Indigenous and Northern Affairs Canada
Affaires autochtones et du Nord Canada

NORTHERN CONTAMINANTS PROGRAM

Call for Proposals 2017-2018

INAC·AANC

Canada

For 25 years the Northern Contaminants Program (NCP) has been engaging Northerners and scientists in researching and monitoring of long-range contaminants in the Canadian Arctic, that is, contaminants that are transported to the Arctic through atmospheric and oceanic processes from other parts of the world and which remain in the Arctic environment and build up in the food chain.

The data generated by the NCP is used to assess ecosystem and human health, and the findings of these assessments are used to address the safety and security of traditional country foods that are important to the health and traditional lifestyles of Northerners and northern communities. The findings also inform policy, resulting in action to eliminate contaminants from long-range sources.

As the NCP marks its 25th anniversary milestone, it is reaffirming its commitment to scientific excellence and Northern engagement on the issue of long-range contaminants in the Arctic, including a renewed focus on community based monitoring and research, and Indigenous knowledge.

The NCP is now accepting funding proposals for 2017-2018.

Northern Contaminants Program

CALL FOR PROPOSALS – 2017 – 2018

Table of Contents

1 – GUIDELINES

1.1 Timelines for the Northern Contaminants Program Call for Proposals

The Northern Contaminants Program (NCP) issues a Call for Proposals in November of every year. The NCP is now accepting funding proposals for 2017–2018. **The deadline for proposal submissions is 11:59 PM Eastern Standard Time, Tuesday, January 10, 2017**

Table 1.1 Timelines for the NCP 2017–2018 Call for Proposals

MILESTONES / TASKS	DATE
Call for Proposals issued	November 18, 2016
Proposal consultation process with Inuit Research Advisors, communities and Regional Contaminants Committees	November 18, 2016 to January 10, 2017
Deadline for submission of proposals	**January 10, 2017**
Applicants apply for research licences and ethics review, as applicable.	January to April 2017
Proposal Review Period – proposals are reviewed by peer reviewers, technical review teams and Regional Contaminants Committees	late January to end of March 2017
Deadline for submission of *Community Engagement* forms	**March 31, 2017**
NCP Management Committee meets to make final funding decisions	April 2017
Written notification sent to applicants on the status of their proposal(s)	May 2017
Funding Agreements prepared and signed	June 2017 and ongoing
NCP Results Workshop – Northern location TBC	September 26–28 2017

1.2 Available Funds

The current focus of the Northern Contaminants Program (NCP) is on the high priority issues in communities where people are exposed to contaminant levels of concern to health authorities (Appendix A).

Activities funded by the NCP fall under five subprograms and their associated funding envelopes. Note these funding levels are approximate and may be subject to change.

Table 1.2 NCP Funding by Subprogram for the 2017–2018 Call for Proposals

NCP Subprograms	Ongoing / Core Projects	Research / Other Projects	Total Funding
Human Health	N/A	$1,075,000	**$1,075,000**
Environmental Monitoring and Research **Ongoing core monitoring projects:** Only project leaders identified in the EMR Blueprint are invited to submit proposals for ongoing core monitoring projects. **Research projects:** Open to proposals for research projects that address priorities identified in the EMR Blueprint	$850,000	$ 225,000	**$1,075,000**
Community-Based Monitoring and Research	N/A	$ 250,000	**$ 250,000**
Communications, Capacity and Outreach **Ongoing core projects:** Support for Regional Contaminants Committees, Inuit Research Advisors and key NCP communicators **Other projects:** Open to proposals for projects and activities that address priorities identified in the CCO Blueprint	$ 450,000	$ 150,000	**$ 600,000**
Program Coordination and Aboriginal Partnerships	$1,100,000	N/A	**$1,100,000**
TOTALS	$2,450,000	$1,650,000	**$4,100,000**

Applicants should consult the NCP Blueprints for a description of these subprograms when preparing their proposals.

1.3 Geographic focus of the Northern Contaminants Program

The geographic focus of NCP is Yukon, Northwest Territories, Nunavut, Nunavik and Nunatsiavut. Proposals for work to be conducted outside these regions will be considered on a case-by-case basis according to their relevance to the various NCP Blueprints.

1.4 Changes to the 2017-2018 NCP Call for Proposals

Please note the following important changes and updates in this year's Call for Proposals:

- There will be an NCP Results Workshop in September 2017 (northern location to be confirmed). As such, project budgets can include a request, up to a maximum of $2,500, to offset travel costs for one project representative to attend.

- The former "Approval of Consultation Form" is now referred to as the "Community Engagement Form." Project leaders are still required to engage their northern community partners to obtain this signed form, due by March 31, 2017, as described in sections 1.1, 2.1, and 3.

- **Human Health Blueprint**: No significant changes for 2017-2018

- **Environmental Monitoring and Research Blueprint**: Microplastics are now being considered a contaminant of emerging concern. Proposals are being solicited to investigate the potential for microplastics to be transported through the atmosphere, and to assess their presences and distribution in marine ecosystems. Ship-based and community centered projects aimed at monitoring contaminants in seawater have been incorporated into the monitoring plan for marine ecosystems.

- **Community Based Monitoring & Research:** There is no longer a three year limit on community based projects as each project is thoroughly reviewed on an annual basis and funding is awarded based on scientific excellence. Additionally, proposals looking at microplastics in the marine environment may be submitted to the community based monitoring & research subprogram provided they meet the essential criteria set out in the blueprint.

- **Communications, Capacity, and Outreach Blueprint:** Additional opportunities have been added under section 9.5.2 "Delivery of synthesized contaminants messages," allowing for projects to highlight the work undertaken in the NCP over the last 25 years.

1.5 Responsibilities of Applicants

All NCP-funded projects must conform to the guidelines outlined below.

1.5.1 Partnerships

The NCP requires that all funded projects be carried out in partnership with Northerners. Scientists are encouraged to work with community leaders, Elders, hunters and other knowledgeable individuals to incorporate traditional knowledge into the design and conduct of the study. Community input to the research is important, as are sensitive and sound researcher-community relations; all must be clearly demonstrated in project proposals. The Regional Contaminants Committees (RCCs) and the Inuit Research Advisors (IRAs) play a particularly important role in this respect and should be involved in any steps taken to work with the communities, see Contacts (Appendix B).

The NCP supports interdisciplinary studies that advance general knowledge related to contaminants, including projects that address the interactions between climate change and contaminants. Applicants are encouraged to seek opportunities to combine NCP activities with those funded by other programs such as ArcticNet to explore interdisciplinary questions.

Project leaders are also encouraged to seek co-funding from other programs that support community-based research and monitoring in the Arctic. Two such programs that operate in the Northwest Territories and Nunavut, respectively, are the Cumulative Impact Monitoring Program (CIMP) and the Nunavut General

Monitoring Plan. For more information, please contact CIMP by e-mail at nwtcimp@gov.nt.ca and for NGMP, please e-mail NGMP-PSGN@aandc-aadnc.gc.ca or call 1-855-897-6988.

1.5.2 Training the next generation of Arctic scientists

The NCP recognizes the importance of training the next generation of Arctic scientists as well as training scientists in the North. Research funded by the NCP is often well suited for graduate level research projects. The involvement of students in NCP research and monitoring projects is strongly encouraged. Project leaders are also encouraged to develop links with the Arctic Colleges and other educational institutions to enhance the training and education of Northern students by including them in the project work.

1.5.3 Northern consultation and informed consent

All applicants are asked to review the *Community Engagement Requirements for Northern Contaminants Program Projects* carefully; this specifies consultation requirements for **all** project proposals, *see section 3*. Applicants must demonstrate, in writing, appropriate engagement as per the above-mentioned requirements, ensure that they allow enough time to complete this process and are encouraged to discuss their consultation plans with the appropriate Regional Contaminant Committee(s) and/or Inuit Research Advisors, see Contacts (Appendix B).

For projects involving the collection of personal information and/or samples from people, informed consent must be obtained prior to final approval of the project. As well, agreements must be established with First Nations and Inuit governments or organizations that pertain to ownership, control, access and possession of data and information (OCAP principles) collected from individuals.

1.5.4 Licensing, ethics review and health and safety

All research taking place in Canada's North requires a scientific research licence. Please consult the websites of the licensing authorities in the following regions, and/or contact the Inuit Research Advisors for guidance, see Contacts (Appendix B):

- Yukon, Northwest Territories, Nunavut
- Nunavik
- Nunatsiavut

Every research project involving the collection of personal information and/or samples from people will be required to provide proof of approval from all relevant ethics review boards/committees to the NCP Secretariat before the research project is given final approval.

The health and safety of NCP research teams, including Northern community members who assist/participate in the research in any way, is of paramount importance. NCP Project Leaders should be aware of their responsibilities with respect to ensuring the health and safety of their teams, particularly when carrying out research activities in remote northern locations.

NCP researchers are encouraged to consider the following information on health, safety, insurance, training, licensing and other aspects of working in the North, which was developed for researchers during International Polar Year, and disseminate this information to applicable members of the project team and incorporate these measures into project plans: http://www.api-ipy.gc.ca/pg_IPYAPI_061-eng.html

1.5.5 Project communications

The NCP places an emphasis on the importance of clear and appropriate communications during all phases of a project's lifecycle, from planning and development to the dissemination of results, and all stages in-between. Projects must develop a communications plan/strategy that is acceptable to the relevant Regional Contaminants Committees (RCCs), First Nations and Inuit governments and public health authorities (where applicable).

It is required that successful applicants will work in partnership with relevant local/regional organizations and the NCP Secretariat to develop any messaging related to contaminants exposure to human populations. Public health authorities, and First Nations and Inuit governments in areas with settled land claims, bear the ultimate authority to approve and release public health messages.

1.5.6 Data management

The integrity and long-term stability of sample archive and data management is very important for meeting the long-term science and policy objectives of the NCP. Therefore, the NCP has developed a Data Principles and Guidelines document that outlines the expectations and responsibilities of the NCP and of project teams regarding data and information generated from NCP-funded research and monitoring projects. This document is available now upon request from the NCP Secretariat (PLCN-NCP@aandc.gc.ca). To meet the objectives laid out in the Data Principles and Guidelines document, the NCP has adopted the use of the Canadian Polar Data Network - Polar Data Catalogue to ensure long-term access and availability of data, as well as to promote collaboration among researchers.

- All NCP project leaders must use the Polar Data Catalogue to create a full set of metadata that completely document and describe the data collected as part of their NCP projects.
- Applicants must describe their data management plans in their proposals.
- Upon approval of funding each project leader will be required to complete and sign the NCP Sample and Data Accessibility Form.
- Where possible, Global Positioning System (GPS) coordinates should be captured when samples are collected.

The NCP Secretariat will review entries in the Polar Data Catalogue to ensure that NCP projects are reporting their metadata. Since metadata can be created before analysis is complete, the deadline for completion is March 31, 2017. Any holdback or further installment of funds including funding for the subsequent year will be contingent upon the creation of a new metadata record or update to an existing record.

1.5.7 Sample archiving

It is important that all tissue samples collected during the course of NCP studies be properly archived for future use. The collection and archiving of tissues from important traditional/country foods is of particular importance. These tissues could be used in the future to assess dietary exposure of Northerners to contaminants.

1.5.8 Quality assurance and quality control

A quality assurance and quality control (QA/QC) program has been established to assess the performance of all laboratories carrying out contaminant analyses under the NCP and to ensure inter-comparability of data. The QA/QC program is also designed to meet the diverse QA/QC needs of the researchers and analysts by providing them with appropriate diagnostic tools for their analyses and by offering guidance and support in taking corrective measures if needed. Further information on the NCP QA/QC program can be found in a detailed QA/QC report available upon request by e-mail to the NCP Secretariat. To ensure the continued success of the QA/QC program, all laboratories performing analyses for NCP research are expected to participate in the program. Applicants are also required to report on laboratory QA/QC performance in their proposals (see Proposal Format in Section 2).

1.5.9 Reporting

Funding recipients are responsible for submitting the following project reports to the NCP Secretariat, in accordance with the deadlines outlined in Table 1.3.

Please incorporate these reporting requirements into your work plans.

Leaders of 2017-2018 funded projects are expected to attend the NCP Results Workshop, held in late September 2017 in a northern location to be confirmed. Please see section 2.2 of this Call for Proposals document regarding travel funds to attend this workshop.

The end of year synopsis of research report allows NCP to make research results and other project information available to the public, including northerners and the scientific community, in a timely manner. Short versions of the results are posted on the NCP website at www.science.gc.ca/default.asp?lang=En&n=7A463DBA-1. The complete Synopsis Report of NCP research is published in electronic format in September of each year. The contents of the Synopsis Report will also be widely accessible to the public through the NCP Publications Database.

Table 1.3 NCP Reporting Requirements 2017-2018

Type of Reporting Requirement	Federal Government funding recipients	All other funding recipients	Date
Mid-year report	Yes		September 15, 2017
NCP Results Workshop	Yes		September 26-28 2017
Final financial report	Yes	No	March 15, 2018
Project metadata input in the Polar Data Catalogue	Yes		March 31, 2018
End of year synopsis of research report	Yes		April 30, 2018
Final financial statement	No	Yes	July 29, 2018

1.5.10 Publications

Project leaders are expected to publish their results in peer-reviewed literature in a timely manner. Project leaders are **required** to provide the NCP Secretariat with an advance copy of any materials being developed for communication with the public that is related to and/or resulting from work carried out with the support of the NCP.

Project leaders and all team members are expected to acknowledge funding from the NCP in any publications, presentations, print and electronic communications related to and/or resulting from work carried out with the support of the NCP. For guidance and/or instructions on the proper acknowledgment of the NCP funding, and/or logos to use, please contact Simon Smith at the NCP Secretariat at Simon.Smith@aandc-aadnc.gc.ca or 819-934-1022.

2 - PROPOSAL FORMAT

In order to be considered for funding, all proposals submitted to the Northern Contaminants Program (NCP) must include a detailed proposal following the format outlined below.

2.1 Proposal Format

If needed, a sample proposal can be provided by contacting the NCP Secretariat.

Note: For ongoing multi-year projects, please emphasize any changes from the original/ previous year's approved proposal.

1. PROJECT TITLE:

2. PROGRAM CATEGORY:

Indicate which of the following five subprograms the project falls under (only one is allowed):

- *Human Health*
- *Environmental Monitoring and Research*
- *Community-Based Monitoring and Research*
- *Communications, Capacity and Outreach*
- *Program Coordination and Aboriginal Partnerships*

3. PROGRAM PRIORITY:

Indicate the key priority under the subprogram Blueprint that the project will be focussing on.

4. PROJECT LEADER, AFFILIATION AND CONTACT INFORMATION:

Include mailing address, telephone, fax and e-mail.

5. PROJECT TEAM MEMBERS AND THEIR AFFILIATIONS:

List names of all the project team members and their affiliations. All team members listed must be actively involved in the research. For multi-year projects please ensure that the list of project team members is still valid. By listing members of the project team, the applicant (or Project Leader) is confirming that these individuals have agreed to be

included as members of the project team in 2017-2018 and have been granted an opportunity to review and/or provide input on this project proposal.

6. PLAIN LANGUAGE SUMMARY:

Provide both project relevance and a description of the proposed project that would be understood by a non-scientific audience in a maximum of 100-200 words (narrative or bullet-form). This will be used in the review process, particularly by the Regional Contaminants Committees (RCCs) during their social/cultural review of proposals as well as by the NCP Management Committee. These plain language summaries will also be used on the NCP website to provide a brief description of NCP-funded projects.

The summary should answer the following questions:

- What is the proposed work?
- What questions does the project attempt to answer and why?
- Where and when will the work be done?
- How will the project involve/help Indigenous peoples and other Northerners?
- What are the expected results and the results to date?

7. PROJECT DESCRIPTION

a) Objectives:

Provide well-defined short-term and long-term objectives for the overall project in relation to the applicable NCP Blueprint.

b) Rationale:

Describe the rationale for the project in relation to the applicable NCP Blueprint. This should be a detailed section that clearly lays out the scientific basis for the proposed work. It is this section that will convince reviewers that the proposed work addresses the needs described in the Blueprint in a way that is scientifically defensible.

c) Progress to Date:

Describe the results of any work completed to date so that the project can be properly and fully evaluated. This should include any work carried out in related NCP projects as well as non-NCP funded projects whose results are specifically relevant to the proposed work. This section should also include information on any progress in the areas of capacity building, communications and/or the use of traditional knowledge.

d) Proposed Work:

Provide a brief description of activities, including project design and methodology, where and when the work will be carried out over the lifetime of the project. Include a more detailed description of planned activities in the year for which funds are being requested.

e) Deliverables:

Specify the deliverables to be submitted to the NCP Secretariat over the lifetime of the project, as well as for the year for which funding is requested. Include data reports, open literature publications, reports, workshops and items for communications initiatives; please refer to Table 1.3 for reporting requirements.

8. CLIENTS/PARTNERS:

List the departments, agencies, Aboriginal organizations, communities and other countries, along with the corresponding contact persons, involved in the project and/or who could make use of the results (**for the current funding year only**). List any other projects that are related to the proposed work and indicate any shared costs and/or sample archival possibilities.

9. COMMUNICATIONS, CAPACITY BUILDING, AND INDIGENOUS KNOWLEDGE:

a) Communications

Describe in detail (**for the current funding year only**) any communications activities planned as part of the proposed project, including the names of people and organizations that have been or will be contacted. Examples of communications activities include (but are not limited to):

- Production of fact sheets or other materials
- Presentations to school groups and other community organizations
- Progress reports sent to Hunters and Trappers Organizations
- Poster presentations.

b) Northern Capacity Building and Training:

Capacity building can be defined, for the purposes of the NCP, as activities which can improve an organization, community or a person's ability to engage in contaminants issues. Describe the capacity building efforts planned for the year for which funding is requested. Some examples of capacity building include (but are not limited to):

- Formal training programs (one-on-one or small group training with the researcher)
- Community or target-group workshops
- Presentations to, and engagement of, science classes (promoting student involvement)
- Hiring and engagement of local individuals in research projects

c) Indigenous Knowledge:

Explain how the proposed project will utilize local and/or Indigenous Knowledge, unless not applicable (**for the current funding year only**). Local and Indigenous Knowledge may be required when considering overall trends. One example is the use of Indigenous Knowledge in collecting wildlife samples (to assess the timing of sample collection, changes in migration patterns, changes in populations, and/or changes in habitat). Please contact the appropriate IRA and/or RCC members to discuss the potential for collaborative application of Indigenous Knowledge in your project, see Contacts (Appendix B).

10. COMMUNITY ENGAGEMENT:

This section must be completed for all projects, including ongoing multi-year projects for which any part of the project in any year of the study was conducted in the North or made use of samples from the North. For projects that have no northern component at any stage, a brief statement explaining why there has been no northern community engagement is sufficient.

Describe the specific details of the community engagement that has occurred thus far, including efforts and successes from the previous year's project (if applicable) and specific plans for future community engagement (e.g., what was discussed, with whom and when). Applicants are strongly encouraged to contact the relevant RCC and IRA during proposal development to receive guidance on the type of community engagement needed for their project, see Contacts (Appendix B).

Signed *Community Engagement* form(s) and/or letters of community consent must be submitted to the NCP Secretariat by March 31, 2017 and are requirements for funding approval from the NCP.

a) Ethics review:

Proposals for human health research must include information about the relevant ethics review, which ethical review board has or will review the study and the status of the review. A copy of the relevant consent form should also be included. It should be noted that NCP access to project data needs to be recognized in this documentation.

11. LABORATORY ANALYSIS:

Provide the name of the laboratories that will be used to conduct contaminant analyses, the cost of analysis per sample, the quality assurance/quality control (QA/QC) methods and procedures to be used and whether the laboratory currently participates in the NCP QA/QC program or is willing to do so (**for the current funding year only**).

Provide a report on the performance of the laboratories in the most recent NCP QA/QC interlaboratory tests. For laboratories that analyze air extracts or human tissues, report on the performance in QA/QC programs specifically developed for those matrices. Laboratories new to the NCP should report on performance from other recognized interlaboratory testing programs. If a project will use a laboratory new to the NCP that has yet to participate in the NCP QA/QC program, performance in other QA/QC programs should be reported that demonstrate a high quality of analytical performance.

12. DATA MANAGEMENT PLAN:

Describe your data management plan, where and when the data will be captured and when the metadata records will be created in the Polar Data Catalogue. Project leaders will be requested to complete and sign the NCP *Sample and Data Accessibility Form* upon approval of funding.

13. RELEVANT PUBLICATIONS/ PRESENTATIONS:

This should include publications and presentations by project team members relevant to the proposed project (2 pages maximum). This section should also include a list of the references cited in the text of the proposal.

14. SUPPORTIVE INFORMATION ON EXPERTISE:

Attach résumés etc. to demonstrate the scientific excellence, experience and/or expertise of the project leader(s) (maximum two pages per individual).

2.2 Budget Tables

Proposals submitted to the NCP for funding must include budget tables prepared using templates available from the NCP Secretariat. Use Budget Table 1 to identify the budget request for 2017-2018; Budget Table 2 summarizes these requests by category; Budget Table 3 identifies any other sources of funds that are available for the project from other sources and includes in-kind support as well as cash contributions. For any questions or issues pertaining to the Budget Tables template, please contact the NCP Secretariat.

BUDGET TABLE 1: DETAILED BUDGET INFORMATION FOR NCP SUPPORT

For NCP funds being requested please follow the instructions outlined within the budget template. Please note that some columns are auto-calculated and thus are locked for editing (i.e you will not be able to delete or enter information directly into these columns).

BUDGET TABLE 2: BUDGET SUMMARY INFORMATION

If your project received funds in 2016-2017, please enter those amounts in the fields provided. If your project intends to request funds for 2018-2019 please enter these amounts (please note, these amounts can be estimates and are not binding). The remainder of Budget Table 2 is auto-filled from the inputs in Budget Table 1 and Budget Table 3

BUDGET TABLE 3: OTHER SOURCES OF FUNDS

Please indicate other funding sources in Budget Table 3. Other funding sources include in-kind contributions such as staff salaries, services, facilities, and operating funds as well as the estimated value, status, and source of other known or potential contributions to the project (e.g., Natural Sciences and Engineering Research Council of Canada (NSERC), ArcticNet, other government departments (OGDs), Canada Foundation for Innovation, etc.).

The following provides further detail on the Classes of Expenditures that are to be used in the budget tables.

1. Professional Fees and Services:

Legitimate entries under this category are the wages of people hired specifically for the project (i.e., non-federal employees including students, Indigenous and/or local

employees). Caution should also be exercised to ensure that double counting of contracted employees does not occur.

- Indicate the total estimated value of each contract to be let under the project, the contractor name (if known) and purpose of the contract.
- Contractors must provide justification of their fees.
- If funding is requested for student stipends, it must be used for tasks directly related to the project.
- In the case of contracted laboratory services, indicate the cost of analysis per sample, as well as the type of analysis and number of samples. If a student is to conduct any of the analyses or sample preparation, the analysis costs should be reduced as appropriate.
- This category should not include the salaries of full-time continuous or term federal employees participating in the proposed project. The latter salaries are government A-base and are covered by the particular department whether the personnel are participating in an NCP project or in other work. Such salaries should be reported in Budget Table 3 “Other sources of funds”.

2. Equipment and Facilities:

- Specify the type of equipment, equipment costs (purchase, lease or maintenance) and the extent to which the equipment will be used in NCP contaminants projects.
- Only equipment that is specifically purchased leased or developed for the particular project should be reported in this category.
- The maintenance cost of equipment already owned by the federal government and used as part of the project should be reported in Budget Table 3 “Other sources of funds”.
- Indicate the cost of any laboratory analysis per sample, the type of analysis and the number of samples to be analyzed.
- Only the cost of the sample analysis and/or the development of specific analytical techniques for an NCP project are appropriate.
- The costs of shipping equipment.

3. Travel:

- Include all travel, accommodation and meals.
- The cost of establishing and operating field camps, aircraft rental and shipping (i.e., freight) should also be included in this category.
- Ship time should be reported under this category only when the use of the ship will be charged directly to the project or when smaller vessels are rented for the express purpose of conducting the project.

- If ship time is considered government A-base (i.e., the project manager is not charged for time on board) then such costs should be reported in Budget Table 3 "Other sources of funds".
- Travel to workshops, northern consultation sessions, and meetings.
- Budgets can include an amount up to a maximum of $2,500 related to travel to the NCP Results Workshop in September 2017

4. Other Costs:

- Other costs include miscellaneous costs such as office supplies and operating expenses (e.g., office space, rental, phone, printing, computer time, fax, photocopying and postage).
- Costs that do not fit in any of the above categories should be included here.

5. Administration Fee:

All administrative expenses associated with the project activity may be included in this category. This may include, for example, payroll or accounting services. Administrative expenses shall not exceed 15% of the total project budget.

3 – COMMUNITY ENGAGEMENT REQUIREMENTS FOR NCP PROJECTS

3.1 Guidelines for Working with Northern Communities

GUIDELINE 1

All recipients of NCP project funding are expected to meet the Northern Contaminants Program (NCP) standards for carrying out research in the North, as outlined in the NCP's *Guidelines for Responsible Research*. These *Guidelines* provide direction to project leaders and scientists for planning communications, and in developing research agreements with communities (see Appendix C).

GUIDELINE 2

All project applicants must contact the relevant Regional Contaminants Committee (RCC) or Inuit Research Advisor (IRA) during the proposal development stage to discuss consultation requirements.

Applicants should then include in the "Community Engagement" section of the proposal a summary of their discussions with the RCC/IRA. During these discussions, RCCs/IRAs may advise the applicant to undertake specific actions before the NCP Management Committee makes its funding decisions in mid-April.

GUIDELINE 3

The Regional Contaminants Committees will determine the appropriate engagement needed for projects in their regions, but there is recognition that not all projects require the same level of engagement (e.g. human health projects vs. computer modelling projects). With this difference in mind, the following is a guideline for minimum levels of engagement required. The RCCs may recommend further engagement in addition to the minimum.

a) Human Health projects (active or archived samples): engagement needed with the regional health authority and/or the appropriate health centre

b) Biotic/Wildlife projects (active sampling): engagement needed with the community and the HTO/HTC (Hunters and Trappers Organization/Committee) at the appropriate level (regional and/or local)

c) Biotic/Wildlife projects (archived samples): engagement not necessarily needed if the original sampling agreement covered further analysis

d) Abiotic projects (active sampling): engagement needed with communities close to the sampling sites. If there is no

nearby community, engagement should only be with the RCC.

e) Abiotic projects (archived samples): engagement not necessarily needed

f) Laboratory-based/Modelling projects: engagement not necessarily needed, except where specified by RCCs

GUIDELINE 4

For every project involving community engagement (as directed by the RCCs), project applicants must ensure that signed *Community Engagement* forms or equivalent letters of support are submitted to the Secretariat by the appropriate bodies with whom community engagement has taken place (**deadline: March 31, 2017**). This assures the NCP that the community engagement for any particular proposed project is satisfactory.

GUIDELINE 5

Due to the different nature of NCP projects, the "appropriate" Aboriginal organization or regional/community body will vary, and will be decided by the relevant RCC. For instance, a project that intends to sample at a remote location may require community engagement with the appropriate Aboriginal organization(s) represented on the NCP Management Committee (Council of Yukon First Nations, Dene Nation, Inuit Tapiriit Kanatami). A project to be conducted within or near a community will require community engagement with a community-level organization. Even if project members stop only briefly in a community en route to a sampling site, community engagement may still be required. In addition, projects involving the use of archived samples may also require community engagement since the proposed use may differ from that which was originally approved. Such cases will be decided by the appropriate RCC on an individual basis.

4 – PROPOSAL REVIEW PROCESS

The steps involved in the Northern Contaminants Program (NCP) proposal review process are described in the following subsections.

4.1 Relevance Review

Submitted proposals are distributed to one of five review teams. The review teams are comprised of representatives from northern organizations, other government departments, academia, and other areas of expertise. These teams are:

- *Human Health* review team
- *Environmental Monitoring* review team
- *Environmental Research* review team
- *Community-Based Monitoring and Research* review team
- *Communications, Capacity and Outreach* review team

The review team's role is to assess the merit of the project and its relevance to the NCP. They assess relevance by reviewing how the proposal addresses the priority areas identified in the relevant NCP Blueprint and other NCP strategic priorities, using the criteria in Table 4.1.

Table 4.1 Review Criteria – NCP Relevance

Weighting	Criteria
Y/N	Does the research proposal address one of the key research needs outlined in the Blueprint? If so, which one(s)?
Y/N	Does the proposed work have relevance and applicability in addressing other issues of importance to northerners (e.g. climate change, food security)?
Y/N	Does the team have the necessary capacity and/or track record to conduct described research, and the potential to deliver results that reflect scientific excellence?

Y/N	Where appropriate (e.g. community based monitoring and research proposals), is co-production of knowledge/indigenous knowledge included in the proposal and does the project use participatory research methods?
Y/N	Does the proposal include educational/training elements?
Y/N	If this research project directly impacts northern communities or Indigenous groups, have they been engaged and do they support this research? Have the applicants addressed the NCP *Guidelines for Responsible Research* and obtained written consent (where applicable)?

4.2 Technical and External Peer Review

All proposals undergo a technical review. This review covers the scientific expertise of the project team, the clarity and scope of objectives, the adequacy of methodology, suitability of project design, and appropriateness of time frame and budget. Proposals are rated and ranked and operational and funding recommendations are made to the NCP Management Committee. Proposals for new projects submitted under the Environmental Monitoring and Research, and Human Health subprograms will undergo an external peer review. Other review teams may request an additional external peer review, for example if more technical expertise is required. Upon receipt of the external peer reviews, the teams are reconvened to take the reviews into account and finalize their recommendations to the NCP Management Committee.

Table 4.2 Review Criteria – Technical and External Peer Review

Weighting	Criteria
20	Scientific excellence/expertise of principal investigator and team (including consideration of relevant publications)
15	Clarity and scope of objectives

15	Clarity, adequacy and inter-comparability of methodology
15	Suitability of proposal design for meeting the objectives (e.g. sample size, etc.)
10	Appropriateness of time frame (e.g. can the project results be delivered within the time frame specified in the proposal and within a time frame appropriate to the NCP?)
10	Appropriateness of budget (e.g. charges for sample analysis)
15	Overall clarity and organization of proposal
Written Assessment	Peer reviewers are asked to provide a brief written assessment of the proposal, including an assessment of the importance of the proposed project with respect to the priority areas identified in the relevant NCP Blueprint.

4.3 Social/Cultural Review

Regional Contaminants Committees (RCCs) conduct a social/cultural review of the proposals. This review assesses aspects in the proposal such as communications, northern priorities, capacity building and training, traditional knowledge, and northern consultation. Each proposal is rated and recommendations are made to the NCP Management Committee on how the proposals could be improved in these areas.

Table 4.3 Review Criteria – Social/Cultural Review

Criteria	Attributes
Communications	How complete are the communications activities: - prior to project implementation? - during project execution? - after project results are received? How is the rapport of the project applicant within the study area?
Northern Priority	Does the project address a question that is important to Northerners?

	(Note: Proposal must also meet a priority outlined in the Blueprints.) Has similar work been done already? Recently? Does the proposal build on existing data?
Capacity Building/Training	Does the proposal provide local or northern training opportunities? Does the proposal promote capacity building in the North?
Indigenous Knowledge	Does the proposal make use of appropriate Indigenous Knowledge? Have the relevant communities been consulted on how Indigenous Knowledge could be incorporated into the project?
Past Experience in the Region	Has the project team established and/or previously demonstrated good working relationships with the relevant communities? Does the project team have a satisfactory track record of delivering on social/cultural aspects of project plans?
Other	Additional comments on technical and logistical aspects, budget and other considerations.

RCCs will provide a review of each proposal that is relevant to their region, using the above criteria as guidance.

The review will also include:

(a) an overall rating of the proposal (High, Medium-High, Medium, Medium-Low, Low) for its social/cultural aspects;
(b) a recommendation (Support, Do Not Support, Conditional Support); and
(c) specific conditions of funding recommended by the RCC, if applicable.

4.4 NCP Management Committee

The NCP Management Committee meets in April to review and consider all the recommendations from the subcommittees and RCCs. The NCP Management Committee makes the final funding decisions for the year.

5 – PROPOSAL SUBMISSION CHECKLISTS

5.1 Before Submitting the Proposal

Completion of this checklist ensures that the applicant has read and understood the NCP proposal requirements.

- ☐ Timeline for the NCP Call for Proposals and Review Process (Section 1.1)
- ☐ Responsibilities of Applicants (Section 1.5)
- ☐ Proposal and Budget Formats (Section 2)
- ☐ The objectives identified in the relevant Blueprint(s) for the current funding year.
- ☐ *Guidelines for Working with Northern Communities* (Section 3.1)

5.2 Submitting the Proposal

- ☐ Complete proposal packages must be submitted by email (maximum size: 10 MB) to the NCP Secretariat at PLCN-NCP@aadnc-aandc.gc.ca using the following text as the Subject: NCP Proposal 2017-2018 – [*insert name of Project Leader*]. The proposal is consistent with the current proposal format as an MS-Word file, while Budget Tables are prepared and submitted using the Excel-based templates. Please note, compressed files cannot be submitted.
- ☐ All project team members identified in the proposal are to be copied on the email submission.
- ☐ The budget information is appropriate, realistic, complete and correct.
- ☐ The deadline for proposal submission is **January 10, 2017, 11:59PM Eastern Standard Time.**

5.3 After Submitting the Proposal

- ☐ The Signed *Community Engagement* form(s) and/or letters of community support are submitted by the Northern community organization(s) by email to the NCP Secretariat at PLCN-NCP@aadnc-aandc.gc.ca by **March 31, 2017, 11:59 Eastern Standard Time.**

6 – BLUEPRINT FOR HUMAN HEALTH

6.1 Introduction

6.1.1 Purpose of the Blueprint

This Blueprint outlines the research issues and questions to be addressed by the *Human Health* subprogram of the Northern Contaminants Program (NCP) so that Northerners can assess, understand and better manage the health risks in Northern Canada related to the long-range transport of contaminants and their presence in people and traditional/country foods. This is closely aligned with the goals of Inuit and First Nations organizations that have a shared objective to improve health and wellness among their populations across the Arctic.

The scope of the Blueprint provides a continuing opportunity for Northern health authorities and/or First Nations and Inuit governments to take the lead on projects within their own regions, enabling Northerners to control and increase their own research capacity more directly. The Blueprint identifies priorities and activities in the areas of human biomonitoring, health effects and benefit/risk evaluation.

The funding envelope for *Human Health* projects in the 2017-2018 fiscal year is set at $1,025,000.

6.2 Background

Elevated concentrations of persistent organic pollutants (POPs) and metals such as mercury and lead have been found in human tissue samples and body fluids in certain Arctic regions. Epidemiological and toxicological studies in Canada and elsewhere have found that at certain concentrations these contaminants are toxic to humans.

The most recent assessment of contaminants and Human Health in the Canadian Arctic (published in 2009) provided some key conclusions and identified a number of knowledge gaps resulting from research supported by the NCP as well as externally funded research. Some of the key conclusions from the report that are still relevant today are listed below:

- Many contaminants measured in maternal blood over a period of about 10 years experienced significant declines in all Canadian Arctic regions studied (NWT, Nunavut and Nunavik).

- Data indicate that co-exposure to a mixture of chemicals appears to modify not only some tissue contaminant levels but also the toxicity of at least some contaminants such as methylmercury and PCBs.
- Prenatal exposure to contaminants in the Arctic may result in poorer immune system function and distinct but subtle effects on neurodevelopment in children
- The current dietary transition in some parts of the Canadian Arctic from traditional/country foods to a market-based diet has led to decreases in intake levels of key nutrients, omega-3 fatty acids and fibre. This transition can contribute to an increased risk of various chronic diseases in First Nations and Inuit communities.
- Most successful risk communication processes draw on and involve a variety of regional experts as well as the public in the formal communication process.

6.3 Biomonitoring for Human Health

One of the knowledge gaps identified in the most recent contaminants and Health Assessment Report (2009) was that biomonitoring as well as food choice surveys and monitoring of traditional/country foods should be continued to provide a clearer understanding of how a changing diet affects contaminant concentrations in Northerners. This work should continue to focus on a cross-section of highly and moderately exposed regions and should include both legacy and emerging contaminants of potential concern where there is the potential for exposure from traditional/country foods.

The assessment of contaminant concentrations in traditional/country foods along with food choices and dietary surveys will be essential to assess sources and levels of dietary exposure. These elements of the biomonitoring program should be developed such that future assessments will be carried out with the cooperation and/or collaboration of project leads responsible for biotic monitoring under the *Environmental Monitoring and Research* subprogram. This provides an excellent opportunity for collaboration between *Human Health* and *Environmental Monitoring and Research* project leads in the North and would be particularly beneficial for regional health and environmental authorities and/or First Nations and Inuit governments evaluating these projects. In particular, Northern health authorities may be interested in having studies under the *Human Health* and *Environmental Monitoring and*

Research subprograms co-located. Doing so will strengthen the links between the two subprograms and ensure that knowledge gained on contaminants in the ecosystem is transferred to the assessment of human health risks. The results generated through such cooperation will also allow for further assessment of spatial and temporal trends.

In order to place human chemical concentrations in a health risk assessment context, there is a need for tools to interpret biomonitoring data. For example, there are only a few substances for which direct relationships between human chemical concentrations and health effects have been established. For lead and mercury, intervention guidelines were established on the basis of studies that directly related blood levels with health effects. Biomonitoring Equivalents (BEs) can be used as tools to help interpret biomonitoring data in a health risk context. Biomonitoring Equivalents are defined as estimates of chemical concentrations in human samples consistent with existing exposure guidance values that have been developed in Canada and elsewhere. BE values for dioxins, hexachlorobenzene, cadmium and DDT have been published previously. BEs are principally intended as screening values applicable at the population level that can help determine which biomarkers are present at concentrations below, near, or above existing exposure guidance values. The unique exposure of northern populations to legacy POPs and metals suggest BEs may serve as useful tools for northern health professionals during their prioritisation efforts for risk management activities. Other tools for interpreting northern biomonitoring data will also be considered.

Prospective biomonitoring programs should be designed to build on pre-existing biomonitoring data and provide for periodic re-sampling (approximately 4 to 6 year sampling period). By focusing on continuation of pre-existing datasets in a comprehensive and recurrent manner, a robust biomonitoring program will be established to create comparable datasets and allow for planned continuity, resulting in more meaningful trend analyses covering all regions of Canada's Arctic

Work under the biomonitoring program for Human Health falls under two main categories: dietary exposure assessments and human biomonitoring.

6.3.1 Dietary Exposure Assessments

The purpose of conducting dietary exposure assessments is to provide an up-to-date estimate of the amount (i.e. mass) of contaminants in the diet of Northerners and to determine likely exposure scenarios. These estimates of dietary exposure can then be compared with guidelines for safe levels of contaminant intake (i.e., tolerable daily intake (TDI)). Dietary exposure assessments were carried out in most regions of the Canadian Arctic at some point over the past 10 years and in many regions these data now require updating. The updated assessments, when compared with past assessments, will provide valuable information on changes in contaminant concentrations in traditional/country foods, changes in dietary habits, and ultimately on changes in exposure to dietary contaminants. New assessments can provide baseline information for new contaminants or participating regions.

To complete dietary exposure assessments there is a need to conduct new food choice and dietary surveys. When survey data is paired with wildlife monitoring data, information is obtained on which traditional/country foods may be important sources of contaminants for people and thus should be given the highest priority for monitoring of contaminants. Food choice surveys will also provide information about the factors affecting the dietary choices of Northerners and the perception of contaminants in making those choices. A number of dietary surveys have been undertaken by NCP researchers over the last 15 years in Yukon, NWT, Nunavut and Nunavik. This has provided valuable information for the interpretation of human contaminant biomonitoring and wildlife monitoring data and has allowed the development of better risk management advice to Northerners.

In connection with these surveys, samples of traditional/country foods should also be collected to allow the measurement of contaminant concentrations, including some of the contaminants of concern listed in Schedule A and Schedule B. Measurement of contaminant concentrations in traditional/country foods should be carried out in cooperation with project leaders from the *Environmental Monitoring and Research* subprogram, who can provide existing data on concentrations and trends in key food species and who also have expertise in analyzing emerging contaminants of concern.

The assessment of contaminant exposure needs to be coupled with an assessment

of nutrient intake, which is essential for evaluating dietary risks and benefits.

Dietary exposure assessments, particularly the food choice and dietary surveys, should be carried out in parallel with human biomonitoring studies. This will allow valuable comparisons of dietary exposure assessments to measured contaminant concentrations in human tissues and will facilitate the development of effective dietary intervention strategies.

The NCP has supported several maternal contaminant studies (Nunavik, Baffin and Inuvik regions) and various phases of the IPY-Inuit Health Survey in Nunatsiavut, Nunavut, and the Inuvialuit Settlement Region in NWT to study both contaminant concentrations in human tissues and dietary exposure to contaminants. This body burden and dietary exposure information continues to be evaluated and will allow development of better intervention strategies. The results will also be used to inform international/national regulatory organizations dealing with contaminants (such as the *Stockholm Convention*) as well as future dietary/human biomonitoring studies.

6.3.2 Human Biomonitoring

Biomonitoring studies that have measured POPs and metals in maternal blood over the past two decades suggest declines for certain POPs and metals in the Canadian Arctic (NWT, Nunavut, and Nunavik) amongst different population groups including Inuit, Dene/Métis, and non-Aboriginal northerners. These biomonitoring studies have informed where and how human exposures to contaminants are changing and have also allowed an assessment of the effectiveness of international agreements.

The coincident collection of information on dietary choice and food frequency during biomonitoring studies will permit researchers to further elucidate contaminant exposures from country foods and better understand modern dietary transitions in the North.

Role of Northern Health Authorities and First Nations and Inuit Governments

Any region in Canada's Arctic can be considered for human biomonitoring studies if the Northern health authorities and/or First Nations and Inuit governments[1] are engaged and have an

[1] In regions with settled land claims, First Nations and Inuit Governments are to be

interest in participating in the biomonitoring work.

It is important that the Northern health authorities and First Nations and Inuit governments are involved in the development of these human biomonitoring projects. Understanding that there are many demands placed on their limited resources, Northern Health Authorities can gauge their level of involvement based on internal capacity and interest. Their participation aligns with the desire of Northerners to conduct their own research in the North and allows project leaders to more easily encourage community engagement in the projects. Having the Northern health authorities involved in the biomonitoring component will ensure that any important health, dietary or contaminant issues that may arise will be addressed for the communities in the most appropriate health context. Including First Nations and Inuit governments will ensure the cultural context of issues will be considered before publication/dissemination of results.

The objective of NCP human biomonitoring is to provide as complete coverage of each northern region as possible to fill regional gaps in data and develop time trends to allow on-going insight on the changing relationship between contaminant exposures and human health outcomes. Ultimately, these studies, in conjunction with monitoring results from the *Environmental Monitoring and Research* subprogram, will help the NCP to determine the effectiveness of international agreements such as the Stockholm Convention and the Minamata Convention. In addition, data from these biomonitoring studies using this standardized approach can be used to inform local health authorities of the general health status of northern populations from a contaminants perspective.

The overarching goal of NCP human biomonitoring is to create time trends and fill regional gaps; however this does not preclude the NCP from adjusting the schedule to address targeted biomonitoring if the need arises. For example a rapid dietary shift in country food consumption or increased levels of contaminants in country food species regularly monitored through the *Environmental Monitoring and Research* subprogram would be valid reasons for establishing a biomonitoring program in the affected region.

Funding Parameters

included in the development, execution and dissemination of results from a project.

A biomonitoring project will usually extend from three to five years and include the following key elements: regional consultation and engagement, project design/feasibility assessment, project implementation/execution, and reporting of results to the communities. The planning process should not be underestimated and usually requires at least one year to prepare a comprehensive proposal. The proposals should set the general requirements for the project, including recruitment strategy, sample size and frequency (a position paper on these components was prepared by Health Canada[2]), dietary assessment, collection of demographic information through questionnaires, contaminants to be measured, laboratory capacity, data analysis, and reporting of results. The participation and collaboration of the Northern health authorities and First Nations and Inuit governments/organizations will ensure that regional communications on contaminants will be balanced and incorporated into ongoing health messages.

Seed Funding

In order for biomonitoring studies to commence in regions not currently part of long term NCP funded biomonitoring work, interested parties may apply to the Call for Proposals for seed funding to establish partnerships with regional health authorities, First Nations and Inuit governments or organizations, academia/federal scientists and local community organisations. Seed funding may be used to support travel and facilitate meetings in northern communities with all of these key potential partners. Seed funding may also be used for preparatory work on research design, survey development or other pertinent preliminary work. Seed funding will be of a limited amount and will be scaled according to the scope of the proposed biomonitoring work. In addition, seed funding will be provided for one year only. Applicants who receive seed funding are not guaranteed to receive long term funding for future biomonitoring work and must submit proposals for each subsequent year of funding applied for.

6.3.3 Target Populations for Human Biomonitoring

The NCP has identified key target populations for human biomonitoring. Early biomonitoring studies focussed on pregnant women in order to obtain information on potential health impacts for the unborn child, recent studies have

[2] NCP Maternal Blood Biomonitoring Studies: Sampling and Sample Size Considerations.

included both genders and all adult age groups to obtain a better understanding of human exposures across the Canadian Arctic. Therefore the priority populations for biomonitoring studies under the NCP are presented as follows in order of importance:

1. Pregnant women and women of child-bearing age.

2. Children

3. Adults of both genders and in particular older adults

Pregnant women and women of child-bearing age are the highest priority due to the sensitivity of the developing fetus to contaminant exposure. Maternal trends that are not confounded by the sampling medium or differing study design can be determined through the continued sampling of maternal blood using prior protocols. Children are the next priority for biomonitoring studies as they have been found to have relatively high concentrations of some contaminants (e.g., polybrominated diphenyl ethers (PBDEs)). Research of this type will highlight the interest of First Nations and Inuit governments and Northern health authorities in supporting this mother/child unit. Biomonitoring of older adult populations of both genders is important because contaminant concentrations have, in general, been shown to be higher in this adult population than in children and pregnant women or women of child bearing age due in part to higher historical and current consumption of country foods.

6.3.4 Contaminants of Concern

The chemicals of interest for the core biomonitoring program have been prioritized into two general groups: legacy contaminants and additional/emerging contaminants. Effort should be made to coordinate the biomonitoring of these chemicals of interest under the *Human Health* subprogram with those monitored within the *Environmental Monitoring and Research* subprogram.

Broadening the spectrum of monitored contaminants to include chemicals studied in Canada under the Chemicals Management Plan (CMP), supports public health efforts by territorial, provincial, and federal risk management groups to take action on chemicals found to be harmful to people and their environment.

PRIORITY 1: LEGACY CONTAMINANTS

The core biomonitoring program would continue to measure legacy contaminants (POPs and heavy metals including mercury, lead and cadmium) in human

tissue and traditional/country foods to ensure comparability with earlier datasets to be used in trend assessments and to fulfill Canada's commitment to monitoring these contaminants under international agreements. Northerners continue to be exposed to legacy contaminants through the consumption of traditional/country foods. See Schedule A (Appendix A) for a list of legacy POPs for continued monitoring.

PRIORITY 2: NEW AND EMERGING CONTAMINANTS.

Monitoring by the NCP also includes new and emerging contaminants that need assessment and monitoring to determine if they are present in the Arctic environment and in human tissues given their persistent and bioaccumulative properties and their ability to be transported long distances into the Arctic. It is expected that a number of chemicals measured under the CMP will meet these criteria and thus should be monitored under the NCP.

Schedule B (Appendix A) contains a list of additional/emerging contaminants that are known to fall within the NCP's mandate. Several new contaminants have already been included or nominated as potential candidates for regulation under UNEP's *Stockholm Convention* and the UNECE *1998 Aarhus Protocol on Persistent Organic Pollutants (POPs)*.

OTHER RELEVANT CONTAMINANTS AND NUTRIENTS

The biomonitoring program may include chemicals that Northern populations are exposed to through local use and exposure (e.g., store-bought foods, the preparation and preservation of traditional/country foods, drinking water and consumer products) to fully understand the exposure profile of Northern populations. However, applicants are expected to seek alternate funding sources for these analyses. See Table 6.1.

However, selenium should continue to be measured as part of NCP funded Health Research. Biomonitoring studies should include other contaminants/nutrients that are relevant to understanding potential health effects associated with consuming traditional/country foods.

6.4 Human Health Effects Research

The focus of the health effects element is the study of the interactions and effects of contaminants on human biological systems through investigations based on measurable determinants of health. The desired outcome is to reduce the current

burden of environmentally-related disease, and to minimize environmental health risk across all life stages by addressing single and multiple chemical exposures. Investigative techniques could include epidemiological, laboratory-based toxicological and relevant toxicogenomic studies.

6.4.4 Health Effects Priorities

The following outlines the priority themes for health effects studies under the NCP:

- Child and maternal health effects including pregnancy complications, endocrine disruption, duration of gestation and fetal growth;
- Physical, motor, cognitive, behavioural, and emotional development from infancy to childhood, adolescence ,and adulthood;
- Research into interactions between nutrients and contaminants (e.g., methyl mercury and selenium), particularly in the area of lifestyle, nutritional status and contaminant-related health effects;
- Diabetes, metabolic syndrome, and cardiovascular disease;
- Subclinical effects observed as DNA damage, enzymatic activity variations and other measured changes in studied human biomarkers;
- Other chronic diseases likely to be associated with early-life or multi-exposure scenarios (such as allergy and asthma); and
- Immune system function, especially mild immune system malfunction leading to increased risk of infections.

Health effects studies should take into account co-exposure to mixture of chemicals and factors likely to modulate vulnerability of exposed individuals. Special interest should be devoted to characteristics of the diet of First Nations and Inuit groups where evidence exists for potential protective strategies such as specific micronutrient intake (e.g., selenium, polyunsaturated fatty acids, vitamins, and antioxidants). For example, interactions between methyl mercury and selenium should be investigated, as well as whether health effects are resulting from high concentrations of contaminants (e.g., selenosis from high selenium concentrations).

It is expected that results from current and previous biomonitoring studies such as the *Inuit Health Survey* and the *Nunavik Child Development Study* will be used to guide future pathways and effects research. The following sections provide further guidance on pathways and effects research priorities for the NCP.

6.4.2 Pathways

Biomarkers

Biomarkers have the potential to provide an early detection system for health conditions that may develop later in life or can help address epidemiological issues that cannot be investigated directly because of low sample numbers. Research that focuses on biomarker development, however, is beyond the scope of the NCP. Any work with biomarkers funded through the NCP should be integrated within an epidemiological (or toxicological) study and should demonstrate that a gap in NCP work will be filled by the research. Convincing arguments need to be made by project applicants regarding the relevance of these biomarker studies to the Arctic human context. In order for a project to be considered for funding, the chosen biomarkers should demonstrate a link to clinical health effects or health outcomes currently or potentially afflicting Arctic peoples. Similarly, a relationship needs to be established between such health effects and contaminants.

Human Genomics

Human genomics has received much attention in recent years and has been raised as a potentially beneficial area of research related to the effects of contaminants. Identifying the molecular mechanisms behind the contaminant effects observed in Arctic peoples could be a useful approach to clarifying how contaminants affect the human body. Genomics has the ability to identify the molecular mechanisms associated with certain chemically related exposures at a very early stage and possibly uncover new biomarkers of toxicity. Any NCP-funded genomic work should emphasize applied outcomes relevant to the Arctic human situation and will need to be clearly linked to known biomarkers of contaminant toxicity and/or to the elucidation of the mechanisms of action for high priority Northern contaminants. Proposed projects must use existing, well-validated genomic methods. Projects must ensure relevant and specific informed consent and ethical approvals regarding the use of samples for genomic analysis and that First Nations and Inuit community or individual approval processes have clearly been obtained.

6.4.3 Health Effects Research and Relevance to Arctic Populations

Contaminants have been associated with reproductive and developmental effects in studies of Southerners and people exposed to contaminants occupationally;

similar effects have been found in laboratory studies using animals. Reproductive concerns among Canadian Northerners have not emerged at a clinical or epidemiological level and fertility rates among Northern First Nations and Inuit people are among the highest in Canada. Despite this, reproductive studies will be considered by the NCP if a clear rationale is provided showing that reproductive effects related to contaminants are, or may become, a concern in the North.

The population is exposed to a mixture of contaminants rather than individual chemicals. During the past few years, NCP toxicological studies have investigated not only the health effects of individual contaminants but also the effects of mixtures that mimic the exposure profile of highly exposed Northerners. Early results demonstrate that the effects of the mixtures are not necessarily the same as those expected from studies of the effects of individual chemicals and that interactions occur among contaminants.

Arctic epidemiological research is revealing that nutrients found in certain traditional/country marine foods may offer some partial protection from the detrimental health effects of contaminants found in those same foods (e.g. methyl mercury and selenium). Lifestyle factors may also influence the health effects of contaminants. For example, smoking during pregnancy is common in Northern communities. In such cases, a host of other chemical contaminants may contribute to (or mitigate) the effects of prenatal exposure to Arctic contaminant mixtures.

There are a number of factors that come into play to ensure that studies of effects funded by the NCP are relevant in the Arctic human context. Researchers are required to provide a brief but strong rationale justifying their choices with respect to each of the points below and especially their relevance in the Arctic human context:

- The mixtures of contaminants and nutrients to be used should typify those found in traditional/country food diets or (human) maternal/cord blood, as appropriate.
- While mixture studies are a priority, studies of the effects of individual contaminants will be considered if a strong rationale is provided.
- If the study is *invitro* or based on laboratory animals, the specific exposures, including nutrients, should take into consideration the actual range of exposure levels (e.g., frequency

distributions of exposure) experienced by Arctic residents.

- Residual tissue concentrations of contaminants in laboratory animals should be measured to assess whether they are consistent with those of exposed Arctic human populations.
- Study endpoints need to be able to be interpreted in an Arctic human context (e.g., appropriate neurobehavioural and sensory endpoints).

6.5 Benefit/Risk Evaluation

The ability to determine and compare benefits and risks is a key component of the NCP and a current focus of the *Human Health* subprogram. Standard risk assessment methodologies used to assess the potential risks to human health of various contaminants are, in general, well known and have been used for many years. However, their application to populations dependent on the use of traditional/country foods can be problematic because there is little consideration given to benefits, and there are no common metrics to compare multiple risk/benefit scenarios. For example, reporting that some consumers of traditional/country foods are exposed to concentrations of a particular contaminant above the TDI should be considered only a preliminary stage of assessing the overall risk because it does not account for the many health benefits that can be attributed to the consumption of traditional/country foods.

The development of methodologies for assessing the benefits of traditional/country foods is a relatively new area of research, and some of the benefits are only described in subjective terms. These benefits pertain to overall well-being and can be nutritional, physical, social, spiritual and economic, whereas the risks focus on the narrower questions of toxicity and potential health effects. It is, therefore, very difficult to evaluate the benefits against the risks, or vice versa, and considerably more research is required in this area.

When developing management strategies to balance the benefits of the traditional/country food diet and the risks from contaminants in that diet, it is also crucial to look at the benefits and risks of dietary alternatives (e.g., a typical (affordable) store-bought diet). Because the benefits and risks associated with store-bought foods are very different from those associated with traditional/country foods, and many of the benefits of the latter would be

irretrievably lost by switching to store-bought foods, both techniques to "balance" the benefits and risks of store-bought foods with the traditional/country food diet and the development of management strategies that consider the complete diet require attention. Additionally, increased knowledge of local risk perception and how people make dietary choices is necessary to determine an effective way to decrease barriers to message comprehension. Studies that include risk communication activities with affected communities should include follow-up work that evaluates the effectiveness of those risk communication activities. More research is needed in determining best practices for risk communication and their effectiveness in an Arctic context.

Arctic communities face risks from a variety of sources: contaminant exposure is only one. It is important to these communities that the risks and benefits associated with exposure to contaminants in traditional/country foods are placed in a context relevant to the community in question. Issues surrounding food security and malnutrition are of increasing concern in Arctic communities and could have profound effects on health, particularly in early life. Communities also require more information on how the risks from contaminants compare with other lifestyle risks such as smoking, alcohol consumption and other substance use. It is well known that these other lifestyle factors pose considerable risk to the developing fetus.

Projects that intend to study the evaluation of benefits and risks should focus on those communities considered to be at higher risk, as determined in consultation with public health authorities and First Nations and Inuit governments/organizations, from contaminants (e.g., communities characterized by high and moderate exposure to contaminants and dependent on a primarily marine mammal diet). Because the fetus, infants and children are often most at risk from contaminants, benefit/risk evaluations and communication should focus on their particular situations. This may require special communication efforts to pregnant women and women of child-bearing age.

6.5.1 Benefit/Risk Evaluation Priorities

The following are the priority areas of NCP *Human Health* research on benefit/risk evaluations:

- Improve our understanding of the factors influencing Northerners' choice of food

and the extent to which contaminants factor into these choices, with particular emphasis on mothers, pregnant women and other women of child-bearing age.

- Evaluate food substitution and other management programs that aim to reduce contaminant exposure in high risk regions but still encourage consumption of highly valued traditional/country foods and other nutritional food sources.
- Carry out benefit/risk evaluations and comparisons with special emphasis on the most highly exposed communities and vulnerable groups (e.g., the fetus, infants and children).

Table 6.1 Other contaminants of potential interest but outside of the NCP mandate.

Chemicals [a]	Justification
Exposure from consumer products (e.g., phthalates, bisphenol A) *Exposure from food* • Pesticides (e.g., organophosphates, pyrethroids) • Metals (e.g., total arsenic, speciated arsenic, cobalt, zinc) • Other (e.g., polyaromatic hydrocarbons [PAHs])	To fully understand the exposure profile of populations in the Arctic, it is important to have information on chemicals that populations are being exposed to through imported foods and other routes of exposure. The main route of exposure for these chemicals is thought to be through dietary consumption or through consumer products. In addition to food exposure, consumer products may pose a risk of exposure to other chemicals such as phthalates and bisphenol A.
Other biomarkers of exposure (Cotinine)	High concentrations of cadmium have been linked to smoking in the Arctic. Measuring cotinine, a biomarker for exposure to cigarettes, would clarify the issue of smoking in the Arctic.

[a] *Measured in human urine samples*

7 – BLUEPRINT FOR ENVIRONMENTAL MONITORING AND RESEARCH

7.1 Purpose

The purpose of the *Environmental Monitoring and Research* subprogram of the Northern Contaminants Program (NCP) is to:

- Monitor contaminant levels and trends in the Arctic environment.
- Conduct research into the influence of environmental change on levels and trends of contaminants in the Arctic environment.
- Conduct research into the effects of contaminants on the health of Arctic ecosystems.
- Support the assessment of human health risks using information on levels and trends of contaminants in traditional/country foods.
- Support, through collaboration and mentorship, projects that are funded under Community Based Monitoring and Research, and other NCP subprograms.
- Produce scientific information supporting domestic and international chemical management initiatives.

The funding envelope for the 2017–2018 Environmental Monitoring and Research subprogram is $1,075,000 of which approximately $850,000 will be allocated to ongoing trend monitoring projects and $225,000 will be allocated to research projects.

7.2 Introduction

This Blueprint outlines environmental monitoring and research priorities for the Northern Contaminants Program (NCP).Additional monitoring activity is being planned in cooperation with the *Human Health* subprogram and regional health authorities that will involve the measurement of contaminant levels in traditional/country foods to assess the dietary exposure of Northerners. Under the *Human Health* subprogram, the NCP is developing a long-term human biomonitoring plan that includes the collection and analysis of traditional/country food items to conduct these dietary exposure assessments. It is intended that dietary exposure

assessments will be carried out cooperatively by the *Environmental Monitoring and Research, Community-Based Monitoring and Research,* and *Human Health* subprograms. Doing so will strengthen the links between the three subprograms and ensure that knowledge about contaminants in Arctic ecosystems will be transferred to the assessment of human health risks.

Priorities for monitoring and research are described separately for the Atmosphere and three major ecosystem types: Terrestrial, Freshwater, and Marine. The majority of ecosystem monitoring and research is to be carried out in a limited number of defined "focal ecosystems" so that the related activities are closely coupled and complementary. By concentrating monitoring and research on focal ecosystems, the NCP hopes to develop detailed conceptual models of contaminant dynamics in these ecosystems. Monitoring plans have been designed for optimal detection of temporal trends and build on ongoing monitoring projects, with robust timeseries datasets and sample archives. Research priorities are designed to improve our understanding of contaminant related ecological risks, including: how contaminants enter Arctic ecosystems and cycle within them; how contaminant cycling is influenced by environmental change and the resulting effect on biological exposure; and the combined biological effects of contaminants and climate change on arctic wildlife.

In the current Blueprint Schedule A POPs (formerly known as legacy POPs, see Appendix A) will continue to be measured on a biennial basis (i.e. every other year), however, Schedule B POPs (i.e. new POPs and chemicals of emerging concern see Appendix A) will be analyzed annually to ensure the rapid detection of trends. Annual analysis of chemicals of emerging concern, i.e. those not yet considered POPs by the Stockholm Convention, is important for demonstrating their presence in the Arctic in the least number of years possible.

New for 2017-2018 is the inclusion of microplastics as a contaminant of emerging concern. Microplastics have emerged as a global pollutant of concern for which there is very limited Arctic data (AMAP 2016). Microplastics exhibit many of the same characteristics of POPs that make them a risk to Arctic ecosystems and people. The NCP is well positioned to fill critical data gaps on microplastics in the Canadian Arctic, including their presence (concentrations), distribution (geographic and ecosystemic), long-range transport (marine and

atmospheric), and ecological risks. The NCP will be taking a stepwise approach to assessing microplastics in the Canadian Arctic as outlined in section 7.4. and focussing first on assessing their presence and distribution in Arctic air and the marine environment.

7.3 Background

The Arctic is a remote environment, far from major emission sources, with environmental characteristics that make it particularly sensitive to long-range contamination by persistent organic pollutants (POPs) and heavy metals. Furthermore, some Indigenous peoples in the Arctic who rely on traditional/country foods, particularly marine mammals, as an essential part of their diet are exposed to elevated levels of contaminants in a scenario that is unique to the Arctic. The successful implementation of international conventions to reduce contaminant emissions is the best method available for reducing levels of human exposure in the Arctic. Arctic monitoring and research are among the most important sources of information for supporting current agreements, including the *Stockholm Convention* on POPs and the United Nations Economic Commission for Europe (UNECE) *Convention on Long-Range Transboundary Air Pollution* (*CLRTAP*) Protocols on POPs and heavy metals. The results from Arctic science were a key driver for the development of these international agreements. Negotiations on mercury that were initiated under the United Nations Environment Programme (UNEP) in 2009 produced a global legally binding treaty on mercury named the Minamata Convention, which was formally adopted in 2013. Again, scientific results generated by the NCP and AMAP were critical to the negotiations of this new agreement. Each of these international and global agreements has requirements for ongoing monitoring and research, with a particular need for Arctic data and information. Results from NCP monitoring and research will be particularly important for the global monitoring plans being established under both the Stockholm and Minamata Conventions, and for periodic effectiveness evaluations of both Conventions.

The *Environmental Monitoring and Research* subprogram is also intended to support ongoing assessments of human health risks. Information related to temporal trends in traditional/country food species can be used to forecast potential changes in dietary exposure to contaminants. Similarly, the identification

of new chemical contaminants in the environment provides an indication of possible future risks to human health and may lead to preliminary screening of human tissues (e.g., blood) and assessment of dietary exposure.

Contaminants of concern to the NCP include POPs, mercury, and other chemicals of emerging concern for which there is a reasonable probability of Arctic contamination resulting from long-range atmospheric and oceanic transport (see Appendix A for more information on contaminants of concern). One of the main objectives of monitoring POPs, which are already regulated under the *Stockholm Convention*, is to assess how the environment is responding to actions taken under the convention and to assess the effectiveness of these actions. Similarly, monitoring related to mercury is also aimed at assessing how the environment will respond to global actions to reduce emissions under the new Minamata Convention once it enters into force. Because the Arctic accumulates contaminants primarily from long-range transport, monitoring data on new chemicals in the Arctic are regarded as critical evidence when assessing the need to add new substances to the *Stockholm Convention*. The NCP needs to ensure that it can provide the most complete dataset possible for substances being considered (see Appendix A for more information on contaminants of concern).

Microplastics have emerged as a global pollutant of emerging concern for which there is very limited Arctic data (AMAP 2016). Microplastic particles, as well as larger pieces of plastic, can travel long distances across oceans, are extremely persistent in the environment, and accumulate in marine organisms. They also have the ability to be transferred up the food chain. Microplastic particles also carry toxic chemicals inherent to the plastic material, as well as persistent organic pollutants and metals that accumulate from ambient water. The risk to wildlife is two-fold: the microplastics can inflict physical damage and clog digestive systems, causing pathological injury or starvation, and/or delivering co-transported toxic chemicals including POPs to predators and other high trophic level organisms. In many ways microplastics exhibit all the characteristics of POPs and other globally regulated pollutants. For this reason in 2017-2018 the NCP will begin assessing microplastics as long-range pollutants in the Canadian Arctic. The first step of this assessment will focus on measuring the presence and distribution of microplastics in the marine environment and evaluating long-range atmospheric

transport through measurements in Arctic air.

Interpreting temporal variability in monitoring data and explaining the potential causal influence of global contaminant emissions and their sources can be very difficult. Contaminant concentrations in environmental media may be influenced by numerous factors in addition to global emission sources. For example, environmental changes brought on by climate shifts have been shown to influence temporal records of contaminant levels quite dramatically. Discerning the sources (anthropogenic or natural) and understanding the dynamic processes responsible for uptake and accumulation in Arctic food webs presents a particular challenge to the interpretation of trends in mercury. Source apportionment and consideration of changing environmental processes (e.g. with the use of environmental models) for all contaminants will continue to be important topics for NCP research and monitoring.

Levels of contaminants reported in Arctic wildlife can exceed reported thresholds for effects that were established mainly through laboratory-based dosing studies. Since the last time risks to wildlife associated with contaminants were reported in the *Canadian Arctic Contaminants Assessment Report III* (CACAR III; available on-line: http://pubs.aina.ucalgary.ca/ncp/79027.pdf), a number of important considerations have come to light which may warrant additional assessment. As already noted, climate change can influence contaminant pathways and processes that will result in modulating levels of exposure among Arctic wildlife. Wildlife are also being put under increasing stress because of climate-related changes in their environment that will make them more vulnerable to the potential risks posed by exposure to contaminants. Comparison of tissue residues to published guidelines and thresholds for effects will continue to be an important aspect of NCP assessment reports; however, it is recognized that these comparisons are of limited value given the lack of thresholds developed specifically for Arctic species. The direct investigation of toxic effects in Arctic wildlife (i.e., toxicological studies) is, therefore, an important element in the ongoing assessment of contaminant-related ecological risks.

The NCP is Canada's main contributor of contaminants-related science to the circumpolar Arctic Monitoring and Assessment Programme (AMAP) under the Arctic Council. The NCP works very closely with AMAP and other Arctic nations on collaborative monitoring and

research activities, as well as on the preparation of scientific assessments. Further information on AMAP can be found on their website. The participation of NCP project leaders in circumpolar monitoring networks and collaboration with other Arctic nations on NCP and AMAP priority research is encouraged.

To the greatest extent possible, NCP monitoring and research projects must be carried out in cooperation with Northern communities. In the case of wildlife sampling, collections should be carried out in association with regular community harvesting. In cases where harvesting has been limited because of weakness in a particular population (e.g., polar bear) then project leaders should work with community members to develop non-destructive techniques for sampling wildlife, such as collection of fat biopsies or snagging of fur.

Project leaders are asked to work with community members to utilize traditional knowledge in their projects. This might, for example, include the documentation of observations made through the course of sampling and related to the state of individual specimens being collected and the environment from which they are collected, including the Global Positioning System (GPS) coordinates of the location. These observations must be reported and the information attributed to the individual that provided it. The development of projects under the Community Based Monitoring and Research Subprogram is also encouraged, including projects that complement the priorities of this Blueprint, and that make use of indigenous knowledge.

7.4 Atmospheric Monitoring and Research

Monitoring contaminant levels in the atmosphere over the Arctic continues to be a priority under the NCP. Data collected since 1992 will be used to evaluate temporal trends of atmospheric input of contaminants, monitor current source regions and validate global long-range transport models. Monitoring will contribute key data to evaluate the overall effectiveness of the provisions outlined in the *Stockholm Convention* and the *CLRTAP* protocols on POPs and heavy metals. Another priority for atmospheric monitoring will be measuring new substances that demonstrate a reasonable probability of Arctic contamination as a result of long-range transport. These data are critical to the assessment of potential new POPs and their possible incorporation into international conventions. Temporal

trend data will also be used to provide a general indication of whether or not contaminant input to the Arctic ecosystem is increasing or decreasing, a critical question for consumers of traditional/country foods.

The NCP will participate in internationally coordinated air monitoring activities through the Arctic Council's AMAP. Air monitoring data collected at Alert and Little Fox Lake continues to be a major contribution to AMAP by the NCP.

The current program incorporates continuous automated monitoring of mercury and passive air sampling of POPs using a flowthrough sampler at Little Fox Lake, Yukon, and POPs and mercury at Alert, Nunavut, which is the longest running air monitoring station in the Arctic.

Since 2014 the NCP has expanded the air monitoring network with the addition of 7 passive monitoring stations distributed across all 5 Arctic regions. This expansion will be extremely valuable in providing a more geographically complete picture of atmospheric contamination, including POPs and mercury, and assessing global transport pathways and sources. The NCP's passive sampling network is integrated with the Global Atmospheric Passive Sampling (GAPS) network which is one of the primary sources of POPs monitoring data to the global monitoring plan under the Stockholm Convention. The use of models, or other methods, in collaboration with other programs/projects (e.g., ArcticNet), should be employed to evaluate global atmospheric pathways and potential sources associated with the trends observed at Alert and Little Fox Lake. Models may also be used to provide more detailed information on atmospheric contaminant distribution and deposition across the Canadian Arctic. These efforts should now be enhanced by integration of data from the 7 new passive monitoring stations being incorportated into the NCP air monitoring network.

7.4.1 Priorities for atmospheric monitoring

The following priorities have been established for atmospheric monitoring:

- *Mercury in the atmosphere*: Monitoring of atmospheric concentrations and deposition of mercury at Alert and Little Fox Lake will allow assessment of the temporal trends for mercury deposition and advance our understanding of

atmospheric processes that may influence levels and trends being observed throughout the Arctic environment. This project is led by Alexandra Steffen, Environment and Climate Change Canada.

- *POPs in the atmosphere*: Monitoring atmospheric concentrations of POPs (including new chemicals, see Appendix A) at Alert will allow for the assessment of temporal trends and the advancement of our understanding of atmospheric processes that may influence levels and trends being observed throughout the Arctic environment. Samples should continue to be collected weekly; however, only one out of four weekly samples will be analyzed for routine trend analysis and the remaining samples will be archived. Passive air sampling with a flowthrough air sampler should continue at the Yukon site of Little Fox Lake to assess long-range transport from the Pacific Rim. This project is led by Hayley Hung, Environment and Climate Change Canada.
- *Passive air sampling*: Expand the geographic coverage of the air monitoring program by developing, installing and operating passive air sampling devices capable of operating remotely under Arctic conditions. This will be complementary to the work at Alert and Little Fox Lake. A network of passive air samplers in the Arctic could be an important contribution to a global monitoring network being established to evaluate the effectiveness and sufficiency of the *Stockholm Convention* and *CLRTAP*. Passive air sampling can be used to determine latitudinal gradients in air concentrations from which empirical estimates of characteristic travel distances (CTDs) can be made. Such information can be used to verify and improve the CTD estimates of long-range atmospheric transport models. Proposals for passive air sampling may be submitted as part of the core air monitoring for POPs proposal. This project is led by Hayley Hung, Environment and Climate Change Canada.

7.4.2 Priorities for Atmospheric research

- Assess long-range atmospheric transport of microplastics to the Canadian Arctic.

7.5 Ecosystem-based monitoring and research

Under the Blueprint, ecosystem-based monitoring and research will focus on several geographic areas encompassing locations of past monitoring and research activity on which the current Blueprint aims to build. A number of focal ecosystems have been chosen among Arctic marine, freshwater and terrestrial environments. It is intended that monitoring and research in focal ecosystems will complement one another and will contribute to future synthesis and integration studies to further refine our understanding of contaminant cycling in these specific ecosystems, and notably, consider the influence of climate change. While much of the ecosystem research and monitoring should concentrate on the focal ecosystems, research at other locations that contributes to a general understanding of contaminant pathways, processes and effects will also be considered. This section describes monitoring and research priorities for each of the ecosystem types and specific focal ecosystems. There are, however, a number of common elements to monitoring and research across all ecosystem types which are described below.

Monitoring

The focus of the current ecosystem monitoring plan is to measure long-term trends and variability in contaminant concentrations in Arctic biota. The plan builds on projects to monitor temporal trends established in 2004 whereby samples from a number of key species at a few locations across the Canadian Arctic are collected and analyzed annually to maximize the statistical power of the temporal datasets. Species were selected based on the important role they play in their respective ecosystems and their importance to indigenous human communities (see Section 7.7).

As the temporal datasets become longer and more robust, the monitoring objective has been improved from the detection of a 10% change over 10-15 years, to detection of a 5% change over a 10-15 year period with a power of 80% and confidence level of 95%. This also aligns the NCP monitoring objectives with AMAP objectives. The annual collection and analysis of 10 samples per species and location is felt to be sufficient to achieve this goal; however, the inclusion of more samples may be acceptable if it significantly improves the trend analysis and is not cost prohibitive (e.g., mercury).

Along with monitoring contaminant trends in biota, the long-term monitoring plan for marine ecosystems includes annual monitoring of seawater for POPs

and mercury. Vertical profiles are collected for contaminant concentrations and include standard oceanographic data (e.g., salinity, temperature, nutrients, particulate organic carbon (POC), dissolved organic carbon (DOC), ∂18O, tracers such as SF6, and inorganic carbon), as well as data for zooplankton and forage fish where possible. In the case of mercury, data collection should include full speciation (Hg(II), methylmercury, particulate mercury) and for POPs, it should include the full suite of POPs and chemicals of emerging concern.

The recently completed CACAR III POPs report demonstrates that nearly all of the monitoring projects have produced some statistically significant trends for most POPs. The results show that most POPs covered by international regulations (i.e. legacy POPs) are decreasing in the environment. It was therefore decided that the frequency of legacy-POPs monitoring would be decreased to every other year (biennial). It is felt that this decrease in monitoring frequency will have a minimal impact on the program's ability to measure temporal trends of legacy-POPs. Since sampling will continue on an annual basis, sample archives could be used in future years on a case by case basis to investigate certain trends with annual data, this could include research on climate related drivers of contaminant trends. The analysis of legacy-POPs will be staggered among the different monitoring projects to even out the analytical budget.

Schedule B POPs require annual monitoring to quickly detect trends and, in the case of new chemicals, to definitively establish their presence in Arctic ecosystems over several consecutive years.

In order to update contaminant information on caribou herds from across the Canadian Arctic, of which there are 14, the Blueprint now provides for periodic monitoring of the 12 herds that are not already monitored for temporal trends. Additionally, deca-BDE, total PBDEs, PFOS and PFCAs, have been measured in caribou at concentrations similar to what is measured in marine mammals. Given the relatively high concentrations in caribou, particularly fat and liver, they represent a good opportunity to assess temporal trends in a species for which a rich archive of samples exists. Caribou may also represent an important dietary source of these contaminants to humans (Ostertag et al. 2009, Chemosphere 75:1165-1172).

One or two additional caribou herds will be sampled each year as part of the NCP

core program. The choice of herds will be determined in consultation with Regional Contaminants Committees and based on 1) Level of use, 2) length of time since the last sampling campaign and 3) ease of sampling. Ideally, sampling would occur as part of ongoing body condition or community monitoring programs (i.e. supported by territorial governments), which would minimize the cost to NCP.

For the assessment of temporal trends in biota every effort should be made to explain, and control for, variance components by considering confounding factors such as age, sex and time of collection. Ancillary data such as lipid content, stable isotope ratios and body condition may also be required to account for variance in the dataset.

Research

Ecosystem-based contaminants research is intended to improve our understanding of contaminant pathways, processes and the effects of contaminants on the health of Arctic wildlife. Research projects should be formed around a set of clearly rationalized hypotheses related to the priorities described in this Blueprint. Results of this research will contribute to our interpretation of temporal trends and/or variability, particularly as they relate to the influence of climate change and changing sources (i.e., global emissions). While building on our current understanding of legacy POPs and mercury remains a priority, there is also a need to learn about newer chemical contaminants, such as fluorinated and brominated organic chemicals and current-use pesticides that have the potential for long-range transport and Arctic contamination. Studies related to ecosystem pathways and processes are required in each of the ecosystem types (i.e., terrestrial, freshwater and marine).

Microplastics have been identified as a global pollutant of concern that are capable of long-range transport and can cause adverse effects in wildlife, yet for which there is very little Arctic data. For this reason, the NCP has identified assessing the presence and distribution of microplastics in marine ecosystems as a priority for the current call for proposals.

The investigation of contaminant-related effects in wildlife should focus on those species that, based on the best available information, are at greatest risk. The most important considerations should be the current level of exposure, the expected changes in exposure (i.e., are levels increasing or expected to increase), the potential vulnerability of a given population to toxic effects (e.g.,

diminished health status as a result of climate-related stresses), and whether or not the species is consumed by people. Based on these considerations, species that might be considered for effects studies include polar bear, beluga and, to a lesser extent, seabirds and ringed seal.

Wildlife effects studies should include the measurement of a suite of endpoints designed to provide a comprehensive assessment of contaminant related biological effects. These endpoints should be designed to detect changes in key biological systems (e.g., immune, reproductive, metabolic and neurological) that could be compromised by contaminants. It is recognized that studies on wildlife in their natural environment can at best establish associations between contaminant exposure and effects. A weight-of-evidence approach, which considers multiple lines of evidence from both wildlife studies and laboratory studies where causative relationships between contaminants and effects can be established, is a sound approach to assess the impact of contaminants on wildlife and ecosystem health. Ultimately, the health of northern Indigenous populations is intimately linked to the health of Arctic ecosystems, which represent a source of traditional/country foods and social and cultural well-being.

7.5.1 Terrestrial ecosystems

The focal ecosystem for the purpose of research is: Range of the Porcupine caribou herd.

Monitoring

The Porcupine caribou herd (sampled in Yukon) and the Qamanirjuaq Caribou herd (sampled from Arviat) are monitored annually for mercury and inorganic elements. NEW – samples will also be analyzed for PBDEs (including deca-BDE), PFOS and PFCAs. One or two other herds will be monitored each year for mercury, inorganic elements, PBDEs, PFOS and PFCAs. This monitoring is led by Mary Gamberg, Gamberg Consulting, Whitehorse, Yukon.

Research

The following bullets outline research priorities in terrestrial ecosystems:

- Uptake and accumulation of contaminants in terrestrial food webs with a focus on new contaminants that display a high potential for accumulation in terrestrial food webs
- Influence of climate-induced changes on terrestrial ecosystem contaminant cycles

- Physical-chemical processes related to mercury in Arctic soils, with a focus on fluxes to and from the atmosphere and characterization of soils as source or sink in the Arctic mercury cycle under a variety of climatic conditions.

7.5.2 Freshwater ecosystems

The Focal ecosystems are: Kusawa Lake, Yukon; Great Slave Lake, NWT; and High Arctic lakes on Cornwallis and Ellesmere Islands, Nunavut

Monitoring

The following freshwater ecosystems areas are the priority areas being monitored:

- Kusawa Lake and Lake Laberge:[3] lake trout are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during even numbered sampling years (i.e. 2014, 2016,...). , This project is led by Gary Stern, University of Manitoba, and Mary Gamberg (Gamberg Consulting) on behalf of the Yukon Contaminants Committee.
- Great Slave Lake: lake trout and burbot are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during odd numbered sampling years (i.e. 2015, 2017,...). This project is led by Marlene Evans, Environment and Climate Change Canada.
- Fort Good Hope:3 burbot are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during odd numbered sampling years (i.e. 2015, 2017,...).,This project is led by Gary Stern, University of Manitoba.
- High Arctic lakes: land-locked arctic char are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during odd numbered sampling years (i.e. 2015, 2017,...).This project is led by Derek Muir and Jane Kirk of Environment and Climate Change Canada.

Research

The following bullets outline research priorities in freshwater ecosystems:

- Ecosystem changes in focal ecosystem lakes and impact of these changes on contaminant dynamics in

[3] Continuation of monitoring at Lake Laberge and Fort Good Hope aims to build on long existing time series, although neither of these are considered focal ecosystems for the purpose of ecosystem research.

the system, particularly how change might influence levels and trends in key monitoring species (i.e. lake trout, char and burbot).

7.5.3 Marine ecosystems

The Focal ecosystems are: Beaufort Sea/Amundsen Gulf, Barrow Strait/Lancaster Sound, Cumberland Sound/Davis Strait, Hudson Bay, Labrador Sea (coastal waters).

Monitoring

The following bullets outline species and sampling locations for monitoring in marine ecosystems.

- Ringed seal: Sachs Harbour (Beaufort Sea/Amundsen Gulf), Resolute (Barrow Strait/Lancaster Sound), Arviat (Hudson Bay), and Nain (Labrador Sea) are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during even numbered sampling years (i.e. 2014, 2016,...).This project is led by Derek Muir and Magali Houde of Environment and Climate Change Canada.
- Beluga: Hendrickson Island (Beaufort Sea/Amundsen Gulf), Pangnirtung (Cumberland Sound), and Sanikiluaq (Nunavut) are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during odd numbered sampling years (i.e. 2015, 2017,...). This project is led by Lisa Loseto, Fisheries and Oceans Canada, and Gary Stern, University of Manitoba.
- Polar bear: Hudson Bay Population (Hudson Bay) are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during even numbered sampling years (i.e. 2014, 2016,...). This project is led by Robert Letcher, Environment and Climate Change Canada
- Seabird eggs: thick-billed murres and northern fulmars from Prince Leopold Island (Barrow Strait/Lancaster Sound), thick-billed murres from Coats Island (Hudson Bay) are monitored annually for mercury and new POPs. Biennial monitoring of legacy POPs will take place during even numbered sampling years (i.e. 2014, 2016,...). This project is led by Birgit Braune, Environment and Climate Change Canada
- Sea-run arctic char: Cambridge Bay (Beaufort Sea/Amundsen Gulf) are monitored annually for mercury. This project is led by Marlene Evans,

Environment and Climate Change Canada.

- Ship-based monitoring of POPs in seawater with concurrent air monitoring. This project is led by Liisa Jantunen and carried out in conjunction with ArcticNet aboard the CCGS Amundsen.
- Community centred monitoring of POPs and Mercury. Currently based in Resolute, Nain, Sachs Harbour and Cambridge Bay. This project is led by Derek Muir.

Research

The following bullets outline research priorities in marine ecosystems.

- Contaminant distribution in marine food webs with a focus on marine fishes and other species that represent forage for key monitoring species.
- Ecosystem changes in focal marine areas and the impact of these changes on contaminant dynamics in the system, particularly how change might influence levels and trends in key monitoring species (e.g., ringed seal)
- Contaminant-related effects in wildlife with a focus on those species that, based on the best available information, are at greatest risk or may serve as early warning indicators of effects in humans. Important considerations should be level of contaminant exposure and expected changes in exposure, and the potential vulnerability of a given wildlife population to potential effects (e.g., diminished health status as a result of climate-related stresses).
- Assess the presence and distribution of microplastics in marine ecosystems.

7.6 Contaminants of Interest

Researchers are asked to rationalize an analytical program and schedule that best suits the proposed project. Substances that are either currently included in or are being considered for inclusion in international conventions are identified and discussed in Appendix A. An important function of the NCP is to provide monitoring data on substances that are already covered by these conventions. However, the NCP needs to ensure that it can provide the most complete dataset possible for substances under consideration, particularly those substances that are of concern in the Arctic environment.

Samples should also be screened for new chemicals that demonstrate the potential

for Arctic contamination but have yet to be identified in the Arctic environment. Because the presence of a chemical in a remote environment such as the Arctic automatically implies that it is persistent and subject to long-range transport, this evidence is critical to domestic and international chemical assessment activities. Analytical proposals to measure new contaminants should be well justified, using physicochemical properties, modelling results and existing data to demonstrate the potential for long-range transport and Arctic contamination.

Microplastics have been identified as a global pollutant of concern that are capable of long-range transport and can cause adverse effects in wildlife, yet for which there is very little Arctic data. For this reason, the NCP has identified assessing the presence and distribution of microplastics as a contaminant of concern for the current call for proposals.

7.7 Selection of Species for Long-Term Trend Monitoring

It should be noted that the vast majority of samples collected for NCP research and monitoring are collected by hunters from nearby communities as part of their subsistence hunting activities. When possible, GPS coordinates should be captured when samples are collected.

7.7.1 Ringed seal

Ringed seal, a widely distributed species found throughout the circumpolar Arctic, is an important traditional/country food species for Inuit. Contaminants have been measured in samples of ringed seal collected near Arctic communities, such as Resolute, over the past twenty-five years and represent an excellent opportunity to study temporal trends. A number of other Arctic countries also maintain ringed seal monitoring programs which provides the opportunity for international comparisons, particularly through the NCP's participation in AMAP. Ringed seals will be sampled annually under this program with the help of hunters from the communities of Sachs Harbour, Resolute, Arviat and Nain. These four locations represent very different regions in the Canadian Arctic that are experiencing varying degrees of climate change and contaminant input.

7.7.2 Beluga whales

Beluga whales are an important traditional/country food species for many Arctic communities. Samples of beluga have been collected from places such as the Mackenzie Delta, Hudson Bay and

Pangnirtung at various times over the past twenty-five years and analyzed for contaminants. The existing temporal dataset for this species will be augmented with annual sampling at Hendrickson Island in the Mackenzie Delta, Cumberland Sound and Hudson Bay by hunters from Tuktoyaktuk, Pangirtung, and Sanikiluaq. This monitoring plan will allow researchers to compare beluga from the western and eastern Arctic as well as Hudson Bay. These areas have regional differences with respect to the impacts of climate change and contaminant inputs.

7.7.3 Polar bear

Polar bears are the top predators in the Arctic marine food chain and have the highest concentration of some contaminants found in the Arctic. Polar bear meat is consumed by Inuit and the animal has special socio-cultural and economic importance (through commercial hunts) to Inuit communities. As with other species, polar bears have been sampled periodically in the past and analyzed for contaminants. The most extensive temporal dataset for contaminants in polar bear has been collected for Hudson Bay, which is also Canada's most southerly Arctic sea and is expected to undergo the most rapid climate change. Recent results from ongoing monitoring of polar bear in Hudson Bay suggest that the dietary habits of polar bear may already be changing as a result of climate change.

7.7.4 Seabird eggs

The eggs of seabirds have been used for long-term monitoring of contaminants since the 1970s. The Arctic is an important breeding ground for a large number of seabirds that nest on the rocky shores and cliffs of Arctic islands. During the nesting season seabird eggs are a popular food item for Inuit, for whom collecting and consuming eggs is an important spring tradition and source of nutrition. Since 1975, eggs have been collected periodically from Prince Leopold Island and Coats Island by Environment and Climate Change Canada and represent one of the best temporal contaminant datasets. Eggs of thick-billed murre and northern fulmar are collected once a year from each of these colonies to build on the past data and improve our assessment of temporal trends. Eggs are ideal for monitoring because they are relatively easy to collect and do not involve killing an adult bird. Seabird eggs are also collected as part of monitoring programs in other Arctic countries, allowing for international comparisons. The two colonies selected for monitoring are located in the High

Arctic: Prince Leopold Island and, further south in the mouth of Hudson Bay, Coats Island. These two sites provide opportunities to examine changes over time in two different ecosystems undergoing varying degrees of change. This program samples eggs for three additional species (black-legged kittiwake, black guillemot, glaucous gull) every five years, and adult birds of four species (thick-billed murre, northern fulmar, black-legged kittiwake, black guillemot) every ten years.

7.7.5 Sea-run arctic char

This type of Arctic char is widely distributed throughout the Arctic and is one of the most important traditional/country food species for Arctic people. Char represent a widely available and highly nutritious source of food and is promoted by public health authorities. Char is promoted because contaminant levels are thought to be relatively low in char compared with other traditional/country foods, and it is an excellent source of protein, polyunsaturated fatty acids and other micronutrients. Sea-run char have been collected from communities across the Canadian Arctic and the results confirm that contaminant levels are quite low, particularly in comparison with marine mammals. One location in the central/western Arctic (Cambridge Bay), has been selected for continued annual monitoring to ensure that contaminant levels remain low.

7.7.6 Land-locked arctic char

This species of char is also widely distributed in Arctic lakes and rivers. The NCP has been monitoring land-locked char in High Arctic lakes around the community of Resolute and on Ellesmere Island for the past twenty years and has built strong temporal datasets on contaminant levels. The lakes receive contaminants from the atmosphere and, therefore, are good indicators of changing atmospheric inputs of contaminants. High Arctic lakes are also undergoing significant changes related to climate change which could also influence contaminant levels in the fish.

7.7.7 Lake trout and burbot

Lake trout and, to a lesser extent, burbot are also important traditional/country food species for many northern communities and like char both are excellent sources of nutrition. Lake trout and burbot can, however, contain fairly high levels of mercury, especially older fish, which can be a significant source of mercury to people who consume it frequently. As with all of the species in the temporal trends program, trout and

burbot have been monitored for over twenty years in Yukon and the NWT and represent valuable temporal trend datasets. The program will continue to monitor lake trout and burbot annually in the important fishery of Great Slave Lake; burbot caught in the Mackenzie River near Fort Good Hope; and lake trout in Lake Laberge and Kusawa Lake in Yukon.

7.7.8 Caribou

Caribou were selected for temporal trends monitoring because of their importance as a traditional/country food and because there is good historical information on contaminant levels in some herds. Contaminant levels in caribou, however, are among the lowest of any traditional/country food species, and the monitoring program has verified this over the past five years by sampling and analyzing several herds across the Arctic for heavy metals. Two distinct caribou herds were selected for continued annual monitoring of heavy metals: the Porcupine herd and the Qamanirjuaq herd. The range of the Porcupine herd is northern Yukon and Alaska; these areas may be exposed to atmospheric deposition of contaminants originating in Asia, whereas the range of the Qamanirjuaq herd is from eastern NWT to southern Nunavut and the shores of Hudson Bay, which is more likely to receive atmospheric contaminant input from North America

8 - BLUEPRINT FOR COMMUNITY-BASED MONITORING AND RESEARCH

8.1 Purpose

The Community-Based Monitoring and Research subprogram aims to promote the application of community knowledge and perceptions within NCP projects. This includes community led projects that are linked to projects funded under the Human Health and Environmental Monitoring and Research subprograms as well as standalone community-based projects that combine local knowledge with contaminants science.

Project proposals submitted for consideration under the Community-Based Monitoring and Research subprogram are encouraged to consider focusing on priority species and areas as identified in the Environmental Monitoring and Research Blueprint. Please note that assessing presence and distribution of micro plastics in marine ecosystems has been added to the Environmental Monitoring and Research Blueprint for 2017-2018.

Project proposals submitted for consideration under the Community-Based Monitoring and Research subprogram related to human health are encouraged to focus on dietary choices and/or risk perception of traditional/country foods.

To be eligible for funding under this subprogram, projects must be led or co-led by a community organization or a northern based institution. Eligible northern based institutions include Hunters and Trappers Committees, community research organizations, Arctic College facilities (such as Aurora Research Institute, Nunavut Research Institute, etc.), territorial/northern regional governments and other community-based groups. Researchers based in southern universities or federal departments may only apply for funding under this subprogram if the project is to be co-led by an eligible northern based institution. For further guidance on eligibility, please contact the NCP Secretariat.

Project funding will be provided annually and is conditional on an open annual review of proposals. .

The funding envelope for Community-Based Monitoring and Research projects in the 2017-2018 fiscal year is $250,000.

8.2 Introduction

In this call for proposals the Northern Contaminants Program (NCP) is seeking proposals to conduct Community-Based Monitoring and Research projects on changes in health and the environment. Details related to the type of projects that the NCP will fund are provided in this Blueprint.

Projects currently being carried out under the Environmental Monitoring and Research subprogram are measuring the temporal trends of contaminants in specific fish and wildlife species at a limited number of locations and conducting research to improve our understanding of how contaminants move through the environment.

Projects under the Human Health subprogram focus on research issues and questions to enable Northerners to assess, understand and better manage the health risks in Northern Canada related to the long-range transport of contaminants and their subsequent presence in people and traditional/country foods.

8.3 Community Knowledge and Environmental Trends

It has become increasingly evident that the changing climate is having significant effects on ecosystem structure and function in the Arctic. These ecosystem changes could influence contaminant uptake and accumulation in the food web, which in turn could affect contaminant concentrations in species that the NCP is monitoring such as caribou, ringed seal, beluga and polar bear (complete list of species available in Environmental Monitoring and Research Blueprint). The NCP Environmental Monitoring and Research program measures year-to-year changes in contaminant concentrations in an effort to assess long-term trends, which it is hoped will reflect global efforts to reduce contaminant emissions. In order to make the link between trends and emissions, there is a need to understand the cause of the trends, and this requires knowledge of how the ecosystem has changed over the monitoring period.

In order to survive/thrive in the harsh Arctic conditions, community members have to be keen observers of the environment and biological systems that sustain their communities. These observations have been made for thousands of years and throughout the

period of recent dramatic climate-driven changes in the Arctic and since the NCP began its monitoring program. Hunters and community members will continue to make these observations. Therefore, hunters and community members know how ecosystems have changed in the past, the current status of the ecosystems, and are in the best position to assess future trends and ground truth modeling results. With ongoing observations, hunters and community members will also be able to collect the data that supports their local priorities in a way that can help them to quantify or test relevant predictions. This understanding of Arctic ecosystems and how they have changed can make a significant contribution to the understanding of temporal trends in contaminant concentrations Proposed projects should systematically document these local observations or indicators in a way that is understandable for the community and other hunters, and also useful to contaminant research scientists.

Project teams are encouraged to include researchers who have expertise working with communities and using participatory research methods. Project teams will be encouraged to collaborate with past and current NCP scientists whose work pertains to the species and focal ecosystem proposed for study by the project team. This is to ensure that the study will provide information relevant to ongoing contaminant trend monitoring. The goal of the project should be to document and analyse local observations and traditional knowledge on the ecology of key NCP monitoring species and changes over time. Please contact the NCP Secretariat for contact information and further details on past and current NCP scientists that have worked on species and focal ecosystems in your area of interest.

8.4 Community Studies on Diet Choices and Risk Perception of Traditional/Country Foods

Many Northern communities are facing economic, political, social and environmental changes that influence human health and well-being. As a result, the need for timely, relevant information about food choices and safety has never been greater. In order to fully understand how people perceive the dietary choices available to them, and the extent to which contaminants play a role in their choices, it is important to have up-to-date information from the communities. Additionally, a further understanding of how Northerners perceive the risks of long-range,

transboundary contaminants is important, because this can help us to communicate information about contaminants in a way that is more effective and useful for communities. For example, a message about contaminants in certain food sources may not lead to a change in people's behaviour if contaminants are not perceived to be a risk.

Projects in this category may focus on how risk perceptions and dietary choices have changed over time or may focus only on current perceptions about contaminant risk in relation to food.

The following are projects that could be funded in this category:

- Community survey of the factors influencing household diet choices and whether knowledge of contaminants plays a role
- Study of a community's perception of the risks associated with long-range contaminants in traditional/country foods

8.5 Other Community-based Monitoring and Research Initiatives

It is recognized that some communities want to become more engaged in leading research on contaminants at their location. The NCP is, therefore, soliciting community and/or regionally led proposals to conduct small-scale and short duration monitoring activities related to **contaminants from long-range sources**. Projects related to local sources of contaminants (i.e. local contaminated sites) are not eligible for funding under the NCP.

Projects under this category could include sampling and analysis of important traditional/country foods for contaminants that may pose a risk to human health and for which recent contaminant information is not available. This is also an opportunity for communities to become involved with new passive air sampling tools for persistent organic pollutants (POPs). Educational and training opportunities for local students interested in environmental science, public health and/or community wellness could be incorporated into project activities. Applicants are encouraged to build educational/training elements into their proposals.

8.6 Further Guidance

Projects under the Community-Based Monitoring and Research subprogram should be coordinated at a regional level with the assistance of the pertinent

Regional Contaminants Committees (RCCs). Proposals to measure contaminants in traditional/country foods should be developed in consultation with regional health authorities so that data can be properly used for dietary exposure assessment. Regional health authorities are also responsible for developing and communicating health-related information in the region and will, therefore, need to be key partners in any community-based monitoring project with implications for human health.

Projects under the Community-Based Monitoring and Research subprogram that relate to the Environmental Monitoring and Research subprogram should complement, not duplicate, existing trend monitoring. Applicants should also look for ways to complement other programs (e.g., the Cumulative Impacts Monitoring Program (CIMP) and the Nunavut General Monitoring Plan (NGMP)) and build on existing monitoring activities. Territorial departments of natural resources and other regional wildlife and fisheries management agencies may also be useful project partners.

Applicants wishing to submit a proposal under the Community-Based Monitoring and Research Blueprint are encouraged to work with NCP scientists who have expertise in the methods needed to accurately measure contaminant levels in environmental samples. It is important that the results of community knowledge projects be of the same high quality as the results produced under other NCP subprograms. In addition applicants are encouraged to consult with experts in participatory research methods to ensure rigour in the research design and methods expected in these kinds of projects. Participating analytical laboratories must follow rigorous quality assurance/quality control (QA/QC) practices and participate in the NCP's interlaboratory QA/QC program. Contact the NCP secretariat for more details on the QA/QC program.

When looking for guidance on proposal development, including ideas for potential projects and partners, applicants are encouraged to contact the chairs of their respective RCCs (see Contacts in Appendix B).

9 – BLUEPRINT FOR COMMUNICATIONS, CAPACITY AND OUTREACH

9.1 Introduction

This Blueprint outlines the funding priorities under the Communications, Capacity and Outreach (CC&O) subprogram of the Northern Contaminants Program (NCP) for 2017–2018. The amount of funding available this year is:

- $150,000 for projects as described under section 9.5.1, 9 5.2 and 9.5.3 below; and
- $450,000 for Core Communications and Capacity-Building as described under section 9.5.4 below

9.2 Goal and Objectives

The overall goal of the CC&O subprogram is to support and facilitate activities and initiatives that: (a) raise awareness of contaminants in the North from long-range sources and the work that is under way to address the issue; (b) help to support food choice decisions among consumers of traditional/country foods; and (c) build capacity in the North to participate in and/or contribute to addressing these issues.

9.3 Context

The NCP has been communicating about long-range contaminants and building capacity in the North for more than twenty years. In that time, much has been learned about the presence, trends and health effects of contaminants in the North, as well as about how to communicate this complex information, and how best to engage Northerners in research, monitoring and outreach activities. There have been many outreach efforts to target audiences over the years using a variety of methods (e.g., posters, newsletters, development of school curricula, community tours, radio call-in shows, regional and community workshops, frontline training courses and Elder-scientist retreats).

The presence and effects of long-range contaminants is one of several environmental, social and health issues faced in the North. NCP-funded studies in which community members across the North were surveyed on the importance of contaminants information in their food choices have concluded that, in most cases, the contaminant issue is low on the list of driving forces for community members in choosing what to eat.

Given this finding, the NCP's approach reflects an understanding that information about contaminants is best shared with northern community members within the context of other relevant information and concerns. For example, instead of creating focused workshops and newsletters entirely devoted to the issue of contaminants, public health authorities have deemed it appropriate to insert contaminant messaging into existing public health messages and education efforts. This type of work is encouraged by the NCP. Wherever possible, NCP communications work should be integrated into already existing avenues for communication.

9.4 Links with other NCP Subprograms

The Communications, Capacity and Outreach subprogram is designed to be complementary to the other three NCP subprograms (Human Health, Environmental Monitoring and Research and Community-Based Monitoring and Research). These subprograms are designed to be complementary, and projects that link two or more subprograms are encouraged.

Monitoring and research projects supported through other NCP subprograms (e.g., Human Health; Community-Based Monitoring and Research; Environmental Monitoring and Research) may also have communications/capacity-building/outreach aspects to them and which are to be integrated within the scope and budgets of their main project funding and work plan.

9.5 Priorities for Activities in 2017-2018

The NCP is seeking proposals for projects and activities that are cross-cutting and strategic, and that are broader in scope than project-specific results dissemination, with a focus on:

- Assessment of promising practices in communication and engagement (section 9.5.1)
- Delivery of synthesized contaminants messages (section 9.5.2), and
- Development and assessment of new tools, resources, and approaches for communication (section 9.5.3).

A total of $150,000 is available for these three priorities.

9.5.1 Assessment of promising practices in communication and engagement

This priority area provides opportunities to gather examples of promising practices and assess lessons learned with respect to communicating about contaminants. This includes looking at past NCP communication and engagement methods and activities that have been especially effective, as well as those taking place within other northern programs, and looks into the potential for use of new approaches to communications (e.g. use of new technologies) in a northern context. The goal of this priority is to bring together promising practices, including the evidence describing their impact where possible, and make them readily available to NCP researchers and frontline communicators. Projects could be regionally-based, or could be centred on a particular type of research (e.g., human health communications, or methods of engagement around wildlife monitoring). Activities may include:

- Identifying and assessing practices in taking project results and putting them in an easily accessible and understandable format that communicators of contaminants information, including regional health authorities, can use to make decisions.

9.5.2 Delivery of synthesized contaminants messages

This priority area supports the delivery of synthesized messages related to contaminants, particularly as presented in a regional context, bringing together information from several NCP projects, and building on the results and key messages from the most recent Canadian Arctic Contaminants Assessment Reports ~~III~~ and AMAP reports. Note that delivery of individual project results to the communities in which sampling took place falls under the responsibility of the Human Health, Community Based

Monitoring, or Environmental Monitoring and Research subprograms.

Activities may include:

• Delivering a synthesis or compilation of the results of several projects on contaminants in one or more regions (e.g., regional results workshops, posters, newsletters). These syntheses should be placed in the proper public health context for the region and integrated among related projects (even from different funding programs) occurring in the same location.

• Delivering a regionally-focused workshop, especially if there is significant co-funding and a demonstrated need to disseminate information (e.g., elevated levels of contaminants and a perceived health risk related to traditional/country foods).

• Developing messages and communication tools that highlight the 25 years of work undertaken in the NCP.

9.5.3 Development and assessment of new tools and resources for communication and engagement

This priority provides the opportunity for projects to develop and, when possible, assess new tools and methods of communication and engagement. It allows for the exploration and assessment of whether technologies like online social media, webinars, and internet-based applications and methods would be effective in communicating about long-range environmental contaminants.

While there are many barriers in the North to extensive use of internet-based tools, projects under this priority could assess which regions would be best placed to use new communications technologies, and which methods would be most successful in reaching an audience to provide information that assists informed decision making by individuals and communities in their food use.

9.5.4 Core communications and capacity building

The NCP supports Regional Contaminants Committees (RCCs) in five regions (Yukon, Northwest Territories, Nunavut, Nunavik, Nunatsiavut) and Inuit Research Advisors (IRAs) in four regions (Inuvialuit Settlement Region, Nunavut, Nunavik, Nunatsiavut), all of which play a key role

in the communications network of the NCP.

Proposals for RCCs and IRAs are invited from the organizations listed as Project Leaders in the table below. A total of $450,000 is available for these projects.

Project	Project Leader
Yukon Contaminants Committee	INAC-Yukon
NWT Regional Contaminants Committee	INAC-NWT
Nunavut Environmental Contaminants Committee	INAC - Nunavut
Nunavik Nutrition and Health Committee	Nunavik Regional Board of Health and Social Services
Nunatsiavut Government Research Advisory Committee	Nunatsiavut Government
Inuit Research Advisors • Inuvialuit Settlement Region • Nunavut • Nunavik • Nunatsiavut	• Inuvialuit Regional Corporation • TBD • Kativik Regional Government • Nunatsiavut Government

9.5.4.1 RESPONSIBILITIES AND ACTIVITIES OF A REGIONAL CONTAMINANTS COMMITTEE

Regional Contaminants Committees act as NCP representatives in the North, liaising with communities to inform them of NCP activities, but also to bring community concerns and issues back to the program. They support and assist NCP researchers to develop communications plans, build northern capacity within their projects, and consult with appropriate northern stakeholders. Activities may include, but are not limited to:

- Facilitating a contaminants communications network that ensures community members are informed and involved in contaminant related activities
- Identifying regional and community priorities and information gaps related to environmental contaminants and human health research
- Providing updates on research activities in the region that relate to environmental contaminants
- Maintaining a current catalogue of contacts and resource materials regarding environmental contaminants
- Assisting in the development of appropriate communication strategies to effectively relay information regarding contaminants
- Reviewing NCP proposals, Blueprints and communication materials related to the region on an annual basis
- Providing advice to contaminants researchers working in the region on matters related to community engagement, consultation, research permitting, results communication, and capacity building and training.

9.5.4.2 RESPONSIBILITIES AND ACTIVITIES OF INUIT RESEARCH ADVISORS

The Northern Contaminants Program, along with ArcticNet, support regional Inuit Research Advisor (IRA) positions in each of the four Inuit Land Claim regions of the Canadian Arctic. The Inuit Research Advisors can help facilitate research in Inuit regions for these programs on contaminants, climate change and environmental health and engage Inuit in undertaking research activities of

importance to their communities. Activities should include, but are not limited to:

- Participating in meetings of Regional Contaminants Committee and informing committee of ArcticNet activities, as well as activities of their host organization
- Contacting researchers who have been funded to inquire about the communication of their findings and the need to form building capacity in communities
- Contacting all NCP researchers to see what they plan to communicate, to whom and when, and present this information at your Regional Contaminants Committee meetings
- Reviewing and commenting on the messages being developed by NCP researchers. (as part, or independent, of RCCs)
- Completing a Research Monitoring Form each time they are contacted by a researcher, and submitting all completed forms with the annual Synopsis Report.

10 – PROGRAM COORDINATION AND ABORIGINAL PARTNERSHIPS GUIDANCE DOCUMENT

The information below describes how funding under the *Program Coordination and Aboriginal Partnerships* subprogram will be allocated.

The funding available for projects under this subprogram in the 2017–2018 fiscal year is set at $1.1 million for ongoing projects.

10.1 Coordination and Administration of the Northern Contaminants Program

The Northern Contaminants Program (NCP) Secretariat prepares two proposals for review by the NCP Management Committee to cover the costs and expenses of: (1) administering the program; and (2) for coordination of NCP activities in related international initiatives, particularly the Arctic Monitoring and Assessment Programme (AMAP), a Working Group under the Arctic Council. These proposals include costs for NCP meetings, publications, website and program-wide communications, data management, and a quality assurance/quality control (QA/QC) program.

10.2 Aboriginal Partner Capacity Building

The four northern Aboriginal Partners (Inuit Tapiriit Kanatami (ITK), Inuit Circumpolar Council (ICC (Canada)), Dene Nation and Council of Yukon First Nations (CYFN)) will be funded for their active participation in the management and implementation of the NCP and its activities, both nationally and in the region(s) for which they are the relevant Aboriginal organization. This is to ensure that the NCP incorporates and addresses Aboriginal specific concerns and needs into its planning and program delivery, and to facilitate the

exchange of information and coordination of activities among and between the NCP community and Aboriginal organizations at various levels and Northern communities. Activities may include, but are not limited to:

- Participating in and preparing for Management Committee meetings (twice annually in-person plus by teleconference, as needed).
- Participating in and preparing for Regional Contaminants Committee meetings
- Participating in meetings of NCP subcommittees and/or task groups, and other related initiatives nationally or internationally
- Reviewing regionally relevant NCP projects and consulting with project leaders and communities as necessary.
- Conducting outreach activities related to the NCP
- Participating in the NCP Results Workshop and contributing to its success in part by assisting the NCP Secretariat in workshop planning and delivery
- Providing timely input and feedback in the development of and/or revisions to key NCP documents.

APPENDIX A – CONTAMINANTS OF CONCERN TO THE NCP

The Northern Contaminants Program (NCP) is concerned with contaminants that reach the Arctic via long-range transport from source areas around the globe. These include a large number of persistent organic pollutants (POPs) and heavy metals, particularly mercury. These contaminants can achieve elevated concentrations in the tissues of Arctic wildlife and present a toxicological risk to wildlife and humans who consume them.

HEAVY METALS

The UNEP Minamata Convention on Mercury, a legally-binding agreement to cut emissions and releases of mercury to the environment, was formally adopted in October 2013 and now includes 128 signatures and 8 ratifications. It will enter into force once at least 50 countries ratify the agreement, advancing an international effort to reduce global mercury pollution and protect the environment and human health. The NCP seeks **annual monitoring** of mercury from NCP projects as identified in the blueprints for Environmental Monitoring and Research, Human Health, and Community Based Monitoring and Research.

Table A1. Metals of Concern for the NCP (eligible for annual sampling)

Mercury
Cadmium
Lead

PERSISTENT ORGANIC POLLUTANTS

Most of the POPs that have been found in the Arctic environment are regulated through international agreements including the United Nations Environment Programme (UNEP) *Stockholm Convention* and the United Nations Economic Commission for Europe's *Convention on Long-range Transboundary Air Pollution* (*CLRTAP*). Both of these Conventions routinely

assess candidate chemicals and, when faced with strong evidence to suggest that a certain compound should be considered a POP, they are added to the convention annexes and regulated appropriately. These conventions rely heavily on NCP data to support the assessment of candidate POPs and to evaluate the effectiveness of the regulations at reducing POPs in the environment.

Researchers are asked to rationalize an analytical program and schedule that best suits their proposed project. Schedule A and B identify persistent organic pollutants (POPs) of concern for the NCP and are substances that are currently included in, or being considered by, international conventions. An important role for the NCP is providing monitoring data on substances that are already covered by these conventions. However, it is also very important that the NCP provide information on substances that are under consideration for inclusion in these conventions.

The NCP participates in the annual Stockholm Convention on POPs – POP Review Committee (POPRC). In 2015, the POPRC adopted the risk management evaluation on decabromodiphenyl ether (decaBDE) and recommended that the Conference of Parties consider listing decaBDE in Annex A to the Convention with specific exemptions for some critical spare parts, to be defined, for the automotive and aerospace industries. In 2016 the Committee also adopted the risk management evaluation on short-chained chlorinated paraffins (SCCPs) and recommended that it too be listed under Annex A of the Convention. The Committee also adopted risk profiles for pentadecafluorooctanoic acid (PFOA) and dicofol, which will both now undergo risk management evaluation for review at the next POPRC meeting in 2017.

For more information on the Stockholm Convention and the work of the POP Review Committee (POPRC), please visit http://chm.pops.int.

Schedule A: (Legacy POPs)

COMPOUND	DESCRIPTION OF USE/SOURCE
Aldrin	Pesticide applied to soils to kill termites, grasshoppers, corn rootworm, and other insect pests. Used on crops such as corn and cotton. Can also kill birds, fish, and humans.
Chlordane	Used extensively to control termites and as a broad-spectrum insecticide on a range of agricultural crops, such as vegetables, small grains, potatoes, sugarcane, sugar beets, fruits, nuts, citrus, and cotton.
Dieldrin	Used to control termites and textile pests. Also used to control insect-borne diseases and insects living in agricultural soils.
DDT	Insecticide used on agricultural crops, primarily cotton, and insects that carry diseases such as malaria and typhus.
Endrin	Insecticide sprayed crops such as cotton and grains. Also used to control rodents such as mice and voles.
Mirex	Insecticide used to combat fire ants, termites, and mealybugs. Also used as a fire retardant in plastics, rubber, and electrical products.
Heptachlor	Insecticide used against soil insects and termites. Also used against some crop pests and to combat malaria.
hexachlorobenzene (HCB)	Kills fungi (e.g. wheat bunt) that affect food crops. Also an industrial chemical used to make fireworks, ammunition, synthetic rubber, and other substances; a by-product of the manufacture of certain industrial chemicals; and an impurity in several pesticide formulations.
PCBs	Used for a variety of industrial processes and purposes, including electrical transformers and capacitors, heat exchange fluids, paint additives, carbonless copy paper, and plastics.
Toxaphene	Insecticide used on cotton, cereal grains, fruits, nuts, and vegetables. Also used to control ticks and mites in livestock.
polychlorinated dibenzo-p-dioxins (PCDD)	Produced unintentionally due to incomplete combustion, and during the manufacture of pesticides and other chlorinated substances. Emitted mostly from the burning of hospital, municipal, and hazardous waste; and from automobile emissions, peat, coal, and wood.
polychlorinated dibenzofurans (PCDF)	Produced unintentionally from many of the same processes that produce dioxins, and also during the production of PCBs. Have been detected in emissions from waste incinerators and automobiles.

Schedule B: (New and Emerging POPs)

COMPOUND	DESCRIPTION OF USE/SOURCE
alpha hexachlorocyclohexane (alpha-HCH)	Intentional use as an insecticide was phased out but this chemical is still produced as an unintentional by-product of lindane.
beta hexachlorocyclohexane (beta-HCH)	Intentional use as an insecticide was phased out but this chemical is still produced as an unintentional by-product of lindane.
chlordecone	Agricultural pesticide
hexabromobiphenyl	Flame retardant
hexabromocyclododecane (HBCD)	Used as a flame retardant, providing fire protection during the service life of vehicles, buildings or articles, as well as protection while stored. Main global use is in polystyrene foam insulation, and in textile applications and electric and electronic appliances.
hexabromodiphenyl ether and heptabromodiphenyl ether	Flame retardant
lindane	Broad-spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment, and against ectoparasites (e.g. fleas and lice) on people and other animals.
pentachlorobenzene (PeCB)	Was used in PCB products, dyestuff carriers, as a fungicide, a flame retardant, and as a chemical intermediate. Also produced unintentionally during combustion, thermal and industrial processes, and present as impurities in products such as solvents or pesticides.
perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)	PFOS is both intentionally produced and an unintended degradation product of related manmade chemicals. The current intentional use of PFOS is widespread and includes: electric and electronic parts, fire fighting foam, photo imaging, hydraulic fluids, and textiles.
endosulfan and its related isomers	Insecticide used since the 1950s to control crop pests, tsetse flies, ectoparasites of cattle, and as a wood preservative. As a broad-spectrum insecticide, endosulfan is currently used to control a wide range of pests on crops including coffee, cotton, rice, sorghum, and soy.
tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial	Used as a flame retardant

pentabromodiphenyl ether, or PBDE)	
Pentachlorophenol (PCP) and its salts and esters	Used as a wood preservative in the 1930s and has had a variety of other applications (e.g. biocide, insecticide, fungicide, disinfectant, defoliant, anti-sapstain agent and anti-microbial agent). It has been also used in the production of textiles.
polychlorinated naphthalenes (PCNs: di, tri, tetra, penta, hexa, hepta, octa)	Used in wood preservation, as additive to paints and engine oils, and for cable insulation and in capacitors
Hexachlorobutadiene (HCBD)	Is mainly created as a by-product in the manufacture of chlorinated hydrocarbons like tri- and tetrachloroethene and tetrachloromethane and was/is used as a fumigant.
PFOA	Used either in direct applications in the production of fluoroelastomers and fluoropolymers, with polytetrafluoroethylene (PTFE) being the most important fluoropolymer. PFOA-related substances are used in fire-fighting foams, wetting agents and cleaners. In textiles and leather, paper and cardboard (e.g. food packaging), paints and lacquers and other uses (non-woven medical garments, floor waxes and stone/wood sealants, thread sealant tapes and pastes, adhesives, products for apparel) side-chain fluorinated polymers are used.
Dicofol	An organochlorine pesticide that is chemically related to DDT. The substance is a miticidal pesticide and acaricide used in many countries around the world on a wide variety of fruit, vegetables, ornamental and field crops.
Short-chained chlorinated paraffins (SCCPs)	Used in metal working fluids, sealants, as flame retardants in rubbers and textiles, in leather processing and in paints and coatings.
Deca-BDE	Used as an additive flame retardant, and has a variety of applications including in plastics/ polymers/composites, textiles, adhesives, sealants, coatings and inks. Also used in housings of computers and TVs, wires and cables, pipes and carpets. It is used in commercial textiles, mainly for public buildings and transport, and in textiles for domestic furnitures.

APPENDIX B – CONTACT INFORMATION

NCP Secretariat

Sarah Kalhok Bourque
Chair, NCP Management Committee
Indigenous and Northern Affairs Canada
E-mail: Sarah.Kalhok@aandc-aadnc.gc.ca
Tel: (819) 934-1107

Simon Smith
Indigenous and Northern Affairs Canada
E-mail: Simon.Smith@aandc-aadnc.gc.ca
Tel: (819) 934-1022

Scott Tomlinson
Indigenous and Northern Affairs Canada
E-mail: Scott.Tomlinson@aandc-aadnc.gc.ca
Tel: (819) 639-7430

Jason Stow
Indigenous and Northern Affairs Canada
E-mail: Jason.Stow@aandc-aadnc.gc.ca
Tel: (204) 421-6476

Yukon

Yukon Regional Contaminants Committee Coordinator
Ellen Sedlack
Indigenous and Northern Affairs Canada
Email: ellen.sedlack@aandc-aadnc.gc.ca
Tel: (867) 667-3326

Northwest Territories

NWT Regional Contaminants Committee Coordinator
Carmon Bessette
Indigenous and Northern Affairs Canada
E-mail: Carmon.Bessette@aadnc.gc.ca;
Tel: (867) 669-2416; Fax: (867) 669-2721

Inuit Research Advisor (for research in the Inuvialuit Settlement Region)
Shannon O'Hara
Inuvialuit Regional Corporation
E-mail: sohara@irc.inuvialuit.com
Tel: (867) 777-7026; Fax: (867) 777-2138

Nunavut

Nunavut Environmental Contaminants Committee Co-Chair a
Andrew Dunford
Nunavut Tunngavik Incorporated
E-mail: adunford@tunngavik.com
Tel: (867) 975-4904 or 1-888-646-0006;
Fax: (867) 975-4943

Nunavut Environmental Contaminants Committee Co-Chair
Jean Allen
Indigenous and Northern Affairs Canada
E-mail: Jean.Allen@aandc-aandc.gc.ca
Tel: (867) 975-4732

Nunavik

Nunavik Nutrition and Health Committee
(Nunavik's Regional Contaminants Committee)
Dr. Francoise Bouchard
Nunavik Board of Health and Social Services
E-mail:
Francoise.Bouchard.reg17@ssss.gouv.qc.ca
Tel: (819) 964-2222; Fax: (819) 964-2711

Inuit Research Advisor
Vacant
Kativik Regional Government

Nunatsiavut

Chair, Nunatsiavut Health and Environment Research Committee
Rodd Laing
Nunatsiavut Government
E-mail: rodd_laing@nunatsiavut.com
Tel: (709) 922-2567; Fax: (709) 922-2931

Inuit Research Advisor
Carla Pamak
Nunatsiavut Government
E-mail Carla_Pamak@nunatsiavut.com
Tel: (709) 922-2380; Fax: (709) 922-2504

APPENDIX C – GUIDELINES FOR RESPONSIBLE RESEARCH

I. Introduction

The following document represents a guideline for communications planning to assist Northern Contaminants Program (NCP) project leaders in initiating community contacts and developing research agreements with communities. Ultimately, the objective is that communications/ participation planning will become integral to research proposal development.

II. Key points

The following are key points to consider when planning communications and community participation in NCP projects:

A. ENGAGEMENT

- Engage early with the Regional Contaminants Committees (RCCs) and Inuit Research Advisors (IRAs), before and during the development of a proposal.
- During engagement, researchers should explain the potential beneficial and harmful effects of the research on individuals, communities and/or the environment.
- No undue pressure should be applied to obtain consent for participation in a research project.
- Greater consideration should be placed on the risks to cultural values than to potential contributions of the research to knowledge.

B. RESEARCH OBLIGATIONS

- Research should include community participation in the identification of research topics, traditional knowledge and priorities.
- Community participation in project planning and implementation goes beyond "moral" obligations; rather it is a legal and constitutional requirement associated with land claims.

- For all parties to benefit from research, efforts should be made, where practical, to employ and train local (especially Indigenous) researchers and assistants.
- It is important to develop approaches to research that are responsive to local or regional needs. The Regional Contaminants Committees (RCCs) and Aboriginal organizations are good mechanisms for achieving this.
- Research must respect sacred sites, cultural materials, and cultural properties.
- Subject to requirements for confidentiality, publications should give appropriate credit to everyone who contributes to the research.
- All project leaders are required to prepare a report on their project for inclusion in the annual NCP Synopsis of Research report to be used by the RCCs for communications purposes.

C. RESEARCH RELATIONSHIPS

- Community-researcher relationships should be established early on in the project planning process, outlining details of "level of engagement" and "mutual obligations" for each partner. This will ensure a meaningful two-way exchange of information.
- Researchers and communities may wish to set out the parameters of their agreements and understandings in a Memorandum of Understanding.
- From the NCP perspective, development of researcher-community relationships is a dynamic and evolving process. As research projects progress, common elements will emerge regarding the perceptions, needs, and resource/capacity strengths of individual communities and researchers, including their criteria and preferred form of participation in scientific research projects.
- The right to refuse participation always rests with the individual at any point in any study.

D. COMMUNICATIONS

- Researchers are advised to contact the appropriate Regional Contaminants Committee (RCC) and Inuit Research Advisor (IRA) for advice on communications planning during the development of their proposal.
- Researchers should incorporate advice on communication into their proposal. Communication of results should include consideration of media other than printed reports. Examples of effective methods for information dissemination include: face-to-face discussion, local radio, DVD, pamphlets, videos and web sites. Many of these can successfully present highlights of several projects or categories of research activity over several years. Public presentations that allow for little interaction are seldom regarded as useful. RCCs will direct the project leader if communication of results is required.
- Communication support materials, such as pamphlets, posters and videos, should not be seen as solutions to communications problems, but as tools to be used in combination with person-to-person communication. Communications support materials should be sent to the appropriate Territorial/regional Contaminants Committee for review.
- Translation of summary reports into local languages is recognized as critical and should be done wherever possible/appropriate.

E. REPORTING OF SPECIFIC HEALTH RISK RESULTS

- The existing protocol for reporting results from human health risk assessments (from analysis of fish/wildlife contaminants burdens) must be adhered to. The decision to conduct such assessments is part of this protocol.
- Researchers must ensure the accuracy of their results since these may influence decisions and policy that can directly affect individuals and communities.
- There is a process to prepare contingency plans if results are reported that require some form of intervention or action, in relation to reporting of individual human results. This is done by the responsible health authority (e.g. regional departments of health and social services) in consultation with

the Regional Contaminants Committees, the four NCP Aboriginal Partners, and the NCP Management Committee.