

Thompson Revision of Bair Draft

December 17, 1976

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environmental and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions:

1. Do the residents of Bikini have plutonium burdens higher than those of other persons ^{inhabiting Pacific atolls} ~~living~~ in the same latitude?
 (approximately)
2. If the Bikini residents do have increased plutonium burdens, what is the source of these burdens?
3. What future transuranic body burdens are projected for current residents and their descendants?
4. What potential health risks are associated with current and projected transuranic burdens of the Bikini residents?

BEST COPY AVAILABLE

Bill - I thought you should see where we made changes from my original revision. I've also left a question for you on the final page. My comments on the original comments of others are also attached.

DOCUMENT DOES NOT CONTAIN ECI
Reviewed by R. S. Schmitt Date 4/30/97



Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6345

January 12, 1977

To Members of the Transuranium Technical Group

N. F. Barr	R. O. McClellan
W. C. Hanson	D. A. Orth
J. H. Harley	C. R. Richmond
L. L. Keller	R. C. Thompson

Attached is our assessment of the plutonium contamination of the environment and population of Bikini. I hope this meets with your approval since we have sent the original to Jim.

We have tried to incorporate most of your suggestions into the final submission.

Thank you.

Sincerely yours,

A handwritten signature in cursive script that reads "Bair".

W. J. Bair, Ph.D.
Chairman
Transuranium Technical Group

WJB:mjs

Attachment

cc: W. W. Burr

In addressing the first of these questions, data presented to the TTG indicated that ^{urine} plutonium ^{levels} burdens of Bikini residents were 10 times greater than plutonium ^{burdens} ^{levels in the urine} ~~levels~~ considered typical of residents of the continental United States. ~~These estimates were derived from plutonium analysis of urine samples from Bikini residents and from residents of New York City.~~ Unfortunately, the validity of both these sets of urine data is subject to question.

U.S. data is *from New York City residents, and*
The ~~New York City data~~ based on pooled samples ^{from New York City residents, and} were not confirmed by a ^{recent} carefully collected large sample from one individual. This individual single sample was 10-fold lower than the pooled samples, and is in *better* agreement ^{than the higher number pooled samples} with model estimates based on fallout plutonium burdens from autopsy data. ~~if this single sample is~~

The Bikini data are highly suspect because the samples were not collected in a manner to avoid possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample, or from resuspended plutonium-contaminated soil in the air. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies.

The TTG concludes that the first question cannot be answered with available data and recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled

~~In these substances.~~ Samples are required that will be truly representative ^{nick} of the air the residents breathe and the food they eat. This effort will, of course, become more important if the answer to the first question is positive.

An answer to the third question requires answers to the first two. The TTG recommends that when answers are obtained to questions 1 and 2, estimates of current body burdens and projected future body burdens should be made for current residents and their descendants, based on the best available models. The TTG does not believe in-vivo counting

offers much hope at the estimated current body burdens. However, if the revised projections indicate body burdens attaining nanocurie levels,

then in-vivo counting of all residents ^{should be reconsidered.} ~~would be desirable.~~ Based upon ^{our} ~~our~~ ^{own} ~~own~~ ^{experience} ~~experience~~ with Spanish subjects, it is unlikely that current technology would offer much hope of quantifying low chest burdens of plutonium ^{under field conditions.}

The fourth question, regarding possible health risks, depends upon current and future body burdens of transuranics in Bikini residents.

Data presented to the TTG ^{if accepted at face value,} suggests that the average burden is ~ 20 pCi $^{239,240}\text{Pu}$, but may be higher or lower by a factor of ten or more.

Using risk factors in the BEIR and similar reports, estimates of the health risk associated with this level of plutonium can be calculated ^{that the derivation of such estimates} and would be very small. However, the TTG believes ~~this~~ ^{that the derivation of such estimates} would be premature.

Such estimates would better wait until the body burdens of the Bikini residents can be ascertained with more confidence. Also, such estimates of possible health consequences must be done in context with other radiation exposure, such as from the beta-gamma radiation from fission products dispersed on Bikini.

The TTG is aware that obtaining answers to the questions discussed above requires a considerable degree of cooperation from the Bikini people.

Efforts to obtain this cooperation might result in psychological or sociological stresses ^{of more critical concern than} ~~not exceeding~~ the potential hazard from radiation.

The TTG is in no position to evaluate this problem, but would feel that the overall welfare of the Bikini people should be placed above any concern for precise evaluation of minimal radiation risks.

In considering these questions, the TTG was handicapped by the lack of a concise but comprehensive summary of information on Bikini. Livermore, Brookhaven, IASL, the University of Washington and perhaps other ^{ie} laboratories have collected data which ^c would be useful in assessing the current

levels of contamination on Bikini, ^{It would be appropriate to have this data} and which would also provide guidance brought together, summarized, interpreted, and used as partial guide in planning additional studies. Such a summary should be prepared for establishing a long range monitoring program and for estimating health risks for Bikini residents.

Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mjs

Bill - I'm not sure whether this is appropriate to our assignment. It was Chet's suggestion.

While perhaps beyond the scope of our specific assignment, ~~at~~ the TTG would like to direct attention to ^{two} ~~some~~ ancillary problems that ~~could have~~ ~~major significant impact on~~ relate to the possible contamination of Bikini ~~islands~~ inhabitants. The extent of plutonium contamination of some islands of the Bikini atoll is much less well known than is that of Bikini itself. These islands, whatever restrictions are presently applied, might be visited or inhabited in the future. Also of concern is the impact of forthcoming EPA standards for plutonium in soil. What might be the costs of complying, or even establishing that one is in compliance, with such standards?

OK, it
of this amt.
is needed

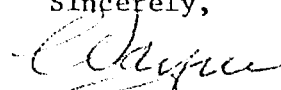
Requires
no change
in letter

~~AVAILABLE TO THE PUBLIC BY THE NATIONAL ARCHIVES AT COLLEGE PARK, MARYLAND~~
realistically consider measuring. This was a general agreement among several laboratories at a recent meeting, although investigators with much less experience in this field believe (mistakenly, we think) that they can measure levels much lower than this. Based upon the average burden of ~200 pCi in Bikini residents stated in your letter, the probability of obtaining meaningful numbers >0 is diminishingly small; and

2. There exists a fair data base on transuranic radionuclides in Bikini environmental samples, much of it published by Nevissi and Schell (1975a 1975b); Nevissi, Schell, and Nelson (1976), and more on hand (Lowman and Schell, pers. comm.). The Enewetak data (Noshkin et al 1976; NVO-140) further provide a reasonable background for extrapolating the Bikini data into the future and to substantiate whether or not a human contamination situation possibly exists or can be expected in the future. The very best data should be summarized, evaluated, and used in the model that you discussed in the third point; however, this higher-quality data will be of little value unless the model used is also of highest quality.

Thanks for the opportunity to comment on the meeting proceedings. Hope I can make the next meeting.

Sincerely,



Wayne C. Hanson
H-8 Alternate Group Leader
Environmental Studies

WCH:mar

OAK RIDGE NATIONAL LABORATORY

OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION



POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

December 30, 1976



Dr. W. J. Bair, Manager
Environmental and Safety
Research Program
Battelle Pacific Northwest
Laboratories
Battelle Boulevard
Richland, Washington 99352

Dear Dr. Bair:

The following comments are on the letter to Jim Liverman from the Transuranium Technical Group on the subject of possible Pu contamination of Bikinians.

1. Item 1 of our proposed letter may be too general. I would suggest the following sentence. "Do the residents of Bikini have body burdens of plutonium above those of other persons inhabiting atolls in the Pacific in approximately the same latitude as Bikini?"
OK but not critical
2. Third paragraph, first sentence: I suggest the word "were" be replaced with "could be."
I prefer were but not critical
3. Third paragraph, last sentence: suggest "approximately 2 picocuries."
OK if relevant at all
4. Fourth paragraph, addition: "We suggest that consideration be given to the use of the radiobiological research vessel R. V. Liktanur as a clean environment in which urine samples can be collected during one or more of its quarterly visits to Bikini."
OK if this and detail is desired
5. Sixth paragraph, last sentence: I suggest we say ". . .then in vivo counting of all residents should be reconsidered. However, based upon our experience to date with Spanish subjects, it is unlikely that the current technology would offer much hope of quantifying low chest burdens of plutonium under field conditions."
OK - work on Newsoms ideas here
6. Seventh paragraph, second sentence: I suggest ". . .the average burden could be about 200 pCi ^{239,240Pu}.
I like 20 ~~plus~~ or minus a factor of ten

OK, if this is part of what we were asked to do. I'm not sure.

- 7. I also feel that Liverman should be appraised of the real situation at Bikini in terms of other islands in the atoll and the potential for situations developing that are similar to Enewetok. Apparently there is not much information on the extent of Pu contamination on other islands (e.g., Nam) that could be visited or inhabited in the future--regardless of what might be said to them at present.

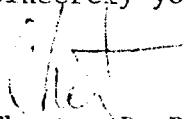
Also, some portions of at least one island in the atoll have Pu contamination levels considerably higher than the average value reported for Bikini. The point is that Bikini is only one of the islands in the atoll and any decisions concerning potential health effects from plutonium to the Bikinians must be based on information covering the entire atoll.

ditto

- 8. I also feel that we need to mention the potential problem of standards for plutonium in soil. For example, would the proposed EPA standards apply to Bikini? What would be the effort required to establish what the levels of contamination are for the various islands? Is the survey information adequate? What costs would be associated with surveys, cleanup, if required, and disposal of soil? Where and under what circumstances would the contaminated soil be isolated and managed?

I hope these comments are helpful. Best personal regards.

Sincerely yours,



Chester R. Richmond
Associate Director for
Biomedical and Environmental
Sciences

CRR:lmm

cc: Transuranium Technical Group

U. S. LETTER
BY
If the enclosed draft letter to Jim Liverman reads like it was written on an airplane you can be assured that it was. I have not tried to polish this but will wait until I receive your comments.

I used the outline that Roger prepared at the meeting but please don't blame him for anything you find objectionable. I let a few of my own possibly biased views get into this draft.

I'd like your comments in time to get a final draft to Jim Liverman in early January.

Sincerely yours,



W. J. Bair, Ph.D.
Manager
Environmental and Safety
Research Program

WJB:mjs

Enclosure

cc: W. W. Burr

D R A F T

December 17, 1976



Pacific Northwest Laboratory
Battelle Building
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6245

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environment and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium. We believe this is an appropriate task for the TTG and are pleased to provide the following comments.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions which need to be addressed.

1. Do the residents of Bikini have body burdens of plutonium above those of other persons throughout the world living in the same latitude?
2. If the Bikini residents do have increased plutonium body burdens, what is the source of their plutonium burden?
3. What transuranic body burdens are projected for the future for current residents and their descendants?
4. What potential health risks are associated with current and projected transuranic body burdens of the Bikini residents?

In addressing the first of these questions, data presented to the TTG indicated that plutonium burdens of the Bikini residents were 10-100 times greater than plutonium levels in residents of the continental United States. These estimates were derived from plutonium analysis of urine samples from Bikini residents and residents of New York City. Unfortunately the validity of the urine data is subject to question. The New York City data vary by a factor of 10 (~ 0.1 to 0.1 pCi Pu/l). The lower value appears to be reconcilable with the best estimate of plutonium burdens in U.S. residents from fallout, or 2 pCi.

The Bikini data are highly suspect because of possible cross contamination. The samples were not collected in a manner to rule out possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample or from resuspension of Pu-contaminated soil. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies. Thus, the TTG concluded that the first question, whether the Bikini residents have elevated body burdens of transuranic elements, cannot be answered with available data. Therefore, the TTG recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled conditions that would minimize possibilities of cross contamination. Samples should not be pooled but clearly identified with specific

Dr. J. L. Liverman

December 17, 1976

individuals. Dietary, work, travel and recreational characteristics of the sampled individuals should be accurately recorded.

With regard to the second question, sources of possible contamination, the TTG was presented a brief review of information on plutonium in the Bikini environment and incomplete information on the dietary habits of the residents and sources of food. The TTG recognizes the need for continued monitoring of air, soil, water, and foodstuffs for plutonium and other transuranics. To minimize the cost of this effort a long range plan is needed that will assure identification of any gradual or precipitous changes in levels of transuranics in these substances. Samples are required that will be truly representative of the air the residents breathe and the food they eat.

OK - I need some clean samples

OK - I need some clean samples

The third question regarding projected levels of transuranics in the current residents and their descendants follows from the first two questions in that it is necessary to derive reliable estimates of the body burdens of the current residents and determine the sources of intake--whether from worldwide fallout or from the Bikini environment. To do this adequately requires better models than now exist. A Lawrence Livermore analysis is inconclusive because the ICRP model used was developed for radiation protection purposes and is not necessarily valid for assessing body burdens from urine data or predicting body burdens from inhalation and ingestion routes. The TTG recommends that the available data be reexamined using an updated metabolic model to derive new estimates of current body burdens and to project future body burdens in current residents and their descendants. The TTG does not believe in vivo counting offers much hope at the estimated current body burdens. However, if the revised projections indicate body burdens attaining nanocurie levels, then in vivo counting of all residents is urged.

The fourth question, regarding possible health risks, depends upon current and future body burdens of transuranics in Bikini residents. Data presented to the TTG suggests that the average burden is ~ 200 pCi ^{239,240}Pu. Using risk factors in the BEIR and similar reports, estimates of the health risk associated with this level of plutonium can be calculated. However, the TTG believes this would be premature and of no value in guiding decisions relative to the human occupation of the Bikini Atoll. Such estimates should not be attempted until the body burdens of the Bikini residents can be ascertained with confidence. Also, such estimates of possible health consequences must be done in context with other possible radiation exposures, such as from the beta-gamma radiation from fission products dispersed on Bikini.

pertinent appearance

In considering these questions, the TTG felt somewhat handicapped in that a concise but comprehensive summary of information on Bikini was not available. Apparently Livermore, Brookhaven, HASL, the University of Washington and perhaps other Labs have collected data which could be useful in assessing the current levels of contamination on Bikini but also provide guidance in obtaining additional data.

Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mjs



ENERGY RESEARCH AND
DEVELOPMENT ADMINISTRATION

12/21

Division of
Technology Overview

*Mr. [unclear] [unclear]
CO [unclear]*

Bill;

I have noted a number
of suggestions and comments on
your draft which I am
returning.

I hope you and your
family have a Happy Holiday
Season and a rewarding

Best Yous

Not



Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 12-6335

December 17, 1976

To Members of the Transuranium Technical Group

N. F. Barr	R. O. McClellan
W. C. Hanson	D. A. Orth
J. H. Harley	R. C. Richmond
O. L. Keller	R. C. Thompson

If the enclosed draft letter to Jim Liverman reads like it was written on an airplane you can be assured that it was. I have not tried to polish this but will wait until I receive your comments.

I used the outline that Roger prepared at the meeting but please don't blame him for anything you find objectionable. I let a few of my own possibly biased views get into this draft.

I'd like your comments in time to get a final draft to Jim Liverman in early January.

Sincerely yours,

A handwritten signature in cursive that reads "Bill".

W. J. Bair, Ph.D.
Manager
Environmental and Safety
Research Program

WJB:mjs

Enclosure

cc: W. W. Burr

18806

*Have
Done*

D R A F T

December 17, 1976

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environment and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Battelle

Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6345

*I prefer the name
informative
statement*

*should be
included
I've
deleted*

*Task is to recommend
actions to be taken
significance of observations
unintentionally*

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium. We believe this is an appropriate task for the TTG and are pleased to provide the following comments.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions which need to be addressed.

question of the significance of the observed urine levels of present

0. All the ~~presenting~~ measured levels are the result of contamination?

1. Do the residents of Bikini have body burdens of plutonium above those of other persons throughout the world living in the same latitude? ✓

2. If the Bikini residents do have increased plutonium body burdens, what is the source of their plutonium burden? ✓

3. What transuranic body burdens are projected for the future for current residents and their descendants?

4. What potential health risks are associated with current and projected transuranic body burdens of the Bikini residents?

In addressing the first of these questions, data presented to the TTG indicated that plutonium burdens of the Bikini residents were 10-100 times greater than plutonium levels in residents of the continental United States. These estimates were derived from plutonium analysis of urine samples from Bikini residents and residents of New York City. Unfortunately the validity of the urine data is subject to question. The New York City data vary by a factor of 10 (~ 0.1 to 0.1 pCi Pu/l). The lower value appears to be reconcilable with the best estimate of plutonium burdens in U.S. residents from fallout, or 2 pCi. ✓

The Bikini data are highly suspect because of possible cross contamination. The samples were not collected in a manner to rule out possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample or from resuspension of Pu-contaminated soil. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies. Thus, the TTG concluded that the first question, whether the Bikini residents have elevated body burdens of transuranic elements, cannot be answered with available data. Therefore, the TTG recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled conditions that would minimize possibilities of cross contamination. Samples should not be pooled but clearly identified with specific

almost the same as i

unnecessary

why should this be deleted?

OK, or do it my way

I prefer original

see e lec to m

Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mis


RCI:jar

Attachment



20 f/m³ for insoluble plutonium in the population.

Sincerely,



John H. Harley, Director
Health and Safety Laboratory



Thompson Revision of Bair Draft

December 17, 1976

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environmental and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions:

1. Do the residents of Bikini have plutonium burdens higher than those of other persons ^{inhabiting Pacific atolls} ~~living in the same latitude?~~
 (approximately)
2. If the Bikini residents do have increased plutonium burdens, what is the source of these burdens?
3. What future transuranic body burdens are projected for current residents and their descendants?
4. What potential health risks are associated with current and projected transuranic burdens of the Bikini residents?

BEST COPY AVAILABLE

Bill - I thought you should see where we made changes from my original revision. I've also left a question for you on the final page. My comments on the original comments of others are also attached.

DOCUMENT DOES NOT CONTAIN ECI
Reviewed by R. Schmitt Date 4/30/97



Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6345

January 12, 1977

To Members of the Transuranium Technical Group

N. F. Barr	R. O. McClellan
W. C. Hanson	D. A. Orth
J. H. Harley	C. R. Richmond
L. L. Keller	R. C. Thompson

Attached is our assessment of the plutonium contamination of the environment and population of Bikini. I hope this meets with your approval since we have sent the original to Jim.

We have tried to incorporate most of your suggestions into the final submission.

Thank you.

Sincerely yours,

A handwritten signature in cursive script that reads "Bair".

W. J. Bair, Ph.D.
Chairman
Transuranium Technical Group

WJB:mjs

Attachment

cc: W. W. Burr

In addressing the first of these questions, data presented to the TTG indicated that ^{urine} plutonium ^{levels} burdens of Bikini residents were 10 times greater than plutonium ^{burdens} ^{levels in the urine} ~~levels~~ considered typical of residents of the continental United States. ~~These estimates were derived from plutonium analysis of urine samples from Bikini residents and from residents of New York City.~~ Unfortunately, the validity of both these sets of urine data is subject to question.

U.S. data is from New York City residents, and
The ~~New York City data~~ based on pooled samples ^{from New York City residents, and} were not confirmed by a ^{recent} carefully collected large sample from one individual. This individual single sample was 10-fold lower than the pooled samples, and is in ^{U.S. data is} better agreement ^{than the higher number pooled samples} with model estimates based on fallout plutonium burdens from autopsy data. ~~if this single sample is~~

The Bikini data are highly suspect because the samples were not collected in a manner to avoid possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample, or from resuspended plutonium-contaminated soil in the air. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies.

The TTG concludes that the first question cannot be answered with available data and recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled

~~In these substances.~~ Samples are required that will be truly representative ^{nick} of the air the residents breathe and the food they eat. This effort will, of course, become more important if the answer to the first question is positive.

An answer to the third question requires answers to the first two. The TTG recommends that when answers are obtained to questions 1 and 2, estimates of current body burdens and projected future body burdens should be made for current residents and their descendants, based on the best available models. The TTG does not believe in-vivo counting

offers much hope at the estimated current body burdens. However, if the revised projections indicate body burdens attaining nanocurie levels,

then in-vivo counting of all residents ~~would~~ ^{should} be desirable. ~~Based upon our~~ ^{Based upon our} ~~experience~~ ^{experience} with Spanish subjects, it is unlikely that current technology would offer much hope of quantifying low chest burdens of plutonium under field conditions.

The fourth question, regarding possible health risks, depends upon current and future body burdens of transuranics in Bikini residents.

Data presented to the TTG, ^{if accepted at face value,} suggests that the average burden is ~ 20 pCi $^{239,240}\text{Pu}$, but may be higher or lower by a factor of ten or more.

Using risk factors in the BEIR and similar reports, estimates of the health risk associated with this level of plutonium can be calculated and would be very small. However, the TTG believes ^{that the derivation of such estimates} ~~this~~ would be premature.

Such estimates would better wait until the body burdens of the Bikini residents can be ascertained with more confidence. Also, such estimates of possible health consequences must be done in context with other radiation exposure, such as from the beta-gamma radiation from fission products dispersed on Bikini.

The TTG is aware that obtaining answers to the questions discussed above requires a considerable degree of cooperation from the Bikini people.

Efforts to obtain this cooperation might result in psychological or sociological stresses ^{of more critical concern than} ~~not exceeding~~ the potential hazard from radiation.

The TTG is in no position to evaluate this problem, but would feel that the overall welfare of the Bikini people should be placed above any concern for precise evaluation of minimal radiation risks.

In considering these questions, the TTG was handicapped by the lack of a concise but comprehensive summary of information on Bikini. Livermore, Brookhaven, IASL, the University of Washington and perhaps other ^{ie} laboratories have collected data which ^cwould be useful in assessing the current

levels of contamination on Bikini, ^{It would be appropriate to have this data} and which would also provide guidance brought together, summarized, interpreted, and used as partial guide in planning additional studies. ~~Such a summary should be prepared for establishing a long range monitoring program and for estimating health risks for Bikini residents.~~

Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mjs

Bill - I'm not sure whether this is appropriate to our assignment. It was Chet's suggestion.

While perhaps beyond the scope of our specific assignment, ~~at~~ the TTG would like to direct attention to ^{two} ~~some~~ ancillary problems that ~~could have~~ ~~major significant impact on~~ relate to the possible contamination of Bikini ~~islands~~ inhabitants. The extent of plutonium contamination of some islands of the Bikini atoll is much less well known than is that of Bikini itself. These islands, whatever restrictions are presently applied, might be visited or inhabited in the future. Also of concern is the impact of forthcoming EPA standards for plutonium in soil. What might be the costs of complying, or even establishing that one is in compliance, with such standards?

OK, it
of this amt.
is needed

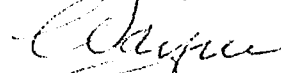
Requires
no change
in letter

~~AVAILABLE TO THE PUBLIC BY THE NATIONAL ARCHIVES AT COLLEGE PARK, MARYLAND~~
realistically consider measuring. This was a general agreement among several laboratories at a recent meeting, although investigators with much less experience in this field believe (mistakenly, we think) that they can measure levels much lower than this. Based upon the average burden of ~200 pCi in Bikini residents stated in your letter, the probability of obtaining meaningful numbers >0 is diminishingly small; and

2. There exists a fair data base on transuranic radionuclides in Bikini environmental samples, much of it published by Nevissi and Schell (1975a 1975b); Nevissi, Schell, and Nelson (1976), and more on hand (Lowman and Schell, pers. comm.). The Enewetak data (Noshkin et al 1976; NVO-140) further provide a reasonable background for extrapolating the Bikini data into the future and to substantiate whether or not a human contamination situation possibly exists or can be expected in the future. The very best data should be summarized, evaluated, and used in the model that you discussed in the third point; however, this higher-quality data will be of little value unless the model used is also of highest quality.

Thanks for the opportunity to comment on the meeting proceedings. Hope I can make the next meeting.

Sincerely,



Wayne C. Hanson
H-8 Alternate Group Leader
Environmental Studies

WCH:mar

OAK RIDGE NATIONAL LABORATORY

OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION



POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

December 30, 1976



Dr. W. J. Bair, Manager
Environmental and Safety
Research Program
Battelle Pacific Northwest
Laboratories
Battelle Boulevard
Richland, Washington 99352

Dear Dr. Bair:

The following comments are on the letter to Jim Liverman from the Transuranium Technical Group on the subject of possible Pu contamination of Bikinians.

1. Item 1 of our proposed letter may be too general. I would suggest the following sentence. "Do the residents of Bikini have body burdens of plutonium above those of other persons inhabiting atolls in the Pacific in approximately the same latitude as Bikini?"
OK but not critical
2. Third paragraph, first sentence: I suggest the word "were" be replaced with "could be."
I prefer were but not critical
3. Third paragraph, last sentence: suggest "approximately 2 picocuries."
OK if relevant at all
4. Fourth paragraph, addition: "We suggest that consideration be given to the use of the radiobiological research vessel R. V. Liktanur as a clean environment in which urine samples can be collected during one or more of its quarterly visits to Bikini."
OK if this and detail is desired
5. Sixth paragraph, last sentence: I suggest we say ". . .then in vivo counting of all residents should be reconsidered. However, based upon our experience to date with Spanish subjects, it is unlikely that the current technology would offer much hope of quantifying low chest burdens of plutonium under field conditions."
OK - work on Newsoms ideas here
6. Seventh paragraph, second sentence: I suggest ". . .the average burden could be about 200 pCi ^{239,240Pu}.
I like 20 ~~plus~~ or minus a factor of ten

OK, if this is part of what we were asked to do. I'm not sure.

- 7. I also feel that Liverman should be appraised of the real situation at Bikini in terms of other islands in the atoll and the potential for situations developing that are similar to Enewetok. Apparently there is not much information on the extent of Pu contamination on other islands (e.g., Nam) that could be visited or inhabited in the future--regardless of what might be said to them at present.

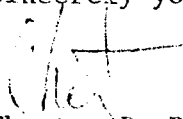
Also, some portions of at least one island in the atoll have Pu contamination levels considerably higher than the average value reported for Bikini. The point is that Bikini is only one of the islands in the atoll and any decisions concerning potential health effects from plutonium to the Bikinians must be based on information covering the entire atoll.

ditto

- 8. I also feel that we need to mention the potential problem of standards for plutonium in soil. For example, would the proposed EPA standards apply to Bikini? What would be the effort required to establish what the levels of contamination are for the various islands? Is the survey information adequate? What costs would be associated with surveys, cleanup, if required, and disposal of soil? Where and under what circumstances would the contaminated soil be isolated and managed?

I hope these comments are helpful. Best personal regards.

Sincerely yours,



Chester R. Richmond
Associate Director for
Biomedical and Environmental
Sciences

CRR:lmm

cc: Transuranium Technical Group

U. S. LETTER
BY SA [redacted]

If the enclosed draft letter to Jim Liverman reads like it was written on an airplane you can be assured that it was. I have not tried to polish this but will wait until I receive your comments.

I used the outline that Roger prepared at the meeting but please don't blame him for anything you find objectionable. I let a few of my own possibly biased views get into this draft.

I'd like your comments in time to get a final draft to Jim Liverman in early January.

Sincerely yours,



W. J. Bair, Ph.D.
Manager
Environmental and Safety
Research Program

WJB:mjs

Enclosure

cc: W. W. Burr

D R A F T

December 17, 1976



Pacific Northwest Laboratory
Battelle Building
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6245

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environment and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium. We believe this is an appropriate task for the TTG and are pleased to provide the following comments.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions which need to be addressed.

1. Do the residents of Bikini have body burdens of plutonium above those of other persons throughout the world living in the same latitude?
2. If the Bikini residents do have increased plutonium body burdens, what is the source of their plutonium burden?
3. What transuranic body burdens are projected for the future for current residents and their descendants?
4. What potential health risks are associated with current and projected transuranic body burdens of the Bikini residents?

In addressing the first of these questions, data presented to the TTG indicated that plutonium burdens of the Bikini residents were 10-100 times greater than plutonium levels in residents of the continental United States. These estimates were derived from plutonium analysis of urine samples from Bikini residents and residents of New York City. Unfortunately the validity of the urine data is subject to question. The New York City data vary by a factor of 10 (~ 0.1 to 0.1 pCi Pu/l). The lower value appears to be reconcilable with the best estimate of plutonium burdens in U.S. residents from fallout, or 2 pCi.

The Bikini data are highly suspect because of possible cross contamination. The samples were not collected in a manner to rule out possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample or from resuspension of Pu-contaminated soil. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies. Thus, the TTG concluded that the first question, whether the Bikini residents have elevated body burdens of transuranic elements, cannot be answered with available data. Therefore, the TTG recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled conditions that would minimize possibilities of cross contamination. Samples should not be pooled but clearly identified with specific

Dr. J. L. Liverman

December 17, 1976

individuals. Dietary, work, travel and recreational characteristics of the sampled individuals should be accurately recorded.

With regard to the second question, sources of possible contamination, the TTG was presented a brief review of information on plutonium in the Bikini environment and incomplete information on the dietary habits of the residents and sources of food. The TTG recognizes the need for continued monitoring of air, soil, water, and foodstuffs for plutonium and other transuranics. To minimize the cost of this effort a long range plan is needed that will assure identification of any gradual or precipitous changes in levels of transuranics in these substances. Samples are required that will be truly representative of the air the residents breathe and the food they eat.

OK - I need some clean samples

OK - I need some clean samples

The third question regarding projected levels of transuranics in the current residents and their descendants follows from the first two questions in that it is necessary to derive reliable estimates of the body burdens of the current residents and determine the sources of intake--whether from worldwide fallout or from the Bikini environment. To do this adequately requires better models than now exist. A Lawrence Livermore analysis is inconclusive because the ICRP model used was developed for radiation protection purposes and is not necessarily valid for assessing body burdens from urine data or predicting body burdens from inhalation and ingestion routes. The TTG recommends that the available data be reexamined using an updated metabolic model to derive new estimates of current body burdens and to project future body burdens in current residents and their descendants. The TTG does not believe in vivo counting offers much hope at the estimated current body burdens. However, if the revised projections indicate body burdens attaining nanocurie levels, then in vivo counting of all residents is urged.

The fourth question, regarding possible health risks, depends upon current and future body burdens of transuranics in Bikini residents. Data presented to the TTG suggests that the average burden is ~ 200 pCi ^{239,240}Pu. Using risk factors in the BEIR and similar reports, estimates of the health risk associated with this level of plutonium can be calculated. However, the TTG believes this would be premature and of no value in guiding decisions relative to the human occupation of the Bikini Atoll. Such estimates should not be attempted until the body burdens of the Bikini residents can be ascertained with confidence. Also, such estimates of possible health consequences must be done in context with other possible radiation exposures, such as from the beta-gamma radiation from fission products dispersed on Bikini.

pertinent appearance

In considering these questions, the TTG felt somewhat handicapped in that a concise but comprehensive summary of information on Bikini was not available. Apparently Livermore, Brookhaven, HASL, the University of Washington and perhaps other Labs have collected data which could be useful in assessing the current levels of contamination on Bikini but also provide guidance in obtaining additional data.

Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mjs



ENERGY RESEARCH AND
DEVELOPMENT ADMINISTRATION

12/21

Division of
Technology Overview

*Mr. [unclear]
[unclear]
CO [unclear]*

Bill;

I have noted a number
of suggestions and comments on
your draft which I am
returning.

I hope you and your
family have a Happy Holiday
Season and a rewarding

Best Yous

Not



Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 12-6335

December 17, 1976

To Members of the Transuranium Technical Group

N. F. Barr	R. O. McClellan
W. C. Hanson	D. A. Orth
J. H. Harley	R. C. Richmond
O. L. Keller	R. C. Thompson

If the enclosed draft letter to Jim Liverman reads like it was written on an airplane you can be assured that it was. I have not tried to polish this but will wait until I receive your comments.

I used the outline that Roger prepared at the meeting but please don't blame him for anything you find objectionable. I let a few of my own possibly biased views get into this draft.

I'd like your comments in time to get a final draft to Jim Liverman in early January.

Sincerely yours,

W. J. Bair, Ph.D.
Manager
Environmental and Safety
Research Program

WJB:mjs

Enclosure

cc: W. W. Burr

18806

Done
12/20/76

D R A F T

December 17, 1976

Dr. J. L. Liverman
Office of the Assistant Administrator
for Environment and Safety
Energy Research and Development
Administration
Washington, D.C. 20545

Battelle

Pacific Northwest Laboratories
Battelle Boulevard
Richland, Washington 99352
Telephone (509) 946-2421
Telex 32-6345

*I prefer the name
informative
statement*

*should be
included
I've
deleted*

*Task is to recommend
actions to be taken
significance of observations
unintentionally*

Dear Jim:

The Transuranium Technical Group met in Washington, D.C. on December 8, 1976 to review the data which suggest the possible contamination of the inhabitants of Bikini with plutonium. We believe this is an appropriate task for the TTG and are pleased to provide the following comments.

The TTG views the issue of transuranium element contamination of present and future residents of the Bikini atoll as consisting of four major questions which need to be addressed.

question of the significance of the observed urine levels of present

0. All the ~~present~~ measured levels are the result of contamination?

1. Do the residents of Bikini have body burdens of plutonium above those of other persons throughout the world living in the same latitude? ✓

2. If the Bikini residents do have increased plutonium body burdens, what is the source of their plutonium burden? ✓

3. What transuranic body burdens are projected for the future for current residents and their descendants?

4. What potential health risks are associated with current and projected transuranic body burdens of the Bikini residents?

In addressing the first of these questions, data presented to the TTG indicated that plutonium burdens of the Bikini residents were 10-100 times greater than plutonium levels in residents of the continental United States. These estimates were derived from plutonium analysis of urine samples from Bikini residents and residents of New York City. Unfortunately the validity of the urine data is subject to question. The New York City data vary by a factor of 10 (~ 0.1 to 0.1 pCi Pu/l). The lower value appears to be reconcilable with the best estimate of plutonium burdens in U.S. residents from fallout, or 2 pCi. ✓

The Bikini data are highly suspect because of possible cross contamination. The samples were not collected in a manner to rule out possible contamination of urine by plutonium-contaminated soil on the body and clothing of the person providing the sample or from resuspension of Pu-contaminated soil. Also, urine samples were generally pooled which prevented identification of possible sampling discrepancies. Thus, the TTG concluded that the first question, whether the Bikini residents have elevated body burdens of transuranic elements, cannot be answered with available data. Therefore, the TTG recommends that an effort be made to obtain urine samples from selected representative residents of Bikini under carefully controlled conditions that would minimize possibilities of cross contamination. Samples should not be pooled but clearly identified with specific

*see
e lec
to m*

*almost the
same
as i*

*unnecessary
(see p. 2)*

*why should
this be
deleted?*

*OK,
or do
it my
way*

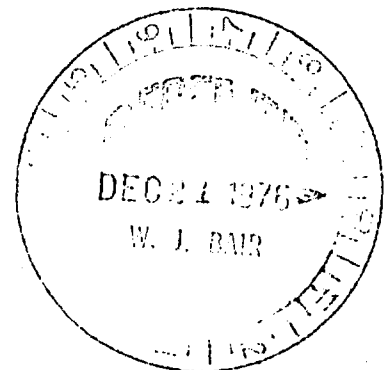
Sincerely yours,

W. J. Bair, Ph.D., Chairman
Transuranium Technical Group

WJB:mis

RCI:jar

Attachment



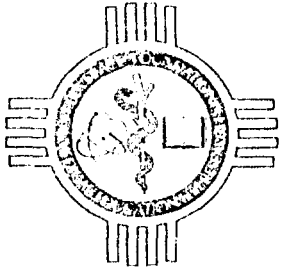
I also disagree with the recommendation of
20 f/m³ for insoluble plutonium in the population.

Sincerely,



John H. Harley, Director
Health and Safety Laboratory





INHALATION TOXICOLOGY RESEARCH INSTITUTE

LOVELACE FOUNDATION for MEDICAL EDUCATION and RESEARCH

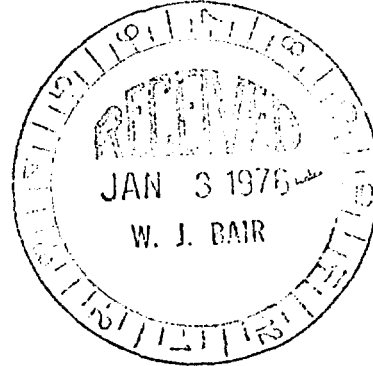
P. O. BOX 5890

ALBUQUERQUE, NEW MEXICO 87115

December 23, 1976

ERDA CONTRACT
NO. E (29-2) - 1013

Dr. W. J. Bair, Manager
Environmental and Safety Research
Program
Pacific Northwest Laboratories
P. O. Box 999
Richland, WA 99352



Dear Bill:

I have reviewed your draft letter of December 17, 1976 to Dr. James L. Liverman relating the TTG recommendations concerning transuranic contamination of Bikini residents. The letter is right on target, however, I would like to see several points clarified or added as noted below:

1. You note that "if the revised projections indicate body burdens attainable levels, then in vivo counting of all residents is urged." I personally feel this should be changed to read - "indicate body burdens of 10 nano-curies or more, then in vivo counting of all residents is urged." I personally doubt that burdens of less than 10 nanocuries can be measured with any degree of validity, especially at Bikini.

I would not like to get this close to 10 nano-curies, so I personally doubt that burdens of less than 10 nanocuries can be measured with any degree of validity, especially at Bikini.

(Time but if we guess they might be 9, they could be 90)

2. I would like to see the last paragraph changed to read as follows: "In considering these questions, the TTG felt somewhat handicapped in that a concise but comprehensive summary of information on Bikini was not available. Livermore, Brookhaven, HASL, the University of Washington and perhaps other labs have collected data which could be useful in assessing the current levels of contamination on Bikini. It would be appropriate to have all of this data brought together, summarized, interpreted and used as partial guidance for establishing a long range monitoring program and estimating health risks for Bikini residents."

OK probably an improvement

Sincerely,

Roger O. McClellan, D.V.M.
Director, Inhalation Toxicology
Research Institute

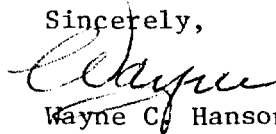
ROM:mm

- xc: Dr. N. F. Barr
- Dr. W. W. Burr
- Dr. W. C. Hanson
- Dr. J. H. Harley
- Dr. O. L. Keller
- Dr. D. A. Orth
- Dr. C. R. Richmond
- Dr. R. C. Thomson

environmental samples, much of it published by Nevissi and Schell (1975a 1975b); Nevissi, Schell, and Nelson (1976), and more on hand (Lowman and Schell, pers. comm.). The Enewetak data (Noshkin et al 1976; NVO-140) further provide a reasonable background for extrapolating the Bikini data into the future and to substantiate whether or not a human contamination situation possibly exists or can be expected in the future. The very best data should be summarized, evaluated, and used in the model that you discussed in the third point; however, this higher-quality data will be of little value unless the model used is also of highest quality.

Thanks for the opportunity to comment on the meeting proceedings. Hope I can make the next meeting.

Sincerely,



Wayne C. Hanson
H-8 Alternate Group Leader
Environmental Studies

WCH:mar

5. Sixth paragraph, last sentence: I suggest we say ". . .then in vivo counting of all residents should be reconsidered. However, based upon our experience to date with Spanish subjects, it is unlikely that the current technology would offer much hope of quantifying low chest burdens of plutonium under field conditions."
6. Seventh paragraph, second sentence: I suggest ". . .the average burden could be about 200 pCi ^{239,240}Pu.

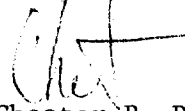
there is not much information on the extent of Pu contamination on other islands (e.g., Nam) that could be visited or inhabited in the future--regardless of what might be said to them at present.

Also, some portions of at least one island in the atoll have Pu contamination levels considerably higher than the average value reported for Bikini. The point is that Bikini is only one of the islands in the atoll and any decisions concerning potential health effects from plutonium to the Bikinians must be based on information covering the entire atoll.

8. I also feel that we need to mention the potential problem of standards for plutonium in soil. For example, would the proposed EPA standards apply to Bikini? What would be the effort required to establish what the levels of contamination are for the various islands? Is the survey information adequate? What costs would be associated with surveys, cleanup, if required, and disposal of soil? Where and under what circumstances would the contaminated soil be isolated and managed?

I hope these comments are helpful. Best personal regards.

Sincerely yours,



Chester R. Richmond
Associate Director for
Biomedical and Environmental
Sciences

CRR:lmm

cc: Transuranium Technical Group

REPOSITORY PNNL
COLLECTION Marshall Islands
BOX No. 5684
FOLDER From Files of Transuranium
Technical Group