Transcript of the ACES Information Session
on the
Proposed Interim Ontario Drinking Water Standard for Tritium
January 27, 1994
Ajax Recreation Centre
Ajax, Ontario

Ralph Stanley, Tritium Work Group Chair: (RS)

Good afternoon (Good evening) and welcome to what I'm sure will be an informative, as well as helpful information session.

My name is Ralph Stanley. I am a member of ACES, the Advisory Committee on Environmental Standards and chair of the ACES' Tritium Working Group. I will also be chairing this session.

Just before we begin, there are a few housekeeping and health and safety items I would like to mention:

-this session is smoke free. You may smoke outside.
-washrooms are located to the left outside the meeting room.
-the emergency exits are located on both sides at the back of the room.
-copies of the rationale document and consultation materials are available on the display tables outside. There is also a sign up sheet for more information and deputation requests at those tables.

The purpose of this session is twofold: first, to explain ACES' public consultation process and secondly, to provide you with a better understanding of the Ministry of Environment and Energy's proposed interim Tritium drinking water objective through an overview of how the objective for tritium was developed. Goff Jenkins with the Ministry will provide the overview. Please note that this session is being recorded in order to provide written transcripts on request. (Evening session-Please also note that McLean Hunter Cable television is taping this meeting.)

It gives me great pleasure to introduce the chairman of the Advisory Committee on Environmental Standards Mark

Mark Goldberg, Chair of ACES: (MG)

Thanks Ralph, just to begin I'd like to give you an outline of today's meeting. After the introductions and after I give you a brief overview of what ACES is all about and why we're here today, Goff is going to explain the standard and the rationale behind it and then we'll have a question and answer session after that so bear with us if you have any burning questions, we'll get to them. The Advisory Committee on Environmental Standards was established in 1990 by the Minister of the Environment and our orle is provide advice to the

Minister on matters concerning environmental standards. Standards in general are levels of environmental contaminants that are tolerable. Some of them are enforceable by law, some of them aren't. ACES is an independent body, we are not really a part of the Ministry of the Environment, we are an arms length agency. Our role is to provide that advisory capacity. We advise the Minister on standards. We also provide advice on principles and policies involved in standard setting and developing standards, research that's needed to fill gaps in the information available for standard setting and priorities for standard setting as well. The members of ACES are not stake holders in any way. They are appointed on the basis of their expertise and experience. They come to the table with that in mind, with their experience foremost as the reason that they are there. They tend to be involved in many other aspects of environmental regulation and environmental affairs but again they are independent in themselves and provide advice. This is a list of the membership and if you want a copy of it there is a list on the table outside. I'll just quickly give you an overview of the members so you can get an idea of the makeup of the Committee. As Ralph mentioned, I am the Chair of ACES. I'm a toxicologist and I'm on faculty at the University of Guelph in Toxicology. I also have a consulting firm called Globaltox International Consultants. The Vice Chair is Beth Savan who is an environmental researcher and educator. She's in the Environmental Studies Program at the University of Toronto on faculty. Bob Boldt is another Committee member. He's an occupational health and environmental expert formally with Dow Chemical. Now he's retired and does a lot of work with the World Health Organization. Ian Brindle, another member, is an analytical chemist with Brock University in St. Catherines. Terry Burrell is an environmental economist and lawyer. Doug Cook is an occupational health expert formally with Imperial Oil. Cindy O'Brien, who is here today in the audience, is an occupational hygienist with the City of Toronto. Sally Paterson is an environmental chemodynamic modeller. She models the fate of environmental contaminants and finds out where they end up. David Pengelly is an air pollution expert at McMaster University. Kim Perrotta is an occupational health and safety labour consultant. Cathy Spoel is an environmental lawyer with the firm Miller Thompson. And finally, Keith Winterhalder is a plant and soil ecologist at Laurentian University in Sudbury. He is really a plant toxicologist interested in what causes plants to grow or not grow and has done a lot of work on revegetating the Sudbury area.

So you can see the members of ACES are really a wide ranging group. Some are involved in business, some are involved in the private sector, some work at Universities. But again, we are independent in that we don't come to the table as stakeholders or representatives of any other body.

The way a consultation works is the Minister will refer a proposed standard to ACES along with any documentation the Ministry develops to support that standard. The Committee will look at that in itself and sometimes the Minister will ask ACES to consult the public. This is what has happened in the case of the Tritium drinking water standard.

After considering any documentation and any information submitted during the consultation by the interested public, and also considering the knowledge and experience of ACES members, the Committee will write a recommendation to the Minister.

Our recommendation is really part of a larger report which contains the recommendation, a rationale for making that recommendation, it also contains a summary of the public input to the consultation process and an explanation of how that public input was considered in arriving at that recommendation. If your interested in seeing how that's done, there are some copies of our previous reports outside. There is one for a standard for NDMA which is a contaminant which was found in the drinking water in Elmira Ontario back in about 1990. If you go through that report it's really analogous to the tritium situation in that it is a drinking water contaminant. There are other reports out there also.

After we submit our report to the Minister, the Minister will make a decision and at that point our report will be made public. Anyone who has participated in the public consultation process will receive a copy of the report at the time it is made public. They will see how their comments were incorporated in our report and considered in making our recommendation.

On December 16, 1993, the Minister of the Environment and Energy, Bud Wildman, requested that ACES consult the public on the proposed drinking water standard for tritium of 7000 Becquerels per litre (Bq/L). A package of background material was mailed to our mailing list of 6,600 people. Notice was given of a 60 day consultation period in the Ontario Gazette, a number of newspapers including local newspapers in the Ajax area, the Globe and Mail and on the Web electronic network. We tried to reach as many people through as many type of media as possible.

The consultation questions were as follows: people were asked is the proposed standard acceptable; if not what is the basis for finding the proposed level unacceptable; and do you have an alternative level to propose? These are the questions we are asking you to consider today as you listen to the material presented.

ACES has reviewed the rationale document and will consider all submissions from the public as well prior to making any recommendations to the Minister.

We will have a 60 day consultation period and we will be able to submit our recommendations to the Minister sometime in May this year.

That's all I have to say about the ACES process, if anyone has any questions about the process itself I'd be happy to address them.

Questioner 1:

My question is how come the Minister only requested this as late as last year when the Minister Ruth Grier requested that it be completed then?

MG:

As I understand it, the background behind this particular consultation involved the Environmental Assessment Advisory Committee. The drinking water treatment plant was

referred to that committee, they are another advisory committee, and they were requested to consider whether it should go to an environmental assessment hearing. They wrote a recommendation to the Minister suggesting that it need not go to an environmental assessment hearing but that a standard for tritium should be updated.

Questioner 1:

This was in 1992.

MG:

Yes, I don't know what the delay between their recommendation and our receiving the consultation was, but you can see that we received the consultation in December and we have acted fairly quickly on it. We hope to write a recommendation on it as soon as possible, as early as May of this year.

Questioner 2:

Is there some reason why tritium is being examined to the exclusion of other radionuclides?

MG:

I'd rather not address that because it's not really a process question. We can defer that until later if you like.

Questioner 3:

Did you say that the government had already suggested the number 7000 to you? It seems they should ask you what number is good rather than give you a number and then say what do you think of it.

MG:

The way ACES is best used is as a review body and the Ministry has people on staff who develop the documentation and develop the standard. We then review them and do the public consultation on them. We are in the consultation phase now. We are asking you if you think it's appropriate to have 7,000 Bq/L as the standard. If you think it is fine let us know, if you think it's not, let us know why not. That's why we're asking.

We'll take one more question because I don't want to delay the presentation of the rationale behind the standard.

Questioner 4:

Who specifically on ACES is considered the expert on tritium radionuclides? You said most of your decisions are based on the expertise of the members.

MG:

It's a good question. We don't have anyone who is a tritium expert per se, we have a wide range of background expertise. In terms of the health effects of ionizing radiation, probably I am the most qualified in terms of expertise but there are a number of people on the Committee who have a lot of expertise on the health effects of ionizing radiation in general.

I'll turn it back over to Ralph, if you have any other process questions we can address them in the question and answer period. Thank you.

RS:

Thanks a lot Mark. As Mark said, we'll have the opportunity to ask lots of questions. At this stage what I'd like to do is talk about the meeting and how it will progress. In addition to being ACES Chair, Dr. Goldberg is also a member of the Tritium Working Group. Another Committee member that is here is Cindy O'Brien. Also here are ACES Staff members Dianne Corrigan, Carol Bennett and Kathy Paidock.

As you are aware, the Minister of the Environment and Energy in December requested that ACES conduct a public consultation on the Ministry's proposed interim drinking water objective for Tritium.

ACES' consultation will focus primarily on the appropriateness of the proposed objective. Information packages, which contain suggested consultation questions, have been distributed.

If you don't have an information package, there are extras on the table outside.

Today's information session is the first part of ACES' consultation program.

ACES wanted to provide you with an opportunity to learn more about the development of the objective and to ask questions before you prepare your written comments or appear at a deputation meeting.

I'd now like to turn to the agenda. You should have been given a copy of it when you came in; if you don't have one, raise your hand so we can get one to you. (if many people don't have an agenda, wait until they are distributed and say: I see that quite a few people don't have an agenda. I'll wait until everyone has one before proceeding.)

The formal part of the session will last for two hours and will end at 5:00 (or 9:30).

After I conclude my opening remarks, Goff Jenkins with the Ministry of Environment and Energy, who had the lead role in the preparation of the report, will make a presentation.

We will hear Goff's presentations before taking questions.

After the presentation, I will open the floor for questions. People who have questions are

asked to raise their hands and then approach a microphone when they are recognized.

I will try and recognize you in turn. Because our time is short, I would ask that you keep your questions as brief as possible. In an effort to provide an opportunity for as many speakers as possible, each questioner will be allowed one question and one supplementary question. If time allows, we will permit additional questions.

Please remember that this is an information session. Try and keep your questions for Goff on the rationale for the objective and for ACES on the consultation process.

You will have an opportunity to make your views and comments known on the proposed objective in written or oral submissions, later.

Following the question period, I will tell you more about ACES' consultation program and the opportunities we have provided for you to express your views to ACES.

We will then break for coffee and informal discussion. Please feel free, however, to get coffee at anytime during the session.

Also with us here today from the Ministry of Environment and Energy is Mr. Jim Smith with the Standards Development Branch and we welcome Jim. Also here is Ernie Baker and Jim Lee from the Radiation Protection Service of the Ministry of Labour. They do a lot of the analytical testing for radionuclides in drinking water.

Any concerns or questions?

If there are no questions, Goff are you ready to make your presentation? Ladies and gentlemen, Goff Jenkins, Ontario Ministry of the Environment and Energy.

Goff Jenkins:

Thank you Ralph. Good afternoon ladies and gentlemen, my name is Goff Jenkins and I work for the Standards Development Branch of the Ministry of the Environment and Energy. Today I'm going to give you an overview of the process and rationale we used in preparing the proposed interim drinking water objective for tritium.

Briefly, by way of background, following the proposal to construct a new water supply plant in the Pickering Ajax area, the Environmental Assessment Advisory Committee (EAAC) held a number of meetings to determine if a full environmental assessment was required on this plant. The EAAC submitted a report to the Minister of the Environment and indicated that there was not a need for a full environmental assessment as long as the recommendations they were making to the Minister were appropriately addressed. One of those recommendations involved requesting ACES to review the current drinking water objective for tritium of 40,000 Bq/L. In order to assist in this public consultation, I was asked to prepare a rationale document that would provide the basis and explantation for a revised drinking water

objective. Today I will summarize the process and give you an opportunity to ask questions about it.

I should tell you right up front that I am not a radiation specialist myself either, but I am an expert in the area of drinking water objectives and that is why I was asked to prepare the rationale document.

First of all, I'd like to give you some quick background information on Ontario drinking water objectives (ODWO) themselves, what are they and how are they used? The primary purpose of ODWOs is to assess the suitability of drinking water supplies for long term consumption for the public. They are used to assess the suitability of a raw water supply, to ensure that the raw water is of a sufficient quality that it may be used to provide and produce drinking water that meets the drinking water objectives that have been established for health based or aesthetic reasons. Basically, if water meets the ODWOs it is considered to be of a quality that is protective of public health and it will also be of an aesthetically pleasing nature which means it should be acceptable to the senses for things such as taste etc. In reality, the ODWOs are not intended to be a regulatory mechanism. They are really there to provide a reference level for the establishment and operation of water treatment plants and to provide a reference level for the Medical Officer of Health to be able to assess the acceptability of any drinking water supply at any time as to whether it is suitable and adequately protective of public health. For actual regulatory control, we have other mechanisms which we place on establishments to control emissions and discharges and that is the main way we limit contaminants getting into the environment in the first place.

Now, how are ODWOs established? Most ODWOs are adopted directly from the Canadian Drinking Water Guidelines (CDWG). The primary group responsible for deriving those CDWGs is the Federal Provincial Subcommittee on Drinking Water. This subcommittee has representatives from each of the provinces and territories in Canada and is led by Health and Welfare Canada and has representation from Environment Canada as well. This is a very formal, involved federal provincial process. What happens is that Health and Welfare Canada prepares the health effects document on any particular contaminant of concern and proposes an initial guideline level in drinking water for that contaminant. Their health effects document is based on information available through international scientific and medical experts. Health and Welfare Canada liaises with these organizations and gets input from experts around the world prior to proposing new Canadian drinking water guideline. The provinces role in this process is to review the health effects document that has been prepared by Heath and Welfare Canada, provide input as necessary into that document and provide input on background levels of the contaminant of concern in the environment, provide information on analytical methods available for testing for contaminants in the environment, treatment technologies that may be used to limit exposure in drinking water to any particular contaminants that may be present in surface water and any cost benefit information or what the effects might be of modifying the guideline levels. There is a debate process that goes on, it is a very intensive formal review process. Finally, once a recommendation comes out for a new CDWG, it is referred to the Committee on Environmental and Occupational Health which has environmental, occupational and health experts from across the country who review the proposed guideline. If they endorse it, it moves up to the Population Health Committee

which was formally the deputy ministers of Health from across the country and once it gets through that process it is then formally established as a Canadian Drinking Water Guideline.

A new aspect to the development of CDWG is that in the last couple of years we have attempted to open up the process that we use to establish those guidelines. As a result, last year we conducted the first national public consultation on the new guideline that has been proposed for trihalomethanes in drinking water. These are all initiatives to try and open up the process to allow input to ensure people understand the reasons behind the guidelines, their purposes and hopefully it will be a very positive feedback mechanism when we get it operating fully.

As you may gather that formal process is quite lengthy and involved. Right now it takes between three and seven years to get a new drinking water guideline through the process from start to finish. There is a lot of effort that has to be put into it and a lot of review and that's why it takes so much time.

As I mentioned, most Ontario drinking water objectives are adopted directly from the Canadian drinking water guidelines. Ontario plays a major role in all stages of this formal process by which the CDWG are established. We agree with the establishment of the number as a CDWG, it means that Ontario supports it and that we adopt it immediately, any new guideline, as an Ontario drinking water objective rather than go through a repeat process as we have been in support throughout that process.

Now that I've given you a basic idea as to how CDWG are established and how most Ontario drinking water objectives come to be, I'd like to give you some background information in this process as to how exactly what is tritium and to how we went about proposing this objective. Once again, I must apologize for not being a radiation expert, I certainly to any of my colleagues in the audience who are, please bear with me as attempt to summarize the area in layman's language to make it slightly more understandable for everybody, particularly me.

First of all, tritium, what is it and why should we be concerned about it? Basically, it's a radioactive isotope of hydrogen that may be formed naturally in the environment principally through the effects of solar radiation on the constituents in the atmosphere. Tritium is capable of emitting ionizing radiation in the form of an electron, it is considered a weak beta emitter when compared to other radionuclides. Tritiated water which may be released from a facility such as a nuclear generating station is basically indistinguishable from normal water when viewed with the ordinary senses such as taste, touch, feel, etc. By that mechanism you cannot tell tritiated water from normal water.

What are the sources of tritium? As I mentioned earlier, solar radiation reacting with constituents in the atmosphere is one of the major sources of tritium in the environment, estimated to contribute up to 10^{15} Bq to the global environment annually, I'll explain that a little more later. When tritium forms naturally in the atmosphere it then falls to earth in the form of rain fall and can be found in surface waters around the globe. Our own Ministry of Health estimates that one in every 7000 water molecules is actually a tritiated water molecule

due to natural processes. Tritium may also enter the environment from fallout from nuclear testing. This of course was much more prevalent many years ago, now that the bands on most atmospheric nuclear testing are in place the contribution from this source will be declining.

The other primary source of tritium in the environment is from nuclear energy production facilities, particulary from Candu type reactors that we use here in Canada since they use heavy water in their processes and tritiated water may be produced and emitted from those facilities.

As I mentioned, the main concerns with tritium revolve around the fact that it is radioactive and emits ionizing radiation. Now I'd like to give you a brief summary about why we have so many concerns about ionizing radiation exposure in general. Initially, I'd like to show you what our estimates are of what we are exposed to in the form of ionizing radiation because of the fact that we live on this earth. It is estimated that natural sources of radiation such as the solar radiation I mentioned due to the radioactive constituents in soil and rock that are natural that have been there for eternity actually contribute 82% of the average annual exposure for humans around the world. In addition to that 82% there are estimated 15% of the estimated annual exposure comes from medical exposure due to diagnostic or treatment methods used in medicine. Up to 3% of the average annual exposure to ionizing radiation comes from consumer products and up to .1% of the total exposure may come from drinking water. This is simply put there to basically indicate that in the scheme of things, drinking water is a relatively small contributor of your total ionizing radiation exposure.

Now that you have a feel for the contributions from various sources, I'd like to briefly discuss the health concerns associated with ionizing radiation. The key concern upon which our objective is based and previous objectives were based is that ionizing radiation may cause cancer. The current scientific opinion on ionizing radiation and its ability to cause cancer is that the actual risk of developing cancer upon exposure is proportional to the dose you receive and are exposed to and that there is actually no threshold below which exposure to ionizing radiation may not have some effect. In other words, there is no absolutely safe level to any amount of ionizing radiation. The risk may be very very small, as I will detail in a short while, but basically the current opinion is that any exposure carries a small risk and the more you are exposed, the risk increases in a linear fashion.

Now that I have concluded the general overview, I would like to get into some specifics. But before I do that I'd like to explain a couple of key terms that I'll be mentioning a lot in the next few minutes. A quick basic course in radiology. As far as measuring ionizing radiation and establishing limits, every radionuclide, every radioisotope out there, each type, whether it be strontium or tritium or whatever it is, is unique in its own way. It has its own special form of radiation whether alpha, beta, gamma rays for example, it has its own individual strength associated with the ionizing radiation it emits. They have unique half lives. Half lives are basically the amount of time it takes for half the radioactivity in a given sample to emit the ionizing radiation contained in it. So about half the ionizing radiation has been emitted. Half lives can range from a few seconds to hundreds, thousands, millions of years. To put it in perspective, the half life for tritium is estimated to be between 12 and 13 years.

Any contributions of tritium to the global environment following atmospheric nuclear testing, for example, the effects of that will now be waning in the environment as it is expected that half of the actual radioactivity out there will disappear in approximately 12 years, is a layman's summary of what that half life means for tritium.

Now, the actual amount or strength of radioactivity is measured in becquerels per litre. This is the international system of measurements, if it doesn't sound like a familiar term that's because when all of us went to school, we learned about rads, rays and all those other things, but now we leave the Americans to dabble with that and we join the international community and we measure radioactivity primarily in becquerels and sieverts these days.

Once you've measured the amount of radioactivity that's actually present in the environment or any sample, you need to work out what is the potential for this radioactivity to cause adverse biological effects. Now, to get to that there are many factors that need to be considered: metabolic considerations; considerations as to how the particular radioisotope or radioactivity is distributed in the body and whether it particularly locates in certain organs or bones or what ever have to be taken into account; then susceptibility of the particular tissues or organs to biological damage from ionizing radiation needs to be considered; the effects need to be weighted over a lifetime; many factors are worked in and at the end of all of this you come up with what I'm going to call today the dose. The dose is basically a measure of the biological effectiveness associated with the exposure of any particular type of ionizing radiation. Now this dose or biological effectiveness is measured in Sieverts (Sv) or millisieverts (mSv), and for those of you who are not aware, a millisievert is simply one onethousandth of a sievert. Most of the exposures I'll be dealing with today I'll be explaining in terms of millisieverts. Now that we're all experts in radiation, it's time to look at the objective.

The current Ontario drinking water objective for tritium is 40,000 Bq/L. This was established in the early '80s, it is identical to the current Canadian drinking water guideline, it was also identical to the World Health Organization (WHO) Guideline which was established in 1984. The basis for that current objective, which was adopted directly from the Canadian drinking water guideline, but was primarily based on the recommendations of the International Commission on Radiological Protection (ICRP) that were published in 1977. This publication, put out by the international scientific community with expertise in this area, basically provided guidance on acceptable occupational and public exposure to radiation over and above natural background sources. Based on those ICRP recommendations, the WHO in 1984 took the allowable public exposure and allocated 10% of that allowable exposure to drinking water. What that meant was that the WHO recommended that the total amount of the dose that is acceptable to receive over one years consumption of drinking water should not exceed a dose of 0.5 mSv. The WHO established in 1984 a drinking water guideline for tritium in drinking water of 40,000 Bq/L. Now, I should mention that this 0.5 mSv that the WHO recommended an exposure that is permissible for tritium alone in drinking water, it is the exposure that is permissible for all radionuclides that may be present in drinking water. If other significant levels of radionuclides are present in a water supply, the tolerable amount of tritium would actually be less that 40,000 Bq/L. When we assess and measure radiation in drinking water samples, we look for other radiation other radionuclides and if there is any

significant other radioactivity associated with a sample, we look at it to ensure this will not be resulting a dose that may approach or exceed this permissible dose of exposure.

That was the basis for the current guideline of 40, 000 Bq/L. Now I'd like to describe the basis for our new proposed objective of 7,000 Bq/L. In 1990, the ICRP published revised updated recommendations to replace its recommendations in 1977. Basically, the ICRP recommended that because of the information they had assessed since the previous publication that it was necessary to revise the acceptable exposure to radiation downwards five fold to take into account the new information. I'd like to give you a feel for what caused this recommendation that tolerable exposure be reduced five fold. The was a lot of new information on cancer from population studies in the last 20 years. Most of the information assessed by the ICRP in coming up with their 1977 recommendations were based on studies of survivors of the atomic blasts in Hiroshima and Nagasaki. When they published their recommendations in 1977 they only had the opportunity to follow survivors of the atomic blasts and assess what adverse biological effects might be happening for twenty to thirty years. They now have an additional 15 years of follow up data on all of those survivors which have allowed the ICRP to refine its estimates of exposure and effect from that. With an additional 15 years to follow these radiation victims, it has been possible to get a much better picture of what has actually happened due to the exposure over there. In addition, there are now new estimates of the exposure dose that people were exposed to in those blasts. Initially, they made estimates of how much radiation people were exposed to based on their distance from the blast and my understanding is that they based their estimates on how much people were exposed to based on their experimentation that they conducted in the south western United States prior to and following the atomic blasts in Japan. I gather the figure they ended up overestimating the exposure that people who were exposed to those atomic blasts actually received. Apparently because the air in the southwestern states where they carried out the experimentation is very dry, there is virtually no humidity. It appears that the environmental factors present in Japan at the time of the blasts, possibly higher humidity factors, led them to mislead the amount of exposure. In addition, new information from laboratory studies and the refining of mathematical models that are used to estimate radiation exposure and effect, all of these factors combined to lead to a five fold reduction in the tolerable radiation that people should be exposed to. To me it means they've looked at all the information currently to date and this is their estimate at the moment as to what the effects of dose exposure to radiation are. They revised the numbers downwards. Following the ICRP recommendations that came out in 1990, the WHO concurred with these recommendations and as a result they revised their tolerable total dose permitted in drinking water from 0.5 mSv down to 0.1 mSv. This has just been completed and the WHO just published its new guidelines in November 1993. The WHO guidelines were established in the same way that they were for the old guidelines based on an assumed consumption of drinking water of 2 litres per day on average. The risk estimates associated with this tolerable dose were based on one years consumption of drinking water. The WHO in their documentation state that water that contains radionuclides that would give you this level of dose from one years consumption is acceptable for human consumption and will not have significant adverse effects. Any water that has levels of radioisotopes less than this is considered acceptable and no action is necessary to improve that water supply. These are the WHO recommendations.

Following this, or I should say, based on this, in its publication that they released in the fall of '93, the WHO has revised its drinking water guideline for tritium down from 40,000 Bq/L to 7,800 Bq/L. Now today, I'm going to give you just a little bit more to explain the basis for our proposed interim objective. We, in our review of the available information, have proposed the new interim Ontario objective of 7,000 Bq/L. It differs slightly from the number recommended by the WHO because they used a dose conversion estimate that was provided by the National Radiological Protection Board in the United Kingdom. Some other groups, including the EPA and ICRP, have also published dose conversion factors. They are not identical, there are slight differences between them. In the time frame that I was given to prepare this document, it was impossible for me to assess which of these dose conversion factors was more appropriate. We felt that we would rather be prudent if we can't make the best decision right now, and so we suggested using one significant figure in our drinking water objective and rounded it down to 7,000 Bq/L to add an extra margin of safety for the public.

What does this mean, just to put this in perspective as a conclusion. If your water contained 7,000 Bq/L on average for a year everyday, it contained 7,000 Bq/L of tritium, then the actual lifetime dose that you would get from that years exposure would be approximately equal to 0.1 mSv. Now that dose, according to current estimates, is believed to carry a lifetime cancer risk of 5 per million people exposed. If the water you consume has an average level of 70 Bq/L, that has one hundred less risk calculated with it, and the actual estimated cancer risk is 5 per 100 million people exposed. If your water averages, 14 Bq/L, the actual cancer risk is 1 per 100 million people exposed over a lifetime and if it were 7 Bq/L it would be 1 per 200 million people exposed over a lifetime. When I say cancer risk, this is actually an estimate of fatal cancer risk, so the serious cancers are factored into this and taken into consideration. Those are the risk estimates associated with drinking water levels of tritium.

I'd like to quickly compare the number that we are recommending with other international standards that are either in place or that are being proposed at this time. The WHO, 1984 guideline, as I mentioned, was 40,000 Bq/L it has now been revised at the end of 1993 to 7,800 Bq/L. We are proposing to bring our current Ontario drinking water objective down from 40,000 Bq/L to 7,000 Bq/L. The current CDWG of 40,000 Bq/L has been under intensive review for a year and a half to two years and we are expecting to revise it within the next year, possibly year and a half. Just to let you know, I happen to be the Ontario representative to that federal provincial subcommittee so I'm quite familiar with where we are with that particular process. Although we do not know where that final CDWG will be, right now the best estimate is that it will lie somewhere between 8,000 and 12,000 Bq/L. It is anticipated to be slightly higher than the number we are proposing because Health and Welfare Canada deem it appropriate to consider one and a half litres the average consumption of drinking water per day which means if they figure that you drink a little less that 2 litres, they can allow a little more radioactivity or whatever contaminant is in there to be in there because you don't consume as much in a year, and this is based on a total years consumption and exposure. However, we felt it appropriate in Ontario to maintain the 2 litre consumption, which gives an extra added margin of safety to the public.

The other main international guidelines that I would like to compare quickly are the US EPA guidelines. Many of you may be aware that back in the 1970s the EPA established a guideline for tritium at that time approximately equal to 800 Bq/L and that is actually the number that is in effect today. As I said, they don't have much worry about it, they don't have CANDU reactors and they see virtually no tritium in the environment so they were quite happy with 800 Bq/L. However, they revised all of their rules on radionuclides and proposed a brand new rule in the Federal Register in 1991 and in that proposed rule for establishing the formal drinking water standards under their Safe Drinking Water Act in the United States they proposed to establish a drinking water standard for tritium of approximately 2,300 Bq/L. Now that rule was supposed to be promulgated within 90 days or 6 months at most, and unfortunately it never was. They had many difficulties getting it through, they go through public consultation, congress input, all sorts of things, and that rule was never passed. Consequently, they are currently revising their radionuclide rule and I have been informed by the radiation experts at the Office of Drinking Water in the States that, although it has not been published yet, they currently feel that in 1994 they will reissue their radionuclide rule and they are going to propose a number for tritium in drinking water of 3,000 Bq/L or slightly more. That is simply a personal communication, it is not in print anywhere, but it is what we expect to see in within the next few months sometime. Now an obvious question at this time is why is the US number so much lower than our proposed number, why are they going for 3,000 and we're going for 7,000? Basically, this is because of a slightly different approach in the regulatory mechanism between Canada and the United States. As I mentioned earlier, what we do in Canada and Ontario is set a total limit of exposure for all radionuclides in drinking water and depending on the contributions from different radioisotopes or radionuclides we adjust the allowable amount of individual radioisotopes such as tritium. If there were large or elevated levels of strontium or uranium or whatever other radionuclides might be out there, we wouldn't allow drinking water to contain as much as what I've said here, 7,000, because it has to be adjusted, because the total exposure must be kept to 0.1 mSv. Everything is judged on a case by case basis. The US EPA takes a slightly different approach, they have decided to allocate 40% of the total permissible exposure to tritium, and allocate other amounts to other radionuclides, alpha emitters, beta emitters, or however they divided it up, and simply set them for each individual group. In discussions with the radiation expert in Nevada on this particular issue and what were the benefits and problems associated with each of our approaches, he indicated to me that he felt that the Canadian and Ontario approach was a much more sensible approach. It ensures that the total exposure to radioactivity in drinking water does not exceed 0.1 mSv and allows authorities the most latitude in dealing appropriately with contamination incidents.

A couple of final things in conclusion, number one, I'd just like to say that the proposed objective that we have for tritium in drinking water is based on the most up to date and current international peer reviewed information from the scientific and medical experts around the world. I would also like to mention why we are proposing this as an interim Ontario drinking water objective. I'm not an expert in radiation, I was asked to facilitate the public consultation process by preparing this rationale document in a short period of time. I was able to review the current information because the ICRP and particularly the WHO were very helpful to us in preparing this. So, we are saying this is interim because of the fact that as soon as the CDWG process completes its thorough review of radioactivity and drinking water

guidelines we will then look at their recommendation and compare our recommendation of 7,000 Bq/L. If it appears that the process we have used is inappropriate, or new information comes to light, and the new CDWG is established at a lower level than what we have put in here, we will revise this number downwards at this time. If it's established at a lower level through the CDWG, Ontario will adopt that lower level. If the CDWG is established at a higher level, we'll look at it to see if it is appropriate to adjust that. Personally, I would probably recommend against that. But, we will have to see at the time. I don't think people would be happy to ever see us raise a drinking water objective. I can only assure you that if we establish a lower one through that formal process, we will adjust downwards.

Well, I'm sure I forgot a few things that I intended to mention to you. Thank you all for your attention and now we're ready for any questions or anything else.

RS:

Thank you very much Goff, for I think a very informative presentation.

Before I open the floor for questions, I would like to remind everyone that if you have a question, please raise your hand. When I recognize you, please approach the microphone on the floor to ask your question as we are recording this session to provide written transcripts upon request.

When I recognize you, please identify yourself and ask your question.

The Committee recognizes that there are many important issues related to the proposed tritium drinking water standard. I want to reiterate, however, that the purpose of this session is to explain the rationale of the development of the MOEE's proposed standard and of ACES's consultation process.

Let's begin, then.

Question Period

Irene Kock, Durham Nuclear Awareness:

Thank you, I wanted to start by introducing myself. I'm Irene Kock and I'm a representative of Durham Nuclear Awareness, a citizens group based in Durham region. I wanted to thank you for all the work you and your colleagues have done. We are very pleased ACES was asked to review the tritium standard because our groups been complaining for years that we thought the standard at 40,000 was way too high so we're very encouraged by the work that you have done. I had a couple of specific questions regarding the document that has been prepared. One relates to the dose conversion factor that you have used to get to the 7,000 level. I wonder if you could tell me what rating you've given tritium in the dose conversion factor you've used in terms of what is sometimes called the quality factor or the relative biological effectiveness, the RBE of tritium. Can you tell me what the value is for that figure that you've incorporated into this document?

GJ:

The dose conversion factor was 1.8×10^{-11} Sv/Bq. That was the figure provided by the NCRP in the UK to the WHO. We did not do any individual assessments of that dose conversion factor since the WHO basically recommended it and adopted it as appropriate, we considered it to be a relatively appropriate dose conversion factor. There are one or two other dose conversion factors, the EPA and ICRP, and because when we used those numbers they came out in the range of 6,800 to 8,000 we felt simply recommending the 7,000 was an appropriate approach to that.

Irene Kock:

I'm wondering if, you weren't really clear there at the end there, in talking about the Canadian standard versus the Ontario standard, and I'm wondering if Ontario is in a position to set and enforce a standard that is tighter than the national standard when that one is settled.

G.J.:

Absolutely. Although we have never established a standard at a higher level, Ontario always has the prerogative to establish a drinking water objective for either a) a contaminant that is not covered by the Canadian drinking water guidelines or b) at a level lower than the CDWG if we feel it is appropriate to do this. So we certainly do have that prerogative but we would not establish a higher guideline under any conceivable circumstances.

IK:

Thanks.

Hugh Brantford:

You have used two terms which I find a little bit confusing. The term objective and the term standard. I presume you are using them interchangeably and I presume you mean these represent upper limits as opposed to the means by which these will fluctuate over time. That's the first part of the question. The second part is that in the licensing of nuclear facilities in Ontario and in Canada the same level of thinking on the releases of radionuclides is used in determining what is the emission limits. The operators of these facilities, to be responsive to public safety, recognize that there needs to be some factor of safety built into those designs and they tend to operate at one percent of those emission limits. The thinking that goes into this appears to be relevant in the current setting of the standards. Was that consideration given during the development of these standards or objectives that you used?

GJ:

Thank you for your questions. They are very good questions. In this process today we are using objectives and standards interchangeably to simplify matters for the public when ACES conduct consultations for the purpose of this they use objectives, standards, guidelines

interchangeably. Actually, as I mentioned, the objective in drinking water is not an absolute limit, it is not meant to be applied that way. Particularly in the area of radionuclides and radioactivity, the 7000 Bq/L is the average exposure, the sum of your 365 daily exposures from a year is supposed to average 7,000 Bq/L or less. Temporary exceedences of that, going above 7,000 Bq/L, according to the WHO and the way the CDWG are derived and defined, is not considered to have any additional risk. The actual overall exposure is still within the limits. So, the 7,000 Bq/L is not a strict maximum that is a safety limit in any way, where below it you're safe and above it you're not safe. It's not meant to be used that way. It is basically what should be the average exposure for a year from the WHO and the authorities. So that is how it was derived and how it was meant to be applied.

Your second question on licensing and the fact that Ontario Hydro, even though it has its limits set by AECB, sets a target of trying to limit exposure at 1 % of the prescribed limits as their goal, a very responsible attempt I feel, the same type of philosophy applies to drinking water objectives. The drinking water objective is not the regulatory mechanism, it isn't meant to be that. It is meant to be used to allow the health authorities to assess if the drinking water supply is adequate and safe to be used for human consumption on a continuous basis. In the same way that Ontario Hydro applies that, that they say Hey these are our limits but we're going to hold it to 1% of that, we would like to say the same thing with drinking water objectives. Our philosophy is that we should not allow surface waters or raw water or source waters to deteriorate from their current condition. If you look at a raw water and it exceeds and is not satisfactory, we have mechanisms to improve raw water quality or surface water quality. If the raw water, as in this case the actual objective is to be set at 7,000 and the raw water is way down at about 14Bq/L, that in no way implies that we would allow the actual level in tritium in water to go up or that we would ever advocate that. We apply, through other mechanisms, in this case with this being Ontario Hydro and a nuclear facility, the AECB are actually the ones who apply limits on facilities, but we want to apply discharge limits that would not result in any further deterioration of that water supply. We want it to continue to improve and that is what the regulatory mechanism is there to do. And even though, if you remember, 2 years ago in August September 1992, Ontario Hydro had the largest release of tritium in a single incident into the lake. A plume of that water came down and impacted on the water intake plant of the Ajax Pickering water treatment plant. At that time, the ODWO was 40,000 Bq/L. What happened when that water was at a level that suddenly shot that tritium level up to 1,000? This was inordinate, this was a spill. The objective here was not meant to be applied to a spill, I'll explain that in a moment, but once it hit 1,000 in that particular circumstance, the water intake for that plant was closed. It was still 40 times below what the objective was and it was closed in order to minimize exposure of the public to any additional radiation.

Audience member:

It was not closed.

G.J.:

The water intake was actually closed for 6 hours, a short period of time, by the Ministry of

the Solicitor General. Now..

Audience member:

And was the tritium gone then?

G.J.:

I don't believe so, no, I don't believe it was after the six hours. So, that brings us to another important point. The drinking water objectives are meant to apply to normal operating conditions and the acceptability and suitability of drinking water supplies. Whenever an unusual event, a spill, an emergency event happens, the drinking water objective is not the appropriate mechanism to determine if drinking water supplies are suitable or acceptable. It's much beyond our capacity as simple environmental and drinking water experts to use it in that way. If there is ever another spill of radioactive material similar to the one that happened in August September 1992, the mandate for controlling and responding to emergency spills in this province is mandated to the Ministry of the Solicitor General who, since that event, have finalized the province of Ontario's nuclear emergency response plan. In any future incidents where there are major spills of any radioactive material into the environment, whether into the water, the air or anything else, the nuclear emergency response plan is going to kick in in this province. And every single spill will be assessed on a case by case basis by a panel of health experts including the Medical Officers of Health, the appropriate government agencies. The Ministry of the Environment does not actually have the mandate or responsibility to judge whether a water supply is safe. It is only the Medical Officer of Health who has the responsibility to say that water is unacceptable, shut down the plant. We don't have the authority to do it ourselves. We take advice on all public health issues of that nature, in accordance with current legislation, we take the advice directly of the Medical Officer of Health in the region that is effected. For all future spills, the nuclear emergency response plan and the Medical Officers of Health will direct, with our assistance, the Ministry of the Environment's response to any particular incident. So yes, although we do not have it written in, we do try to keep our exposure to much less than the actual proposed objective number. I hope that answered your question.

R.S.:

I thank you for your questions. They are thought provoking. Are there any other questions at this point? Yes.

Sherrill Willard:

Welcome to Ajax everyone. I'm Sherrill Willard. I'm a member of the Ajax Save the Waterfront Committee and the Pickering Ajax Waterplant Committee. I have a question on what Goff just said. I think, and perhaps others in the room can justify this better than I, that the day the waterplant was closed we weren't anywhere near the 1,000 Bq/L, we were expecting to see that because the spill was so large. But actually it was normal routine emissions because the currents were behaving a little differently and it didn't come to us until

the next week. We did hit the 1302 on the Saturday after. But it climbed gradually from Tuesday to Saturday according to Hydro's documentation. My question is really based on the comparison between American and Canadian standards. I understand your explanation about the different way it is derived, however is it not true that the Americans would use UNSCEAR, United Nations information and BEIR V, the Biological Effects of Ionizing Radiation? So they come to a different total amount for their statement on tritium that is a body exposure presumably. If ours is roughly the 7,000 and if theirs is the somewhere between 800 and 2000, why then is the Canadian body perceived differently in what it can take in compared to the American body, based on the same information of setting the standard based on what the radionuclide does to the human body?

G.J.:

There is certainly no difference in how tritium would be absorbed into the body and we don't assess it differently that I'm aware of than how the U.S. would do it. I think there's a slight misunderstanding in what this difference actually is. Basically both the U.S. and Canada have the same total dose limit for all radiation and radionuclides, that's approximately the same. As I have mentioned, the tritium number recommended in the States, approximately 3000 Bq/L, is 40% of total allowable exposure to radiation that the U.S. is allowing. They have chosen a number, I believe it's .04mrem or something like that, as being their permissible exposure to tritium which is 40% of what their upper limit dose is. They have simply allocated it directly to it. It loses flexibility to it in your ability to respond and there are circumstances that would result in higher exposures to radioisotopes in drinking water in the United States if drinking water contained just under the limit of all of the permissible radionuclides at their individual levels. They would get a greater exposure at that than we permit from the same cocktail of radionuclides if they were in Canadian water. As soon as the dose from the radionuclides in the water would be calculated to give you more than that .1 mSv of exposure, we would say that's too much. Because of the way the U.S. has set it up, as long as it meets the individual limits, that's OK. They can have circumstances because of their arbitrary apportioning of the limit amongst groups of radionuclides that they could be exposed to more radionuclides through their system than we would be through our system. There is no difference in the actual medical and scientific assessment of the effects of radiation in the human body that I am aware.

S.W.:

Is there any chance that this 7,000 Bq/L standard might come closer to Hydro's objective that you outlined to be 1% of the 40,000? We have been under the impression that they have a much stricter guideline of target of 4,000 Bq. Is there a possibility that through the consultation process that that number might be somewhat closer to what we end up with?

G.J.:

I think when your talking about Hydro's target of 4,000 that you're referring to the radionuclide objectives that were published in 1983 in the Ontario Drinking Water Objectives publication which was the last time that that publication was actually issued. At that time,

what was put forth and proposed in the Canadian Drinking Water Guideline and the Ontario Drinking Water Objectives was an actual Maximum Acceptable Concentration (MAC) of 40,000 Bq/L for tritium and a target concentration for each of the radionuclides that had these MACs established at 10% of this MAC. So in that publication there was a separate listing of the target concentration of 4,000 Bq/L for tritium. That publication will be coming out again in 1994. It will be the first time in 10 years that that publication will be coming out in a formal way and actually published again. At that time you will become aware that the CDWG and the ODWO have undergone many changes since 1983. One of the modifications in this are in approximately 1987 or 1988 the concept of target concentrations for radionuclides was dropped. They were eliminated from the CDWG booklets and we removed that concept from being in effect in Ontario. Hydro may not have checked with us, but anybody whose got that publication actually hasn't checked for an update to find out is it's still applicable, would not be aware at this time that that old target publication of 4,000 was judged to be meaningless and has been removed from the Objectives publications and the Canadian Drinking Water Guidelines. And that, I believe, is the 4,000 Bq/L target that you were mentioning Hydro is trying to get to. Here they may apply another target down to 700 as being 10% of the now new Ontario Drinking Water Objective if they have their own process for going that way.

M.G.:

I'd like to give another answer to that question. I believe your question was is this carved in stone, this 7,000 Bq/L. My answer is no it isn't. This is a proposed interim drinking water objective and the whole reason behind ACES consultation is to find out if this is an appropriate level. This is the level that the Ministry is proposing and the purpose of our consultation is to review that. If you have any information that you would like to make us aware of that would suggest it is not appropriate or that some other level may be more appropriate, we would be interested to find that out.

S.W.:

I would like to hear from others on this. I'm particularly interested in the weighting factors of how we come to the final number, whatever it is. Are we including economic factors, are we just looking at health factors, what the doability factor, what all do you look at when you're weighting the decision for the final number?

M.G.:

That's a good question. In the past, if you look at some of the other reports, often there is a socio-economic component built into the standard. Whether it's economically achievable, whether it's realistic based on control technology that's available. In this particular case, in the case of tritium, it certainly is achievable. If you look at background levels in this area and around the province, they are contained in the rationale document, all the background levels are far far below the proposed drinking water objective. In this case, I don't think economic achievability will enter into it.

S.W.:

So it would be a health standard you would be setting.

M.G.:

That's the basis for its derivation right now.

Jill Bontoff:

Hi, I'm Jill Bontoff and I'm with another ACE, Ajax Citizens for the Environment. One of the questions that I had was with regard, we're talking strictly about drinking water here, as a matter of fact your pie chart that you had up there is a world average, is it not?

G.J.:

It is a composite, it comes close to the Ministry of Health figures as well, but it is a global composite.

J.B.:

How can that possibly reflect Ontario, knowing that we have CANDU reactors, that we have these things in our water. How can that reflect places goodness knows where, in the centre of China, averages per population in terms of the effect on those of us that have to live with this type of thing?

G.J.:

I would not be able to understand that either. These are average exposures. However, the Ministry of Health in Ontario has conducted a series of examinations in this particular area in average exposure of people in the Canadian population in various locations to background radiation. In their publication in 1993, they indicated that the exposure for people living in Southern Ontario, either living in the vicinity of Queens Park or in the vicinity of the Pickering Nuclear Station both, were both 2.4 mSv average exposure for the year.

J.B.:

I find that hard...

G.J.:

...the drinking water concentrations and it indicated that it felt there was a slightly higher level near Pickering because they said up to 2% of this total exposure may be due to exposure from the Pickering Generating Station. But that 2% modification that would be applied in the area of Pickering itself was not enough to adjust the average significantly away from the

overall annual average dose of 2.4 mSv. Their conclusion was that the exposure to background and medical and releases and stuff like that was equal in Pickering to 2.4 mSv per year.

J.B.:

Again here, we're talking about drinking water strictly. What about, tritium is absorbed also through the skin, is it not?

G.J.:

Yes. It acts as water so it certainly is possible for it to be absorbed, and it certainly may get through a cut or abrasion if it was in water.

J.B.:

Or even through the skin as chlorine does.

G.J.:

I do not know how much is actually absorbed through the skin.

J.B.:

OK. In that respect we are not looking at baths and showers and pools and hot tubs and all these other things. We're strictly looking at what we drink. Which yes, you would get the most absorbed.

G.J.:

I think you're correct. I doubt if much of the factor has been weighted on absorption through vapour. That is an area in which we are now addressing all drinking water contaminants at the federal provincial subcommittee. It is only in the last two years that we initiated specific studies to understand how other chemicals are absorbed, inhaled, taken in through the skin while showering or bathing because we recognize that may be a significant contribution for some organic chemicals. We are currently have studies underway so we can get a handle on that so we can factor it in the CDWG. Unfortunately, I have not been able to do or see anything particularly on absorption through the skin or showering or bathing and don't know if it's included in the ICRP and WHO guidelines, but suspect that it probably isn't.

R.S.:

From our perspective we would really appreciate, that's a relative related area, that if you do have some data and could share it with ACES we would really be looking forward to receiving some comments in that regard.

Guy Colm:

My name is Guy Colm, I live in Ajax. I have a question for Mr. Jenkins. You made a reference to the WHO and to the EPA. What information have you got about standards or guidelines in other Western countries such as UK, France, and anything you want to look at. Have you looked at them?

G.J.:

The information we assessed here was the US EPA, the WHO and Canada. We did not have an opportunity to look at the standards or guidelines in the UK. I am not aware of the actual guidelines that they adhere to at this time.

G.C.:

Would it not be useful to do so?

G.J.:

I think if we were to go through a full process to allow a complete assessment of information, then if we were given the resources and time to do that, it would be appropriate to look at all the different authorities. Our basic approach when looking at drinking water objectives is primarily to rely on the WHO and the EPA and those bodies outside Canada because they have the defensible publications with supporting documentation which give the rationale behind their drinking water guidelines. You cannot look at countries which do not publish the rationale and reason behind their objectives. For instance, we got into a lot of trouble a number of years ago when we listed international drinking water objectives and couldn't meet a number of objectives that were published in the USSR. They had no rationale at that time, it was simply set at detection limits. We were unable to interpret them. So we have to be very careful when we go and look and get advice or see what other international groups are doing, they must be able to support and document it. Normally with the British drinking water objectives, they are now being brought in under the European Economic Community and need to meet the drinking water objectives that are being established through the EEC. They are having great difficulty meeting those. They tend to lag behind us in most drinking water initiatives and I suspect that they are at a higher level in their guidelines than what we are.

G.C.:

You have flashed by a lot of overheads. Is it possible to get copies of those?

R.S.:

Yes. We plan to provide copies of those upon request.

Evening Session Question Period

Bob Williard:

Hi. I'm Bob Williard. I'm a resident of Ajax. I've got lots of questions but I'll start with two to respect the process here. There is a statement in the document and I think in your opening remarks a reinforcement of it, that it is assumed that the risk of cancer is proportional to the effective dose. I think what you're saying from that is you can take a high dose and then draw a straight line down to zero and the risk gets lower as the dose gets lower. Am I interpreting that correctly?

G.J.:

Yes, fairly correctly. There is basically a linear relationship assumed. So the higher the dose, the greater the risk.

B.W.:

That raises another question as to whether you have looked at a fairly significant body of knowledge that says that doesn't work that way for radionuclides. That in fact there is a supralinear curve, not linear. The work of Dr. Petkau, Dr. Sternglass and others. Have you looked at that as part of your activities?

G.J.:

In preparing the rationale document we did not review any primary scientific or medical literature. We did not have the resources or time frame to do it. We adopted the same process that was used to adopt our current drinking water objective of 40,000 Bq/L. Therefore, I took the recommendations from the ICRP and WHO and did not do any individual assessment. I do not have the expertise to do that. I am familiar with some of that work, I am not in a position to comment on it, I am not an expert in that area.

B.W.:

Do you have any intent, or is it possible for some of that information to be a part of the process that you are in now, to get some of the people that have spent a fair amount of time this area to have some input to the Committee.

G.J.:

I think we don't have time right now in the process we have started. However, the purpose of this public consultation is to solicit comments from the public. If you feel it is appropriate to review this information, then I encourage you to put that in your submission to ACES and they will consider that when making their recommendations to the Minister.

M.G.:

I wanted to amplify that point. What we are considering is a proposed interim drinking water objective. The key work is proposed. This is something that the Ministry has generated and, as I pointed out earlier, the function of ACES which is an arms length agency, not part of the Ministry but really an advisory body to the Minister, is to review the documentation and review the rationale behind it. I would encourage you, if you have any information such as you indicated, to bring it forward in your submission and we will certainly consider it. The standard we are discussing now is not carved in stone, in other words. We are happy to hear why you do not think it is appropriate and any other standard you may think is more appropriate.

B.W.:

My next question has to do with the way you define health effects. I noticed that the chart you had for incidence of cancer per million population and so on, I wasn't clear if that was cancer or deaths from cancer.

G.J.:

The risk factors listed on this chart would be the risk of fatal cancers. This is not just the risk of developing cancer. The WHO in recognizing there were other less drastic effects of exposure to ionizing radiation, nonlethal cancers, other factors, indicated that these were really the critical factors in establishing these guidelines and that these guidelines were protective of other cancers.

B.W.:

Was it your experience with groups that put together figures like this, including all the United Nations bodies, that they focus primarily on deaths, as in body count, as opposed to disease?

G.J.:

No, that's not my feeling, although once again I'm not an expert in reviewing the primary information. I felt that they reflected a critical concern, an endpoint that needed to be prevented.

B.W.:

One final comment. I find that chart really really misleading because it doesn't say fatal cancer, it says cancer. There's a major difference between the two. I think a lot of the statistics that are coming out of the WHO, the BEIR reports, the ICRP, the UNSCEAR reports, all of those reports, because they're based on atomic bomb explosions are looking at that fatal aspect. That's why it took them 20 years to count the bodies. They wanted to know how long it would take those survivors to die. That's why 35 years later they realized

that people died from those exposures. That's an extremely different kind of trigger than what we're talking about here in Ajax. I respect the fact that you don't have the time to do it, but to establish a standard based on fundamental assumptions that are radically different than what we are exposed to here, to me does not seem right. Plus, I also think, that twenty years from now or 35 years from now, they'll say "Oops, I guess we were wrong". I guess that's the point that I really get concerned about. The body of knowledge upon which all these standards are based is irrelevant to the situation we are in here today. That's a lot of my concern about the way in which both the interim standard and the other standards are being established. I guess that's not a question.

R.S.:

Thank you for your comments. Just to echo Dr. Goldberg. we would really appreciating hearing these types of comments during our consultation process. Questions please.

Sherrill Williard:

Hi, I'm Sherrill Williard, I'm the Ajax Save the Waterfront Committee rep to the Ajax Pickering Waterplant Committee. We are negotiating together as a committee on the terms and conditions that have brought you forward to us in Ajax. I am concerned about the low level doses that we are experiencing here. As the previous questioner said, the standards are based on high level doses and that has been very well researched and there is a great body of evidence to give you your stats for the drinking water standard. However, what we experience in Ajax and Pickering is a constant low level dose. It doesn't come to the 7,000 Bq/L in a year, but it is constant, it is low level, it is always in our bodies regardless of the half life because we are always taking it in, although we excrete it, it is always there because we take it in daily. My concern is really what the dose level should be for sensitive populations like pregnant women, infants, the aged population, and of course the fetus. A lot of research shows that low level radiation is more important in fetal development than high doses, even more important than X rays. A burst of one X ray is not as important as the constant low level consumption that we drink in for effecting genetic mutations. I wonder what you've done to look at this standard in relation to sensitive populations, such as embryos.

G.J.:

Thank you for your question. We did not do any specific assessment of that. The WHO guidelines indicate that the effects of age, susceptibility, susceptible subgroups in the population were taken into account in formulating their recommendations. We did no individual assessment ourselves, as I mentioned earlier, we did not have the expertise or resources. But we accepted the WHO summary that their proposed objective was based on lifetime risk from this exposure and was adequate for the protection of sensitive subgroups and children. Does that answer your question?

S.W.:

Not really. It's a start. Could we perhaps have experts come to the next meeting where public input is accepted and deputations make a real effort to get some more newer information on this?

R.S.:

As I said, the objective of our process is to listen to what the public has to say so we can hone those comments in to our comments to the Minister. We haven't geared a session for someone to come in besides the Advisory Committee at this point to deal with the public consultation process. The next step in the process is to provide from public or experts in the field and hopefully some of these sorts of concerns that you have raised will be brought to our attention so that they can be identified in our report to the Minister. If there is an information need or something that we need to highlight, we can certainly do that in our report. So we are hoping that specialists in the field will thrash these issues out and identify them.

S.W.:

Thank you.

R.S.:

Are there any other questions at this point? Yes sir.

Robert Bailey:

My name is Robert Bailey and I am a resident of Ajax. Part of what Mr. Jenkins presentation indicated an emergency system that would be put in place to alert us if there was a spill and have the water quality checked to advise us if it should be used or not used. I would like more detail on that regarding how fast they can get this information after a spill and how they are going to go about informing the public, how they are going to go about closing the water plant if it is necessary, or what they are going to do about it. I appreciated the detail he gave us, but it wasn't sufficient for me, I would like more detail on that. On exactly how that process is going to work.

R.S.:

That's a fantastic question. I'm sure we can give you some additional information especially on the frequency of sampling and the turn around of results because there has been experience in that area that the Ministry has.

G.J.:

I wish I could give you the final details on all of that. Unfortunately, I am not an expert in that particular plan. I have been involved with certain aspects of the plan and its development over the last year and a half, particularly in the area of drinking water objectives and our

response and what it should be if a spill will impact on a water treatment plant. As I mentioned earlier, this particular plan, the emergency response plan, is the responsibility of the Minister of the Solicitor General. I am sure if you would care to put your request in writing on this plan and any details of this plan you are particularly interested in whether it be monitoring, levels or anything else into the committee, we will ensure that somebody from the Ministry of the Solicitor General who has the full details on this plan, gets back in touch with you and provides all of the information you requested.

Ralph is suggesting that I discuss the sampling at the plant. Again, this is something there is an on going process for sampling at the water treatment plant. There are many recommendations that were contained in the Environmental Assessment Advisory Committee report to the Minister. It is our regional department, central region, that is dealing with most of these recommendations. They are being addressed at the moment. I know one of the recommendations in that report is that it would be appropriate to install a continuous monitoring device for tritium at the intake. This I know is being looked at, but unfortunately it is not commercially available. I'm sure if that does come in the market in the future, it will be addressed at that time. There are a number of other sampling programs that are designed to protect and ensure that drinking water supplies are not contaminated inordinately with any radioactivity. There has been a sampling program conducted by the Ministry of the Environment and the Ministry of Labour in the vicinity of nuclear plants for many years now. Also, the province runs what is known as the drinking water surveillance program. This is an intensive surveillance program that not only looks for contaminants for which drinking water objectives have been established, but they also run scans for any other contaminants that might be present. At the moment, that drinking water surveillance program, which was established in the mid 80s, expanded to cover more than a hundred of the water treatment plants in Ontario, and in the last year to a year and a half they have expanded that program to include radionuclide testing as part of that program. I'm afraid that's all of the details I feel comfortable speaking to at this moment because I'm just not sure of any other aspects. If there is anyone else who could provide more or if you want more detail on that, please put in the request and we will ensure that you get a summary of all the sampling programs and the progress on EAAC's progress to date.

R.S.:

Thank you Goff. I'll just mention that at the back of the Ministry's rationale document there is also some sampling data that may fit in to your question. I hope we've answered some of it.

Bob Williard:

You mentioned radionuclides affect different parts of the body in different ways. That strontium seeks bones and iodine seeks the thyroid gland and that tritium in effect goes throughout the entire body. Because there are standards, obviously when it does that, something goes wrong. I wasn't clear on what, from your perspective, the health effect of tritium was. Assuming there was a dose to cause problems, what kind of problems are caused by tritium in the drinking water?

G.J.:

As I mentioned, tritium is distributed evenly throughout the body as if it were a regular water molecule. Our information is that there are no specific cancers that are specifically related to tritium exposure. I'm afraid that's about all I can say about that subject at the moment. Our current knowledge on that, certainly mine, is that there are no specific cancers specifically related. Once again, if you get a total exposure there is a chance of cancer, but I assume it could attack any organ in the body if you got a large, large dose of tritium. Sorry, I guess that wasn't the best of answers. It simply means that there are no specific cancers specifically related to tritium exposure.

B.W.:

From your point of view it's a cancer issue with tritium as opposed to any other effects of tritium in the body?

G.J.:

Yes, certainly the objective is based on concerns that tritium, or any other ionizing radiation, can cause cancer.

B.W.:

OK, well I guess I would encourage you to look at other side effects as well because there is another body of knowledge that says it's not so much the cancer its the effects on the immune system which make you more susceptible not only to cancer but to a raft of things. It's the difference between the gun and the bullet. The gun is tritium, the bullet is a whole raft of other things which are indirectly generated by tritium and the free radical that it causes and the attacks on the cell membrane. I guess I get concerned when the focus of your reassurances is on fatal cancer incidence and that to me is almost irrelevant to the concern we have about disease and health and the long term impact on disease and health in the population of ingesting little amounts and what they do. So, I guess the question I would have for you is if there is any way you can tap into that body of knowledge as a part of your process here, I would really encourage you to because that is the source of a lot of our concern.

R.S.:

And we thank you again for raising these issues. We would really appreciate you writing in or coming to one of the deputation meetings perhaps and bringing these issues to our attention.

As I said during my opening remarks, this information session is only part of ACES' consultation program.

Your questions suggest that some of you may have quite specific recommendations you wish

to make.

We have organized at least one deputation meeting which will be held on Wednesday February 16, 1994 at the Pickering Recreation Complex, 1867 Valley Farm Road, Pickering.

The deputation meeting will provide you with an opportunity to make an oral presentation directly to and be questioned by ACES. After this session tonight, we would appreciate meeting with anyone who now knows they wish to make a presentation so we can discuss with you the format for that meeting.

The meeting will be open to the public.

Time will be set aside at the deputation meeting to hear from people who do not have pre-arranged times.

ACES is accepting written comments until March 10, 1994, and will be reporting to the Minister in May.

Our report to the Minister will not only contain recommendations, but will include a summary of what we heard during the consultation.

Anyone who makes an oral presentation or provides written comments will receive a copy of the report after the Minister has made a decision.

If you want to be sure of receiving a copy and aren't sure you will submit comments, there is a form you can sign outside.

Do you have any questions?

On behalf of ACES, I would like to thank all of you for participating in this session.

ACES looks forward to hearing from you.

This concludes the formal part of the session. I'd like to remind those of you who may want to make a deputation to ACES that we would like to meet with you now - let's meet at this end of the room with David Evans, our Community Affairs Consultant.

Let's break now for informal discussion and coffee, and, again, thanks.