



**ACTION PLAN
FOR
ASSESSMENT
OF
INCO
COPPER
NICKEL
MINING
PROPOSAL**

**SUPERIOR NATIONAL FOREST
EASERN REGION
FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE**

FOREWORD

The Superior National Forest is on the threshold of a new mining industry - copper, nickel, and other associated metals. Such an industry will have a substantial socio-economic impact on Northeastern Minnesota and the natural environment of the Forest and surrounding areas, regardless of the mining and processing methods used.

Copper-nickel deposits within the Superior National Forest have been well known and widely discussed for over 20 years. Earlier commercial development has not been feasible with existing recovery technology and previous price levels for copper and nickel. Now, new technological developments coupled with rising metal prices have materially improved the prospects for successful development.

In 1966 the International Nickel Company (INCO) was given BLM leases to mine and remove copper-nickel ore on 4,500 acres of Federally-owned surface and minerals within the Superior National Forest adjacent to the Boundary Waters Canoe Area. Additional lands may be needed for tailings, wasterock disposal, and other mining developments. The lease stipulates that the Department of Agriculture is the agency having control over the use of the land. The lease designates the Supervisor of the Superior National Forest as the "Authorized Officer" who must approve or disapprove requests for open pit mining and reduction or smelting of ores. The Supervisor is also delegated the responsibility of approving all clearing, construction, and mine operating plans that affect the surface environment.

In the long run, it will be to everybody's advantage - the public interest groups, local economic interest, and the Company - to have as detailed and thorough a study as possible, so that if and when this project is begun, proper planning can be initiated to minimize adverse environmental effects.

In addition to the potential adverse effects of the proposed INCO project on the waters of the Forest, it has the potential to drastically alter and adversely affect:

1. Water yields
2. Soil quality
3. Air quality
4. Vegetation health and vigor
5. Natural succession processes
6. Vegetation diversity
7. Wildlife habitat and populations
8. Wildlife diversity
9. Raptors (owl, hawk, eagle, osprey)
10. Predators (wolf, mink, marten, fisher)
11. Herbivores (deer, rodents, moose)
12. Omnivores (bear)
13. Warm water fisheries (pike, panfish, sturgeon)
14. Cold water fisheries (trout species)
15. Scenery - visual characteristics
16. Natural aesthetics
17. Recreation experience levels
18. Cultural relics
19. Visitor health and safety
20. Cultural patterns (traditions)
21. Solitude (noise)

In addition, this proposed project could drastically change the physical, scenic, and socio-economic condition of this relatively primitive and undeveloped part of the Superior National Forest.

Secondary spinoffs will of course be studied. A larger population will inhabit the town of Ely and surrounding communities and could create a demand for expansion of housing and public facilities. No doubt the transportation system would also need re-working.

The dumping of taconite tailings into Lake Superior has recently attracted nationwide attention. A nine month long trial was recently completed in Federal District Court in Minneapolis where the United States, the State of Minnesota, and many environmental groups sued to halt the pollution of Lake Superior. Millions of dollars have been spent on the court

costs and attorneys' and consultants' fees to date. The end is not in sight. The purpose of this environmental assessment is to complete the necessary work to assist in making a sound decision. In the long run it will be to everybody's advantage to have as comprehensive a study as possible, so that if mining is permitted, there will be no unforeseen adverse environmental or social effects.

As can be seen the issues are not sharply drawn, but the implications of any decision to either permit mining or prohibit mining are wide in scope and of great importance.

The decision will have great immediate effect, but will also have longer term effects since other mining developments are proposed along the "gabbro" contact.

The action plan which follows is submitted for the purpose of making an objective management decision through the involvement of the public and cooperation with State and Federal agencies using the legal process of the National Environmental Policy Act.

TABLE OF CONTENTS

	<u>Page</u>
A. INTRODUCTION	1
B. FLOW CHART	2a
C. DETAILED DESCRIPTION OF EACH ACTIVITY	3
1. Preplanning Phase	4
2. Public Involvement Phase	7
3. Data Collection Phase	10
4. Alternative Analysis Phase	24
5. Decision Phase	26
6. Critical Path by Completion Dates	27
D. OUTLINE OF ENVIRONMENTAL STATEMENT	31
E. ORGANIZATION AND BUDGET	
1. Organization Chart	35
2. Budget Display	36
F. APPENDIX	
1. Letter of Application from INCO to U.S. Forest Service	
2. U.S. Forest Service Response to INCO Application	
3. Data Collection and Monitoring Designs	
NOTE: Only a partial compilation is included. Additional studies will be available as received.	
4. Environmental Quality Council Resolution	
5. Washington Office Letter of May 1, 1974	
6. Izaak Walton League Letter by Dr. Paul Toren	
7. Letter Signed by 26 Environmental & Church Organizations	
8. Maps	
9. U.S. Geological Survey Requirements for Mining & Reclamation Plan.	
NOTE: Completion of a final copy of these requirements is pending receipt of the base operating plan from INCO as required by Geological Survey Regulation 30-CFR-231.	

INTRODUCTION

The purpose of this action plan is to develop an organized method toward solution of a complex problem.

The problem presented to the U.S. Forest Service is the development of an Environmental Impact Statement based on gathering of scientific, social, and economic data to meet the requirements of the National Environmental Policy Act. The necessity for an Environmental Impact Statement was generated by a request from International Nickel Company (INCO) to the Supervisor of the Superior National Forest for permission to open a pit mine and construct a concentrating plant waste rock dump and tailings disposal area under terms of its lease for mining of copper and nickel on approximately 4500 acres of the Superior National Forest. The proposed mine site is less than 1 mile from the BWCA on the South Kawishiwi River which flows into and drains 50% of this wilderness area.

This action plan will encompass four major points. The primary objective of the four points described below is to formulate an action plan which will permit the Forest Service as lead agency, through cooperation and assistance of many State and Federal agencies, to achieve objectivity and service to the public.

1. Identification and description of activities and responsibilities.

All major tasks which are necessary to reach the objective of data gathering, analysis and development of an E.I.S. must be identified and defined before action begins. This organized approach is necessary to realize unification of the interdisciplinary, multi-agency team effort. Responsibility of each agency (Federal & State) and the company is outlined in the Appendix.

2. Development of a critical path.

A flow chart showing the sequence of events that will occur during the environmental analysis will be developed through a process known as the critical path method. The critical path is a graphic demonstration of all the major steps necessary to

follow a natural flow from inception to completion of the project.

3. Statement of time and budget requirement.

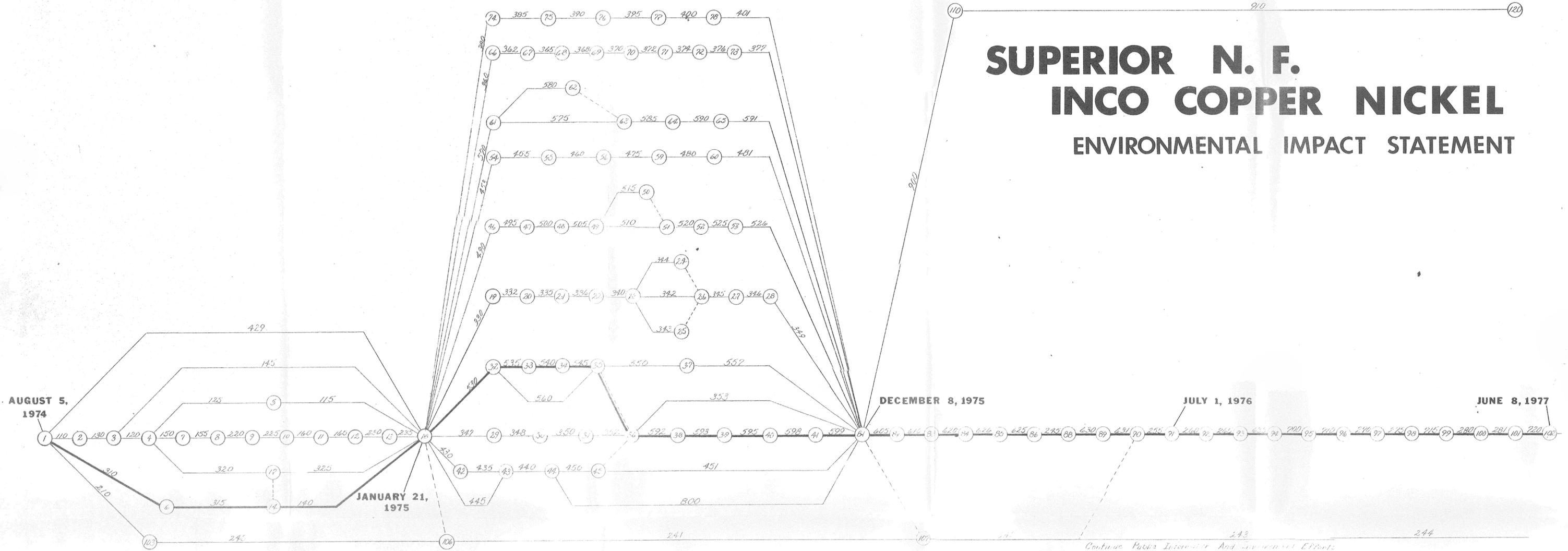
Each activity must be defined in terms of cost and completion time. This information will be used for administrative purposes to justify project allotments and personnel requirements. It is also intended as a means of providing the public with a detailed account of costs and time estimates.

4. Construction of a preliminary outline for the E.I.S.

Writing a document of large proportions such as an E.I.S. necessitates an organization of content in outline form before the job of fact gathering, analysis and writing can be undertaken. This outline, similar to a "table of contents", aids in directing the E.I.S. in an orderly process, helps to avoid unnecessary steps, and guides the efforts of the project task force. The public is also informed in advance on the method of addressing the problem.

The job of collecting and analyzing data, examining alternatives and rendering a decision is complicated by legal, environmental, social and economic problems extending from local to international in scope. This action plan is designed with full recognition of the magnitude and importance of the work which must follow.

SUPERIOR N. F. INCO COPPER NICKEL ENVIRONMENTAL IMPACT STATEMENT



Develop Action Plan
Organize Team
Staffing
Budgeting

PREPLANNING PHASE

Working Groups
Team Training
Establish Laboratory
Write Action Plan

Archeological Studies
Water Studies
Biological Studies
Soil Studies

DATA COLLECTION PHASE

Survey Project
Meteorological Studies
Development of Mine Operating Plan
Toxicity Study for Soil & Stream Organisms
Land Exchange Studies

Aerial Photography & Mapping

Refine Analytical System
Analyse Alternative Effects

ALTERNATIVE ANALYSIS PHASE

Select Proposed Alternative
Write Draft Statement

Select Final Alternative
Write Final Statement

DECISION PHASE

Review & Rewrite
FINAL DECISION

News Releases
Public Meetings
Action Plan Review

PUBLIC INVOLVEMENT

Seminars
Newsletters
Environmental Statement Review

DETAILED DESCRIPTION OF EACH ACTIVITY

The activity descriptions which follow are not listed in the chronological order of planned accomplishment. The activity list should be used with the flow chart in order to follow the route of the action plan in detail.

The critical path by completion date for each activity is summarized on pages 27-30.

PREPLANNING PHASE

The administrative chores of staffing, budgeting, training and ordering of supplies and equipment must be achieved before orderly progress of the Environmental Impact Study begins. During this phase, contacts with other agencies will lead to sharing of expertise to design data collection which begins in the second phase of the study.

110 - DEVELOP CPM CHART

Includes preparation of an activity list, description of these activities, preparation of a network diagram, estimation of time requirements, and the scheduling of jobs. It also includes computer runs associated with development of boundary time charts.

115 - TRAINING FOR THE TEAM

Includes training in the environmental analysis and statement process.

120 - DEVELOPMENT OF TEAM ORGANIZATION

Includes skill selection, clerical support, establishment of multi-agency work groups.

125 - PROCESSING OF PERSONNEL ACTIONS

Includes administrative details required for the announcement of vacancies, the selection of personnel, and the administrative items associated with transfer and the relocation of employees. This activity is performed by the Regional Office but will require an elapsed time of approximately 2 months.

130 - DEVELOPMENT OF A TEAM BUDGET

Includes budgeting for the entire project, FY 75 through FY 77. Budget to show breakdowns by salaries, equipment, travel, contracts, or cooperative agreements. Because of the involvement of contracts and cooperative agreements, exact budgeting will not be possible until project work is well advanced.

140 - DEVELOPMENT OF WORKING PROCEDURES

Includes the development of working procedures among the various working groups associated with the project, RO support, and other Federal agency support. It will involve matters such as circulation of study reports, the handling of analysis data, development of data storage systems, etc. This activity also includes the continuing process of maintaining good relationships with working groups and cooperators. It will require a great deal of travel and attention on the part of the Project Leader as well as writing of reports, setting of deadlines, etc.

145 - LOCATION OF OFFICE AND LAB FACILITIES

Includes the location of office space for use by the team and the location of a field lab for the work associated with collecting field data, cataloging of field data, security, and transmitting field samples to other lab facilities. If the lab facilities are not available through other means and use of a trailer becomes necessary, the hook-ups, etc., will have to be installed prior to winter so the lab may be set up and used during the winter of 74-75. This will require an estimated lapse time of 30 days for advertising and 45 days for delivery.

150 - WRITE THE ACTION PLAN

The action plan will contain the following items:

1. An introduction, which describes the objective of the project, the background on the INCO project, and a description of the area.
2. A flow chart indicating the activities that will be required for completion of the project, the schedule of completion dates, etc.
3. A description of each activity in detail.
4. An outline of the environmental statement.
5. Organization and budget associated with the project.
6. A flow chart diagram.

This plan will be used as a public information document after internal review. Preliminary action and planning was conducted in May and June, 1974 for purposes of initial team action. Direction and objectives were determined during an inter-agency meeting on August 1, 1974.

155- PUBLISHING THE ACTION PLAN

Includes editing, drafting of the network diagram, typing, printing and mailing. This is an initial draft for internal review.

160 - REWRITE THE ACTION PLAN

Action plan is rewritten to reflect comments from internal review by the U. S. Forest Service, Regional Office, and Chief's Office.

165 - PUBLISH THE FINAL ACTION PLAN

Includes typing, editing, printing, drafting, and mailing of the final action plan to the public. The length of time for this activity will depend upon the amount of comments made during the internal draft. It will be presented to the public as an information document upon which they may comment if they so desire. We will not request specific comments nor will we run a Codinvolve analysis on any comments we may receive. It is an information document. It will also be reviewed with working groups and cooperating organizations to ensure complete coverage of the various areas. The final action plan will include activity time for assistance from I & E Staff in layout and design.

PUBLIC INVOLVEMENT PHASE

Public involvement activities will occur throughout all phases of the environmental impact study. Some items included under public involvement could logically be placed under the decision phase since the review of the environmental impact statement by the public is an integral part of the decision making process.

210 - INITIAL MEDIA RELEASE

Includes initial press releases, television appearances, person-to-person contacts made to explain the beginning of the project, who will be involved in leading the project, and what the objectives of the project are. The initial media work will probably extend over a period of several months in lapse time, however, it should only occupy the team for 5 team days.

220 - REVIEW OF THE ACTION PLAN BY FOREST AND REGIONAL OFFICE

Includes description for activity 165 and 160. This activity is the internal review of the action plan and will take approximately 10 days for review with one day devoted to a staff meeting with Regional Forester and Resource Staff Directors.

225 - REVIEW OF THE ACTION PLAN WITH THE WASHINGTON OFFICE

This is associated with activity 155. This review may not be required unless it is necessary for budget justification.

230 - RELEASE OF THE ACTION PLAN TO THE PUBLIC

This is in reference to activity 165 on publishing the final action plan.

235 - ANALYSIS OF ACTION PLAN COMMENTS

It is essential that the public is informed of the steps that we will be taking to analyze environmental impacts created by the proposed project, although we will not ask for formal public comment on our action plan. However, if comments are received which provide valuable contributions toward the environmental analysis process, we will change the action plan to reflect comments. We do not plan

a Codinvolve analysis on these comments.

240 - PERIODIC NEWS RELEASES AND PROGRESS REPORTS

Includes an up-to-date report of the status of the project on a quarterly basis. It will be achieved through releases to the various news media and written reports to the Regional Forester, Forest Supervisor, and the company, as well as cooperating agencies. It will be an ongoing occurrence initially scheduled for once every quarter. This activity also includes the time spent in making presentations to special interest groups throughout the entire project.

241 - PERIODIC NEWS RELEASE

242 - PERIODIC NEWS RELEASE

243 - PERIODIC NEWS RELEASE

244 - PERIODIC NEWS RELEASE

The sequence of news releases listed above is not all inclusive. The listing is shown in this order to note continuing activity and to assist the team in addressing the formal schedule of public information activities on a scheduled basis as project work progresses.

245 - REVIEW OF PRELIMINARY DRAFT ENVIRONMENTAL STATEMENT BY THE RO, WO, SO AND OTHER AGENCIES

This is the internal agency review of the preliminary draft environmental statement before it is released to the public. If the land exchange is a part of the draft environmental statement, it may require WO review of the draft. This will include approximately 15 to 20 days of review time for the Regional Forester and staff plus a 1-day presentation by the project team to the Regional Forester and staff directors.

255 - FILE DRAFT ENVIRONMENTAL STATEMENT WITH CEQ

This involves the mailing of sufficient copies to CEQ and the filing of a notice in the Federal Register.

260 - REVIEW OF THE DRAFT ENVIRONMENTAL STATEMENT BY THE PUBLIC AND OTHER AGENCIES AND CONDUCT PUBLIC HEARINGS

265 - ANALYSIS OF PUBLIC AND OTHER EXTERNAL AGENCY COMMENTS

We will utilize Codinvolve system for analyzing comments made on the draft environmental statement.

270 - RESPONSE TO COMMENTS ON THE DRAFT ENVIRONMENTAL STATEMENT

This activity involves answering comments made concerning the various parts of the draft environmental statement. These responses to the comments will be handled as a part of the final environmental statement.

275 - REVIEW OF FINAL ENVIRONMENTAL STATEMENT BY REGIONAL FORESTER, CHIEF, AND OTHER AGENCIES.

280 - PUBLISH FINAL ENVIRONMENTAL IMPACT STATEMENT AND FILE WITH CEQ AND MAIL TO PUBLIC.

Includes public review time and printing and mailing.

281 - ANALYSIS OF COMMENTS RECEIVED ON THE FINAL ENVIRONMENTAL STATEMENT

The analyses of the comments on the final environmental statement are made following the lapse of the 30-day review period for the final environmental statement. A decision announcement by the Forest Service will be made following this analysis.

DATA COLLECTION PHASE

The detailed planning to determine information needs and techniques of data collection will be accomplished in the preplanning which precedes this phase. The formal data collection will begin after information needs are determined by inter-agency working groups. These groups will complete plans in January 1975. In some cases (e.g. activity 330) this can be accomplished in a 1 day meeting to review draft plans developed during the preplanning phase.

If it becomes necessary to gather further information the data collection phase will be continued through the alternative analysis phase and beyond. When sufficient data have been collected to make decisions, the data collection activities will shift into a monitoring phase which could continue indefinitely.

DATA COLLECTION PHASE

The data collection phase began in August 1974 with inter-agency working group meetings. These meetings continued through October and were the basis of initial action taken by the team to implement the beginning of data collection and formulation of working plans.

310 - DETERMINE INFORMATION OBJECTIVES

The purpose of this activity is to attempt to define how we will use specific information collected in the data collection phase. It is an activity in which we try to eliminate or reduce the amount of data collected that is of no consequence to the decisions to be made.

315 - IDENTIFY INFORMATION NEEDS BY SPECIFIC DATA COLLECTION AREAS

There have been a number of data collection areas identified.

*Impact on
Energy availability
and distribution
in the state*

These are (1) land line location, photo and mapping, (2) socio-economics, (3) water, (4) climate, (5) operating plan development, (6) archeological and historical sites, (7) soil studies, (8) toxicity studies on soils and stream organisms, (9) biological studies. Specific information needs will be developed through the use of working groups of specialists involved in particular types of studies important to making environmental impact decisions.

320 - DEVELOPMENT OF AN ANALYTICAL SYSTEM FOR ANALYZING DATA

The objective of this activity is to develop at least in a broad framework the techniques that will be used to analyze the data collected by the various studies. It is imperative to develop the analytical system at an early stage in order to help in identification of the information needs.

325 - DEVELOP DATA COLLECTION PLAN BY STUDIES

This is a step-by-step procedural plan for each of the independent studies mentioned previously, such as biological studies, water studies, soil studies, etc. The objective is to establish clear procedures and directions for field and laboratory procedure to

meet the information objectives as mentioned in activity 310 described previously.

WATER STUDIES ACTIVITIES

330 - DEFINE WATER INFORMATION NEEDS AND WRITE PROCEDURES FOR STUDY THROUGH WORKING GROUPS

This will be a very detailed plan including identification of monitoring points, streams to be sampled, number of parameters and description of parameters to be included in the study, frequency of samples, etc. This will be accomplished by a multi-disciplinary, multi-agency working group team, who will make recommendations based on professional and technical experience. A scribe will be assigned by the group who will assemble the report. The report will be edited by representatives of the group and ultimately accepted by the Project Leader and included in the work plan.

332 - ORDER EQUIPMENT FOR MONITORING

Equipment will have been specified by the working team and included as part of the write-up. It will include actual working time of the team and will include lapse time which will be necessary for actual delivery of the equipment after the order is in place.

335 - INSTALL EQUIPMENT

This will be accomplished by a technician, hydrologist, and forester in cooperation with other agencies who are participating in the study. It will necessitate travel time by water and air and will be fulfilling the recommendations of the procedures as written by the working group study team.

336 - LOCATE AND INSTALL EQUIPMENT FOR FIELD LABORATORY

This will involve, in all likelihood, the purchase or acquisition from surplus of a trailer and either renovating a trailer or writing contract specifications for custom building of a trailer;

finding a site in which to install the facility and hooking up utilities, sewage, water, etc. This will involve time of the hydrologist and technician, some time from the forester, and will involve an extra effort from regular Forest maintenance personnel who are not members of the INCO project team. It will involve lapse time from the moment of ordering and moment of arrival on the site to the time that lapses during hook-up of the utilities until the actual time that it is ready for use.

340 - ESTABLISH LAB QUALITY AND CONTRACT PROCEDURES AND ESTABLISH FIELD COLLECTION AND QUALITY CONTROL PROCEDURES.

The objective is to obtain the highest degree of security for sampling and analysis procedures and for field procedures so that any interpretation of data that is forthcoming in the future analysis and environmental statement has the highest degree of credibility. The analyses must be conducted to achieve the highest degree of quality. This process will be one that will have to be very carefully thought out and will take considerable time on the part of the hydrologists and cooperating agencies to lay out a tight procedure. EPA water lab in Cincinnati, Ohio, will be consulted for quality control procedures and the procedures will then be written up by the project hydrologist and presented to the various participating laboratories and agencies involved in the study. Once the procedures are determined, it will be necessary to train the laboratory and field personnel who are involved in the study.

342 - COLLECT DATA FROM MONITORING STATION AND CONDUCT INVENTORY FOR BASELINE DATA

This will continue nearly throughout the life of the project and data may be collected almost up to the time of writing the final environmental statement. It is possible that some monitoring may continue after the writing of the environmental statement.

343 - PERFORM LAB WORK

344 - SUPERVISE LAB AND FIELD PROCEDURES

345 - WRITE LAB REPORT ON WATER MONITORING AND BASELINE DATA STUDIES

346 - ANALYZE THE WATER REPORT

This will consume the time of the project hydrologist cooperating with the inter-agency task force and the technicians under his supervision and, coupled with activity 342, will consume the major part of the project time for these personnel for at least 2 years or possibly longer depending on the necessity of the length of the study.

347 - DEVELOP CONTRACT FOR LEACHATE COLUMN STUDIES WITH THE UNIVERSITY OF MINNESOTA OR OTHER QUALIFIED AGENT

The purpose of this study is to determine what process weathering will have on waste rocks and tailings. This is a laboratory method for accelerating natural weathering to predict long term effects in the shortest period of time.

348 - CARRY OUT THE LEACHATE COLUMN STUDIES

This will be done by the contractor or the University and could involve lapse time up to 1 year with occasional correspondence and monitoring by the team hydrologist.

349 - PUBLISH AND CIRCULATE THE WATER REPORT

350 - WRITE REPORT ON LEACHATE COLUMN STUDIES

This will be the responsibility of the contractor with interpretation (which is activity 352) by the team hydrologist in cooperation with the members of the inter-agency task force.

352 - ANALYZE LEACHATE STUDIES

This will be accomplished by the project team in cooperation with the University, or other contractor, and representatives of cooperating agencies.

353 - PUBLISH AND CIRCULATE THE LEACHATE REPORT

ARCHEOLOGICAL STUDIES

360 - MEET WITH THE HISTORICAL SOCIETY TO DISCUSS THE STUDY TO DETERMINE DATA NEEDS, OBJECTIVES, USE OF DATA, ANALYSIS OF DATA, PROCEDURES, ETC.

These archeological and historical studies are a requirement of the Forest Service Manual and must be performed in the course of the environmental impact study. Since they are specific to the site, (i.e. they do not involve the entire Gabbro area) they are therefore specific to the INCO proposal so INCO will be asked to pay for such a study. The Forest Service will assist in arranging terms of contract by meeting with the Minnesota Historical Society or the University and procedures will be written after such a meeting in consultation with the people just mentioned and the company.

362 - DRAW UP THE CONTRACT

365 - REVIEW OF CONTRACT BY REGIONAL OFFICE FISCAL AGENT AND APPROVAL BY REGIONAL FORESTER

368 - REVIEW BY THE HISTORICAL SOCIETY AND APPROVAL

370 - PROVIDE THE HISTORICAL SOCIETY WITH MAPS AND SUPPORTING DATA NECESSARY TO PROCEED WITH THE CONTRACT

372 - ACTUAL PERFORMANCE OF THE CONTRACT BY THE HISTORICAL SOCIETY OR CONTRACTOR

374 - THE HISTORICAL SOCIETY COMPLETES ITS REPORT AND PRESENTS IT TO THE TEAM

376 - PUBLICATION OF THE HISTORICAL SOCIETY REPORT TO BE INCLUDED IN THE ENVIRONMENTAL STATEMENT

377 - CIRCULATE THE HISTORICAL SOCIETY REPORT

All of the above items should be self-explanatory and there will naturally be lag time. Once the contract procedure is determined and

the contract is approved and let, there will be lapse time for performance of the contract, which will consume the greater amount of time for this particular project.

AERIAL PHOTOGRAPHY AND MAPPING PROJECT

380 - DEFINE THE MAPPING AREA AND DESCRIBE THE TYPES OF MAPS NEEDED

This will be combined with a statement of objectives to be achieved in mapping and aerial photography.

385 - TEAM MUST DEFINE BEST METHODS FOR GATHERING THE NEEDED MAPPING DATA, I.E. BY CONTRACT, COOPERATOR, FORCE ACCOUNT, ETC.

This will be done by a group meeting and consultation among the project team and probably in cooperation with other agencies and supporting staff in the RO and other SO personnel.

390 - DEVELOP CONTRACT SPECIFICATIONS OR COOPERATIVE PROCEDURES, ETC., FOR AERIAL PHOTO AND MAPPING PROJECT

This will begin when the determination is made in activity 385.

395 - ADVERTISE PROJECT AND AWARD CONTRACT

400 - ADMINISTER AERIAL PHOTO AND MAPPING CONTRACT

401 - DISTRIBUTE MAPS TO COOPERATORS

NOTE: The greatest amount of time in the mapping project will be consumed in initial planning, determination of what area is to be mapped, determining objectives and letting the contract. The rest of the time will be lapse time for the contractor performance and for maps to be made either by the contractor or supporting personnel in the RO. One thought that should not be overlooked is that the Minnesota DNR, USGS, and perhaps the Bureau of Mines should be consulted before beginning this project.

DEVELOPMENT OF THE MINE OPERATING PLAN

Includes preliminary meetings to develop requirements of the mining and reclamation plan. This will be done through the cooperation of the USGS, the U.S. Forest Service and INCO. This plan is expected in December 1974

with portions of the plan periodically submitted prior to that time as they are developed. The major work on the operating plan will be conducted in pre-planning phase with the company, USGS and U.S. Forest Service working to determine sufficient information to design monitoring.

429 - DEVELOP THE PRELIMINARY MINING AND RECLAMATION PLAN OUTLINE

This will consist of general ecological data as well as a mining plan and a reclamation plan in complete detail including chemical and mineral analysis and manufacturing and excavating procedures. The outline for the operating plan should include the proposal for land exchange.

430 - DEVELOP THE FINAL OPERATING PLAN OUTLINE FOR THE COMPANY'S USE BY THE USGS WITH COMMENTS FROM THE FOREST SERVICE AS IT DEEMS PROPER
The significant portions of this plan which influence monitoring will have been reviewed before initial monitoring can begin.

435 - MEET WITH THE COMPANY TO REVIEW PORTIONS OF THE OPERATING PLAN WHICH ARE SIGNIFICANT TO MONITORING DESIGN

This meeting should include representatives of the USGS as well as the Bureau of Mines.

440 - FINAL REVISION OF OPERATING PLAN BY INCO

445 - IDENTIFY TAILINGS AND WASTE ROCKS SITES

The tailings and waste rocks sites, which at this writing are unknown, must be identified and included as an integral part of the plan. At this point in time the only fixed part of the mining proposal is the actual site of the mine itself. Tailings and waste rocks sites must be determined in cooperation with the Minnesota DNR who have the capability of telling us which sites would be environmentally acceptable. This information is expected in January of 1975. This portion could be very time consuming, as the identification of site(s) must be agreed to by permit agencies, INCO, etc. and can cause delay of the monitoring and data collection.

450 - ANALYSIS OF THE OPERATING PLAN AND DEVELOPMENT OF PROPOSED
ALTERNATIVES

This includes action by the USFS team, the company and representatives of the inter-agency task force, especially by Bureau of Mines and USGS. This includes field time for the project team.

451 - CIRCULATE THE OPERATING PLAN

SOCIO-ECONOMIC STUDY

This will be done in cooperation with the Minnesota Office of State Planning with the Arrowhead Regional Development Commission and, because of the possible international implications having to do with balance of trade and the implications on the boundary area between Minnesota and Canada, it could become necessary to contract with a consulting firm of national or international reputation. It's doubted that this expertise to analyze these data exists in the USFS, although we will, of necessity, have to have someone with a strong economic background to interpret data that are given to us by the previously mentioned cooperators and consultant.

453 - SURVEY INFORMATION PRESENTLY AVAILABLE

This should be done by a cooperator such as Arrowhead Regional Development Commission, State Planning, or a consultant. There will be a great amount of elapsed time before the survey can be completed. Many of the cooperators consulted in pre-planning predict that the socio-economic portion of the project will be the item having the greatest magnitude of the whole project. The social-economic benefits will be balanced against all other data when alternatives are analysed and could be the key in the final decision.

455 - DETERMINE WHAT DATA ARE REQUIRED TO MAKE A DECISION ON THE
ENVIRONMENTAL STATEMENT

This data includes population trends, number of jobs created, impacts on the community in terms of health, education, transportation, communications, the balance of trade requirements, etc.

460 - IDENTIFY SPECIFIC SOURCES WHICH WILL BE ABLE TO PROVIDE THE TYPES OF DATA NEEDED, I.E. LOCAL, REGIONAL, NATIONAL, INTERNATIONAL
Consider the cooperators and other sources of work and information mentioned at the outset of this discussion on the socio-economic studies. Enter into a contract or cooperative agreement once these specific sources are determined.

475 - ADMINISTER THE CONTRACT

480 - REVIEW AND ANALYZE THE REPORT

481 - PUBLISH AND CIRCULATE THE SOCIAL-ECONOMIC REPORT

METEOROLOGICAL STUDIES

This involves data collection and monitoring for climate, air, rain, water, and snow.

490 - DEFINE METEOROLOGICAL INFORMATION NEEDS SUCH AS RAIN, WATER, SNOW, WIND AND AIR QUALITY THROUGH INTER-AGENCY, MULTI-DISCIPLINARY WORKING GROUP AND WRITE PROCEDURES FOR THE STUDY

The procedures and methods will be similar to the water studies which were mentioned in activities 330-350.

495 - ORDER EQUIPMENT
Self-explanatory.

500 - INSTALL EQUIPMENT
Self-explanatory and similar to the water studies.

505 - ESTABLISH FIELD AND LABORATORY QUALITY CONTROL PROCEDURES

510 - COLLECT THE DATA IN THE FIELD

515 - ANALYZE THE FIELD DATA IN THE LAB

520 - MAKE THE LABORATORY REPORT

525 - ANALYZE THE LAB REPORT BY THE TEAM

526 - PUBLISH AND CIRCULATE THE METEOROLOGICAL REPORT

BIOLOGICAL STUDIES

This will include biological studies for aquatic and terrestrial life including birds, mammals, herbivores, carnivores, vegetation, and aquatic life.

- 530 - DEFINE THE BIOLOGICAL STUDY INFORMATION NEEDS AND CONSIDER AND IDENTIFY COMMON POSSIBILITIES FOR SIMULTANEOUS COLLECTION OF DATA IN CONDUCTING WATER AND OTHER STUDIES.

The procedures have been described for water and meteorological studies previously and points will have been determined for collecting samples in the course of these other studies.

Wherever possible the biological studies will include sampling from stations that were included in the water and other studies so that we will be able to avoid duplication and minimize travel and field time. Incidentally, these biological studies will be expanded to include the rare and endangered species inventory as probably a separate contract under the broad term of biological studies.

- 535 - IDENTIFY PORTIONS OF THE STUDY TO BE CONTRACTED AND THEN DEVELOP CONTRACTS OR COOPERATIVE AGREEMENTS, WHICHEVER ARE MOST APPROPRIATE
It is expected that the Minnesota DNR, the University of Minnesota, NCFES, the U.S. Fish and Wildlife Service and the U.S. Geological Survey will be involved with the Forest Service as a minimum amount of agencies and groups to be considered.

- 540 - ADVERTISE AND LET CONTRACT AND/OR ENTER INTO A COOPERATIVE AGREEMENT TO CONDUCT BIOLOGICAL STUDIES

- 545 - ADMINISTER THE BIOLOGICAL CONTRACT OR COOPERATIVE AGREEMENTS

- 550 - ANALYZE THE BIOLOGICAL CONTRACT OR COOPERATOR REPORTS

- 557 - PUBLISH AND CIRCULATE THE BIOLOGICAL REPORT

560 - CRUISE TIMBER AND MAKE A REPORT

This will be done by the Forest Service, probably District personnel.

SOILS STUDY

This will be done by the Superior National Forest soil scientists with some support from the project team's forester, technicians and District personnel as required. The information gathered will be related to biological studies and to the company operating plan to analyze the effects of the operation on various aspects of soils and its effect on vegetation and erosion. An inventory of the soils and the anticipated response to expected land use is a major need of this project toward completion of the environmental statement. This will also involve an analysis of chemical and physical properties of the soils for integrating with data from geologic, water, and vegetation studies.

570 - DEFINE THE INFORMATION NEEDS FOR THE SOIL STUDY

575- PERFORM THE SOIL INVENTORY AND OTHER NECESSARY FIELD WORK

580 - PERFORM A LABORATORY ANALYSIS OF THE SOIL SAMPLES THAT ARE GATHERED IN THE FIELD

585 - WRITE A FIELD AND LAB REPORT FOR SOIL STUDIES

590 - ANALYZE SOIL STUDY REPORTS

591 - PUBLISH AND CIRCULATE THE SOIL STUDY REPORT

TOXICITY STUDY FOR SOIL AND STREAM ORGANISMS

Before this can be done the effects of the leachate column studies for waste rock and tailings must be determined and we must have further information which will be forthcoming in the company operating plan as to what chemicals will be introduced in the manufacturing and processing.

592 - DESIGN THE TOXICITY STUDY BASED UPON THE OPERATING PLAN AND LEACHING STUDIES

593 - ENTER INTO A COOPERATIVE AGREEMENT WITH THE ENVIRONMENTAL PROTECTION AGENCY, SPECIFICALLY THE NATIONAL WATER QUALITY LAB, IN DULUTH TO CONDUCT THE ANALYSES OF THE SAMPLES.

595 - PERFORM THE STUDY AND WRITE THE REPORT

Two separate types of studies will be conducted.

598 - ANALYZE THE REPORT BY THE TEAM

599 - PUBLISH AND CIRCULATE THE TOXICITY REPORT

Note that the samples which will be analyzed by the National Water Quality Lab will be samples gained in the course of normal water studies. These samples, taken in the course of studies mentioned in a previous discussion beginning with activity 330, will be split and some used for specific water studies and others sent to the EPA lab to determine toxicity levels.

LAND EXCHANGE PHASE

- 800 - PRELIMINARY EXCHANGE REPORT
- 810 - APPRAISE COMPANY LANDS
- 815 - LAND EXCHANGE REVIEW BY FOREST SERVICE REGIONAL OFFICE
- 820 - LAND EXCHANGE REVIEW BY FOREST SERVICE WASHINGTON OFFICE
- 825 - COMPLETION OF LAND EXCHANGE ACTIVITIES

Note: Activities 810-825 will be necessary only if the company is given an affirmative response to their request to mine. These activities would then be conducted after the Environmental Impact Statement process is complete and are therefore not included in the flow chart diagram.

The feasibility and desirability of a long term special use or a combination of special use and a limited land exchange will also be evaluated as an alternative to an exchange of all lands in the mining development area.

MONITORING PHASE

- 900 - REDEFINE MONITORING NEEDS FOR H₂O, METEOROLOGICAL AND BIOLOGICAL STANDARDS - INCLUDE FREQUENCY, LOCATION AND METHODOLOGY
- 910 - IMPLEMENTATION OF MONITORING CONTINUING THROUGH IMPLEMENTATION OF THE PROPOSAL AND BEYOND IF MINING REQUEST IS APPROVED

Note: Although project personnel will conduct monitoring, no time is assigned as this phase does not affect the E.I.S.

ALTERNATIVE ANALYSIS PHASE*

The study team makes an assessment of data it has collected, analyzes alternatives in cooperation with other agencies, makes proposals, and writes the draft environmental statement for public review.

Data collection and monitoring may continue through this phase and beyond, if required.

605 - REFINE ANALYTICAL SYSTEM

The analytical system was originally developed as activity 320 and was intended to assure proper techniques for data analysis to assure quality data collection activities. This activity consists of re-evaluation of the analytical system developed in 320 and refining that system to reflect the data that has been collected and furthering our knowledge concerning the project.

610 - DEVELOP FINAL ALTERNATIVES WITH STATE OF MINNESOTA AND INCO

This activity is related to activity 450 which was the development of preliminary alternatives to guide us in the collection of data. Here again we have a situation where we take earlier work and refine it to reflect the knowledge that we've gained as a result of our data collection activities. These will be the final alternatives that will be evaluated in the environmental statement.

620 - ANALYSIS OF ALTERNATIVE EFFECTS

This is an activity which should constitute a major portion of time. It is where the effects of each one of the alternatives are evaluated using the information developed in the data collection phase. Include time for team to write and time for review by line prior to presentation.

*Includes some tasks described in Public Involvement Phase (See Flow Chart).

626 - SELECTION OF PROPOSED ALTERNATIVE

This activity consists of a presentation by the project leader and his team to the Forest Supervisor, his staff, and the Regional Forester and Chief (and his staff). Allowing 2 days for presentation and 3 days for preparation of presentation.

625 - WRITE DRAFT ENVIRONMENTAL STATEMENT

Self-explanatory. This activity also includes the typing of a number of drafts, development of charts, etc.

630 - REWRITE THE DRAFT ENVIRONMENTAL STATEMENT AFTER INTERNAL REVIEW

631 - PUBLISH DRAFT ENVIRONMENTAL STATEMENT

Includes printing, typing, artwork and mailing of the draft environmental statement to CEQ and the public. The typing, drafting and artwork associated with publishing the draft could take in the neighborhood of 2 weeks of lapse time. The printing could take 30-45 days including mailing.

635 - REEVALUATE THE ENVIRONMENTAL ANALYSIS IF THE NEED IS INDICATED BY THE PUBLIC COMMENTS

This activity consists of studying public comments to determine areas of weaknesses or deficiencies in the environmental statement and activities associated with correcting these weaknesses.

DECISION PHASE*

The final decision by the Forest Supervisor will be based on recommendations of the planning team (assisted by public review and comment as provided for in the National Environmental Policy Act).

700 - SELECT THE ALTERNATIVE

The alternative is selected through line/staff review following review of the draft statement by the public.

710 - WRITE-UP OF THE FINAL ENVIRONMENTAL STATEMENT

Self-explanatory.

715 - REWRITE THE FINAL ENVIRONMENTAL STATEMENT TO REFLECT INTERNAL REVIEW

720 - FINAL DECISION OF THE FOREST SERVICE

This decision occurs after the 30-day waiting period for the filing of the final with CEQ. This includes any corrections to the final statement that were submitted to CEQ in response to public comments upon the final.

*Includes some tasks described in Public Involvement Phase.

INCO EIS PROJECT

Critical Path By Dates

<u>Activity No. & Description</u>	<u>I Node</u>	<u>J Node</u>	<u>Job Time</u>	<u>Early</u>		<u>Late</u>	
				<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
310 INF OBJ	1	6	5	8/5/74	8/12/74	8/5/74	8/12/74
110 CPM	1	2	8	8/5/74	8/15/74	9/4/74	9/16/74
130 BUDGET	2	3	3	8/15/74	8/20/74	9/16/74	9/19/74
120 DEV ORG	3	4	10	8/20/74	9/4/74	9/19/74	10/3/74
150 WRITE AP	4	7	20	9/4/74	10/2/74	10/3/74	11/4/74
155 PUB AP	7	8	10	10/2/74	10/17/74	11/4/74	11/18/74
315 *INFO ID	6	14	70	8/12/74	11/21/74	8/12/74	11/21/74
220 REV AP RO	8	9	10	10/17/74	11/1/74	11/18/74	12/3/74
225 REV AP WO	9	10	10	11/1/74	11/15/74	12/3/74	12/17/74
160 RTE P	10	11	1	11/15/74	11/18/74	12/17/74	12/18/74
210 INIT NR	1	103	5	8/5/74	8/12/74	12/13/74	12/20/74
320 DVAN SYM	4	17	5	9/4/74	9/11/74	12/30/74	1/7/75
DUMMY	14	17	0	11/21/74	11/21/74	1/7/75	1/7/75
125 STAFFING	4	5	45	9/4/74	11/8/74	11/11/74	1/16/75
165 RPUB AP	11	12	20	11/18/74	12/17/74	12/18/74	1/17/75
230 MAIL AP	12	13	1	12/17/74	12/18/74	1/17/75	1/20/75
429 MIN REC P	1	18	85	8/5/74	12/6/74	9/17/74	1/21/75
145 HOUSING	3	18	50	8/20/74	11/1/74	11/7/74	1/21/75
115 TRAINING	5	18	3	11/8/74	11/13/74	1/16/75	1/21/75
235 AZCOM AP	13	18	23	12/18/74	1/21/75	1/20/75	1/21/75
325 DV DATAPL	17	18	10	11/21/74	12/6/74	1/7/75	1/21/75
140 *DEV W. P.	14	18	40	11/21/74	1/21/75	11/21/74	1/21/75
240 PDNEWRELA	103	106	20	8/12/74	9/10/74	12/20/74	1/21/75
DUMMY	106	18	0	9/10/74	9/10/74	1/21/75	1/21/75
530 *DEFBIOLND	18	32	1	1/21/75	1/22/75	1/21/75	1/22/75
535 *CON COOP	32	33	3	1/22/75	1/27/75	1/22/75	1/27/75
330 DEFWTRND	18	19	1	1/21/75	1/22/75	2/4/75	2/5/75
347 DEVLCHCON	18	29	3	1/21/75	1/24/75	2/27/75	3/4/75
332 ORDWTREQ	19	20	20	1/22/75	2/20/75	2/5/75	3/6/75
335 INSWTREQ	20	21	5	2/20/75	2/27/75	3/6/75	3/13/75
540 *ADVCON	33	34	32	1/27/75	3/13/75	1/27/75	3/13/75
336 ESTFLDLAB	21	22	5	2/27/75	3/6/75	3/13/75	3/20/75

INCO EIS PROJECT

Critical Path By Dates

<u>Activity No. & Description</u>	<u>I Node</u>	<u>J Node</u>	<u>Job Time</u>	<u>Early Start</u>	<u>Finish</u>	<u>Late Start</u>	<u>Finish</u>
380 DETMAPOBJ	18	74	2	1/21/75	1/23/75	3/27/75	3/31/75
385 DETMAPRO	74	75	1	1/23/75	1/24/75	3/31/75	4/1/75
340 WTRQLCNTL	22	23	10	3/6/75	3/20/75	3/20/75	4/3/75
390 MAP SPECS	75	76	10	1/24/75	2/7/75	4/1/75	4/15/75
490 DEFMTTRND	18	46	1	1/21/75	1/22/75	4/21/75	4/22/75
453 SVYSCEC	18	54	10	1/21/75	2/4/75	4/15/75	4/29/75
455 PLNSCEC	54	55	2	2/4/75	2/6/75	4/29/75	5/1/75
495 ORDMTREQ	46	47	10	1/22/75	2/5/75	4/22/75	5/6/75
500 INSTAL EQ	47	48	5	2/5/75	2/12/75	5/6/75	5/13/75
505 METQLCONT	48	49	5	2/12/75	2/20/75	5/13/75	5/20/75
570 DEFSSOILND	18	61	2	1/21/75	1/23/75	5/21/75	5/23/75
395 CONTR MAP	76	77	32	2/7/75	3/26/75	4/15/75	5/30/75
360 MTNG HS	18	66	1	1/21/75	1/22/75	6/2/75	6/3/75
362 DEVHSCONT	66	67	1	1/22/75	1/23/75	6/3/75	6/4/75
365 REVHSRO	67	68	10	1/23/75	2/6/75	6/4/75	6/18/75
368 REVBYHS	68	69	10	2/6/75	2/21/75	6/18/75	7/2/75
460 CONTRSCEC	55	56	45	2/6/75	4/11/75	5/1/75	7/7/75
370 MAPS HS	69	70	24	2/21/75	3/27/75	7/2/75	8/6/75
430 DEVOPRPLN	18	42	2	1/21/75	1/23/75	8/27/75	8/29/75
445 IDTWSITE	18	43	20	1/21/75	2/19/75	8/4/75	9/2/75
435 OPRPLNMTG	42	43	1	1/23/75	1/24/75	8/29/75	9/2/75
348 CONLCHSTD	29	30	130	1/24/75	7/30/75	3/4/75	9/5/75
440 COPREPPLN	43	44	5	2/19/75	2/26/75	9/2/75	9/9/75
350 RITLCHRPT	30	31	5	7/30/75	8/6/75	9/5/75	9/12/75
560 CRUISE	32	35	10	1/27/75	2/10/75	9/2/75	9/16/75
545 *ADM B CON	34	35	130	3/13/75	9/16/75	3/13/75	9/16/75
*DUMMY	35	36	0	9/16/75	9/16/75	9/16/75	9/16/75
352 ANLCHSTD	31	36	2	8/6/75	8/8/75	9/12/75	9/16/75
450 ANOPRPLN	44	45	5	2/26/75	3/5/75	9/9/75	9/16/75
DUMMY	45	36	0	3/5/75	3/5/75	9/16/75	9/16/75
592 *DEVTXYSTD	36	38	2	9/16/75	9/18/75	9/16/75	9/18/75
593 *COOPAGM	38	39	1	9/18/75	9/19/75	9/18/75	9/19/75
372 HS SVY	70	71	60	3/27/75	6/20/75	8/6/75	11/3/75

INCO EIS PROJECT

Critical Path By Dates

<u>Activity No. & Description</u>	<u>I Node</u>	<u>J Node</u>	<u>Job Time</u>	<u>Early</u>		<u>Late</u>	
				<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
374 HS RPT	71	72	1	6/20/75	6/23/75	11/3/75	11/4/75
342 COLWTRDTA	23	26	150	3/20/75	10/22/75	4/3/75	11/6/75
343 PFMLABWK	23	25	150	3/20/75	10/22/75	4/3/75	11/6/75
344 SPVLABWK	23	24	150	3/20/75	10/22/75	4/3/75	11/6/75
DUMMY	24	26	0	10/22/75	10/22/75	11/6/75	11/6/75
DUMMY	25	26	0	10/22/75	10/22/75	11/6/75	11/6/75
345 WTRLABRPT	26	27	10	10/22/75	11/6/75	11/6/75	11/20/75
515 AMMETDTA	49	50	130	2/20/75	8/25/75	5/20/75	11/25/75
510 COLMETDTA	49	51	130	2/20/75	8/25/75	5/20/75	11/25/75
DUMMY	50	51	0	8/25/75	8/25/75	11/25/75	11/25/75
475 ADMSCEC	56	59	100	4/11/75	9/3/75	7/7/75	11/28/75
575 SOILINV	61	63	130	1/23/75	7/29/75	5/23/75	12/1/75
580 SOIL LAB	61	62	130	1/23/75	7/29/75	5/23/75	12/1/75
DUMMY	62	63	0	7/29/75	7/29/75	12/1/75	12/1/75
520 METLABRPT	51	52	5	8/25/75	9/2/75	11/25/75	12/3/75
595 *PFMTXYSTD	39	40	50	9/19/75	12/3/75	9/19/75	12/3/75
585 RIT S RPT	63	64	3	7/29/75	8/1/75	12/1/75	12/4/75
400 ADMCONTRC	77	78	130	3/26/75	9/29/75	5/30/75	12/5/75
376 PUBHSRPT	72	73	22	6/23/75	7/24/75	11/4/75	12/5/75
590 ANSOILRPT	64	65	1	8/1/75	8/4/75	12/4/75	12/5/75
480 ANSCECRPT	59	60	5	9/3/75	9/10/75	11/28/75	12/5/75
525 ANMETRPT	52	53	2	9/2/75	9/4/75	12/3/75	12/5/75
346 ANWTRRPT	27	28	10	11/6/75	11/20/75	11/20/75	12/5/75
550 ANBIOLRPT	35	37	5	9/16/75	9/23/75	11/28/75	12/5/75
598 *ANTXYRPT	40	41	2	12/3/75	12/5/75	12/3/75	12/5/75
401 DIST MAPS	78	81	1	9/29/75	9/30/75	12/5/75	12/8/75
377 CRCHSRPT	73	81	1	7/24/75	7/25/75	12/5/75	12/8/75
591 CRCSRPT	65	81	1	8/4/75	8/5/75	12/5/75	12/8/75
481 CRCSFRPT	60	81	1	9/10/75	9/11/75	12/5/75	12/8/75
526 CRCM RPT	53	81	1	9/4/75	9/5/75	12/5/75	12/8/75
349 CRCWRPT	28	81	1	11/20/75	11/21/75	12/5/75	12/8/75
557 CRC B RPT	37	81	1	9/23/75	9/24/75	12/5/75	12/8/75
353 CRCLCHRPT	36	81	1	9/16/75	9/17/75	12/5/75	12/8/75

INCO EIS PROJECT

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				<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
599 *CRCTXYRPT	41	81	1	12/5/75	12/8/75	12/5/75	12/8/75
451 CRCOPRPLN	45	81	1	3/5/75	3/6/75	12/5/75	12/8/75
800 PLMXCHRPT	44	81	20	2/26/75	3/26/75	11/7/75	12/8/75
605 *RFNANSYS	81	82	2	12/8/75	12/10/75	12/8/75	12/10/75
610 *DEVALTNTV	82	83	5	12/10/75	12/17/75	12/10/75	12/17/75
620 *ANALTNTV	83	84	40	12/17/75	2/13/76	12/17/75	2/13/76
626 *SLCTALT	84	85	5	2/13/76	2/23/76	2/13/76	2/23/76
625 *RITDFTPRL	85	86	20	2/23/76	3/22/76	2/23/76	3/22/76
245 *RVWPRL	86	88	21	3/22/76	4/20/76	3/22/76	4/20/76
630 *RERITPRES	88	89	5	4/20/76	4/27/76	4/20/76	4/27/76
243 PDNEWRELD	106	107	0	9/10/74	9/10/74	4/28/76	4/28/76
244 PDNEWRELE	107	90	0	12/8/75	12/8/75	4/28/76	4/28/76
DUMMY	81	107	0	12/8/75	12/8/75	4/28/76	4/28/76
631 *PBLDFTES	89	90	45	4/27/76	6/29/76	4/27/76	6/29/76
255 *FILEDFTES	90	91	1	4/28/76	4/29/76	4/28/76	4/29/76
260 *PBLCRVW	91	92	60	7/1/76	9/27/76	7/1/76	9/27/76
265 *ANCMNT	92	93	25	9/27/76	11/3/76	9/27/76	11/3/76
635 *INCPTCMNT	93	94	20	11/3/76	12/2/76	11/3/76	12/2/76
700 *SLCTALT	94	95	5	12/2/76	12/9/76	12/2/76	12/9/76
710 *RITENLES	95	96	10	12/9/76	12/23/76	12/9/76	12/23/76
270 *FNLCMNT	96	97	5	12/23/76	1/3/77	12/23/76	1/3/77
275 *RVWFNLES	97	98	21	1/3/77	2/1/77	1/3/77	2/1/77
715 *FNLRRERIT	98	99	2	2/1/77	2/3/77	2/1/77	2/3/77
280 *FILEFNL	99	100	80	2/3/77	5/27/77	2/3/77	5/27/77
281 *ANCMNT	100	101	5	5/27/77	6/6/77	5/27/77	6/6/77
720 *FNLDEC	101	102	2	6/6/77	6/8/77	6/6/77	6/8/77

GENERAL OUTLINE FOR ENVIRONMENTAL STATEMENT

- I. Summary
- II. Objectives to be achieved for area as stated in land use plans, water resource development plans, state plans, etc.
- III. Environmental setting (present and future without project).
Including such elements as:
 - A. Physical Elements such as:
 - 1. Topography
 - 2. Climate
 - 3. Regional geography
 - 4. Air quality
 - 5. Noise levels
 - 6. Soils
 - 7. Natural hazards
 - 8. Other
 - B. Geologic and Mineral Elements
 - C. Hydrologic Elements
 - 1. Stream, lake and pond characteristics
 - 2. Wetland characteristics
 - 3. Ground water--quality, quantity
 - 4. Surface water--quality, quantity
 - 5. Floods
 - 6. Water supply and use
 - D. Biological Elements
 - 1. Vegetation
 - a. Productivity
 - b. Diversity
 - c. Rare plants

2. Wildlife
 - a. Game
 - b. Other
 - c. Rare and endangered
3. Fish
 - a. Game
 - b. Other
 - c. Rare and endangered
4. Aquatic fauna
5. Other terrestrial life
6. Fire
7. Other

E. Socio-Economic Elements

1. Archeology
2. History
3. Land use and agriculture
4. Land ownership and administration
5. Recreation
6. Wilderness or other special ecosystems
7. Open space
8. "Tradition"
9. Research
10. Transportation
11. Employment
12. Regional and local income -- output of goods and services
13. Population distribution
14. Life, health, safety
15. National economics, Cu-Ni demands, present and future supplies

IV. Description of Action

A. Description of Proponent's Proposal

1. Location and purpose -- relationship to other land use plans, and other State, Federal and local activities.

2. History and status
3. Project elements
 - a. General
 - b. Economics
 - (1) Supply and demand of product, e.g. national need
 - (2) Employment created, shifts in employment
 - (3) Rural/urban migration effects
 - c. Structural and operating components
 - (1) Mining plan
 - (2) Operating plan
 - (3) Mining plant
 - (4) Transportation
 - (5) Solid Waste Disposal
 - (6) Auxiliary services--waste, housing, utilities
 - (7) Restoration plan
 - (8) Water use, culinary and plant
 - (9) Transportation

B. Proposed Action by Federal Agency and reasons for it.

This section will be formulated after the analysis of effects of the proponent's proposal and alternatives found in Section IV. It will propose either approval, disapproval, or approval with modification and its relationship to other land use plans, and other Federal, State and local agency activities.

V. Alternatives considered that will meet objectives

(Evaluation includes proponents proposal)

A. Describe how alternatives were formulated

B. Describe each alternative.

1. Environmental impacts of each alternative.

a. Favorable effects

b. Adverse effects (primary and secondary)

- (1) Avoidable--those that can be eliminated, or mitigated and how.

(2) Unavoidable--those effects that cannot be avoided.

2. Relationship between short term uses and long term productivity for each alternative.

C. Irreversible and irretrievable commitment of resources caused by each alternative.

VI. Management Recommendations and Management Requirements

A. Recommended decision and reasons for selection (e.g. if there are adverse environmental effects that are unavoidable, what are the reasons for going ahead with the proposal?)

B. Requirements. These are considerations and requirements used to offset all avoidable adverse environmental effects for the alternative selected.

VII. Consultation with Others

VIII. Appendix

Note: This outline is not all inclusive at this time, but gives a basic framework upon which to build. It will be further refined and broadened to include most elements found in the Principles & Standards For Planning Water and Related Land Resources, as found the Federal Register, September 10, 1973, Volume 38, Number 174.

Fiscal Year 1975

U. S. Department of Agriculture

Forest Service

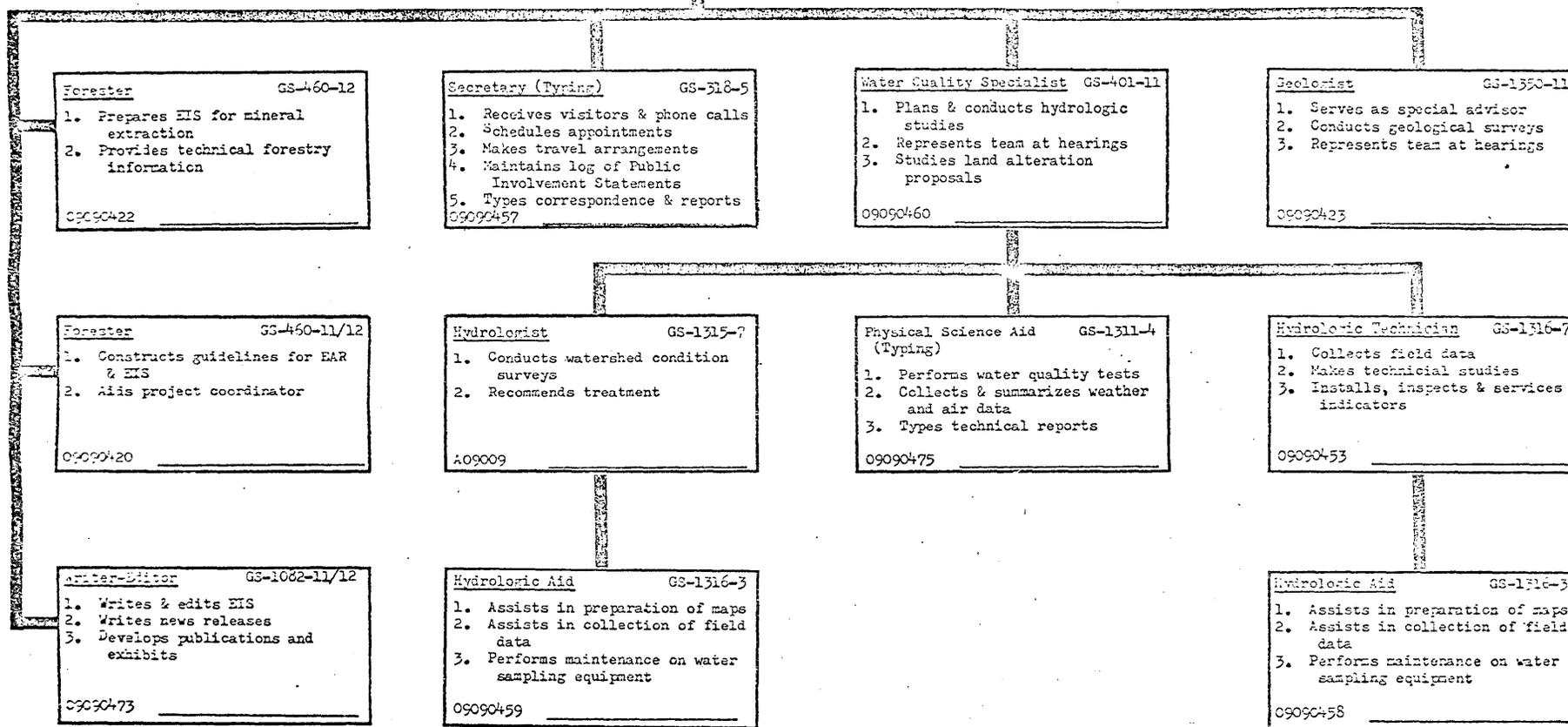
Superior National Forest

Recommended: *James J. [Signature]*
Forest Supervisor

Approved: _____

Date: _____

INCO ENVIRONMENTAL IMPACT PLANNING
Supervisory Forester GS-460-13
1. Serves as Forest Service Coordinator
2. Directs preparation of EIS
09090408



BUDGET SUMMARY

The budget summary shown below is an estimate of project costs that will be incurred. This does not necessarily mean that the Forest Service will assume all expenses, as other agencies and the company may contribute as appropriate.

	<u>FY 75</u>	<u>FY 76*</u>	<u>FY 77*</u>
1. Administration			
Personnel salaries, travel, misc.	174,000	119,000	119,000
Printing, illustration, publishing	8,000	10,000	10,000
2. Data Collection			
Air quality studies	52,000	25,000	25,000
Precipitation studies	11,000	17,000	10,000
Water quality studies	73,000	103,000	60,000
Meteorological studies	5,000	1,000	1,000
Water quantity studies	84,000	10,000	3,000
Biological studies			
Aquatic biology	13,000	90,000	-
Terrestrial biology	25,000	50,000	-
Toxicity studies	15,000	-	-
Leachate studies	16,000	-	-
Socio-economic studies		No estimate	
Soil studies	4,000	20,000	-
3. Analytical quality control	10,000	11,500	5,000
4. Land line location	23,000	8,000	12,000
5. Base maps	1,500	-	-
6. Rare and endangered species survey	2,500	-	-
7. Archeological and historical survey	2,500	-	-
8. Aerial photography	3,000	-	-
9. Kawishiwi District professional and technical support	8,500	8,500	8,500
10. Forest overhead and support	44,000	31,000	24,000
Total	<u>575,000</u>	<u>504,000</u>	<u>277,500</u>

*These are preliminary estimates, and final budgets for FY76 and FY77 will be completed in April 1975 and 1976.

APPENDIX

Page Two
Mr. Harold E. Andersen
Supervisor, Superior National Forest

April 26, 1974

.../...

We further wish to advise that at the present time we have no plans for the reduction or smelting of ores either on the leased premises or elsewhere within or adjacent to the boundaries of the Superior National Forest.

Very truly yours,



W.W. Shropshire
Manager, Ventures Development

WWS/lmp

cc: R. Pederson, Superior National Forest
D.W. Eng, Superior National Forest
P.M. Hanft
D.D. Ramstad

SUPERIOR NATIONAL FOREST
P.O. Box 338, Duluth, Minnesota 55801

2820

April 29, 1974

Mr. W. W. Shropshire
Manager, Ventures Development
International Nickel Company
One New York Plaza
New York, N. Y. 10004

Dear Mr. Shropshire:

This will acknowledge receipt of your letter of April 26, 1974, requesting approval of the use of open pit mining on Lease ES 01353 issued to International Nickel Company on June 1, 1966.

As you know, under the National Environmental Policy Act, a development of this magnitude will require preparation of an Environmental Analysis and Environmental Impact Statement. This will involve other Federal agencies as well as coordination with agencies of the State of Minnesota.

This will also acknowledge your request for a land exchange. An analysis of the exchange proposal will be a part of the mining Environmental Impact Statement.

We will proceed as expeditiously as possible on this proposal.

Sincerely,

HAROLD E. ANDERSEN
Forest Supervisor

METEOROLOGICAL STUDIES

Meteorological Monitoring

Objectives

1. To provide baseline atmospheric information prior to mining development.
2. To provide information needed to predict air quality impacts of proposed mining development.

Station Location

One station located at the U.S. Forest Service Service Center in Ely is proposed for obtaining wind speed, direction, humidity, precipitation quantity, and temperature. In addition, solar radiation and precipitation quality information will be obtained at the air quality monitoring station located at the Field Experiment Station on the South Kawishiwi River. The weather station is proposed for the Ely location for the following reasons:

1. A fire weather station with 200 ft. mast already exists at this site.
2. The station is manned every working day during the winter and every day during the fire season.
3. A heated building is located adjacent to the weather mast.
4. Installation would upgrade existing meteorological equipment and improve fire weather data acquisition.
5. Upon inspection, it was determined by a qualified meteorologist that this station would provide meteorological data representative of that proposed mine site.

For these reasons it will not be necessary to duplicate meteorological facility only 8 miles away from an existing weather station. However, it will be necessary to upgrade the present equipment at the Ely weather station to meet the objectives of the meteorological monitoring proposal.

Parameters and Instrumentation

With the exception of precipitation sample collection, the weather data collected, in conjunction with plant emission information, will provide information needed to develop air quality predictions through the use of existing diffusion models.

A. Air Speed and Direction

Air speed and direction data will be determined continuously using a recording Aerovane system mounted at the 120' level on the existing mast.

B. Temperature and Humidity

Temperature and humidity will be continuously recorded on a hygrothermograph with a standard recording period of 7 days. In addition maximum and minimum thermometers will be provided along with a sling psychrometer to serve as reference checks.

C. Precipitation Quantity

Precipitation will be determined with a recording rain and snow gauge already in place at site.

D. Solar Radiation

Solar radiation will be continuously recorded using an Eppley black and white pyranometer and a pyranometer recorder.

In addition to the above mentioned meteorological monitoring, radiosounds will be prepared and correlated to radiosound information taken daily at the International Falls weather station. It is expected that upper air measurements at International Falls will be very similar to that of Ely and upper air meteorological information need not be duplicated at the Ely site on a routine basis.

Recording and Data Analysis

All meteorological data will be recorded continuously. At the end of each week, data will be reduced to 1 hour and 24 hour averages on standard forms. This information will then be keypunched onto standard IBM cards in a format specified by the diffusion model's requirements.

E. Precipitation Quality

Samples for precipitation analysis will be collected with a thermostatically activated automatic precipitation collector. Samples will be analyzed in accordance with procedures listed in water quality section and analyses will consist of all primary and secondary parameters.

Precipitation analysis will be governed by the quantity of sample needed for analysis and the frequency and magnitude of precipitation events.

E.P.A. Chicago, has agreed to do the diffusion modeling on meteorological data collected. Diffusion modeling will be done every six months after start of data collection. Estimates of pollutant quantity will be provided by INCO as a part of their mining and reclamation plan.

Cost

1.	Hygrothermograph	\$ 300
2.	Aerovane and recorder	2,200
3.	Pyranometer and recorder	1,400
4.	Automatic Precipitation Col.	460
5.	Installation	250
6.	Analytical costs (annually)	6,000
		<hr/>
	TOTAL	\$10,610

SOIL STUDIES

Copper-Nickel Soil Resource Study

I. Evaluate Existing Soil Information

- A. A literature review of soil resource information pertinent to the area will be completed by the Superior National Forest soil staff.
- B. The SNF soil staff will also determine the needs for additional information and recommend means for its collection.

II. Staffing

- A. Soil inventory
Superior National Forest soil staff can complete an inventory of the estimated 10 M acres.
- B. Sample collection
Superior National Forest soil staff can complete this task.
- C. Laboratory analysis of the soil samples would be done by the staff at a reputable laboratory.
- D. SNF soil staff can complete a summary of the lab analysis.

III. Schedule

- A. Soil staff will complete a study plan by 1/23/75.
- B. Soil staff will complete the soil inventory by 9/1/75. Soil samples will be collected and sent to a laboratory for analyzing before 9/1/75. Should there be a delay in obtaining new aerial photographs, (scheduled for the spring of 1975) the 9/1/75 deadline will have to be adjusted or substitute other photographs.
- C. Completion of the laboratory analyses of the soil samples will be in two phases:
 - Phase 1 - Values representing extractable amounts of elements will be available by 12/1/75.
 - Phase 2 - Values representing total amounts of elements will be available by 3/1/76.

IV. Equipment and Materials

- A. Aerial photographs will be provided to the soil staff by another part of the Cu-Ni project.
- B. A list of equipment and materials is being prepared and will include office and field items necessary to complete the soil resource part of the project. The list will include instruments for determining basic soil characteristics and materials for preparing the final report.

V. Laboratory Services

- A. Laboratory services will be provided by a reputable laboratory in the Lake States. Contacts have been made for the purpose of obtaining information about services available, scheduling, costs, and systems.
- B. Soil properties for laboratory analysis include those pertinent to activities and facilities common to a mine operation. Examples of some analyses are amounts of nitrogen, phosphorous, and sulfur in the surface organic layers and underlying mineral soil. Other examples are the percent of sand, silt, and clay; amount of coarse material and water holding capacity. Mining activities would include clearing land for ore extraction, road building, and dam building. Facilities included are sewage disposal systems, parking lots, and surface water collection system.

VI. Soil Resource Report

- A. This report will contain the following:
 - 1. Purpose of inventory
 - 2. How the inventory was made
 - 3. Soil landscape
 - a. geology
 - (1) glacial
 - (2) bedrock
 - b. climate
 - c. vegetation
 - d. drainage pattern
 - 4. Soil resource
 - a. classification
 - b. descriptions of soils
 - c. laboratory (summary) analyses
 - d. soil map (either 2"/mile or 4"/mile scale)
 - 5. Soil interpretations
 - a. vegetation
 - b. engineering
 - c. hydrology
 - d. mining operations
 - 6. Recommendations for soil monitoring
 - 7. Summary

A rough draft copy of the report will be submitted to the Cu-Ni project team who will be responsible for printing and distribution.

WATER STUDIES

LEACHING CHEMISTRY OF WASTES FROM COPPER-NICKEL
MINING AND BENEFICIATION

Preliminary Proposal for Research Support
on Short Term Leaching Tests

submitted to

Cu-Ni Development
U.S. Forest Service

by

Duane W. Long, Lake Superior Basin Studies Center

Professor Thomas J. Bydalek, Chemistry Dept.

Lake Superior Basin Studies Center

University of Minnesota, Duluth

At a meeting on August 27, 1974 in the Federal Building, Duluth with the Department of Natural Resources, U. S. Forest Service, and other parties an agreement was reached that a preliminary leaching study on tailings and waste rock should be run in as short a time as possible. This study was thought to be necessary because there is very little data available on leaching studies done on Cu, Ni tailings and on leaching studies in general. With the small amount of data available it is difficult to plan leaching tests that will give us the information that is needed to determine the effects of leaching Cu-Ni tails and waste rock on the environment. This preliminary leaching study will be designed to give us information on whether there is a leaching problem or not and will give us information on the short term leaching of tailings and waste rock. It will give us information on the rate and amount of leaching. Using this information plans can be made on the type of leaching tests which will be needed to evaluate the Cu-Ni leaching problem.

Proposed Research

The leaching tests will be run in 13 gallon polyethylene carboys. The tailings concentration that will be used in the leaching tests is 100 grams of tailings per liter of distilled water. A sample of distilled water will be filtered through a 0.45 μ pore size membrane filter and analyzed for copper, nickel, sulfate, conductivity, and pH. Forty (40) liters of the distilled water will then be added to each of the carboys. Four (4) kilograms of Cu-Ni tailings (received from the U. S. Bureau of Mines, Minneapolis) will be added to each of two of the leaching carboys.

The other carboy of water will be used as a blank. The tests will be run at room temperature. Mixing will be started immediately and mixed continuously except for a ten to fifteen minute period immediately preceding each removal of sample for analysis. The tailings are allowed to settle so that large amounts of tailings are not removed when the sample is taken. A tentative sampling schedule will be set up as follows: initial, 1 hr, 2 hr, 3 hr, 6 hr, 12 hr, 24 hr, 2 day, 4 day, 6 day, 9 day, 12 day, 15 day, 18 day, 21 day, 24 day, 27 day, 30 day. This sampling schedule is tentative in that results of initial analyses will be used to determine later sampling times.

Chemical analyses will be run for copper, nickel, conductivity, sulfate, and pH. Samples for Cu, Ni, and sulfate analyses will be filtered through 0.45 μ pore size Millipore filter paper. Conductivity and pH will be run on unfiltered samples. For copper and nickel the samples will be chelated with APCD and extracted with MIBK. The analyses will then be run by Atomic Absorption Spectrophctometry. Standards will be run with each set of samples. Sulfate will be run by the turbidimetric method. This method is from Standard Methods for the Examination of Water and Wastewater; 13th Edition; APHA, AWWA, WPCF: 1971, p.334. Conductivity will be run using a conductivity bridge and a YSI dipping type conductivity cell. Readings will be taken at 25°C. pH will be run electrometrically using a glass electrode and a saturated calomel reference electrode.

The leaching tests will be run a maximum of one month for tailings and one month for waste rock. Reports will be ready a week after the tests are completed.

Budget (per testing of tailings (duplicate) and waste rock(duplicate) for
Cu, Ni, Conductivity, sulfate, pH)

Salary (principal investigator 20% time)	\$ 356.40
Overhead	156.64
Fringe	62.38
Polyethylene carboys	138.00
Chemicals, glassware, disposable items	<u>286.58</u>
Total	<u>\$1000.00</u>

Water Quality Monitoring

INTRODUCTION

On April 26, 1974, the International Nickel Company, Inc., requested approval of an open pit mine on National Forest lands adjacent to the South Kawishiwi River, just west of the BWCA. INCO was advised by the U. S. Forest Service that..."a development of this magnitude will require preparation of an Environmental Analysis and Environmental Impact Statement."

It is well recognized that metal sulfide ore extraction has the potential of causing severe and complex pollution problems and that the proposed location of the mine (adjacent to the BWCA) is in an area of high environmental concern and sensitivity. It is, therefore, recommended that an intensive surface water monitoring survey be conducted for the following general purposes:

1. The determination of existing water quality for operational and post-operational comparisons,
2. and the determination of water quality and stream characteristics that will permit the prediction of probable impacts from Cu-Ni mining in conjunction with other related studies.

On August 26-27 and September 10-13, 1974, an interagency meeting of technical representatives was held to design a tentative surface water monitoring survey.

1. The scope of the water quality program would be limited to INCO's mining proposal;
2. The survey would be designed according to what is necessary to meet objectives, not on the basis of what monies may be made

available;

3. the survey is to be complete, objective, and meet judicial requirements;

4. and reasonable cost estimates were to be provided.

SCOPE

The area to be surveyed is limited to INCO's mining proposal including mining, transporting, crushing, milling, concentrating, tailings disposal, wasterock disposal, and wastewater discharge points. At this time, the area to be monitored includes T62N, T61N, R11W, 10W, 9W; however, it is possible that the proposed tailings and wasterock disposal areas will not be located adjacent to the mine. Once suitable wasterock and tailings disposal areas are tentatively agreed upon, the W.Q. survey will be expanded to include these areas. At present, the surface water survey area entails the Isabella River, Bald Eagle Lake, Gabbro Lake, South Kawishiwi River, North Kawishiwi River split, Birch Lake, and a number of tributaries.

SURFACE WATER MONITORING STATIONS

1. Station Locations

Objective

The surface water monitoring stations are located to provide a measure of stream constituent inputs, movements, and outputs within, to, and from anticipated wastewater discharge points and receiving waters as necessary for determining concentrations and mass balances of stream constituents. This will provide the basis

for the simulation of loading for pre-operational analysis, the determination of acceptable additional loading, the evaluation of wastewater treatment schemes and a basis for determining the success of pollution control actions if mining activities are undertaken.

SAMPLING STATIONS

<u>Station</u>	<u>Name</u>	<u>Description</u>	<u>Priority</u>
1	Isabella R.	Gauging Station T61N, R9W, S6	Secondary
2	Snake R.	Mouth T61N, R10W, S12	Tertiary
3	August Creek	Mouth T62N, R10W, S35	Tertiary
4	Bald Eagle Creek	Mouth 62N, R10W, S34	Tertiary
5	Bald Eagle Lake	Outlet T62N, R10W, S23	Tertiary
6	Cobalt Creek	Mouth T62N, R10W, S21	Tertiary
7	Nickel Creek	Mouth T62N, R10W, S17	Secondary
8	Dam #1 Gabbro L.	Outlet T62N, R10W, S9	Secondary
9	Dam #2	Outlet T62N, R10W, S8	Secondary
10	South Kawishiwi R.	Rapids T62N, R10W, S3	Secondary
11	South Kawishiwi R.	Rapids T62N, R10W, S6	Primary

<u>Station</u>	<u>Name</u>	<u>Description</u>	<u>Priority</u>
12	South Kawishiwi R.	Rapids T62N, R11W, S24	Secondary
13	Filson Creek	Upstream T62N, R10W, S19	Primary
14	Filson Creek	Mouth T62N, R11W, S24	Primary
15	So. Kawishiwi R.	Gauging Station T62N, R11W, S23	Primary
16	So. Kawishiwi R.	Rapids T62N, R11W, S27	Secondary
17	So. Kawishiwi R.	Bridge #1 T62N, R11W, S33	Secondary
18	Birch Lake	Dam T62N, R11W, S31	Secondary
19	So. Kawishiwi R.	Mouth into White Iron Lake T62N, R11W, S19	Secondary

1. Random sampling on Filson Creek will be supplemental with event sampling at the discretion of the W.Q. field operations supervisor. Care will be taken to insure that data obtained during climatic events is kept separate from data obtained in a routine manner.
2. Exact station location and sampling method is to be decided after a field inspection of all proposed stations.

Because mass transport of water quality constituents is a desired goal of the water quality program, stream flow measuring stations and rating curves will be developed in the study area as follows:

RECOMMENDED CONTINUOUS RECORDING STATIONS

<u>Name</u>	<u>Status</u>	<u>Location</u>
A. Isabella R. Gauging Station	USGS & USFS Existing Station	T61N, R9W, S6
B. No. Kawishiwi R. Benchmark Station	USGS Existing Station	T63N, R9W, S19
C. So. Kawishiwi R. Gauging Station	USGS & USFS Existing Station	T62N, R11W, S23
D. Filson Creek Gauging Station	USGS & USFS New installation	T62N, R11W, S24
E. Birch Lake Gorge Below dam	To be constructed spring of 1975	T62N, R11W, S19

In addition, a considerable quantity of flow data already exists on the South Kawishiwi River system.

SUMMARY OF AVAILABLE
FLOW INFORMATION ON THE
SOUTH KAWISHIWI RIVER

<u>Station</u>	<u>Information</u>	<u>Agency</u>	<u>Period of Record</u>
1	Continuous stage recording and rating curve	USGS USFS	10/52 - 9/61 6/67 - date
2	No record	---	---
3	No record	---	---
4	No record	---	---
5	Rating curve established	USFS	---
6	No record	---	---
7	No record	---	---
8	Rating curve established	USFS	---
9	Rating curve established	USFS	---
10	Rating curve established	USFS	---

6

<u>Station</u>	<u>Information</u>	<u>Agency</u>	<u>Period of Record</u>
11	Rating curve established	USFS	---
12	Rating curve established	USFS	---
13	No record	---	---
14	No record	---	---
15	Continuous stage record-	USGS	10/51 - 9/61
	ing and rating curve	USFS	11/67 - date
16	Rating curve established	USFS	---
17	No record	---	---
18	No record	---	---
19	No record	---	---

Additional flow information:

- A. USGS bench mark station Continuous stage re- 6/66.- date
T63N, R9W, S19 cording and rating curve
- B. Rapids USFS rating curve --
T63N, R10W, S28
- C. Rapids USFS rating curve --
T63N, R10W, S26

Note: Staff gauges have been installed at stations 2, 3, 4, 5, 6, 7, and 14. Rating curves will be developed for all non-recording stations except 17 and 18. Stage will be recorded at every station when sampled.

The identification of sampling stations is not complete as INCO has not submitted a formal mining and reclamation plan describing the

proposed wasterock and tailings disposal areas. INCO has agreed to provide the mine plan by Jan. 1975. At this time, the W.Q. task group will be reassembled to address additional sample stations.

PARAMETERS

Every attempt was made to tailor parameter coverage to anticipated pollutants, which could arise as a result of INCO's proposed Cu-Ni mining operation. However, the information needed to develop a parameter list specific to INCO's proposal is sketchy at this time. An analysis of the ore body, overburden, and wasterock and a description of chemicals which will be added during mining and ore processing will be made available through the mining and reclamation plan. However, the following list should encompass most, if not all, of the parameters to be measured.

PARAMETER LIST

Principal

Field

ph (1,4)
Temp. (1,4)
Sp. cond (4)
D.O. (4)

Laboratory

Calcium (4,1)
Magnesium (4,1)
Potassium (4,1,3)
Sodium (4,1)
Chloride (4)
Copper (1,2)
Iron (1,4)
Nickel (1,2)

Auxiliary

Laboratory

Aluminum (1)
Chromium (2,1)
Cobalt (2,1)
Fluoride (1,2)
Manganese (1,4)
Total - P(3,4)
Ortho - P(3,4)
Mercury (2)
Arsenic (1,2)
Selenium (1,2)
Silver (2,1)
Nitrate (1,3,4)
Nitrite (2,3,1)
Ammonia (1,3,2)
Total Kjeldahl (1,3)

Principal

Silica (1,3,4)
 Sulfide (1,2)
 Sulfate (1,4)
 Zinc (2,1)
 Cadmium (2,1)
 Lead (2,1)
 Color (4)
 Alkalinity (4)
 Hardness (4)
 Suspended Sed (1,4)
 Turbidity (1,4)

Auxiliary

C.O.D. (4)
 Acidity (4)
 Oils (1,4)
 T.O.C. (1,4)

1. Anticipated pollutant as a result of Cu-Ni mining.
2. Constituent with inherent toxic properties.
3. Constituent with inherent nutritional value for aquatic species.
4. Constituent having value as a general W.Q. indicator or as a regulatory requirement.

Note: Organic constituent evaluations will be made when INCO's operating plan is made available.

Note: The metal complexing capacity of the receiving waters should also be determined.

SAMPLING FREQUENCIES

Objectives

The sampling frequency must be sufficient to define mass balances and parameter variability over time and flow for the primary sampling stations. Sampling intensity and duration will be sufficient to define existing water quality within acceptable limits and confidence intervals.

The following table tentatively defines sampling frequencies for the various stations and parameters. This level of sampling will be carried out until six (6) months of data is available for statistical analysis. At this time, detectable limits of change will be defined, acceptable levels of confidence will be defined, and any changes in sampling frequency will be determined by a qualified statistician.

BREAKDOWN OF ANNUAL PARAMETER LOAD

<u>Station¹</u>	<u>Parameters²</u>	<u>Frequency</u>	<u>Determinations</u>
4 (P)	19 (P)	26/yr	1976
4 (P)	19 (A)	12/yr	912
10 (S)	19 (P)	12/yr	2280
10 (S)	19 (A)	4/yr	760
5 (T)	19 (P)	4/yr	<u>380</u>
		Total	6308

1. Stations: P=Primary
S=Secondary
T=Tertiary

2. Parameters: P=Principal
A=Auxiliary

Note: The field parameters will be taken at each station when visited for sampling

FREQUENCY TABLE

<u>Stations</u>	<u>Parameters</u>	<u>Frequency</u>
Primary ¹	Principal	Bi-weekly
	Auxiliary	Monthly
Secondary	Principal	Monthly
	Auxiliary	Quarterly
Tertiary	Principal	Quarterly

1. The primary stations located on Filson Creek will be supplemented with event data consisting of the primary parameters only.
2. Quarterly sampling to consist of one sample at Spring runoff, Summer stable flow, Fall flush, and Winter base flow.

The parameter designation (principal and auxiliary) and the sampling frequency simply reflect choices to date. It is the intent of the water quality task group to initially establish parameters and sampling frequencies for the water quality program. However, this does not preclude the possibility of changes in the number of parameters, priority of parameters, sampling frequency, etc., as the program progresses. Indeed, these changes are expected.

RECOMMENDED ANALYTICAL PROCEDURES

At this time, the U. S. Forest Service intends to use the USGS analytical services available in Salt Lake City. The methods used, therefore, will be those specified in the USGS methods manual except for heavy metals. These will be done by methods prescribed by the

W. Q. task group. The recommendation to use more advanced and sophisticated techniques for heavy metals is based upon the desire to obtain significant figures for heavy metal levels in the study area which has existing heavy metal levels in the micro and nanogram range. Present methodology used in most laboratories will not provide accurate, precise values at these low levels.

Analytical quality control will be addressed in a separate paper but it is recognized that a quality control program is necessary and will be a substantial portion of the water quality program. Roughly 10% of the analytical work will be for quality control purposes.

In addition, the following recommended methods do not preclude the use of suitable alternative methods and represent only the recommendations of the task force.

Heavy Metal Evaluation and Recommendations
(all values in ppb)

Parameter	Toxic Level	Existing Level	Detection Value		Advised Method*
			Desired	Obtainable	
Cu	5	1.5	0.5	0.5	ASV FAA
Fe	1000	220	100	100	AA
Ni	20	<5	0.5	0.5	EAA
Zn	20	1.3	1	.02	FAA
cd	1.0	.1	.01	.01	FAA
pb	20	.5	.5	.3	ASV FAA
AL	100	400	100	--	--
Cr	100	<.5	5	0.5	FAA
Co	5	<1	.5	1.0	FAA
Mn	2000	25	10	.5	FAA
Hg	>.02	<.02	.01	.05	FVAA
Ar	100	<10	<10	<10	FAA
Se	--	--	--	--	--
Ag	.1	--	.05	.1	FAA

Method abbreviations: ASV - Anodic stripping voltametry

AA - Flame atomic absorption

FAA - Flameless atomic absorption

EAA - Extraction & atomic absorption

Note: In addition, it is recommended that periodic splits also be run by ASV on most of the above metals.

RECOMMENDED PROCEDURES

Parameter & Units	Method	References			
		Standard 1/ Methods	2/ ASTM	EPA 3/ Methods	Fed. 4/ Reg.
1. Alkalinity mg Cn Co ₃ /L	Electrometric titration	P.370	P.143	P.6	x
2. C.O.D. mg/L	Dichromate reflux	P.495	P.219	P.17	x
3. Suspended solids mg/L	Glass fiber filtration; 105° C	P.537	--	P.277	x
4. Ammonia-N-mg/L	Distillation-Nesslerization or titration	--	--	P.134	x
5. Kjeldahl nitrogen-N mg/L	Digestion & distillation-Nesslerization or titration	P.469	--	P.149	x
6. Nitrate-N mg/L	Cadium reduction-Hydrazine reduction brucine sulfate; automated	P.461 P.461	P.124 --	P.170 P.175	x x
7. Total phosphorus-P mg/L	Persulfate digestion and single reagent; ascorbic acid	P.526 P.532	P.42	P.235	x
8. Acidity mg CnCo ₃ /L	Electrometric titration	P.50	--	--	
9. Total organic carbon mg/L	Combustion-Infrared method	P.257	P.702	P.221	x
10. Hardness mgCnCo ₃ /L	EDTA titration	P.179	P.170	P.76	x
11. Silica mg/L	Heteropoly blue method	P.306	--	--	
12. Nitrite-N mg/L	Colorimetric diazotization	--	--	P.185 P.195	x
13. Ortho-Phosphate-P mg/L	Direct; single reagent	P.532	--	P.235 P.246	x
14. Sulfate mg/L	Turbidimetric	P.334	--	P.286	x
15. Sulfide-S mg/L	Titrimetric-Iodine w/Pretreatment	P.336 P.551	--	P.294	

Parameter & Units	Method	References			
		Standard <u>1/</u> Methods	<u>2/</u> ASTM	EPA <u>3/</u> Methods	Fed. <u>4/</u> Reg.
16. Chloride mg/L	Silver nitrate; mercuric nitrate, auto- mated colorimetric-Ferricyanide	P.96 P.97	P.23 P.21	P.29 P.31	x
17. Oil and grease mg/L	Extraction with freon (Hexane)	P.254	--	(P.217)	x
18. Calcium mg/L	Atomic absorption; direct	--	--	P.102	x
19. Magnesium mg/L	Atomic absorption; direct	P.210	--	P.112	x
20. Sodium mg/L	Atomic absorption; direct	--	--	P.118	x
21. Potassium mg/L	Atomic absorption; direct	--	--	P.115	x
22. Color PT-Co units	Colorimetric	P.160	--	P.38	x
23. Turbidity JTU's	Turbidimeter; Hach 2100 A	--	--	P.308	x
24. Specific cond. umho/cm at 25° C	Calibrated wheatstone bridge	P.323	P.163	P.284	x
25. Temp. °C	Mercury Thermometer; w ref standard	P.348	--	P.296	
26. Diss. oxygen mg/L	Winkler; Azide modification	P.477	--	P.53	

1/ Standard methods for the examination of water and wastewater, 13 Ed. 1971.

2/ Annual Book of Standards, Part 23, Water, Atmospheric Analysis, 1972.

3/ Methods for Chemical Analysis of Water and Wastes, 1971.

4/ Federal Register, Vol. 38, No. 199 Tuesday, October 16, 1973.

ADDITIONAL STREAM CHARACTERISTICS

1. Suspended sediment analysis

Suspended sediment will be sampled using a flow proportional sampling device available from John Skinner, Interagency Sediment Project, St. Anthony Hydrolics Laboratory. Sampling sites will be stations 1, 15; 19 and the U.S.G.S. benchmark station on the North Kawishiwi River. Sampling frequency will be monthly at all sampling stations. Sampling technique and analysis is standard U.S.G.S. methodology. All stations will have continuous stage recorders and rating curves so that total sediment loads can be determined.

2. Bottom Sediments

Core transects will be done in Three Mile Lake at the deepest portion below station 11 (T62N, R10W, S18), below station 16 at the deep hole (T62N, R11W, S27) if stratified and/or $\frac{1}{2}$ mile downstream of station 16. There is no immediate need to take cores as long as the work is done before mining operations occur. Tentative sampling date would be the winter of 1976. The parameters to be analyzed would be based upon leachate studies.

3. Time of Travel

Time of travel from proposed diversion of Filson Creek to water intakes and Birch Lake will be determined by MPCA,

who are set up to do this work, using a fluorescence based dye. This information will also be used to select additional sampling stations, if necessary.

4. Water Uses

Types, locations and magnitudes of water uses should be determined downstream of the proposed plant. This work should be done by the State MPCA to verify the present classification of the South Kawishiwi River.

PROGRAM REVIEW

The water quality task group will also serve as a program review committee to recommend changes in parameters, sampling frequency, sampling stations, etc., or to deal with problems if any arise. It is imperative that the water quality program respond to changes that are indicated by the data collected, to recommendations by the informed public, and to data provided by other agencies or the mining company. The water quality program will be reviewed every four (4) months and all recommended changes will be acted on and published along with the data obtained to date. In addition, an annual report, including all data, quality control work, analytical methods, sampling methods, etc., will be made available to all concerned.

AIR STUDIES

Air Quality Monitoring

1. Objective

The objective of air monitoring for the INCO proposal is to provide baseline air quality information in and around the proposed mine site.

This information will be used to make operational and postoperational comparisons and to identify existing sources of air pollution, if any, which may influence a compliance monitoring system if the mine becomes operational. This information may also be useful in the design of a compliance monitoring network.

2. Station Locations

The sampling network will consist of 4 secondary stations and one primary station, located in and around the proposed mine site.

a. Primary Station

South Kawishiwi Field Experiment Station, located immediately adjacent to mine property. (R11W, T62N, S34).

b. Secondary Stations

1. Ely station located 8 miles N.W. of mine site reflecting air quality in population center. (R12W, T63N, S34).
2. Babbitt Station located 8 miles S.W. of mine site reflecting air quality in population center. Site could also reflect baseline air quality for Amax proposal if need arises. (R13W, T60N, S6).
3. Isabella Station located 16 miles S.E. of proposed mine site. (R8W, T59N, S2).

4. Moose Lake Station, located 12 miles N.E. of proposed mine site. (R9W, T64N, S35).

3. Parameters; Air Quality

I. Particulates will be measured at all stations. Potential sources of particulates from INCO's operations are from:

- a. Blasting.
- b. Wind erosion of exposed surfaces, esp. tailings basin.
- c. Crushing, milling and drying operations.
- d. And, potential stack emissions.

1. Total suspended particulates, mass/volume.
2. Respirable particulates and particulate sizing.
3. Inorganic composition.

- a. Copper
- b. Nickel
- c. Silicon
- d. Sulfide
- e. Zinc
- f. Cadmium
- g. Lead
- h. Total Phosphorus

4. Samples for asbestos-like fibers will be taken and stored.

II. Gases and Vapors

SO_x and NO_x will also be measured at all locations.

Potential sources are:

1. Fossil fuel burning
2. Smelting operations
3. Incomplete oxidation of blasting agents,

4. Sampling Frequency

Primary Station

1. Suspended particulates - daily
2. Respirable particulates - weekly
3. Inorganics - every 6th day
4. Asbestos - weekly
5. Sulfur oxides - continuous
6. Nitrogen oxides - continuous

Secondary Stations

1. Suspended particulates - every third day
2. Respirable particulates - not done
3. Inorganics - twice monthly
4. Asbestos - not done
5. Sulfur oxides - every third day
6. Nitrogen oxides - every third day

Annual Parameter Load

<u>Parameter</u>	<u>Primary Station</u>	<u>Secondary Stations</u>	<u>Total</u>
Sus. part.	365	488	853
Resp. part.	52	--	52
Inorganics	480	960	1440
Asbestos	52* (See text)		
Wet SO _x	--	480	480
Wet NO _x	--	480	<u>480</u>
			3305

Methods

1. Sampling)
 2. Analytical) Portion to be written by MPCA.

Costs

A. Equipment

1. NO ₂ - Continuous	\$ 7,000
2. SO ₂ - Continuous	8,000
3. Six Hi-Vol samplers	3,500
4. Membrane sampler	600
5. Cascade impactor	600
6. 5 - Multi-gas samplers	4,000
7. Calibration Equipment	1,200
8. Recorders	2,000

B. Sampling Media

1. Reagents	250
2. Filters	500

5

C. Misc. parts as needed	\$ 2,000
D. Analytical costs/yr	17,000
E. Maintenance contracts	2,000
F. Utilities	200

Data Reporting

All data will be tabulated and stored according to EPA's SAROAD format. Data will be summarized and reviewed quarterly by a qualified statistician. The analysis will be used to determine the adequacy of the data collected and recommend changes in sampling frequency if needed. In addition, all data will be made available in a summarized report form in a lay terminology format and a technical format, annually.

MEQC RESOLUTION
COPPER-NICKEL ISSUE

WHEREAS, Copper-nickel development is a major state policy issue and should be considered from a perspective which allows public participation in the planning and decision-making process; and

WHEREAS, International Nickel Company (INCO) has proposed the first copper-nickel development in the State of Minnesota, including a mine and concentrator that will be located on the south side of the South Kawashiwi River near the Boundary Waters Canoe Area; and

WHEREAS, INCO has recommended in the Environmental Assessment, which it submitted to the Minnesota Environmental Quality Council (MEQC), that an Environmental Impact Statement (EIS) be prepared on its proposed copper-nickel development; and

WHEREAS, the Forest Service of the United States Department of Agriculture has initiated the preparation of a comprehensive EIS on the proposed INCO copper-nickel mining development, and has requested funds in the amount of \$1,000,000 for the preparation of this EIS; and

WHEREAS, the studies relating to copper-nickel development in the State of Minnesota that have been prepared, including copper-nickel study for which the 1973 Legislature appropriated \$100,000, do not adequately consider the regional impact of copper-nickel development;

WHEREAS, Copper-nickel data collection, research, pre-operational monitoring and exploratory programs are essential to provide a base of necessary information for the preparation of a meaningful EIS on any subsequent copper-nickel development proposal; and

WHEREAS, American Metal Climax Inc. (AMAX) has submitted an Environmental Assessment on a proposed shaft sinking and ore sample program and has requested that it be considered at the November MEQC meeting;

THEREFORE, BE IT HEREBY RESOLVED:

1. That the MEQC assign the highest priority to the consideration of copper-nickel development in the State of Minnesota;
2. That the MEQC, based on the INCO Environmental Assessment, order the preparation of an EIS on the proposed INCO development with the Department of Natural Resources and the Pollution Control Agency as joint lead agencies;
3. That the MEQC require the State to work closely with the U. S. Forest Service in the preparation of the EIS on the proposed INCO development and to supplement the U. S. Forest Service EIS to the extent that it does not adequately address regional issues; and that the MEQC support the U. S. Forest Service's request for additional funding for the EIS on the INCO development;
4. That the MEQC require that an adequate regional EIS be completed prior to the acceptance of any site specific EIS on any mining developmental proposal;
5. That the MEQC require the establishment and implementation by INCO of a site specific pre-operational monitoring program, which meets the requirements of the Department of Natural Resources and the Pollution Control Agency and is approved by the MEQC, before the State will accept any applications for permits

on the proposed INCO development and before the MEQC will find an EIS on the INCO development to be adequate;

6. That the MEQC request the U. S. Forest Service to expand the scope of the EIS on the INCO development to include an evaluation of the regional effects and implications of that proposed development and other potential developments;

7. That the MEQC appoint and adequately staff an Inter-Agency Task Force, which would consist of the Department of Natural Resources and the Pollution Control Agency as co-chairmen, the State Planning Agency, the Department of Health, the Department of Highways, the Energy Agency, and a technical person appointed by the Citizen's Advisory Committee, and which would involve the public through an open working process, to conduct the following activities:

- a. To review the Copper-Nickel Study, the Inter-Agency Task Force Report on Base Metal Mining Impact, the U. S. Forest EIS proposal and other appropriate studies to determine the existing base of site specific and region-wide copper-nickel information;
- b. To advise MEQC on the site specific and regional issues and implications that may not be adequately addressed in the above copper-nickel activities and make recommendations to MEQC concerning the development, timing and funding of necessary additional environmental information in order to develop a regional EIS and site specific EIS's;
- c. To review and develop regional environmental monitoring programs and to make recommendations to MEQC concerning the development, coordination and funding of an system for regional environmental monitoring;
- d. To request the assistance of the U. S. Forest Service, the Environmental Protection Agency, the Bureau of Mines, and U. S. Geological

Survey in its activities; and

- e. To hold public meetings to provide for public input into the study of the copper-nickel issue.

8. That the MEQC support the establishment and continuation of environmental monitoring, exploratory, research and data collection programs within the region by the State and industry, particularly as they apply to potential copper-nickel development to the end that decisions on any copper-nickel development proposals will be based on adequate knowledge and information rather than on assumptions and speculation; and

9. That the MEQC require any copper-nickel exploration program, which will include the taking of a bulk sample or the sinking of a shaft, to be preceded by a data collection program and a pre-operational monitoring program, as prescribed by the Department of Natural Resources and the Pollution Control Agency and approved by the MEQC, and an environmental assessment.

10. That the MEQC consider the AMAX Environmental Assessment at the November MEQC meeting and require AMAX to make available to the MEQC, exploration drilling information relating to the proposed AMAX shaft sinking and ore sampling program, for use in the MEQC analysis of the AMAX Environmental Assessment.

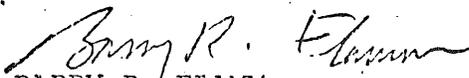
5. The land exchange proposal of INCO that is associated with this mining activity.

The third question deals with participation of each of the agencies. It was agreed that there are joint responsibilities involving both the Forest Service and Department of Interior. The agencies would have to work closely in the preparation of the statement. In addition to the USGS, Bureau of Land Management, Bureau of Sport Fish and Wildlife, National Park Service, and Bureau of Mines will need to participate in the study. It was generally agreed that the study details would have to be worked out on the ground and that an early planning step would entail agreement on an outline of the study and analysis. Because of the critical aspects involving water quality, it was mutually agreed that we should request EPA technical assistance and participation in the study.

Participants at this meeting emphasized the importance and need for an objective, thorough, and comprehensive study.

Region 9 and Supervisor Anderson will follow up in organizing for the study. I have advised both Howard Banta and Supervisor Anderson that USDI agreed that Forest Service should be the lead agency on this particular proposed action.

Bruce Blanchard requested that we send him a complete package of the company's proposal. Anderson agreed to put this together for my transmittal to Blanchard.


BARRY R. FLAMM
Staff Assistant

MINNESOTA DIVISION

Izaak Walton League of America, Inc.

DEFENDER OF SOIL, WOODS, WATERS AND WILD LIFE

STATE HEADQUARTERS

106 Times Building, 57 South 4th Street, Minneapolis, Minn. 55401

Phone 338-1418



May 6, 1974

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Southern Area
Mrs. Ruth Cruikshank, Owatonna
Mrs. Maurine Stephan, Winona

Mr. Harold E. Andersen, Supervisor
Superior National Forest
Federal Building
Duluth, Mn. 55802

Dear Mr. Anderson:

The enclosed resolution was unanimously approved by the Minnesota Division of the Izaak Walton League of America, at its 52nd Annual State Convention on May 5, 1974.

We are seriously concerned about the lack of public information concerning the copper-nickel mining development and its possible adverse effects on the Boundary Waters Canoe Area. The mining proposals of which we are aware, appear to us to contain the potential for another Reserve Mining situation in future years. I am sure you agree with us that such a situation should not be repeated.

If there is any way the Izaak Walton League can assist you in your consideration and study of this problem, please call on us.

Sincerely,

Paul Toren, First Vice President

encl.

MINNESOTA DIVISION
IZAAK WALTON LEAGUE OF AMERICA

RESOLUTION CONCERNING POTENTIAL COPPER-NICKEL MINING IN NORTHEASTERN MINNESOTA

Major mining developments are now being considered in the low-grade copper-nickel sulfide-bearing rocks of the Duluth Gabbro complex along the South Kawishiwi River and Birch Lake, just outside of the Boundary Waters Canoe Area. Such developments may include, among other proposals, a massive open-pit mine with an ultimate depth of 1,000 feet, located within one mile of the BWCA and within a few hundred feet of the Kawishiwi River. Such developments would apparently require one or more ore concentration plants and tailings ponds within the Kawishiwi watershed, major water withdrawals from the Kawishiwi system, massive waste rock dumps near the river, a smelter, new power plants, new roads, railroads, and service facilities. It is known that copper is highly toxic to fish and other aquatic life, that pollution of waters by copper and other heavy metals is a common problem with this industry, and that pollution of the Kawishiwi River could endanger not just the river, but many important downstream lakes including Birch, White Iron, Garden, Fall, Basswood, Crooked, and La Croix. Worldwide experience with sulfur dioxide air pollution from the smelting of copper-nickel sulfide ores has repeatedly shown serious damage to vegetation, soils, fish, and even human health, and the technology for preventing this damage is still inadequate and uneconomic. Industrialization of the Kawishiwi area would in itself seriously impair the wilderness qualities of much of the adjacent BWCA, withdraw large areas from timber and wildlife production, and reduce the habitat of the already endangered eastern timber wolf. The lands in question are almost entirely public lands, owned by the people of the United States or of the State of Minnesota, making the whole question clearly a public matter.

NOW THEREFORE BE IT RESOLVED, BY THE MINNESOTA DIVISION OF THE IZAAK WALTON LEAGUE OF AMERICA: That the Governor and Department Heads of the State of Minnesota, the United States Forest Service and the U. S. Bureau of Land Management be implored, by copy of this resolution, to delay the granting or issuance of any licenses, permits, or privileges which would encourage copper-nickel development in the Kawishiwi River watershed; to make no further commitments to this industry whatsoever, unless and until adequate environmental, social, economic and technological studies by competent public bodies and industry, demonstrate that no unacceptable environmental, social, or economic damage to the region will result from planned operations, and until there has been full disclosure to the public of all proposals and plans; and adequate time for public discussion of alternatives, baseline environmental studies, and for public participation in the decision-making process.

AND BE IT FURTHER RESOLVED, THAT THE LEGAL ACTION TASK FORCE OF THE NATIONAL IZAAK WALTON LEAGUE OF AMERICA be directed to explore all aspects of the proposed mining developments, including the possible future initiation of litigation and appropriate administrative proceedings.

Copies of this resolution shall be sent to: The Governor of the State of Minnesota, Minnesota Commissioner of Natural Resources, Director of the Minnesota Pollution Control Agency, Supervisor of the Superior National Forest, Chief of the U. S. Forest Service, Regional Forester, Director of the U. S. Bureau of Land Management and the Minnesota Congressional Delegation.

May 22, 1974
FOR IMMEDIATE RELEASE

For further information contact:

Rodney Loper (612) 333-4479
Walt Pomeroy (715) 682 - 5564
John Herman (612) 333-4591

Members of 26 environmental and church organizations today co-signed an eleven-page letter detailing their concern for unanswered questions related to potential water and air pollution, economic and social impacts, and related land use changes which are possible if deposits of copper - nickel are mined in northeastern Minnesota. The letter was sent to eleven Minnesota, United States and Canadian governmental agencies which will have to deal with the complex questions related to the mining operations.

Two weeks ago the Superior National Forest received a formal request from International Nickel Corporation to grant them a permit to mine for copper - nickel on a site immediately adjacent to the South Kawishiwi River, which flows into the Boundary Waters Canoe Area and into international border lakes comprising the Quetico - Superior Region.

Amongst the recipients of the letter are Minnesota's Governor Wendell Anderson, Harold Anderson, Supervisor of the Superior National Forest, Grant Merritt, Executive Director of the Minnesota Pollution Control Agency, Rogers C.B. Morton, Secretary of the federal Department of the Interior and William Davis, Premiere of the Province of Ontario.

Regarding the specific questions addressed in the letter, the groups said, "Man's specific questions must be answered before the public can understand what the future might bring and how it will effect their lives. At this time, there is little real information on what is actually involved".

The letter went on to say, "We too are concerned about the economic needs of Ely and other local communities, and we recognize the political

Page 2
May 22, 1974

implications of their economic situation. But it is precisely these same kinds of pressures and the resultant hasty planning that produced the present Reserve Mining Company Silver Bay tragedy."

Open pit mines over one mile long, three quarters of a mile wide and one thousand feet deep would be dug by the mining company to extract an ore which is less than 1% copper - nickel. An ore concentrating plant, tailings basins, mine dumps and possibly smelters would be located next to the open pit. These operations would be heard and seen from within portions of the Boundary Waters Canoe Area, the largest federally designated wilderness area east of the Rocky Mountains, and the only wilderness oriented toward the use of the canoe as the primary mode of travel.

The organizations signing the letter were also concerned about necessary public participation in the decision making process related to the potential mines. In the letter they said, "Without extensive environmental reviews or public input, both the state and federal agencies involved seem to be rushing headlong toward approval of this development, perhaps because of immediate, short-term economic pressures."

While the Minnesota legislature approved the appropriation of \$ 100,000 in 1973 to the State Planning Agency for a study related to the impact of the mining on the area, the organizations believed that there will still be many unanswered questions. Given the record of environmental problems caused by the copper - nickel industry in North America over the years, a number of serious questions need to be posed and answered before development should be considered in this fragile, environmentally sensitive area of the country.

Page 3
May 22, 1974

WATER POLLUTION: Unlike taconite tailings, which when disposed on land are relatively inert, the runoff from copper - nickel sulfide mines and tailings dumps are acidic and contain heavy metals, especially copper. When these are found even in low concentrations they are lethal to many forms of aquatic life, including game fish. This area is where rainfall exceeds evaporation, so open pit mines can fill up, tailings basins overflow and the control of water becomes a critical question. To date neither Minnesota nor the federal government has begun a baseline sampling program in the South Kawishiwi River Area.

AIR POLLUTION: International Nickel Company (INCO) has indicated its desire to smelt the copper - nickel ore in Minnesota. If the smelting is done by the traditional method of roasting, serious air pollution by sulfur dioxide could occur. Sulfur dioxide destroys vegetation at very low concentrations and for very long distances, particularly in sensitive pine forests such as those in the BWCA. Decades before any attempt at pollution control was thought of, the area around Sudbury, Ontario, became a virtual moonscape. Even now, with tall stacks, rainfall carrying sulfur dioxide is acidifying lakes and streams, killing fish and harming vegetation as far as 40 miles from the smelter site. If the smelting is done by a new and yet untested hydrometallurgical leaching process, unknown and potentially serious water pollution problems could arise with devastating effects on the fragile aquatic systems of the north.

ECONOMIC AND SOCIAL IMPACT: Although the state agencies and corporations promoting copper - nickel development have talked about economics, it is hoped they will consider in greater detail than what they have so far the costs of new roads, schools, sewage facilities and other social facilities

Page 4
May 22, 1974

needed to support an increased population. The question of 800 - 1,000 jobs must also be fully explored and publicized. Will these be people from the area, or highly skilled people brought in from outside the area? What will this mining impact do to the well established tourist and outdoor based industry that now supports Ely?

LAND USE: Is it appropriate to allow land use that will place such a mine and open pit on the immediate periphery of a unique national wilderness area? Is there any way to avoid the degradation resulting from heavy mining and machinery movement when it is so close to wilderness, recreational lakes and forests? How far will reverberations of blasting extend and what will be the effect on aesthetic and recreational values? What will it do to fish and wildlife including the eastern timber wolf? Are all uses except mining to be sacrificed in this famous and beautiful region?

LONG TERM EFFECTS: Even if toxic levels of heavy metals and sulfides in the water and sulfur dioxide in the air are avoided in a copper - nickel development, can we be sure that low concentrations over a long period of time will have no harmful effect? Studies have shown that lichens and other plants and animals absorb the heavy metals and that they accumulate in larger doses up the food chain. Also, acids and heavy metals can build up over long periods by fall-out from rains polluted from smelter stacks. The research is yet to be done that will provide the assurances needed on these long term questions.

(The following letter was addressed specifically to the following individuals: Governor Wendell Anderson, State of Minnesota; Grant Merritt, Executive Director, Minnesota Pollution Control Agency; Harold Andersen, Supervisor, Superior National Forest; Robert Herbst, Commissioner, Minnesota Department of Natural Resources; Rogers C.B. Morton, Secretary of the Interior; Earl Butz, Secretary of Agriculture; Victor Arnold, Director, Planning Development, Minnesota State Planning Agency; Curt Berklund, Director, Bureau of Land Management; John McGuire, Chief, Forest Service, Department of Agriculture; William Newman, Minister, Department of Environment, Toronto, Ontario, Canada; and William Davis, Premiere, Province of Ontario, Toronto, Canada.)

Minnesota is on the brink of a major copper-nickel development of low grade sulfide ores containing less than 1% combined copper-nickel. One mining company has already requested a permit to begin mining operations which would include at least one open-pit mine up to 1000 feet deep and over a mile in length, an ore-processing plant, vast waste rock dumps and tailings basins, and a smelters, or hydro-metallurgical ore refining plant. Eventually several firms could move in and develop a new mining district comparable to that of the Mesabi Range.

It is encouraging that the 1973 Minnesota legislature appropriated \$100,000 to the State Planning Agency for a copper-nickel study. In accordance with the intent of this legislation, the State Planning Agency, the Department of Natural Resources, and the University of Minnesota, are currently involved in a joint effort to determine the socio-economic and environmental impacts of copper-nickel mining in Northeastern Minnesota. Citizen groups have been invited to attend a meeting on July 8th to discuss a monitoring system devised by National Biocentrics, Inc., for this purpose, should the copper-nickel development materialize.

Most of the land involved is public land administered by the Superior National Forest within the State of Minnesota. Thus, the resource alternatives and environmental concerns are clearly public matters which are local, national, and international in scope. Without extensive environmental reviews or public input, both the state and federal agencies involved seem to be rushing headlong toward approval of this development, perhaps because of immediate, short-term economic pressures. We too are concerned about the economic needs of Ely and other local communities, and we recognize the political implications of their economic situation. But it is precisely these same kinds of pressures and the resultant hasty planning that produced the present Reserve Mining Company Silver Bay tragedy.

Man's specific questions must be answered before the public can understand what the future might bring and how it will effect their lives. At this time there is little real information on what is actually involved.

FOREST SERVICE
RE.

MAY 30 1974

FOREST SERVICE
RECEIVED

MAY 28 1974

OFFICE OF THE CHIEF

As an example, you are aware that one of the proposed mines will be within a mile or two of the Boundary Waters Canoe Area (BWCA) and within a few hundred feet of the South Kawishiwi River. This watershed, which today is unpolluted, drains northward through Birch, White Iron, Farm Garden, Fall, and Newton Lakes into Basswood, Crooked Lake and Lac La Croix along the international border.

The record of environmental problems posed by copper-nickel mining is familiar across North America. Waters have been polluted, sulfur dioxide emissions have caused vast vegetational kills and the accompanying industrialization has brought not only environmental blight, but human health problems to large areas. While industry is working on new methods to meet these problems, even now there is no proven technology to deal with the complex air and water pollution posed by such developments.

The following questions should be satisfactorily answered before any commitments are made by governmental agencies. The following questions are pertinent:

STATUS OF NEGOTIATIONS WITH MINING FIRMS

1. What corporate plans or strategies have been disclosed to your agency either formally or informally? The public needs the same information you have concerning projected mine locations and pit dimensions, tailings ponds, processing plants, smelter plans and locations, roads, railroad and power requirements, etc. If there have been discussions of such plans, the substance of these talks should be disclosed.
2. What facts have INCO, AMAX, EXXON, or other firms disclosed about the extent of mineralization, location of potential ore bodies, or the quantities and qualities of potential ores?
3. What further disclosures of such facts can you legally require?
4. What permits, leases, or licenses have been granted or are now being processed in any manner?
5. To what parties? What public revenues have been or will be derived?
6. What "informal" agreements have been made and with whom?
7. Have there been discussions either with the industry or internally within your agency about potential exchanges or sale of public lands to facilitate the development of this industry? If so, what is the substance of such discussions? What specific tracts are involved? Have any sales or exchanges already been made? If so, where?
9. What agencies or private parties now own or control all lands and mineral rights in the target areas?

ENVIRONMENTAL CONCERNS

Many specific questions about possible environmental impacts should be discussed publicly before decisions are made and before the formal Environmental Impact Statement process begins.

WATER QUALITY: For example, large-scale water use needs and waste disposal questions seem involved. But the Kawishiwi River is really a low-volume stream, and its waters flow directly back into the BWCA and the Boundary lakes chain, raising International questions about water rights and pollution control responsibilities. The waters of Quetico Provincial Park in Ontario could be affected. The parallel with the present Silver Bay interstate and international wranglings is obvious. An Act of Congress, the Shipstead-Newton-Nolan Act, already prohibits water level changes or dam construction in most of the Kawishiwi watershed.

Copper is extremely toxic to fish, aquatic insects, and aquatic plants at very low levels. Reproduction of fish may be prevented at copper levels as low as 30 parts per billion. Serious pollution problems with copper and other heavy metals have occurred with base metal mines in Ontario, New Brunswick and other Canadian areas with environments similar to the Kawishiwi region. In some of these cases it will apparently now be necessary to treat mine and tailings waters in perpetuity if further pollution is to be avoided. Here are some examples of the kinds of specific questions that must be answered for the proposed Minnesota operations:

1. What would the total water requirements be for this development including the possible ultimate extent of the mine fields?
 - a. How much water would be needed? When?
 - b. From what sources?
 - c. For what purposes?
 - d. How much would be returned directly to the natural system?
 - e. How much would be consumed, and how much unavoidably discharged into the environment without treatment?
 - f. What heavy metals contamination might occur, and what could be done to eliminate or purify such contaminated water?
 - g. What industrial chemicals would be added in various processes involving water use, and what contamination of natural waters from this source could be foreseen? What could be done to alleviate these problems?
 - h. What would be the extent of surface seepages from tailings ponds, mine dumps, pits, etc.? What will be the chemical quality of such seepage waters? Can such waters be treated to remove heavy metals?

1. Would there be groundwater seepage through fractured bedrock or glacial drift adjacent to the proposed mines, rock dumps, or tailings areas? Would such seepage waters be contaminated with heavy metals? Where would such seepage go, and is treatment feasible?
2. Would new dams or higher dams be required for Birch Lake, the Kawishiwi River, or Gabbro-Bald Eagle Lakes to assure adequate water supplies? Are such dams being considered?
3. What diversions of natural streams (such as Filson Creek) would be required? Where would the waters go?
4. What changes in water flow and water levels would be required in the extensive forested swamps and other wetlands in the immediate area of the mines and tailings basins?
5. What technical procedures could be used to handle the potential run-off from tailings ponds, mine pits, rail yards, and other facilities to prevent copper and other toxic heavy metals from entering natural waterways? During active mining? After the mines are exhausted?
6. An open pit mine such as the 1000 foot deep pit rumored for the INCO operation would eventually fill with water after mining ceases, because rainfall exceeds evaporation in northeastern Minnesota. When it filled, where would the outflow go? Could it be prevented from reaching the Kawishiwi River which lies only a few hundred feet downhill from the proposed edge of the pit? Can we be sure these mine waters would not be polluted with copper and other heavy metals?
7. Might the surface soils, lichens, mosses, and other vegetation in this ecosystem accumulate heavy metals from mine dust, smelter fume fall-out, and other sources so that after 10 to 20 years of "safe" operation, irreversible damage might then begin to occur?
8. If a major "accident" should occur at the mine or smelter (such as failure of tailings pond dikes during a severe rainstorm or spring flood), what damage to the environment could occur? How long would it take for the natural system to recover? 10 years, 50 years, or forever? Who would be held responsible?

AIR QUALITY: Even though Governor Anderson has said that a smelter would not be involved, it now appears that the industry is considering smelters. In fact, most large copper-nickel mining regions do have their own smelters, and it is logical that one or more would be built if this industry develops. But throughout the world the smelting of copper-nickel sulfide ores has caused major damage to soils, waters and vegetation from air pollution due to sulfur dioxide emissions. For example, at Sudbury, Ontario, INCO's operations have killed or damaged the natural vegetation up to 30 miles from the smelter. Rain out of sulfuric acid is causing the acidification of lakes, streams, and soils over vast areas, and lake trout and other fish populations

are now being killed out over 40 miles from the smelters. White pine, aspen, jack pine and lichens--all common plants in the BWCA--are among the most sensitive to sulfur dioxide. The worst vegetation damage at Sudbury was caused by smelting at ground levels many decades ago, but sulfur removal technology is still costly, uncertain in its effectiveness, and uneconomic. So far INCO at Sudbury and most other North American firms have little sulfur removal equipment and are instead relying on tall stacks to disperse the sulfur dioxide. But tall stacks simply spread the pollution over wider areas and decrease the most obvious local damage. They are not a solution. Hydrometallurgical ore processing is a possible new approach that might greatly reduce sulfur emissions to the atmosphere, but its ecological effects are almost totally unknown. Before a smelter is even considered in Minnesota, the following kinds of questions with respect to air quality must be answered:

1. If any type of base metal smelting or refining facility might be built, what specific process would be used? What would be the details of plant design?
2. If a pyrometallurgical smelter, what sulfur removal process, if any, would be used? What degree of sulfur removal would be achieved? Would stacks be used? How tall?
3. Exactly what sulfur dioxide emissions would still be produced? At what elevation?
4. Where would such a smelter be located?
5. What would the atmospheric circulation patterns be with respect to sulfur emissions? What ground level sulfur dioxide concentrations would result? When? Where?
6. What vegetation damage can be foreseen? Where?
7. Will there be sulfuric acid deposition downwind? Where?
8. What new power plants will be needed to supply the smelter and its supporting facilities? Will coal-fired furnaces be used? What will the sulfur emissions be? Where would such plants be sited?
9. What outputs of dust or particulates will be produced by mining, ore processing, smelting? What would their chemical nature and ecological impact be?

BASELINE ENVIRONMENTAL MONITORING: Without an adequate environmental baseline, especially with respect to water and air resources, there would be no scientifically sound basis for determining whether environmental degradation in fact did result from any proposed operations. Another Silver Bay situation, without pre-operational data, is a distinct possibility. The public needs to know what is being done to forestall such a situation by MPCA,

MDNR, EPA, USFS, and any other agencies involved. The following questions are relevant here:

1. What water quality studies have been made of the target area to date? By what agencies?
2. What laboratory methods and instruments were used to determine the levels of copper, nickel, zinc, cadmium, lead, mercury, arsenic, and other potential pollutants? Was the instrumentation used adequate to detect heavy metals at the biological significant levels?
3. What are the present natural levels of the above metals in the Kawishiwi River above and below the proposed mine sites, in all tributary streams, lakes and wetlands of the general region, and in the important downstream lakes (Birch, White, Iron, Farm, Garden, Fall, Basswood, Crooked, La Croix)?
4. How do the levels of the potential pollutants vary by season, depth, and location?
5. What is the relation of potential pollutants to local bedrock, lithology, nature of the glacial drift, wetland types, etc.?
6. What is the hardness of the waters in question, and how do hardness, presence of humic acids and humates relate to the possible mitigation of heavy metals toxicity?
7. At least a three year program of research would be necessary to establish the necessary water quality baseline for the natural waters of the whole potential impact area. What steps have been taken to get such a program underway?
8. What steps have been taken to establish a baseline for the present quality of the ambient air in the potential impact region?
9. What studies of the vegetation, soils, and wetlands have been conducted? For what specific areas?
10. Are there significant areas of virgin forest remaining within the potential impact area? Exactly where are they, and what is their value? Could they be used to document any adverse impacts of the proposed operations? How?
11. What are the present wildlife and fish populations of the potential impact area? Are there significant populations of endangered species (such as the timber wolf)? How could monitoring the populations of fish and wildlife be used to document adverse impacts?

LAND USE: Another potential impact of the rumored developments is the likelihood of major changes in land use (over an area of unknown size). To re-

spond to this concern, the following questions should be answered:

1. When can your agency, the other agencies involved, or the mining firms provide the public with a map of the total proposed operations now being considered? Only then can the full impact on land use and the related social, economic, and environmental impact be visualized. Such a map should show:

- a. All proposed open pit mines;
- b. All proposed underground mines;
- c. Proposed ore concentration plants;
- d. Proposed tailings ponds;
- e. Proposed overburden and waste rock dumps;
- f. Proposed roads;
- g. Proposed railroads;
- h. Proposed powerlines;
- i. Proposed pipelines;
- j. Proposed power plants;
- k. Proposed communication lines and facilities;
- l. All proposed fenced-in areas and other areas to be closed to public use;
- m. All existing campgrounds, resorts, summer houses, docks, beaches, roadways, and other public or private facilities to be moved, eliminated, or closed;
- n. All proposed smelters or metal refining plants;
- o. Any other significant developments.

2. Would it be feasible to restore the mine pits, waste rock dumps, tailings areas, and other disturbed lands to a condition that will again support native forest? Would there be sufficient soil in the mined-out areas to cover pits, tailings, and rock dumps? When would any such possible restoration occur? Is it in fact feasible to ever restore deep open pits and coarse waste rock dumps (which may be hundreds of feet high) or must such lands realistically be considered ecological "sacrifice" areas? Who would finance any restoration work? How much power (fossil fuel?) would be needed to move the necessary soil and rock back into acceptable locations? What is the status of implementation of the new Minnesota mine land reclamation law (Chaper 526, H.F. 2029)?

3. What other resource uses would be eliminated or changed by the eventual total operation?

- a. Timber land to be permanently removed from production?
- b. Wildlife habitat to be permanently destroyed? Areas, populations involved? Sustainable harvest lost?
- c. Endangered or rare species populations to be eliminated or reduced--eastern timber wolf, pine marten, bald eagle?
- d. Fish population impacts? Species, sustainable annual harvest to be lost?
- e. Area of adjacent National Wilderness System (BWCA) to be damaged by air or water pollution, noise from blasting and heavy equipment uses, or visual impacts (high waste rock dumps, tall stacks, headframes, shaft horses, etc.)? Total areas involved? Number of annual visitor days of use to be foregone? Time periods involved?

4. Does the U.S. Forest Service plan to retain the Keeley Creek Research Natural Area (within the impact region)? Will its value as a natural area be lost? Could it be used as a check area to monitor vegetation changes if mining and smelting in fact go forward?

5. Must the U.S. Forest Service's Kawishiwi Field Laboratory on Birch Lake be moved or abandoned? (This is the lab where Dr. L. David Mech's wolf research and the ecological and social studies in the BWCA have been based. It is located in the center of the rumored INCO mine field). Would some of the key timber wolf packs on which Dr. Mech has accumulated such a long history be eliminated?

ENERGY

Energy demands in our society are increasing at a pace that cannot be sustained. The metal mining and processing industry is already a large user in northeastern Minnesota. How much more power would a copper-nickel industry require? Where would the plants have to be located? What fuel sources could be counted on? What is the pollution potential of such new power stations? How much new transmission line right-of-way would be needed? Where would the lines be? How much forest land would be permanently withdrawn from production for this purpose?

LEGAL AND REGULATIONS PROBLEMS

1. What modifications of state, federal or local laws or zoning and environmental regulations have already been made to accommodate this industry? For what specific areas?

2. What additional modifications of such laws or regulations are being, or have been considered, by your agency?

3. What additional legal or regulatory changes would be required to permit this industry to operate?

4. What additional permits, licenses, leases or other legal steps must the industry obtain or take before any operations can commence? What would be the timing and sequence of such steps? (A response is needed from each agency involved).

5. What water rights would be required by firms developing these potential ores?

6. Who would determine this, what legal steps would be required and what agency or agencies would control the water levels?

7. Exactly what air and water quality standards have to be met by this industry? What is the relation of such standards to present knowledge of the toxicity of sulfur oxides, heavy metals, and other pollutants to the native trees, shrubs, herbs, aquatic plants, fish, and wildlife of the region? What is their relation to human health?

SOCIAL AND ECONOMIC QUESTIONS

We are concerned about both the present residents of the potential impact region and any new residents that might be supported by such an industry. We are also concerned about future generations. Many questions require answers before the true impact of this development would be clear. Some examples are:

1. What would be the impact on human health, both for local residents and the occasional recreational user?
 - a. Would the waters of the Kawishiwi River and lake system remain potable, even with boiling or chlorination?
 - b. Would the flesh of the fish in the Kawishiwi River and lake system remain safe for human consumption, or would the accumulation of heavy metals render it unfit for use?
 - c. Would increased noise levels erode the quality of life in some areas? Where?
 - d. Would smelter fumes and other gas emissions pose health or nuisance problems?
 - e. How would enforced changes in recreational patterns (such as crowding more people into the remaining wilderness) affect the quality of life for residents and visitors?

2. How many new jobs would be created, and how many lost?
 - a. When would new jobs appear?
 - b. What kinds of skills are needed?
 - c. Are such skills available among the present unemployed or underemployed of the area?
 - d. For how long would specific jobs last?
 - e. Where would employees with the needed skills come from?
 - f. Where would they live?
 - g. What kinds of jobs might be lost due to proposed operations? Canoe outfitting? Resort operation? Timber harvesting and processing?
 - h. For how long would such losses persist?
3. What would be the impact on municipal facilities of any population increase?
 - a. New sewage disposal plants or expansions?
 - b. New schools?
 - c. New roads?
 - d. New public utilities?
 - e. Who would pay for new facilities?
 - f. Could the Burntside River meet the increased water needs of a larger population in Ely?
 - g. Could Shagawa Lake handle the increased sewage load?
4. What royalties or other compensation would be paid for the use of public lands and/or minerals? (This should include compensation for all lands destroyed for other purposes as well as the lands or minerals directly used by the industry).
5. What compensation would be paid to private landowners whose property or land values were adversely affected?
6. Will there be an honest attempt to look at the long term vs. short term trade-offs in jobs and quality of life for the region and nation? (Or will the time-frame be only 20 to 50 years?)

7. What alternative sources of employment for present unemployed or underemployed residents of the region are there? (Intensification of timber management outside the wilderness area? Intensification of wildlife management outside the wilderness? Improved management of the BWCA itself? Non-polluting high-skill manufacturing, such as electronics components, canoe manufacture, fishing tackle manufacture, packsack and tent manufacture, and many others?)

CONCLUSION

We are asking for serious consideration of these questions now, before further commitments of public resources or responsibilities are made to this industry. Once firm decisions to proceed have been made and the formal Environmental Impact Statement process begins, the public is too often locked out of the discussions until nothing but litigation can prolong the decision-making process. Such an approach is costly to all concerned, and not a desirable way to resolve important public questions. We ask you to open up the discussion now, to inform the public of plans and options, and to seek wide public participation in these important matters. To do other than that at this point in history would surely demonstrate that we have learned nothing from the great environmental awakening that swept the world in the past decade.

The decisions to develop or to forego these low-grade base metal ores, or how to develop them if indeed they should be developed, could well be among the classic environmental decisions of our time. These are decisions that involve potentially irreversible commitments of precious resources. They are also commitments that will be binding on our children, grandchildren, and on unborn generations to come. Their options for a quality environment and diversity of human experience could be severely limited by short-sighted and hasty actions now. The copper-nickel sulfides of the Duluth Gabbro have lain in the earth for a long time, and there is no real need for haste now. If these minerals have some positive value now, that value could increase, or it could disappear in future years. There is time for responsible and even-tempered public discussion of society's options. It would be folly to close off such discussions now by proceeding toward a legal confrontation. Will you tell us how our questions and concerns can be answered and cooperate in establishing the public forums for the necessary dialogues?

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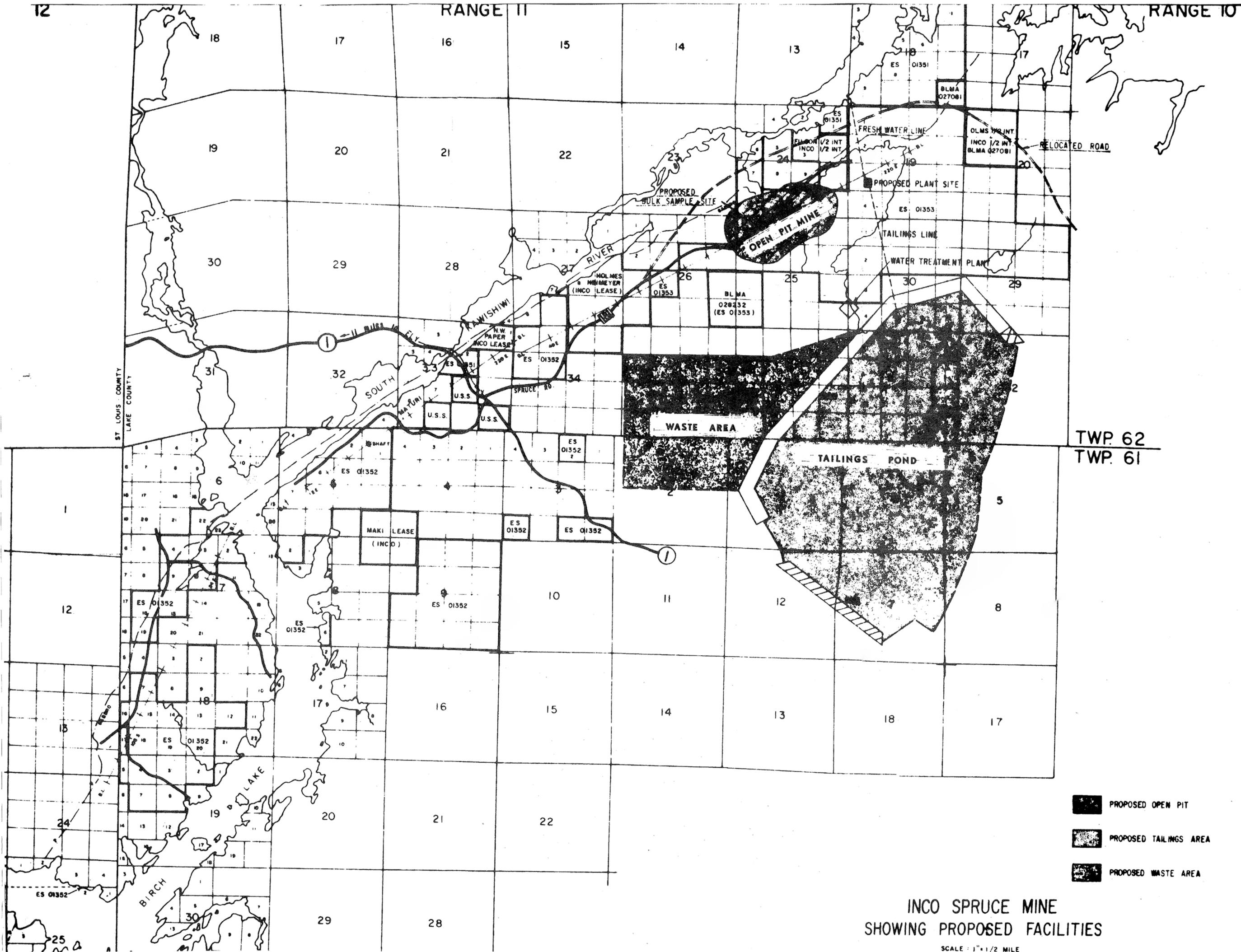
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The following map depicts INCO's original proposal for mining development. Although the mine site is fixed, location of tailings and wasterock disposal areas are not.

Alternative location for these facilities will be evaluated when the base operating plan is submitted by INCO.

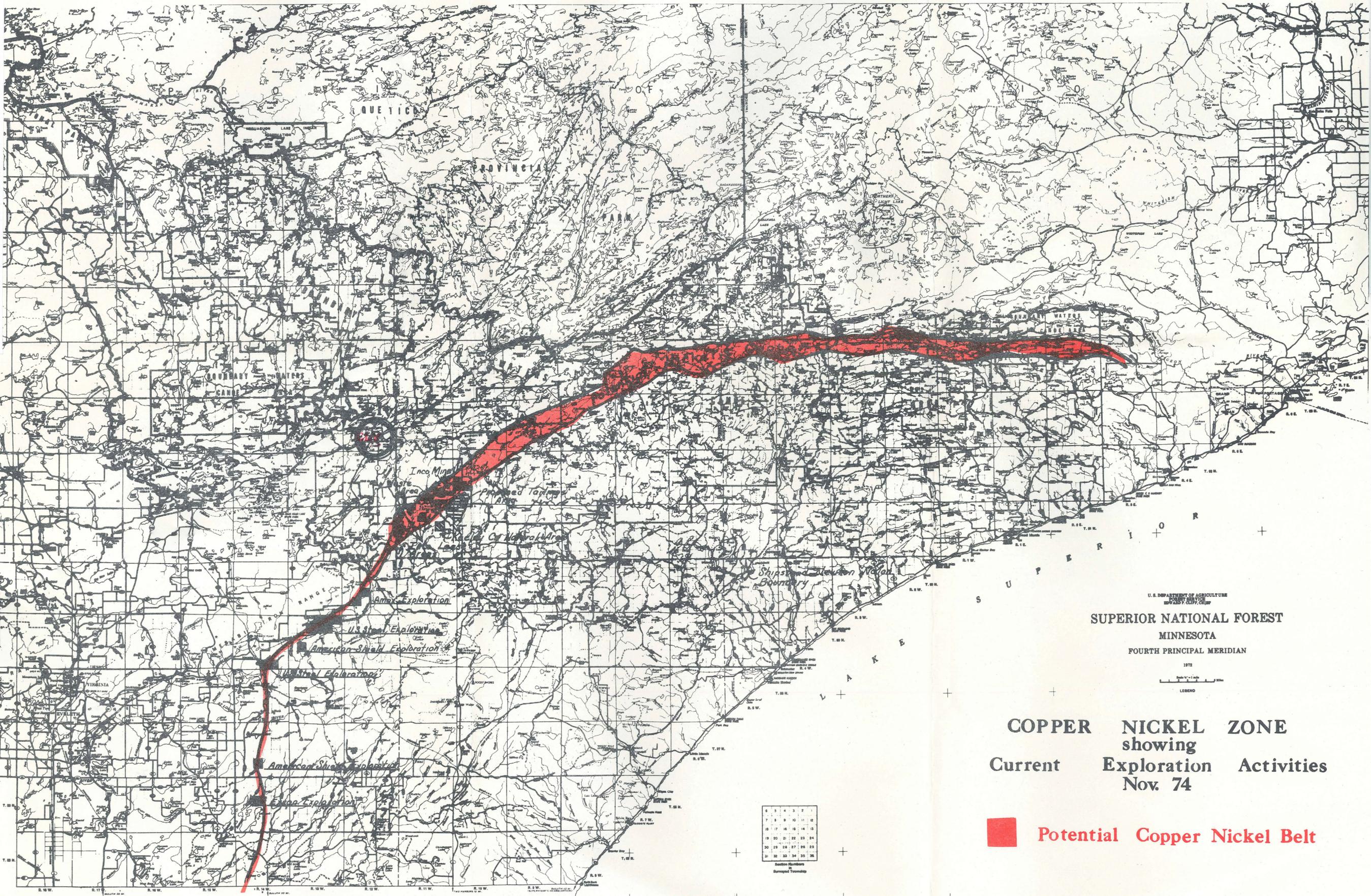


TWP. 62
TWP. 61

- PROPOSED OPEN PIT
- PROPOSED TAILINGS AREA
- PROPOSED WASTE AREA

INCO SPRUCE MINE
SHOWING PROPOSED FACILITIES

SCALE: 1" = 1/2 MILE



U.S. DEPARTMENT OF AGRICULTURE
 FOREST SERVICE
 EDWARD T. CLIFF, CHIEF

SUPERIOR NATIONAL FOREST
 MINNESOTA
 FOURTH PRINCIPAL MERIDIAN

1972
 Scale 1" = 1 mile
 LEGEND

COPPER NICKEL ZONE
 showing
 Current Exploration Activities
 Nov. 74

■ Potential Copper Nickel Belt

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40

Section Numbers
 Developed Township