PLAIN LANGUAGE VERSION

A REVIEW OF THE PHASE II ENVIRONMENTAL SITE ASSESSMENT AND THE HUMAN HEALTH & ECOLOGICAL RISK ASSESSMENT OF THE NANISIVIK MINE

1.0 INTRODUCTION

Almost all routine human activities in today's world can be shown to create unnatural substances or enhance the presence of naturally occurring substances to the point where they become a threat to human and environmental health. These natural and unnatural substances are then called "contaminants." Some routine human activities, such as driving a snowmobile or truck, produce such small amounts of contaminants that human and environmental health is not a major concern. Other human activities, especially those large-scale activities such as mining, produce many more contaminants. When a mine shuts down after several years of operation, the question is usually asked as to whether the total amount of contamination released over the period of mine operation was large enough to cause problems of human health or adverse ecological effects, or both.

To determine the answer to this question for Nanisivik, three different studies were conducted. These studies included the land occupied by the Nanisivik Mine area, the town of Nanisivik and the associated facilities, such as the dock area. The first study identifies and quantifies the contaminants present and determines their pervasiveness. This study (called a Phase II Environmental Site Assessment) reviews historical data and collected new data at the site. Once the ESA is completed, two additional studies were conducted to determine if the contaminants found in the Nanisivik area pose a threat to humans living in the area and to the animal and plant life of the area. These studies are called the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA), respectively, and were combined in a single document identified as the Human Health and Ecological Risk Assessment (HHERA).

2.0 REVIEW OF THE PHASE II ENVIRONMENTAL SITE ASSESSMENT

The purpose of the Phase II Environmental Site Assessment (ESA) was to identify and delineate the surface area, depth and severity of environmental contamination related to mine activities. The ESA was to also include an evaluation of the chemical data in relation to federal regulatory guidelines for environmental quality. A review of the ESA found several problems with the document.

The first problem was the way in which the document was organized and the manner in which the information and data collected was presented.

The main sections of the ESA were:

1. Introduction
    - 1.1 Project Objectives
    - 1.2 Background on Closure and Reclamation Plan
    - 1.3 Overview of Nanisivik Mine, Town and Related Facilities
    - 1.4 Regulatory Setting/Framework
    - 1.5 Scope of Work
2. Pre-mining Environmental Setting
    - 2.1 Climate

- 2.2 Permafrost
- 2.3 Geology
- 2.4 Topography
- 2.5 Hydrology
- 2.6 Vegetation
- 2.7 Soil
- 2.8 Mammals
- 2.9 Birds

3. Environmental Site Assessment Setting
   - 3.1 Marine Sediments
   - 3.2 Air Quality / Dust Monitoring
   - 3.3 Surface Water Quality
   - 3.4 Acid-Rock Drainage Testing
   - 3.5 Possible Contaminants of Potential Concern
4. Site Development and Operations
   - 4.1 Description of Facilities and Mining Activities
   - 4.2 Development Sequence
5. Phase II Environmental Site Assessment
   - 5.1 Methodology
   - 5.2 Observations
   - 5.3 Results
6. Contaminants and Areas of Environmental Concern
   - 6.1 Contaminants of Environmental Concern
   - 6.2 Areas of Environmental Concern

By contrast, the form of presentation recommended by the Canadian Standards Association (CSA) is indicated as follows:

- Introduction (this would include sections 1.1, 1.2 of the ESA)
- Background (this would include all information and data collected prior to the start of the Phase II ESA in July, 2002, such as found in sections 1.3, 1.4, 2.1 to 2.9, 3.1 to 3.4, 4.1 and 4.2)
- Site Investigation Methodology (this would include sections 1.5 and 5.1)
- Findings (this would include all information collected specifically for the ESA in July 2002 such as found in sections 5.2 and 5.3)
- Evaluation of Findings (this would include information from sections 3.5, 5.3, 6.1, and 6.2 and be a synthesis of information during July 2002 with those data previously collected.
- Conclusions (this section does not exist in the ESA as currently presented)
- Qualifications of Assessor (this section does not exist in the ESA as currently presented)
- References and supporting documentation
- Appendices

Another problem with the ESA was that the ESA described the surface materials in the Nanisivik area as "soil" and then cited a report by B.C. Research that soil formation did not occur in the Nanisivik area. If "soil formation" does not occur, should the surface material at Nanisivik be called soil? Several definitions of the word "soil" were examined from soil science textbooks and a federal government soil science glossary. The surface material at Nanisivik did not meet the strict definitions of soil that were provided by the references.

This raised another question. The environmental quality guidelines used to judge whether or not contamination was present in surface material at Nanisivik were based on "soil" as described in the soil science textbooks and by the federal department of agriculture (that is, soils such as those found in southern Canada). The intended future land use of the mine was identified as "Arctic wild land." However, there are no guidelines for the contamination of Arctic wild lands. Thus, the guideline for soils in parkland/residential areas in southern Canada was used to judge the amount of contamination in surface material in the high Arctic at Nanisivik. The review of the ESA concluded that this was not a reasonable approach for the determination of "contamination" at Nanisivik.

The ESA identified several contaminants of concern that were supposedly associated with the mining activity that had taken place over previous 25 years. These were grouped into categories identified as:

- Volatile Petroleum Hydrocarbons
- Extractable Petroleum Hydrocarbons (including the specific hydrocarbon Naphthalene)
- Chlorinated Ethenes; and
- Trace Elements (specifically cadmium, copper, zinc and lead).

A reason for the identification of chlorinated ethenes as a contaminant of concern was not provided in the text of the ESA. In fact, no reference to chlorinated ethenes could be found anywhere in the text. In addition, laboratory analytical reports for these compounds could not be found. The source of the chlorinated ethenes was stated to be xanthate. However, this could not be verified in a chemical dictionary or other sources of chemical information. Thus, there does not appear to be any supporting evidence for the identification of chlorinated ethenes as contaminants of concern.

While specific areas of the town of Nanisivik were determined to be contaminated with petroleum hydrocarbons, almost all of these areas were restricted to the surface material beneath aboveground diesel or heating oil storage tanks. This contamination was often characterized as "localized." The presence of metallic trace elements was also determined, in many cases, to be "localized" or present in small amounts.

Although explicit conclusions as to the nature of the overall contamination at the mine, in the town and at the dock area were not provided in the ESA, it was implied that environmental contamination which had occurred as a result of mining activities had not been extensive or severe. The corresponded with the conclusion of a 1992 report concerning trace element contamination at Nanisivik in which the "scale" of contamination was characterized as "minor."

3.0 REVIEW OF THE HUMAN HEALTH RISK ASSESSMENT

A Human Health and Ecology Risk Assessment (HHERA) was prepared to predict if exposures to surface soil contamination found at the Nanisivik Mine may lead to harmful health effects on people or the environment. AMEC Earth & Environmental Limited (AMEC) was asked to review the HHERA determine if the HHERA adequately identifies the health risks. The human health component of the HHERA is a scientific tool that is intended to evaluate health risks objectively. HHERAs are regularly used by various government agencies for numerous applications including food and drug testing and contaminated site remediation. The current HHERA was designed to evaluate the risks associated with current and future exposures, not historical

exposures. The risks were primarily evaluated by comparison of the surface soil concentrations of the contaminants of concern with the calculated Soil Quality Remediation Objectives.

The HHERA evaluates the risk of the former mine by looking at three study areas based on future uses of the land *i.e.,* Town Area, Dock Area, and General Mine Area. The HHERA indicates that the future land use may involve the ongoing use of the dock area as a storage facility for marine environmental response equipment and refuelling, use of area as a regional training centre for equipment operation, trades, and jobs and use of area as a military training base. As for the town facilities, there are two possibilities: demolition of all facilities within the town or transfer ownership of the town facilities to other organizations for ongoing use.

Since the data used in the HHERA came from a number of previous reports, it is important to cross check the data between those presented in the reports and those used in the HHERA. JWEL checked only 20% of the data. However, AMEC would recommend that 100% of the data be cross checked in order to ensure that the results are complete.

In the review of the HHERA, AMEC identified several items that needed clarification. They included the following:

- Explanation of the statistics used;
- Description of how the HHERA deals with concentrations that were less than the ability of the laboratory to measure;
- Explanation why arsenic was not included in the assessment;
- Explanation why lead and zinc were not evaluated from an inhalation perspective for the toddler;
- Explanation for a lower rate of eating soil in a toddler than recommended by CCME;
- Explanation of how chemical concentrations were calculated in wild game and subsequently determining the chemical intake in people;
- Explanation of why an inhalation exposure limit was not available for cadmium;
- Provide an example of the calculations done in the HHERA to ensure that the right values were substituted in the equations;
- Explanation of why the cancer assessment focused on a composite person (*i.e.,* adding up intakes from each life stage), rather than an adult as recommended by the regulatory agencies;

The primary criticism of the HHERA was the use of data from other regions of Canada to support the HHERA when conditions in the high arctic may be completely different.

Based on the review of the HHERA, AMEC is of the opinion that the assessment adequately addresses the potential risks to human receptors at the Nanisivik Mine. The issues identified above, once addressed, are not considered significant to the point that the HHERA would be considered wrong.

4.0 REVIEW OF THE ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment is an attempt to establish the threat posed by specific levels of contamination to the animals and plants in a specific area. It has been known for several decades that animals and plants living in areas of contaminated soil tend to have these same contaminants in their tissues to various degrees due to exposure to the contaminated soils. In animals, this exposure to contaminated soils may be directly though inadvertent ingestion of soils with their food or from other portions of the environment that have become contaminated due to the migration of the soil contaminants. For example, surface water could be contaminated as a result of snowmelt runoff coming in contact with the soil. Plants growing on the contaminated soil could also become contaminated and pass the contaminants along to animals that eat plants. The contamination of animals that eat plants could ultimately result in the contamination of animals that eat other animals.

An ecological risk assessment (ERA) examines all the possible ways that the contaminants in soil can be transferred to other portions of the ecosystem and to organisms in that ecosystem. An ERA also examines the organisms that have the greatest value to the ecosystem or for other reasons are of special importance. These organisms are called "valued ecosystem components" or VECs. Depending on their relative importance and their life cycle characteristics that bring them in contact with the contaminated soil or with other organisms potentially contaminated by contact with the contaminated soil, specific organisms are selected to represent all animal or plant species at the site where the ERA is conducted. Individual animal species are chosen to represent all other animals at a given food level in the ecosystem (i.e. plant eating animals and animals which eat other animals). The chose is usually based on the economic-social attributes of the animal as well as their species-specific habits that result in the greatest exposure of the animal to the contaminates in the soil. The assumption behind this is that if the level of contaminant in the soil does not endanger the selected animal, then other animals receiving less exposure will, likewise, be protected from adverse effects of the soil contaminants.

Once selected for the ERA, an animal species is intensively examined for its species-specific characteristics. Information concerning body weight, food habits, amount of food ingested per unit of body weight, water consumption, amount of air passed through lungs as well as any other characteristics that would potentially influence the amount of contaminated soil coming in contact with the animal is identified and documented. The information collected for plant species is generally related to the ability to absorb the contaminants that have been identified as of being of concern.

The ability of the contaminants to leave the soil environment and be transferred to other parts of the environment must also be investigated. This requires the examination of the physical-chemical characteristics of the specific contaminants of concern as well as their environmental fate and toxicology.

Once all this information is compiled, estimates are made of the amount of contaminant absorbed by the VECs. The fate and toxicology information previously compiled for the specific contaminant of concern is then used to interpret the effect on the organism of the amount of contaminant absorbed. These effects could range from no effect to the death of the animal or plant over either a short or long time span.

Jacques Whitford Environmental Limited, Fredericton, New Brunswick conducted the Nanisivik mine ERA. The ERA was well organized and presented issues associated with the potential for

trace element concentrations to cause problems in the area wildlife in a format that was easy to follow. There was no mention of the hydrocarbon contamination identified in the Phase II ESA, and it was assumed that the hydrocarbons did not constitute a threat to wildlife. As with the ESA, the authors of the ERA referred to the surface material at Nanisivik as "soil." This terminology should probably have been examined in light of the statement in the ESA that no soil formation occurred at Nanisivik. However, this in a minor matter as the main focus of the ERA document was an attempt to quantify the amount of trace elements that passed from the soil directly to plants, from the plants to the animals

Generally, the ERA satisfied the standard protocols for this type of investigation and came to the conclusion that there is little or no potential for adverse effects on the Nanisivik ecosystem from the trace elements in the area due to *naturally* occurring concentrations or the higher concentrations present as the result of mining activity. The individual criticisms of this ERA are concerned with relatively small details and assumptions of the assessment and do not alter the general conclusions. These individual criticisms, other than typographical errors, concerned:

- The use of an arithmetic mean for calculating the exposure point concentrations instead of using the 95% upper confidence limit of the geometric mean of the log transformed data;

- The absence of a pathway in the conceptual model of contaminant movement involving a connection between contaminated surface material and surface water via surface runoff water;

- The absence of a pathway whereby the tailing pond releases contaminants to the marine environment via the creek;

- The effect of snow cover and frozen surface material on the transfer of contaminants to the lemming for eight months of the year;

- The very conservative assumption of 100% bioavailability of the ingested trace elements; and

- The lack of a discussion of metallothioeins in mammals as a counteractive and migrating issue in trace element uptake, metabolism and toxicity. Metallothioeins are proteins produced primarily by the liver for the purpose of combining with excessive amounts of trace elements entering the body, thus preventing cellular damage that would otherwise result from the presence of the trace elements.

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ᑕᒪᐃᑕᓕᒫᑲᓴᒃ ᐃᓄᓕᒫᓄᑦ ᐱᓕᕆᐊᕆᔭᐅᔪᑦ ᓄᓇᒥ ᐅᓪᓗᒥ ᓄᓇᐅᑉ ᒪᓂᕋᙵᓄᑦ ᐊᓯᔾᔩᕙᑕᐅᓘᖕᒍᖕᒪᑕ ᓄᓇᒥ ᕿᒪᒃᑕᐅᕙᐱᓂᕐᓂᒃ ᐱᑕᖃᓕᓘᖕᒍᖕᒪᑦ ᑕᒫᓂᒃᑲᔭᖕᒋᑦᑑᓗᐊᓂᒃ ᐃᓚᖕᒋᑦ ᐱᓗᐊᖅᐸᑕ ᖃᖓᑐᐃᓐᓇᖅ ᐃᓅᓯᕐᒧᑦ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᒍᓐᓇᖅᑐᑦ ᐊᕙᓗᑦᑕ ᐱᖅᑯᓯᑐᖃᖓᓄᑦ ᐊᓯᔾᔩᕙᑕᐅᔪᓐᓇᖅᓗᑎᒃ ᐋᓐᓂᐊᕐᓇᖅᑐᖃᐃᓐᓇᓇᐊᖅᑲᕐᓂᖏᓪᓗ ᐃᓱᒫᓗᒋᔭᐅᔫᙳᓪᓗᑎᒃ. ᑖᒃᑯᐊ ᓄᓇᒥᑦ ᐲᖅᑕᐅᔪᑦ ᐅᕝᕙᓗ ᓄᓇᒧᑦ ᐃᓕᔭᐅᔪᑦ ᓴᓇᖅᑯᑎᕕᓃᑦ "ᓱᕈᔪᐃᒍᓐᓇᕐᒪᑕ". ᑕᐃᒪᙵᓄᑦ ᐃᓄᖕᓄᑦ ᒪᑯᐊ ᓂᒪᕈᑕᐅᓲᑦ ᖃᒧᑕᐅᔭᐃᑦ ᓄᓇᒃᑰᔫᓪᓗ, ᒥᑭᔫᒪᓇᖕᓂᒃ ᓱᕈᔫᕐᓇᖅᑐᓂᒃ ᓄᓇᒧᑦ ᐃᓕᐅᖅᑲᐃᓱᙳᖕᒪᑕ ᑕᐃᒫᒃ ᐊᑦᑕᕐᓇᖕᒋᓐᓂᕋᖅᑕᐅᓲᑦ ᐃᓅᓯᕐᒧᑦ ᐱᕈᖅᑐᓄᓪᓗ ᐆᒪᔪᓄᓪᓗ ᐃᓱᒫᓗᒋᔭᐅᔫᖕᒍᖕᒋᑦᑐᑦ. ᑭᓯᐊᓂᓕ ᐊᓯᖕᒋᑦ ᐃᓄᖕᓄᑦ ᓄᓇᒥ ᐱᓕᕆᐊᑦ, ᐊᖕᒋᔪᒃᑲᓪᓚᒥᒃ ᐃᒻᒪᖄ ᐅᔭᕋᖕᓂᐊᖅᑐᓂᒃ, ᓱᕈᔫᕐᓇᖅᑐᓂᒃ ᓴᓇᖅᑯᑎᓂᒃ ᐊᖕᒋᓂᖅᓴᓂᒃ ᐊᑐᕈᑕᐅᖃᑦᑕᕐᒪᑕ. ᖃᖓᑐᐃᓐᓇᖅ ᐅᔭᕋᖕᓂᐊᕐᕕᒃ ᒪᑐᓖᙳᑦ ᐊᒥᓱᓂᒃ ᐅᑭᐅᓂᒃ ᐱᓕᕆᕝᕕᐅᓚᐅᖅᑐᓂ, ᐊᐱᖅᑯᑕᐅᓕᓲᖅ ᓄᓇᒧᑦ ᓴᓇᖅᑯᑎᕈᔪᐃᑦ ᑲᑕᒃᑲᓂᑯᐃᑦ ᑲᑎᒡᓗᒋᑦ ᓯᕕᑐᔪᒥᒃ ᑲᑕᖅᑕᐅᓂᑯᐃᑦ ᓄᓇᒥ ᐊᖕᒋᓪᓕᕚᓪᓕᐊᓲᖑᒪᑕ ᐊᑦᑕᕐᓇᕈᑕᐅᓕᓇᐊᖕᒋᑦ ᐊᐱᖅᑯᑕᐅᓕᓲᖑᒪᑕ ᑎᒥᒧᑦ ᐋᓐᓂᐊᖅᑲᓕᕐᓇᖅᑐᒥᒃ ᐱᑕᖃᖕᒋᒃᑲᓗᐊᕐᒪᖕᒪᑕ ᑕᒫᓂᕐᒥᐅᓄᑦ ᓄᓇᖕᓂᓗ ᐆᒪᔪᓄᑦ ᐱᕈᖅᑐᓄᑦ, ᑕᒪᐃᓐᓄᓕᒫᕐᓗ.

ᑐᑭᓕᐅᕋᓱᐊᖅᓗᒍ ᖃᓄᖅ ᐊᐱᖅᑯᑕᐅᓯᒪᔪᖅ ᑭᐅᒐᓱᐊᓇᐊᖅ ᓇᓂᓯᕕᖕᒥ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᐱᓂᕐᒧᑦ, ᐱᙵᓱᐃᖅᓱᖅᓗᑎᒃ ᐊᕙᓗᙵᓂᒃ ᖃᐅᔨᓴᖅᓯᒪᓕᕐᒪᑕ. ᖃᐅᔨᓴᕈᑕᐅᓪᓗᑎᒃ ᐃᓱᒪᓕᐅᕈᑕᐅᓚᐅᖅᑐᑦ ᓇᓂᓯᕕᒃᒥ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᓕᐅᕐᕕᐱᓂᖅ, ᓄᓇᓕᙵᓗ ᑕᒫᓂᑦᑐᓪᓗ ᓴᓇᕖᑦ, ᒪᑯᐊ ᑐᓚᒃᑕᕐᕖᑦ. ᓯᕗᓪᓕᖅᐹᒥᒃ ᖃᐅᔨᓴᕈᑕᐅᑎᓪᓗᒍ ᓇᓗᓇᐃᔭᐃᓚᐅᕐᒪᑕ ᖃᓄᑎᒋ ᐊᒃᑎᒋᖕᒪᙵᑕ ᓱᕈᔭᐃᔭᓐᓇᖅᑐᑦ ᑕᒫᓂ ᐊᒻᒪᓗ ᖃᓄᑎᒋ ᐊᑦᑕᕐᓇᕐᓂᖅᓴᒪᖔᑕ. ᒫᓐᓇᓕ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ (ᑭᙳᓂᖓᓂ II ᐊᕙᓗᐊᓂᒃ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ) ᕿᒥᕐᕈᓚᐅᖅᑐᑦ ᑕᐃᓱᒪᖓᓂᓂᑦ ᑲᑎᖅᓱᖅᑕᐅᓯᒪᔪᓂᒃ ᐊᒻᒪᓗ ᓄᑖᓂᒃ ᑲᑎᖅᓱᐃᓪᓗᑎᒃ ᓈᓴᖅᑕᐅᕆᐊᓕᖕᓂᒃ ᑕᒫᙵᑦ. ᑕᐃᒪ ᐊᕙᓗᙵᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ ᐱᐊᓂᒃᑕᐅᖕᒪᑕ, ᑭᙳᓂᙵᒍᑦ ᒪᕿᐊᖅᑎᒃᑲᓐᓂᖅᓗᒃ ᖃᐅᔨᓴᕈᑕᐅᑕᓚᐅᕐᒥᔪᑦ ᓱᕈᔫᕐᓇᖅᑐᖅᑕᖃᓇᐊᖕᒐᓂᒃ ᓇᓂᓯᕕᖕᒥ ᐃᓅᓯᕐᒧᑦ ᐱᕈᖅᑐᓄᑦ ᐆᒪᔪᓄᑦ ᑕᒫᓂ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᒍᓐᓇᖅᑐᓂᒃ. ᑖᒃᑯᐊ ᖃᐅᔨᓴᕈᑕᐅᔪᔪᑦ ᑕᐃᔭᐅᖕᒪᑕ ᐃᓅᓯᕐᒧᑦ ᐋᓐᓂᐊᕐᓇᖅᑐᖅᑕᐃᓕᕐᖁᓪᓗᒍ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ (HHRA) ᐱᕈᖅᑐᓄᓪᓗ ᐆᒪᔪᓄᓪᓗ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᒍᓐᓇᖅᑐᑦ ᖃᐅᔨᓴᖅᑕᐅᔪᑦ (ERA), ᐃᓪᓗᐊᒍᙵᖅ, ᐅᓂᒃᑳᖕᒋᑦ ᑲᑎᑕᐅᓪᓗᑎᒃ ᑕᐃᔭᐅᓕᖅᑐᑦ ᐃᓅᓯᕐᒧᑦ ᐋᓐᓂᐊᕐᓇᖅᑐᖅᑕᐃᓕᕐᖁᓪᓗᒍ ᐱᕈᖅᑐᓄᑦ ᐆᒪᔪᓄᓪᓗ ᐊᑦᑕᕐᓇᖅᑐᖅᑕᐃᓕᕐᖁᓪᓗᒍ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ (HHERA).

2.0 ᑭᙳᒡᒋᙵᓂ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ ᐊᕙᓗᙵᓄᑦ ᓱᕈᔪᐃᔭᑦᑐᑦ

ᑭᙳᒡᒋᙵᓂ ᖃᐅᔨᓴᕈᑕᐅᓚᐅᖅᑐᑦ ᐊᕙᓗᙵᓄᑦ ᓱᕈᔪᐃᔭᑦᑐᓂᒃ ᓯᓕ ᐱᑕᖃᕐᒪᙵᑦ (ESA) ᓇᓗᓇᐃᔭᐃᓇᓱᐊᖅᓗᑎᒃ ᖃᓄᐃᑦᑑᒥᐊᖕᒋᓐᓂᒃ ᐊᒻᒪᓗ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᖃᕐᓂᖕᒐᓄᑦ ᓱᕈᔪᒃᑕᐅᓪᓗᑎᒃ ᐊᓯᔾᔨᖅᑕᐅᕙᓂᕐᓂᒃ ᓴᓄᓪᒪᖅᓴᐃᓪᓗᑎᒃ ᓱᕌᓕᐅᑕᐅᓗᐊᔫᖕᒋᒪᑕ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᖕᒥ ᐲᔭᖅᑕᐅᓪᓗᑎᒃ ᓴᓇᖅᑯᑎᕕᓃᑦ. ᐊᕙᓗᙵᓄᑦ ᖃᐅᔨᓴᕈᑕᐅᔪᔪᑦ ᐃᓗᓕᖃᓚᐅᖅᑐᑦ ᓴᓇᖅᑯᑎᕐᓗᑯᓂᒃ ᓱᕈᔪᐃᔭᑦᑐᓂᒃ ᓈᓴᐃᓪᓗᑎᒃ ᓚᕙᒪᑎᑐᖃᒃᑯᑦ ᒪᓕᒐᖕᒋᑦ ᐆᒃᑐᕋᐅᑕᐅᓪᓗᑎᒃ ᐊᕙᓗᙵ ᖃᓄᐃᑦᑑᓂᐊᖕᒐᓄᑦ ᐃᓱᒪᓕᐅᕈᑕᐅᓪᓗᑎᒃ. ᐊᕙᓗᙵᓄᑦ ᖃᐅᔨᓴᕈᑕᐅᔪᑦ ᐅᓂᒃᑳᙵ ᐃᓄᖅᓴᕐᓂᖃᐅᓚᐅᕐᒪᑦ.

ᓯᕗᓪᓕᖅᐹᖅ ᓈᒻᒪᖕᒋᔾᔭᑕᐅᓚᐅᖅᑐᖅ ᐅᓂᒃᑳᑉ ᐋᕿᒃᓱᖅᓯᒪᓂᖓ ᐊᒻᒪᓗ ᖃᐅᔨᓴᖅᑎᓄᑦ ᓯᕗᓂᖓᓂ ᑲᑎᖅᓱᖅᑕᐅᕙᓃᑦ ᐅᓂᒃᑲᐅᓯᐅᓂᖕᒋᑦ.

ᐅᑯᐊ ᑕᕙ ᖃᐅᔨᓴᖅᑏᑦ ᐅᓂᒃᑳᙵᑕ ᐃᓗᓕᙵᓃᓚᐅᖅᑐᑦ:

1. ᐱᒋᐊᙵᓚᐅᕈᓯᐊ
    1.1 ᑐᕌᖅᑕᐅᔪᑦ

1.2 ᐃᓕᖅᑯᓯᑐᖃᖕᖏᓐᓄᑦ ᒪᑐᔭᐅᓕᖅᑎᓪᓗᒍ ᐅᑎᖅᑎᑕᐅᒋᐊᓖᓪᓗ ᐸᕐᓇᐃᔪᑕᐅᓯᒪᓂᖕᒋᑦ
1.3 ᑕᒪᐃᑕ ᑕᑯᓪᓗᒋᑦ ᓇᓂᓯᕕᖕᒥ ᐅᔭᕋᒐᕐᓂᐊᕐᕕᒃ, ᓄᓇᓕᖕᓗ ᐊᓯᖕᒋᓪᓗ ᓴᓇᕐᕖᑦ
1.4 ᒪᓕᒐᑎᒍᑦ ᐊᑐᐊᖅᑕᐅᒋᐊᓖᑦ/ᓴᓇᒪᓂᕆᔭᐅᔪᑦ ᑭᓱᑐᐃᓐᓇᓄᑦ

2. ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᖃᓚᐅᕐᓇᓂ ᐊᕙᓗᖓᑕ ᖃᓄᐃᓕᖓᓚᐅᕈᓯᐊ
   2.1 ᓯᓚᖓᑕ
   2.2 ᓯᕐᒥᐊᓗᐃᑦ
   2.3 ᑕᒪᑐᒪ ᐅᔭᕋ
   2.4 ᓄᓇᖓᑕ ᐋᕿᒃᓱᖅᓯᒪᓂᐊ
   2.5 ᐃᒪᖓᑕ ᑰᖏᑕᓗ
   2.6 ᐱᕈᖅᑐᖏᑕᓗ
   2.7 ᐃᔾᔪᐃᓪᓗ ᓄᓇᐃᑦ
   2.8 ᐆᒪᔪᐃᑦ ᑕᒫᓂ
   2.9 ᑎᖕᒥᐊᑦ

3. ᐊᕙᓗᖓᑕ ᖃᓄᐃᓕᖓᓂᖓ ᖃᐅᔨᓴᖅᑕᐅᑎᓪᓗᒍ
   3.1 ᐃᒪᐅᑉ ᐃᖅᑲᖓᓄᑦ ᑲᑕᖕᓂᕐᓗᑯᐃᑦ
   3.2 ᓯᓚᖓᑕ ᖃᓄᐃᓐᓂᖓ/ᐳᔪᖃᑦᑕᖅᑐᓂᒃ ᑎᑦᑕᐅᓂᑯᓂᒃ ᐅᔾᔨᖅᓱᕈᑏᑦ
   3.3 ᒪᓂᕋᖓᓂ ᑯᓚᓕᐃᑦ ᐃᒪᕐᓗᐃᑦ ᑕᓯᕐᓗᐃᓪᓗ ᖃᓄᐃᓐᓂᖏᑦ
   3.4 ᐅᔭᕋᖕᓂᒃ ᐊᐅᒃᓯᔭᑦᑐᑦ ᐃᓗᓕᖕᒋᑦ ᓇᒧᖓ ᑰᓯᖑᖅᒪᖓᑕ ᐆᒃᑐᕋᖅᑕᐅᓪᓗᑎᒃ
   3.5 ᓱᕈᔪᐃᔪᓐᓇᖅᑐᓂᒃ ᑯᕕᔪᖃᑐᐃᓐᓇᕆᐊᖃᕐᓂᖓᓄᑦ ᐃᓱᒫᓗᑎᔭᐅᔪᑦ

4. ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᖕᒥ ᓴᓇᔭᐅᔪᑦ ᐱᕙᓪᓕᐊᑎᑕᐅᔪᓪᓗ ᐊᐅᓚᑕᐅᔪᓪᓗ
   4.1 ᐅᓂᒃᑳᓯᐅᔪᑦ ᓴᓇᕐᕕᓕᐊᖑᓯᒪᔪᑦ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᖕᒥ ᐱᓕᕆᕖᑦ
   4.2 ᐱᕙᓪᓕᐊᑎᑕᐅᔪᑦ ᖃᖓ ᐱᒋᐊᖅᑎᑕᐅᓚᐅᕐᒪᖔᑕ

5. ᑭᖑᓂᖓᓂ II ᐊᕙᓗᐊ ᖃᐅᔨᓴᖅᑕᐅᔪᖅ
   5.1 ᖃᓄᖅ ᓱᕈᔪᖃᕐᕕᐅᔪᑦ ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕐᓗᑎᒃ ᐅᔾᔨᖅᓱᖅᑕᐅᓂᐊᕐᒪᖔᑕ
   5.2 ᐅᔾᔨᖅᓱᖅᑕᐅᓗᑎᒃ ᕿᒥᕈᔭᐅᖃᑦᑕᕆᐊᓖᑦ ᑕᑯᔭᒃᑐᖅᑕᐅᖃᑦᑕᕆᐊᓖᑦ
   5.3 ᖃᓄᐃᓕᕖᓪᓕᐅᑕᐅᖕᒪᖔᑕ

6. ᓱᕈᔪᒃᑕᐅᓯᒪᔪᑦ ᐊᒻᒪᓗ ᐊᕙᓗᖓᓄᑦ ᐊᒃᑐᐊᓂᖃᖅᑐᑦ ᐃᓱᒫᓗᑎᔭᐅᔪᑦ
   6.1 ᓱᕈᔪᐃᔭᑦᑐᑦ ᐊᕙᓗᖓᓄᑦ ᐃᓱᒫᓗᑎᔭᐅᔪᑦ
   6.2 ᓄᓇᐃᑦ ᐊᑦᑕᕐᓇᖅᑐᖃᕆᐊᖏᓐᓂᒃ ᐃᓱᒫᓗᑎᔭᐅᔪᑦ

ᐃᒻᒪᓗᐊᒍᖓᖅ ᑕᑯᓪᓗᒋᑦ, ᖃᐅᕆᓴᖅᑎᓄᑦ ᐅᓂᒃᑲᓕᐅᖅᑕᐅᔫᑦ ᐊᑐᐊᒻᒪᖏᑦ ᒪᓕᒃᑕᐅᒐᓗᐊᕐᒪᖓᑕ ᑲᓇᑕᒥ ᒥᑭᓐᓂᖅᐹᒥᒃ ᒪᓕᒐᓂᒃ ᐊᑐᖅᑕᐅᑎᑦᑎᓚᐅᑦ ᑲᑐᔾᔨᖃᑎᒌᖕᖓᓐᓄᑦ (CSA) ᐅᖃᐅᓯᐅᔪᑦ ᐅᑯᐊᖑᔪᑦ:

- ᐱᒋᐊᖓᓚᐅᕈᓯᐊᓂᒃ ᐅᓂᒃᑳᑦ (ᐃᓗᓕᖕᒋᑦ ᐅᑯᐊ 1.1, 1.2 ᐊᕙᓗᖓᑕ ᖃᓄᐃᓕᕐᓂᖓᓄᑦ ᖃᐅᔨᓴᕈᑏᑦ ESA ᐃᓗᐊᓂ)
- ᖃᓄᐃᓕᐅᓚᐅᕈᓯᖏᑦ (ᐅᑯᐊ ᐃᓚᐅᓪᓗᑎᒃ ᑐᓴᐅᒪᔭᐅᒋᐊᓖᑦ ᑲᑎᖅᓱᖅᑕᐅᓯᒪᔪᓪᓗ ᖃᐅᔨᓴᖅᑎᓄᑦ ᓈᓴᖅᑕᐅᓯᒪᔪᑦ ᖃᓄᐃᓐᓂᖓᓄᑦ ᐆᒃᑐᕋᐅᑏᑦ ᑭᖑᓂᖓᓂ II ᐊᕙᓗᓕᕆᔪᑎᓄᑦ ᖃᐅᔨᓴᕈᑏᑦ ᔪᓚᐃ, 2002, ᑕᑯᔭᐅᔪᓐᓇᖅᑐᑦ ᐃᓚᖓ 1.3, 1.4, 2.1 2.9-ᒧᑦ 3.4, ᐊᒻᒪᓗ 4.1 4.2)
- ᒪᓂᕋᖓᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ ᖃᓄᐃᓕᐅᕈᑕᐅᓚᐅᕐᒪᖔᑕ (ᐅᑯᓇᓂᑦᑐᑦ 1.5 ᐊᒻᒪᓗ 5.1)
- ᖃᐅᔨᔭᐅᔪᑦ (ᐅᑯᐊ ᐃᓚᐅᔪᑦ ᑲᑎᖅᓱᖅᑕᐅᔪᕕᓃᑦ ᖃᐅᔨᓴᖅᑎᓄᑦ ᐊᕙᓗᓕᕆᔪᑎᓂᒃ ᐅᓂᒃᑳᓕᐅᕐᓂᐊᖅᓗᑎᒃ ᔪᓚᐃ 2002-ᒥ ᑕᑯᔭᐅᔪᓐᓇᖅᑐᑦ ᐃᓚᖓ 5.2 ᐊᒻᒪᓗ 5.3-ᒥ)
- ᖃᐅᔨᓴᕈᑕᐅᔪᕕᓃᑦ ᐃᓱᒪᓕᐅᕈᑕᐅᓪᓗᑎᒃ ᑐᑭᑖᕈᑕᐅᓪᓗᑎᒃ (ᐃᓗᓕᐊᓃᑦᑐᑦ 3.5, 5.3, 6.1 ᐊᒻᒪᓗ 6.2 ᐊᒻᒪᓗ ᑲᑎᖅᓱᖅᑕᐅᔪᕕᓃᑦ ᓈᓴᖅᑕᐅᔪᕕᓃᓪᓗ ᑐᑭᓕᐅᖅᑕᐅᓪᓗᑎᒃ ᑐᓴᖅᑎᑦᑎᔪᑕᐅᔪᑦ ᔪᓚᐃ 2002-ᒥ ᐅᖃᐅᓯᖃᕐᒪᑕ ᓯᕗᓂᖓᓂ ᑲᑎᖅᓱᖅᑕᐅᔪᕕᓃᖕᓂᒃ.

- ᐃᓱᒪᓕᐅᕈᑕᐅᔪᑦ ᑐᑭᑖᕈᑕᐅᔪᓪᓗ (ᑖᓐᓇ ᐅᓂᒃᑳᖅᓯ ᐱᑕᖃᙱᒪᑦ ᑕᐃᒫᒃ ᒫᓐᓇ ᐊᕙᓗᓕᕆᔪᑎᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ ᐋᕿᒃᓱᖅᓯᒪᑎᓪᓗᒍ)
- ᐊᔪᙱᓐᓂᙱᑦ ᖃᐅᔨᓴᖅᑏᑦ ᐅᔾᔭᖅᓱᖅᑎᐅᕆᐊᖅ ᑕᒪᒃᑯᓂᖓ (ᑖᓐᓇᑦᑕᐅᖅ ᐱᑕᖃᙱᒪᑦ ᒫᓐᓇ ᐊᕙᓗᓕᕆᔪᑎᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ ᐅᓂᒃᑳᖅᓯ)
- ᖃᐅᔨᒪᓂᙱᓐᓄᑦ ᓱᓕᓂᕋᐅᑕᐅᔫᑦ ᐅᓂᒃᑳᑦ ᐃᓕᓴᖅᓯᒪᓂᙱᓐᓄᑦ ᓇᓗᓇᐃᒃᑯᑕᐃᑦ
- ᐃᓚᒋᐊᕈᑏᑦ

ᓈᒻᒪᓈᖅᓯᓚᐅᙱᒻᒥᔪᖅ ᐅᓂᒃᑳᖅᓯ ᐊᑲᐅᙱᒻᒪᑦ ᑕᐃᔭᐅᔪᓯᐊ ᓇᓗᓇᐃᔭᐃᓪᓗᑎᒃ ᓄᓇᑕᖅᑕ ᒪᓂᕋᖅᑕᓂ ᓄᓇᑐᐃᓐᓇᐅᓂᕋᐃᓚᐅᕐᒪᑕ ᓇᓂᓯᕕᖕᒥ "ᐃᔾᔪᖃᐅᕐᓂᖅᑕᓂᒃ" ᑭᖑᓪᒧᑦ ᖃᐅᔨᓴᖅᑎᕕᓂᕐᒥᒃ ᑕᐃᓯᓪᓗᑎᒃ ᐱ.ᓯᒥ ᖃᐅᔨᓴᖅᑎᒥᒃ ᐃᔾᔫᓂᖃᐅᕐᓂᕋᐃᙱᒪᑕ ᓇᓂᓯᕕᖕᒥ ᒪᓂᕋᖅᑕᓂ. ᑕᒪᑐᒪ ᒪᓂᕋ "ᐃᔾᔫᓂᖃᙱᑉᐸᑦ" ᑕᐃᒪ ᓄᓇᐅᓂᖅᑕᐅᔪᓐᓇᖅᐸ? ᐅᓄᖅᑐᓂ ᑐᑭᓕᐅᖅᑕᐅᓯᒪᔪᓂᒃ ᕿᓂᓕᐅᕋᑦᑕ "ᐃᔾᔪᐃᑦ" ᖃᓄᖅ ᑐᑭᖃᖅᑎᑕᐅᖕᒪᖔᑦ ᐅᖃᓕᒫᓗᓂ ᐃᓕᓴᐃᔪᑎᓂᓗ ᕿᓂᖅᓗᑕ ᓚᕙᒪᑎᑐᖃᒃᑯᑦ ᑐᑭᓕᐅᖅᓯᒪᔭᙱᓐᓂᒃ ᖃᐅᔨᓴᖅᑎᓄᑦ ᐆᒃᑐᕋᐅᑕᐅᓪᓗᑎᒃ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᓂ ᐅᖃᐅᓯᕐᓂᒃ. ᒪᓂᕋᖓ ᓇᓂᓯᕕᖕᒥ ᑐᑭᓕᐅᖅᑕᐅᓯᒪᔪᓂ ᖃᓪᓗᓈᓂ ᓄᓇᖕᓂᒃ ᐅᓂᒃᑳᖅᑐᓂᒃ ᐊᔾᔨᒋᙱᒪᒍ.

ᑕᒪᓐᓇ ᓄᐃᑦᑐᖃᕈᑕᐅᓕᓚᐅᕐᒥᖔᒪᑦ ᐊᐱᖅᑯᑕᐅᔪᓐᓇᖅᑐᒥᒃ. ᐊᕙᓗᕗᑦ ᓱᕈᔪᒃᑕᐅᑦᑕᐃᓕᕐᑯᓪᓗᒍ ᐊᑐᐊᓚᐃᑦ ᐃᓱᒪᓕᐅᕈᑕᓚᐅᖅᑐᑦ ᓯᕗᓂᖔᓂ ᖃᓄᐃᓚᐅᕈᓯᖔᓂᒃ ᐃᖅᑲᖅᑐᐃᔾᔪᑎᖃᖅᓗᑎᒃ ᓱᕈᔪᒃᑕᐅᓯᒪᔪᓂᒃ ᒪᓂᕋᖅᑕᓂ ᓇᓂᓯᕕᖕᒥ "ᐃᔾᔪᖅᑐᓂᒃ" ᓇᓗᓇᐃᔭᐃᓪᓗᑎᒃ ᖃᐅᔨᓴᖅᑏᑦ ᐅᓂᒃᑳᖅᓯ ᓄᓇᐃᑦ ᖃᓄᐃᑦᑑᓯᖑᓂᙱᓐᓂᒃ ᓚᕙᒪᑎᑐᖃᒃᑯᓪᓗ ᓂᕿᒃᓴᓄᑦ ᐱᕈᖅᓯᕕᐅᓱᓂ ᓄᓇᓄᑦ ᒪᓕᒪᓕᐊᕆᓯᒪᔭᙱᓐᓂᒃ ᐆᒃᑐᕋᐅᑎᖃᓚᐅᕐᒥᔪᑦ (ᖃᓪᓗᓈᑦ ᓄᓇᖓᓂ ᐃᔾᔪᖃᕐᓂᐅᓯᓄᑦ ᐊᑐᐊᓚᙱᓐᓂᒃ ᐆᒃᑐᕋᐅᑎᖃᓚᐅᕐᒪᑕ). ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᐅᑉ ᑭᖑᓂᖓᒍᑦ ᓄᓇ ᐊᑐᖅᑕᐅᓕᕈᖅᑐᖅ ᐅᑎᖅᑎᑕᐅᕋᓱᓪᓗᒍ "ᐅᑭᐅᖅᑕᖅᑐᒥ ᐃᓄᐃᓚᕐᒥ ᓄᓇᑐᑦ." ᑭᓯᐊᓂᓕ, ᑲᓇᑕᒥ ᐊᑐᐊᓚᖃᙱᒪᑕ ᖃᓄᖅ ᓱᕈᔭᐃᔭᑐᑦ ᓄᓇᒥᒃ ᐅᑭᐅᖅᑕᖅᑐᒥ ᑲᒪᒋᔭᐅᒋᐊᖃᕐᒪᖔᑕ. ᑕᐃᒪᐃᓐᓂᖔᓄᑦ ᑕᕝᕙ, ᐊᑐᐊᓚᓇᔭᐅᔪᑦ ᓄᓇᖔᑕ ᐃᔾᔫᓂᖃᕐᓂᖔᓂ ᖃᓪᓗᓈᓂᓂᑐᑦ ᐱᕈᖅᓯᕖᑦ ᓄᓇᐃᑦ ᐊᑐᐊᓚᙱᓐᓂᒃ ᑕᒫᓂ ᐱᑕᖃᙱᒪᑦ ᐊᓱᐃᓛᒃ ᐊᑐᐊᓚᖃᓕᓚᐅᕐᒥᑦ ᒥᓐᖑᐊᕐᓯᕙᓕᓇᔪᑏᑦ ᐊᑐᐊᓚᙱᓐᓂᒃ/ᐃᓪᓗᖃᕕᐅᔪᓐᓂ ᓄᓇᐃᑦ ᐊᑐᐊᓚᙱᓐᓂᒃ ᓱᕈᓂᖓᓂ ᐃᓕᖅᑯᓯᑐᖃᖏᓄᑦ ᐅᑎᖅᑎᑕᐅᕆᐊᓕᖕᓂᒃ ᐃᖅᑲᖅᑐᐃᔾᔪᑕᐅᔪᑦ ᖃᓄᑎᒋ ᓱᕈᔪᒃᑕᐅᓂᕐᒪᖔᑦ ᐃᓱᒪᓕᐅᕈᑕᓇᓱᐊᖅᑎᓪᓗᒍ ᑯᑦᑎᒃᑐᒥᐅᑦ ᓄᓇᖓᓂ ᓇᓂᓯᕕᖕᒥ.

ᐊᕙᓗᖓᓄᑦ ᖃᐅᔨᓴᕈᑕᐅᔪᓂ ᓇᓗᓇᐃᖅᓯᓚᐅᖅᑐᑦ ᓱᕈᔪᒃᑕᐅᑐᐃᓐᓇᕆᐊᓕᖕᓂᒃ ᐃᓱᓖᓗᒋᔭᐅᔪᓂᒃ ᑕᐃᒪᐃᓕᖅᑎᑕᐅᓂᕋᖅᑕᐅᔪᓂᒃ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᒃᑲᓚᐅᕐᓂᖕᓄᑦ ᑕᒫᓂ ᐅᑭᐅᓂᒃ 25-ᓂᒃ. ᐅᑯᐊ ᑕᕝᕙ ᓱᕈᔭᐃᔪᓐᓇᖅᑐᑦ ᑕᒪᐅᖓ ᑯᕕᓯᒪᓂᑰᔪᑦ ᑲᑎᖅᓱᖅᑕᐅᓚᐅᖅᑐᑦ ᐊᑐᓂ ᓇᓗᓇᐃᒃᑯᑎᖅᓱᖅᑕᐅᓪᓗᑎᒃ ᐃᒫᒃ:

- ᐃᑭᓴᕋᐃᑦᑐᑦ ᐅᕐᓱᐊᓗᕈᔪᐃᑦ ᐃᑯᒪᓕᐅᕈᑕᐅᔫᑦ
- ᐄᔭᖅᑕᐅᕆᐊᓖᑦ ᐅᐊᕈᑎᓯᒪᔪᑦ ᐅᕐᓱᐊᓗᕈᔪᐃᑦ ᐃᑭᓴᕋᐃᑦᑐᑦ (ᒪᑯᐊ ᓚᓰᑦ ᒪᓂᕋᐅᑉ ᐃᓗᐊᓃᑦᑐᑦ ᐃᒃᑲᒃᓴᐅᑎᓖᑦ)
- ᑕᕆᐅᕐᒧᑦ ᐅᐊᕈᑎᓯᒪᔪᑦ ᐃᒃᑲᒃᓴᐅᑏᑦ ᐅᔭᕋᑦ ᓰᕐᓇᖅᑐᑦ; ᐊᒻᒪᓗ
- ᐃᑦᑎᐅᑎᓯᒪᔪᑦ ᓴᕕᕋᔮᒃᓴᔭᓂᒃ ᐅᔭᕋᑦ (ᐱᓗᐊᙳᐊᖅᑐᒥᒃ ᑳᑦᓂᐊᓪᖃᑦᑐᑦ, ᐅᓗᒃᓴᔭᒥᓗ, ᔨᖕᒃ, ᖃᕐᔭᒃᓴᔩᓪᓗ).

ᓱᖕᒪᑦ ᑕᒪᒃᑯᐊ ᐅᔭᕋᑦ ᓰᕐᓇᖅᑐᑦ ᓚᓯᓂᓗ ᐃᓗᓕᖅᑐᑦ ᐃᓱᒫᓗᒋᔭᐅᕆᐊᖃᕐᒪᖔᑕ ᐅᓂᒃᑳᖅᓯᒪᓚᐅᙱᒪᑦ ᑕᕝᕙᓂ ᐊᕙᓗᓕᕆᔨᑦ ᐅᓂᒃᑳᖅᓯ. ᓱᓕᓪᓗᖓ, ᐅᖃᐅᓯᐅᓯᒪᙱᑦᑎᐊᒻᒪᕆᖓᑕ ᑕᒪᒃᑯᐊ ᑕᕆᐅᕐᒧᑦ ᐅᐊᕈᑎᓯᒪᔪᑦ ᐃᒃᑲᒃᓴᐅᑏᑦ. ᐊᒻᒪᓗᑦᑕᐅᖅ, ᑭᓱᑐᐃᓐᓇᐃᑦ ᖃᓄᐃᑦᑐᓂᒃ ᐃᓗᓕᖃᕆᐊᙱᓐᓂᒃ ᐆᒃᑐᕋᖅᑎᓄᑦ ᓈᓴᖅᑕᐅᓯᒪᔪᓂᒃ ᐱᑕᖃᙱᒪᑕ. ᐅᖃᐅᓯᐅᓯᒪᖕᒪᑕ ᓚᓯᒥᒃ ᐳᔾᔪᖃᑦᑕᕐᓂᙱᑦ ᐃᒃᑲᒃᓴᐅᑎᒥᒃ ᐅᐊᕈᑎᓯᒪᕝᕕᐅᔪᓂᑦ xanthate-ᒥᒃ. ᑭᓯᐊᓂᓕ, ᐊᓯᑦᑎᓐᓂᑦ ᐆᒃᑐᕋᐅᑕᐅᔪᓐᓇᖅᑐᒥᒃ ᐱᔪᕙᓂᕐᒥᒃ ᐊᔾᔨᒋᔭᖃᓚᐅᙱᒪᑦ ᐃᓗᓕᙱᑕ ᓴᓇᒪᓂᙱᓐᓂᒃ ᓴᕕᕋᔮᒃᓴᑦ ᑕᐃᔭᐅᔪᓯᕙᐅᒃᑕᙱᓐᓂ ᑕᒪᐃᑦᑐᒥᒃ ᐱᑕᖃᙱᒪᑕ ᐃᓪᓗᐊᒍᙰᖅ ᑐᓴᐅᒪᕝᕕᒋᔭᐅᖅᑦᑎᓐᓂᒃ. ᑕᒪᐃᓐᓂᖔᓄᑦ ᑕᕝᕙ, ᑕᒪᑐᒥᖓ ᐃᑲᔫᓴᕈᑕᐅᔭᐅᖅᑐᒥᒃ ᐅᓂᒃᑳᖃᙱᓚᖅ ᓇᓗᓇᐃᔭᐃᔭᑕᐅᓗᓯᐅᖅᑐᒥᒃ ᐅᔭᕋᐃ ᓚᓯᒥᒃ ᑕᕆᐅᓕᖕᒥᒃ ᐅᐊᕈᑎᓯᒪᔭᓂᒃ ᐃᒃᑲᒃᓴᐅᑎᓂ ᐊᑦᑕᕐᓇᕈᑕᐅᓇᔭᕐᒪᖔᑕ ᓱᕈᔭᐃᓕᔭᕆᐊᙱᓐᓗ ᑕᒪᑐᒪ ᐊᕙᓗᖓᓄᑦ.

ᐃᓛᒃ ᓇᓗᓇᖏᑑᒐᓗᐊᖅ ᓇᓂᓯᕕᐅᑉ ᓄᓇᖓᓂ ᐅᖅᓱᐊᓗᑭᕙᖕᓂᒃ ᑯᕐᕕᕕᐅᓯᒪᔪᓂ ᐱᑕᖃᐅᕐᒪᑦ ᓱᕈᔾᑕᐅᓯᒪᓕᕐᓂᖓ ᑕᑯᒃᓴᐅᔪᓂ, ᑕᒪᐃᑕᓕᒫᕐᓕ ᒪᓂᕋᖓᓄᑦ ᓱᕈᐃᓯᒪᖕᒪᑦ ᑭᓂᖅᑐᓄᑦ ᐅᖅᓱᐊᓗᖕᓄᒃ ᖃᑦᑕᐅᔭᕐᔪᐊᖃᕐᕕᓂ. ᑖᒃᑯᐊ ᓱᕈᔾᑕᐅᓯᒪᔪᑦ ᑕᒪᑐᒥᖓ ᒪᓂᕋᖓᓂᒃ ᑭᓯᐊᓂ "ᓇᔪᕐᑕᖏᓐᓂ" ᓱᕈᐃᓂᕋᕐᑕᐅᔪᖕᒪᑦ. ᓴᕕᕋᔭᒃᓴᖃᕐᕕᐅᔪᑦᑕᐅᕐ "ᓇᔪᕐᑕᖏᓐᓂ" ᒪᓂᕋᓂ ᑭᓯᐊᓂᑐᐊᕐ ᒥᑭᔪᒥᒃ ᓱᕈᐃᓂᕋᕐᑕᐅᒋᓪᓗᑎᒃ.

ᐃᓛᖏᓛᒃ ᓇᓗᓇᐃᔭᑦᑎᐊᕐᓯᒪᔪᒥᒃ ᖃᓄᐃᓕᕐᓂᖏᓐᓄᑦ ᐅᓂᒃᑳᕐᑐᖃᕐᓯᒪᓚᐅᖏᓪᒪᑦ ᓱᕈᔾᑕᐅᔪᕕᓂᕐᓂᒃ ᐅᔭᖅᑕᕐᓂᐊᕐᕕᖕᒥ, ᓄᓇᓕᖕᒥ ᓇᓂᓯᕕᐅᑉ ᑐᓕᒃᑕᕐᕕᖕᒪᓂᓗ ᓯᓪᔭᖕᒪᓂ ᐊᕙᓗᓕᕆᔩᑦ ᐅᓂᒃᑳᖕᒪᓂ, ᑭᓯᐊᓂᓕ ᐃᒫᖕᒪᕐ ᐅᖃᐅᓯᐅᓚᐅᕐᒪᑦ ᑕᒪᑐᒪ ᓯᓚᑎᖕᒪᓄᑦ ᓱᕈᔾᑕᐅᔪᑦ ᐊᒃᓯᓗᐊᖕᒍᖏᓐᓂᖅᑕᐅᒋᓪᓗᑎᒃ. ᑖᓐᓇ ᒪᓕᒃᓗᓂ ᑕᐃᓯᒪᓂ ᐅᓂᒃᑳᓕᐊᕕᓂᕐᓂᒃ 1992-ᒥ ᓇᓂᓯᕕᖕᒥ ᖃᓄᑎᒋ ᓴᕕᕋᔭᒃᓴᔭᐃᑦ ᐊᕙᓗᖕᒪᓄᑦ ᐃᑦᑎᑎᕐᓯᒪᓂᖏᓐᓄᑦ ᐅᓂᒃᑳᖕᒪᓂ ᐅᖃᐅᓯᐅᓚᐅᕐᓯᒪᔪᓂᒃ "ᐆᒃᑐᕿᐅᑕᐅᓪᓗᑎᒃ" ᓱᕈᐃᔪᑦ "ᒥᑭᔪᒥᒃ."

3.0 ᕿᒥᕈᔭᐅᓪᓗᑎᒃ ᐃᓅᓯᖏᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓐᓇᕐᑐᑦ ᖃᐅᔨᓴᕐᑕᐅᔾᔪᑎᖏᑦ

ᐃᓅᓯᖏᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓐᓇᕐᑐᑦ ᐊᒻᒪᓗ ᐱᕈᕐᑐᓄᑦ ᐆᒪᔪᓄᓪᓗ ᖁᐊᕐᓵᕐᓇᕐᑐᑦ ᖃᐅᔨᓴᕐᑕᐅᔾᔪᑎᖏᑕ ᐅᓂᒃᑳᖓ (HHERA) ᐋᕿᒃᓱᕐᑕᐅᔪᕕᓂᕐ ᓯᕗᓂᖓᓂ ᓇᓚᐅᑦᑖᕿᑕᐅᓇᓱᐊᕐᓗᓂ ᓄᓇᖓ ᓱᕈᔾᑕᐅᒃᐸᑦ ᖃᓄᑎᒋ ᓇᓂᓯᕕᖕᒥ ᐆᒪᔪᓄᑦ ᐃᓅᓯᕐᒧᓗ ᐋᓐᓂᐊᕐᑲᓂᕐᓇᕿᔭᕐᒪᖔᑦ ᓴᓇᕐᑯᑎᕕᓃᑦ ᐃᓄᖕᓄᑦ ᐊᕙᓗᖕᒪᓄᓪᓗ. AMEC-ᑯᑦ ᐊᕙᓗᓕᕆᔨᖏᑦ ᕿᒥᕈᑎᑕᐅᓚᕐᑐᑦ ᐊᕙᓗᓕᕆᔩᑦ ᐅᓂᒃᑳᖓᓂᒃ HHERA ᓇᓚᐅᑦᑖᕿᑕᐅᓯᒪᔪᑦ ᓈᒪᓈᕐᓯᒪᓗᐊᕐᒪᖔᑦ ᑐᑭᓯᓇᓱᐊᕐᑯᔭᐅᓪᓗᑎᒃ ᐊᑦᑕᕐᓇᕈᑕᐅᓇᔭᕐᑐᓂᒃ ᓈᓯᓪᓗᑎᒃ ᑕᒪᐃᓐᓂᒃ ᖃᐅᔨᓴᕈᑎᖃᓚᐅᕐᓗᐊᓇᐊᖏᓐᓂᒃ. ᐃᓅᓯᖏᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓐᓇᕐᑐᓂᒃ ᖃᐅᔨᓴᕐᑏᑦ ᐆᒃᑐᕐᑎᐅᖕᒪᑦ ᑭᓱᑐᐃᓐᓇᐃᑦ ᑕᒫᓂ ᐱᑕᖃᕐᑐᑦ ᖃᓄᑎᒋ ᖁᐊᕐᓵᓇᔭᐅᕆᐊᖃᕐᒪᖔᑦ ᑐᑭᓕᐅᖁᔭᐅᓪᓗᑎᒃ ᓯᓚᑖᓂᑦ ᑕᐅᑦᑐᒍ ᐃᓱᒪᓕᐅᕐᑎᕆᔭᐅᓚᐅᕐᑐᑦ. HHERA ᐅᓂᒃᑳᖓ ᐊᑐᕐᑕᐅᖃᑦᑕᓗᐊᕐᑐᕐ ᐊᒥᓱᓄᑦ ᒐᕙᒪᑎᒃᑯᓐᓂ ᐆᒃᑐᕿᐅᑕᐅᓪᓗᑎᒃ ᐊᔾᔨᒌᖏᑦᑐᓄᑦ ᒪᑯᓇᓂ ᓂᕿᓄᑦ ᐃᓅᓕᓴᐅᑎᓄᓪᓗ ᖃᓄᑎᒋᓗ ᓱᕈᔾᑕᐅᓯᒪᔪᑦ ᓴᓗᒻᒪᕐᓴᕐᑕᐅᕆᐊᖃᕐᒪᖔᑦ. ᒫᓐᓇ HHERA ᐅᓂᒃᑳᕐᓯᒪᖕᒪᑦ ᖃᓄᑎᒋ ᐊᑐᓂ ᐃᑉᐱᓐᓇᕐᓂᖃᕈᓐᓇᕐᒪᖔᑦ ᓯᕕᑐᔪᒧᑦ, ᐊᑯᓂᓗᐊᕐ ᑕᒫᓂ ᓴᓇᕐᑯᑎᓂᒃ ᐊᑦᑐᐊᔭᕕᓂᕐᓄᑦ, ᑕᐃᓱᒪᖓᓂᓂᑦ ᖃᐅᔨᒪᔭᐅᕙᒥᕐᑐᓂᒃ ᐃᓅᓯᓕᒫᕐᒧᑦ ᐆᒃᑐᕿᑕᓯᒪᔪᓂᒃ ᐱᑕᖏᓪᒪᑦ. ᐊᑦᑕᕐᓇᕐᓂᖏᑦ ᐆᒃᑐᕿᐅᑕᐅᓚᐅᕐᑐᑦ ᒪᓂᕿᑦᑐᑦ ᐊᑐᕐᓗᒋᑦ ᓄᓇᐅᑉ ᐃᔭᖓᑕ ᓴᓇᒪᓂᖓᓄᖓᑦ ᐊᑦᑕᕐᓇᓕᕆᓐᓇᕐᓂᖏᑦ ᐃᓕᕐᑯᓯᑐᖃᖏᓐᓄᑦ ᐅᑎᕐᑎᑕᐅᒍᒪᒍᑎᒃ ᓄᓇᒥ ᓱᕈᔾᓯᒪᔪᑦ.

HHERA-ᒥ ᑐᑭᑖᕿᑕᐅᔪᔪᑦ ᐊᑦᑕᕐᓇᕐᑐᖃᕐᑐᓂᒃ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᕕᓂᕐᒥ ᐆᒃᑐᕿᐅᑎᖃᕐᓗᑎᒃ ᐱᖓᓱᓂᒃ ᖃᐅᔨᓴᕿᑕᐅᔪᕕᓂᕐᓂᒃ ᐃᓱᒪᒥᒐᓗᒍ ᓯᕗᓂᖓᓂ ᑭᓱᒧᑦ ᓄᓇ ᑕᒪᓐᓇ ᐊᑐᕐᑕᐅᒃᑲᓐᓂᕈᒪᓕᕐᒪᖔᑦ ᐃᒻᒪᖄ ᓄᓇᓕᖃᕐᕕᐅᓗᓂ, ᑐᓕᒃᑕᕐᕕᐅᓗᓂ, ᐅᔭᕋᒃᑕᕐᓂᐊᕐᕕᐅᓗᓂᓗ. HHERA ᐅᓂᒃᑳᖓᓂ ᐅᖃᓚᐅᕐᒪᑦ ᐊᑐᕐᑕᐅᒃᑲᓐᓂᕈᓐᓇᕐᓂᖅᓗᓂᔪᒃ ᓄᓇᐃᑦ ᒪᑯᐊ ᑐᓕᒃᑕᕐᕕᒃᑲᐃᑦ ᓯᕐᓗᐊᖅᑲᕐᕕᐅᓗᑎᒃ ᐃᒪᕐᒥ ᐱᓂᕐᓗᒃᑐᖅᑲᕐᓂᖅᐸᑦ ᑐᐊᕕᖅᑐᒥᒃ ᐸᖅᓴᐃᔮᓄᑦ ᐸᕐᓇᐃᔭᕐᑕᐅᓯᒪᔪᓂᒃ ᐅᖅᓴᒃᓴᕐᕕᐅᓗᓂᓗ. ᐊᑐᖅᑕᐅᒃᑲᓐᓂᕈᓐᓇᕐᒪᑦ. ᑕᒪᓐᓇ ᐃᓕᓴᕐᕕᐅᓗᓂ ᐅᕿᖏᑦᑐᓂᒃ ᓴᓇᖅᑯᑎᓂᒃ ᐊᐅᓚᑦᑎᔨᐅᓂᕐᒥᒃ, ᓴᓇᔨᐅᓂᕐᒥᒃ, ᐊᒻᒪᓗ ᐃᖅᑲᓇᐃᔭᓂᒃ ᐊᔾᔨᒌᖏᑦᑐᓂᒃ ᐊᒻᒪᓗ ᐊᑐᖅᑕᐅᒃᑲᓐᓂᕈᓐᓇᕐᒥᔮᖅ ᐅᓇᑕᖅᑐᒃᓴᓄᑦ ᐃᓕᓴᕐᕕᐅᓗᓂ. ᓄᓇᓕᖕᓕ, ᒪᕿᖕᓂᒃ ᖃᓄᖅᑑᕈᑕᐅᓚᐅᕐᒥᔮᖅ ᓱᕿᑎᖅᑕᐅᔭᓐᓇᖅᑐᖅ ᐅᐸᓗᖓᓐᓂᑦ ᓄᑎᖅᑕᐅᔭᓐᓇᖅᑐᑦ ᐊᓯᖕᒐᖏᓐᓄᑦ ᓄᓇᓕᕐᑯᑎᒥᔭᐅᓕᕐᓗᓂ ᑎᒥᕐᑯᑎᒥᔭᐅᔪᓄᑦ ᐊᑐᖅᑕᐅᒃᑲᓐᓂᕈᓐᓇᖅᑐᖅ.

ᑖᓐᓇ HHERA ᐅᓂᒃᑳᓕᐅᖅᑕᐅᓚᐅᕐᒪᑦ ᐊᒥᓱᓂᒃ ᑲᑎᖅᓱᐃᓪᓗᑎᒃ, ᓱᓕᔪᒥᒃ ᐊᑐᕐᓂᖃᕐᓇᖅᑐᑦ ᐃᔾᔪᐊᖅᑕᐅᔪᒥᓇᖅᑐᓂᒃ ᓈᓴᖅᑕᐅᓯᒪᔪᓂᒃ ᑕᐃᓯᓪᓗᑎᒃ HHERA-ᒥᑦ ᐱᔭᐅᓗᑎᒃ. JWEL-ᑯᑦ ᕿᒥᕈᓚᐅᕐᒪᑦ 20%-ᑐᐃᓐᓇᖏᓐᓂᒃ ᓈᓴᖅᑕᐅᓯᒪᔪᑦ. ᑭᓯᐊᓂᓕ, AMEC-ᑯᑦ ᐊᑐᓕᖅᑎᑕᐅᕐᑯᔭᓯᒪᖕᒪᑦ 100% ᕿᒥᕈᔭᐅᓚᐅᖅᑎᓪᓗᒋᑦ ᓈᓴᖅᑕᐅᓯᒪᔪᑦ ᓱᓕᓗᐊᕐᒪᖕᒪᑦ ᑕᒪᐃᒫᒃ ᑐᑭᑖᕿᑕᐅᔪᑦ ᑭᖑᓪᓕᖅᐸᒥ ᓱᓕᔪᓇᔭᐅᔪᓐᓇᕐᓂᐊᕐᒪᑦ.

ᕿᒥᕈᔭᐅᑎᓪᓗᒋᑦ HHERA, AMEC-ᑰᓄᑦ ᓇᓂᓯᓚᐅᕐᒪᑕ ᐊᒥᓱᓂᒃ ᐃᓄᖕᓴᖅᑐᓂᒃ ᓇᓗᓇᐃᔭᖅᑕᐅᒃᑳᓂᕆᐊᓕᖕᓂᒃ. ᐅᑯᐊ ᐃᓚᐅᑎᓪᓗᒋᑦ:

- ᐅᓂᒃᑳᓕᐅᖅᑕᐅᒋᐊᓖᑦ ᓈᓴᖅᑕᐅᓯᒪᔪᑦ ᐊᑐᖅᑕᐅᔪᑦ;
- ᓇᓗᓇᐃᔭᐃᓗᑎᒃ ᑭᓯᓂᒃ HHERA ᐆᒃᑐᕋᐅᑎᖃᓚᐅᕐᒪᖔᑕ ᑕᒫᓂ ᓱᓇᒃᑰᑦ ᐃᓗᓕᖕᒋᓐᓂᒃ ᖃᐅᔨᓴᖅᑏᑦ ᒥᑭᓐᓂᖅᑳᒥᒃ ᐊᑐᐊᖅᑕᐅᒋᐊᓕᖕᓄᑦ ᐆᒃᑐᕋᐅᑎᒋᖃᑦᑕᖅᑕᖕᒋᓐᓂᒃ;
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᓱᖕᒪᑦ ᐋᕐᓯᓂᒃ ᓴᐱᕋᔭᒃᓴᓂᑦ ᐲᔭᖅᑕᐅᓲᖅ ᐊᒃᑕᕐᓗᑯ ᐱᑕᖃᕐᓂᖕᖓ ᐆᒃᑐᖅᑕᐅᓚᐅᖕᒋᒻᒪᖕᖓᑦ;
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᓱᖕᒪᑦ ᓕᑦᐊᖅᑯᑦ ᐴᖕᒃᖃᖅᑐᓪᓗ ᓴᐱᕋᔭᕈᔦᐃᑦ ᐱᕈᖅᓴᔪᓄᑦ ᐊᑦᑕᕐᓇᕐᓂᖃᖅᑐᑦ ᓂᐅᖅᓯᔭᐅᔫᓇᕐᓂᖕᒋᓐᓄᑦ ᓄᑦᑕᓖᓄᑦ ᑕᒫᓂᕐᒥᐅᓄᑦ ᑐᓴᖅᑕᐅᑎᑕᐅᒋᐊᖃᖅᑐᑦ;
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᓱᖕᒪᑦ ᑕᒫᓂ ᓄᑦᑕᓖᑦ ᓄᓇᕐᖅᑐᖃᑦᑕᖕᒋᓐᓂᖅᓴᐅᓂᖕᒋᓐᓄᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᖕᒋᓐᓂᖅᓴᐅᓂᖕᒋᓐᓂᒃ ᐊᑐᐊᓚᖕᒋᑦ CCME ᐆᒃᑐᕋᐅᑎᓪᓗᒋᑦ;
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᖃᓄᑎᒋ ᓴᓇᖅᑯᑎᕐᓗᑯᓂᒃ ᐃᑦᑎᓯᒪᔪᓂᒃ ᓂᖑᖃᑦᑕᕐᓂᕐᒪᖔᑕ ᓄᓇᕐᓂᑦ ᐆᒪᔪᐃᑦ ᑎᖕᒥᐊᑦ ᐊᒻᒪᓗ ᑖᓇ ᐆᒃᑐᕋᐅᑎᓗᒍ ᐆᒪᔪᖅᑐᓲᓄᑦ ᐃᒻᒪᖄ ᐃᓅᖕᓄᑦ;
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᓱᖕᒪᑦ ᓂᐅᖅᓯᔭᐅᖃᑦᑕᖅᐸᑦ ᓴᐱᕋᔭᕈᔦᐃᑦ ᑳᓂᐊᒻᖃᖅᑐᑦ ᑎᒥᖁᑦ ᐋᓐᓂᐊᕐᒃᓕᕈᑕᐅᔫᓐᓇᖅᑐᑦ ᖃᓄᑎᒋᐅᑎᓪᓗᒋᑦ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᔫᖑᖕᒪᖔᑕ ᐃᓅᓯᕐᒧᑦ;
- ᐅᓂᒃᑦᑎᐊᕐᒥᓗᒍ ᓇᓗᓇᐃᔭᑦᑎᐊᖅᓯᒪᔪᓂᒃ ᐆᒃᑐᕋᐅᑎᓕᐅᖅᑕᖕᒋᓐᓂᒃ HHERA ᐅᓂᒃᑲᖕᓂ ᓈᓴᖅᑕᐅᓯᒪᔪᓂᒃ ᐊᑐᖅᑕᐅᔪᕕᓂᕐᓂᒃ ᐊᔾᔨᓕᐅᖅᑕᐅᑦᑎᐊᖅᓯᒪᓚᐅᕐᒪᖔᑕ ᐅᓂᒃᑳᖕᓂ.
- ᐅᓂᒃᑳᕐᓗᑎᒃ ᐆᒃᑐᕋᐅᑕᐅᓕᐅᖅᑐᒥᒃ ᑳᓱᖅᑐᖑᑦ ᐃᓅᖑᑦ (ᐃᒪᓐᒃ, ᖃᓄᑎᒋ ᓂᐅᖅᓯᖃᑦᑕᕐᓂᑰᓂᖓ ᖃᓄᑎᒋ ᐳᔫᕐᕕᐅᔦᒥᓯᓂ ᐊᖕᒋᕐᒥᓂ ᐃᖅᑲᓇᐃᔮᒥᓂᓗ), ᐃᓐᓇᐃᓐᓇᑐᐊᖑᖕᒋᑦᑐᑦ ᐃᓄᒃ ᐱᕈᖅᓴᓂᖓᓂᑦ ᐋᓐᓂᐊᕐᒃᓕᕈᑕᐅᔪᑦ ᖃᓄᑎᒋ ᐊᒃᑐᐊᓯᖃᑦᑕᓚᐅᓇᐊᖕᒋᑦ ᓱᕈᔦᐃᔭᑦᑐᓂᒃ ᐆᒃᑐᕋᐅᑎᓪᓗᒋᑦ.

ᓯᕗᓪᓕᖅᐹᖅ ᐅᓐᓂᕐᓗᒃᓴᐅᑕᐅᒐᔪᖕᓂᖅᐹᖑᔪᓚᐅᖅᑐᖅ HHERA ᐅᓂᒃᑲᖕᓄᑦ ᓈᓴᖅᑕᐅᓯᒪᔪᓂᒃ ᑕᐃᓯᖃᑦᑕᓚᐅᕐᒪᑕ ᐊᓯᖕᒋᓐᓂ ᐅᓂᒃᑯᓂ ᓄᓇᓂ ᑲᓇᑕᒥ ᖃᐅᔨᓴᖅᑎᓄᑦ ᐃᓱᒪᒋᓪᓗᒍ ᖁᑦᑎᒃᑐᒥᐅᑦ ᓄᓇᖕ ᐊᓯᖕᒋᓐᓂᑦ ᓄᓇᓂᑦ ᑲᓇᑕᒥ ᐊᔾᔨᒋᔭᐅᖕᒋᒻᒪᑦ ᑳᒃᑯᓇᓂ ᑕᐃᔭᐅᔪᓂ ᖃᐅᔨᓴᕈᑕᐅᔪᕕᓂᕐᓂ.

HHERA-ᑯᑦ ᐅᓂᒃᑳᖕᓂᒃ ᖃᐅᔨᓴᕈᑕᐅᔪᕕᓃᑦ ᐊᑐᐊᖅᓗᒋᑦ, AMEC-ᑯᑦ ᑐᑭᑰᕈᑎᖃᓚᐅᕐᒪᑕ ᓈᒻᒪᓈᖅᓯᔪᓂᒃ ᐃᓅᓯᕐᒧᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᓇᔭᖅᑐᓂᒃ ᓇᓚᐅᑦᑰᕈᑎᖃᓚᐅᕐᒪᑕ ᑕᒫᓂ ᓇᓂᓯᕕᖕᒥ. ᐃᓱᒫᓗᒋᔭᐅᔪᑦ ᐅᖃᐅᓯᐅᓚᐅᖅᑐᑦ ᑭᐅᔭᐅᑎᐊᓚᐅᕐᒪᑕ, ᐊᒃᓱᓗᐊᖑᔫᓂᕐᓂᖅᑕᐅᒍᓐᓇᖅᓯᔪᑦ HHERA-ᑯᑦ ᐅᓂᒃᑳᖕᓂ ᐋᕿᒃᑕᐅᓯᒪᓕᕐᒪᑕ ᑕᒻᒪᖅᓯᒪᖕᒋᓐᓂᖅᑕᐅᓕᕈᓐᓇᖅᑐᑦ.

4.0 ᕿᒥᕈᔭᐅᑎᓪᓗᒋᑦ ᓄᓇᖕᒥᓄᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓐᓇᖅᑐᑦ

ᓄᓇᖕᒥ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᔪᓐᓇᖅᑐᑦ ᖃᐅᔨᓴᖅᑕᐅᓚᐅᕐᒥᔪᑦ ᒪᑯᐊ ᖃᓄᐃᓕᖕᒥᓂᖕᒋᑦ ᐱᒋᐊᖕᒪᕐᕕᖕᒥ ᐃᓱᒪᓕᐅᕈᑎᒋᓇᓱᐊᖅᓗᒋᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᓇᔭᖅᑐᑦ ᐆᒪᔪᓄᑦ ᐱᕈᖅᑐᓄᓪᓗ ᑕᒫᓂ. ᖃᐅᔨᒪᔭᐅᔪᑐᖃᐅᓕᕐᒪᑕ ᐊᒥᓱᓂᒃ ᐅᑭᐅᓂᒃ ᐆᒪᔪᐃᑦ ᐱᕈᖅᑐᓪᓗ ᓄᓇᓂ ᓱᕈᔫᒃᑕᐅᔪᕕᓃᑦᑐᑦ ᑎᒥᖕᒋᓐᓃᑦᑐᖃᓕᖕᒍᖕᒪᑕ ᑕᒫᖕᒑᑦ ᓄᓇᒥᑦ ᐱᔪᓂᒃ. ᐆᒪᔪᓂ, ᐃᓚᓕᐅᑎᔭᐅᓲᑦ ᓂᕿᖕᒋᓐᓂᑦ ᐱᔪᑦ ᓱᕈᔫᒃᓯᒪᔪᓂᒃ ᐱᕈᖅᑐᓂᒃ ᓄᓇᒥᑦ ᐅᕙᓗ ᐊᕙᓗᖕᒐᓂᑦ ᐊᓂᖅᑎᖓᐅᓂᑯᐃᑦ ᓱᕈᔫᒃᓯᒪᔪᒥᒃ ᐊᓯᖕᒋᓐᓄᑦ ᑎᒃᑕᐅᕙᖕᒪᑕ ᐳᔫᖅᑕᐅᕙᖕᒪᑕᓗ. ᐃᒫᖕᒑᐃ, ᒪᓂᕐᒥ ᐃᒪᖅ ᓱᕈᔫᒃᓯᒪᓪᓗᓂ ᓇᒧᐃᓐᓇᖅ ᑰᒍᓐᓇᕐᒪᑦ ᓄᓇᒨᑦ. ᓄᓇᕐᐃᑦ ᑕᒫᓂ ᐱᕈᖅᑐᑦ ᓱᕈᔫᖅᓗᑎᒃ ᐱᕈᕈᓐᓇᕐᒪᑕ ᐊᐃᑦᑑᑎᔦᓐᓇᖅᑕᒥᓂᒃ ᐆᒪᔪᓄᑦ ᓂᕆᔪᓄᑦ ᐱᕈᖅᑐᓂᒃ ᑕᐃᒪᐃᒃ ᐆᒪᔪᐃᑦ ᑲᑎᖅᓱᐃᓯᒪᓕᖁᔪᑦ ᐊᓯᒥᓂᑦ ᐆᒪᔪᓂᑦ ᐱᕈᖅᑐᖅᑐᓲᓂᑦ ᓂᕿᖃᖅᑐᑦ.

ᐊᕙᓗᕐᑎᓐᓂ ᐆᒪᔪᓄᑦ ᐱᕈᖅᑐᓄᓪᓗ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓂᒃ (ERA) ᕿᒥᕈᓲᑦ ᐅᓂᒃᑳᖕᒐ ᖃᓄᐃᓐᓇᖅ ᓇᐅᒃᑯᐃᓐᓇᖅ ᓱᕈᔩᑕᐅᔪᓐᓇᖅᑐᑦ ᓄᓇᒥᑦ ᐊᓯᖕᒋᓐᓄᑦ ᓅᒃᑎᕈᓐᓇᕐᒪᑕ ᓄᓇᒥᐅᑕᓄᑦ ᐆᒪᔪᓄᑦ ᐱᕈᖅᑐᓄᓪᓗ. ᓄᓇᖕᒥᓄᑦ ᐊᑦᑕᕐᓇᕈᑕᐅᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᖅᑏᑦ ᐅᓂᒃᑳᖕᒋᓂ ᖃᐅᔨᓴᓚᐅᕐᒪᑕ ᐊᓯᒥᓄᑦ ᐊᒃᑐᐊᓂᖃᕐᓂᖅᐹᓂᒃ ᐆᒪᔪᓂᒃ ᐱᕈᖅᑐᓂᓗ ᐅᕙᓗ ᖃᓄᐃᓐᓇᖅ ᐃᒻᒥᒃᑰᖕᒐᔪᒥᒃ ᐊᑐᕐᓂᖅᑐᓂᒃ ᑕᒫᓂᒥᐅᓄᑦ. ᑳᒃᑯᐊ ᓄᓇᒥᐅᑕᐃᑦ ᑕᐃᔭᐅᓲᑦ "ᐊᑐᕐᓂᖅᑐᑦ ᓄᓇᒥᐅᑕᓄᑦ ᐊᓯᒥᓄᑦ"

ᐅᑉᐸᓗ VECs. ᐊᒃᓱᒃᑲᓪᓚᒃ ᐱᒻᒪᕆᐅᑎᑕᐅᓂᖏᑦ ᑕᒫᓂᕐᒥᐅᑦ ᐃᓅᔪᑎᖏᓐᓄᑦ ᓄᓇᖓᓄᑦ ᐃᓚᖓᔾᔪᑎᕆᔭᖏᑦ ᐆᒪᔪᖏᓐᓄᓪᓗ ᐊᓯᒥᓄᓪᓗ ᐱᕈᖅᑐᓄᑦ ᐊᐃᑦᑐᐃᔪᓐᓇᕐᓇᐊᖏᑦ ᓱᕈᔫᒃᑕᐅᒍᑎᒃ, ᐃᓚᐃᓐᓇᖏᓐᓂᒃ ᓂᕈᐊᖅᓯᓪᓗᑕ ᐆᑦᑐᕋᐅᑎᖃᓚᐅᕋᑦᑕ ᐊᓯᖏᓐᓂᒃ ᐆᒪᔪᓂᒃ ᑭᒡᒐᖅᑐᕐᓂᐊᖅᑐᓂᒃ ᑕᒫᓂ (ᐃᒪᐃᒃ ᐱᕈᖅᑐᓱᑦ ᐆᒪᔪᑦ ᐊᒻᒪᓗ ᓂᕿᑐᓱᑦ ᐆᒪᔪᑦ). ᓂᕈᐊᖅᑕᐅᓚᐅᖅᑐᑦ ᑕᒫᓂᕐᒥᐅᓄᑦ ᕿᓇᐅᔭᒃᓴᐅᑕᐅᓱᖑᔪᑦ ᐊᓯᖏᓐᓄᓪᓗ ᐆᒪᔪᓄᑦ ᐃᓅᔪᑕᐅᓱᑦ ᖁᐱᕐᕈᐃᑦ ᐊᑐᕐᓂᖃᖅᑐᑦ ᓂᕐᔪᑏᑦ ᐆᒪᔫᖃᑎᒥᓄᑦ ᐊᐃᑦᑐᐃᒍᓐᓇᖅᑐᑦ ᓱᕈᔫᒃᓯᒪᔪᓂᒃ ᓂᕿᖃᕈᑎᒃ ᓄᓇᒥᑦ. ᐃᓱᒪᒋᔭᐅᓚᐅᕐᒪᑕ ᖃᓄᑎᒋ ᐊᒃᑎᒋᔪᒥᒃ ᓄᓇ ᓱᕈᔫᒃᓯᒪᓪᓚᖅᓱᓂ ᐆᒪᔪᓄᑦ ᑕᒫᓂ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᔪᓐᓇᕐᓴᕐᒪᖔᑦ ᓇᓕᐊᑐᐃᓐᓇᖅ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᖏᑉᐸᑦ ᑕᐃᒪᓵᐃᓐᓇᖅ ᐊᓯᖏᑦ ᐆᒪᔪᐃᑦ ᖃᓄᐃᔾᔭᖏᓪᓚᑦ ᓱᕈᔾᔨᖏᑦᑐᓃᑦᑐᑦ ᑕᒪᓐᓇ ᓇᔪᖅᑕᖓ ᓄᓇ ᓱᕈᔫᒃᑕᐅᓯᒪᓪᓚᕐᓗᐊᖅᑎᓪᓗᒍ.

ᓂᕈᐊᖅᑕᐅᓚᐅᖅᑎᓪᓗᒋᑦ ᖃᐅᔨᓴᖅᑕᐅᓂᐊᖅᑐᑦ ᐆᒪᔪᐃᑦ ᐊᑉᐸᓗᓕᕆᔪᑎᓂᒃ ᖃᐅᔨᓴᖅᑎᓄᑦ ᐅᔾᔨᖅᓱᖅᑕᐅᑦᑎᐊᓕᓚᐅᖅᑐᑦ ᐆᒪᔪᐃᑦ ᓱᑉᐸᓪᓕᐊᓂᕆᐸᒃᑕᖏᑦ ᐆᒃᑐᕋᐅᑕᐅᕙᒃᑕᖅᓗᑎᒃ ᐊᓯᖏᓐᓄᑦ ᑭᒡᒐᖅᑐᖅᑎᒋᔭᐅᓗᑎᒃ ᐃᓕᖅᑯᓯᖏᑦ. ᐅᕿᖏᓐᓂᐊᖅᑕᐅᕙᒃᓗᑎᒃ, ᓂᕿᖏᑦ, ᖃᓄᑎᒋ ᓂᕆᔪᖑᓂᖏᑦ ᖃᓄᑎᒋ ᐊᒃᑎᒋᔪᑦ, ᐃᒥᕋᔪᖕᓂᖏᑦ, ᐊᓂᖅᑎᕆᓂᖏᑦ ᐊᓯᖏᓪᓗ ᐊᔾᔨᐅᖏᔾᔪᑕᐅᔪᑦ ᐆᒃᑐᕋᖅᑕᐅᓪᓗᑎᒃ ᓱᕈᔫᒃᓯᒪᔪᒥᒃ ᑎᒥᖓᓃᑦᑐᖃᓕᕐᒪᖔᑦ ᑎᑎᕋᖅᑕᐅᕙᓪᓕᐊᖏᓐᓇᖅᓗᑎᒃ. ᖃᐅᔨᓴᕈᑕᐅᔪᑦ ᓈᓴᖅᑕᐅᓲᖑᖏᓐᒥᔪᑦ ᐱᕈᖅᑐᓂᒃ ᖃᓄᑎᒋ ᒪᓂᕋᒥᑦ ᓂᕆᒃᑲᑦᑕᕐᒪᖔᑦ ᐃᓱᓕᓗᒋᔭᐅᓂᕋᖅᑕᐅᓪᓗᑎᒃ ᐅᖃᐅᓯᐅᓯᒪᔪᓂᒃ ᓄᓇᕋᓂᒃ.

ᐊᔪᖏᒻᒥᖕᒪᑕ ᓱᕈᔪᐃᓱᑦ ᓄᓇᒥᑐᐃᓐᓇᐅᖏᒻᒪᑕ ᐊᓯᖕᖓᖏᓐᓄᑦ ᓄᒃᑎᕈᓐᓇᕐᒪᑕ ᑎᒃᑕᐅᓪᓗᑎᒃ ᑯᐱᔭᐅᓗᑎᒃ ᖃᐅᔨᓴᖅᑕᐅᕆᐊᖃᕐᒥᔪᑦ. ᑕᒃᑯᐊ ᕿᒥᕈᔭᐅᕆᐊᖃᖅᓯᔭᕈᑦ ᓱᕈᔪᐃᔭᑦᑐᑦ ᐃᓗᓕᖏᑦ ᓴᓇᒪᓂᖏᑦ ᐊᒻᒪᓗ ᐊᑉᐸᓗᑦᑎᓐᓅᖅᑕᐅᓘᖓᑕ ᖃᓄᖅ ᐃᓚᓕᐅᑎᓯᒪᖕᒪᖓᑕ ᑎᒥᖓᓂ ᐊᐅᓚᔾᔪᑎᓄᑦ ᖃᓄᖅᒥᓗ ᐃᓅᓯᖏᓐᓄᑦ ᐃᖃᓕᕈᑕᐅᔪᓐᓇᕐᒪᖔᑕ.

ᑕᒪᒃᑯᐊ ᑕᑉᐸ ᑲᑎᖅᓱᖅᑕᐅᒃᐸᑕ, ᓇᓚᐅᑦᑖᕈᑕᐅᔪᓐᓇᖅᓯᓇᔭᖅᑐᑦ ᖃᓄᑎᒋ ᓄᓇᒧᑦ ᐊᑉᐸᓗᑦᑎᓐᓄᑦ ᐃᓚᓕᐅᑎᓯᒪᓕᕐᒪᖔᑕ ᓄᓇᒥ ᐱᕈᖅᑐᓄᑦ VECs. ᓯᕗᓂᐊᓂᐊᖅᑕᑦᑎᓐᓂ ᖃᓄᐃᓕᕈᒫᕐᒪᖔᑦ ᓇᓚᐅᑦᑖᕈᑕᐅᓐᓇᖅᓯᓂᐊᖅᑐᑦ ᐊᓯᒥᓄᑦ ᓱᕈᔪᐃᔪᑕᐅᔪᓐᓇᖅᐸ ᑐᑦᑯᓐᓇᖅᑐᕐᑲᓕᕈᓐᓇᖅᐸᑦ ᑎᑎᕋᖅᑕᐅᓯᒪᓲᖑᖕᒪᑕ ᐊᑐᓂ ᓱᕈᔪᐃᔭᑦᑐᑦ ᑮᓱᓂᖏᑦ ᒪᓕᒃᓗᒋᑦ ᕌᖓᒍᑦ ᓇᓗᓇᐃᒃᑯᑎᖅᑕᐅᓪᓗᑎᒃ ᑕᐃᒪᐃᒃ ᖃᓄᖅ ᐃᒃᐱᖕᓇᕐᓂᖅᑯᓂᐊᕐᒪᖔᑦ ᐊᓯᒥᓄᑦ ᑐᑭᓕᖅᑕᐅᓲᖑᔪᑦ ᐅᔾᔨᖅᓱᖅᑕᐅᕆᐊᓖᑦ ᐊᑦᑕᕐᓇᕐᓂᖅᑯᖅᑐᑦ ᓇᓗᓇᐃᒃᑯᑎᖅᓱᖅᑕᐅᓯᒪᓕᕆᐊᓖᑦ ᓂᕆᔭᐅᕆᐊᖃᖏᑦᑐᑦ. ᐊᑐᓂ ᐆᒪᔪᑦ ᖃᓄᖅ ᐃᒃᐱᒍᓱᖑᔪᓂᖏᑦ ᐊᔭᕆᖏᒻᒪᑕ ᖃᓄᑎᒋ ᓱᕈᔫᒃᑕᐅᓂᖏᑦ ᒪᓕᒃᓗᒋᑦ ᐃᓚᖏᑦ ᖃᓄᐃᖏᑦᑎᐊᔪᑦ ᐃᓚᖏᓪᓗ ᑐᕐᑯᓱᑦ ᐆᒪᔪᑦ ᐱᕈᖅᑐᓪᓗ ᕿᓚᒥ ᓯᕕᑐᔪᒻᒪᓪᓗᓃᑦ ᓱᕈᔫᒃᓯᒪᔪᒥᓯᒃ.

ᔮᒃ ᕗᐃᑦᕗᑦ ᐊᑉᐸᓗᓕᕆᔨᖏᑦ, ᕗᕆᑦᑐᕆᒃᑕᓐ, ᓂᐅᕙᕐᕗᐃᒃᒥᐅᖅ ᓇᓂᓯᕕᖕᒥ ᖃᐅᔨᓴᖅᑎᐅᓚᐅᕐᒪᑕ ᐊᑉᐸᓗᓕᕆᔨᑎᓂᒃ. ᐊᑉᐸᓗᓕᕆᔨᑎᓄᑦ ᐅᓂᒃᑳᖓ ᐋᕿᒃᓱᖅᓯᒪᑦᑎᐊᓚᐅᖅᑐᖅ ᐊᒻᒪᓗ ᐃᓱᓕᓗᒋᔭᐅᔪᓂᒃ ᐅᖃᐅᓯᖃᑦᑎᐊᖅᓗᑎᒃ ᓴᕕᕋᔭᒃᓴᔭᕈᔪᐃᑦ ᐃᓅᓯᕐᒧᑦ ᐆᒪᔪᓄᓪᓗ ᐊᑦᑕᕐᓇᕈᑕᐅᔪᓐᓇᖅᑐᑦ ᐅᓂᒃᑳᖓ ᑐᑭᓯᒐᕐᓂᓚᐅᖅᑐᖅ. ᑭᓯᐊᓂᓕ ᐅᖃᐅᓯᖃᓚᐅᖏᒻᒪᑕ ᐅᕐᓱᐊᓗᕈᔪᖕᓄᑦ ᓱᕈᔫᒃᑕᐅᔪᓂᒃ ᑭᖑᓪᓕᕐᒥ ᐊᑉᐸᓗᓕᕆᔨᑎᓂᒃ ᐅᓂᒃᑲᓕᐊᖓᓂ, ᑕᐃᒪᐃᒃ ᐅᕐᓱᐊᓗᕈᔪᐃᑦ ᒪᓂᕋᒥ ᐱᕈᖅᑐᓄᑦ ᐆᒪᔪᓄᓪᓗ ᐊᑦᑕᕐᓇᖏᓇᓱᒋᔭᐅᓕᔪᔪᑦ ᐆᒪᔪᓄᑦ ᐊᑉᐸᓗᓕᕆᔩᑦ ᐅᓂᒃᑳᖓᓂ ᐃᓚᓕᐅᑎᔭᐅᓯᒪᖏᒻᒪᑕ. ᑕᐃᒪᓵᐃᓐᓇᖅ ᐊᑉᐸᓗᓕᕆᔨᒃᑯᑦ ᐅᓂᒃᑳᖓᓂ ᓄᓇᖓᓄᑦ ᓱᑉᐱᓕᐅᑕᐅᔪᑦ ᐆᒃᑐᕋᖅᑕᐅᓚᐅᖏᒻᒪᑕ ᒪᓂᕋᖓᓂ ᓇᓂᓯᕕᖕᒥ "ᐃᔾᔪᓂᕋᖅᑕᐅᔪᑦ". ᐅᖃᐅᓯᐅᑉ ᑖᓱᒪ ᑐᑭᖓ ᕿᒥᕈᔭᐅᑦᑎᐊᕆᐊᓪᓚᒃ ᐅᖃᐅᓯᐅᓯᒪᔪᑦ ᐊᑉᐸᓗᓕᕆᔨᒃᑯᑦ ᐅᓂᒃᑳᖓᓂ ᐃᓱᒪᒋᓪᓗᒋᑦ ᑎᑎᕋᖅᓯᒪᖓᒪᑦ ᓇᓂᓯᕕᐅᑉ ᓄᓇᖓ ᐃᔾᔪᖅᑲᕐᓂᖃᐅᖏᓐᓂᕋᖅᑕᐅᖓᒪᑦ. ᑭᓯᐊᓂᓕ, ᑳᓐ ᐱᑕᖃᖏᒪᑦ ᓯᕗᕋᓇᓗᐊᖏᑦᑐᖅ ᐅᓂᒃᑳᓂ ᑭᑭᑕᐅᑲᓗᐊᖅᐸᑦ ᑕᑉᐸᓂ ᑕᐃᔭᐅᑐᐃᓐᓇᓚᐅᕐᒪᑦ ᑐᑭᓯᑦᑎᓇᓱᐊᕈᑎᑎᒍᑦ ᖃᓄᑎᒋ ᐃᑦᑎᓯᒪᔪᑦ ᓴᕕᕋᔭᒃᓴᓂᒃ ᐱᑕᖃᐅᕐᒪᖔᑦ ᐅᔭᕋᐃᑦ ᐃᔾᔪᐃᑦ ᓄᓇᐃᑦ ᑕᒫᓂ ᓴᕕᕋᔭᒃᓴᖃᖅᑐᒥ ᐱᕈᖅᑐᑦ, ᐆᒪᔪᓗ

ᑕᒪᐃᑎᒎᓕ, ᐊᑉᐸᓗᓕᕆᔨᑎᓂᒃ ᖃᐅᔨᓴᕈᑎ ᐅᓂᒃᑳᖓ ᓈᒻᒪᒋᔭᐅᓚᐅᖅᑐᖅ ᒥᑭᓐᓂᖅᐸᒥᒃ ᐊᑐᐊᖅᑕᐅᕆᐊᓕᖕᓂᒃ ᒪᓕᖓᓪᓚᑦ ᖃᐅᔨᓴᕈᑏᑦ ᐃᓱᒪᓕᐅᕈᑕᐅᓪᓗᑎᒃ ᐊᑐᖅᑕᐅᒍᓐᓇᕐᒪᑕ ᑲᑎᒪᔨᓄᑦ ᖃᓄᐃᓐᓇᓕᒫᕐᑎᐊᖅ ᒥᑭᔫᓂᖅᐸᒥᒃ ᖃᐅᔨᒪᔭᐅᕆᐊᓖᑦ ᐱᑕᖃᕐᒪᑕ ᑭᓯᐊᓂ ᓇᓂᓯᕕᐅᑉ ᓄᓇᖓᓄᑦ ᒥᑭᔫᑎᐅᒍᓗᐊᖅ ᐊᒥᓱᓂᒃ ᐅᑭᐅᓂᒃ ᑲᑎᖅᓱᖅᐸᓪᓕᐊᓂᑯᐃᑦ ᓱᕐᕋᓕᐅᑕᐅᒍᓐᓇᕐᒪᑕ ᐱᕈᖅᑐᓄᑦ ᐆᒪᔪᓄᓪᓗ ᑕᒫᓂ ᓴᕕᕋᔭᒃᓴᔪᑦ ᐱᑕᖃᕐᓂᖏᓐᓄᑦ ᐃᓱᒪᒋᓪᓗᒍ ᑕᐃᒪᓐᓂᑦ ᑳᒃᑯᐊ ᓴᕕᕋᔭᒃᓴᔭᐃᑦ

ᑕᒫᓃᖏᓐᓇᐅᔭᕐᒪᑕ ᐋᒃᓱᓗᐊᖑᓕᖅᐹᓪᓕᕐᓇᑎᒃ ᐅᔭᕋᓐᓂᐊᖅᑕᐅᓕᕐᓂᖏᓐᓄᑦ. ᐃᒻᒥᒃᑰᖅᑐᑦ ᐅᓐᓂᕐᓗᒃᓴᐅᑕᐅᓚᐅᖅᑑᓗᐊᑦ ᑭᓯᐊᓂᓕ ᐊᒥᓲᖏᓚᐅᕐᓂᖏᓐᓄᑦ ᓱᒌᓪᓕᐅᑕᐅᓗᐊᓚᐅᖏᑦᑐᑦ ᑐᑭᖀᑕᐅᔪᓄᑦ. ᐅᑯᐊ ᑕᑉᐸ ᐃᒻᒥᒃᑰᖅᓱᑎᒃ ᐅᓐᓂᕐᓗᒃᓴᐅᑕᐅᓚᐅᖅᑐᑦ, ᓇᕿᑦᑕᖅᓯᒪᔪᓂ ᑕᒪᖅᓯᒪᔪᑦ ᐊᓯᖏᑦ, ᐃᓱᒫᓗᑎᔭᐅᔪᑦ:

- ᓈᓴᐅᓯᓇᔪᑎᓂᒃ ᐆᒃᑐᕋᐅᑎᖃᓚᐅᕐᒪᑕ ᑎᒥᒧᑦ ᐋᒃᑐᐊᓂᖅᑯᓂᒃ ᐃᒃᐱᖕᓇᕐᓂᖅᑯᓂᓗ ᐃᓱᒪᕆᓪᓗᕆᑦ ᖃᓄᑎᕆ ᐊᑯᓂᐅᑎᕆᔪᒥᒃ ᓱᕈᔪᖕᓇᖅᑐᕆᓚᐅᓇᐊᖏᑦ ᐊᓯᖏᓐᓂ ᐆᒃᑐᕋᐅᑕᐅᑉᐳᖅ ᐊᑐᖅᑕᐅᖏᖑᖅᓗᓂ 95% ᐊᒥᓱᓂᖅᓴᓄᑦ ᐃᓯᕆᔭᐅᔪᑦ ᑲᑎᖅᓱᕋᕆᒃ ᐃᒃᐱᖕᓇᕐᓂᖏᑦ ᖁᑉᐸᖅᐸᓪᓕᐊᔪᓐᓇᖅᑐᑦ ᐊᑯᓚᐃᓐᓂᖃᓕᖅᐸᓪᓕᐊᔪᑦ ᖃᑎᖅᓱᖅᓯᒪᓕᕋᒃ ᐅᓗᖅᓯᐸᓪᓕᐊᓲᖑᓂᖏᑦ ᓈᓴᐅᑏᑦ;
- ᐱᑕᖃᖏᒻᒪᑕ ᓯᓚᒃᑯᑦ ᓇᒧᖓᖃᑦᑕᓲᖑᓂᖏᓐᓂᒃ ᐆᒃᑐᕋᐅᑏᑦ ᓱᕈᔨᔪᖅᑎᓪᓗᒍ ᓄᓇᒥᒃ ᐆᒃᑐᕋᖅᑕᐅᕆᐊᓖᑦ ᒪᑯᐊ ᒪᓂᕋᒥ ᓱᕈᔾᑕᐅᔪᑦ ᐊᐸᓗᑦᑎᓐᓂ ᓇᒧᑦ ᑰᓱᖑᒪᖕᖓᑕ;
- ᐱᑕᖃᖏᒻᒪᑕ ᓇᒧᖓᐅᖃᑦᑕᓲᖑᓂᖏᓐᓂᒃ ᐆᒃᑐᕋᐅᑏᑦ ᓴᐃᕋᔭᒃᓴᐃᔭᖅᑕᐅᓂᑯᐃᑦ ᓴᓇᖅᑯᑎᑦ ᐅᐊᕆᑎᖏᑦ ᐊᒃᑕᕐᐃᖓᓂᑦ ᑕᓯᕐᒥᑦ ᑰᒃᑐᑦ ᓱᕈᔨᑦ ᐃᒪᕐᒧᑦ ᓯᕝᔭᒧᓪᓗ ᑰᖕᓂᑯᐃᑦ;
- ᖃᓄᖅ ᐊᐳᑎ ᓱᕈᔫᒃᓯᒪᔪᖅ ᐊᐅᒃᐸᓪᓕᐊᓕᖅᑎᓪᓗᒍ ᐃᖏᕋᔾᔪᖑᓂᖓ ᑰᒃᑯᑦ ᓯᑯᑉ ᖄᖓᓄᑦ ᑎᒃᑕᐅᓂᑯᐃᑦ ᐊᐃᖓᐃᑦ ᑎᒥᖏᓐᓃᓪᓕᔾᔪᖑᓂᖏᑦ ᑕᖅᑭᓂ 8-ᓂ ᐅᑭᐅᓕᒫᒥ;
- ᒥᑭᓐᓂᖅᐹᒥᒃ ᖃᓄᐃᒃᑲᔭᕐᓂᖓᓂᒃ ᐆᒃᑐᕋᐅᑎᖃᖅᓱᑎᒃ ᑕᒪᐃᓐᓄᓪᓚᒫᖅ ᐋᒃᑐᐊᓂᖅᑲᖓᖅᑎᓪᓗᒍ ᓂᕆᔭᐅᓗᓂ ᓱᕈᔩᑕᐅᔪᓐᓇᖅᑐᓂᒃ ᐅᐊᕆᑎᓯᒪᔪᑦ; ᐊᒻᒪᓗ
- ᐅᖃᐅᓯᐅᓯᒪᖏᓗᐊᕐᒪᑕ ᓴᐃᕋᔭᕆᔪᖕᓂ ᐃᓗᓕᖅᑲᓲᑦ ᐆᒪᔪᑦ ᓂᕿᑦᔭᐅᖃᑦᑕᖅᑐᑦ ᐊᓯᖏᓐᓄᑦ ᐆᒪᔪᓄᑦ ᐊᐃᖓᐃᑦ ᑕᒫᓂ ᐅᔭᕋᒃᑕᕐᓂᐊᕐᐃᐅᔪᓂ ᐊᒃᑕᕐᓗᑯᓂᑦ ᐱᕆᐊᕐᐃᖓᓂᑦ ᐃᓯᓕᕐᐃᖓᓄᑦ, ᑎᒥᖓᓃᓕᖅᑎᓪᓗᒍ ᖃᓄᑎᕆ ᐱᑕᖃᓕᖅᐸᑦ ᐊᑦᑕᕐᓇᓕᕈᑕᐅᓇᔭᕐᒪᖔᑦ ᐃᓅᓯᕐᒧᑦ. Metallothioeins ᓴᓇᔭᐅᓲᖑᖓᒪᑕ ᑎᖑᖓᓂ ᓂᕿᑦᔭᐅᔪᑦ ᓴᐃᕋᔭᒃᓴᖃᐅᓗᐊᓕᕐᖓᒪᑕ ᑎᒥᒧᑦ ᓱᕈᔨᔭᐃᒃᑯᑎᓂᒃ ᐊᑐᖅᑕᐅᒍᓐᓇᖅᑐᓂᒃ ᓴᓇᓇᓯᐊᖅᓱᑎᒃ ᓴᓇᔭᐅᓲᑦ ᓱᕈᔨᔭᐅᑦᑐᓂᒃ ᐱᑕᖃᕋᖕᖓᑦ ᑎᖑᖓᒧᑦ ᐹᔭᐃᔪᑕᐅᓇᓯᐊᓲᑦ.

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CRITICAL REVIEW OF THE 2002 PHASE II ENVIRONMENTAL SITE ASSESSMENT
AND
THE ECOLOGICAL RISK ASSESSMENT
AND
THE QUANTITATIVE RISK ASSESSMENT –
OF
CANZINCO LTD. NANISIVIK MINE, NUNAVUT

AMEC Earth & Environmental Limited
221 – 18th Street S.E.
Calgary, Alberta
CANADA T2E 6J5
Tel: +1 (403) 248-4331
Fax: +1 (403) 248-2188
www.amec.com

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PART 1: CRITICAL REVIEW OF THE 2002 PHASE II ENVIRONMENTAL SITE ASSESSMENT
NANISIVIK MINE, NUNAVUT

1.0 INTRODUCTION

The 2002 Phase II Environmental Site Assessment (ESA) of the Nanisivik Mine was prepared for CanZinco Ltd. by Gartner Lee Limited. The purpose of the ESA was to complete the data collection and interpretation that was initiated by CanZinco Ltd. to identify and delineate areas of environmental contamination related to mine activities.

There is no doubt that this ESA is a comprehensive compilation of data on surface and subsurface material, sediments and surface water in the Nanisivik area. However, conveying the findings and meaning of this information is made somewhat difficult by the report organization and criteria used to delineate "contamination." There are also problems with the nomenclature used to describe the surface material. A specific contaminant is also listed as being of concern in the conclusion of the report, but was not previously identified in any analysis of material from the Nanisivik mine area or discussed in the text. These problems are discussed below.

2.0 ORGANIZATION OF THE PHASE II REPORT

The general format of a Phase II ESA report, according to the Canadian Standards Association (2000) "should present information in ways that follow a logical order and are unambiguous and comprehensive." While the author of this report probably does not have any problem with the "logical order" in which information is presented, this reviewer found the Phase II document somewhat unorganized and not in accordance with the proposed report format detailed by the Canadian Standards Association (CSA). Although the CSA proposed section headings are not required, the presentation of the data in the Phase II document should have attempted better organization. For example, the proposed format for a Phase II assessment by the CSA suggests the following main sections:

- Introduction (including background)
- Site investigation methodology
- Findings (i.e. the nature and extent of contamination)
- Evaluation of Findings (includes contaminant fate and transport, if applicable)
- Conclusions
- Qualifications of Assessor
- References and supporting documentation
- Appendices

In accordance with the above format, the Phase II ESA document begins with an introductory section. Subsections include a background on Closure and Reclamation Plan (Section 1.2) and an overview the Nanisivik Mine, town and related facilities (Section 1.3). The information discussed much later in Section 4 (Site Development and Operations) would appear to be more appropriate in Section 1.2. The information currently in Section 4 seems out of place.

Section 2 (Pre-mining Environmental Setting) would also seem to be more appropriate in the section discussing the background of the facility, rather than a separate section. The title "Pre-Mining Environmental Setting" begs the question as to whether their should be a section entitled "Post-Mining Environmental Setting" that would describe the changes in climate, permafrost, geology, topography, hydrology, vegetation, soil, mammals and birds due to the mining activity.

Section 3 (Environmental Site Assessment Setting) is still related to the discussion of actions and studies carried on before the 2002 Phase II study and as such should be in the section dealing with "background information." Indeed, it would seem appropriate to have a section entitled "Environmental Setting" which included all the subjects under 2.0 and the sections 3.1, 3.2, 3.3 and 3.4. Sections 3.5 (Possible Contaminants and potential Areas of Concern) does not seem appropriate to the environmental setting section, but should be placed in Section 6 (Contaminants and Areas of Environmental Concern) of the ESA document.

There should be an entirely separate major section for "Methodology"; not as a subheading under Section 5. This methodology section would contain the information from section 1.5 (Scope of Work) as well as all methodologies, regardless of their time scale so as to present them at one location in the document.

A major section heading, such as "Findings - Nature of Extent of Contamination," should be used for the information currently covered in 5.2 (Observations) and 5.3 (Results). This type of organization would make the document much easier to read and follow along with the discoveries made by the author.

Another section that seems out of place in the Phase II ESA document is Section 1.4.2 "Remedial Guidelines." The section states that the soil, sediment and water quality will be assessed according to various government guidelines. This section would seem more appropriate to the "evaluation of findings" section such as the existing sections 5.3 or 6.

3. THE SURFACE MATERIALS AND IDENTIFICATION OF CONTAMINATION

In the Introduction section of the ESA, an explanation is provided of the various criteria used for interpreting the data collected. Specifically, the CCME Canadian Environmental Quality Guidelines for soil are identified for land use activities. This section of the ESA goes on to mention that the mine area "is currently being used for residential, commercial and industrial purposes." The future land use of the mine site appears to be the subject of negotiations, but regardless of this the remediation objective is to restore the land to as close as possible to natural conditions (i.e. arctic wild lands). The ESA document admits that there are no remediation criteria for a land use category identified as arctic wild lands and that parkland land use "objectives" will be used in the interpretation of data even though "these criteria were developed for urban areas in southern Canada."

The last section of the Introduction (Section 1.5, Scope of Work) identifies the extensive soil sampling program undertaken to attain the objectives of the ESA. A most remarkable statement is made in section 2.7 (Soil) that reports on the 1973 study of the area. This statement is as follows:

> "Soil studies were conducted by B.C. Research Inc. in conjunction with the 1974 vegetation mapping and reported that virtually **no soil formation has occurred in the mine area**. The little soil that has developed was found to be located primarily in alluvial plains where eroded and wind blown material has settled."

If this is indeed the case, then exactly what was the material collected in place of soil and how does this affect the use of soil quality guidelines derived from soil-types common to southern Canada?

Definitions of "soil" generally follow the examples below. Buckman and Brady (1962) defined soil as:

> "A natural body, synthesized in profile form from a variable mixture of broken and weathered minerals and decaying organic matter…"

Flawn (1970) defined soil as:

> "mixtures of fragmented or partly or wholly weathered rocks and minerals, organic matter, water and air, in greatly varying proportions, and have more or less distinct layers or horizons developed under the influence of climate and living organisms."

Clearly, organic matter is an essential component of soil. In fact, all authors of textbooks dealing with soil agree that soil has four major components even though the relative proportions of these components may vary widely. These components are **mineral matter, organic matter, water and air**. Although the surface material collected from the Nanisivikic site for the Phase II Environmental Assessment are analyzed for minerals, there is no analysis of organic matter or water.

Another definition of soil (Russell 1973) states:

> "A soil is a regolith that shows vertical anisotrophy due to biological activity. By this is meant that a soil consists of layers of mineral material whose properties differ from another in some recognizable respects, and these differences are due to biological activity.".

In addition Russell (1973) goes on to say:

> "However, chemical changes can take place in the rock below the zone of biological activity, giving vertical anisotrophy, or layers in the rock which differ from the rock itself. **This material is usually not considered to be soil, although it is produced from the rock by weathering**."

The following definition for soil is from the Canada Department of Agriculture (1976).

> "For the purpose of the Canadian taxonomic system, the earth's surface (the material that is to be classified) is divided into soil and nonsoil. Soil is the naturally occurring, unconsolidated, mineral or organic material at the earth's surface that is capable of supporting plant growth. It extends from the surface to 15 cm (6 inches) below the depth at which properties produced by **soil-forming process** can be detected."

Thus, if B.C. Research Inc. reported that virtually **no soil formation has occurred in the mine area**, the surface material in the mine area is not "soil." If it is not soil, should this material be judged as to its potential for harm by criteria developed for soil?

As an example of the application of generic standards for soil monitoring, Alberta Environmental Protection (1996) Soil Monitoring Directive states:

> "For a given substance or parameter, generic standards shall be applied only at sites having the following characteristics:
>
> a) clay content in soil greater than five percent;
> b) soil pH between 6.0 and 8.5;
> c) seasonal water table no closer than one metre to the soil surface; and
> d) the ambient background concentration of a given substance does not exceed the standard."

Thus, the solid surface material collected at the Nanisivik site does not appear to be "soil" and yet it is collected as such, is analyzed as such and then judged as such for its potential to cause detrimental ecological and human heath effects.

Statements in the Phase II ESA such as:

> "The natural soils at Nanisivik generally displayed elevated metal concentrations when compared to generic CEQG CI and/or PL guidelines." (page 17) and
>
> "The results confirm that the background, or natural, quality of the weathered bedrock does not meet the generic CEQG CL guidelines of 260 µg/g for lead and 360 µg/g for zinc." (page 61)

cause anyone reading this document to question why the Canadian Environmental Quality Guidelines (CEQGs) for soils characteristic of southern Canada would be used for this particular surface material in a high arctic "polar desert" environment. These guidelines seem inappropriate.

An extremely important paragraph begins at the bottom of page 17. This paragraph points out "an area containing a surficial trend of naturally occurring mineralized soil." In order words, what the author of the Phase II ESA appears to be saying is these surface materials should be considered to contain the naturally high background concentrations of metals. The paragraph goes on to state that the lead concentrations in the samples collected from this area ranged from 48 ppm to 2296 ppm, with an average of 662 ppm. In this same area, zinc concentrations ranged from 93 ppm to 1404 ppm with an average concentration of 825 ppm. If 2296 ppm lead and 1404 ppm zinc are considered to be "naturally occurring," why shouldn't these numbers be used to assess "contamination" rather than CEQGs for soils? The document gives no explanation or rationale regarding this question.

4. CONTAMINANTS OF ENVIRONMENTAL CONCERN

Section 6.1 of the ESA contains Table F entitled "Contaminants of Environmental Concern." Under the table column heading "contaminant," in the fourth row of the table are the words "Chlorinated Ethenes – Volatile Organic Compounds." A search of the Phase II ESA text and embedded tables and the tables at the end of the text failed to find any reference to these compounds. The "comment" column in Table F, fourth row states: "Constituents of Xanthate." However, xanthate is defined in the 12th edition of the Condensed Chemical Dictionary (Lewis 1993) as:

> "A salt (usually potassium or sodium) of a xanthic acid. Available as yellow palletized solids having a pungent odor, soluble in water."

There is absolutely no indication that xanthate contains chlorinated ethenes. Yet, as a contaminant, chlorinated ethenes are given the same status of concern as the obviously ever-present metals cadmium, copper, lead and zinc.

5. AREAS OF ENVIRONMENTAL CONCERN

Table G, in Section 6.2 summarizes the areas that are of environmental concern due to the presence of hydrocarbons. There are a total of 12 areas identified. However, in eight of the 12 areas (67% of the areas cited), the contamination is characterized as "localized." For the "Town," hydrocarbon contamination is stated as "confined to shallow areas (less than 0.05 m)…." These comments beg the question as to whether "localized" contamination can be considered an "environmental concern."

Table H, in Section 6.2 summarizes the areas that are of environmental concern due to the presence of metals. Comments related to five of the 14 areas use words such as "small quantities," "limited," and "localized" to describe the presence of these contaminants. This again raises the question: If these areas are characterized as "small" "limited" and "localized" are they necessarily of concern? This is especially relevant when the natural background levels of metals in the surface material generally exceed the CEQGs for parkland soil.

6. SUMMARY

This ESA contains a wealth of data and information from which to draw conclusions. Given the nature of the site and the lack of generic criteria for the protection of "Arctic wild lands", the term "contamination" as related to the specific geographic and geologic conditions of Nanisivik should have been a major topic of discussion. There are, in addition, several errors (e.g. "chlorinated ethenes" in Table F) that should have been easily identified by any reviewer prior to release of the Phase II ESA document.

The words used to describe the presence of contamination (e.g. "small quantities," "limited," and "localized") seem to indicate that the contamination due to mining at Nanisivik is not pervasive. However, the Phase II ESA does not provide an overall quantitative or qualitative assessment regarding the extent of contamination. In a review of Arctic terrestrial ecosystem contamination, Thomas et al. (1992) qualifies the "scale of chemical contamination" at Nanisivik as "minor." This would seem to support the terminology used to describe the presence of contamination by the ESA.

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7. REFERENCES

Alberta Environmental Protection. 1996. Soil Monitoring Directive.

Buckman, H.O, and N.C. Brady. 1962. The Nature and Properties of Soils. A College Text of Edaphology. Sixth Edition. T he Macmillan Co. N.Y.

Canada Department of Agriculture. 1976. A Glossary of Soil Science.

Canadian Standards Association (CSA). 2000. Phase II Environmental Site Assessment.

Flawn, P.T. 1970. Environmental Geology; Conservation, Land-Use Planning and Resource Management. Harper & Row, N.Y. 313 pp.

Lewis, R.J. 1993. Hawley's Condensed Chemical Dictionary, 12th edition. van Nostrand Reinhold Co., N.Y.

Russell, E. W. 1973. Soil Conditions and Plant Growth. Tenth Edition. Longman, N.Y. 849 pp..

Thomas, D.J., B. Tracey, H. Marshall and R.J. Norstrom. 1992. Arctic terrestrial ecosystem contamination. Sci. Total Environ. 122:135-164.