WAS FARMLAND BECAUSE IT'S COMPLETELY DEVOID OF ANY LARGE TREES.

Q. DO YOU KNOW WHEN THE LAST PERIOD OF TIME THAT WAS USED FOR ANYTHING -- THE SITE WAS USED FOR ANYTHING AT ALL?

A. NO, I CAN'T SAY THAT.

Q. FARMING ERASES ANY EVIDENCE OF EROSION, DOESN'T IT?

A. WELL, NO, BUT IT CAN MASK SMALL EROSION. BUT IF YOU'RE THINKING OF SOME OF THE MAJOR GULLIES, OF COURSE, THOSE WOULD TAKE MORE THAN JUST NORMAL FARMING TO ERASE.

Q. ISN'T THE SITE VEGETATED RIGHT NOW?

A. IT IS, YES.

Q. SO THIS VEGETATION, YOU'RE SAYING, THAT'S ON IT RIGHT NOW WOULD MASK SOME SMALL EROSION THAT YOU WOULD HAVE BEEN ABLE TO TELL HAD OCCURRED?

A. WELL, THINGS I WAS LOOKING FOR WOULD BE DISRUPTED VEGETATION. I WOULD HAVE SUSPECTED THAT THAT KIND OF THING, EITHER DISRUPTED VEGETATION, GULLYING, OR ACTUALLY DEPOSITION OF MATERIAL; DURING A FLOODING EVENT, AS THE WATER SLACKENS, THE MATERIAL THAT'S LEFT BEHIND IN THE WATER WOULD SETTLE OUT, AND YOU MIGHT FIND A COATING OF SEDIMENT ON THE PLANTS, LEAVES, AND I FOUND NO

EVIDENCE OF ANY OF THAT KIND OF THING.

Q. WELL, WHAT OTHER EVIDENCE WOULD YOU BE LOOKING FOR TO FIND TO LOOK FOR SOIL EROSION?

A. WELL, THE EFFECTS OF FLOODING, YOU MIGHT LOOK FOR TRASH LINES OR DEBRIS, THIS KIND OF

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THING, LEFT BEHIND. BUT MAINLY I WAS LOOKING FOR RIVULETS AND SMALL EXCAVATIONS IN THE SOIL AND INTO THE SURROUNDING DIKES.

Q. WELL, DOESN'T EVIDENCE OF EROSION IN SOIL REALLY LAST A VERY SHORT PERIOD OF TIME?

A. REALLY DEPENDS ON THE CLIMATIC REGIME. IN CERTAIN AREAS, EROSIONAL FEATURES CAN LAST THOUSANDS OF YEARS.

Q. IN THIS AREA THAT WE'RE SPECIFICALLY --

A. IN THIS AREA, I WOULD EXPECT THAT I -- IF THERE WAS SEVERE EROSION OR -- YOU KNOW, WHAT I MEAN BY SEVERE EROSION, SEVERAL INCHES OF MATERIAL REMOVED, THAT SHOULD PERSIST OVER A FEW SEASONS.

Q. A FEW SEASONS?

A. I WOULD THINK SO.

Q. WHAT ABOUT EROSION IN CLAY? DOESN'T THAT GENERALLY LAST ABOUT FOUR OR FIVE YEARS, THE EVIDENCE OF IT?

A. NO. CLAY IS QUITE A RESISTANT MATERIAL. IT HANGS TOGETHER QUITE WELL, AND IT DOESN'T

SLOUGH, AND SANDY -- SANDIER SOIL OR A SOIL WITH A LOT OF ORGANIC MATERIAL WOULD TEND TO EVEN OUT MUCH MORE EASILY THAN A HARD COMPACT CLAY WHICH TENDS TO HOLD ANY FEATURE THAT'S GOUGED INTO IT.

Q. WELL, WOULDN'T ANY EVIDENCE OF, SAY, THE 1972 FLOODING BE ERASED BY NOW?

A. YES, I WOULD -- I WOULD THINK THAT IN THAT SPAN OF TIME. I WASN'T EXPECTING TO FIND ANY '72 EVIDENCE. I WAS LOOKING FOR MORE RECENT EVENTS.

Q. WHAT ABOUT FREEZE AND THAW? DOES THIS ERASE EVIDENCE OF EROSION?

A. IT CAN. I SUPPOSE IT CAN MOVE PARTICLES TOGETHER.

Q. ISN'T IT TRUE THAT VEGETATION, WHILE IT MIGHT PROVIDE SOME PROTECTION AGAINST EROSION FROM RUNOFF, WOULDN'T PROTECT MUCH -- WOULDN'T PROTECT THE AREA FROM EROSION FROM WAVE ACTION?

A. WELL, IT WOULD PROVIDE SOME PROTECTION, BUT DEPENDING ON THE MAGNITUDE OF THE WAVE. FOR EXAMPLE, THE DEPARTMENT OF AGRICULTURE DOES RECOMMEND PLANTING ON WATER COURSES THAT ARE FAIRLY RAPIDLY MOVING STREAMS. THAT'S NOT A WAVE ACTION, BUT THAT'S FAIRLY RAPIDLY MOVING WATER. WAVE ACTION HAS A LOT MORE FORCE BEHIND IT, AND A

BREAKING WAVE CAN BE QUITE DISRUPTIVE, AND A BREAKING WAVE OF SEVERAL FEET HIGH PROBABLY CAN UPLIFT VEGETATION.

Q. THE BURIAL CELLS, AS YOU'VE HEARD IN THE PREVIOUS TESTIMONY, ARE GOING TO BE COVERED WITH A GRASS.

A. YES. THAT'S MY UNDERSTANDING.

MR. SILBERG: I'M SORRY. THAT'S THE TOP OF THE BURIAL CELLS.

MS. SIGLER: RIGHT, THE TOP.

BY MS. SIGLER:

Q. CAN YOU -- DO YOU KNOW WHAT'S GOING TO -- I DON'T KNOW IF THIS IS BEST ADDRESSED TO YOU OR MAYBE MR. SWIM -- BUT WHAT'S GOING TO KEEP THIS VEGETATION FROM DYING? IT'S GOING TO BE ELEVATED TO THE ELEMENTS, THE SUN, RAIN. WHAT'S GOING TO KEEP IT FROM DYING?

A. THAT SOUNDS LIKE A MANAGEMENT QUESTION.

Q. PASS THE BUCK.

A. (MS. SCOTT-WASILK) IF YOU DON'T MIND, I'LL ANSWER THAT QUESTION.

MY ENVIRONMENTAL MONITORING SECTION IS TASKED WITH INSPECTING THAT SITE THREE -- THREE TIMES OR MORE PER WEEK, THEY DRIVE PAST THAT SITE ON INSPECTION TOURS OF THE PROPERTY, AND THINGS

THAT ARE SO OBVIOUS AS GRASS, VEGETATION, DYING WOULD BE READILY DETECTED BY THEIR NORMAL ROUTINE SITE INSPECTIONS THAT ARE CONDUCTED SEVERAL TIMES A WEEK.

Q. ISN'T IT TRUE THAT YOU'RE ONLY GOING TO DO AN INSPECTION OF THE SITE TWICE A YEAR?

A. (MS. SCOTT-WASILK) A FORMALLY DOCUMENTED INSPECTION WILL BE CONDUCTED TWICE A YEAR, BUT LIKE I SAID, IT'S STANDARD OPERATING PROCEDURE FOR MY ENVIRONMENTAL MONITORING SECTION TO INSPECT THE SITE, DO AN ENVIRONMENTAL SURVEY, SEVERAL TIMES A WEEK.

Q. WHAT IF IT LOOKS LIKE IT'S DYING? ARE YOU GOING TO WATER IT?

A. (MS. SCOTT-WASILK) CERTAINLY SOUNDS LIKE A VERY PRACTICAL IDEA, IF IT LOOKS LIKE THE DYING VEGETATION WILL COMPROMISE THE ABILITY OF THE DIKE TO SHED WATER.

Q. DURING A DRY PERIOD, WILL THE DIKE BE IRRIGATED TO MAINTAIN THE VEGETATION?

A. (MS. SCOTT-WASILK) I'D RATHER LEAVE THAT TO THE PROFESSIONAL JUDGMENT OF THE ENVIRONMENTAL PEOPLE WHEN THEY'RE -- WHEN THEY'RE CONDUCTING THEIR ROUTINE SITE ENVIRONMENTAL INSPECTIONS.

Q. SO YOU DON'T KNOW RIGHT NOW. IF IT WERE

TO DIE, WOULD YOU REPLANT IT?

A. WE'VE MADE A COMMITMENT IN THIS TESTIMONY THAT WE'RE GOING TO MAINTAIN VEGETATIVE COVER, AND THAT'S -- THE IMPLICATION IS WE WILL MAINTAIN IT IN A LIVE STAGE, SO IF THE VEGETATION DOES DIE, WE WILL REPLANT IT TO KEEP OUR COMMITMENT.

Q. SO YOU'D HAVE TO UPROOT THE SOIL TO REPLANT DURING THIS PERIOD?

A. NOT NECESSARILY. PROBABLY THE MORE REASONABLE PRACTICE WOULD BE TO CAST APPROPRIATE SEED OUT AND THEN PUT SOME KIND OF STRAW OVER ON TOP OF THAT AND NOT ACTUALLY DISRUPT THE SURFACE NO MORE THAN MAYBE A QUARTER OF AN INCH.

Q. YOU WERE SAYING THAT YOU WOULD MOST LIKELY WATER THIS IF IT WERE DRY. WOULD THIS PENETRATE THE COVER?

MR. SILBERG: EXCUSE ME. CAN WE GET AN ANSWER TO THAT QUESTION?

JUDGE HOYT: YOU MEAN AS TO WHETHER OR NOT IT WILL BE WATERED?

MR. SILBERG: YEAH.

MS. SIGLER: SHE HAD SAID IT WOULD BE WATERED. SHE SAID SHE DIDN'T KNOW IF IT WOULD BE IRRIGATED, I BELIEVE.

JUDGE HOYT: WELL, LET'S NOT

HAVE A CONFLICT. ARE YOU GOING TO WATER IT?

THE WITNESS: (MS. SCOTT-WASILK) WE'RE GOING TO MAINTAIN THE VEGETATION IN A LIVE STATE. IF THAT MEANS WE HAVE TO WATER IT TO MAINTAIN THE COMMITMENT, YES.

JUDGE HOYT: THE ANSWER'S YES, MA'AM. LET'S GO ON. WHAT WAS YOUR NEXT QUESTION THEN? I THINK MR. SILBERG JUMPED IN ON THAT.

BY MS. SIGLER:

Q. WOULD THIS WATER PENETRATE THE COVER?

A. I WOULDN'T EXPECT IT TO HAVE ANY DIFFERENT PENETRATING CHARACTERISTICS THAN THE RAIN WATER.

Q. WHEN THE VEGETATION DIES, DOESN'T IT LEAVE ROOTS? DOESN'T IT LEAVE CHANNELS GOING DOWN IN, ROOT HOLES?

A. THE GRASS ITSELF IS GOING TO PENETRATE INTO THE TOPSOIL. WE'RE NOT TALKING ABOUT THE CLAY CAP RIGHT NOW.

Q. WELL, HOW ARE YOU GOING TO KEEP SAPLINGS AND OTHER THINGS FROM GROWING IN THIS AREA THAT WOULD PENETRATE THE CLAY? FOR INSTANCE, DANDELIONS WHICH CAN GO DOWN 36 INCHES AND CAN PENETRATE CLAY.

A. THAT'S -- THAT'S -- THAT PARTICULAR

SITUATION IS SOMETHING THAT WE WOULD ASSESS AT THE TIME OF OUR OBSERVATIONS. IF WE FELT THAT SAPLINGS OR DANDELIONS WERE COMPROMISING THE INTEGRITY OF THE CLAY LINER, WE WOULD DEAL WITH IT AT THAT TIME. THAT'S ONE OF THE REASONS WHY WE'RE DOING THOSE SEMI-ANNUAL FORMAL INSPECTIONS.

Q. SO YOU REALLY DON'T KNOW AT THIS POINT; IS THAT RIGHT?

A. THERE ARE A NUMBER OF -- THERE ARE SOME -- BY DEFINITION, THERE ARE SOME UNKNOWNS; DANDELIONS SAMPLINGS. THAT'S WHY WE ARE COMMITTED TO THE SEMI-ANNUAL FORMAL INSPECTIONS.

Q. NOW, EARLIER, I THINK MR. SWIM SAID THAT ON THE AREA -- ON THE AREA ON THE EDGE OF THE CELLS IT'S GOING TO BE QUITE THIN, THE TOPSOIL? NO? WHERE IT'S ONLY GOING TO BE, WHAT?

A. TWO FEET.

Q. TWO FEET. BUT THE TOPSOIL -- HOW THICK DO YOU EXPECT THE TOPSOIL TO BE ON THE EDGES?

A. (MR. SWIM) WE HAVEN'T DETERMINED EXACTLY HOW THICK THE TOPSOIL WILL BE OVER THE CLAY COVER AS OF YET.

Q. WILL IT BE LESS THICK THAN IT IS IN THE MIDDLE?

A. I EXPECT A MORE UNIFORM DISTRIBUTION OF

THE TOPSOIL ACROSS THE ENTIRE COVER.

Q. BUT YOU'RE NOT CERTAIN AT THIS POINT?

A. WE DON'T HAVE A FINALIZED DESIGN SHOWING THAT, NO. THE TOPSOIL WILL NOT BE TAPERED IN THE SAME MANNER THAT THE CLAY LINER IS TAPERED. IT WILL FOLLOW THE CONTOUR OF THE CLAY LINER IN A UNIFORM MANNER.

Q. SO IF THE TOPSOIL'S GOING TO BE UNIFORM, THERE'S GOING TO BE LESS CLAY LINER ON THE END OF THE CELLS?

A. NO. THE THICKNESS OF THE CLAY TOP IS ALREADY TREATED, IN OUR PRELIMINARY DESIGN IS ALREADY SET AT TWO FEET. ANYTHING -- THE GRAVEL AND THE TOPSOIL WILL BE ABOVE AND ON TOP OF THAT CLAY LINER. IT WILL NOT BE A TOTAL OF TWO FEET, PART OF WHICH IS MADE UP OF TOPSOIL AND CLAY. IT WILL BE A TWO-FOOT CLAY MINIMUM.

Q. KNOWING THE AREA, WHAT OTHER -- I'VE MENTIONED SAMPLINGS AND DANDELIONS. IS THERE SOME OTHER COVER THAT COULD GROW IN THIS AREA THAT YOU'RE AWARE OF?

MR. SILBERG: I'M SORRY. ARE YOU REFERRING TO --

MS. SIGLER: OTHER VEGETATION THAT COULD GROW IN THIS AREA.

MR. SILBERG: THE RECOMMENDED COVER THAT'S --

MS. SIGLER: NO. NO. I MEAN THAT COULD GROW WILD IN THIS AREA THAT COULD GROW IN THE TOPSOIL OR ON TOP OF THE CELLS.

A. (MS. SCOTT-WASILK) MOST OF THE WILD -- WILD GRASSES THAT ARE FOUND IN THE AREA I WOULD EXPECT TO SEED THEMSELVES TO SOME DEGREE ON THE TOP OF THE DIKED AREA. IT'S NOT GOING TO THE -- THE TOPSOIL THERE WILL NOT HAVE THE CHARACTERISTICS THAT ARE MUCH DIFFERENT THAN THE TOPSOIL IN THE SURROUNDING AREA.

Q. WHAT ABOUT THE -- WON'T THERE BE HOLES LEFT IN THE TOPSOIL AND PERHAPS THE CLAY FROM DECAYING ROOTS?

A. (MS. SCOTT-WASILK) IN MY EXPERIENCE -- AGAIN, I'M NOT A SOILS BIOLOGIST -- BUT NORMALLY I -- IN NORMAL GARDENING, THAT'S NORMALLY NOT A CONSIDERED A PROBLEM.

Q. WELL, THIS ISN'T A NORMAL GARDEN.

MR. SILBERG: IS THAT A QUESTION?

MS. SIGLER: NO.

JUDGE HOYT: STATEMENT.

BY MS. SIGLER:

Q. MR. SWIM, ON PAGE 18 OF YOUR TESTIMONY

YOU WERE TALKING ABOUT THE CAP, AND YOU SAID THAT THE CELL WOULD BE CAPPED WITH A TWO-TO-FOUR-FOOT THICK COVER CONSISTING OF A LOWER COMPACTED CLAY LAYER, A SAND AND GRAVEL FILTER, AND AN UPPER LAYER OF TOPSOIL.

CONSIDERING WHAT WE JUST TALKED ABOUT, CAN YOU EXPLAIN THIS IN A LITTLE MORE DETAIL JUST EXACTLY WHAT THIS CAP IS GOING TO BE?

A. (MR. SWIM) YOU MEAN THE -- BEFORE YOU WERE TALKING ABOUT THE SIDES AND THE BOTTOM.

Q. RIGHT.

A. NOW YOU'RE ASKING THE QUESTION AS TO WHAT THE CAP WILL BE?

Q. THE DIMENSIONS OF THE CAP, SIDE AND BOTTOM, OR TOP.

A. THE CAP IN THE MIDDLE, THE PEAK OR THE CROWN WILL BE APPROXIMATELY FOUR FEET THICK AND WILL TAPER TO A POINT WHERE IT COVERS THE RESIN MATERIAL OR SLUDGE TO A THICKNESS OF NO LESS THAN TWO FEET.

MR. SILBERG: EXCUSE ME. JUST TO CLARIFY -- MAYBE THIS IS THE POINT THAT'S CONFUSING PEOPLE. THE FOUR FEET AND THE TWO FEET IS ALL COMPACTED CLAY; IS THAT CORRECT?

THE WITNESS: (MR. SWIM) THAT'S

YOU WERE TALKING ABOUT THE CAP, AND YOU SAID THAT THE CELL WOULD BE CAPPED WITH A TWO-TO-FOUR-FOOT THICK COVER CONSISTING OF A LOWER COMPACTED CLAY LAYER, A SAND AND GRAVEL FILTER, AND AN UPPER LAYER OF TOPSOIL.

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MR. SILBERG: EXCUSE ME. JUST TO CLARIFY -- MAYBE THIS IS THE POINT THAT'S CONFUSING PEOPLE. THE FOUR FEET AND THE TWO FEET IS ALL COMPACTED CLAY; IS THAT CORRECT?

THE WITNESS: (MR. SWIM) THAT'S

CORRECT. AS I SAID EARLIER, THAT'S THE CLAY ITSELF. THAT DOES NOT TAKE INTO ACCOUNT THE GRAVEL AND TOPSOIL WHICH WE WOULD PLACE ON TOP OF THAT. THOSE ARE MINIMUMS FOR THE CLAY CAP.

BY MS. SIGLER:

Q. THIS SEEMS SOMEWHAT CONSISTENT -- INCONSISTENT WITH WHAT'S ON THE BOTTOM OF PAGE 18.

MR. SILBERG: I THINK THE WITNESS HAS TESTIFIED. I THINK THAT EXPLAINS --

MS. SIGLER: THE TESTIMONY IS SOMEWHAT DIFFERENT FROM WHAT'S IN --

MR. SILBERG: WELL, THE TESTIMONY WILL SPEAK FOR ITSELF. I THINK THE WITNESS HAS STATED WHAT IT WILL BE. I THINK IT IS CONSISTENT WITH THE TESTIMONY.

JUDGE HOYT: THAT'S IN THE FORM OF OBJECTION, MR. SILBERG?

MR. SILBERG: ATTEMPT TO CLARIFY WHAT I THINK IS A MISUNDERSTANDING.

BY MS. SIGLER:

Q. WELL, I HAVE A QUESTION ON INSECT BURROWS. CAN INSPECTS BURROW THROUGH THE COVER AND ADD PERMEABILITY TO THE BURIAL CELLS?

A. (MR. SWIM) DO YOU HAVE A SPECIFIC INSECT IN MIND?

Q. NO.

A. I'M NOT A BIOLOGIST AND I'D HAVE TO DEFER POSSIBLY TO A MEMBER ON THE PANEL.

Q. DOES ANYONE -- CAN ANYONE ELSE ON THE PANEL ADDRESS IT?

MAYBE WE CAN TALK ABOUT EARTHWORMS.

MS. SCOTT-WASILK: THEY'RE NOT INSECTS.

MR. SWIM: YEAH, IT'S NOT AN INSECT.

A. (DR. JACKSON) WELL, IF WE COULD ASK THE QUESTION: WOULD THERE BE PERHAPS AN ANT COLONY THAT WOULD ESTABLISH ITSELF? THESE TEND TO BE RELATIVELY SHALLOW, PARTICULARLY IN RELATIVELY DRY AREAS WHERE THE FOOD SUPPLY IS RESTRICTED, THEY MIGHT HAVE A VERY EXPANDED SERIES OF TUNNELS AND CHAMBERS, BUT IT'S A VERY POROUS SORT OF THING, SO IT DOESN'T PROVIDE A ONE-WAY CHUTE FROM THE TOP TO THE BOTTOM, AND ONCE THAT COLONY DIED OUT OR WAS NO LONGER ACTIVE, THOSE GALLERIES WOULD VERY QUICKLY COLLAPSE AND WOULD NOT CONSTITUTE A EROSION CHANNEL. SO THAT I DON'T SEE THAT AN INSECT INFESTATION OR THAT EARTHWORM BURROWS WOULD BE THAT EXTENSIVE. IF WE DON'T HAVE THE GIANT AUSTRALIAN EARTHWORMS THAT DIG AROUND HERE FOR US.

BUT I DON'T SEE THE ANIMAL ACTIVITY OCCURRING, THE INSECT ACTIVITY, THE INVERTEBRATE ACTIVITY OCCURRING IN THE TOP TWO FEET OF SOIL BEING SOMETHING WHICH WOULD COMPROMISE THAT LAYER.

Q. COULDN'T THEY ADD TO THE PERMEABILITY OF THAT LAYER, THEIR BURROWINGS?

A. WELL, THE -- THE TOP TWO FEET IS A BIOLOGICAL ENVIRONMENT IN WHICH YOU HAVE PLANTS GROWING, IN WHICH YOU HAVE SOIL INVERTEBRATES. IT ALREADY IS POROUS. THE UNDERLYING CLAY LAYER IS THE IMPERVIOUS LAYER.

Q. WELL, IT MAKES THE CLAY SO IT'S NO LONGER AS COMPACTED; ISN'T THAT RIGHT?

A. WELL, YOU AREN'T -- WE'RE TALKING ABOUT THE INSECT ACTIVITY, THE INVERTEBRATE ACTIVITY OCCURRING IN THE AREA ABOVE THE CLAY. THIS IS IN SOIL, WHICH IS MAYBE A RELATIVELY HEAVY SOIL, BUT IT'S NOT A CLAY LAYER IN THE SENSE OF THE IMPERVIOUS CAP.

Q. ARE YOU SUGGESTING THERE ARE NO INSECTS THAT ARE GOING TO ENTER THE CLAY LAYER?

A. I'M NOT SURE I CAN SAY THERE ARE ABSOLUTELY NO INSECTS THAT ARE GOING TO ENTER THE CLAY LAYER. IT'S A LAYER WHICH WOULD BE VERY DIFFICULT FOR INSECTS TO ENTER, TO SURVIVE IN, TO

TUNNEL IN. IT'S NOT A LAYER THAT WOULD BE TYPICALLY PENETRATED BY AN INVERTEBRATE POPULATION. THEY'RE GOING TO BE FEEDING AND DEPENDING ON NUTRIENTS OR FOOD ON THE SURFACE OR NEAR THE SURFACE, AND THE FURTHER THEY GET FROM THE SURFACE, THE LESS OF THOSE NUTRIENTS ARE GOING TO BE AVAILABLE. THERE'S NOTHING TO EAT IN A CLAY LAYER.

Q. WELL, WHAT ABOUT BURROWING ANIMALS SUCH AS GROUNDHOGS? CAN THEY GET THROUGH THE RIP-RAP AND BURROW INTO THE COVER?

A. GROUNDHOGS CERTAINLY WOULD BE A LARGER KIND OF ANIMAL THAT COULD, IF THE RIP-RAP WERE NOT SECURELY OR NOT FULLY IN PLACE, KNOCK A BOULDER OUT OR SOME STONES OUT. THEY'D BE MORE LIKELY, HOWEVER, I THINK IN THIS SITUATION, TO GO IN AT THE TOP WHERE DIGGING WAS A WHALE OF A LOT EASIER THAN KNOCKING ONES TEETH AGAINST A BUNCH OF STONES. AND THIS, I THINK, WOULD BE PART OF THE NORMAL MONITORING THAT WOULD GO ON AS A PART OF THE -- THAT'S BEEN INDICATED IN THE TESTIMONY WE'VE ALREADY HEARD.

Q. BUT THESE ANIMALS WOULD GO INTO THE CLAY LAYER; CORRECT?

A. NOT IF THEY GOT SOMETHING EASIER TO DIG

IN. AND YOU HAVE GIVEN THEM TWO FEET OF SOIL, WHICH IS A LOT EASIER TO DIG IN THAN CLAY, SO THAT AS LONG AS THERE'S PLENTY OF PLACES TO DIG, I WOULD NOT EXPECT THEM TO GO INTO THE CLAY.

I THINK FURTHER YOU NEED TO LOOK AT THE SITUATION, THERE IS A GRAVEL BARRIER, AND RODENTS HAVE A TERRIBLE TIME GOING THROUGH GRAVEL BARRIERS. THEY START DIGGING, AND ALL OF A SUDDEN THE STONES FALL IN WHERE THEY'RE DIGGING, AND THEY GET DISCOURAGED VERY QUICKLY. AND THIS KIND OF AN ENVIRONMENT, INSTEAD OF GOING DOWN, THEY'LL GO LATERALLY.

Q. I UNDERSTAND THAT THEY ARE SORT OF THE SCOURGE OF THE DIKES ALONG LAKE ERIE, BUT HAVE YOU EVER SEEN A GROUNDHOG THAT DIDN'T BURROW DOWN FURTHER THAN TWO FEET?

A. WHEN YOU SAY "DOWN", YOU MEAN DOWN FROM THE SURFACE OR THE BURROW IS SHORTER THAN TWO FEET?

Q. THEY DON'T STAY THAT NEAR THE SURFACE.

A. YEAH, I'VE SEEN SOME THAT STAY THAT CLOSE TO THE SURFACE.

Q. IT'S UNUSUAL, THOUGH, ISN'T IT FOR A GROUNDHOG TO STAY THAT CLOSE TO THE SURFACE?

A. THEY WILL DO IT.

Q. ISN'T IT UNUSUAL, THOUGH?
A. DEPENDS ON THE CIRCUMSTANCES.
Q. ARE THERE GOING TO BE ANY PRECAUTIONS TAKEN AT THE SITE TO KEEP THESE ANIMALS OUT?
A. (MS. SCOTT-WASILK) WE HAVE A STANDARD POLICY WHEN WE -- ANIMAL CONTROL POLICY WE'VE WORKED OUT FOR THE NAVARRE MARSH PORTION OF OUR PROPERTY AND HAVE A METHOD THAT'S BEEN APPROVED BY FISH AND WILDLIFE SERVICE TO SPECIFICALLY CONTROL GROUNDHOGS ON DIKE STRUCTURES, SO WE'RE VERY PRACTICED AT THAT.
Q. MR. HERDENDORF --
JUDGE HOYT: MISS SIGLER, IT IS 5:00, AND I HAVE A COMMITMENT TO END THESE HEARINGS IN THIS FACILITY AT AROUND 5:00. WE HAVE EXCEEDED OUR TIME. I WONDER IF WE ARE AT A GOOD PLACE TO BREAK IN YOUR QUESTIONS.
MS. SIGLER: SURE. I CAN START TOMORROW.
JUDGE HOYT: WE'VE HAD ALL I THINK WE CAN TAKE OF GROUNDHOGS. BUT WE'LL RESUME TOMORROW AT 9:30, AND YOU CAN CONTINUE YOUR QUESTIONING.
THE HEARING IS RECESSED.
- - -

(THEREUPON, THE HEARING WAS RECESSED AT 5:07 P.M., TO BE RECONVENED AT 9:30 A.M. ON WEDNESDAY, AUGUST 6, 1986.)

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C E R T I F I C A T E

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WE, KENDRA E. JOHNSTON AND CYNTHIA J. NEFF, REGISTERED PROFESSIONAL REPORTERS AND NOTARIES PUBLIC IN AND FOR THE STATE OF OHIO, DO HEREBY CERTIFY THAT THE FOREGOING IS A TRUE AND CORRECT TRANSCRIPT OF THE PROCEEDINGS BEFORE THE UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION ATOMIC SAFETY AND LICENSING BOARD, ON TUESDAY, AUGUST 5, 1986, AS REPORTED BY US IN STENOTYPE AND TRANSCRIBED BY US OR UNDER OUR SUPERVISION.

Kendra E. Johnston

KENDRA E. JOHNSTON, R.P.R.
NOTARY PUBLIC IN AND FOR
THE STATE OF OHIO

MY COMMISSION EXPIRES: JULY 13, 1987

Cynthia J. Neff

CYNTHIA J. NEFF, R.P.R.
NOTARY PUBLIC IN AND FOR
THE STATE OF OHIO

MY COMMISSION EXPIRES: NOVEMBER 8, 1986

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