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August 21st, 2000

The Secretary,

House of Representatives Joint Standing Committee on Treaties (JSCOT),
Inquiry into the Kyoto Protocol, 1997, Conference of the Parties,
Inter-Governmental Panel on Climate Change (IPCC), of the United Nations.

Dear Sir,

I wish to make a submission to the Committee, with particular relevance to that part of the terms of reference part relating to the veracity of the current conflicting theories on global warming. I would introduce the topic with some general comments on the relevance of scientific method in relation to the global warming, or "greenhouse", theory of climate change, and the impact which science, and its contra pseudo-science, have, on the political and economic questions of the day.

I preface my remarks by looking back at another great outbreak of pseudo-science which had a disastrous impact on the political stability of the nations of Europe, and then the entire world. It was Gobineau, French aristocrat, sometime ambassador to the court of Persia, who wrote his treatise, in the late nineteenth century, on the theory of the races. If subjected to the critical analysis which is central to scientific method, his ideas would have been consigned to the dustbin. Instead, they lingered on for at least two generations, eventually to be picked up by a minority political party. We have a similar situation today with respect to "greenhouse". Driven by a fringe political party, with intellectual origins close to the German idealist, and "volkisch" movements, this compelling, simplistic, idea of a global warming catastrophe must be analysed scientifically and reduced to verifiable parameters. ***The penalty for not doing this will be first, an economic, then, a political, catastrophe.***

INTRODUCTORY COMMENTARY: I wish to make some very brief observations on how science evolves by paradigm shifts. My particular interest is earth sciences, and I will keep my remarks to this area. The world is very complex. Humans for at least ten thousand years have been trying to get a grip of how nature works. So the complexities of the earth are reduced by a series of abstractions, to models, or paradigms. The models are an invention of the human mind and are only an initial step to an holistic view of the earth. With the advent of electronic computers in the 1950's, the capacity of mathematical physicists, including geo-physicists, to develop numerical models, using partial differential equations, to represent physical systems, has been expanded. However, it must be reiterated that numerical models are not the atmosphere, or the oceans, or the earth's crust; they are merely an extension of the physicists' mind, an abstraction, a representation, or a simulation.

The model is not reality. In the mind of the public, which carries over inevitably to the political perception, it is often, erroneously, taken that the model is reality. This is incorrect. An extreme case of this misconception is the viewpoint strenuously put by the political lobbyists of some of the meteorological science fraternity, acting through the Inter-Governmental Panel on Climate Change (IPCC) of the United Nations, that, because a certain numerical result on the effect of higher levels of carbon dioxide on the temperature of the atmosphere is generated by a computer model, then this necessarily represents the external reality. There is an important logical step missing here. The missing step is to use scientific method, the codification of observations and experiments (pioneered by Roger Bacon, and then Francis Bacon) to test the hypothesis of global warming, by anthropocentric "greenhouse" gases, by radiosonde measurements and remote sensing by satellites. The observations from radiosonde temperature measurements on weather balloons and satellite borne microwave sensing devices for temperature show that temperatures in the middle and upper troposphere, worldwide, are falling, whereas globally averaged surface temperatures are rising. The "greenhouse" effect, actually a misnomer, depends on radiative warming of the upper troposphere, an elevation of the "radiation blanket", and, in turn, a heating of the lower troposphere. The reality is the other way round. This proves there is some fundamental flaw with the computer models as theory predicts an elevation of temperature from "greenhouse" gases in the upper troposphere. I will not in this submission further elaborate on these aspects, but will leave the field of rebuttal in terms of meteorology to others.

Average temperatures in the southern hemisphere are also trending downwards, an indication of ice sheet collapse in the Antarctic causing a long term downward trend in temperatures.

The observation I do wish to make on this issue is that the argument on whether or not anthropocentric warming of the atmosphere is occurring, is one that will go on for a long time. It is essentially a very esoteric argument on the validity and use of statistical correlation measures.

A WAY OUT OF THE IMPASSE: *I would put the proposition, that, with systematic observations, and critical analysis, the Arrhenius Paradigm of industrial gases causing a rise in atmospheric temperature is not proven. The protagonists in the argument, however, are unlikely to concede in the short term.* The central problem of the meteorologists is whether, in fact, the projected increase in carbon dioxide concentration to a doubling, or more, will occur, with the recorded effect now of CO₂ fertilisation by plants and forests. There may well be buffering effects from the phytosphere on carbon dioxide levels. Recent scientific papers seem to indicate that the steep rise in CO₂ levels of the 1980's, which precipitated the global warming issue in the first place, may be tapering off. It could be that elevated levels of CO₂ might assist with crop production. The meteorologists persist in the amateurish notion, from a biologists' viewpoint, that plant fertilisation will cause an acceleration of decomposition. I am not suggesting that efforts to develop better general circulation models (GCM's) of the atmosphere using computer techniques be discontinued. I am suggesting, however, that the models have a long way to go if they are to represent physical reality.

One must remember the celebrated words of Sir Douglas Mawson, "an advance in one part of science is an advance everywhere"; it may prove that the computer routines of the atmospheric scientists will be useful in other sciences. The new climate sensing satellite of USA may be used for early detection of bushfires, a very topical issue in Australia and the United States at present.

Now the problem from global warming in the doomsday scenario painted by IPCC is the flooding of islands, marine estuaries, and low-lying land in countries such as Holland and Bangla Desh. There are low coastal lands in France and Germany. Many major metropolises such as New York, London, and Melbourne, would be affected. The sea-level rise from global warming has been projected at 400-600 mm in the first century (from a doubling of CO₂) and Jenkins of the U.K. Hadley Centre has estimated that the sea-level rise from any thermal expansion of the oceans will continue on for several centuries at a similar rate. The disadvantages, and benefits, of changes in climate, solely, on their own, are not propounded, even by CSIRO, Australia, to be of great significance, or of much concern.

Now let us examine more closely this issue of sea-level rise. The meteorologists maintain that sea level has been static throughout the Holocene (Prof. W.F. Budd, IASOS-Antarctic CRC, 1999, personal communication). (The Holocene is the geological age of the past ten thousand years and more since the break-up of the Great Northern Ice Sheets of the Last Ice Age in Laurentia, Scandinavia and the High Arctic). It is central to the doomsday projections of IPCC that sea-level rise cannot occur from any other natural cause apart from global warming. After all, if it is proven that there are other geophysical operators on the climate system, then the science budget to meteorological research may be curtailed, a disaster even greater than global warming! Now there is a still stand of 6 metres above current sea-level, dating from the last interglacial, about 100,000 years and more past (Prof. J Bowler, School of Earth Sciences, University of Melbourne, 1999, personal communication). So there is a conflict in opinions! Now to what could be attributed a sea-level 6 metres higher than the present?

So what happens if sea-level rise has been proven to be continuous throughout the Holocene?

COMMENTARY: *CASE FOR CONTROLS ON CARBON EMISSIONS DISAPPEARS.*

IPCC attempt to ignore the science, the observations, the disciplines of glaciology, geophysics, oceanography, and palaeo-geography. The reason given by them as to why they should ignore it is the issue of morality. "Greenhouse" is a moral issue. But is it not an even greater immorality to ignore the truth? Is it not extremely immoral for the governments of the world to spend trillions of dollars in an ill-considered effort to control energy supplies when this public expenditure would be more effectively spent on dealing with some of our more pressing and more relevant environmental issues. Is "decarbonizing the world" really a serious program for the post-industrial world?

Shades of the great disaster of the early twentieth century, when pseudo-science was supplanted for truth, in a miasma of internecine war and destruction. Greenhouse has similar potential!

I hope so far in this essay to have proven, or established, the point, that if the sea-level is rising from other natural causes, or dynamic geophysical operators, and, is likely to continue to rise in the future millennium, at similar or escalating rates, then the current political, scientific, and economic emphasis on the greenhouse issue, and attendant mitigation measures, is misplaced.

THE ROLE OF THE WEST ANTARCTIC ICE SHEET: I will now attempt to present a summary of the recent scientific literature on the topic of sea-level rise induced primarily by a dynamic operator, the disintegrating West Antarctic Ice Sheet. This is the last of the marine ice sheets, attached to the continental crust of the craton of East Antarctica, and the chain of islands of West Antarctica. It is partly grounded on basement, and partly floating, extending to the Weddell and Ross Seas, around the continent of Antarctica, to the south of Australia. I will make a selection of the more accessible scientific literature, avoiding some of the topics of mathematical physics, relating to internal mechanisms of ice flow, at the heart of glaciology; a science originally pursued by meteorologists, but now emerging as a discipline in its own right. I will refer to the work by NASA Goddard SFC.

I will quote from the abstract of Prof. Hughes' paper of 1992, a landmark paper, initiating a paradigm shift in glaciology; how the life cycles of ice streams affect climate, and drive climate cycles.

"Ice streams are fast currents of ice that drain some 90% of present-day ice sheets, and probably drained a similar percent of ice from former ice sheets. Ice streams may have life cycles akin to, but much longer than, surge cycles of certain mountain glaciers. The floating tongues of marine ice streams coalesce to form floating ice shelves that buttress marine ice sheets, and the grounded lobes of terrestrial ice streams stabilize terrestrial ice sheets. Ice shelves and ice lobes form during the life cycles of ice streams, and disintegrate rapidly to initiate new life cycles. Successive life cycles continue until the ice sheet collapses. A new paradigm is postulated in which abrupt climatic change is driven by iceberg outbursts associated with life cycles of marine ice streams and dust storms associated with life cycles of terrestrial ice streams.....

Life cycles of Greenland ice streams during the Holocene seem to be linked to episodes of regional climate cooling: most recently, the Little Ice Age. When superimposed on the present Milankovitch hemicycle of reduced insolation over the North Atlantic, this could abruptly initiate a new world-wide glaciation cycle in the aftermath of present-day CO₂ "greenhouse" warming. Proliferation of Antarctic ice-stream life cycles during the period of "greenhouse" warming may also trigger global climatic change by forcing a reorganization of circumpolar thermohaline circulation in the Southern Ocean." ⁽¹⁾

(1) Hughes, T., 1992, "Abrupt climate change related to unstable ice-sheet dynamics: Towards a new paradigm", *Palaeogeography, Palaeoclimatology, Palaeoecology* (Global and Planetary Change Section), Vol. 97, pp 203-234.

I now move from the startling prognosis and paradigm shift as postulated by Hughes, to some recent results of geophysical surveys in the Ross Sea, Antarctica, published recently in the *Geological Society of America Bulletin*, October, 1999, in a paper by S. Shipp, J. Anderson, and E. Domack. ⁽²⁾ Quoting from their Introduction: "Many key questions about late Quaternary geology revolve around the expansion and contraction of the Antarctic Ice Sheet. Were ice-sheet fluctuations in phase with the Northern Hemisphere ice sheets? Did the East and West Antarctic Ice Sheets expand and contract in concert? What, and when, was the contribution of Antarctic ice to global sea level during the past 18 k.y.? (18,000 years, clarification by R.-R.) Does the West Antarctic Ice Sheet have a history of catastrophic collapse? How does the geologic setting of the continental shelf (e.g., bed topography, sediment cover, and character) influence the behavior of the ice sheet and its potential to collapse? Resolving these questions requires documentation of the maximum extent of the ice sheet during the Last Glacial Maximum (LGM), characterization of deposits and geometric features that existed under the expanded ice sheet, and establishment of the history of ice-sheet retreat.

The questions of maximum limits of ice grounding and rates of retreat from the Ross Sea are central to the debate on possible future behavior of the West Antarctic Ice Sheet and predictions about future sea-level change (Bentley, 1997, Bindschadler, 1997a, Bindschadler et al, 1998). Collapse of marine based ice sheets has been proposed by researchers working in the Northern Hemisphere (Heinrich, 1988; Andrews and Tedesco, 1992; Bond et al, 1992). Anderson and Thomas (1991) argued that periodic collapse of marine ice sheets is the most likely mechanism to explain rapid eustatic rises during the past 18 k.y. They stressed that, although the magnitude of these collapse events (<2 m) often is too small to be observed as rises on the global sea-level curve (e.g. Fairbanks, 1989), the rises occurred so rapidly that they caused significant, and observable, shifts in coastal systems (Thomas and Anderson, 1994). Similar small increases in sea level in the future would have a large impact on human populations located near the present shoreline.

If pulses of rapid ice-sheet retreat occurred since the LGM, similar rapid retreat of the ice mass could occur in the future. The West Antarctic Ice Sheet is the sole extant marine-based ice sheet; disintegration of the entire West Antarctic Ice Sheet would result in a eustatic sea-level rise of approximately 6 m (Denton et al., 1991). Considerable speculation has focused on the stability of the

marine-based West Antarctic Ice Sheet (e.g., Hollin, 1962; Hughes, 1973, 1977, 1987; Thomas and Bentley, 1978; Blankenship et al., 1986; Alley et al., 1986, 1987a; Denton et al., 1991; Lingle et al., 1991; MacAyeal, 1992; Bentley, 1997; Bindschadler, 1997a; Bindschadler et al., 1998; Oppenheimer, 1998). Recent investigations assessed the mechanisms that may result in instability of the West Antarctic Ice Sheet, such as a deforming substrate (e.g. Alley et al., 1986, 1987a; MacAyeal, 1992), a rise in sea level (e.g. Hollin, 1962; Thomas and Bentley, 1978; Lingle and Clark, 1979; Hughes, 1987; Lingle et al., 1991), or undermelting of an ice shelf by relatively warm water masses flowing onto the continental shelf (e.g., Potter and Paren, 1985; Jacobs et al., 1996; Jenkins et al., 1996).

Approximately 25% of the Antarctic Ice Sheet discharges into the Ross Sea, including contributions from the West and East Antarctic Ice Sheets, making this region a valuable focus for monitoring past ice-sheet activity (Denton, et al., 1989; Fig. 1). This study was designed to provide constraints on the extent and configuration of the ice sheets in the Ross Sea during the LGM, their relative retreat histories, conditions at their bases, and the stratigraphic intervals related to retreat. An understanding of the extent and behavior of the ice sheets during the LGM will allow partial assessment of the links between deglaciation and internal and external environmental influences, and will aid in the development of models for future activity of the ice sheets”.

And now turning to the authors' Conclusions, in the paper, last paragraph:

“...6. Retreat of the ice sheet occurred throughout Holocene time and undoubtedly contributed to Holocene sea-level rise. The nature of this retreat may have been episodic (Bindschadler, 1998). The available data suggest that if a large-scale collapse of the ice sheet occurred, it took place later than ~6.4 ka when the grounding line retreated from a position near Ross Island to its present location....”

(2) Shipp, S., Anderson, J., and Domack, E., 1999, “Late Pleistocene-Holocene retreat of the West Antarctic Ice-Sheet system in the Ross Sea: Part 1 – Geophysical results”, Bulletin, Geol. Soc. Am., pp 1,486-1,516.

In summary, in the scientific literature, it is now well established that Holocene sea-level rise has been occurring for the approximately ten millennia since the breakup of the ice sheets.

COMMENTARY: SO THIS IS STARTLING NEWS; SIGNS OF A HEINRICH LIKE (GLACIAL SURGE) EVENT IN THE ANTARCTIC, ALMOST WITHIN HISTORICAL TIMES!

Note: Heinrich was the author of a 1988 landmark paper describing layers of detritus deposited on the floor of the North Atlantic at a periodicity of circa 7-10,000 a. The layers have been attributed to massive outbursts of icebergs from the Hudson Bay area and Greenland, subsequently characterized as “Heinrich Events”.

I now turn to some specific sources to throw some more light on sea-level rise since deglaciation of the Great Northern Ice Sheets, the Last Glacial Maximum (LGM) being circa 14 ka past.

To do this, I refer to recent research on the opposite side of the world, in fact, the sub-tropical coast of Florida, U.S.A. The nearby corals of Barbados Islands were the subject of an earlier study of eustatic sea-level rise during the period of deglaciation with the breakup of the northern hemisphere ice sheets. There has been approximately 120 metres rise in sea-level since the inception of the deglaciation which commenced circa 14,000 a past. ⁽³⁾

(3) Fairbanks, R.G., 1989, “A 17,000-year glacio-eustatic sea level record: influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation”, Nature, Vol. 342, pp 637-642.

Toscano and Lundberg ⁽⁴⁾ have followed on this work by extending the sea-level curve to the late Holocene. Quoting from their abstract, “A portion of this interval, represented by a gap in the Caribbean record of *A. Palmata* reefs, has been interpreted as reef drowning during an inferred catastrophic sea-level rise event of > 45 mm/yr, or a 6.5 m rise between 7.6 and 7.2 ka, attributed to West Antarctic Ice Sheet instability and changes in marine ice extent between 8 and 7 ka”. Further on in their text, these authors suggest that; “Sea level rose 8.5 m k.y.⁻¹ from 8.5 to 6.5 ka, then slowed to 3.7 m k.y.⁻¹ from 6.5 to 5 ka, slowing to 1.5 m k.y.⁻¹ from 5 to 0 ka.”

(4) Toscano, M.A., and Lundberg, J., 1998, “Early Holocene sea-level record from submerged fossil reefs on the southeast Florida margin”, Geology, Vol. 26, pp 255-258.

COMMENTARY: CSIRO maintain that sea-level has been static during the Holocene, and that there have been no Heinrich-like events. An example of selective filtering of information.

CURRENTLY ACTIVE SURGE EVENT IN THE WEST ANTARCTIC ICE SHEET: In order to obtain a more comprehensive viewpoint of the ice sheet changes during the surge event which was triggered in the West Antarctic circa 8,000 a past, and which is still active, I now turn to research by NASA Oceans and Ice Branch, at NASA Goddard Space Flight Center, undertaken by Drs. Robert Bindschadler and Patricia Vornberger. ⁽⁵⁾ The satellite imagery indicates that the headward margins of the fast-moving ice streams are moving toward the continental divide at a rate of 140 m/a. At this rate the ice sheet will have wasted itself entirely in about one thousand years. The curious aspect of these measurements from satellite imagery is that when integrated over the depth and width of the ice stream complex, and distributed over the present surface area of the world's oceans, a sea-level rise rate of approximately 0.9 mm/a is computed, equivalent to the "missing" component in sea-level rise, that which is unexplained by hydrologists, of 1 mm/a. Again, this figure correlates roughly with the findings of Toscano and Lundberg noted above. Indeed, a great mystery is now revealed. The collapse event triggered circa 8,000 a past in the West Antarctic is the explanation of the flood myths.

(5) Bindschadler, R., and Vornberger, P., 1998, "Changes in the West Antarctic Ice Sheet since 1963 from declassified satellite photography", *Science*, Vol. 279, pp 689-691.

Bindschadler has further developed his theory and elaborated on these conclusions ⁽⁶⁾.

(6) Bindschadler, R., 1997, "Actively surging West Antarctic ice streams and their response characteristics", *Annals of Glaciology*, Vol. 24, pp 409-414.

A Review Article written by Dr. Robert Bindschadler, and published in *Science*, entitled "Future of the West Antarctic Ice Sheet", is attached to this submission.

(7) Bindschadler, R., 1998, "Future of the West Antarctic Ice Sheet", *Science*, Vol. 282, pp 428-429.

The topic of the grounding line retreat in the Ross Sea area has been further elaborated on in a paper ⁽⁸⁾ by H. Conway, B.L. Hall, G.H. Denton, A.M. Gades, and E.D. Waddington. This review paper discusses the results of findings from glacial geology and geophysics on the action of the retreat of the grounding line over the last 10,000 years of the Ross Ice Shelf, flowing into the Ross Sea. The occurrence of a catastrophic collapse, matching that found in Florida corals of Toscano and Lundberg, 1998, is the most significant aspect of research from American ice core drilling efforts at Taylor Dome, Antarctica.

(8) Conway, H., Hall, B.L., Denton, G.H., Gades, A.M., and Waddington, E.D., 1999, "Past and future grounding-line retreat of the West Antarctic Ice Sheet", *Science*, Vol. 286, pp 280-283.

The last 10,000 years since the Last Glacial Maximum (LGM) has seen the West Antarctic Ice Sheet (WAIS) lose 2/3 of its mass. How can this be steady state? How is it possible for reputable scientists of this day and age to totally ignore over twenty years of intensive field research in the Antarctic by American, British, and German scientists? These institutions expend such funds on this scientific research because it is important and has immense significance to the future environment!

The hypothesis of "steady-state" by Budd and others is really rather passe`. This hypothesis, now totally discredited, was a very early step in the development of dynamic glaciology.

NOTE: CSIRO is an acronym for Commonwealth Scientific and Industrial Research Organization.

CONCLUSIONS: *As a final attachment I would include a recent, circa early 2000, Field Report submitted by Prof. Terence Hughes, while on board the R.V. Nathaniel Palmer in the Amundsen Sea, Antarctica, to National Science Foundation fund managers where he highlights exciting results of marine glacial geology and geophysics which indicate very recent, geologically, a few hundred years, and major changes in the Thwaites and Pine Island Glaciers, draining the West Antarctic Ice Sheet into the Amundsen Sea. Hughes maintains that this is "the soft underbelly" of the marine ice sheet and is the most probable location for the initiation of a major collapse event which would cause a worldwide sea-level rise of 6 metres (approximately). The most recent research information from the field collated by Prof. Terence Hughes of the Institute for Quaternary Studies, University of Maine, U.S.A., could be made available on the request of the committee. Broecker, ⁽⁹⁾ has also noted the role of the demise of the Little Ice Age, from 1870 to 1940, as indicating natural variability to be the origin of the elevation in surface temperatures through the 1990's.*

(9) Broecker, W. 1999, "Climate Change Prediction", *Science*, Vol. 283, 8 January, p.

I first came to this view of the atmosphere-ocean-cryosphere system in 1993 when I realized that the ice sheets were driving changes in the rest of the system. This led me to research the literature in greater depth when I found that Hughes had been working along a similar track. This led me to this long journey of getting the science into the public area as I realized then its immense significance. The fact that it contradicts the meteorologists' global warming paradigm and will inevitably shift the focus of the climate change debate to the polar ice sheets is simply "tough".

COMMENTARY: THE AUSTRALIAN ACADEMY OF SCIENCE FOLLOW THE AGENDA OF IPCC AS APOLOGISISTS FOR CSIRO DIVISION OF ATMOSPHERIC RESEARCH. THEY REFUSE TO LOOK AT EVIDENCE AVAILABLE FROM GEOSCIENCE.

I HAVE HEARD ON SEVERAL OCCASIONS SENIOR SCIENTISTS FROM CSIRO VIGOROUSLY DEFEND THE NOTION THAT THERE HAVE BEEN NO HEINRICH LIKE EVENTS DURING THE HOLOCENE. THIS IS SCIENTIFIC NONSENSE.

Yours faithfully

Murray Rowden-Rich (Ph.D.),

Attachments in addition to references noted above:

1. *Press Release prepared for presentation at Royal Society of Victoria, April, 1999.*
2. *Paper published in Transactions, Royal Society of Victoria, 1998.*
3. *Research Report, Chapman Conference, West Antarctic Ice Sheet, Orono, Maine, 1998.*
4. *"A Geo-Scientists View of Sea-Level Rise", by R.J.M. Rowden-Rich, January, 2000.*