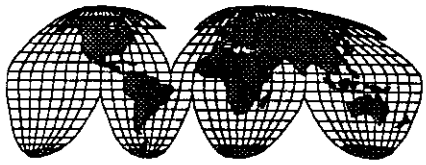


INTERNATIONAL CONSORTIUM FOR RESEARCH
ON THE HEALTH EFFECTS OF RADIATION

MEMORANDUM

Date: 13 August 1998

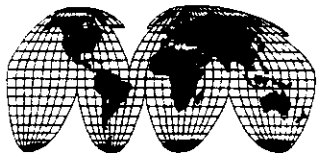
To: Distribution List (A, B and C).

From: Colonel M E. Spiro

Subject: Consortium Response to the 1998 ONR External Review Panel Report

Enclosed is a copy of the Consortium's response to the 1998 external review panel's report (covering ONR III-2). It consists of the Scientific Director's response along with Admiral Zumwalt's forwarding letter. Additionally, I have enclosed as the last item a copy of Dr. Fry's covering letter used to transmit the Consortium's response to this office.

c: Adm Zumwalt



INTERNATIONAL CONSORTIUM FOR RESEARCH ON THE HEALTH EFFECTS OF RADIATION

12 August 1998

Captain Robert J. Hartzman, MC, U. S. Navy
Consortium Navy Scientific Officer
Naval Medical Research Institute
Nicholson Research Building, 3rd Floor
5516 Nicholson Lane
Kensington, Maryland 20895

Dear Captain Hartzman:

The enclosed 10 August 1998 letter from Shirley A. Fry, M.D., the Consortium's Scientific Director, provides the Consortium's response to the February 1998 Office of Naval Research external review panel's report of our research program during the period commonly referred to as ONR III-2, or from March 1997 to February 1998. It is forwarded to you with the following comments:

1. I fully concur with and support the comments and recommendations contained in Dr. Fry's response.

2. At its annual board meeting on 22 April 1998, the Board of Directors approved the recommendation of its Scientific Policy Council that continued research in the Ukraine was an essential component of the overall Consortium research program and its continued funding should be so recommended in the strongest possible terms.

3. Program planning for next year's annual review has already included extending the external review period to encompass a two (2) day period.

4. The Consortium staff has been actively engaged in making the necessary arrangements for strengthened research management of the Ukraine project. As soon as possible, these arrangements will be formalized in a proposed subcontract with an approved budget and statement of work. During the interim, as indicated in Dr. Fry's response, the Scientific Director, assisted by the Central Office staff, will continue to coordinate and oversee the Ukraine field research activities.

I note with pleasure the favorable comments in the panel report regarding the preparations for and the material presented to the panel for its meeting. We will ensure that this level of performance continues.

Consortium:
Telephone:
Facsimile:

1419 Forest Drive, Suite 205
Annapolis, Maryland 21403
U.S.A.

Sincerely,

Elmo R. Zumwalt, Jr.
Admiral, U.S. Navy (ret.)
Chair

Distribution: A, B and C (w/encl)

To: Admiral E. Zumwalt, Chairman, Board of Directors,
International Consortium for Research on the Health Effects of Radiation

From: Shirley A. Fry, M.B., B.Ch., M.P.H., Scientific Director, ICRHER

Date: August 10, 1998

Subject: Response to the ONR report of its February 25, 1998 review of the Consortium's research program

The members of the Scientific Policy Council (SPC), the Principal Investigators (PIs) of the International Consortium for Research on the Health Effects of Radiation (ICRHER; the Consortium) and I have reviewed the document that was forwarded from the Office of Naval Research (ONR) to the Consortium's Central Office on April 14, 1998. We presume that this document, although undated and without attribution or transmittal information, represents the opinions and recommendations of the expert committee that was convened on February 25, 1998 by ONR with the charge to review and evaluate the progress of the Consortium's scientific program since ONR's previous program review on March 20, 1997. This eleven month period encompassed the program activities and related achievements for almost all of the second subcontract year of the Consortium's three year program project for ONR which is identified as ONR III-2.

Following is our response to the reviewers' general comments and recommendations regarding the scientific aspects of the Consortium's overall research program, and to those concerning specific projects and tasks performed or planned as part of the overall program. Our response in part reflects the opinions and recommendations which were formulated and agreed upon by the SPC at its meeting on March 31, 1998 regarding the Consortium's research program in ONR III-3 in anticipation of the report of the review from ONR; they remained essentially the same after the Council members had had an opportunity to individually review the report.

I. General Comments

While the majority of the reviewers' comments and recommendations with respect to the overall program and country and task-specific projects are recognized and appreciated by all the above

readers as being generally fair, balanced, insightful and constructive, some disappointingly and importantly suggest a lack of understanding of the scientifically interdependent, integrated and collaborative nature of the multicenter epidemiological studies that are the focus of the Consortium's efforts to achieve the major objectives of its overall research program. Specifically, the recommendation that the research in Ukraine not be funded in Year 3 of the present program (i.e. ONR III-3) falls into the latter category. Because of the potential for implementation of this recommendation to have a major negative impact on the overall program thereby seriously jeopardizing the Consortium's ability to achieve its research objectives, we have chosen to address this recommendation first, out of order of the general and project-specific comments.

1. Epidemiologic and Dose Reconstruction Efforts in Ukraine

The recommendation that the Ukraine project not be funded in Year 3 of the Consortium's three year research program came as an unanticipated and devastating blow to us all. Although we recognize the probationary state of the project that was prescribed by the reviewers as a result of its March 1997 program review, we understood this to be based primarily on the reviewers' perception of the project's slow progress. This criticism was addressed in the SPC's June 20, 1997 response to the ONR III-1 program review. In the present report, the reviewers while acknowledging that progress on this project had 'improved' and that achievement of project goals had been 'very good' in the interim (i.e. ONR III-2), identified what they considered to be scientific weaknesses that were considered fatal, thereby prompting the recommendation not to fund the project after the end of ONR III-2. We appreciate the opportunity to respond to this criticism and to present information in support of our position that the recommendation is not justified.

Firstly, we would like to address the issue of the vital importance of the project in Ukraine to the Consortium's achievement of its overall programmatic goals and objectives that may not been totally appreciated by the reviewers in formulating their recommendation. As was indicated in the Consortium's three year project proposal that was presented to ONR in 1996 (1), the Ukraine project is an integral and essential component of the research program and vital, for reason of its population size, for pooled data analyses across the three republics that have been a goal of the program from the beginning. This strategy was adopted in the research plan because it was considered unlikely that any one of the participating populations alone could provide the number of cases of malignant diseases of interest with sufficiently high radiation doses that would be necessary to achieve sufficient statistical power, but by pooling data from the participating centers, scientifically valid and epidemiologically meaningful results would obtain (1, p.55/56). The SPC's recommendation made in advance of its access to the reviewers' report, that 'continuation of the Ukranian leukemia study component is vital to the success of the entire

leukemia study', reflects its support of this strategy. Our recognized need to pool cases across the three republics has, and continues to be an important impetus for the efforts of the Consortium's working committees of knowledge experts from each Consortium and collaborating center to standardize the methods used at all the centers. Methodologies that have been standardized thus far (e.g. data collection), are being applied to the extent and as rapidly as is feasible in all three republics and Israel, not only in Belarus and the Russian Federation (RF) as the reviewers' may have understood.

The reviewers' comments regarding apparent scientific weaknesses in the epidemiological study in Ukraine of which the leukemias study is a part, are cogent but appear to have been based on incomplete information or understanding of the information available. Most of the reviewers' scientific concerns were previously recognized, and were in the process of being addressed and remedied to the extent possible, at the time of the program review. The reviewers' recommendation to discontinue funding for the Ukraine component of the overall program, appears to have been most strongly influenced by the report to it in February 1998 of the low ascertainment of leukemia cases through January 31, 1998, relative to the number of cases it has been estimated would have occurred in Ukraine in the 0 - <20 year-old group since the Chernobyl accident in 1986 (reported to be approximately 29%). A subsequent review of this issue by the PI revealed an error in the algorithm developed in December 1997 for revising the initial power estimates (1) following indications that the reconstructed estimates of radiation doses to individual leukemia cases were lower than had been anticipated based on existing population and area monitoring data. The use of this algorithm had resulted in the overestimation of the expected number of leukemia cases by about a factor of three (i.e. the estimate of leukemia cases expected should have been 438 rather than 1313 as was reported to the Committee), and a resultant underestimation of the case ascertainment by the same factor. Thus the reported case ascertainment through ONR III-2 should have been approximately 89% (385/438) of the cases expected since 1986 in the oblasts included in the study. We do not know if the reviewers had this information when preparing its report so we bring it to attention here in support of our position on the importance of the Ukraine project to the overall program.

The second major factor that apparently influenced the reviewers' recommendation was the likelihood that it would be impossible, given the perceived case ascertainment problem and the lower than expected radiation doses being obtained for individuals (who had been interviewed and completed exposure history questionnaires), to ascertain enough cases in Ukraine to achieve sufficient statistical power to unequivocally detect or rule out a radiation effect. We wish to remind the reviewers that the initial sample size estimates were for the three republics combined, not the Ukraine alone (1, p. 55/56). The estimates of the number of cases needed were reassessed upwards in December, 1997 on account of the lower than expected radiation doses that had been calculated for interviewed cases. Seventy and

80% powers were used in the total sample size re-estimation for consistency with the levels used to estimate the Belarus sample size alone. We consider the revised sample size to be achievable with the implementation of actions and plans to expand the scope and/or accelerate the case ascertainment rate in all three republics as endorsed by the SPC. Accordingly, efforts are on-going to address these critical issues in support of our justification for continuation of the epidemiological program in Ukraine, of which the leukemia case/control study is a part. As previously stated, we believe the Ukraine project to be critical for the success of the Consortium's overall research program whereby it can be of potential benefit to the Navy. These efforts include:

1. Inter-republic comparison and standardization of the methods used at all centers to reconstruct radiation doses for individual study participants and to minimize uncertainties in the estimated doses and verify these estimates (on-going).

2. Independent reassessment and verification of individual dose estimates for the Ukraine leukemia cases using the approaches and methods developed by action 1 (pending completion of action 1).

3. Independent verification of the case sample sizes at given levels of statistical power that are necessary to achieve epidemiologically meaningful results (positive or negative) in the combined leukemia case/control study, taking the verified revised dose estimates into account, and using established statistical methods and software packages (pending data from action 1).

4. Expansion of the scope of leukemia case ascertainment in Belarus by including the Brest oblast (on-going).

5. Exploration of the feasibility of including the leukemia cases already identified in performance of the Consortium's project in the Bryansk oblast of RF, and of extending the case ascertainment into other contaminated oblasts (e.g., Tula, Oriel, Kaluga), (on-going).

6. Revision (by the Scientific Director, PI pro-temp) of the Ukraine project protocol to increase case ascertainment by including other contaminated areas, and to accelerate the rate of interviewing of cases and controls (completed).

We expect to have sufficient quantitative data from these efforts by mid-September, 1998 to more thoroughly evaluate the justification for continuation of the Ukraine project.

2. Efforts to develop and validate biodosimetry methods.

The SPC agrees that the studies conducted in ONR II-1 and 2 of the Consortium's program for these purposes have resulted in little direct applicability in the present case-control studies because of low radiation doses and had recommended earlier in ONR III-2 that they not be continued after the end of that subcontract year. Accordingly, work at collaborating sites on these tasks was completed or terminated before the end of ONR III-2. There are no plans to perform work in these areas in ONR III-3, except for completing analyses of the extant data as recommended by the reviewers. However, the studies in Bryansk have provided generally useful information regarding the comparability of doses estimated using different biological endpoints.

3. 'Satellite' Projects at Consortium Sites in US.

Most of these projects were designed to apply basic new and developing biological or molecular technologies in efforts to estimate radiation doses or to detect early radiation damage in the study populations. As stated by the SPC in the report of its March 31, 1998 meeting, we hope that the application of these types of technologies 'may eventually be of value for biodosimetry or identification of early radiation damage at low-dose for military or occupational purposes', but agree that the projects of this type that were proposed for ONR III-3 are premature in the case of present study populations, and should not proceed except for the study of interleukin 5 (IL-5) levels in Belarus residents exposed to radiation which we agree is of interest and relevant to the project. We also supported the previously planned use in Ukraine of in situ hybridization techniques to evaluate lymphocytes obtained only from leukemia patients prior to any chemotherapy or other cytotoxic treatment, as an opportunity to verify on-site technical capabilities; the number of cases available in Year 3 for inclusion in this task is likely to be small.

4. Family Studies.

The task of evaluating the feasibility of recruiting immediate family members of living cases of malignant diseases to participate in future studies to explore the role of host factors in susceptibility to radiogenic malignancies in the event of scientific interest, was completed at all collaborating centers before the end of ONR III-2 as planned. The task was performed at all centers in conjunction with planned and scheduled interviews with living cases, and contrary to reviewers' impressions with respect to implementation of the task in Bryansk, required no significant increase in the usual level of effort expended on the case interview alone.

II Russia

Following are the responses of Dr. S. Davis, PI and Dr. K. Kopecky, P. Voilleque, Dr. E. Bryant and N. Logan, members of the team at the Fred Hutchinson Cancer Research Center, Seattle, that is responsible for the project in the Russian Federation. The team's responses are organized to correspond to the list of the reviewer's project specific recommendations beginning on page 9 of the review document.

1. The thyroid case-control study should continue.

We agree, and have structured Year 3 activities accordingly. In fact, this element of the work will constitute the largest single component of the Russian field activities in Year 3. We do not agree, however, with the reviewer's assessment that such studies are "unlikely to provide much new information regarding health effects." Apparently this judgement is based on the concern that physical dose reconstruction methods will not be capable of characterizing doses adequately for use in an epidemiologic study, and that the biological methods (FISH and ESR) will not be useful in estimating thyroid doses. Although it is true that dose estimates derived from physical reconstruction methods are subject to uncertainties, and that FISH and ESR are not used to estimate thyroid dose directly, we believe that the application of dose reconstruction methodology in the present setting, particularly *in conjunction with* the parallel use of biological methods, affords a unique opportunity that will result in individual dose estimates, as well as estimates of uncertainty in the doses, that are of relatively high quality and are well suited for use in an epidemiologic study. In fact, the current case-control study is the only such population-based study of thyroid cancer with such a degree of individual dosimetry conducted to date of the Chernobyl experience. As such, we anticipate that it is quite possible to learn more about the relationship between thyroid cancer and radiation dose, particularly from iodine-131. Similarly, although there have been a number of reports of excess thyroid cancer attributable to Chernobyl exposures, there has been no systematic population-based analytical study of thyroid cancer with individual dose estimates to date. We believe it is therefore premature to assert that "the childhood thyroid cancer excess has already been documented." The current study, and others like it, will certainly add new knowledge about the extent to which the Chernobyl accident has influenced the occurrence of thyroid cancer in exposed populations, particularly in relation to radiation dose. Also, this study is likely to provide more information on other risk factors than is generally available from other thyroid cancer studies thus far.

2. The work on cancer incidence at less than 20 years of age should continue.

We agree, and have incorporated this task into Year 3 plans. We also agree with the reviewers that

indications currently are that whole body doses are likely to be relatively low in the population groups under study, and thus it is probably unlikely that additional analytical studies (e.g. additional case-control studies) will provide much new information regarding radiation health effects at this time. However, we believe it is important to continue to identify cases in the defined populations in order to preserve the capability to conduct such studies if the situation warrants it in the future, and to provide accurate estimates of cancer occurrence in this population over time.

3. **At attempt should be made to evaluate the quality of the physical estimations being done, and to estimate the contributions to errors from various sources (for example, how accurate do the cow's milk consumption estimates really appear to be for Bryansk children?).**

The physical dose reconstruction methods being used to estimate thyroid dose, external whole body dose, and internal whole body dose incorporate a number of different strategies to both enhance and evaluate the quality of the dose estimates being produced (including the extensive use of counting data (thyroid and whole body), environmental measurements taken after the accident, analysis of soil and food samples, and phantom measurements). In response to the reviewers' comment, we will explore this question in additional depth with the Russian dosimetry team to see if anything more can be done in Year 3. Similarly, although it is not possible to directly evaluate whether reported milk consumption is accurate (i.e. there is no way to determine what the actual amount was for any given individual), we will explore ways to evaluate whether the general levels of reported consumption are at least consistent with what might be expected, or what has been recorded in the past.

4. **Any further efforts to do biodosimetry with either FISH cytogenetics methodology or ESR of tooth enamel should focus on an evaluation of these technologies at such low doses. If it appears these techniques will not contribute anything to the Russian dose estimations, the technologies should be abandoned.**

This is the strategy we have proposed for Year 3. No new FISH assays are planned. Additional ESR will be undertaken only in the context of the evaluation of different dose estimation methods, and within the framework of the thyroid cancer case-control study.

5. **The focus of the "genomic instability" studies in Seattle should be on an analysis of the material from experiments already performed.**

This is the plan for Year 3 activities. No new experimental work will be undertaken.

6. **The Family feasibility studies . . . . . should not be pursued.**

There apparently was a misunderstanding of our intentions in this regard. This activity was completed in Year 2, and no additional work was proposed for Year 3 regarding Family studies. Incidentally, the reviewers indicated that the feasibility studies appeared to take a lot of effort. This was not the case at all. Obtaining cooperation from family members was relatively easy, and proved feasible without a lot of extra effort.

7. **The genomic instability studies and SCE and retinoid prevention studies should be terminated as soon as possible.**

As noted in (5) above, no new experimental work in this area will be undertaken in Year 3.

8. **The leukemia *in utero* exposure studies should probably be investigated from the standpoint of feasibility.**

We have proposed in Year 3 to evaluate the feasibility of conducting a study of leukemia in relation to *in utero* exposures. The workplan specifies that we will investigate: a) possible study populations; b) methods of ascertaining outcomes in defined cohorts; and c) methods of estimating *in utero* radiation dose. This effort will be undertaken in consultation with a Belarus/Bridgeport team to ensure that any efforts initiated in Russia will be compatible with similar on-going activities in Belarus.

9. **The investigators should be encouraged to publish results of their studies in peer-reviewed scientific journals.**

We are actively pursuing the publication of several articles based on work conducted to date, and have placed this task as a high priority for Year 3.

III Belarus

The responses of Dr. N. Daniak, PI, Bridgeport Hospital, to the reviewers' comments and recommendations on the project in Belarus presented on pages 10-14 of the review document are:

1. **Dose calculations have been performed on 27 leukemia cases and are under development for 27 controls.**

The results were presented for 27 leukemia cases only; no dose estimates for controls were presented. Therefore, the total sample size is small (i.e. 27 dose reconstructions), and may not reflect what will happen in the next 100 cases and 100 controls (the results of which will be known during ONR III, Year 3). It is simply speculation to conclude that overall doses will be so low that a "very large number" of leukemia cases and controls over a prolonged study period will be required to detect a positive effect (page 13). Indeed, doses in a total of 47 other cases (of myelodysplasia) and matched controls were 3-10 fold higher than in those determined for leukemia cases; these data also were presented to the reviewers.

2. **The numbers reported of leukemia cases and controls from whom samples of peripheral blood lymphocytes have been obtained do not add up precisely (page 11).**

This issue was addressed during the presentation to the reviewers as the case/control ascertainment data presented were compiled through January 31, 1998, while data collected utilizing biological specimens were obtained through December 30, 1997.

3. **Comparative genomic hybridization (CGH) was performed on "tumors which appear to be unrelated to radiation exposure" (page 11).**

This comment is not fully accurate. Feasibility studies using CGH on tumor samples were included in the rewritten project report (figure 3). This included data from a child with retinoblastoma, a tumor that is clearly related to radiation exposure. Fibroblasts from patients with the genetic form of retinoblastoma have been clearly shown to have increased radiation sensitivity as well as defective DNA repair. Furthermore, data were presented showing that UV-B alters the plasma membrane and its capacity to exfoliate cytokine-expressing and FAS/FAS Ligand-expressing vesicles. Virtually identical changes have been observed in the plasma membrane of human lymphocytes exposed to ionizing radiation as well (presented and discussed in the manuscript published in Stem Cells 15:49-57, 1997). This manuscript was made available to the reviewers prior to the external review. The specific reference to plasma membrane changes is Chandra S and Stefani S. Int J Radiat Biol 1981; 40:305-311. Unfortunately, the time available for discussion of this topic with the reviewers was limited.

4. **The *in utero* leukemia study "has not begun" (page 11).**

This statement is incorrect. Data were presented in two tables indicating that the number of leukemia cases occurring in children less than 5 years of age has been quantified (for the years 1980-1996), and

that birth numbers have been recorded on an oblast basis. Verification of leukemia case number and supplementation of leukemia cases will be performed during ONR III, Year 3.

5. **There may be some value in establishing a null effect by a well-conducted study (of leukemia) . . . . , perhaps 15 years after the accident . . . . . (page 13).**

This and related comments are perplexing. Year 3 of the ONR III program already is 12 years post-Chernobyl. The rationale for delaying an ongoing study for three years is elusive.

IV Ukraine

The majority of the issues raised and the recommendations made regarding Consortium's project in Ukraine have been addressed earlier in this response. Dr. L. Petersen, PI, Ukraine project, summarized his detailed responses as follows:

- Computer program reruns indicate ascertainment of 89%, instead of 27%
- Our calculations for cumulative average annual dose to Ukranian subjects indicate 3.07 mSv (based on the average of the mean doses for interviewed leukemia cases (3.70 mSv) and controls (2.44 mSv)
- Independent dose calculations for four Ukranian subjects were made by three dosimetrists and presented

V. Israel

Drs. L. Epstein, PI, Haddeseh Medical Organization, Jerusalem, and G. Rennert, Carmel Hospital, Hifa, Israel felt the reviewers' comments and recommendations regarding the Israel project were comprehensive. However, they point out that the cost of computer matching of the several cancer databases by the Israel Cancer Registry was but a small proportion of the total cost of the project, the major effort being in the independent confirmation of the diagnoses and many other parameters are required.

As with the other country - specific projects, the family study feasibility task terminated at the end of ONR III -2 as planned.

VI. Diagnostic Working Groups

We agree that independent verification of the diagnoses of putative causes of malignant diseases is essential for the validity of the studies in which such groups of cases will be included. The focus of the present case-control studies mandates such reviews of the leukemia cases already identified in Ukraine and Belarus, and the thyroid cancer cases identified in the Bryansk oblast of Russia.

The Thyroid Diagnostic Working Group met as a group for this purpose in June, 1998, in Bryansk under the chairmanship of Prof. Sir Dilwyn Williams (England). The Leukemia Diagnostic Working Group is scheduled to hold its second meeting in late September in Kiev, Ukraine. At this meeting, the group will review approximately 150 putative leukemia cases from each of the two centers.

VII. Consortium Clearing House

ORISE is building on the efforts of the previous subcontractor on this project and an expanded web site is available online at http://www.orau.gov/icrher. Links to other relevant web sites are in place. A list server is in place for distribution of E-mail among all consortium and collaborating investigators, thereby facilitating their interactions. The proceedings of the February 1998 Annual Investigators' Meeting will be added to the web site as soon as the final editing is completed to enhance dissemination of information about the consortium's research activities to the scientific and other interested communities and institutions.

CONCLUSION

We have presented responses to the ONR reviewers' comments and recommendations regarding the Consortium's overall research program and its country and task-specific activities. Thereby, we have attempted to correct apparent misunderstandings or misperceptions that may have influenced the reviewers' specific recommendation that ONR discontinue its support of the Ukraine project. We believe the bases for this recommendation are unjustified given the corrected, updated, or otherwise more complete information presented here about this project and its vital role as a component of the Consortium's overall research program. We consider it essential that the reviewers and ONR thoroughly understand the negative implications that the decision to discontinue the Ukraine project is likely to have for the success of the overall program. With the continued inclusion of the Ukraine population and revised protocols, we expect to provide epidemiologically valid and useful information regarding the magnitude of risk of malignancies, particularly for leukemia among the younger segment of the population that is known to be at greatest risk for such outcomes. We consider that significant progress already has been made in the program towards achieving this objective which is expected to be of interest and potential benefit to the Navy as well as to public health professionals in the countries

in which our study populations are identified. Without continued support for the Ukraine project, our ability to achieve the major scientific objective prescribed for ONR III will be seriously jeopardized.

On an administrative note, we wish to suggest that ONR consider allocating at least two days for the ONR III-3 program review to allow adequate time for the discussion of questions and issues that arise during the presentations, as well as for an exit interview between the reviewers and the PIs and Consortium staff. We consider such interactions would be mutually helpful and useful. We feel much of the present difficulty could have been avoided had there been adequate time for such discussions and clarifications at the February 1998 review. It also may allow the reviewers to complete their draft report before departing from the meeting site, which could facilitate the early communication of the reviewers recommendations to the researchers.

REFERENCE

1. Three year plan of a project proposal to the Office of Naval Research for the International Collaborative Studies of the Health Effects of Radiation resulting from the Chernobyl accident. International Consortium for Research on the Health Effects of Radiation. Volume 1. May, 1996.

SHIRLEY A. FRY, M.B., B.CH.; M.P.H.
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August 11, 1998.

Colonel Micheal E Spiro, USMC.,
Executive Director,
International Consortium for Research on The Health Effects of Radiation,
1419 Forest Drive, Suite 205,
Annapolis, Maryland, 21403.

Dear Mike,

I am forwarding to you for transmittal, my report to Admiral Zumwalt in response to report of the Office of Naval Research's review of the Consortium's research program on February 25, 1998. I wish to acknowledge the input to the report of Dr. W. J. Schull, Chairman and members of the Consortium's Scientific Policy Council both collectively and individually, and the individual Principal Investigators on the Consortium's projects in Belarus, Russian Federation, Ukraine and Israel.

Best regards,

Shirley

Shirley A. Fry, MB., BCh.; MPH.,
Scientific Director, ICRHER.