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WELCOMING REMARKS

DR. SPINRAD: ALOHA AND GOOD MORNING. MY NAME IS RICK SPINRAD. I'M FROM NOAA. I'M A CO-CHAIR OF THE CONFERENCE. I'M DELIGHTED TO WELCOME YOU ALL HERE TODAY.

FRIENDS, ESTEEMED GUESTS, COLLEAGUES, THIS TRULY IS A SPECIAL OCCASION. WE ARE SCHEDULED TO HAVE A NUMBER OF IMPORTANT PRESENTATIONS. WE'RE GOING TO START THIS MORNING WITH PRESENTATIONS FROM A DISTINGUISHED PANEL OF SPEAKERS, INCLUDING MR. TIM KEENEY, NOAA'S DEPUTY ASSISTANT SECRETARY; DR. KEN MELVILLE, SCRIPPS INSTITUTION OF OCEANOGRAPHY; AND DR. LEN BARRIE OF THE WORLD METEOROLOGICAL ORGANIZATION.

WE HAVE A SPECIAL TREAT TODAY BEFORE WE GET STARTED WITH PRESENTATIONS. WE ARE HONORED TO HAVE WITH US GOVERNOR LINGLE'S LIAISON FOR WEST HAWAII, MR. ANDY SMITH, WHO WILL SHARE WITH US A PROCLAMATION FROM GOVERNOR LINGLE.

ANDY, PLEASE JOIN US ON STAGE.

[Andy Smith's presentation about Nov. 28, 2007 being "CO2 Observing Day in Hawaii has been removed from this file."]

(APPLAUSE)

DR. SPINRAD: THANK YOU, ANDY.

IT'S APPROPRIATE THAT ON CO2 OBSERVING DAY HERE IN HAWAII, WE'RE GOING TO HAVE A LOT OF SPEAKING DONE HERE TODAY, A LOT OF IMPORTANT INFORMATION.

IT REALLY IS AN HONOR AND PRIVILEGE FOR ME TO BE HERE WITH SO MANY DISTINGUISHED LEADERS OF THE SCIENTIFIC COMMUNITY, OF GOVERNMENT, OF BUSINESS, TO CELEBRATE THIS IMPORTANT ANNIVERSARY OF THE GLOBAL CARBON DIOXIDE RECORD AND, ALSO, TO EXAMINE SOME OF THE EFFORTS TO MANAGE CO2 EMISSIONS TODAY AND IN THE FUTURE. WE WILL HAVE AN EXTRAORDINARY SET OF DISCUSSIONS SPANNING THAT WHOLE SPECTRUM OF ACTIVITIES.

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I WANT TO THANK OUR SPONSORS. AS ALL OF YOU KNOW, A CONFERENCE LIKE THIS CAN'T BE PUT TOGETHER WITHOUT EXTRAORDINARY EFFORTS ON THE PART OF SPONSORS AND VOLUNTEERS; AND SPECIFICALLY, I WOULD LIKE TO THANK PEABODY ENERGY, SCRIPPS INSTITUTION OF OCEANOGRAPHY, THE NATIONAL MARINE SANCTUARIES FOUNDATION, SCIENCE AND TECHNOLOGY CORPORATION (STC), THE WORLD METEOROLOGICAL ORGANIZATION (WMO), THE CHICAGO CLIMATE EXCHANGE, AND STEELCOAST GRAPHIC DESIGN.

LET'S GIVE THEM A ROUND OF APPLAUSE, PLEASE.

(APPLAUSE)

I ALSO WANT TO THANK THE PROGRAM AND LOGISTICS COMMITTEES, OUR SPEAKERS AND PANELISTS, AND ALL WHO HAVE LABORED DILIGENTLY TO ENSURE THIS CONFERENCE IS A SUCCESS.

SPECIAL THANKS GO TO THE SCRIPPS INSTITUTION OF OCEANOGRAPHY, AS A WORKING PARTNER IN THIS EFFORT, AND OF COURSE, AS THE ORGANIZATION THROUGH WHICH DR. CHARLES DAVID KEELING INITIATED THIS LONG-TERM RECORD.

IN 1957 WHEN DR. KEELING BEGAN MEASURING ATMOSPHERIC CO2 AT MAUNA LOA AND AT THE SOUTH POLE, THERE WAS REALLY VERY LITTLE KNOWN ABOUT CO2 IN THE

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ATMOSPHERE, AND NO RELIABLE ATMOSPHERIC RECORD EXISTED AT THAT TIME. FEW COULD HAVE PREDICTED THE IMPORTANCE THAT HIS INNOVATIVE RESEARCH WOULD HAVE FOR GENERATIONS TO COME. THIS WILL BE A PERSISTENT THEME IN THE PRESENTATIONS OVER THE NEXT THREE DAYS, PARTICULARLY IMPORTANT IN THIS DAY AND AGE WHEN WE ARE TRYING TO MAKE THE COMPELLING ARGUMENTS ABOUT THE NEED FOR SUSTAINED HIGH-QUALITY CLIMATE DATA RECORDS.

OVER THE LAST HALF CENTURY NOAA AND MEMBER COUNTRIES OF THE WORLD METEOROLOGICAL ORGANIZATION HAVE EXPANDED SIGNIFICANTLY ON DR. KEELING'S INITIAL EFFORTS, BUILDING AN INTERNATIONAL GLOBAL CLIMATE OBSERVATIONAL NETWORK; AND TODAY THE CO2 RECORD IS THE BACKBONE FOR RESEARCH INTO UNDERSTANDING GREENHOUSE GASSES AND OUR CHANGING CLIMATE. NOAA AND OTHER SCIENTISTS DEPEND ON ACCURATE LONG-TERM MEASUREMENTS, AND SOCIETY INCREASINGLY REQUIRES INFORMATION THAT IS NOT ONLY RELEVANT BUT ALSO ACCURATE AND COMPREHENSIVE. THE SCIENTIFIC PROCESS AND THE VALUE OF CLIMATE RESEARCH IS BUILT UPON ACCURATE DATA DERIVED FROM OBSERVATIONS.

CLIMATE RESEARCH CONDUCTED BY NOAA AND OTHER SCIENCE ORGANIZATIONS, MANY OF WHOM ARE REPRESENTED HERE AT THIS CONFERENCE, HELPS TO FRAME THE

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QUESTIONS THAT NEED TO BE ASKED, HELPS TO FIND ANSWERS, AND HELPS POLICY MAKERS MAKE INFORMED DECISIONS THAT IMPACT OUR WORLD AND OUR FUTURE. AND WHILE, OF COURSE, THIS IS A SCIENTIFIC CONFERENCE, THE POLICY SIDE IS A CRITICAL COMPONENT. AND IT IS IMPORTANT TO POINT OUT THAT DATA FROM THIS NETWORK AND THE ANALYSIS AND MODELS THAT FOLLOW INFORM NATIONAL AND INTERNATIONAL ASSESSMENTS OF GLOBAL CLIMATE CHANGE, INCLUDING THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE -- IPCC -- ASSESSMENT REPORTS.

THE IPCC HAS, OF COURSE, RECEIVED CONSIDERABLE ATTENTION THIS YEAR; AND WITH THE RELEASE OF THE FOURTH ASSESSMENT REPORT AND THE NEWS THAT THEY HAVE BEEN AWARDED A NOBEL PEACE PRIZE, WE ARE ALL DELIGHTED. THIS AWARD RECOGNIZES THE EFFORTS OF SCIENTISTS WORLDWIDE CONTRIBUTING TOWARD THIS IMPORTANT BODY OF SCIENTIFIC LITERATURE.

I POINT OUT IT INCLUDES, JUST BY WAY OF

EXAMPLE, MORE THAN 120 SCIENTISTS IN MY OWN ORGANIZATION, NOAA, SOME OF WHOM WERE HONORED TO BE AT A CEREMONY AT THE WHITE HOUSE JUST TWO DAYS AGO. AND AS I'M SURE YOU'RE ALL AWARE, THE IPCC WORKING GROUP I REPORT IN FEBRUARY ON PHYSICAL SCIENCE BASIS, CO-CHAIRED BY NOAA'S OWN SUSAN SOLOMON IN THE AUDIENCE, MADE THE STRONGEST STATEMENTS EVER,

INCLUDING THE FOLLOWING:

THE WARMING OF THE CLIMATE SYSTEM IS UNEQUIVOCAL.

MOST OF THE OBSERVED INCREASE IN GLOBALLY-AVERAGED TEMPERATURES SINCE THE MID 20TH CENTURY IS VERY LIKELY DUE TO THE OBSERVED INCREASE IN ANTHROPOGENIC GREENHOUSE GAS CONCENTRATIONS.

THE LONG-TERM TREND OF DECLINING CO2 EMISSIONS PER UNIT OF ENERGY SUPPLIED REVERSED AFTER 2000.

AND CARBON DIOXIDE IS THE MOST IMPORTANT ANTHROPOGENIC GREENHOUSE GAS.

SINCE FEBRUARY, WORKING GROUPS II AND III HAVE RELEASED THEIR ASSESSMENTS, AND ALMOST TWO WEEKS AGO THE IPCC SYNTHESIS REPORT WAS RELEASED.

SOME OF THE KEY FINDINGS OF WORKING GROUP II INCLUDE THE FOLLOWING:

MANY NATURAL SYSTEMS ARE BEING AFFECTED BY REGIONAL CLIMATE CHANGES.

REGIONAL-SCALE CHANGES INCLUDE A VERY LIKELY INCREASE IN FREQUENCY OF HOT EXTREMES, HEAT WAVES, AND HEAVY PRECIPITATION.

AND UNMITIGATED CLIMATE CHANGE WOULD, IN THE LONG TERM, BE LIKELY TO EXCEED THE CAPACITY OF NATURAL, MANAGED, AND HUMAN SYSTEMS TO ADAPT.

FINALLY, SOME OF THE KEY FINDINGS OF WORKING GROUP III THAT ARE RELEVANT TO WHAT WE WILL BE DISCUSSING OVER THE NEXT SEVERAL DAYS INCLUDE:

THERE IS HIGH AGREEMENT AND MUCH EVIDENCE OF SUBSTANTIAL ECONOMIC POTENTIAL FOR THE MITIGATION OF GLOBAL GREENHOUSE GAS EMISSIONS OVER THE COMING DECADES.

THERE IS HIGH AGREEMENT AND MUCH EVIDENCE THAT MITIGATION ACTIONS CAN RESULT IN NEAR-TERM CO-BENEFITS; FOR EXAMPLE, IMPROVED HEALTH DUE TO REDUCED AIR POLLUTION.

A WIDE VARIETY OF POLICIES AND INSTRUMENTS ARE AVAILABLE TO GOVERNMENTS TO CREATE THE INCENTIVES FOR MITIGATION ACTION.

AND MANY IMPACTS CAN BE REDUCED, DELAYED, OR AVOIDED BY MITIGATION.

THIS CONFERENCE IS NOT INTENDED TO ANSWER ALL QUESTIONS AND ACHIEVE GREAT SOLUTIONS IN THREE DAYS, AND IT'S NOT INTENDED TO REPEAT THE EFFORTS THAT WERE SO WELL CARRIED OUT BY THE IPCC. THIS CONFERENCE IS AN OPPORTUNITY TO ACKNOWLEDGE AND HONOR PAST RESEARCH ACCOMPLISHMENTS RELATING TO THE INCREASED CO2 IN THE ATMOSPHERE WHILE AT THE SAME TIME

EXPLORING THE PATH FOR FUTURE RESEARCH THAT MEETS SOCIETY'S NEEDS.

I LOOK FORWARD TO EXPLORING THESE CRITICAL ISSUES WITH YOU OVER THE NEXT SEVERAL DAYS.

I WOULD LIKE TO POINT OUT TO THE AUDIENCE THAT BECAUSE OF THE IMPORTANCE AND QUALITY OF THE DISCUSSIONS THAT WE WILL BE HAVING HERE, WE ARE KEEPING THE DISCUSSION ON RECORD. IT IS, IN FACT, BEING RECORDED. MORE IMPORTANTLY, IT WILL BE REPORTED AS A SERIES OF PROCEEDINGS IN WEB FORMAT, AND ALL OF THE POWERPOINT PRESENTATIONS THAT YOU SEE WILL BE POSTED TO THE WEBSITE WITHIN A WEEK; AND IF YOU HAVE FORGOTTEN THAT WEBSITE, WHICH WE WILL REPEATEDLY REMIND YOU OF, IT IS CO2CONFERENCE.ORG.

NOW IT IS MY PLEASURE TO INTRODUCE A VIDEO MESSAGE FROM THE HONORABLE DANIEL INOUYE, ONE OF THE GREAT SENATORS AND AMERICANS OF OUR TIME. THE SENATOR IS A WAR HERO WHO WAS SINGLED OUT A FEW WEEKS AGO DURING A SPEECH TO A JOINT SESSION OF CONGRESS BY FRENCH PRESIDENT NICOLAS SARKOZY FOR HIS BRAVERY WHILE FIGHTING TO LIBERATE EUROPE DURING WORLD WAR II. IN ITALY, HE LOST HIS RIGHT ARM IN COMBAT AND WAS LATER AWARDED THE HIGHEST HONOR THAT THIS COUNTRY CAN GIVE FOR MILITARY VALOR, THE MEDAL OF HONOR.

AFTER THE WAR HE FOUGHT FOR STATEHOOD FOR HAWAII AND BECAME ITS FIRST CONGRESSMAN IN 1959.

AFTER THAT HE WAS ELECTED TO THE U.S. SENATE IN 1962 AND HAS SERVED FOR 45 DISTINGUISHED YEARS IN THAT BODY. HE IS CURRENTLY CHAIRMAN OF THE SENATE COMMERCE, SCIENCE, AND TRANSPORTATION COMMITTEE, WHICH WE HOLD NEAR AND DEAR TO MY WHOLE ORGANIZATION.

SENATOR INOUYE HAS BEEN A CHAMPION OF NOAA AND ITS CLIMATE RESEARCH SINCE ITS CREATION IN 1970. IT IS REALLY HARD TO DO A 37-YEAR FRIENDSHIP JUSTICE IN JUST A FEW MINUTES, BUT I WOULD JUST LIKE TO CAPTURE SOME OF HIS ACCOMPLISHMENTS AND GOALS IN THREE KEY THEMES:

FIRST, HE'S FOUGHT TO SAVE THIS STATE'S MAJESTIC CORAL REEFS. HE'S FUNDED MANY PROJECTS TO ADVANCE THE SCIENTIFIC STUDY, RESEARCH, AND MANAGEMENT OF THE WESTERN PACIFIC CORALS, AND THEN SECURED THE SHIPS FOR THE NOAA CORPS TO CARRY OUT THIS CRITICAL RESEARCH. IN 2006 THE SENATOR WAS NAMED "CORAL CHAMPION" BY THE U.S. CORAL REEF TASK FORCE AND RECEIVED A SECOND AWARD FROM THE FRIENDS OF THE COAST.

SECONDLY, SENATOR INOUYE INTRODUCED LEGISLATION IN 1990 TO ESTABLISH THE HAWAIIAN ISLANDS HUMPBACK WHALE NATIONAL MARINE SANCTUARY AND LATER AN EDUCATION CENTER FOR VISITORS. IN 2004 HE WAS AWARDED THE NATIONAL MARINE SANCTUARY FOUNDATION'S

2004 "STEWARD OF THE SANCTUARY AWARD" FOR THAT WORK.

AND THIRD, SENATOR INOUYE HAS WORKED

TIRELESSLY TO PRESERVE MARINE MAMMALS, SAVE ENDANGERED AND THREATENED SEA TURTLES, MONK SEALS, AND BUILD SUSTAINABLE FISHERIES IN THE WESTERN PACIFIC.

WITH THAT, PLEASE JOIN ME IN ENJOYING A VIDEO MESSAGE FROM SENATOR INOUYE.

(BY VIDEOTAPE)

[Sen. Inouye's video presentation has been removed from this file.]

(APPLAUSE)

DR. SPINRAD: ONCE AGAIN, I WOULD LIKE TO THANK THE SENATOR AND HIS STAFF FOR SENDING THIS MESSAGE. MANY OF THE STAFF HAVE BEEN INVOLVED IN EARLY DEVELOPMENTS OF THIS CONFERENCE, AND I'M DELIGHTED, IN FACT, THAT WE'LL HAVE AN OPPORTUNITY TO ENGAGE ADDITIONAL CONGRESSIONAL STAFF DURING THE COURSE OF

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THIS MEETING, SEVERAL OF WHOM HAVE JOINED US FOR THIS CONFERENCE.

IT IS NOW MY HONOR TO INTRODUCE DR. MELVILLE. KEN MELVILLE IS THE DEPUTY DIRECTOR FOR RESEARCH AT SCRIPPS INSTITUTION OF OCEANOGRAPHY; AND AMONG HIS MANY HONORS, HE HAS BEEN NAMED A FELLOW OF THE ACOUSTICS SOCIETY, AND THE AMERICAN PHYSICAL SOCIETY. HE WAS A JOHN SIMON GUGGENHEIM MEMORIAL FELLOWSHIP WINNER AND A HAWKER SIDDELEY FELLOW, AS WELL AS A COMMONWEALTH SCHOLAR IN AUSTRALIA.

SCRIPPS IS, OF COURSE, A LONG-STANDING PARTNER WITH NOAA IN ITS GLOBAL MONITORING EFFORT AND IS THE INSTITUTION, OF COURSE, WHERE DR. KEELING SPENT MOST OF HIS ACADEMIC CAREER.

DR. MELVILLE IS A PROFESSOR OF OCEANOGRAPHY, AND A GOOD DEAL OF HIS WORK HAS FOCUSED ON ISSUES OF AIR-SEA INTERACTION, A PHYSICAL PROCESS GERMANE, OF COURSE, TO THE EXCHANGE OF CO2 BETWEEN THE OCEAN AND ATMOSPHERE; AND, OF COURSE, AS MANY OF YOU WILL OBSERVE, DR. MELVILLE IS PART OF THE AUSTRALIAN INVASION OCCURRING AT SCRIPPS THESE DAYS. SO IT'S, PERHAPS, APPROPRIATE THAT WE HAVE HIM HERE HALFWAY BETWEEN SAN DIEGO AND AUSTRALIA. HE HAS A LONG AND DISTINGUISHED CAREER AT SCRIPPS, AND WE ARE PROUD AND EXCITED THAT HE IS HERE TO REPRESENT SCRIPPS, ONE OF

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OUR CONFERENCE SPONSORS.

PLEASE WELCOME DR. KEN MELVILLE.

(APPLAUSE)

[Ken Melville's presentation has been removed from this file.]

(APPLAUSE).

DR. SPINRAD: THANK YOU, KEN.

HOW APPROPRIATE FOR THE NEXT INTRODUCTION TO HAVE HEARD ROGER REVELLE'S NAME INVOKED IN KEN'S PRESENTATION. ROGER REVELLE, OF COURSE, COMBINED A

WONDERFUL BLEND OF SCIENTIFIC, CIVILIAN GOVERNMENT SERVICE, AND NAVAL SERVICE; AND AS YOU'LL SEE IN MY NEXT INTRODUCTION, THERE ARE SOME PARALLELS WITH TIM KEENEY'S ACTIVITIES.

TIM IS THE NOAA DEPUTY ASSISTANT SECRETARY FOR OCEANS AND ATMOSPHERE, AND HE IS HERE TODAY ON BEHALF OF NOAA LEADERSHIP.

SINCE TIM JOINED NOAA BACK IN 2002, HE HAS BEEN RESPONSIBLE FOR MUCH OF THE ENVIRONMENTAL POLICY AND STRATEGIC PLANNING AND PROGRAM ANALYSIS AT NOAA. HIS MAJOR FOCUS HAS BEEN ON CROSS-CUTTING PROGRAMS SUCH AS CORAL REEFS, INVASIVE SPECIES, HABITAT RESTORATION, AND OBSERVATION SYSTEMS. TIM BROUGHT WITH HIM TO NOAA MANY YEARS OF VALUABLE EXPERIENCE IN NATURAL RESOURCE CONSERVATION AND MANAGEMENT, AS WELL AS REGULATORY DECISION MAKING. HE HAS BEEN A CRITICAL ASSET IN THIS REGARD. PREVIOUSLY HE SERVED AS THE COMMISSIONER FOR THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION, AS NOAA GENERAL COUNSEL, AS

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THE DIRECTOR OF THE RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, AND ALSO AS A FORMER NAVY SEAL WHO HOLDS THE SOMEWHAT SINGULAR HONOR OF HAVING BEEN JESSE VENTURA'S DIVE BUDDY, AND HE RECENTLY RETIRED WITH THE RANK OF CAPTAIN FROM THE U.S. NAVY RESERVES.

PLEASE WELCOME TIM KEENEY.

(APPLAUSE)

[Tim Keeney's presentation has been removed from this file.]

(APPLAUSE)

DR. SPINRAD: THANK YOU, TIM.

ON BEHALF OF ALL OF THE LINE OFFICE SCIENTISTS IN NOAA AND THE SCIENTIFIC COMMUNITY IN GENERAL, I WANT TO EXPRESS THANKS TO THE NOAA LEADERSHIP, AND ESPECIALLY ADMIRAL LAUTENBACHER, FOR HIS STRONG SUPPORT OF THESE ACTIVITIES. IT IS PARTICULARLY IMPORTANT. AND IT GOES WITHOUT SAYING THAT THE CLIMATE CHANGE ISSUES THAT WE'RE TALKING ABOUT RECOGNIZE NO NATIONAL BORDERS, AND WE WOULD NOT

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BE HERE TODAY WITHOUT OUR GLOBAL PARTNERS, CHIEF AMONG THEM, OF COURSE, THE WORLD METEOROLOGICAL ORGANIZATION, WMO. WMO IS NOT ONLY A CO-SPONSOR OF THIS CONFERENCE BUT, OF COURSE, ALSO OF THE IPCC.

AND OUR NEXT SPEAKER, DR. LEN BARRIE, IS THE DIRECTOR OF WMO'S ATMOSPHERIC RESEARCH AND ENVIRONMENT PROGRAM, WHICH INCLUDES THE ATMOSPHERIC CHEMISTRY COMPONENT OF THE GLOBAL CLIMATE OBSERVING SYSTEM, GLOBAL ATMOSPHERE WATCH. DR. BARRIE IS A RENOWNED ATMOSPHERIC SCIENTIST WHO HAS SERVED IN LEADERSHIP POSITIONS ON NUMEROUS CANADIAN AND INTERNATIONAL SCIENTIFIC EFFORTS FOCUSING ON ATMOSPHERIC CHEMISTRY, CONTAMINANTS, AEROSOLS, AND POLAR PROCESSES. HE IS A MEMBER AT LARGE OF THE

EXECUTIVE COMMITTEE OF THE INTERNATIONAL ASSOCIATION OF METEOROLOGY AND ATMOSPHERIC SCIENCE AND A FELLOW OF THE ACADEMY OF SCIENCE OF THE ROYAL SOCIETY OF CANADA.

DR. BARRIE.

(APPLAUSE)

[Len Barrie’s presentation has been removed from this file.]

(APPLAUSE)

DR. SPINRAD: THANK YOU, LEN, AGAIN. WE REALLY APPRECIATE THE OUTSTANDING LEADERSHIP FROM WMO ON ALL OF THESE ACTIVITIES.

THIS NOW CONCLUDES THE INTRODUCTORY TALKS, AND WHAT I WOULD LIKE TO DO IS JUST GIVE ONE MORE ROUND OF APPLAUSE FOR OUR INTRODUCTORY SPEAKERS RIGHT NOW.

THANK YOU, GENTLEMEN.

(APPLAUSE)

AND WITH YOUR FORBEARANCE AND THE GOOD WORK OF VINCE AND HIS AV TEAM, WE WILL JUST TAKE A SHORT BREAK. I WILL ASK OUR PANELISTS TO STEP FROM THE STAGE AS WE PREPARE FOR OUR KEYNOTE SPEECH. PLEASE DON'T LEAVE YOUR SEATS. BEAR WITH US FOR A FEW SECONDS AS WE MAKE A SLIGHT CHANGE HERE.

(BRIEF BREAK)

KEYNOTE SPEAKER

DR. SPINRAD: IT NOW REALLY IS MY DISTINCT PRIVILEGE TO INTRODUCE OUR KEYNOTE SPEAKER, DR. RALPH CICERONE, THE PRESIDENT OF THE UNITED STATES NATIONAL ACADEMY OF SCIENCES AND CHAIR OF THE UNITED STATES NATIONAL RESEARCH COUNCIL. AND OF COURSE, IT IS A REAL TREAT TO INTRODUCE DR. CICERONE BUT A SPECIAL TREAT FOR US IN THIS AUDIENCE BECAUSE WE HAVE THE UNIQUE CONFLUENCE OF EVENTS, I WOULD SAY, TO HAVE AS THE LEADER OF THE UNITED STATES NATIONAL ACADEMY OF SCIENCES SOMEBODY WHOSE OWN RESEARCH CAREER IS SO INTIMATELY TIED WITH THE MATERIALS AND SUBJECTS THAT WE'RE TALKING ABOUT HERE TODAY.

DR. CICERONE, OF COURSE, HAS A LONG HISTORY AS AN ATMOSPHERIC AND EARTH SCIENTIST, HAVING DIRECTED THE ANALYTICAL CHEMISTRY DIVISION AT THE NATIONAL CENTER FOR ATMOSPHERIC RESEARCH AND SERVED AS PRESIDENT OF THE AMERICAN GEOPHYSICAL UNION. HE

ALSO SERVED AS CHANCELLOR OF THE UNIVERSITY OF CALIFORNIA AT IRVINE, WHERE HE FOUNDED AND DIRECTED THE DEPARTMENT OF EARTH SYSTEM SCIENCE. HE HAS RECEIVED A VAST NUMBER OF AWARDS FOR HIS RESEARCH IN ATMOSPHERIC CHEMISTRY AND CLIMATE CHANGE, AND WAS RECOGNIZED ON THE CITATION FOR THE 1995 NOBEL PRIZE

IN CHEMISTRY AWARDED TO UCI COLLEAGUE F. SHERWOOD ROWLAND. HE'S A GRADUATE OF THE UNIVERSITY OF ILLINOIS AND MIT, WHERE YOU WILL NOTE AS JUST ONE INDICATOR OF HIS SUPERIOR INTELLECT HE ALSO HAD TIME TO PLAY VARSITY BASEBALL AT MIT.

HE'LL TALK TO US TODAY ABOUT CLIMATE CHANGE: IT'S NOT JUST FOR SCIENTISTS.

PLEASE WELCOME HEARTILY DR. RALPH CICERONE.

(APPLAUSE)

[Ralph Cicerone’s presentation has been removed from this file.]

(APPLAUSE)

(BREAK TAKEN)

[Cicerone’s Q&A session has been removed from this file.]

SESSION 1

WHAT HAVE WE LEARNED FROM THE CO2 MEASUREMENT RECORD?

DR. SPINRAD: WELCOME BACK.

WE'RE GOING TO GET STARTED WITH SESSION 1 ENTITLED, "WHAT HAVE WE LEARNED FROM THE CO2 MEASUREMENT RECORD?"

AND IN THIS PANEL, THE WAY WE WILL CONDUCT IT IS I WILL BE PROVIDING UPFRONT SOME INTRODUCTIONS OF OUR DISTINGUISHED PANELISTS; AND THEY WILL, IN SEQUENCE, GIVE THEIR TALKS. AND WE WILL RESERVE TIME AT THE END FOR Q-AND-A, WHEN THE PANELISTS WILL STAY UP HERE, UP FRONT, FOR YOUR QUESTIONS. SO BE THINKING OF THOSE QUESTIONS.

AGAIN, WE'LL GO THROUGH THE SAME DRILL FOR QUESTIONS, USING THE MIKES IN THE CENTER AISLE AND

ASKING FOLKS TO INTRODUCE THEMSELVES WHEN THEY ASK QUESTIONS.

SO, AS I SAID, THIS SESSION IS GOING TO PROVIDE AN OVERVIEW OF WHAT WE'VE LEARNED FROM THE 50-YEAR GLOBAL CARBON DIOXIDE RECORD. MEASUREMENTS FROM THIS INCREASINGLY SOPHISTICATED AND GLOBAL NETWORK HAVE ENABLED US TO DRAW CONCLUSIONS ABOUT THE CARBON CYCLE. WE'RE GOING TO COVER WHAT WE NOW KNOW AND WHAT OTHER GASSES CAN TELL US ABOUT THE ORIGIN

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AND FATE OF CARBON DIOXIDE.

WE HAVE DRS. RALPH KEELING, PIETER TANS, AND MARTIN HEIMANN, WHO HAVE SPENT THEIR PROFESSIONAL LIFETIMES INVESTIGATING THE TRENDS AND DISTRIBUTIONS OF ATMOSPHERIC CO2. ALL HAVE SOME LINK TO DAVID KEELING: RALPH AS HIS SON; AND PIETER AND MARTIN AS HIS POST-DOCS.

RALPH KEELING, A PROFESSOR OF GEOCHEMISTRY AT THE SCRIPPS INSTITUTION OF OCEANOGRAPHY, UC SAN DIEGO, DIRECTS SCRIPPS' PROGRAM FOR MEASURING CO2 IN THE ATMOSPHERE. HE IS ALSO A LEADING INVESTIGATOR OF THE GLOBAL OXYGEN CYCLE AND KNOWN FOR HIS PRECISE MEASUREMENTS AND ANALYSIS TECHNIQUES. SINCE 1989, HIS GROUP HAS MEASURED CHANGES IN ATMOSPHERIC OXYGEN LEVELS FROM AIR SAMPLES COLLECTED AT STATIONS AROUND THE WORLD.

PIETER TANS IS A SENIOR SCIENTIST AT NOAA'S EARTH SYSTEM RESEARCH LAB, WHERE HE LEADS THE CARBON CYCLE GREENHOUSES GASSES GROUP. THIS GROUP MAINTAINS A COOPERATIVE GLOBAL ATMOSPHERIC OBSERVING NETWORK, PRODUCING THE MOST WIDELY USED DATA OF ATMOSPHERIC CO2 AND SEVERAL OTHER GREENHOUSE GASSES. PIETER, ALONG WITH INEZ FUNG OF THE UNIVERSITY OF CALIFORNIA AT BERKELEY, AND TARO TAKAHASHI OF LAMONT-DOHERTY, REVOLUTIONIZED RESEARCH ON CO2 WHEN THEY DISCOVERED A

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LARGE UPTAKE OF CO2 BY TERRESTRIAL ECOSYSTEMS IN THE NORTHERN HEMISPHERE. THIS SINK PARTIALLY OFFSETS THE EMISSIONS FROM THE BURNING OF FOSSIL FUELS.

OVER THE LAST THREE DECADES, MARTIN HEIMANN HAS ANALYZED AND MODELED THE GLOBAL CARBON CYCLE AND ITS INTERACTION WITH THE PHYSICAL CLIMATE SYSTEM. KNOWN FOR HIS MODELING CONTRIBUTIONS TO UNDERSTANDING CO2 UPTAKE AND EMISSIONS, DR. HEIMANN, THE DIRECTOR OF THE MAX-PLANCK INSTITUTE FOR BIOGEOCHEMISTRY, IS CURRENTLY WORKING TO EXPAND GLOBAL MEASUREMENT SYSTEMS TO PLACES LIKE SIBERIA AND CABO VERDE IN ORDER TO IMPROVE THE ESTIMATES OF THESE MODELS.

LET'S GO AHEAD AND GET STARTED, AND WE'RE GOING TO START WITH DR. KEELING.

(APPLAUSE)

[Ralph Keeling’s presentation has been removed from this file.]

DR. SPINRAD: AGAIN, WE'LL SAVE QUESTIONS FOR AFTER ALL THREE OF THE TALKS.

(APPLAUSE)

[Pieter Tans’ presentation has been removed from this file.]

(APPLAUSE)

[Martin Heimann’s presentation has been removed from this file.]

DR. SPINRAD: I WANT TO THANK ALL THREE SPEAKERS.

WE ARE RUNNING UP AGAINST THE CLOCK HERE, BUT I DO WANT TO GIVE FOLKS A CHANCE TO RAISE QUESTIONS.

I REMIND FOLKS THAT IMMEDIATELY AFTER THIS WE'LL BE GOING TO LUNCH, WHERE YOU CAN CORNER THE SPEAKERS IN MORE DETAIL.

BUT LET'S OPEN IT FOR ONE OR TWO QUESTIONS AT THIS POINT IF THERE ARE ANY FROM THE AUDIENCE.

[Q&A for Keeling, Tans and Heimann has been removed from this file.]

(APPLAUSE)

I WILL REMIND FOLKS THAT LUNCH WILL BE SERVED IN THE CRYSTAL BLUE AREA, AND WE WILL RECONVENE AT 1:15, WHEN WE TALK ABOUT ASSESSING IMPACTS AND URGENCY.

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1 SESSION 2
2 ASSESSING IMPACTS AND URGENCY
3
4 DR. SPINRAD: AS PEOPLE ARE COLLECTING, I
5 HAVE ONE HOUSEKEEPING REPORT TO PROVIDE, AND IT HAS
6 TO DO WITH DINNER TONIGHT AND THE FORECAST FROM THE
7 NATIONAL WEATHER SERVICE, WHICH WE OBVIOUSLY TRUST
8 IMPLICITLY, SUGGESTS THAT WE'RE GOING TO HAVE TO MOVE
9 THE DINNER INDOORS; AND MY UNDERSTANDING IS IT WILL
10 BE IN THIS ROOM. BECAUSE OF THE SCHEDULE FOR OUR
11 TALKS THEN, WE WILL BE DELAYING THE START OF DINNER
12 UNTIL 7:30 TONIGHT. I WILL TRY TO REMEMBER TO REMIND
13 YOU OF THAT AGAIN, BUT KEEP THAT IN MIND, SO WHEN
14 WE'RE DONE WITH THE SESSIONS TODAY, IT WILL BE 7:30
15 IN THIS ROOM, DINNER.
16 WE'RE GOING TO GO AHEAD AND GET STARTED
17 THEN WITH THIS SESSION 2 ON ASSESSING IMPACTS AND
18 URGENCY.
19 WE'VE GOT A SET OF EXCITING TALKS COMING UP
20 ALL AFTERNOON, AND THIS NEXT ONE IS A NATURAL
21 FOLLOW-ON TO THE PRESENTATIONS THAT WE HAD THIS
22 MORNING AND A WONDERFUL LEAD-IN TO THE CONTINUED
23 DISCUSSIONS WE'LL HAVE, ESPECIALLY AS WE START
24 BRINGING IN SOME OF THE POLICY AND INDUSTRY
25 PERSPECTIVES.
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1 INTRODUCING THIS SESSION, IMMEDIATELY AFTER
2 MY OPENING COMMENTS, WILL BE DR. SANDY MACDONALD.
3 SANDY IS THE DIRECTOR OF NOAA'S EARTH SYSTEM RESEARCH
4 LAB; IN FACT, THE FIRST DIRECTOR OF NOAA'S EARTH
5 SYSTEM RESEARCH LAB.
6 YOU'VE SEEN A LOT OF REFERENCES TO ESRL AND
7 THE WORK THAT ESRL HAS BEEN DOING. SANDY IS GOING TO
8 BE FRAMING HIS SESSION IN THE CONTEXT OF
9 INTERPRETING IMPACT PROBABILITIES.
10 FOLLOWING SANDY, DR. RICHARD SOMERVILLE, A
11 DISTINGUISHED PROFESSOR EMERITUS AT THE SCRIPPS
12 INSTITUTION OF OCEANOGRAPHY, WILL SPEAK TO THE
13 ENVIRONMENTAL ISSUES SURROUNDING CLIMATE CHANGE.
14 DR. SOMERVILLE WAS A COORDINATING LEAD AUTHOR FOR
15 WORKING GROUP I OF THE IPCC ASSESSMENT, AND HE BRINGS
16 TO BEAR A BROAD PERSPECTIVE AND IS OFTEN FOUND TAKING
17 VERY GREAT PAINS TO CLARIFY THE CLIMATE CHANGE ISSUES
18 TO A RANGE OF AUDIENCES.
19 FOLLOWING DR. SOMERVILLE, WE HAVE VICE
20 ADMIRAL PAUL GAFFNEY, WHO ADDRESSES THE
21 SELDOM-DISCUSSED BUT NO-LESS IMPORTANT ASPECT OF
22 CLIMATE CHANGE; THAT, OF COURSE, BEING INCREASED
23 THREATS TO NATIONAL AND GLOBAL SECURITY. ADMIRAL
24 GAFFNEY IS THE PRESIDENT OF MONMOUTH UNIVERSITY. HE
25 HAS BEEN A FRIEND OF MINE FOR ACTUALLY MANY DECADES
0139
1 NOW; AND OF NOTE, HE WAS THE HIGHEST RANKING NAVAL
2 METEOROLOGY AND OCEANOGRAPHY OFFICER IN UNITED STATES
3 HISTORY. THE ADMIRAL WAS THE CO-AUTHOR OF "

NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE," ALONG WITH TEN OTHER FLAG OFFICERS. HE'S A GRADUATE OF THE U.S. NAVAL ACADEMY, FORMER PRESIDENT OF THE NATIONAL DEFENSE UNIVERSITY, AND HAS BEEN THE PRESIDENT OF MONMOUTH SINCE 2003.

I WILL NOW TURN THE PANEL OVER TO SANDY FOR SOME OF THE INTRODUCTORY COMMENTS.

[Sandy MacDonald's presentation has been removed from this file.]

(APPLAUSE)

[Richard Somerville's presentation has been removed from this file.]

(APPLAUSE)

[VADM Gaffney's presentation has been removed from this file.]

(APPLAUSE)

[Q&A for Somerville and Gaffney has been removed from this file.]

(APPLAUSE)

AND REMIND FOLKS THAT WE'RE GOING TO TAKE A BIT SHORTER BREAK THAN IS SCHEDULED SO THAT WE CAN START BACK ON TIME. LET'S COME BACK AT 3:15 TO TALK ABOUT BUSINESS OPPORTUNITIES, CHALLENGES AND RISKS.

BEFORE YOU BOLT, LET ME REMIND YOU DINNER WILL BE LATER, 7:30. SO THOSE OF YOU WHO ARE WORRIED ABOUT, PERHAPS, HAVING ENOUGH TIME TO SEE THE POSTERS, YOU SHOULD HAVE TIME AFTER WE FINISH AND BEFORE DINNER. SO WE WILL BREAK UNTIL 3:15.

THANK YOU.

(BREAK TAKEN)

SESSION 3
BUSINESS CHALLENGES, OPPORTUNITIES AND RISKS

DR. SPINRAD: OKAY, WE'RE GOING TO GET STARTED HERE AGAIN.

AS PEOPLE ARE SETTLING IN, I WANT TO OFFER A SPECIAL THANKS TO OUR AUDIOVISUAL TEAM, WHO HAVE SURVIVED DEAFENING THUNDER, POWER OUTAGES, AND AT LEAST ONE MINOR FLOOD, FOR THOSE OF YOU WHO NOTICED.

WE SAID WE WERE GOING TO BE RECORDING ALL OF THIS. WE TRIED TO GUARANTEE THERE WOULD BE NO LEAKS DURING THIS MEETING, BUT WE'VE HAD AT LEAST ONE THAT I COULD TELL UP HERE, AND WE'VE MANAGED TO MAKE IT THROUGH. SO, VINCE AND JAMES, GOOD JOB. WELL DONE. KEEP IT UP.

(APPLAUSE)

THE OTHER ANNOUNCEMENT IS THAT, ONCE AGAIN, LET ME REMIND YOU THAT DINNER WILL BE AT 7:30. THERE IS ONE MORE PIECE OF THE INSTRUCTIONS FOR DINNER: ON THE BACK OF YOUR BADGE, SOME OF YOU MAY HAVE HANDWRITTEN A DINNER TABLE NUMBER. PLEASE NOTE THAT. IF YOU DON'T HAVE ANYTHING ON THE BACK OF YOUR BADGE, YOU ARE WELCOME TO EAT AT ANY OF THE TABLES WITH ANYONE YOU WANT. BUT IF YOU DO HAVE A NUMBER ON THERE, THAT MEANS YOU'VE GOT ASSIGNED SEATING FOR

0203

DINNER.

OKAY. AS WITH THE LAST SESSION, I WILL BE DOING SOME INTRODUCTIONS, AND THEN I WILL TURN IT OVER TO FRED PALMER, WHOM I WILL INTRODUCE IN JUST A MINUTE, FROM PEABODY ENERGY, WHO WILL BE SERVING AS THE MODERATOR FOR THIS SESSION, INCLUDING THE Q-AND-A AT THE END OF THE FORMAL PRESENTATIONS.

WE'RE SHIFTING GEARS NOW A LITTLE BIT, AND IN THIS NEXT SECTION AND IN THE PRESENTATION AFTER THIS BY DR. SOCOLOW, YOU WILL HAVE A CHANCE TO LOOK AT THE CHALLENGES, RISKS, AND OPPORTUNITIES IN PROVIDING SAFE ENERGY FOR THE FUTURE.

THE SESSION BEFORE US IS GOING TO CONSIDER THE ISSUE FROM THE PERSPECTIVE OF HOW TO SUPPLY LARGE AMOUNTS OF ENERGY WITHOUT CONTRIBUTING TO GLOBAL WARMING. THE PARTICIPANTS ALL REPRESENT LARGE SECTORS OF ENERGY IN THE UNITED STATES AND THE WORLD, AND IT REALLY IS A REMARKABLE LIST OF PANELISTS, AS YOU'LL SEE WHEN I MAKE THESE INTRODUCTIONS.

FRED PALMER, WHO IS GOING TO BE INTRODUCING THE SESSION, IS THE SENIOR VICE PRESIDENT OF GOVERNMENT RELATIONS AT PEABODY ENERGY, ONE OF THE CO-SPONSORS OF THIS EVENT. PEABODY IS THE LARGEST SUPPLIER OF COAL IN THE UNITED STATES AND A MAJOR PRODUCER OF COAL FOR MUCH OF THE WORLD.

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MR. PALMER HAS RECENTLY RETURNED FROM CHINA AND INDIA, WHERE HE HAS WITNESSED FIRSTHAND THE UNBELIEVABLE ACCELERATION OF DEMAND FOR ENERGY IN THE THIRD WORLD.

TWO ADDITIONAL SPEAKERS, MS. HELEN HOWES OF EXELON AND MR. BRUCE BRAINE OF AMERICAN ELECTRIC POWER, SIMILARLY COME FROM MAJOR SUPPLIERS OF ENERGY, YET HAVE DIFFERENT PERSPECTIVES AS TO HOW TO APPROACH THE PROBLEM.

EXELON, REPRESENTED TODAY BY MS. HOWES, THE VICE PRESIDENT FOR CORPORATE ENVIRONMENT, HEALTH, AND SAFETY, IS THE LARGEST SUPPLIER OF NUCLEAR ENERGY IN THE UNITED STATES, ACCOUNTING FOR 20 PERCENT OF U.S. NUCLEAR POWER, ITSELF EQUAL TO ONE-FIFTH OF THE U.S.

TOTAL ENERGY SUPPLY.
AMERICAN ELECTRIC POWER SERVICES CORPORATION, REPRESENTED BY MR. BRUCE BRAINE, THE VICE PRESIDENT OF STRATEGIC POLICY ANALYSIS, SUPPLIES ENERGY TO PARTS OF 11 STATES IN THE UNITED STATES AND IS THE LARGEST SINGLE SUPPLIER OF U.S. ENERGY.
IN ADDITION TO THESE SPEAKERS, WE ALSO HAVE CHUCK KUTSCHER, FROM THE NATIONAL RENEWABLE ENERGY LAB, AVAILABLE AS PART OF THE PANEL DISCUSSION FOLLOWING THE PRESENTATIONS. DR. KUTSCHER WILL BE GIVING A PRESENTATION ON FRIDAY'S SESSION ON

0205

MITIGATION OPTIONS AND WILL SIT IN ON THIS PANEL TO FIELD ANY QUESTIONS REGARDING RENEWABLE ENERGY THAT MAY ARISE.
SO WE HAVE THE BIG PLAYERS IN THIS ROOM IN THIS PANEL TODAY, AND WE THANK THEM VERY MUCH FOR TAKING THE TIME OUT OF THEIR BUSY SCHEDULES TO PARTICIPATE IN THIS SYMPOSIUM; AND WITH NO FURTHER ELABORATION, I'M GOING TO GIVE YOU FRED PALMER, WHO WILL LEAD THIS SESSION.
FRED.
(APPLAUSE)

[Fred Palmer’s presentation has been removed from this file.]

(APPLAUSE)
[Braine’s presentation has been removed from this file.]

(APPLAUSE)

[Helen Howes’ presentation has been removed from this file.]

(APPLAUSE)

[Q&A for Braine and Howes has been removed from this file.]

DR. SPINRAD: WITH THAT COMMENT, WE'RE

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GOING TO HAVE TO WRAP UP HERE. I WOULD LIKE TO ASK THE AUDIENCE AGAIN TO THANK THIS WONDERFUL PANEL.
(APPLAUSE)
WHILE THE PANEL IS STEPPING DOWN, I WANT TO POINT OUT THAT THIS IS THE VALUE OF A CONFERENCE LIKE THIS, TO GET THIS KIND OF BROAD SET OF PERSPECTIVES, AND I THINK YOU CAN SEE THAT WE HAVE WORKED HARD TO TRY TO GET THE DIVERSE PERSPECTIVES ALL IN THE CONTEXT OF THIS VERY IMPORTANT SET OF ISSUES ASSOCIATED WITH CLIMATE CHANGE.
ONE ANNOUNCEMENT, IF I CAN. YOU MAY HAVE NOTICED THE EXHIBIT AND POSTER AREA HAS BEEN SHUT

DOWN. IT WAS SHUT DOWN EFFECTIVE 4 P.M., IN CONJUNCTION WITH STRUCTURING OF DINNER HERE. HOWEVER, IT WILL OPEN AGAIN TOMORROW PROMPTLY AT 7:30. SO PEOPLE WILL HAVE A CHANCE TO GO IN JUST ABOUT THE SAME TIME THE BREAKFAST OPENS UP.

0267

SESSION 4
CLIMATE CHANGE MITIGATION
UNDER STRONG CARBON CONSTRAINTS

DR. SPINRAD: IT IS NOW MY PLEASURE TO INTRODUCE DR. ROBERT SOCOLOW, PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING AT PRINCETON UNIVERSITY. DR. SOCOLOW, ALONG WITH DR. STEVE PACALA, ALSO OF THE PRINCETON ENVIRONMENTAL INSTITUTE, HAS BEEN PROMOTING A STABILIZATION WEDGE; AND IN FACT, YOU HEARD BRUCE BRAINE ALLUDE TO THAT IN HIS COMMENTS.

AS YOU HAVE SEEN FROM THE PREVIOUS SESSIONS, THE SIMPLE MAGNITUDE OF THE CHALLENGE AHEAD FOR US AND FOR ALL OF SOCIETY IS RATHER DAUNTING BY ANY MEASURE - ECONOMICS, POLICY, SOCIETAL BENEFITS. THE SCALE OF THE PROBLEM BEFORE US REALLY DOES DICTATE THAT WE WILL NEED MANY DIFFERENT STRATEGIES. THE URGENCY OF THE ISSUE SAYS WE MUST BEGIN DOING SOMETHING NOW. I THINK THAT IS A COMMON ASPECT OF EVERYTHING WE'VE HEARD TODAY THUS FAR. THE BEAUTY OF THIS APPROACH IS THAT IT WORKS WITH EXISTING TECHNOLOGY, APPROACHES THAT THOUGH CHALLENGING, CAN BE STARTED TODAY.

DRS. SOCOLOW AND PACALA'S WORK IN THIS THEORY WAS RECENTLY FEATURED IN THE OCTOBER 2007

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NATIONAL GEOGRAPHIC AS PART OF THEIR COVER STORY ON ENERGY.

SO, WASTING NO MORE TIME, PLEASE WELCOME ROB SOCOLOW.

(APPLAUSE)

[Rob Socolow’s presentation has been removed from this file.]

DR. SPINRAD: WELL, WHAT A WONDERFUL WAY TO CAP AN EXCITING SET OF PRESENTATIONS TODAY. WE ARE TIGHT ON TIME, BUT I WOULD LIKE TO MAKE SURE WE DO HAVE AN OPPORTUNITY FOR A COUPLE OF QUESTIONS HERE. SO LET'S OPEN UP THE FLOOR FOR QUESTIONS.

IF YOU COULD PLEASE USE THE MIKE. ONCE AGAIN, I ASK FOLKS TO IDENTIFY YOURSELVES.

DR. SPINRAD: DR. SOCOLOW, THANK YOU,

AGAIN.

(APPLAUSE)

IF I CAN ASK YOU FOLKS TO TRY AND CLEAR THE ROOM AS SOON AS YOU CAN SO THEY CAN SET THIS UP FOR DINNER. ONCE AGAIN, 7:30 IN THIS ROOM FOR OUR DINNER.