FINDING OF NO SIGNIFICANT IMPACT

for the

NORTHWEST AREA WATER SUPPLY PROJECT

in

NORTH DAKOTA

Bureau of Reclamation
Great Plains Regional Office
Dakotas Area Office
Bismarck, North Dakota

FONSI No. DK-600-97-03

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Introduction

This finding of no significant impact (FONSI) describes the Bureau of Reclamation's environmental conclusions regarding the proposed Northwest Area Water Supply Project (Project) in North Dakota. Environmental effects of the proposed Project and alternatives were evaluated under the provisions of the National Environmental Policy Act (NEPA), and are documented in a Final Environmental Assessment (EA) dated April 30, 2001. The proposed Project would be constructed through the Garrison Diversion Unit's Municipal, Rural, and Industrial (MR&I) Water Supply program, as authorized by the United States Congress in the Garrison Diversion Unit Reformulation Act of 1986. This Act authorized the appropriation of $200 million in Federal funding for the planning and construction of water supply facilities throughout North Dakota.

The purpose of the proposed Project is to provide a reliable source of high quality water to northwestern North Dakota for MR&I uses. Planning activities for the Project, including public involvement and interagency coordination, have been underway for over a decade, beginning with a 1987 survey of potential Project users to assess interest and need. In 1991, the North Dakota Legislative Assembly passed a law (NDCC 61-24.6) creating a Northwest Area Water Supply Advisory Committee, and gave its full support to development of the Project. The Advisory Committee includes representatives of municipalities, rural water associations, water resource districts, and the Three Affiliated Tribes. The law gives the North Dakota State Water Commission full authority to design, construct, and operate the Project.

A Draft EA was completed for the proposed Project in June, 1997, and a thirty day review period was provided by Reclamation to allow for public comment. Copies of the Draft EA were distributed to agencies, organizations, and individuals with an interest in the Project. Three public meetings were held during the review period in communities within the proposed Project service area. All comments received on the Draft EA were considered and addressed during preparation of the Final EA, which was completed on April 30, 2001. The Final EA includes a full description and evaluation of three action alternatives and a no action alternative for the bulk water distribution system, and three options for intake structures at either Lake Audubon or Lake Sakakawea. It also describes and evaluates an option for pre-treating Missouri River water before it is transported to the Hudson Bay basin.

On May 18, 2001, a FONSI for the proposed Project was signed by the Dakotas Area Manager and distributed to parties of known interest. On July 12 and 13, 2001, the Area Manager's decision to sign the FONSI was appealed to the Great Plains Regional Director by three parties. These appeals were made under Regional procedures established on July 27, 1995, as part of a delegation of authority for NEPA compliance to Area Managers. After thorough consideration of the issues raised in the appeals, including additional review of the Final EA and FONSI for the proposed NAWS project, the Regional Director concluded that the Final EA complies with applicable laws, regulations, and policies, and provides an adequate foundation upon which a

FONSI/EIS decision can be based. However, the Regional Director determined that the May 18, 2001 FONSI was deficient in that it did not properly articulate all criteria that must be considered when making a FONSI/EIS determination, and remanded the FONSI to the Area Manager for reconsideration.

This revised FONSI replaces the May 18, 2001 FONSI and constitutes Reclamation's final decision with respect to NEPA compliance for the proposed Project. No further opportunity for appeal or administrative review of this decision is available.

Proposed Action

The proposed action is to construct an integrated, bulk water distribution system which would deliver pre-treated Missouri River water to an upgraded, final treatment facility at Minot, North Dakota, from which finished water would then be delivered to 16 communities and rural water systems: Berthold, Bottineau, Bowbells, Columbus, Minot (including the Minot Air Force Base and the North Prairie Rural Water Association), Mohall, Noonan, Sherwood, Souris, Westhope, Willow City, All Seasons I, II, and III, and Upper Souris I and II. In addition, existing water systems would be upgraded for 3 other communities (Grenora, Parshall, and Wildrose) which would remain independent of the integrated system. (See Figure 1-1)

The proposed integrated system would have one intake at either Lake Sakakawea or Lake Audubon on the Missouri River; a pre-treatment facility at the intake or the Max booster pump station; an upgraded, centralized, final treatment plant at Minot; eight storage reservoirs; 13 pumping plants; and 304 miles of distribution pipelines. The pre-treatment facility would disinfect raw water drawn from the Missouri River to provide for biota transfer control through 3-log and 4-log inactivation of *Giardia* and viruses, respectively, prior to reaching the continental divide separating the Missouri River and Hudson Bay basins. Additional mechanical/structural features and operational procedures would be implemented to provide additional safeguards for the prevention of biota transfer between river basins.

The proposed Project was identified as the preferred alternative in the Final EA, based on capital costs for both an integrated system and individual treatment systems. Additional information regarding the proposed Project and alternatives can be found in the Final EA, pp. 13-35.

Potential for and Mitigation of Effects from the Proposed Action

During the environmental review process, numerous potential effects from the proposed action (sometimes called *issues*) were identified, either by members of the general public, other agencies, or Reclamation staff. Reclamation used potential effects to help focus the

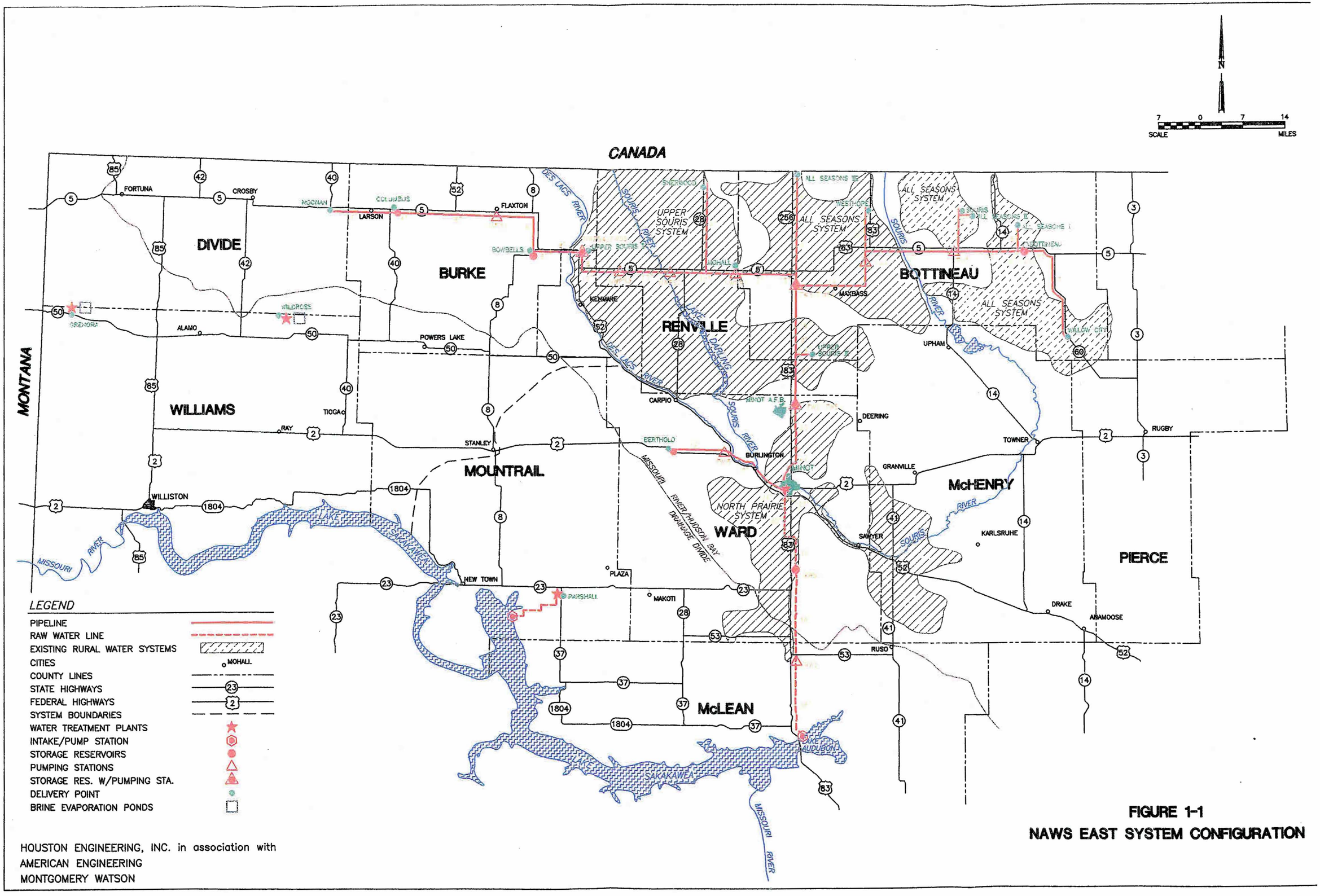

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FIGURE 1-1
NAWS EAST SYSTEM CONFIGURATION

environmental review process, to structure the content of the Draft and Final EAs, and to identify opportunities for mitigating or avoiding adverse effects from the proposal.

The Final EA identifies a number of project design features and other mitigation measures which will avoid, reduce, or eliminate adverse environmental effects which may otherwise result from construction and operation of the proposed Project. Reclamation, through cooperation with the State of North Dakota, the Garrison Conservancy District, and other appropriate parties, is committed to full and proper implementation of such features and measures, as described below. These are organized according to the principal environmental concern which would be addressed by each feature or measure; however, many features or measures would benefit multiple environmental resources and values.

To aid in implementing these environmental commitments, an Impact Mitigation Assessment team will be formed to monitor the final design, construction, mitigation and operation of the proposed Project. The Impact Mitigation Assessment team will be composed of environmental specialists from Reclamation, the State Water Commission and other project sponsors, consulting engineers, U.S. Fish and Wildlife Service and the North Dakota Game and Fish Department. When construction takes place on lands administered by other agencies or on Tribal or private lands, other specialists and/or landowners will be invited to become members of the team for that part of the construction affecting them.

Prior to annual construction activities, the Impact Mitigation Assessment team will review Project work plans and recommend specific modifications or other measures to avoid, reduce, or eliminate any construction impacts which would otherwise occur. After each construction season is completed, a review of newly-constructed facilities will be undertaken by the Impact Mitigation Assessment team to determine if any impacts have occurred in order to enter mitigation requirements into the Bureau of Reclamation's Garrison Diversion Unit (GDU) ledger. Project impacts, mitigation and other recommendations of the Impact Mitigation Assessment team will be entered on a ledger for ongoing resolution prior to project completion. Mitigation will be on an acre-for-acre basis, based on ecological equivalency, and will be completed concurrently with project construction. Any changes in the construction program warranting additional NEPA review or other environmental compliance will be addressed by the Impact Mitigation Assessment team.

Additional information regarding environmental effects and mitigation measures can be found in the Final EA, pp. 39-117 and 122-138.

1. Geology, Topography, and Soils

The potential for impacts to geologic, topographic, and soil resources is discussed in the Final EA on pp. 40-44. Potential effects include minor soil disturbance and displacement during construction activities, short-term soil erosion and reduction in soil productivity, and temporary

effects to prime farmland totaling approximately 1,604 acres. Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Pipelines will be constructed adjacent to existing highways and roadways where practical. Pipelines may be constructed within roadway rights-of-way when it presents advantages.

- Topsoil will be stripped and respread on pipeline corridors, pump station sites, and all rights-of-way, except when the pipeline is installed by a trencher or plow. Where topsoil depth exceeds 12 inches, the top 12 inches will be salvaged. Gravel may be placed around the edge of pump stations and storage reservoirs to control weeds.

- Compacted areas will be chisel plowed and large rocks will be removed to develop a good seed bed.

- Compaction of trench backfill will be ensured to prevent settlement for mainline segments. The line will be inspected after one year to check for subsidence and correct subsidence problems where these occur.

- Soil will be mounded over the trench of small diameter pipelines (approximately six inches or less). One year will be allowed for settlement, following which the trench will be graded to match existing topography.

- To the extent possible, all excavated material from streams or wetlands will be placed above the high water mark when water is present. Where not possible, the placement of soil materials in streams or wetlands will be minimized.

- Erosion control measures will be employed where necessary to reduce wind and water erosion.

- Pipeline segments requiring special reclamation efforts will be identified during final design utilizing soils maps and field survey data.

- The placement of permanent facilities on prime (important) farmland will be avoided where possible. Where prime farmland is removed, a farmland conversion rating form (AD-1006) will be completed and processed through the Natural Resource Conservation Service.

- Construction areas will be wetted during dry conditions to control dust.

2. Water Resources

The potential for impacts to water resources is discussed in the Final EA on pp. 45-52. Potential effects include a reduction to flows in the Missouri River, construction impacts where pipelines would cross streams, and a reduction in demands on the Minot and Sundre aquifers. The latter effect, while not readily quantifiable, would be beneficial in that it would reduce the current hydrological gradient away from the Souris River, potentially to the point where the Souris River would again be supplemented by the groundwater system. Potential effects involving biota transfer are addressed separately in the Final EA and in this FONSI.

Construction impacts at stream crossings would be minor and short-term. Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Directional bore techniques will be used under perennial streams. At flowing intermittent streams, directional boring will be used whenever practical. The contractor will be required to make at least two boring attempts before using an alternative crossing method. Where it is not practical to bore, open cut construction will be used to cross intermittent streams.[1] Construction will be initiated when the streams are dry whenever practical. Standard reclamation practices will be used to reclaim vegetation and minimize erosion.

- Silt barriers or fabric mats will be placed on slopes where necessary to reduce movement of sediments into stream channels.

- Discharges of fill material at stream crossings will be avoided, as specified under provisions of Section 404 of the Clean Water Act.

- Contamination of water at construction sites from fuel spillage, lubricants, and chemicals will be prevented by following safe storage and handling procedures and North Dakota Department of Health guidelines.

- No structures will be placed in any flood plain where such structures would interfere with the movement of flood water.

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[1]The Impact Mitigation Assessment team would review the engineer's construction specifications for intermittent stream crossings in consultation with agencies who have jurisdiction. The Impact Mitigation Assessment team would make recommendations for specification changes to minimize impacts where necessary.

With respect to the significance of withdrawals from the Missouri River that would be caused by operation of the proposed Project, the Final EA (p. 51) provides the following information:

> A combined system using groundwater and pre-treated Missouri River water would conserve groundwater resources and make maximum use of Missouri River water. Ninety-four percent of the water would come from the Missouri River, approximately 9,810 acre-feet annually; this amounts to approximately 0.06 percent of the annual Missouri River flows at Garrison Dam.

In summary, the incremental effect of the proposed Project withdrawal on flows in the Missouri River will not be measurable at or below Lake Sakakawea.

3. Vegetation

The potential for impacts to vegetation resources is discussed in the Final EA on pp. 52-61. Potential effects include minor, localized losses of overstory vegetation associated with shelterbelts and wooded draws, the temporary loss of a variety of vegetative types during project construction, and the permanent loss of vegetation where pumping stations, storage reservoirs, and brine ponds are constructed. A total of approximately 4,057 acres would be temporarily affected by construction of the proposed Project. Permanent vegetation losses would involve less than 21 acres.

Impacts to vegetation resources would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Topsoil will be stockpiled and respread on all project areas. Topsoil will be recovered to the fullest extent possible.
- Trenches will be backfilled after pipe installation.
- Re-topsoiled areas will be treated with a disc or chisel plow to reduce compaction created by heavy equipment and to prepare the seedbed.
- Disturbed native grassland will be reseeded with native species; the appropriate seed mix will be determined during final design. Planted grassland will be reseeded with a seed mixture appropriate for the site.
- Noxious weeds will be controlled, as specified under State law, within pipeline corridors during and following construction.

- Herbicides will be applied in accordance with labeled instructions and State, Federal and local regulations.

- Efforts will be made to work with landowners to defer grazing on newly seeded areas for a minimum of two years.

- Where shelterbelts, riparian woodlands, or woodland vegetation cannot be avoided, trees will be replaced and replanted off-site at a ratio of two trees planted for each tree lost.

- Weed growth in tree plantings will be controlled for three years.

- Tree plantings will be monitored for three years and grass plantings for one year. Where plantings do not adequately catch, they will be replanted with appropriate species.[2]

4. Wildlife

The potential for impacts to wildlife resources is discussed in the Final EA on pp. 61-65. The principal effect would be localized, temporary disturbance of wildlife and wildlife habitat resulting from project construction. Approximately 7.5 acres of habitat would be permanently lost from the construction of permanent facilities. Lost habitat would be replaced as determined by the Impact Mitigation Assessment team and in accordance with agreements with landowners and appropriate land managing agencies.

Impacts to wildlife resources would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Native and tame grasslands will be restored as noted in the preceding section.

- Native woodlands and shelterbelts will be replanted as noted in the previous section.

- Sharp-tailed grouse dancing grounds will be avoided from April to mid-May.

- Electrical power lines to any facilities associated with the proposed Project will be constructed according to "Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 1981" (Olendorf et al. 1981) to the extent practicable.

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[2]The Impact Mitigation Assessment team would inspect tree and grass plantings to determine when it would be necessary to replant.

5. Fisheries

The potential for impacts to fisheries is discussed in the Final EA on pp. 65-70. Potential effects involve increases in sedimentation and disruptions to stream flows during construction at stream crossings, reductions to flows in the Missouri River, entrainment of fish eggs, larvae, and small aquatic organisms through the intake structure, and the potential for accidental spills of pre-treated water if a pipeline break were to occur near an intermittent or perennial stream.

As previously noted, construction impacts at stream crossings would be minor and short-term, and the incremental effect of the proposed Project withdrawal on flows in the Missouri River will not be measurable at or below Lake Sakakawea. Impacts from accidental spills of pre-treated water, while possible, are highly unlikely given the design features and mitigation measures which will be implemented during construction, operation, and maintenance of the proposed Project. The entire pipeline system will be monitored with a computerized data acquisition system to enable quick detection of any pipeline rupture and minimize the amount of water released.

Entrainment and stream crossing impacts, in particular, would be minimized or eliminated through the following design features and mitigation measures incorporated into the proposed Project:

- Water intakes will be protected with a screen of no greater than one-quarter inch (¼") mesh opening to minimize fish mortality.
- Intake structures will be designed with maximum inlet velocities of 0.5 feet per second or less.
- Construction across streams will be avoided during periods of high flow and aquatic spawning.
- In-stream flows will be maintained where possible during construction of stream crossings.

6. Interbasin Biota

The potential for interbasin biota transfer is addressed in the Final EA on pp. 70-80. Interbasin biota transfer is defined as the transfer, through man-made structures as well as through natural processes, of life forms from one watershed or drainage basin to another. The proposed Project would move pre-treated water from the Missouri River basin to the Hudson Bay basin. The

potential transfer of non-native biota from the Missouri River basin into the Hudson Bay basin via the Souris River and its tributaries is the specific concern associated with the proposed Project.

As discussed in the Final EA, the sponsors and cooperators for the proposed Project, as well as the governments of Canada and the United States, recognize the importance of maintaining a barrier to biota transfer between the two drainage basins. Since 1981, numerous international committees and groups have been formed to address this issue at both a policy and technical level.

In December 1993, the State of North Dakota requested that the Garrison Joint Technical Committee evaluate the transfer of untreated water via pipeline for treatment at an upgraded Minot water treatment plant as part of planning for the proposed Project. The U.S.-Canada Consultative Group appointed a joint Engineering-Biology Task Group to evaluate the proposal "...and provide a technical recommendation to the Garrison Joint Technical Committee with respect to the potential for violation of Article IV of the Boundary Waters Treaty." This joint Engineering-Biology Task Group submitted its report, *Northwest Area Water Supply, Engineering-Biology Task Group* [Canada/United States Joint Technical Committee, Engineering-Biology Task Group 1994], to the Garrison Joint Technical Committee in April of 1994. The six findings presented in this report are:

> "1. A number of pathways exist by which biota transfer has occurred, may be occurring, or could occur even without the completion of the NAWS. These pathways include, but are not limited to, the following: Approved transfer or introduction by fisheries management agencies, unauthorized or accidental introduction, accidental or deliberate introductions from bait buckets and live wells, or from boat bilges or boat hulls. While extensive efforts are being made to control these pathways, a residual probability remains that biota transfer may/could occur through one or more pathways;
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> "2. Only the East System of the NAWS Proposal is of concern relative to biota transfer to the Hudson Bay drainage. The Parshall and West Systems would be served by water treated to drinking water standards within the Missouri River drainage;
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> "3. The East System of the NAWS project, whereby Missouri River water would be distributed in the Hudson Bay drainage, has the potential to transfer Missouri drainage biota to the Hudson Bay drainage. The most acceptable method of fully overcoming this would be to treat the water to acceptable drinking water standards prior to its transport into the Hudson Bay drainage;

"4. The Task Group found that all pipeline options had a relatively low risk of transferring biota to the Hudson Bay drainage if they included chloramination at the source of the pipeline to control slime growth. As shown in Table S-1, the relative risk of biota transfer decreased with the addition of safeguards. The cost of options increased with the magnitude of the safeguards.

"5. Because of the consequences of a pipeline failure, operation, maintenance, and replacement must ensure the integrity of the pipeline for its entire operational life;

"6. If chloramination within the Missouri River drainage proves to be effective in addressing biota transfer concerns, standard engineering practices for construction, maintenance, and replacement could be followed."

Table S-1 Comparison of Options

Biota Transfer Risk Reduction Option (RRO)	Risk	Incremental Cost[1] ($1,000's)	Total Cost ($1,000's)	Annual O&M Cost
OPTION O: Minot treatment only	MEDIUM	$ 0	$ 10,850	$ 975,000
OPTION 1: Minot treatment, chloramination	LOW	$ 650	$ 11,500	$ 1,020,000
OPTION 2: Minot treatment, chloramination, blow off containment structures, extra signing, motor operated mainline valves, welded pipe, WTP [Water Treatment Plant] containment, and WTP flood control	VERY LOW	$ 4,700	$ 15,550	$ 1,120,000
OPTION 3: Option 2 + rupture containment system	EXTREMELY LOW	$ 10,550	$ 21,400	$ 1,150,000
OPTION 4: Phased Development[2]	VIRTUALLY NONE[3]	$ 5,700	$ 16,550	$ 1,380,000
OPTION 5: Full supply treated at source	VIRTUALLY NONE[3]	$ 10,850	$ 21,700	$ 1,005,000

[1] Incremental cost is the cost of the risk reduction option minus the cost of treatment at Minot alone ($10.85 million, Option O in table).

[2] Phased development combines a 20.5 MGD treatment plant at source and 8 MGD treatment at Minot. Treated water is mixed in Minot WTP for treatment, or is "decontaminated," or is disposed of in the Missouri drainage.

[3] Provided that treatment is adequate to address biota transfer concerns.

"The likelihood of failure of the East System could be reduced through the adoption of the following measures:

♦ identify one agency responsible for operating and maintaining the entire system;

♦ all raw water captured in containment structures, which would not meet the 50-day seepage travel time criteria, is either transferred into the Minot WTP for treatment, or is "decontaminated," or is disposed of in the Missouri drainage;

♦ Minot WTP sludge is handled in such a manner that incidental or accidental discharge to the Souris River is not possible;

♦ all structural components are monitored, maintained, and repaired as called for in the original designs;

♦ disinfectant residual is monitored and maintained to the original design standard, and other water quality standards will be monitored.

The U.S.-Canada Consultative Group considered and accepted the findings of the Engineering Biology Task Group during a joint meeting of the Garrison Joint Technical Committee and the Consultative Group on September 23, 1994. The Consultative Group did, however, conclude that a study of the effectiveness of the proposed chloramination process be undertaken.

Based on this conclusion, the North Dakota State Water Commission initiated the NAWS Chloramine Challenge Study in the fall of 1994. The purpose of this study was to investigate the effectiveness of chloramination for disinfection and pre-treatment of Missouri River water. With concurrence of the Garrison Joint Technical Committee, ozonation was added to the study in the spring of 1995.

Montgomery Watson engineers conducted the challenge study and developed the experimental protocols for microbial inactivation using chlorine/chloramine and ozone. The chlorine/chloramine protocols included both *Giardia* and MS2 Bacteriophage inactivation experiments. The ozone protocols were developed for *Giardia* inactivation. Following are excerpts from the summary (Section 5) of the *Chloramine Challenge Study* [Houston Engineering et al. 1995b].

> "This study demonstrated that chloramine could be employed for disinfection of Lake Audubon water. Four logs of MS2 virus were inactivated in less than 30 seconds of free chlorine contact time with a residual between 3.5 mg/L and 4.0 mg/L. However, 5 minutes of free chlorine contact time are recommended as a margin of safety. *Giardia* inactivation experiments showed that with a dose of 4.5 mg/L and 5 minutes of free

chlorine contact time followed by ammonia addition to form chloramine, greater than 3 logs of inactivation were achieved in less than 180 minutes. Under these conditions, the contact time for inactivation is approximately one half of the residence time in the pipeline to the divide (5.9 hours) corresponding to the peak daily flow of 28 mgd....

"This study also demonstrated that ozone could be employed for disinfection of Lake Audubon water. Greater than 3 logs of *Giardia* inactivation were achieved in approximately 4 minutes at doses greater than or equal to 0.3 mg/L ozone at 4°C. Inactivation continued to occur despite the consumption of ozone residual. Although inactivation of viruses by ozone was not investigated at bench-scale, viruses are more sensitive to ozone than protozoan cysts; therefore, virus inactivation requirements would be met if 3 logs of *Giardia* inactivation is achieved by ozone treatment."

Details of the study are contained in the *Northwest Area Water Supply Project, Chloramine Challenge Study, Final Report* [Houston Engineering et al. 1995b]. This study report was subsequently presented to the Garrison Joint Technical Committee in January 1996.

The proposed Project includes numerous, significant design features and operational measures which collectively have been determined to provide for a very low risk of biota transfer. These include the following:

- Raw water from the Missouri River will be pre-treated near the intake site or the Max booster pump station with either ozone or chlorine/chloramine. A chloramine residual will be maintained in the pipeline for biofilm control. Pre-treatment will be sufficient to meet the disinfection requirements of 3-log and 4-log inactivation of *Giardia* and viruses, respectively.

- Water quality of the raw water sources will be monitored to determine seasonal changes in water quality and how that may affect disinfection strategies.

- A long-term water monitoring plan will be developed to assess the effectiveness of pre-treatment in meeting the disinfection requirements of 3-log and 4-log inactivation of *Giardia* and viruses, respectively.

- Final design plans and construction specifications for the pre-treatment and delivery systems will be provided to the Garrison Joint Technical Committee prior to the awarding of their respective construction contracts.

- A long-term operation, maintenance, and replacement plan will be provided to the Garrison Joint Technical Committee for review, prior to the system becoming operational.

- The pre-treated water reservoir and the pressure reducing valve (PRV) vault within the Hudson Bay basin will incorporate isolation valves. Three additional automated isolation valves will be incorporated in the design of the pipeline within the Hudson Bay basin to reduce volumes of water released in the event of a pipeline failure. These will be located approximately at pipeline stations 2377+60, 2480+40, and 2527+20.

- Sludge resulting from the filter backwash and softening clarification processes at the Minot Water Treatment Plant will be either treated to inactivate disinfectant resistant pathogens or transported for disposal at an appropriate disposal facility. Disposal of sludge within the Minot municipal waste landfill (RCRA subtitle D landfill) is acceptable provided the sludge is placed within lined cells, covered daily with soil, and the leachate from the landfill is not discharged into a waterway within the Hudson Bay basin. Disposing of sludge leachate in the city sewage treatment system will not be allowed. Any sludge from the leachate collection system will also be placed in the lined cell at the landfill. Landfill disposal within the Missouri River basin will be explored as an alternative. The annual monitoring, operational and maintenance report to the Garrison Joint Technical Committee will include information to verify compliance with this commitment.

- An emergency response plan with special emphasis on potential biota transfer issues will be provided to the Garrison Joint Technical Committee, prior to the system becoming operational.

- The State of North Dakota, through the State Water Commission, will provide an annual monitoring, operation, and maintenance report to the Garrison Joint Technical Committee.

- The State of North Dakota, through the State Water Commission, will assume ultimate responsibility for the operation, maintenance, and replacement of the pre-treatment and delivery system.

- The State of North Dakota, through the State Water Commission, will implement the recommendations of the Biota Transfer Control Measures Report (Houston Engineering et al, 1998) and the Biota Transfer Control Measures Report Update (Houston Engineering and Montgomery Watson, 2001), and refinements thereof during the detailed design of the facilities, and during startup of operations. These reports consolidate the

results of studies, findings, process recommendations and management plans for biota transfer control, and include a number of pre-final design elements identified in the Final EA (p. 77).

- The State of North Dakota, through the State Health Department, will assume responsibility for Safe Drinking Water Act compliance monitoring for the raw water disinfection system.

- The Garrison Joint Technical Committee, or its representatives, will be permitted to inspect the system and examine the records at any time.

- The State of North Dakota, State Water Commission, and the NAWS Advisory Committee will continue to provide project updates to the U.S.-Canada Consultative Group as the project moves into final design phase.

Based on the implementation of these design features and operational measures, the Final EA concludes on p. 80 that the risk of interbasin biota transfer resulting from the proposed Project would be very low. Given a finding of very low risk, the effects of the proposed Project with respect to biota transfer are reasonably certain and do not involve unique or unknown risks. The proposed Project involves the use of standard engineering, construction, water treatment, and system operation and maintenance methods and techniques. These methods and techniques address the types of human health and safety, water quality, biota transfer, and other environmental and engineering concerns commonly faced by any project intended to treat and deliver water for MR&I purposes.

7. Threatened and Endangered Species

The potential for impacts to threatened and endangered species is discussed in the Final EA on pp. 80-84. Potential effects are similar to those described above for wildlife and fisheries in general. Table 12 in the Final EA (p. 81) identifies all Federally-listed species known to occur, or which could possibly occur, in the eight-county Project area.

Any potential effects to listed species, including those which may be identified during final design and construction, would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- The Impact Mitigation Assessment team will review the final location of the pipeline and other facilities and determine if additional field surveys are needed to determine the occurrence of listed species.

- If it is determined that the final design may affect listed species, the U.S. Fish and Wildlife Service will be consulted as required by the Endangered Species Act.

- Known locations of piping plover habitat and saline lakes will be avoided.

- If threatened or endangered species are encountered during construction, all ground disturbing activities in the immediate area will be stopped immediately until Reclamation can consult with the U.S. Fish and Wildlife Service to determine appropriate steps to avoid any effects to these species, including cessation of construction in the area.

Based on these considerations, no adverse effects to threatened or endangered species are expected to result from construction, operation, or maintenance of the proposed Project.

8. Wetlands

The potential for impacts to wetlands is discussed in the Final EA on pp. 84-88. Potential effects include temporary disturbance and some permanent but replaceable losses. The overall acreage affected includes approximately 68 acres of semipermanent wetlands, 95 acres of seasonal wetlands, and 57 acres of temporary wetlands.

Most wetland impacts would be minor and short-term. Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Seasonal, semipermanent and permanent wetlands will be avoided where practical. Where they cannot be avoided, construction through seasonal, semipermanent, or permanent wetlands will be avoided until after July 15 where practical.

- Where large wetlands abut the road right-of-way, pipeline will be placed in rights-of-way where possible to reduce impacts.

- Locations will be noted and recorded before construction, with assistance from state, federal and local officials.

- Backfill will be placed in trenches to restore the impermeable layer where necessary.

- The use of diaphragms or cutoff collars will be used where soils and engineering evaluations indicate they are needed to prevent wetland drainage. [3]

- The placement of trench spoil material within wetland boundaries when wetlands are wet will be avoided if possible.

- Where existing wetlands cannot be reconstructed in their current location, wetlands will be created or restored on an acre per acre basis as defined by the Garrison Diversion Unit mitigation plan.

The Final EA (p. 132) notes that Section 10 and Section 404 permits must be secured from the U.S. Army Corps of Engineers before the proposed intake facilities and portions of the proposed pipeline can be constructed.

9. Historic Properties

The potential for impacts to historic properties is discussed in the Final EA on pp. 88-99. A two-mile wide corridor was evaluated for each proposed pipeline segment to develop baseline information and to estimate effects on these resources. A Class I literature review has been completed; however, some proposed facility locations have not been surveyed at a Class III level (intensive, pedestrian inventory). Additional inventory, analysis, and consultation with the North Dakota State Historic Preservation Officer and Tribes will be required after project designs are completed and pipeline centerlines are known.

Impacts to historic properties would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Upon determining pipeline alignments for each phase of construction, Reclamation will use the Class I file search to consult with the State Historic Preservation Office (SHPO) per 36 CFR Part 800.4 to determine which areas will require further Class III, pedestrian cultural resource inventories in the high and medium site potential zones. These inventories will be conducted by a qualified professional archaeologist and will be completed before construction of each phase begins. In addition, Reclamation will invite the appropriate tribal groups to participate in the consultation process.

[3]The Impact Mitigation Assessment team would review the engineer's construction specifications for wetland crossings in consultation with agencies who have jurisdiction. The Impact Mitigation Assessment team would make recommendations for specification changes to minimize impacts where necessary.

- Reclamation will consult with the appropriate Native American Tribes regarding the locations of and potential impacts to properties of traditional religious and cultural importance to Native Americans. If any such properties cannot be avoided and must be mitigated, Reclamation will invite the appropriate Native American Tribes to participate in the development of an appropriate treatment plan.

- Should any buildings, structures, sites, objects, or districts or properties of traditional religious and cultural importance be discovered that qualify as historic properties, Reclamation will consult with the SHPO to determine whether any qualify as historic properties and to determine the effects of construction activities on the properties per 36 CFR part 800.4 and 800.5. Reclamation will avoid affecting historic properties to the extent possible. If avoidance is not possible, Reclamation, in consultation with the SHPO, will determine appropriate mitigation measures. These measures would be instituted before construction begins, in compliance with the programmatic agreement between Reclamation, the Advisory council on Historic Preservation, and the North Dakota State Historic Preservation Office for the implementation of Reclamation undertakings in North Dakota.

- If unanticipated cultural resources are encountered during construction, all ground disturbing activities in the immediate area of the resource will be stopped until Reclamation can consult with the SHPO and appropriate Tribes and evaluate the resource per 36 CFR Part 800.13.

10. Paleontological Resources

The potential for impacts to paleontological resources is discussed in the Final EA on pp. 99-101. A literature and database search has been completed to determine the general types of paleontological resources present within the proposed Project area. Additional inventory, analysis, and consultation with the North Dakota Geological Survey will be required after project designs are completed and pipeline centerlines are known.

Impacts to paleontological resources would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Reclamation has entered into a cooperative agreement with North Dakota Geological Survey regarding paleontological resources. Under this agreement, North Dakota Geological Survey will provide Reclamation with the locations of all known fossil sites in the vicinity of the pipeline corridors.

- All previously recorded paleontological resources and paleontologically sensitive zones within the path of the proposed project will be inspected in the field by a qualified paleontologist. Avoidance measures will then be developed to avoid significant resources.

- Reclamation will consult with North Dakota Geological Survey about the need for paleontological survey of areas likely to contain significant fossils. Such surveys will be completed prior to project construction. Based upon survey data, Reclamation will consult with North Dakota Geological Survey about revising routes to avoid damaging significant fossil locations.

11. Social and Economic Conditions

The potential for impacts to social and economic conditions is discussed in the Final EA on pp. 101-103. Potential effects include improved human health resulting from the availability of high quality water to a greater number of people; improved economic opportunities and increased employment; and a general increase in the attractiveness and quality of life in areas served by the proposed Project.

Negative effects on social and economic conditions resulting from construction and operation of the proposed Project would be minor and localized. Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Members of the general public and local officials will be kept informed on the progress of the NAWS project through regular communication avenues.

- To the extent possible, local workers will be hired to construct and operate the Project to reduce the influx of people and demands on community services.

12. Land Use and Ownership

The potential for impacts to land use and ownership is discussed in the Final EA on pp. 104-109. Approximately 95 percent of the lands that would be affected by the proposed Project are privately owned and consist of farmland and rangeland. Other land uses in the area include oil and gas production, power, telephone, and other communications transmission, and general public use of public lands.

The main impact to land use on private lands would be a temporary loss of cropland, rangeland, and hayland during construction of the proposed Project, lasting until reclamation can be completed. Landowners would be compensated for losses through easement payments. Potential impacts to other land ownerships and uses would also generally be minor, temporary, and localized. Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Ownership maps will be prepared for use by all agencies, project sponsors and cooperators.
- Landowners to be affected by the construction of project pipelines and facilities will be contacted as early as possible during the development of final project designs.
- All existing utilities will be located prior to completion of final Project design and each utility operator will be notified.
- All gas and petroleum lines will be located and owners will be consulted about specific design precautions to be taken when crossing them.
- Companies and agencies will be consulted about crossing land underlain by mineable mineral deposits such as coal or gravel.
- Agencies and private owners will be consulted to ensure that the locations of project facilities do not conflict with current or future land use plans.
- EPA will be consulted to accurately delineate the locations of any hazardous waste sites.
- Landowners and agencies will be consulted about specific recommendations for restoration of their lands after construction.
- All fences will be repaired after Project construction, unless otherwise agreed to by the landowner.
- State and county highway departments will be consulted about the use of roadway rights-of-way as pipeline corridors and the type of crossings to be installed.
- The U.S. Air Force will be consulted to determine the locations of underground missile communication systems.

- Farming operations will not be interrupted once construction is completed and no permanent change of land use would occur after installation of the pipeline. Where valves would be located in cultivated areas, driveways, roads, or other high traffic areas, the valve box would be buried below the plow depth, or at a depth to clear road grader maintenance.

- Sewer crossings will be constructed in accordance with the North Dakota State Health Department requirements.

13. Indian Trust Assets

The potential for impacts to Indian trust assets is discussed in the Final EA on pp. 109-111. Indian trust assets are defined as legal interests in property held in trust by the United States for Indian Tribes or individuals. Potential effects to Indian trust assets could occur if proposed Project facilities would be located on trust lands, or if other trust resources would be affected by construction or operation of the proposed Project.

The proposed Project will not significantly affect any Indian trust assets, either through construction on trust lands or through the withdrawal and use of Missouri River water. However, should Tribes with an interest in Missouri River water pursue a settlement of their Winters Doctrine rights, such settlement(s) could potentially affect the waters available for the proposed Project.

Potential effects to Indian trust assets would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- For any portions of the system within the Fort Berthold Reservation and crossing trust lands, right-of-way easements for the pipeline will be secured according to 25 CFR Part 169 - Rights-of-Way Over Indian Lands. In part, this will require the consent of the landowner(s), with concurrence from the Bureau of Indian Affairs.

14. Aesthetics

The potential for impacts to aesthetic resources is discussed in the Final EA on pp. 111-112. Potential effects include visual and noise impacts. Most effects would be limited to the construction phase of the proposed Project, and would therefore be temporary and localized.

Such impacts would be minimized or eliminated through design features and mitigation measures incorporated into the proposed Project, including the following:

- Surface disturbance from construction of the proposed Project will be reclaimed (recontoured and revegetated) to minimize long-term scars on the land.

- Pipeline rights-of-way crossing native prairie will be reseeded with native species to reduce contrast between the rights-of-way and undisturbed native prairie.

- Facilities related to the proposed project will be built and maintained in conformance with local or county zoning and/or building requirements or restrictions. Tanks will be painted to blend in with the locale.

- Noise from system operation will be contained by installing all pumping equipment within buildings.

Findings

Given the implementation and effectiveness of proposed Project design features and mitigation measures described above and committed to by Reclamation, the State of North Dakota, and Project sponsors and cooperators, and based on Reclamation's analysis documented in the Final EA for the proposed Project, I find that all potentially significant environmental effects associated with the proposed Project, including localized Project construction effects as well as larger-scale operational effects to the Missouri River and Hudson Bay basins, have been identified, evaluated, and resolved or mitigated.

I also make the following additional findings:

1. The proposed Project will have no significant adverse effects on public health or safety. The proposed Project will benefit public health and safety by providing a safe, reliable source of high quality water to northwestern North Dakota for municipal, rural, and industrial uses.

2. Adverse effects to unique characteristics of the geographic area will be minor, and will consist primarily of short-term and/or localized impacts to prime farmland and wetlands. Features of the proposed Project will be located so as to avoid such important resources wherever possible.

3. By regulation (40 CFR 1508.27), the degree of controversy surrounding a proposal is one of many factors a Federal official should consider in determining the significance of environmental effects, and in making a FONSI/EIS decision. The proposed Project,

particularly because it involves the interbasin transfer of water from the Missouri River to the Hudson Bay basin, has been and remains a cause of disagreement and contention among affected interests. The nature of this disagreement and contention is reflected in the comments received on the Draft EA, and in Reclamation's responses to those comments (see attached Summary of Comments and Responses section). The controversy may be illustrated by a quote from a letter submitted by Manitoba Environment (an agency of the Province of Manitoba) on the Draft EA:

> *Both Alternative A and the Preferred Option pose a significant risk of accidental interbasin transfer of biota to the Hudson Bay drainage basin. This inherent danger is acknowledged in Section 6.0, page 112: "One of the greatest concerns for irreversible commitments of resources is interbasin biota transfer. Most often, when this occurs, the damage is not reversible". It is stated on page 66 that the project sponsors and cooperators "recognize the importance of maintaining a barrier to transfer of biota from the Missouri River basin into the Hudson Bay basin".*
>
> *However, there is a relatively high probability of accidental release of untreated or insufficiently treated Missouri River water to the Hudson Bay in during the expected lifetime of the project. Releases of biota not indigenous to the Hudson Bay basin could result in significant impacts that would not be mitigable. This is based on the following factors:*
>
> a) *There is insufficient evidence to demonstrate that all reasonable measures that represent standard good operating practices are proposed to ensure efficacious treatment of biota indigenous to the Missouri River basin, including known bacteria, viruses, protozoans, etc. For example:*
>
> 1) *Removal or inactivation of unknown non-indigenous biota such as undefined fish pathogens, is essentially equivalent to the application of treatment technologies to kill unknown or undefined human pathogens in drinking water treatment systems. To effect this result in water treatment, good operating practices dictate the use of a disinfectant of known adequacy, coagulation and settling, and filtration. For protection of human health, these three components must be in place, properly optimized and operated, followed by a rigorous monitoring protocol using suitable surrogates. However, both the Preferred Option and Option A propose only the use of a disinfectant. Because disinfectants may not inactivate some protozoans presently being more commonly encountered, such as Cryptosporidium, complete treatment,*

including filtration, is becoming the treatment technology of preference. Parallel or equivalent good operating practices intended to control unknown or undefined fish parasites or pathogens would dictate the application of complete treatment at the source, including filtration, proper operation and optimization, followed by rigorous monitoring to assure efficacy.

Reclamation responds to this comment in the following way:

The NAWS Engineering - Biology Task Group, and subsequently, the Garrison U.S./Canada Consultative Group, concluded that the risk of biota transfer of all options presented in the NAWS Engineering - Biology Task Group's report on the NAWS project dated May, 1994 was low. The Garrison U.S./Canada Consultative Group, in September 1994, concluded that Option 1 of the NAWS Engineering - Biology Task Group's report was technically feasible provided that the project proponent could satisfy the GJTC on several other points. One of the findings of the NAWS Engineering - Biology Task Group, contained in its 1994 report, was that "all pipeline options had a relatively low risk of transferring biota to the Hudson Bay drainage if they included chloramination at the source of the pipeline..." The assertion that there is a "high probability of accidental release of untreated or insufficiently treated Missouri River water to the Hudson Bay basin during the expected lifetime of the project" is contrary to the conclusions of the NAWS Engineering - Biology Task Group, the Garrison Joint Technical Committee, and the Garrison U.S./Canada Consultative Group.

The NAWS Engineering - Biology Task Group also concluded that additional safeguards would lower the already low risk of biota transfer associated with disinfection alone. These safeguards include: one agency responsible for operating and maintaining the entire system; transfer of all water captured in containment structures to either the Minot water treatment plant for treatment, decontamination, or disposal in the Missouri River drainage, handling Minot water treatment plant sludge in such a manner that accidental discharge to the Souris River is not possible; monitoring, maintaining and repairing all structural components as called for in the original designs; monitoring and maintaining the disinfection system to original design standards as well as monitoring other water quality parameters. These additional safeguards, as well as others, are being incorporated in the design of the NAWS project to minimize the potential for biota transfer.

a) We remain committed to the consultative process to ensure satisfactory provision of information referenced in conclusion 6(I.) of the September

23, 1994 conclusions of the Garrison U.S./Canada Consultative Group. A supplemental report, *Biota Transfer Control Facilities and Criteria*, addresses operating practices for the proposed pipeline, appurtenances, pretreatment facilities, and the Minot water treatment plant, with respect to biota transfer control. This report has been distributed to the GJTC for consideration.

I) The NAWS Engineering - Biology Task Group concluded (page 41, *NAWS Engineering - Biology Task Group, May 1994)* that the most acceptable method of fully overcoming the transfer of Missouri River basin biota into the Hudson Bay basin was to treat the water to acceptable drinking water standards prior to its transport into the Hudson Bay drainage. This report was published before a study was conducted to determine the effectiveness of disinfection with chloramine and ozone in addressing biota transfer concerns. The NAWS Engineering - Biology Task Group also concluded that if chloramination. (disinfection) within the Missouri River drainage proves to be effective in addressing biota transfer concerns, standard engineering practices for construction, maintenance, and replacement could be followed. The 1995 NAWS Chloramine Challenge Study showed that ozone or chlorine pretreatment of raw Missouri River water inoculated with a protozoan noted for its resistance to disinfection *(Giardia)* could achieve 3 logs or greater (99.9%) inactivation by the time water reached the continental divide. In September 1996, the Canadian section of the Garrison Joint Technical Committee expressed a preference for ozone pretreatment and encouraged the state of North Dakota to consider that option (Canadian section GJTC letter to George Malleck, September 6, 1996). Accordingly, ozone pretreatment has been incorporated into the preferred alternative to provide an additional level of protection against biota transfer.

Ozone has been found to be much more effective than chlorine in controlling *Cryptosporidium* and it should be noted that no fish diseases or parasites have been identified which are as resistant to disinfection as *Cryptosporidium*. The NAWS Engineering - Biology Task Group and the Garrison U.S./Canada Consultative Group only identified the disinfection requirements of the USEPA Safe Drinking Water Act, not the entire act, as the requirement for biota transfer pretreatment.

The issue of treating water for human consumption involves the Minot water treatment plant, which will provide multi-barrier treatment. Optimized treatment, proper operation, and monitoring are all a part of the requirements for the potable water supply.

In summary, notwithstanding the substantial amount of consultation, coordination, and collaboration with Canadian and other affected interests which has occurred since the inception of the proposed Project, and also notwithstanding the significant design features and mitigation measures which have been incorporated into the proposed Project as a result of such communication, there remains some level of controversy. The disagreement deals primarily with the potential for the Project to result in a transfer of non-native biota from the Missouri River to the Hudson Bay basin. The controversy is acknowledged. However, given the substantial amount of attention which has already been paid to this issue in the Final EA and in the numerous studies referenced in the Final EA, and given the findings of the NAWS Engineering - Biology Task Group, the Garrison Joint Technical Committee, and the Garrison U.S./Canada Consultative Group with respect to this issue, I find that there is sufficient, reliable information presently available to support a FONSI/EIS determination for the proposed Project.

4. The effects of the proposed Project on the human environment, as described in the Final EA, are reasonably certain and do not involve unique or unknown risks. The proposed Project involves the use of standard engineering, construction, water treatment, and system operation and maintenance methods and techniques. These methods and techniques address the types of human health and safety, water quality, biota transfer, and other environmental and engineering concerns commonly faced by any project intended to treat and deliver water for MR&I purposes.

5. The proposed Project does not establish a precedent for future actions with significant effects, nor does it represent a decision in principle about a future consideration. The decisions related to the proposed Project are specific and limited to the Project, as clearly stated in the guiding principal included in the January 19, 2001 determination by the Secretary of the Interior that the Project meets the requirements of the 1909 Boundary Waters Treaty.

6. All related aspects of the proposed Project, including construction, operation, and maintenance, are addressed and evaluated in the Final EA. Individual water connections to the proposed Project are not addressed in detail in the Final EA because there are no specific plans for connections at the present time. System connections will be dealt with through local environmental review and planning.

In addition, the incremental effects of the proposed Project, when added to other past, present, and reasonably foreseeable future actions, have been considered. Two areas of potential cumulative impacts were identified in the Final EA (pp. 113-114) for the proposed Project: water withdrawals from the Missouri River, and transfer of biota to the Hudson Bay basin.

The Final EA notes that flows down the Missouri River through Lake Sakakawea average 16,527,000 acre-feet per year for the period of record of 1967-1999. No alternative considered for the proposed Project would withdraw more than approximately 10,500 acre-feet per year from the Missouri River system via Lake Sakakawea or Lake Audubon; this constitutes approximately 0.06 percent of the current average annual flow. Cumulative impacts could accrue in conjunction with other future withdrawals along the system. However, the incremental effect of Project water withdrawal, when added to other past, present, and reasonably foreseeable future withdrawals from the Missouri River system, will not be measurable at or below Lake Sakakawea.

The risk of interbasin biota transfer as a result of the proposed Project is considered very low, given the treatment methods and additional safeguards built into normal operation and maintenance programs for the Project. The incremental risk of interbasin biota transfer from the proposed Project, when added to the risk which may result from other future interbasin transfers (none are reasonably foreseeable at the present time), is also considered to be very low. Any future interbasin transfers would require additional environmental review, consultation with Canada, and Federal approval before they would be authorized.

7. The proposed Project is unlikely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places. As noted in the Final EA (p. 98), should any such resources be discovered either prior to or during Project construction, Reclamation will consult with the State Historic Preservation Office (SHPO) to determine whether any qualify as historic properties and to determine the effects of construction activities on the properties. Any avoidance or mitigation measures would be instituted before construction begins. If unanticipated cultural resources are encountered during construction, all ground disturbing activities in the immediate area of the resource will be stopped until Reclamation can consult with the SHPO and appropriate Tribes and evaluate the resource per 36 CFR Part 800.13.

8. The proposed Project is unlikely to adversely affect endangered or threatened species or identified critical habitats.

9. The proposed Project does not threaten a violation of Federal, State, or local laws or other requirements imposed for the protection of the environment. The Final EA (pp. 134-138)

identifies a number of Federal and State requirements with which the proposed Project would be in compliance. In addition, the following are of particular importance:

Boundary Waters Treaty of 1909

The 1909 Boundary Waters Treaty is the basis for continuing consultations on water matters of mutual concern to both Canada and the United States. Article IV of the international treaty states that neither country will construct or maintain projects that will change the level or the flow of water crossing the international boundary unless approved by the International Joint Commission. It further states that the waters flowing across the boundary shall not be polluted on either side to the injury or property of the other.

The Secretary of the Interior, in consultation with the U.S. Environmental Protection Agency and the U.S. Department of State, has determined that the project will not violate the Boundary Waters Treaty of 1909.

Executive Order 12144

This Executive Order provides direction to Federal agency officials when addressing environmental affects abroad of major Federal actions. Actions are exempted from the Order if the agency determines that such actions would not have a significant effect on the environment outside of the United States.

For major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action, Federal officials are directed to take into consideration information contained in the following types of documents:

> bilateral or multilateral environmental studies, relevant or related to the proposed action, by the United States and one or more foreign nations, or by an international body or organization in which the United States is a member or participant; or concise reviews of the environmental issues involved, including environmental assessments, summary environmental analyses or other appropriate documents.

In this case, the proposed Project will not have a significant effect on the environment outside of the United States, and therefore is exempt from the Order. Nonetheless, an environmental assessment has been prepared; bilateral environmental studies relevant to the proposed action have been carried out, considered, and incorporated in that assessment; and substantial design features and mitigation measures for the proposed Project have been committed to for the purpose of addressing environmental concerns outside of the United States.

Executive Order 13112

This Executive Order provides direction to Federal agencies with respect to invasive species. Among other things, it generally requires that each Federal agency shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere. It also generally requires Federal agencies to take all feasible and prudent measures to minimize risk of harm from invasive species in conjunction with proposed Federal actions.

In this case, the proposed Project is not likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere. Substantial design features and mitigation measures have been incorporated into the proposed Project for the particular purpose of minimizing the risk of harm from interbasin transfer of biota. Reclamation, the State of North Dakota, and the Project sponsors and cooperators are committed to taking all feasible and prudent measures to achieve this goal.

CEQ July 1, 1997 Memorandum to Heads of Agencies

This memorandum provides guidance to Federal agencies on the application of the National Environmental Policy Act to proposed Federal actions in the United States with transboundary impacts. CEQ has determined that agencies must include analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis of proposed actions within the United States. The memorandum notes, however, that courts have adopted a "rule of reason" to judge an agency's actions in this respect, and do not require agencies to discuss "remote or highly speculative consequences." Any analysis of transboundary effects should be included in the EA or EIS prepared for the proposed action.

In this case, given the substantial design features and mitigation measures which have been incorporated into the proposed Project for the particular purpose of minimizing the risk of harm from interbasin transfer of biota, there are no reasonably foreseeable transboundary effects which would occur from construction, operation, or maintenance of the proposed Project within the United States.

Based on my consideration of all of the issues raised by the proposed Project, and given the measures that have been and will be taken to address and resolve those issues, I find that there would be no significant impact on the quality of the human environment, as defined by the National Environmental Policy Act and its implementing regulations, resulting from construction, operation, and maintenance of Project. Preparation of an environmental impact statement will not be required.

Recommended: Richard D. Nelson 10 Sept. 2001

Richard D. Nelson, Ph.D.
Chief, Resource Management
Dakotas Area Office

Date

Approved: for Dennis E. Breitzman 9/10/01

Area Manager
Dakotas Area Office

Date

SECTION II

COMMENTS AND RESPONSES FOR THE DRAFT ENVIRONMENTAL ASSESSMENT

This section consists of the written comments received during the public review period and Reclamation's responses. Comment letters were received from the North Dakota Department of Transportation, North Dakota Department of Health, Garrison Diversion Conservancy District, U.S. Environmental Protection Agency, North Dakota Game and Fish Department, Gary Pearson, Manitoba Environment, Canadian Section of the Garrison Joint Technical Committee, U.S. Natural Resources Conservation Service and the U.S. Fish and Wildlife Service. A written comment was also provided by All Seasons Water Users during the public meetings.

Any reference in the Draft Environmental Assessment or attached responses to pretreated water meeting the 1994 disinfection standards of the Surface Water Treatment Rule is further clarified to provide for biota transfer control through 3-log and 4-log inactivation of *Giardia* and viruses, respectively, prior to water reaching the continental divide. This level of disinfection will be obtained using either ozone, chlorine/chloramine or chloramine.

NAWS

COMMENTS

RESPONSES

NAWS COMMENT RESPONSES

North Dakota Department of Transportation

1. Comment: You have indicated in the document that permits would be required if portions of the pipeline need to be placed on highway rights of way. Also, permits will be required for any crossing of the State Highway System.

1. Response: Thank you for your comment. We will obtain permits for crossing the State Highway System as you request.

2. Comment: In the event that it becomes necessary to locate the portion of the pipeline on the highway right of way, you should be aware that in some locations wetland mitigation has been designed into the highway rights of way. This is especially true alone US 83. Ditch blocks were installed to create small impoundments. Also, native grass species were seeded in some areas. If any of these features are disturbed by your pipeline, they will need to be restored to the previous condition.

2. Response: We will be in touch with you to determine where mitigation areas are once we are in the final design phase. We will restore any mitigation areas disturbed by the pipeline as you requested.

North Dakota Department of Health

1. Comment: Of the 12 intake options evaluated during the pre-final design phase of the project, 3 options continue to be under consideration. Of the 3 options, intake Option No. 8 is recommended by this Department

Lake Sakakawea water quality is significantly better than Lake Audubon water. Lower concentrations of total dissolved solids, total hardness, alkalinity, sulfates, chlorides, sodium, organic carbon, and plankton in the raw water supply directly translate into improved aesthetic quality, reduced softening costs, and enhanced ability to meet future Safe Drinking Water Act requirements related to disinfection by-products. Since the useful project life is several decades, we project the quality of Lake Sakakawea to remain superior to Lake Audubon during this period.

1. Response: A water quality monitoring program has been initiated at the proposed intake locations of Intake Option numbers 8 and 10. Both of these locations are considered to be deep water intake sites with bottom elevations of approximately

1790 - 1800 feet M.S.L. The monitoring program will include profiling the water column to determine the variation with depth of temperature, dissolved oxygen and pH. Samples will also be collected for laboratory analysis of major ions, nutrients, organic carbon, and total dissolved solids, as well as algae speciation and turbidity characterization.

2. *Comment:* *Option No. 2 which was eliminated, should be reconsidered. This inlet location would provide even better water quality than Option No. 8. This is especially important when considering plankton and other biota. Some species of plankton, in relatively sparse concentrations, can impart taste and odor problems in finished water, as well as toxins harmful to humans.*

2. Response: The Bureau and Water Commission has eliminated Option 2 because the cost is significantly more than Option 8 ($21.7 million for Option 2 compared to $5.9 million for option 8). We do not believe that the difference in water quality would be significant enough to justify the extra expense of Option 2.

3. *Comment:* *We recommend a monitoring program be initiated at locations congruent with Option Nos. 2, 8, 7, and 11. We believe that results o this monitoring will conclusively illustrate the benefits of Option No. 2, relative to the others. We welcome the opportunity to work with project sponsors in the design of an appropriate monitoring plan.*

3 Response: The Water Commission will begin a water quality monitoring program to compare the water quality at Intake Option sites number 8 and 10, as mentioned above. Site 2 for the reasons mentioned above will not be considered.

Garrison Diversion Conservancy District

1. *Comment:* *We have reviewed the Draft Environmental Assessment of the Northwest Area Water Supply (NAWS) Project and are providing the following comments. Overall, the draft report is not only very comprehensive, but, in our opinion, exceeds the requirements for an environmental assessment as described by CEQ.*

1. Response: No response necessary.

2. *Comment:* *That said, we do have some specific comments for your consideration and inclusion in the final EA. The process described as the Impact Mitigation Assessment Team is an excellent approach, which I commend you for incorporating. This will allow for the greatest of flexibility in project design, while avoiding impacts.*

On page 34, in the last paragraph, you identify the members of that team. As a project sponsor, I would ask that the Garrison Diversion Conservancy District be identified as a member of that team. I believe our involvement will prove to be a benefit to that process.

2. Response: Membership of the Impact Mitigation Assessment team will be decided when it is formalized by the Bureau of Reclamation. We will consider adding a representative of the Garrison Diversion Conservancy District.

3.Comment: On page 41, 2nd paragraph, it is stated that if the NAWS intake is located in Lake Audubon, a portion of the federal capital expenditures and a portion of the OM&R of the GDU would be the responsibility of the NAWS project. While it appears we may have a differing opinion on that issue. I would suggest that this is not an issue we can resolve at this time, and I don't believe that a NEPA document is the place to resolve it. I would ask that the statement be removed from Thea, and that we agree to address it in a more appropriate document.

3. Response: The statement has been removed from the draft EA consistent with your comment.

4. Comment: Page 56, 3rd paragraph, the last sentence states that "wetlands and farmland would be avoided ." I believe it would be more appropriate and consistent with other language in the report if this is qualified as on page 60 "Wetlands would be avoided whenever possible."

4. Response: The changes have been made as suggested.

5. Comment. Section 3.6.2. addresses the biota transfer issue. While I recognize the concern of potential biota transfer, the technical evaluations as discussed on page 72 indicate that chloramine alone could be "an effective disinfectant." Considering the long-term costs of both methods, we would propose the following for consideration. For the initial operation, both chloramine and ozone would be used as per the proposed plan. Our recommendation would be to include in the plan design and the long-term monitoring plan consideration for changes in the future. Specifically, we would ask that the system be designed to allow for testing of the effectiveness of the chloramine prior to introduction of ozone into the water. Then, if after an agreed to time, results of the monitoring prove that the chloramine addresses all technical concerns, and with the concurrence of the Canadians, an operation plan could be developed and implemented which relies on chloramine solely, thus, significantly reducing the operation cost. If this idea is agreeable, we would ask that it be identified as a commitment in the EA.

5. Response: The final selection of the pretreatment option has not been made at this time. The NAWS project will provide for biota transfer control through 3-log and 4-log inactivation of Giardia and viruses, respectively, prior to project water reaching the continental divide. This level of disinfection will be obtained using, either chlorine/chloramine, chloramine, or ozone pretreatment.

Estimates of the operating costs of ozone/chloramine and chlorine/chloramine pretreatment have indicated that chlorine/chloramine would cost approximately $0.06 per thousand gallons while ozone/chloramine would cost approximately $0.09 per thousand gallons. If an average consumption rate of 6,000 gallons per month per household is assumed, the additional cost of ozone/chloramine would be $0.18 per month. We do not consider this cost difference to be substantial enough to be a factor in the decision.

North Dakota Game and Fish Department

1. Comment. The Department's primary concern with the proposed project is the potential loss of fish, either through impingement or entrainment in the intake structure. Generally, shallower intakes result in higher degrees of fish loss. Of the three intake options discussed options 8 and 11 draw water from relatively deep water. We believe that either ALTERNATIVES 8 or 11 will have minimal impact on fish impingement or entrainment provided the water intake guidelines listed in the EA are followed. Specifically, they are:

- *Intakes must be screened and maintained with material having a maximum mesh opening of one-quarter (¼) inch. The screens should be regularly inspected and replaced if the screen has deteriorated.*

- *Intake velocities would not exceed 0. 5 feet per second.*

- *The intake opening would be positioned three to five vertical feet above the bottom of the river or reservoir bed to minimize the entrainment of bottom-dwelling fish.*

- *If the intake lines are to be buried beneath the riverbed, the trench shall he backfilled to the original contours of the riverbed.*

1. Response: These guidelines will be followed.

2. *Comment:* *Alternatives B and C briefly mention the need to extend the Parshall Bay intake. We agree and suggest the intake at this location use the aforementioned guidelines.*

2. Response: The same guidelines will be followed at Parshall Bay.

3. *Comment:* *The EA also discusses the adverse potential impact that would occur in the event of a pipeline break or spill of pre-treated water into Lake Sakakawea or Lake Audubon. Pre-treated water would contain chlorine and possibly ammonia which would likely result in some degree of fish mortality depending on the amount spilled. We suggest that the EA explore the need and feasibility of a containment barrier or feature, especially if the pre-treatment facility is to be built on the shore of Lake Sakakawea or Lake Audubon.*

3. Response: The pretreatment facility will be located either at the Max booster station or at the intake facility. If the pretreatment facility is located at the intake, we will consider adding a containment system in the final design, as you suggested. Section 3.5.2 discusses potential environmental effects of pretreated water on aquatic species if a break occurs in the pipeline and notes the worst case scenario of a break near a perennial stream. The chances of this occurring are minimal, so the effects on aquatic species of a pipeline break are considered insignificant.

Gary Pearson

1. *Comment:* *In reviewing the Draft Environmental Assessment for the Northwest Area Water Supply (NAWS) Project, I note that the project does not include any consideration of plans for providing supplement water to maintain instream flows in the project area. Concurrently, the Bureau of Reclamation is working on the Red River Valley Municipal, Rural and Industrial Water Needs Assessment where North Dakota water development interests are insisting that provisions be included for supplying water to maintain and augment instream flows in the Sheyenne and Red rivers.*

This inconsistent approach clearly reflects an effort on the part of the North Dakota Water Users Association, the Garrison Diversion Conservancy District and other North Dakota water development interests to manipulate the conclusions of the Red River Valley MR&I Water Needs Assessment to conform them to the foregone assumption that utilization of the existing Garrison Diversion facilities, rather than a pipeline directly from the Missouri River such as is planned for the NAWS project, is necessary to meet the water needs of eastern North Dakota. This was made clear in the enclosed copy of the March 18, 1997, letter from the North Dakota Water Users Association to the North Dakota

Congressional Delegation, the Governor and the legislative leadership in which the Association states that:

> *"Delivering water to eastern North Dakota should utilize the existing (Garrison Diversion) facilities...the alterative of a pipeline...should not be considered ."*

Unfortunately, North Dakota has no statutory instream flow requirements. However, the small municipal and rural water projects developed under the 1986 Garrison Diversion Unit Reformulation Act were not conceived and are not authorized to augment instream flows, nor are provisions for maintaining instream flows included in the design and construction of the Southwest Pipeline Project, nor they are not included in the design of the NAWS Project, nor should they be required in the Red River Valley MR&I Water Needs Assessment.

Regrettably, irresponsible local decisions made by the State Engineer and the Garrison Diversion Conservancy District have fostered and exacerbated the current water supply controversy in the Red River Valley as financing and support for water supply developments have been diverted to other regions of the State, leaving the problems in the Red River Valley unresolved. Now that it is time to address responsibility for meeting the water needs of the Red River Valley, North Dakota water development interests are again attempting to shift the burden to the Federal Government.

Thank you for providing your comments. No response is necessary.

U.S. Fish and Wildlife Service

1. Comment: *The draft EA discusses the potential for impacts to National Wildlife Refuges (NWR) due to river crossings. The affected NWR's have been identified as, J Clark Salyer NWR, Upper Souris NWR, Des Lacs NWR, and Lake Zahl NWR. The EA states that all crossings could be made adjacent to the highway to minimize impacts. With the described 110 foot wide construction right-of-way, impacts to refuge lands will likely occur, thus the Service recommends that all river crossings be made in the highway rights-of-way. Where construction cannot be accommodated in the rights-of-way, a refuge permit will be required Impacts to wetlands under easement will likewise require special use permits. Please contact the appropriate refuge manger indicated in our scoping letter dated April 15, 1997.*

1. Response: We understand that constructing the pipeline across Refuge lands will consist of crossing the flooded pools/marshes and crossing the flowing portion of the Souris River. We will coordinate with the Service to obtain necessary permits and avoid impacts as much as possible. Generally, we will commit to using the highway right-of-way as much as possible when crossing refuge pools and will bore under the river crossings. Details of other avoidance and mitigation measures will be negotiated with the Service and the Impact Mitigation Assessment team when final design and construction takes place.

2. *Comment: The avoidance of a documented location of, and habitat for, piping plovers along segment 14 (Berthold to Parshall) is strongly supported by the Service. If additional saline wetlands are encountered, I recommend you contact this office for assistance in avoiding potential impacts to piping plovers or their habitats. The Service concurs with the "no effect" finding for NAWS pipeline project impacts to federally listed threatened and endangered species. Under requirements of Section 7 of the Endangered Species Act, there is no need for further consultation. However, should project plans change, or sensitive habitats or threatened or endangered species are encountered, a reassessment of impacts to listed species will be necessary.*

2. Response: Thank you for your concurrence.

3. *Comment: I look forward to the formation and participation on the Impact Mitigation Assessment Team. The formation of this team ensures agency participation in seeking ways to minimize or mitigate project impacts when avoidance is not possible. In this way, the Service can be an active participant in formulating mitigation strategies that avoid or minimize impacts to wetland resources. To avoid mitigation, we recommend that construction through wetlands be planned after July 15th. If this is not possible, the Service will seek mitigation for wetland impacts.*

The Service recommends mitigation for all wetland impacts which result in the loss of productivity and habitat for aquatic birds, prior to the July 15, date mentioned in our scoping letter dated April 15, 1997. If wetland impacts occur prior to July 15, we request that an agreement with willing landowners be established to create or restore wetlands for a temporary time period of 10 years. This agreement will adequately mitigate for temporary wetland impacts, with a temporary restoration of wetland functions and values. Based on the EA, potential project impacts to wetland habitats have been determined to be 297.7 acres (Alternative A), and 220 acres (Preferred alternative). Based on a 10-year contract, the

wetland impact would be mitigated with a 30 or 22 acre (respectively) created or restored wetland. The impact mitigation assessment team can work out the specifics as to ecological equivalency. I understand that these figures represent a "worst case" scenario, however, should wetland impacts be less, divide the wetland acres by a 10-year contract period to produce the mitigation acreage (the 10-year contract time frame is commonly accepted and understood with North Dakota landowners). If project impacts result in a permanent loss of wetlands or their productivity, or if project plans change, you should consult with this office to determine if additional mitigation is required.

3. Response: Should any permanent wetland impacts occur prior to July 15th, Reclamation will consult with the Service, through the impact mitigation assessment team, on any necessary mitigation consistent with the conditions outlined in the 1986 Garrison Diversion Unit Reformulation Act.

Natural Resources Conservation Service

Specific Comments:

2. *Comment. The definition used for wetlands in Section 3.8.1, page 80, is a classification definition. We suggest using a definition that defines a wetlands as:*

> *"An area that has a predominance of hydric soils and that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances does support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions.*

2. Response: This definition is used by the Corps of Engineers for regulatory purposes, which the Bureau of Reclamation follows. This definition will be added to the final EA.

All Seasons Water Users

1. *Comment: In 1997 ALL SEASONS WATER USERS ASSOCIATION, INC. (ASWU) presented a plan to the Water Commission as an alternative to NAWS. This plan would provide water service to the cities within ASWU Service Area that had signed water service agreements. It would consist of a Water Treatment Plant located north of Bottineau and a gravity fed pipeline going west to supply the cites of Souris and Westhope, along with ASWU Systems I, II and III. Water would also be provided for Bottineau and Willow City.*

ASWU feels that this plan is a feasible option and should be included as a alternative to bring water service to the area that is in immediate need.

2. Response: The NEPA process requires all reasonable alternatives for a given project be evaluated prior to selection of a preferred alternative. Accordingly, the project sponsor selected various altematives for consideration in the environmental assessment.

The preferred alternative is a combination of an integrated system, development of local groundwater supplies in Grenora and Wildrose, and Parshall's existing Lake Sakakawea supply. Selection of these communities for individual treatment was based primarily on a comparison of capital cost. With 14 communities and 3 rural water systems in the project, there could be numerous combinations of individual treatment and integrated systems. However, all would be some combination of Alternatives A and B. As the project progresses, it is conceivable that other local supplies and systems may be considered for integration with the project.

CANADIAN SECTION, GARRISON JOINT TECHNICAL COMMITTEE

Canadian Section, Garrison Joint Technical Committee

General Comments

Comment 1: *We believe there was inadequate consideration of options that would minimize or eliminate the risk of interbasin transfer of biota. Given the potential irreversibility of damage that would occur in the event of biota transfer, there is a need to make full and equal comparison of all alternatives. Some options appear to have been rejected on the sole criteria of construction costs. A detailed benefit-cost evaluation of all options would provide a more accurate comparison of alternatives. This evaluation would include all costs to society associated with each alternative.*

Response: Any project to transfer water from one basin to another, with or without treatment, will have some risk of biota transfer. The consultations of the GJTC on he NAWS project have been engaged to help ascertain an acceptable level of risk. The NAWS Engineering - Biology Task Group, and subsequently, the Garrison U.S./Canada Consultative Group, concluded that the risk of biota transfer of all options presented in the NAWS Engineering - Biology Task Group's report on the NAWS project dated May, 1994 was low. The NAWS Engineering - Biology Task Group further concluded that additional safeguards would lower the already low risk of biota transfer associated with disinfection alone. We believe that the safeguards proposed for the NAWS project, which include pretreatment technologies that have been shown to meet the 1994 disinfection standards of the U. S. Environmental Protection Agency (EPA) Surface Water Treatment Rule, provide a reasonable level of protection against biota transfer.

A detailed benefit-cost evaluation which would consider all costs to society associated with each alternative and assignment of risk probabilities to each alternative would also need to include a comparison with background risk due to natural and man-made processes. We considered preparing a risk assessment for this project but because of its subjective nature, we do not believe it would add value to the decision making process. We believe that the studies done to date have shown that the preferred alternative poses minimal increased risk of interbasin biota transfer, over and above the background risk. This aside, the section of the Draft Environmental Assessment (DEA) which discusses alternatives will be expanded.

Comment 2: *The reliance on pre-treatment without filtration to protect against interbasin transfer of biota continues to be of significant concern. Without filtration, there is an increase in risk that pre-treatment could prove ineffective, especially in situations of high levels of turbidity. Not only does filtration provide additional*

protection, it is in keeping with the recent trend to use filtration as the first line of defense in protecting water supplies from pathogens.

Response: The NAWS Engineering - Biology Task Group concluded (page 41, *NAWS, Engineering - Biology Task Group, May 1994*) that the most acceptable method of fully overcoming the transfer of Missouri River basin biota into the Hudson Bay basin was to treat the water to acceptable drinking water standards prior to its transport into the Hudson Bay drainage. This report was published before a study was conducted to determine the effectiveness of disinfection with chloramine and ozone in addressing biota transfer concerns. The *Northwest Area Water Supply Project Chloramine Challenge Study, Final Report - December 1995,* showed that ozone or chlorine pretreatment of raw Missouri River water inoculated with a protozoan noted for its resistance to disinfection *(Giardia)* could achieve 3 logs or greater (99.9%) inactivation by the time water reached the continental divide. Safeguards proposed for the NAWS project include pretreatment technologies that have been shown to meet the 1994 disinfection standards of the U. S. Environmental Protection Agency (EPA) Surface Water Treatment Rule.

Comment 3: *Much has been learned in the past several years about effective measures required to protect drinking water from protozoans such as Giardia and Cryptosporidium. In drinking water systems, current good operating standards include the use of a disinfectant of known adequacy, coagulation and settling, and filtration. For protection of human health, these three components must be in place, properly optimized, integrated and operated, followed by a rigorous monitoring protocol. Protozoans especially Cryptosporidium, may be useful surrogates for other unknown biota foreign to the Hudson Bay Drainage Basin. Thus, the EA should demonstrate that the preferred option has the same level of treatment in both the United States and Canada to protect human health from such parasites.*

Response: The pretreatment criteria established in the September 23, 1994 conclusions of the Garrison U.S./Canada Consultative Group was to meet the September 1994 EPA drinking water disinfection standards. These standards included 3 log inactivation of *Giardia.* Laboratory procedures for enumerating and determining the viability of *Giardia* cysts have been developed and accepted in the scientific literature. To our knowledge, similar procedures have not been developed for *Cryptosporidium.*

Consultations of the GJTC have generally concentrated on and implied that the primary concern lies with preventing the transfer of fish pathogens and diseases. This is reflected in a number of discussions of the GJTC relative to fish hatchery operations. Water for the NAWS project will be treated to meet current USEPA Drinking Water standards and will be monitored by the North Dakota Department

of Health. Accordingly, any risk to human health from these types of parasites should be insignificant.

The issue of treating water for human consumption involves the Minot water treatment plant, which will provide multi-barrier treatment. Optimized treatment, proper operation, and monitoring are all part of the requirements for the potable water. Operational constraints and additional safeguards for the NAWS project are addressed in detail in the supplemental report, *Biota Transfer Control Facilities and Criteria,* which has been distributed to the GJTC for consideration.

Comment 4: *The lack of a comprehensive monitoring program and contingency plan is a critical deficiency in terms of understanding how the project could impact Canadian waters.*

Response: These items are addressed in detail in the supplemental report, *Biota Transfer Control Facilities and Criteria,* which has been distributed to the GJTC for consideration.

Comment 5: *The lack of data and details in the report makes it difficult to interpret the potential consequences.*

Response: The DEA was prepared to fulfill requirements of the National Environmental Policy Act (NEPA). Accordingly, the DEA only includes data which are relevant to pertinent issues and which are unavailable in other specific reports. NEPA documents are intended to be read and understood by the general public, and often times summarize the findings of other supporting documentation and studies. Specific documents related to the NAWS project are cited in the reference section of the DEA on pages 131 to 137.

General Comment: *Given the potential of the preferred alternative to have irreversible impacts, the number of significant technical deficiencies in the Draft Environmental, Assessment, and the fact there are alternatives that do not pose a risk to Canadian waters, we would recommend the proponent be requested to develop an environmental impact statement of the NAWS project.*

Response: Based on the National Environmental Policy Act (NEPA) process, and consistent with the NAWS Approval Process, it is premature at this time to make a decision on whether or not a formal environmental impact statement (EIS) is warranted.

Specific Comments - Project Evaluation

The purpose of the NAWS project is to provide a reliable source of good quality water to communities in Northwestern North Dakota. The Environmental Assessment (EA) focuses, for all practical purposes, on two solutions. The first, is providing pre-treatment at the source and distribution through a pipeline system to the communities. The other alternative is upgrading existing systems. The EA does an inadequate job in presenting a full range of options and information to demonstrate the true costs of each alternative for comparison purposes. Comparable information of all costs and potential impacts, both quantitative and qualitative, are critical requirements of any project assessment.

Comment 1: *Full treatment at source has been rejected without providing the details for that rejection other than stating (page 33) construction costs would be $12.4 million more than the cost of pre-treatment. It was not clear if the dollar difference was simply the construction costs or the actual net difference with all capital and operating costs considered*

Response: Previous studies have evaluated the potential for treatment of the NAWS water supply at either Lake Audubon or Lake Sakakawea. The cost of treatment at the Minot water treatment plant was developed in the *Northwest Area Water Supply Project, Final Report - Pre-final Design, June 1995*. The estimated construction cost of $12.2 million was increased by 30 percent to account for contingencies, engineering, and administration. The resulting project cost is $15.9 million.

Cost estimates for a water treatment plant at the raw water intake location were revised in March 1994 for use by, and consultation with, the NAWS Engineering - Biology Task Group in the preparation of their report dated May, 1994. The construction cost for a water treatment plant at the intake location was identified at $21.7 million. The project cost (including 30 percent for contingencies, engineering, and administration) is $28.2 million.

The difference in cost between the alternative treatment plant locations is $12.3 million ($28.2M - $15-9M). If the project cost for the intake chloramination facility is included for the Minot water treatment plant alternative, the difference in costs between the alternatives is reduced to $12 million.

The NAWS project would be constructed in phases, with the first phase being the water supply pipeline to Minot. Construction of the first phase is anticipated to occur over a five year period (at an estimated project cost of approximately $45 million). Thirty-five percent of the cost of this pipeline will be funded by water fees. The most difficult part of any revenue generating project to finance is that

portion which is to be built before the project can generate revenue. Obviously, if water fees are to be used to pay for the project, the project cannot begin to generate revenue until water can be sold.

Under the Preferred Alternative, expansion of the Minot water treatment plant will be deferred until after water from the project reaches Minot. The estimated cost of the expansion and upgrade of the Minot water treatment plant is approximately $15.9 million. With full treatment within the Missouri River basin, not only would the pipeline have to be built before water can be sold, but a treatment plant would also have to be constructed, thereby increasing the up-front cost by $27.9 million (an increase of approximately 60 percent). The entire cost of the treatment plant would have to be financed as part of the first phase, which places a significant financial burden on the users of project water and is considered cost prohibitive.

Minot has expressed the desire to maintain operation of its water treatment plant for economic expansion possibilities. In its current configuration, the Minot water treatment plant would be able to treat Missouri River water with few modifications (estimated at $3 to $4 million in construction costs) to accommodate the water demands under Phase 1. Construction of a new water treatment plant at the intake would initially result in the closure of the Minot water treatment plant (loss of existing invested capital). Therefore, the use of Minot's water treatment plant was considered the most viable and most supportable treatment alternative in terms of costs, financing, and use of existing facilities.

The additional cost of full treatment at the source is close to the normal contingency added for any construction project of this type and magnitude (contingencies for the NAWS project are estimated to be about ten percent). However, by adding $12 million to the project, contingency costs will also increase because of the increase in project costs.

Comment 2: While a full treatment plant at source does not provide a 100% guarantee there would never be interbasin biota transfer, it does significantly lower the risk factor. An evaluation of the full treatment alternative in which all associated related project costs and potential impacts are identified should be done to determine the viability of this alternative relative to others.

Response: Any project to transfer water from one basin to another, with or without treatment, will have some risk of biota transfer. The consultations of the GJTC on the NAWS project have been engaged to help ascertain an acceptable level of risk.

The NAWS Engineering - Biology Task Group, and subsequently, the Garrison U.S./Canada Consultative Group, concluded that the risk of biota transfer of all options presented in the NAWS Engineering - Biology Task Group's report on the NAWS project dated May, 1994 was low. The NAWS Engineering - Biology Task Group further concluded that additional safeguards would lower the already low risk of biota transfer associated with disinfection alone. We believe that the safeguards proposed for the NAWS project, which include pretreatment technologies that have been shown to meet the 1994 disinfection standards of the U. S. Environmental Protection Agency (EPA) Surface Water Treatment Rule, provide a reasonable level of protection against biota transfer.

A detailed benefit-cost evaluation which would consider all costs to society associated with each alternative and assignment of risk probabilities to each alternative would also need to include a comparison with background risk due to natural and man-made processes. We considered preparing a risk assessment for this project but because of its subjective nature, we do not believe it would add value to the decision making process. We believe that the studies done to date have shown that the preferred alternative poses minimal increased risk of interbasin biota transfer, over and above the background risk.

Comment 3: *Since the proponent can not give any assurances that the proposed level of treatment would be adequate enough to ensure 100% effectiveness, 100% of the time, the evaluation of the alternatives should include consideration of what are the costs to Canada should there be biota transfer. The report recognizes the significance of the problems resulting from interbasin transfers (page 112):*

> *"One of the greatest concerns for irreversible commitments of resources is interbasin biota transfer. Most often, when this occurs, the damage is not reversible."*

The current evaluation essentially externalizes those costs that would occur to Canada should there be biota transfer instead of associating them with the project. If, for example, full cost accounting procedures had been used, there would be little or no biota associated costs with building a full treatment plant at source or, Alternative B, upgrading of existing systems.

Response: Any project to transfer water from one basin to another, with or without treatment, will have some risk of biota transfer. The consultations of the GJTC on the NAWS project have been engaged to help ascertain an acceptable level of risk. We believe that the safeguards proposed for the NAWS project, which include pretreatment technologies that have been shown to meet the 1994 disinfection

standards of the U. S. Environmental Protection Agency (EPA) Surface Water Treatment Rule, provide a reasonable level of protection against biota transfer.

Comment 4: *The report on page 33 implies that one of the reasons for rejecting the construction of a full treatment plant at source is because the funding mechanism would require the entire plant be built prior to receiving financial assistance from the federal government. Such considerations should be secondary when evaluating projects.*

Response: Federal assistance in funding the project is anticipated through the state administered Municipal, Rural, and Industrial (MR&I) Water Supply Program. The NAWS project would be constructed in phases, with the first phase being the water supply pipeline to Minot. Construction of the first phase (at an estimated project cost of approximately $45 million), is required before revenue from water sales can be generated. Thirty-five percent of the cost of this pipeline will be funded by water fees. Construction of the first phase is anticipated to occur over a five year period, which will make financing of the project significantly more difficult. The difference in project costs for the water treatment plant alternatives ($12 million) is a significant portion (27 percent) of the anticipated Phase I cost. Furthermore, the entire cost of the treatment plant would have to be financed as part of the first phase. This increases the first phase cost by $27.9 million (a 60 percent increase), which is a significant financial burden on the users of project water and is considered cost prohibitive.

Comment 5: *The assumptions used in justification of the project are questionable.*

- the per capita demand of 130 gals and the peaking factors shown on page 10 seem high. As well, it is not clear why Minot has a peaking factor higher than the other communities.

- Are there assurances that the Minot Air Force base will be retained at its present level?

- what consideration was given to demand management to help reduce the need for additional water supply.

Response: The values cited in Table 4 came from the report *1993 Community Needs Assessment, Northwest Area Water Supply Project, Pre-final Design,* by Houston Engineering, et al. The average water consumption for Minot during the period 1985-1992 was 127 gallons per capita per day. The peak daily use reported by Minot Water Treatment Plant personnel was 13 million gallons, which results in a

peak use factor of 2.3. The capacity of Minot's existing water treatment plant is limited hydraulically by pumps and the pipe distribution system. Were these limitations not present, it was felt that the peak use rates may have been even higher. A comparison with other North Dakota cities indicated that a peaking factor of 3 would be appropriate for a city of Minot's size and business activity.

Closure of the Minot Air Force Base (AFB) would result in reduced water requirements. However, closure of the Minot AFB, while a topic of considerable speculation throughout North Dakota, is neither certain nor imminent. NEPA documents are prepared with anticipated project impacts evaluated "based on the reasonably foreseeable future". Accordingly, the impacts of closure of the Minot AFB are not included in the DEA.

The concept of "demand management" was not included in the needs assessment process because although it might have an impact on water quantity, it does not address water quality issues throughout the project area.

Comment 6: *Using the limited information about the project, Environment Canada using the EPA Water Treatment Plant Simulation Model undertook a cursory analysis to determine the estimates of THMs in the pipeline to Minot. The results showed that in the first section of pipeline to the divide there would be an excess of 40 ppb, which would be in excess of the new proposed EPA standard for THM. Even with ozone treatment, there remains a high probability that should the high levels of organics remain in the drinking water, a bacterial slime would form in the pipeline since it is impossible to design a perfect, maintenance-free disinfection system that operates indefinitely. Consequently, the pipeline will have bacteriological accumulation once sufficient organic matter accumulates and provides a breeding area for it.*

Given the potential water quality problems that result when you have the pre-treatment and the final treatment water plants so far apart, this would be another consideration for favoring construction of a full treatment plant at the source. 7he EA should therefore address how this potential water quality problem will be handled and what are the implications should the problem occur.

Response: We are aware of the potential for the formation of disinfection process by-products (THM) within the pipeline. The NAWS Chloramine Challenge Study showed formation of THM in excess of 40 micrograms per liter (ug/L) with free chlorine contact times in excess of 10 minutes. Accordingly, the recommended free chlorine contact time would have been something less than 10 minutes. This information was considered in making the decision to utilize ozone followed by a

chloramine residual. This two-stage disinfection process is not expected to result in excessive THM formation.

As you are aware, all water distribution systems contain biofilms, although these biofilms are not generally associated with either human or fish pathogens. Typically, a disinfectant residual is maintained within a water distribution system to inactivate biofilm organisms which may slough from the pipeline wall and enter the bulk water. In the case of the NAWS pipeline, a disinfectant (chloramine) residual will be maintained in the water column.

To control biofilm growth and problems associated with nitrification, water utilities using chloramination often switch to free chlorine for one to six weeks per year. The free chlorine acts as a "shock" to the system, and aids in cleaning out unwanted biogrowth. Because free chlorination is employed for only a short period of time, the resultant increase in disinfection by-product formation is not considered a major water quality issue. Facilities for shock chlorination, together with physical pipeline cleaning, will be incorporated into the design of the pipeline to reduce the potential for slime growth.

Comment 7: *One of the reasons for rejecting the option of upgrading existing systems is that the brine from the reverse osmosis process at an upgraded. Minot plant would increase the TDS levels of wastewater that would have to be treated before discharge into the Souris River. Was consideration given to disposing of the waste water through deep-well injection?*

Response: Treatment of local groundwater supplies by reverse osmosis (RO), as presented in Alternative B, results in a concentrated waste stream that is high in total dissolved solids, sodium, and sulfate. The volume of the RO concentrate (brine) is estimated at approximately 25 percent of the volume pumped from the wells. Several alternatives were considered for disposal of this brine, including deep-well injection and evaporation ponds. Discussion of deep-well injection and evaporation pond alternatives will be added to the Final Environmental Assessment.

In North Dakota, disposal using deep-well injection is regulated by the ND Department of Health. The brine generated by RO systems would result in the injection wells being classified as Class I injection wells, which require disposal below any water bearing strata. Extensive studies, including test drilling to characterize subsurface strata and testing of the receiving formation to determine its suitability, would be required. Subsurface conditions could preclude the technical viability this option in some areas of the project.

Brine disposal options at the Minot water treatment plant include other alternatives because of the large volumes of brine involved. Evaporation ponds would consume large land areas and be expensive to construct. The recommended brine disposal option for Minot (Alternative B) includes equalization storage with discharge to the wastewater treatment plant. Since the water supply treatment process under this alternative would remove constituents from the water, blending the brine back into the wastewater would put those constituents back into the wastewater stream and should not impact biological wastewater treatment processes.

Specific Comments - Missing Information

Comment 1: *A Monitoring Plan for all aspects of the project should be an integral part of any EA. The monitoring plan should include, but not be limited to, such things as:*

- the parameters and monitoring frequency for monitoring the water supply;

- the success of the pre-treatment in the elimination of biota before the water leaves the Missouri Paver basin;

- leaks along the pipeline;

- the quality of the water at the raw water storage facility and at the Minot treatment plant;

- the contents of the sludge and backwash water

Response: Environmental commitments to be contained in the Final Environmental Assessment include: providing final design plans and construction specifications for the pre-treatment and delivery systems to the GJTC prior to awarding of any construction contract; providing a long-term operations, maintenance and replacement plan to the GJTC; providing an emergency operation plan with special emphasis on potential biota transfer issues to the GJTC; providing an annual monitoring, operational and maintenance report to the GJTC; and permitting the GJTC or its representatives to inspect the system and examine its records at any time. In addition, the current project design includes the reliance on disinfection credit for the raw water disinfection system. This design feature will require compliance monitoring oversight by the ND Department of Health.

The 2.4 million-gallon reservoir at the Minot water treatment plant discussed in past documents, and the DEA, was intended for use in the event of either flows in excess of the plant capacity and/or if required to drain the lower reaches of the pipeline. Further review of project facilities during final design review and preparation of the *Biota Transfer Control Facilities and Criteria* report has resulted in the conclusion that this reservoir will not reduce the risk of biota transfer and is not needed.

The Minot plant is currently, and will continue to be, operated on a 24-hour basis. Electrically operated valves at the influent control facility will close automatically in the event of power failure. The plant itself has two feet of freeboard at the normal operating level. The influent control valves will close within 60 seconds which would result in a maximum 0. 1 foot increase in water levels in the clarifiers at the maximum flow rates. Float switches in the clarifiers will be hard-wired into the influent control valves themselves. In the event of a pipeline failure requiring drainage of the pipeline, the upstream valve at the pressure reducing, station would be shut and pipeline flows would be processed through the treatment plant at a higher rate. Further details are presented in the supplemental report, *Biota Transfer Control Facilities and Criteria*, which has been distributed to the GJTC for consideration.

Comment 2: *There was no Contingency Plan. Given the potential for irreversible damage for Alternatives A and the Preferred Alternative, a well designed and implemented Contingency Plan is critical. The proponent should address the "what if" question for all aspects of the project, from the time the water is taken into the pre-treatment plant to the disposal of sludge in Minot, that could result, even with a remote possibility, in interbasin transfer of biota.*

Response: A supplemental report, *Biota Transfer Control and Criteria,* addresses operating practices for the proposed pipeline, appurtenances, pretreatment facilities, and the Minot water treatment plant, with respect to biota transfer control. This report has been distributed to the GJTC for consideration,

Comment 3: *The report should also clearly lay out how the monitoring and contingency commitments would be incorporated into the routine, legally binding framework in the state, including responsibility for compliance monitoring.*

Response: Environmental commitments to be contained in the Final Environmental Assessment include: providing final design plans and construction specifications for the pre-treatment and delivery systems to the GJTC prior to awarding of any construction contract; providing a long-term operations, maintenance and replacement plan to the GJTC; providing an emergency operation plan with

special emphasis on potential biota transfer issues to the GJTC; providing an annual monitoring, operational and maintenance report to the GJTC, and permitting the GJTC or its representatives to inspect the system and examine its records at any time. In addition, the current project design includes the reliance on disinfection credit for the raw water disinfection system. This design feature will require compliance monitoring oversight by the ND Department of Health.

Comment 4: *Since the preferred project clearly has an element of risk of potentially providing a source for interbasin transfer of biota, there should be a scientifically based risk assessment carried out on all options to demonstrate the degree and significance of that risk.*

Response: A detailed benefit-cost evaluation which would consider all costs to society associated with each alternative and assignment of risk probabilities to each alternative would also need to include a comparison with background risk due to natural and man-made processes. We considered preparing a risk assessment for this project but because of its subjective nature, we do not believe it would add value to the decision making process. We believe that the studies done to date have shown that the preferred alternative poses minimal increased risk of interbasin biota transfer, over and above the background risk.

Comment 5: *The report does not identify what the response would be from North Dakota should there be a failure in the system and there is an interbasin transfer of biota.*

Response: Numerous safeguards have been designed into the project to prevent the transfer of biota. from the Missouri River basin to the Hudson Bay basin. Since project water will be pretreated to drinking water disinfection standards, it will likely be difficult to verify whether or not a failure in the system resulted in the interbasin transfer of biota. Nevertheless, any failure in the system which results in a transfer of water which has not passed through the Minot Water Treatment Plant will result in immediate notification of the GJTC, intensive review of the causes of the failure, and incorporation of measures to prevent reoccurrence.

Specific Comments - Interbasin Transfer of Biota

The report states that there would be pre-treatment of the raw water at the water source. This treatment would consist of ozone to reduce the risk of interbasin transfer of foreign biota from the Missouri river basin. Chloramine (chlorine and ammonia) would also be added at the source. The assumption is made by the proponent that these steps will, by themselves, be adequate to prevent the potential transfer of non-native biota to the Hudson Bay drainage system.

Comment 1: *Even though the NAWS project has been under consideration for many years, there is a lack of water quality information. In particular, the lack of information about turbidity is troublesome as particulate matter can mask and shield viruses, bacteria or protozoans during the disinfection process. The EA should address how problems with turbidity will be prevented.*

Response: The North Dakota State Water Commission (NDSWC) has initiated water quality monitoring at the proposed intake sites (both Lakes Sakakawea and Audubon). Turbidity is one of the parameters that is being monitored. Data collected to date indicate that turbidity levels will likely remain relatively low. The highest level of turbidity from water quality samples taken from November 1994 to August 1995 was 6.4 nephelometric turbidity units (NTU). At this turbidity level, over 3-log *Giardia* inactivation was achieved in the NAWS Chlorarmine Challenge Study. The data collected by the NDSWC will be provided to the GJTC on a yearly basis. If turbidity levels raise concern, the State of North Dakota will consult with the GJTC for their recommendation on remedial action to be taken.

Comment 2: *While ozone and chloramine have been shown to provide for 3 log inactivation of Giardia and 4 log inactivation for viruses, there are a number of concerns associated with the implied conclusion that these tests have validated the proposed pre-treatment process.*

- there were only a few measurements of turbidity available at the time of the test. Even though none of these samples were taken during periods when conditions would be expected to cause turbid conditions, there were still exceedances of 5 NTU.

- the reliability of the treatment is significantly dependent on the quality of the raw water. If, for example, the raw water contains between 10 and 100 cysts/100L, 5 log inactivation of Giardia is required and 6 log inactivation for viruses. Because of the lack of information about the raw water, the 3 log and 4 log inactivations can only be considered a minimum requirement.

- the SWTR was developed to reduce the risk from human pathogens in drinking water supplies. The focus of the SWTR is on Giardia and viruses. No information is presented to indicate that the proposed treatment will result in inactivation of wild pathogens such as those that may impact fisheries to levels which meet the goal of the pretreatment process.

Response: We disagree with your statement that water samples were not taken at times when conditions would be expected to cause turbid conditions. Samples were collected under the ice, immediately after ice out, during the peak of the summer when algae conditions would be expected to be most abundant, and during the fall after turnover should have occurred if the lake were stratified. The spring, summer, and fall samples were taken specifically at times when turbidity was expected to be highest. Additionally, the sampling protocol was discussed with the GJTC giving adequate opportunity for members to provide input on the sample scheduling. At its May 2, 1995 meeting the GJTC was provided with a schedule for the last two samples, again providing an opportunity for input on the sample scheduling. We have no record of any input from the GJTC relative to the sampling schedule.

The pretreatment design is intended to meet U. S. EPA surface water disinfection standards current **in September 1994.** This was specified in conclusion 6(I) of the September 23), 1994 conclusions of the Garrison U.S./Canada Consultative Group after review of the NAWS Engineering-Biology Task Group's report. It should be noted that the project will comply with any future changes in the EPA drinking water standards for potable water supplies. This should not be confused with, nor considered part of, the project requirements for biota transfer control.

The issue of wild pathogens has been discussed at several Garrison Joint Technical Committee meetings. Through the consultative process, the project proponent has sought a method of satisfying Canadian concerns about biota transfer. Pretreatment using both ozone and chloramine, as proposed in the Preferred Alternative, will meet requirements set by the Garrison U. S./Canada Consultative Group for prevention of biota transfer.

Comment 3: There is *concern that the proponent has not fully considered different filtration methods. The importance of filtration is significant for several reasons:*

- to respond to the problems of turbidity, as noted above. What will the proponent do should turbidity become a problem? Can the problem be identified and corrected before biota gets through the pretreatment system? If not, what remedial measures would be taken to prevent the masked/shielded biota from getting in to the Hudson Bay drainage system?

- the lack of filtration results in a total reliance on disinfection for control of biota transfer. If the proposed disinfection process fails to achieve full removal of the biota for any reason, including mechanical failure, there is no back up protection.

- because of the difficulty in treating water supply systems, the importance of filtration as a primary treatment method for pathogens is gaining recognition in the scientific community. Given this trend, it would be prudent for the proponent to provide a full evaluation of different filtration systems.

Response: Turbidity data will be collected by the NDSWC and provided to the GJTC on a yearly basis. If turbidity levels raise concern, the State of North Dakota will consult with the GJTC for their recommendation on remedial action to be taken.

The pretreatment facility will include a feedback system to continually monitor and adjust the ozone dosage. A complete description of the pretreatment systems is provided in the supplemental report, *Biota Control Facilities and Criteria,* which has been provided to the GJTC for consideration.

In the DEA full treatment at the source was an alternative that was considered but eliminated. Conversely, if full treatment at the source had been an action alternative a full evaluation of different filtration systems may have been considered in the document.

Comment 4: *In order to reduce turbidity and water temperature* fluctuations, *which will affect the disinfection process, a deep intake is preferable. The Lake Audubon deep intake would be approximately 55 feet below the surface at its normal operating level. The EA does not state if the lake fluctuates above or below this level. It is also important to note that while a deep intake is preferred there is concern that there could still be water quality problems associated with this option. The text states on page 42 that the deeper intake of Lake Audubon will have less turbidity than if from the shallower intake. Lack of data hampers the assessment of the intake options.*

Response: Lake Audubon is not expected to fluctuate appreciably. The current operating plan between the Bureau of Reclamation, the U. S. Fish and Wildlife Service, and the North Dakota Game and Fish Department calls for annual fluctuations of approximately 2.5 feet. Lake Sakakawea, on the other hand, has experienced fluctuations of 30+ feet. At a lake elevation 1839.3 feet MSL, the proposed Sakakawea, intake would be at a depth of about 69 feet. The U. S. Army Corps of Engineer's Master Manual for the operation of Lake Sakakawea cites a minimum water surface elevation of 1775 feet MSL, which could put the intake in only 5 feet of water.

Lower turbidity levels are expected at the deeper intake locations. This expectation is due primarily to presumed lower levels of biological activity at depths below which very little light penetrates (below the phototrophic zone. Data is being collected to monitor the turbidity levels seasonally at both proposed intake locations.

Comment 5: *No details of the design requirements for the disinfectant system were provided It is not clear, for example, if the project is designed for the ozone to meet the required log removal on its own and not rely on additional removal from chloramines through contact time in the pipe.*

Response: Detailed information on the disinfectant system is contained in the supplemental report *Biota Transfer Control Facilities and Criteria,* which has been provided to the GJTC for their consideration. Specifically, the ozone disinfection system is designed to maintain a 0.4 mg/L ozone residual. In the NAWS Chloramine Challenge Study, inactivation of 3 logs for *Giardia* was shown to occur with an ozone residual greater than or equal to 0.3 mg/L at 4\ Celsius.

Comment 6: A raw water storage facility is included on the Hudson Bay side of the continental divide. There could be a loss of disinfection residual and regrowth in the storage facility. What will be done to ensure a disinfection residual is maintained and prevent regrowth problems and biota transfer? What would happen in the event of a major storm occurring while the storage facility is full?

Response: The storage facility on the Hudson Bay side of the continental divide will store pretreated water with a residual chloramine disinfectant. The storage facility will be covered, baffled to prevent short-circuiting, and compartmentalized to allow cleaning without removing the facility from service. A loss of residual is not anticipated since chloramines are long-lived and the system will be designed to maintain a residual at the Minot Water Treatment Plant on the incoming pretreated water with a feedback loop to the pretreatment facility.

A discussion of failure modes and responses is included in the supplemental report *Biota Transfer Control Facilities and Criteria,* which has been provided to the GJTC for consideration.

Comment 7: *There is a lack of information about the operation of the Minot treatment plant.*

- Does the treatment process include flocculation, sedimentation and filtration?

- Treatment processes such as coagulation are designed to remove particulate matter including living organisms. It is indicated (p. 74) that the sludge handling facilities will be upgraded to "further reduce the potential for biota transfer". No details are provided on what is meant by this statement. How will the sludge be handled to prevent biota transfer should the pretreatment not be completely successful?

- How will backwash water from the filters be disposed to ensure that there is no contamination of biota that may have survived the pretreatment disinfection process?

Response: Please refer to *Northwest Area Water Supply Project, Final Report, Pre-final Design, Volume 1, June 1995* as well as the *Biota Transfer Control Facilities and Criteria* report, (January 1998) for descriptions of the Minot Water Treatment Plant and processes.

Conclusion 6 (iv.) of the Garrison U. S ./Canada Consultative Group stipulates that design details of sludge disposal facilities at the Minot Water Treatment Plant must be provided to the satisfaction of the GJTC. The sludge has a pH exceeding 12, which is usually sufficient to allay fears of biological contamination. The sludge will be hauled in trucks for disposal in the city of Minot's landfill which includes containment berms, clay lined cells, and a leachate collection system. Spill containment and wash down facilities are located in the sludge loading area. All spills during loading operations will be contained within the loading area. Each sludge transport truck will be washed down prior to leaving the loading area.

Filter backwash water is recirculated to the head-end of the treatment plant.

Comment 3: *A balancing reservoir is proposed at the Minot Water treatment plant to contain incoming pipeline flows and particularly to store flows in case of an emergency shutdown at the Minot plant. The 2.4 million gallon reservoir could hold only two hours of flow from the 26 million gallon per day pipeline should an emergency, develop. This is completely inadequate for responding to an emergency developing in the evening or weekend As well, there is a lack of information about:*

- consideration of a major storm (e.g. 1: 100, maximum probable) occurring while the reservoir is being used to hold water during an emergency shutdown.

- what safeguards will be taken to prevent any possible spill or regrowth problems at this facility?

- what precautions will be used to prevent discharge into the Souris River?

Response: The 2.4 million-gallon reservoir at the Minot water treatment plant discussed in past documents, and the DEA, was intended for use in the event of either flows in excess of the plant capacity and/or if required to drain the lower reaches of the pipeline. Further review of project facilities during final design review and preparation of the *Biota Transfer Control Facilities and Criteria* report has resulted in the conclusion that this reservoir will not reduce the risk of biota transfer and is not needed.

Comment 9: *The pre-treatment design is intended to meet current EPA drinking water disinfection standards (p. 15). These rules however are currently under review and presumably will continue to be reviewed and updated as new scientific information emerges to demonstrate that current requirements are insufficient. The report does not discuss how changes will be implemented in the pre-treatment process.*

Response: There are no mechanisms to ensure that advanced drinking water treatment methodologies will be incorporated into project components located within the Missouri River basin. The pretreatment design is intended to meet U.S. EPA surface water disinfection standards current in **September 1994.** This was specified in conclusion 6(I) of the September 23, 1994 conclusions of the Garrison U.S./Canada Consultative Group after review of the NAWS Engineering-Biology Task Group's report. The qualifying date for the statement was inadvertently omitted from the text in the DEA. This change will be made in the final Environmental Assessment.

As a public water system, the project will be regulated by the North Dakota Department of Health to ensure compliance with federal regulations. The raw water disinfection system will be an integral part of the public water supply system and will be used to meet Safe Drinking Water Act disinfection requirements. Through the consultative process, and with free access to inspect the project, a process will exist for discussions concerning upgrading and enhancing the pretreatment technology, should it prove to be necessary.

Comment 10: *In discussing the intake options (page 27), there is no mention of what measures would be taken to prevent the entrainment of fish from the lake into the pipeline.*

Response: Please see pages 62 and 63, the fisheries section of the Draft Environmental Assessment, which discuss entrainment and remedies which will be followed.

The N. D. Game and Fish Department has recommended screened intakes with maximum mesh openings of one-quarter (1/4) inch and maximum intake velocities of 0.5 feet per second. The proposed intakes would have horizontal passive screens located approximately five (5) feet off of the bottom. Mechanical screens may be used at the intake pump station facility. If these screens are used, a trash rack grating system would replace the horizontal passive screen at the intake structure. Additional information is provided in the supplemental report *Biota Transfer Control Facilities and Criteria.*

Comment 11: *Coho salmon Oncorhynchus kisutch and Chinook salmon Oncorthynchus tschawytscha (page 61) are species which are not present in the Hudson Bay drainage. The correct spelling of the scientific name for rainbow trout is Oncorhynchus mykiss.*

Response: This correction will be incorporated in the Final Environmental Assessment.

Miscellaneous Comments

Comment 1: *The reference to the Rafferty-Alameda project incorrectly portrays the project as partially contributing to North Dakota's need for the NAWS project. The Rafferty-Alameda project provides flood protection to North Dakota. While the project is intended to be operated in a way which mirrors the natural hydrograph, the state can request Canada to hold off its allocation for a later date. The argument that it is detrimental to the water supply of Minot is inaccurate.*

Response: The United States willingly participated in the construction of these two dams to provide downstream flood control assistance. However, water quality in the Souris River continues to be a problem during certain times of the year. Historically, the United States has received 80-85 percent of the runoff on the Souris River basin, while entitled to 50 percent of the runoff which would have occurred in a state of nature at the border. This is because Canada has been unable to capture and store their full share of runoff generated in the basin. Studies undertaken during the environmental review of the Souris Basin Flood Control Project did however, show that the project will result in a reduction of flow within the United States. During this review, computer modeling conducted by the U.S. Army Corps of Engineers (and others) indicated that any effects would be on water rights junior to the U.S. Fish and Wildlife Service.

According to the report *Rafferty-Alameda Dam Project Initial Environmental Evaluation, Volume 1,* prepared for Environment Canada, "After completion of the Project, the United States would deliver to the Manitoba boundary only sufficient water to meet the requirements of the Interim Measures. The frequency and duration of this minimum flow delivery would probably increase over pre-Project conditions as demonstrated by an analysis conducted by Manitoba... The Project would reduce the total amount of water reaching North Dakota, and so would affect all users. A reduced supply of water may be available to all users."

Comment 2: *Table 3 (page 6) appears to be a misleading comparison of water quality sources. The Missouri water is fully treated while the community water sources do not have similar levels of treatment.*

Response: The purpose of Table 3 is to illustrate the current water quality of public water supply systems in the project area which have elected to participate in the project, as a partial statement of the need for improved supplies. Alternative B includes sufficient treatment of the water supplies identified in Table 3 to match that expected with treatment of Missouri River water.

Comment 3: *It is unlikely that an increase in waste water flows would benefit the Souris River because of the low water quality relative to the Souris River (page 43).*

Response: Conditions of the existing point source pollution discharge permit for the Minot wastewater treatment plant will continue to be met with the NAWS project. There is very little, if any, negative impact to the Souris River due to Minot wastewater discharges. Wastewater passes from aeration basins to 5 lagoon cells totaling 200+acres, and from there into four 40 acre wetland cells. Prior to release from the wetlands, the treated water meets all current State and Federal wastewater quality standards. As the water flows from the wetland complex, it is further treated by biological and mechanical processes as it travels down a 2 mile natural drainage and into the river. A positive effect is generally realized through increased flow into the system.

The Sundre and Minot Aquifers, currently used by Minot as its major source of water supply, are hydrologically connected to the Souris River. Before the 1970's when Minot began to develop the Sundre Aquifer, the hydraulic gradient at some locations in the aquifer was towards the river. With development of Minot's wells and the subsequent drop in groundwater levels, the gradient has changed so that it is now towards the wells and away from the river. If the proposed alternative is constructed and lower demands are subsequently placed on the groundwater system, the hydraulic gradient should be reduced, potentially to the point where flows are reversed and the Souris River would again be supplemented by the groundwater system. The Minot Aquifer, though much smaller than the Sundre,

has been used as a water source by the city for a much longer period. If the city discontinues using the Minot Aquifer, its water levels should rebound, with a subsequent reduction in recharge from the Souris River. The net effect should be higher flows in the Souris River.

Comment 4: *The report, page 67, incorrectly states that the International Joint Commission established the U. S. - Canada Consultative Group. The Consultative Group was established by governments to advise on Garrison related issues. The JTC established the Engineering-Biology Task Group, not the Consultative Group (page 69).*

Response: This correction will be made in the Final Environmental Assessment.

Comment 5: *Several errors were noted in the historical overview. For example, the North West Company was not the predecessor of the Hudson's Bay Company.*

Response: The entry was taken verbatim from the *Class I Cultural Resources Inventory,* prepared by Byron Olson for American Engineering, P.C., and consequently will require correction in that report along with other Reclamation comments.

Comment 6: *It was noted that the EPA was not part of the impact mitigation team (page 113). Will the EPA be providing comments on this EA ? What role will the EPA have in this project should it proceed (e.g approvals)?*

Response: The membership of the Impact Mitigation Assessment team will be decided when it is formalized by the Bureau of Reclamation. Adding a representative of the EPA will be considered.

The EPA has several other roles, including membership on the GJTC, in providing technical assistance and agency review. EPA must be consulted according to the Garrison Diversion Reformulation Act for transboundary issues. EPA will also be involved in any review for compliance with Section 404 of the Clean Water Act.

Comment 7: *On page 30, it is stated that mainline from lake to Minot is 42 inches. Figure 4 shows the pipeline diameter decreasing from 42 inches to 22 inches at Minot.*

Response: This correction will be incorporated in the Final Environmental Assessment.

Comment 8: *On page 67, the correct spelling of the scientific name of Smallmouth Buffalo is Ictiobus bubalus.*

Response: This correction will be incorporated in the Final Environmental Assessment.

Comment 9: On page 14 7 (Appendix B), should add Chinook Salmon Oncorhynchus tschawytscha to the list of fish species occurring in the Missouri River but not in either the Souris River or Lake Winnipeg.

Response: This correction will be incorporated in the Final Environmental Assessment.

ENVIRONMENTAL

PROTECTION

AGENCY

Environmental Protection Agency

Comment 1: *Section 2.5 of the DEA indicates that evaluation continues for three intake site options. Subsequent discussions indicate that option 11, the Lake Audubon deep water intake, may be selected as the preferred intake location. The DEA notes, and EPA concurs, that a deep water intake is preferable due to lessor impacts from warm temperature influence, and turbidity. Since the DEA doesn't provide water quality information, EPA cannot make an evaluation of the intake site options. However, EPA recommends that consideration of the preferred intake location include obtaining the best quality raw water associated with meeting present and future Safe Drinking Water Act requirements.*

Response: The North Dakota State Water Commission (NDSWC) is evaluating water quality conditions in both Lake Audubon and Lake Sakakawea. The water quality analysis includes water column profiles for temperature, dissolved oxygen, turbidity, pH and algae. A long-term water quality program has been implemented to compare water quality constituents in the two potential sources of supply for the NAWS project. This information will be used to identify the best source in terms of raw water quality, treatment consequences, and cost.

Comment 2: *Bacteria attached to particles can be up to 100 times more resistant to disinfection than free-floating bacteria. For this reason, EPA's Surface Water Treatment Rule (SWTR) encourages public water systems to achieve the majority of pathogen inactivation after filtration (e.g., after achieving the 0.5 NTU standard). Since only pre-treatment of the raw Missouri River water is proposed at the intake location (without filtration), turbidity becomes an important factor for achieving desired disinfection results. The higher the turbidity, the less effective even ozone becomes at inactivating pathogens. As such, EPA recommends that consideration of the preferred intake location include obtaining raw water with the lowest possible turbidity.*

Response: To our knowledge, EPA regulations are designed to assure the adequate disinfection of drinking water through the contact time (CT) concept. The Guidance Manual to the Surface Water Treatment Rule does not stipulate that CT must be achieved after filtration. Many drinking water treatment plants in the United States currently achieve their required CT through prechlorination (chlorination of the raw water before it is filtered).

The reference which cites the 100-fold decrease in disinfection effectiveness was for laboratory disinfection research conducted on attached and unattached biofilm bacteria using free chlorine, chlorine dioxide, and monochloramines. The attachment medium on which the biofilm bacteria was grown included granular

activated carbon particles, metal coupons, and glass microscope slides. Attached biofilm. bacteria form a capsular material of extracellular polysaccharides. Chlorine has a difficult time penetrating this material in comparison to chloramines. While we certainly acknowledge this research, we believe that the findings are not directly applicable to the effectiveness of the pretreatment methodology in the Preferred Alternative (i.e, ozone as a primary disinfectant for pathogens followed by a chloramine residual). We believe that the research conducted as part of the *Northwest Area Water Supply Project Chloramine Challenge Study - December, 1995* provides more specific and applicable insight to the turbidity/disinfection issue.

The NAWS Chloramine Challenge Study disinfection experiments were conducted on Lake Audubon water samples at ambient turbidities using seeded organisms. The range of ambient turbidities represent a 16-fold increase between the lowest and highest values for the raw water used in the experiments. It was demonstrated that both *Giardia* and virus were inactivated by the disinfectants to levels exceeding the SWTR requirements at these turbidities. For the three water quality samples, the following disinfection performance for *Giardia* was achieved:

Date	Turbidity (NTU)	Ozone Residual (mg/L)	Disinfection Results
3/12/95	0.4	0.40	Exceeds 3-log reduction in 30 sec. contact time
5/20/95	6.4	0.30	Exceeds 3-log reduction in 30 sec. contact time
8/21/95	1.8	0.31	Exceeds 3-log reduction in 60 sec. contact time

The results indicate that turbidity in the raw water supply had little influence on disinfection effectiveness. Based on these results, it is not anticipated that disinfection would be hindered at the levels of turbidity expected in either Lake Audubon or Lake Sakakawea.

Comment 3: *Ozone disinfection is effective at breaking down high and medium molecular weight total organic carbon (TOC) into molecular weight biodegradable TOC. A specific biodegradable TOC parameter of concern, known as assimible organic*

carbon (AOC) always increases with respect to non-ozonated water. If the resulting AOC concentration exceeds 100ppb, it will cause an increase in the growth of the biofilm density (slime) on the inner pipeline wall, and may cause increased sloughing of the biofilm into the flow of pre-treated water. As a way of lowering this AOC concentration, public water systems typically follow ozone disinfection with a biologically active filtration method consisting of a granular activated carbon media(BAC). While the BAC produces finished water having a higher heterotrophic bacteria plate count, the water is more stable with regard to biota regrowth potential. Accordingly, the NAWS project's proposed ozonation of raw water at the intake size without filtration will likely cause an increase in the production of microorganism in the pre-treated water along the length of the pipeline. While we understand that chloramine residual concentrations ranging from 0. 2 to 1. 0 mg/L are to be maintained for controlling biota regrowth and pipeline slime, we still expect an increase in the biofilm density, due to the increased concentration of AOC. A discussion should be provided of the impact of this ozone induced nutrient, particularly as it relates to spillage of pre-treated water at either the Minot treatment plant, or at a potential pipeline rupture, and the subsequent potential for transfer of non-native biota into the Souris River. Additionally, the discussion should include consideration of locating the intake site in an area of low TOC in the raw water.

Response: As you are aware, all water distribution systems contain biofilms, although these biofilms; are not generally associated with either human or fish pathogens. Typically, a disinfectant residual is maintained within a water distribution system to inactivate biofilm, organisms which may slough from the pipeline wall and enter the bulk water. In the case of the NAWS pipeline, a disinfectant (chloramine) residual will be maintained in the water column.

To control biofilm growth and problems associated with nitrification, water utilities using chloramination often switch to free chlorine for one to six weeks per year. The free chlorine acts as a "shock" to the system, and aids in cleaning out unwanted biogrowth. Because free chlorination is employed for only a short period of time, the resultant increase in disinfection by-product formation is not considered a major water quality issue. Facilities for shock chlorination, together with physical pipeline cleaning, will be incorporated into the design of the pipeline to reduce the potential for slime growth.

It is recognized that ozone reacts with TOC in the water to form AOC at a concentration which is higher than the AOC concentration in the raw water, and it is also recognized that this will likely result in increased biofilm activity in the pipeline. However, chloramines have been shown to control biofilms (even to a greater extent than free chlorine). Chloramine residuals will be maintained at less

than 1 mg/L to mitigate potential impacts to receiving waters, should a discharge from the pipe system occur. However, chloramine concentrations as high as 4-5 mg/L may be temporarily employed should a problem be detected. Should biofilm sloughing occur, the free-floating biofilm will be exposed to the chloramine residual disinfectant. In the event of a leak from the pipeline, or a discharge from the Minot water treatment plant, any free-floating biofilm material should already be inactivated by the chloramine. It should be noted that the water will have been disinfected to a level similar to that stipulated by the SWTR (4 log inactivation of virus; 3 log inactivation of *Giardia)* before it reaches the divide.

The key issues concerning CT credit need to take into account that disinfection will be provided to Safe Drinking Water Act (SDWA) disinfection requirements for biota transfer control. The NAWS Engineering - Biology Task Group's report stated that if disinfection to this level is achieved, there would be no concern regarding leakage, pipeline rupture, or other drainage from the pipeline. If 4-log virus and 3-log *Giardia* inactivation is achieved at the intake, then the SDWA requirements for disinfection of the water supply (including filtration at the Minot water treatment plant) would also be achieved.

Comment 4: *We are concerned that the discussions on pages 32 and 33 of the DEA do not provide sufficient information regarding the elimination from consideration of the alterative of full treatment at the raw water intake location (either Lake Sakahawea or Lake Audubon). This alternative reduces the risk of interbasin biota transfer to "irtually none" (see Table S-1, p. 70), and at a project cost increase of apparently only 12%. As such, we believe it would be helpful for a more detailed comparative risk analysis be presented that compares this alternative to the other alternatives presented in the DEA, and provides more information as to why the option is cost prohibitive.*

Response: Previous studies have evaluated the potential for treatment of the NAWS water supply at either Lake Audubon or Lake Sakakawea. The cost of treatment at the Minot WTP was developed in the *Northwest Area Water Supply Project, Final Report - Pre-final Design, June 1995.* The estimated construction cost of $12.2 million was increased by 30 percent to account for contingencies, engineering, and administration. The resulting project cost is $15.9 million.

Cost estimates for a water treatment plant at the raw water intake location were revised in March 1994 for use by, and consultation with, the NAWS Engineering - Biology Task Group in the preparation of their report dated May, 1994. The construction cost for a water treatment plant at the intake location was identified at $21.7 million. The project. cost (including 30 percent for contingencies, engineering, and administration) is $28.2 million.

The difference in these costs for the alternative treatment plant locations is $12.3 million ($28.2M - $15.9M). If the project cost for the intake chloramination facility is included for the Minot water treatment plant alternative, the difference in costs between the alternatives is reduced to $12 million.

The NAWS project would be constructed in phases, with the first phase being the water supply to Minot. Construction of the first phase (at an estimated project cost of approximately $45 million), is required before revenue from water sales can be generated. Construction of the first phase is anticipated to occur over a five year period, which will make financing of the project significantly more difficult. The difference in project costs for the water treatment plant alternatives ($12 million) is a significant portion (27 percent) of the anticipated Phase I cost. Furthermore, the entire cost of the treatment plant would have to be financed as part of the first phase. This increases the first phase cost by $27.9 million (a 60 percent increase), which is a significant financial burden on the users of project water and is considered cost prohibitive.

Further, Minot has expressed the desire to maintain operation of its water treatment plant for economic expansion possibilities. In its current configuration, the Minot water treatment plant would be able to treat Missouri River water with few modifications (estimated at $3 to $4 million in construction costs) to accommodate the water demands under Phase 1. Construction of a new water treatment plant at the intake would initially result in the closure of the Minot water treatment plant (loss of existing invested capital). Therefore, the use of Minot's water treatment plant was considered the most viable and most supportable treatment alternative in terms of costs, financing, and use of existing facilities.

The risk of biota transfer associated with water treatment plant location and treatment alternatives is highly qualitative. The table on page 70 of the Draft Environmental Assessment was developed as part of the NAWS Engineering - Biology Task Group's report, May 1994. This table uses qualifiers to describe the different levels of risk between treatment strategies (low, very low, extremely low, etc.). These comparisons do not include risks from other non-project pathways and are not considered quantitative.

The NAWS Engineering-Biology Task Group's report referenced in your comment contains the following conclusion:

> "If the raw water were [sic] disinfected to drinking water standards in the Missouri River drainage [sic], there would be no concerns regarding leakage, pipeline rupture, or other drainage from the pipeline during

routine dewatering. Engineering designs would, therefore, be in accordance with "standard practice" and generally accepted safety factors."

Based on the NAWS Chloramine Challenge Study, 4-log virus reduction and 3-log *Giardia* reduction is achievable using either five minutes of free chlorine contact followed by ammonia addition to form chloramines, or by ozone disinfection. We consider the risk of biota transfer under these conditions to be minimal.

A detailed benefit-cost evaluation which would consider all costs to society associated with each alternative and assignment of risk probabilities to each alternative would also need to include a comparison with background risk due to natural and man-made processes. We considered preparing a risk assessment for this project but because of its subjective nature, we do not believe it will add value to the decision making process. We believe that the studies done to date have shown that the preferred alternative poses minimal increased risk of interbasin biota transfer, over and above the background risk.

Comment 5: *Section 3.6.4 of the DEA notes that the following State commitments will be developed at a later time: raw water monitoring plan; long-term water monitoring plan for assessing pre-treatment effectiveness; design and construction specifications, long-term operation, maintenance, and replacement plan; and an emergency operations plan. Without this information, EPA cannot make an adequate evaluation of the potential for interbasin biota transfer of pre-created water in the pipeline.*

Response: The NAWS Chloramine Challenge Study was conducted, in part, to evaluate the effectiveness of disinfection using Lake Audubon water as a worst case water quality condition compared to Lake Sakakawea. The results of the study indicated that the requirements established by the Garrison U.S./Canada Consultative Group for the control of biota transfer, can be met. The collection of water quality information on both the Lake Audubon and Lake Sakakawea sources of NAWS water has been initiated. This data will be used to address the operating conditions for the disinfection facilities, rather than used to determine whether or not disinfection can meet biota transfer disinfection requirements, since the latter has already been determined.

A supplemental report, *Biota Transfer Control Facilities and Criteria,* has been prepared to describe the water quality monitoring plans, facilities design criteria and layout, operation and maintenance plans, and emergency operations associated with the NAWS project. This report has been distributed to the Garrison Joint Technical Committee for consideration.

Comment 6: *At some time during the service life of the pre-treatment pipeline, spillage should be assumed. A discussion should be presented of the potential for pipeline spillage, the reasonable measures taken to reduce risk of interbasin biota transfer, and a determination of an acceptable level of risk in relation to other naturally occurring, or man-caused, interbasin biota transfer risks.*

Response: According to the NAWS Engineering - Biology Task Group's report, there would be no concern regarding pipeline spillage if disinfection requirements were met. Since the publishing of the NAWS Engineering - Biology Task Group's report, consultations with the GJTC have primarily concentrated on reducing the risk of catastrophic failure and releases of large quantities of pretreated water into the Hudson Bay basin.

Comment 7: *EPA appreciates that wetlands will be avoided along the pipeline routes whenever possible, and that appropriate mitigation measures will be used when wetlands cannot be avoided. Elsewhere in the DEA, it is noted that spillage of pre-treated water could impact fisheries or aquatic communities if a pipeline break occurs. However, no mention is made of the effect of chloramine residual concentrations in wetlands due to pipeline breaks, or expected leakage at pipe junctions. A description should be provided of these impacts, and an explanation of mitigation measures taken to avoid these impacts.*

Response: The supplemental report *Biota Transfer Control Facilities and Criteria* describes the control features and facilities which will limit spillage should a pipeline rupture occur. The report also identifies pipeline testing and construction methods intended to limit joint leakage. Instrumentation and automatic controls will limit the potential volume of accidental pipeline discharges.

As described in Section 3.8.2 of the DEA, temporary impacts to invertebrates would be expected should a pipeline break occur in or near a wetland. Within large permanent wetlands, the pipeline joints would be welded to limit joint leakage for steel pipes and mechanically restrained joints would be used for ductile iron pipe.

MANITOBA ENVIROMENT

Manitoba Environment

General Comments (in response to comments contained in the Manitoba Environment letter)

1. The NAWS Engineering - Biology Task Group was appointed by the Garrison Joint Technical Committee (GJTC) in 1993 to evaluate the proposal of the Northwest Area Water Supply (NAWS) project to distribute Missouri River water into the Hudson Bay drainage. The NAWS Engineering - Biology Task Group concluded in their report to the GJTC that the combination of Minot treatment, chloramination, blow off containment structures, extra signing, motor operated mainline valves, welded pipe joints, water treatment plant containment, and water treatment plant flood control would provide a risk level of "very low." The NAWS Engineering - Biology Task Group also concluded that "If chloramination within the Missouri River drainage proves to be effective in addressing biota transfer concerns, standard engineering practices for construction, maintenance, and replacement could be followed." This conclusion was accepted by the Garrison U.S./Canada Consultative Group.

   The Preferred Alternative incorporates all but one of the features described in the preceding paragraph (welded or mechanically restrained joints will be implemented at stream crossings), with the added measure of ozonation pretreatment. Additional safeguards are employed to further reduce the risk of biota transfer. These include a feedback system to continually monitor and adjust the ozone and chloramine dosage, and automatic shut down of the pipeline if a rupture is sensed, the telemetry system fails, or if there is a power failure at any facility along the pretreated water pipeline.

   With required monitoring of the effectiveness of the pretreatment process, proper operation and maintenance of the transmission pipeline and safety features, the risk of a transfer of biota to Canadian waters is very low. Only through a simultaneous combination of system failures could a transfer occur, e.g. a failure of the pipeline concurrent with a failure of the supervisory control and data acquisition (SCADA) control system, which results in an unobserved release of a substantial volume of water at a point near a watercourse in conjunction with a failure of the disinfection system. This combined failure would also have to be coincident with the presence in the pipeline of a viable species of concern which remains viable until it passes into Manitoba waters.

2. The issue of full treatment versus pretreatment at the intake site is a difficult, but critical one. The purpose of the proposed NAWS project is to provide a reliable source of high quality water to northwestern North Dakota for municipal, rural, and industrial uses. Technical studies have been conducted to find a solution that is responsible and reasonable from both an economic and environmental standpoint. Pretreatment using both ozone and chloramine, as proposed in the Preferred Alternative, will meet requirements set by the Garrison U. S./Canada Consultative Group for prevention of biota transfer. The

Northwest Area Water Supply Project Chloramine Challenge Study - December 1995 demonstrated that pretreatment with either chloramine or ozone provides disinfection of *Giardia* to 3- log detection (inactivation) and Bacteriophage to 4-log detection (inactivation). The Canadian Section of the GJTC considers use of both ozone and chloramine "to provide a disinfection residual as providing a higher level of safety than only having a chloramine treatment" (letter to George Malleck, September 6, 1996). We believe the incremental reduction in the environmental risk of biota transfer provided by full treatment at the intake, compared to that of pretreatment, does not warrant the additional cost of constructing full treatment facilities at the source.

The North Dakota State Water Commission (NDSWC) has initiated water quality monitoring at the proposed intake sites (both Lakes Sakakawea and Audubon). Turbidity is one of the parameters that is being monitored. Data collected to date indicate that turbidity levels will likely remain relatively low. The highest level of turbidity from water quality samples taken from November 1994 to August 1995 was 6.4 nephelometric turbidity units (NTU). At this turbidity level, over 3-log *Giardia* inactivation was achieved in the NAWS Chloramine Challenge Study. The data collected by the NDSWC will be provided to the GJTC on a yearly basis. If turbidity levels raise concern, the State of North Dakota will consult with the GJTC for their recommendation on remedial action to be taken.

3. The publication *Applying Manitoba's Water Policies* contains policy statement 3.5 which states in part "Transfer of untreated water across the Continental Divide (to or from the Hudson drainage area) shall be opposed." We believe that the safeguards proposed for the NAWS project, which include pretreatment technologies that have been shown to meet the 1994 disinfection standards of the U. S. Environmental Protection Agency (EPA) Surface Water Treatment Rule, provide a reasonable level of protection against biota transfer and meet the intent of Manitoba's policy statement.

Specific Comments

Comment 1: *Per capita demand of 130 US gallons is high for an average day with peak day factors of 2.5. This should be reviewed with a view towards initiating a conservation program or implementing an appropriate pricing policy.*

Response: The average day demand and peaking factors cited in the Draft Environmental Assessment (DEA) were developed from historic use data in the project area. The water use data for cities in the project area is documented in the *1993 Community Needs Assessment, Northwest Area Water Supply Project, Pre-final Design,* by Houston Engineering et al.

Comment 2: *Pages5, 13, 40, 42, and 47: It is stated that construction of the two Canadian reservoirs (Rafferty and Alameda) has resulted in reduced flows on the Souris River, thus affecting availability of water in North Dakota to meet municipal, rural, and industrial needs. It is implied that construction of the Canadian reservoirs has therefore been partly responsible for creating a need for the present project.*

It is important to note that significant funding was provided by the United States to assist in the construction of these reservoirs to provide flood protection to North Dakota. In the absence of flood protection measures being in place in Canada, more costly measures would have likely been needed in North Dakota, resulting in similar water flow reductions to downstream systems.

The contention that the reservoirs have or will result in a "reduction of flows" is unproven and open to interpretation. There is a joint operating plan in place to maximize benefits to both parties and which includes "evaporation credits" for Saskatchewan. North Dakota benefits from flood control in the spring and greater assurance of a stable water supply through timed releases during the rest of the year.

Response: The United States willingly participated in the construction of these two dams to provide downstream flood control assistance. However, water quality in the Souris River continues to be a problem during certain times of each year.

Historically, the United States has received 80-85 percent of the runoff on the Souris River basin, while entitled to 50 percent of the runoff which would have occurred in a state of nature at the border. This is because Canada has been unable to capture and store their full share of runoff generated in the basin. Studies undertaken during the environmental review of the Souris Basin Flood Control Project did however, show that the project will result in a reduction of flow within the United States. During this review, computer modeling conducted by the U.S. Army Corps of Engineers (and others) indicated that any effects would be on water rights junior to the U. S. Fish and Wildlife Service.

According to the report *Rafferty-Alameda Dam Project Initial Environmental Evaluation, Volume 1,* prepared for Environment Canada, "After completion of the Project, the United States would deliver to the Manitoba boundary only sufficient water to meet the requirements of the Interim Measures. The frequency and duration of this minimum flow delivery would probably increase over pre-Project conditions as demonstrated by an analysis conducted by Manitoba.... The Project would reduce the total amount of water reaching North Dakota, and so would affect all users. A reduced supply of water may be available to all users."

Comment 3: *Page 6: Table 3 is not a fair representation of water quality among sources since it appears to contain a mixture of treated, untreated, and partially treated water. Figures shown for the Missouri River are projections following treatment, and while unclear, it appears that water quality shown for the various communities are based upon existing levels of minimum treatment. In most cases, minimum treatment includes only disinfection. Sufficient additional treatment technologies are available, such as reverse osmosis, to provide equivalent quality from the numerous groundwater sources relative to the projections for the treated Missouri River.*

Further, as stated on page 13, "sufficient groundwater supplies exist in nearly every location of the NAWS area", and on page 40, "Plentiful supplies of groundwater can be found in numerous locations within the eight-county are", satisfactory treatment of these sufficient supplies can be achieved to produce equivalent quality water. This tends to support Option B and raises questions about the need for Missouri River water.

Response: The purpose of Table 3 is to illustrate the current water quality of public water supply systems in the project area which have elected to participate in the project, as a partial statement of the need for improved supplies. Alternative B includes sufficient treatment of the water supplies identified in Table 3 to match that expected with treatment of Missouri River water.

Plentiful groundwater supplies are found in numerous locations in the study area, but not in all locations. Generally, most groundwater is of very poor quality, requiring treatment (as identified in Alternative B) to be comparable with treated Missouri River water. Each community, with the exception of Parshall, would need a reverse osmosis treatment plant to provide high quality, treated water which would be low in TDS, sulfates, sodium, and total hardness. While the quality of finished water from a reverse osmosis system would be very good, the process requires high energy use and includes the generation of a brine which requires disposal. The brine generated by the reverse osmosis treatment will total approximately 25 percent of the water treated, thus increasing the amount of groundwater pumped (from sometimes limited resources) by 33 percent. Alternative B is also the least economical alternative, with annual operating costs nearly 70 percent higher than the preferred alternative.

Comment 4: *Page 14: Closure of the Minot Air Force Base has been discussed. If this occurs, significant reduction in water requirements may occur since this is the second largest community to be served by the proposal.*

Response: Closure of the Minot Air Force Base (AFB) would result in reduced water requirements. However, closure of the Minot AFB, while a topic of considerable speculation throughout North Dakota, is neither certain nor imminent. NEPA documents are prepared with anticipated project impacts evaluated "based on the reasonably foreseeable future". Accordingly, the impacts of closure of the Minot AFB are not included in the DEA.

Comment 5: *Page 29: Reasons for rejecting a number of the alternatives do not appear well justified. For example and as previously mentioned, it is stated on page 13 and page 40 that there is sufficient groundwater supply in nearly every location of the NAWS area, but Alternative 6 was rejected because of drawdown of the Grenora Aquifer during the drought years 1988 to 1992. It is reasonable to assume that all surface water and many groundwater sources declined during this drought period. Groundwater aquifers may provide a better buffer to withstand drought conditions than surface water sources. The Grenora Aquifer may have recharged during the last five years following cessation of the drought period.*

Response: There are sufficient quantities of groundwater in many areas of the NAWS project area. However, most of these groundwater supplies are characterized as hard, with high levels of dissolved solids requiring expensive treatment.

As is stated in section 3.2.1, groundwater supplies should be considered in those communities where pipeline and pumping costs from the Missouri River are excessive. Examples of such communities are Grenora and Wildrose, which are served with advanced treatment of local supplies in the preferred alternative.

Comment 6: *There is mention that costs and federal and state funding mechanisms have significantly influenced the choice of options, resulting in options being selected that have low risk of interbasin transfer of biota rather than selection of options with no risk While economics are acknowledged to play a large role in all projects, reliance upon good science and sound ecosystem-based management principles should receive considerable weight during the decision-making process when there is risk for potential interbasin transfer of biota. Complete treatment at the source was rejected because the cost was estimated to be $12. 4 million more than the Preferred Option. This additional cost is about 12.5% of the total project cost and would likely be well within the normal engineering contingency. Further, complete treatment at source was partly rejected because, as suggested on Page 33, construction of the facility would be required before funding could flow for the remaining components.*

Response. Previous studies have evaluated the potential for treatment of the NAWS water supply at either Lake Audubon or Lake Sakakawea. The cost of treatment at the

Minot water treatment plant was developed in the *Northwest Area Water Supply Project, Final Report - Pre-final Design, June 1995.* The estimated construction cost of $12.2 million was increased by 30 percent to account for contingencies, engineering, and administration. The resulting project cost is $15.9 million. Cost estimates for a water treatment plant at the raw water intake location were revised in March 1994 for use by, and consultation with, the NAWS Engineering - Biology Task Group in the preparation of their report dated May, 1994. The construction cost for a water treatment plant at the intake location was identified at $21.7 million. The project cost (including 30 percent for contingencies, engineering, and administration) is $28.2 million.

The difference in cost between the alternative treatment plant locations is $12.3 million ($28.2M - $15.9M). If the project cost for the intake chloramination facility is included for the Minot water treatment plant alternative, the difference in costs between the alternatives is reduced to $12 million.

The NAWS project would be constructed in phases, with the first phase being the water supply pipeline to Minot. Construction of the first phase is anticipated to occur over a five year period (at an estimated project cost of approximately $45 million). Thirty-five percent of the cost of this pipeline will be funded by water fees. The most difficult part of any revenue generating project to finance is that portion which is to be built before the project can generate revenue. Obviously, if water fees are to be used to pay for the project, the project cannot begin to generate revenue until water can be sold.

Under the Preferred Alternative, expansion of the Minot water treatment plant will be deferred until after water from the project reaches Minot. The estimated cost of the expansion and upgrade of the Minot water treatment plant is approximately $15.9 million. With full treatment within the Missouri River basin, not only would the pipeline have to be built before water can be sold, but a treatment plant would also have to be constructed, thereby increasing the up-front cost by $27.9 million (an increase of approximately 60 percent). The entire cost of the treatment plant would have to be financed as part of the first phase, which places a significant financial burden on the users of project water and is considered cost prohibitive.

Minot has expressed the desire to maintain operation of its water treatment plant for economic expansion possibilities. In its current configuration, the Minot water treatment plant would be able to treat Missouri River water with few modifications (estimated at $3 to $4 million in construction costs) to accommodate the water demands under Phase 1. Construction of a new water treatment plant at the intake would initially result in the closure of the Minot

water treatment plant (loss of existing invested capital). Therefore, the use of Minot's water treatment plant was considered the most viable and most supportable treatment alternative in terms of costs, financing, and use of existing facilities.

The additional cost of full treatment at the source is close to the normal contingency added for any construction project of this type and magnitude (contingencies for the NAWS project are estimated to be about ten percent). However, by adding $12 million to the project, contingency costs will also increase because of the increase in project costs.

Comment 7: *The present NAWS proposal involves 15 communities rather than 14, as cited in Mr. Breitzman's letter of June 9, 1997.*

Response: The NAWS project includes fifteen communities when the city of Rugby is included. The DEA however, does not evaluate the impacts of the Rugby component of the project. This point will be clarified in the final document.

Comment 8: *Page 15: It is stated that the pre-treatment design is intended to meet current US EPA drinking water disinfection standards. However, as shown in Appendix G, these rules are presently under review and may change in the near future when new scientific information emerges to demonstrate that current requirements are insufficient. It is unclear how on-going, routine changes in drinking water disinfection standards will be incorporated into the pre-treatment system. Further, it is stated that North Dakota Department of Health has agreed that primary disinfection credit may be achieved However, the supporting documentation (Appendix G) contains numerous qualifications related to this opinion (e.g., "if the above criteria remain valid, are met, and raw water disinfection alone is capable of satisfying inactivation requirements, post-disinfection would be limited to..."). As well, it is our understanding that ongoing monitoring requirements to demonstrate compliance with primary disinfection credits are not part of the Surface Water Treatment Rule. This may have little significance in normal water treatment systems where all treatment processes occur at the same site. However, in this case, pre-treatment is being proposed to occur 45 miles from the water treatment facility in Minot.*

Response: The pretreatment design is intended to meet U. S. EPA surface water disinfection standards current **in September 1994.** This was specified in conclusion 6(i) of the September 23, 1994 conclusions of the Garrison U.S. Canada Consultative Group after review of the NAWS Engineering-Biology Task Group's report. The qualifying date for the statement was inadvertently omitted From the text in the DEA. This change will be made in the Final Environmental Assessment.

It should be noted that the project will comply with any future changes in the EPA drinking water standards. Reference to Appendix G, and to changing rules, refer to EPA drinking water standards for potable water supplies. This should not be confused with, nor considered part of, the project requirements for biota transfer control.

Comment 9: *Pages 34 and 115: If formed, the impact mitigation team should include a representative from the US Environmental Protection Agency.*

Response: The membership of the Impact Mitigation Assessment team will be decided when it is formalized by the Bureau of Reclamation. Adding a representative of the EPA will be considered.

Comment 10: *Page 67: It is mistakenly stated that the International Joint Commission established the U. S. -Canada Consultative Group. The Consultative Group was established by two federal governments to review and advise on Garrison-related issues and reports through the State Department and Foreign Affairs.*

Response: The comment is correct and the appropriate changes will be incorporated in the Final Environmental Assessment.

Comment 11: *Page 73: The pipeline flow rate cited of 26 million gallons per day is less than the maximum (28 million gallons per day), resulting in contact time of 6.5 hours rather than 5.9.*

Response: Currently, the maximum project design flow rate is 26 million gallons per day (mgd). References to maximum flow rates of 28 mgd are from previous reports that included additional users. The chloramine residual will be maintained at low levels for biofilm control, rather than to provide disinfection contact time. Reference to contact time will be eliminated in the Final Environmental Assessment.

Comment 12: *Page 90, last paragraph: Additional information should be included in the historical overview. The Hudson's Bay Company was chartered in 1670 and was granted a trade monopoly in all lands draining into Hudson Bay. Since the 1680's, it has conducted business on the western shore of Hudson Bay and western Canada. The North West Company and the Hudson's Bay company were amalgamated in 1821.*

Response: The entry was taken verbatim from the *Class I Cultural Resources Inventory*, prepared by Byron Olson for American Engineering, P.C., and consequently will require correction in that report along with other Reclamation comments.

Comment 13: *Page 149: Smallmouth buffalo have been located in the south basin of Lake Winnipeg.*

Response: This correction will be incorporated in the Final Environmental Assessment.

Comment 14: *Page 43: It is unlikely that an increase in wastewater flows would be considered a benefit to the Souris River during low flow periods, since wastewater flows would typically be of lower quality relative to the Souris River.*

Response: Conditions of the existing point source pollution discharge permit for the Minot wastewater treatment plant will continue to be met with the NAWS project. There is very little, if any, negative impact to the Souris River due to Minot wastewater discharges. Wastewater passes from aeration basins to 5 lagoon cells totaling 200+ acres, and from there into four 40 acre wetland cells. Prior to release from the wetlands, the treated water meets all current State and Federal wastewater quality standards. As the water flows from the wetland complex, it is further treated by biological and mechanical processes as it travels down a 2 mile natural drainage and into the river. A positive effect is generally realized through increased flow in the system.

The Sundre and Minot Aquifers, currently used by Minot as its major source of water supply, are hydrologically connected to the Souris River. Before the 1970's when Minot began to develop the Sundre Aquifer, the hydraulic gradient at some locations in the aquifer was towards the river, With development of Minot's wells and the subsequent drop in groundwater levels, the gradient has changed so that it is now towards the wells and away from the river. If the proposed alternative is constructed and lower demands are subsequently placed on the groundwater system, the hydraulic gradient should be reduced, potentially to the point where flows are reversed and the Souris River would again be supplemented by the groundwater system. The Minot Aquifer, though much smaller than the Sundre, has been used as a water source by the city for a much longer period. If the city discontinues using the Minot Aquifer, its water levels should rebound, with a subsequent reduction in recharge from the Souris River. The net effect should be higher flows in the Souris River. Appropriate changes to the text will be made in the Final Environmental Assessment.

Comment 15: *Page 44: Brine resulting from the reverse osmosis process could be disposed of through deep-well injection, thus not impacting the quality of surface water resources.*

Response: Treatment of local groundwater supplies by reverse osmosis (RO), as presented in Alternative B, results in a concentrated waste stream that is high in total dissolved solids, sodium, and sulfate. The volume of the RO concentrate (brine) is estimated at approximately 25 percent of the volume pumped from the wells. Several alternatives were considered for disposal of this brine, including deep-well injection and evaporation ponds. Discussion of deep-well injection and evaporation pond alternatives will be added to the Final Environmental Assessment.

In North Dakota, disposal using deep-well injection is regulated by the ND Department of Health. The brine generated by RO systems would result in the injection wells being classified as Class I injection wells, which require disposal below any water bearing strata. Extensive studies, including test drilling to characterize subsurface strata and testing of the receiving formation to determine its suitability, would be required. Subsurface conditions could preclude the technical viability of this option in some areas of the project.

Brine disposal options at the Minot water treatment plant include other alternatives because of the large volumes of brine involved. Evaporation ponds would consume large land areas and be expensive to construct. The recommended brine disposal option for Minot (Alternative B) includes equalization storage with discharge to the wastewater treatment plant. Since the water supply treatment process under this alternative would remove constituents from the water, blending the brine back into the wastewater would put those constituents back into the wastewater stream and should not impact biological wastewater treatment processes.

Comment 16: *Both Alternative A and the Preferred Option pose a significant risk of accidental interbasin transfer of biota to the Hudson Bay drainage basin. This inherent danger is acknowledged in Section 6.0, page 112: "One of the greatest concerns for irreversible commitments of resources is interbasin biota transfer. Most often, when this occurs, the damage is not reversible". It is stated on page 66 that the project sponsors and cooperators "recognize the importance of maintaining a barrier to transfer of biota from the Missouri River basin into the Hudson Bay basin".*

However, there is a relatively high probability of accidental release of untreated or insufficiently treated Missouri River water to the Hudson Bay in during the

expected lifetime of the project. Releases of biota not indigenous to the Hudson Bay basin could result in significant impacts that would not be mitigable. This is based on the following factors:

a) *There is insufficient evidence to demonstrate that all reasonable measures that represent standard good operating practices are proposed to ensure efficacious treatment of biota indigenous to the Missouri River basin, including known bacteria, viruses, protozoans, etc. For example:*

1) *Removal or inactivation of unknown non-indigenous biota such as undefined fish pathogens, is essentially equivalent to the application of treatment technologies to kill unknown or undefined human pathogens in drinking water treatment systems. To effect his result in water treatment, good operating practices dictate the use of a disinfectant of known adequacy, coagulation and settling, and filtration. For protection of human health, these three components must be in place, properly optimized and operated, followed by a rigorous monitoring protocol using suitable surrogates. However, both the Preferred Option and Option A , propose only the use of a disinfectant. Because disinfectants may not inactivate some protozoans presently being more commonly encountered, such as Cryptosporidium, complete treatment, including filtration, is becoming the treatment technology of preference. Parallel or equivalent good operating practices intended to control unknown or undefined fish parasites or pathogens would dictate the application of complete treatment at the source, including filtration, proper operation and optimization, followed by rigorous monitoring to assure efficacy.*

ii) *It is well documented that turbidity significantly reduces the efficacy of standard disinfectants. First, turbidity data are not available from the proposed deep water intake on Lake Audubon, although the project proponents assume that turbidity will be lower at this intake site relative to near-shore intake (e.g., on page 28, it is stated that deep water intakes would provide more favorable temperatures and turbidity for efficient disinfection). However, this assumption is not supported with data. It is understood from communication with Bureau of Reclamation staff (GJTC meeting, July 9, 1997) that no data are yet available from the proposed deep water intake site. Second, it is reasonable to assume that turbidities will likely range above 1.0 NTU, at least seasonally, yet no treatment technologies are proposed to remove*

turbidity prior to disinfection. However, even with removal of turbidity, there still remains the problem of disinfectant effectiveness for surrogate protozoans such as Cryptosporidium, as identified in 16(a) (7).

b) *Given 16(a), there are a large number of potential sources or events that could lead to the accidental release of untreated or insufficiently treated Missouri River water to the Hudson Bay drainage. These include:*

I) *There is no assurance that failure of pre-treatment facilities at Lake Audubon would result in the automatic and immediate shutdown of all pumps located within the Missouri River basin, without intervention being required on the part of an operator. Further, there is no assurance that in the event of failure, all water in the pipeline would remain within the Missouri River basin.*

ii) *A2.4 million gallon overflow basin is proposed to capture flows in the event of an emergency plant shutdown at Minot. Since the pipeline capacity is 26 million gallons per day, the proposed storage basin will hold just over two hours of flow. This is insufficient to cover emergencies that may occur during evenings or weekends.*

iii) *The pipeline is proposed to be constructed of ductile iron with cement mortar lining. These pipe materials have bell and spigot ends which have allowable leakages. Additional allowable leakages can occur at other junctions since the piping sizes varies from 20 to 42 inches in diameter.*

iv) *Leakage can commonly occur due to corrosion failure of the pipeline. The air/vacuum vaults may also be subject to leakage. Ductile iron pipe is heavy, and may result in long-term settlement problems if not installed properly in soft soil conditions. In the event of a rupture of the pipeline within the Hudson Bay drainage basin, particularly where the line traverses ditches, gullies, or intermittent streams, a considerable quantity of water could be lost before being detected and remedied. Living biota present in the pipeline at the time of rupture could he transferred to either the Red or Souris basins.*

v) *Surviving foreign biota from the Missouri River basin may be accidently transferred to the Hudson Bay drainage during improper sludge disposal practices at the Minot drinking water treatment facility.*

c) *Notwithstanding 16(a) and 16(b), there are insufficient regulatory, monitoring, contingency, and operational procedures in place to demonstrate that the project can be operated for its reasonably expected lifetime without significant risk of interbasin transfer of biota:*

I) *Monitoring plans have not been developed to ensure the successful elimination of all reasonably known organisms that may become entrained, although assurances have been provided that such plans will be developed during mid-1997.*

ii) *Contingency plans have not been developed to identify how all reasonably potential failures will be managed. Assurances have also been provided that contingency plans will be developed during mid-1997.*

iii) *Once developed, it is not clear how monitoring and contingency commitments would be incorporated into the routine, legally binding frame work in North Dakota, including responsibility for compliance monitoring. Compliance monitoring and contingency planning are integral parts of the operation of drinking water treatment systems, but it is apparent that these would not apply to the pre-treatment components located within the Missouri River basin.*

d) *Notwithstanding 16(a), 16(b), and 16(c), there are no mechanisms to ensure that advanced drinking water treatment methodologies developed to reflect new scientific findings related to interbasin biota transfer will be incorporated into project components located within the. Missouri River basin. As mentioned in Comment #8, it is stated on page 15 that the pre-treatment design is intended to meet <u>current</u> US EPA drinking water disinfection standards. However, as shown in Appendix G, these rules are presently under review and may change in the near future when new scientific information emerges to demonstrate that current requirements are insufficient.*

Many advances have been made in the last several years related to protection of human health from pathogens through application of appropriate drinking water treatment technologies. It is unclear how on-

going, routine changes in drinking water disinfection standards will be . incorporated into the pre-treatment system to protect waters in the Hudson Bay basin from similar organisms:

1) Plans have not been identified to ensure that future advances made in treatment technologies and which would routinely be applied through voluntary or regulated upgrades to standard drinking water treatment systems, particularly those related to enhanced control of known pathogens, would be incorporated expeditiously into the project. For example, good operating practices in recent years, have more commonly incorporated filtration as part of water treatment systems to eliminate protozoans, such as Cryptosporidium, which are relatively resistant to disinfectants. It is likely that these good operating practices may soon become incorporated into drinking water treatment legislation.

ii) North Dakota Department of Health, in a letter dated may 16, 1997, attached as Appendix G, mentions that a number of changes are being considered to the Surface Water Treatment Rule. Additional changes can be expected to occur routinely throughout the lifetime of the project. While it is clear that these advances would apply to drinking water treatment facilities, it is apparent that they would not apply to the pre-treatment components of the NAWS project that are located in the Missouri River basin.

iii) It is understood that planned revisions to drinking water standards applicable in North Dakota may soon require log 4 reduction of certain pathogens rather than log 3 reduction. Log 3 reduction of Giardia was the target identified during the Northwest Area Water Supply Chloramine Challenge Study to meet, at the time, current U.S. Surface Water Treatment Rule. Notwithstanding the fact that it is now known that Giardia may not have been the best surrogate that could have been selected, there is no mechanism to assure compliance should log 4 reduction be required.

Response: The NAWS Engineering - Biology Task Group, and subsequently, the Garrison U.S./Canada Consultative Group, concluded that the risk of biota transfer of all options presented in the NAWS Engineering - Biology Task Group's report on the NAWS project dated May, 1994 was low. The Garrison U.S./Canada Consultative Group, in September 1994, concluded that Option 1 of the NAWS Engineering - Biology Task Group's report was technically feasible provided that the project proponent could satisfy the GJTC on several other points. One of the

findings of the NAWS Engineering - Biology Task Group, contained in its 1994 report, was that "all pipeline options had a relatively low risk of transferring biota to the Hudson Bay drainage if they included chloramination at the source of the pipeline..." The assertion that there is a "high probability of accidental release of untreated or insufficiently treated Missouri River water to the Hudson Bay basin during the expected lifetime of the project" is contrary to the conclusions of the NAWS Engineering - Biology Task Group, the Garrison Joint Technical Committee, and the Garrison U.S./Canada Consultative Group.

The NAWS Engineering - Biology Task Group also concluded that additional safeguards would lower the already low risk of biota transfer associated with disinfection alone. These safeguards include: one agency responsible for operating and maintaining the entire system; transfer of all water captured in containment structures to either the Minot water treatment plant for treatment, decontamination, or disposal in the Missouri River drainage, handling Minot water treatment plant sludge in such a manner that accidental discharge to the Souris River is not possible; monitoring, maintaining and repairing all structural components as called for in the original designs; monitoring and maintaining the disinfection system to original design standards as well as monitoring other water quality parameters. These additional safeguards, as well as others, are being incorporated in the design of the NAWS project to minimize the potential for biota transfer.

a) We remain committed to the consultative process to ensure satisfactory provision of information referenced in conclusion 6(I.) of the September 23, 1994 conclusions of the Garrison U.S./Canada Consultative Group. A supplemental report, *Biota Transfer Control Facilities and Criteria*, addresses operating practices for the proposed pipeline, appurtenances, pretreatment facilities, and the Minot water treatment plant, with respect to biota transfer control. This report has been distributed to the GJTC for consideration.

I) The NAWS Engineering - Biology Task Group concluded (page 41, *NAWS Engineering - Biology Task Group, May 1994)* that the most acceptable method of fully overcoming the transfer of Missouri River basin biota into the Hudson Bay basin was to treat the water to acceptable drinking water standards prior to its transport into the Hudson Bay drainage. This report was published before a study was conducted to determine the effectiveness of disinfection with chloramine and ozone in addressing biota transfer concerns. The NAWS Engineering - Biology Task Group also concluded that if chloramination. (disinfection) within the Missouri

River drainage proves to be effective in addressing biota transfer concerns, standard engineering practices for construction, maintenance, and replacement could be followed. The 1995 NAWS Chloramine Challenge Study showed that ozone or chlorine pretreatment of raw Missouri River water inoculated with a protozoan noted for its resistance to disinfection *(Giardia)* could achieve 3 logs or greater (99.9%) inactivation by the time water reached the continental divide. In September 1996, the Canadian section of the Garrison Joint Technical Committee expressed a preference for ozone pretreatment and encouraged the state of North Dakota to consider that option (Canadian section GJTC letter to George Malleck, September 6, 1996). Accordingly, ozone pretreatment has been incorporated into the preferred alternative to provide an additional level of protection against biota transfer.

Ozone has been found to be much more effective than chlorine in controlling *Cryptosporidium* and it should be noted that no fish diseases or parasites have been identified which are as resistant to disinfection as *Cryptosporidium*. The NAWS Engineering - Biology Task Group and the Garrison U.S./Canada Consultative Group only identified the disinfection requirements of the USEPA Safe Drinking Water Act, not the entire act, as the requirement for biota transfer pretreatment.

The issue of treating water for human consumption involves the Minot water treatment plant, which will provide multi-barrier treatment. Optimized treatment, proper operation, and monitoring are all a part of the requirements for the potable water supply.

ii) To our knowledge, EPA regulations are designed to assure the adequate disinfection of drinking water through the contact time (CT) concept. The Guidance Manual to the Surface Water Treatment Rule does not stipulate that CT must be achieved after filtration. Many drinking water treatment plants in the United States currently achieve their required CT through prechlorination (chlorination of the raw water before it is filtered).

The NAWS Chloramine Challenge Study disinfection experiments were conducted on Lake Audubon water samples at ambient turbidities using seeded organisms. The range of ambient turbidities represent a 16-fold increase between the lowest and highest values for the raw water used in the experiments. It was

demonstrated that both *Giardia* and virus were inactivated by the disinfectants to levels exceeding the SWTR requirements at these turbidities. For the three water quality samples, the following disinfection performance for *Giardia* was achieved:

Date	Turbidity (NTU)	Ozone Residual (mg/L)	Disinfection results
3/12/95	0.4	0.40	Exceeds 3-log reduction in 30 sec. contact time
5/20/95	6.4	0.30	Exceeds 3-log reduction in 30 sec. contact time
8/21/95	1.8	0.31	Exceeds 3-log reduction in 60 sec. contact time

The results indicate that turbidity in the raw water supply had little influence on disinfection effectiveness. Based on these results, it is not anticipated that disinfection would be hindered at the levels of turbidity expected in either Lake Audubon or Lake Sakakawea.

Turbidity levels encountered during the NAWS Chloramine Challenge Study ranged from 0.80 to 3.5 NTU on Lake Sakakawea, and from 0.40 to 6.4 NTU on Lake Audubon. While the data was not collected at the proposed deep water intake site, the turbidity levels for Lake Audubon should be comparable or lower because the proposed depth is below the trophic zone of biological activity and below depths where wave action could be expected to influence turbidity levels. Lake Sakakawea samples were collected at 55 feet below the surface. Turbidity data collected by the United States Geological Survey at Garrison Darn since 1976 show turbidity ranging from 0.20 to 13.0 NTUs *(06338490, Missouri River at Garrison Dam)*. We are unaware of any research findings showing that turbidity at the levels anticipated will significantly reduce ozone disinfection. Organic material, which may contribute to turbidity levels, will cause an increase in consumption of disinfectant. The disinfection residual will be maintained and monitored, in the preferred alternative, at a

level with an adequate factor of safety to counteract anticipated turbidity levels.

The research conducted as part of the NAWS Chloramine Challenge Study on Lake Audubon water indicated that the sample with a turbidity of 6.4 NTU exceeded a 3-log *Giardia* reduction in 30 seconds of contact at an ozone residual of 0.30 mg/L. The effect of turbidity, based on existing data and process disinfection studies, should not be an issue since safety factors of increased ozone dose capabilities and longer ozone contact detention times will be designed into the project.

Surrogates are commonly used to analyze treatment effectiveness because it is not reasonable to analyze the effectiveness of treatment for every known microorganism. The surrogates chosen for the 1995 NAWS Chloramine Challenge Study were *Giardia muris* and MS2 bacteriophage virus. Laboratory procedures for enumerating and determining the viability of these organisms have been established in past research and were incorporated into the study protocol. To our knowledge comparable laboratory procedures have not been fully established for *Cryptosporidium*.

b) The preferred alternative incorporates pretreatment of Missouri River water within the Missouri River basin to standards accepted by the Garrison U. S./Canada Consultative Group. There is no alternative which includes the transfer of "untreated" or "insufficiently treated" water across the continental divide.

I) These items have been addressed in a supplemental report, *Biota Transfer Control Facilities and Criteria*, which has been distributed to the GJTC for consideration.

ii) The 2.4 million-gallon reservoir at the Minot water treatment plant discussed in past documents, and the DEA was intended for use in the event of either flows in excess of the plant capacity and/or if required to drain the lower reaches of the pipeline. Further review of project facilities during final design review and preparation of the *Biota Transfer Control Facilities and Criteria* report has resulted in the conclusion that this reservoir will not reduce the risk of biota transfer and is not needed.

The Minot plant is currently, and will continue to be, operated on a 24-hour basis. Electrically operated valves at the influent control facility win close automatically in the event of power failure. The plant itself has two feet of freeboard at the normal operating level. The influent control valves will close within 60 seconds which would result in a maximum 0.1 foot increase in water levels in the clarifiers at the maximum flow rates. Float switches in the clarifiers will be hard-wired into the influent control valves themselves. In the event of a pipeline failure requiring drainage of the pipeline, the upstream valve at the pressure reducing station would be shut and pipeline flows would be processed through the treatment plant at a higher rate. Further details are presented in the supplemental report, *Biota Transfer Control Facilities and Criteria*, which has been distributed to the GJTC for consideration.

iii) The NAWS Engineering - Biology Task Group concluded that if chloramination (disinfection) within the Missouri River drainage proves to be effective in addressing biota transfer concerns, standard engineering practices for construction, maintenance, and replacement could be followed. The 1995 NAWS Chloramine Challenge Study showed that ozone or chlorine pretreatment of raw Missouri River water inoculated with a protozoan noted for its resistance to disinfection *(Giardia)* could achieve 3 logs or greater (99.9%) inactivation by the time water reached the continental divide. The Garrison U.S./Canada Consultative Group, in September 1994, concluded that Option 1 of the NAWS Engineering - Biology Task Group's report (which is substantially the preferred alternative) was technically feasible provided that the project proponent could satisfy the GJTC on several other points, The NAWS Engineering - Biology Task Group's report also states on page 21, "if the raw water were [sic] disinfected to drinking water standards .... there would be no concerns regarding leakage, pipeline rupture, or other drainage from the pipeline during routine dewatering."

It is recognized that some joints may leak. After construction, the pipeline will be tested for leaks in segments. The allowable leakages for pipes proposed for the pretreated water pipeline are 20 gallons per day per mile per inch of diameter at the highest operating pressure. The pipe win be buried at depths approaching 7 feet. Minor joint leakage is not expected to come to the surface. Leaks which do surface will be detected through daily observation of the pipeline route and promptly repaired.

iv) A corrosion control system will be installed on the pipeline. Welded or mechanically restrained joints will be implemented at stream crossings and instrumentation will be installed to provide automatic shut down of the pipeline if a rupture is sensed. The water in the pipeline will be pretreated with ozone and have a chloramine residual to address concerns about living biota being present in the pipeline.

v) Sludge management and operational issues at the Minot water treatment plant are addressed in the supplemental report, *Biota Transfer Control Facilities and Criteria,* which has been distributed to the GJTC for consideration. The Minot water treatment plant is a conventional lime softening plant and the lime sludge will have a pH greater than 12. At this pH, no biological activity is anticipated.

c) Environmental commitments to be contained in the Final Environmental Assessment include: providing final design plans and construction specifications for the pretreatment and delivery systems to the GJTC prior to awarding of any construction contract; providing a long-term operations, maintenance and replacement plan to the GJTC; providing an emergency operation plan with special emphasis on potential biota transfer issues to the GJTC; providing an annual monitoring, operational and maintenance report to the GJTC; and permitting the GJTC or its representatives to inspect the system and examine its records at any time. In addition, the current project design includes the reliance on disinfection credit for the raw water disinfection system. This design feature will require compliance monitoring oversight by the ND Department of Health.

d) There are no mechanisms to ensure that advanced drinking water treatment methodologies will be incorporated into project components located within the Missouri River basin. The pretreatment design is intended to meet U S EPA surface water disinfection standards current in **September 1994**. This was specified in conclusion 6(I) of the September 23, 1994 conclusions of the Garrison U.S./Canada Consultative Group after review of the NAWS Engineering-Biology Task Group's report. The qualifying date for the statement was inadvertently omitted from the text in the DEA. This change will be made in the Final Environmental Assessment.

I) As a public water system, the project will be regulated by the North Dakota Department of Health to ensure compliance with federal

regulations. The raw water disinfection system will be an integral part of the public water supply system and will be used to meet Safe Drinking Water Act disinfection requirements. The letter in Appendix G was included in the Draft Environmental Assessment to illustrate that intention. Regulation by the N.D. Department of Health will ensure compliance with future regulatory developments.

The pretreatment criteria established in the September 23, 1994 conclusions of the Garrison U.S./Canada Consultative Group was to meet **the September 1994** EPA surface water disinfection standards. Ozonation, the pretreatment method chosen for the preferred alternative, has been shown to be an effective disinfectant for *Cryptosporidium*.

ii) Through the consultative process, and with free access to inspect the project, a process will exist for discussions concerning upgrading and enhancing the pretreatment technology, should it prove to be necessary.

iii) The raw water disinfection system will provide for 3 logs of inactivation of *Giardia*. Further drinking water disinfection requirements can be met through the conventional treatment processes at the Minot water treatment plant.

We are unaware that there has been a conclusion that a surrogate other than *Giardia* would have been more appropriate for the prevention of biota transfer. Laboratory procedures for enumerating and determining the viability of *Giardia* cysts have been developed and accepted in the scientific literature. To our knowledge similar procedures have not been developed for *Cryptosporidium*.