MT-AB St. Mary and Milk Rivers Water management Initiative
Description of Options – Initial Evaluation

Initial Option #1
Title: Ridge Reservoir-Milk River Diversion

Description:
This is a project that could divert water from Ridge Reservoir (Oldman River watershed), Alberta, to the Milk River watershed, Alberta, either upstream or downstream of the town of Milk River, depending on which sub-option is used. The capacity of the diversion is approximately 11 300 acre-feet / year or 123 cfs (3.5 m^3/sec).

The purpose of the diversion is water supply security for the Town of Milk River, secure water supply for the existing 8200 acres, and secure water supply for an additional 10 000 new acres of irrigated land in the Milk River watershed, AB.

There are three sub-options to move water from Ridge Reservoir to the Milk River; the difference is the mechanism used to transfer the water:

(a) open canal gravity-feed system (upland, not in the coulee system)
(b) pump system into canal
(c) a complete pump system and pipeline

This project could be designed as the primary water supply or a backup water supply when there is not enough Alberta entitlement water in the Milk River to meet Alberta's needs. This project could also be an accounting mechanism, used to balance deficits in the overall entitlement balance. This project may also have benefits to Montana as an alternative diversion from the St. Mary River to the Milk River, either in real Montana entitlement water or in deficit balancing.

Jurisdictional **interests** addressed:

- Secure supply of water for AB municipalities
- Secure supply of water for existing AB Milk River irrigators
- Quality of raw water supply is sufficient for use and treatment by AB municipalities
- Expand economic base (industrial, irrigation, *etc*.) in AB Milk River basin
- Recognize possible increase in recreational use
- Secure supply of water for additional AB irrigation acres

Evaluation criteria

Water Supply Impact

- Does the option increase or decrease the volume of water available to each jurisdiction?
- Does the option increase or decrease the security of municipal water supplies?
  - Number of day/year (long-term probability frequency)
- Does the option increase the number of acres provided "full service" irrigation (need to define)?
  - Percent of time
  - # of acres
- Does the option increase or decrease the number of acres receiving full service irrigation per unit of water per day?
- Does the option reduce water shortages to current acres?
  - Percentage of time.
- Does the option increase the length of the irrigation season?
  - Number of days
- Is the option effective in addressing the special circumstances associated with low water years?
  - Effectiveness during average water years
  - Effectiveness during high water years

Water Quality Impact

- Does the option improve or reduce water quality?
- Does the option increase or decrease the volume of sediment entering the Milk River?
- Does the option increase or decrease the rate of sediment deposition in Fresno Reservoir over time?
- Does the option increase or reduce the rate of bank erosion and loss of adjacent lands along the Milk River in Alberta?

In-stream Flow Impact and Other Impact

- Does the option increase or decrease the amount of water available for in-stream flow?
  - Number of days in-stream flow objective are achieved?
  - Number of days Water Conservation Objectives are achieved?
- Does the option decrease the number of days winter flows are reduced to zero?
- Does the option expand or decrease recreational use?
- Effects on habitat
  - Improve or reduce available habitat?
  - Improve or reduce quality of habitat?
  - Improve or reduce area of habitat?

Implementation Impact

- Is the option economically feasible?
  - Cost (capital and O&M) versus benefits (economic)
  - Costs incurred by which jurisdiction and which group of stakeholders within each jurisdiction.
  - Benefits received by which jurisdiction and which stakeholders within each jurisdiction.
- Ease of implementation
  - Legislative
  - Political
  - Financial
- Treaty/Order/LOI – Can the option be implemented within the current Treaty/Order or does the option require opening the Treat/Order?

Operational Impact

- Does option increase or decrease management flexibility?
  - Increase or decrease communications between jurisdictions and between water users?
  - Increase or decrease operational flexibility and ability to adapt to changing circumstances?
- Does the option provide the ability to deal with potential service disruptions associated with reconstruction of St. Mary Canal? Construction may last 10 years.
- Does the option provide the ability to manage risk of failure before reconstruction is complete?

Recommendations for further evaluation and Reasoning

Hydrologic analysis should be undertaken.

Items for discussion

a) Total cost of all the sub-options range from $90M to $130M in 2008 Canadian dollars
b) Either pump option (b) or (c) costs about CAN$50/ac.ft.
c) Water quality issues related to alkalinity
d) This is potentially an inter-basin transfer and may require special legislation in Alberta
e) There may be questions about water transfer outside of Canada, an issue in Alberta's legislation.
f) In a drought year, what priority would this diversion have in the St. Mary system? (impact on AB St. Mary water users)
g) Environmental concerns

Initial Option #2a

Title: Diversion from Tiber Reservoir for Municipal Water

Description

The Rocky Boy's/North Central Montana Regional Water System is located in north central Montana in Chouteau, Glacier, Hill, Liberty, Pondera, Teton and Toole Counties.

The project area generally consists of plains-land of North Central Montana in the Marias, Milk, Teton, and Missouri River drainages. The system will deliver water from Tiber Reservoir to serve approximately 10,000 households with an estimated population of 28,000.

The system will serve both the Rocky Boy's Reservation and numerous off-reservation systems including municipalities, county water districts, Hutterite colonies and other users.

Jurisdictional **interests** addressed

- Secure supply of water for MT municipalities (Rocky Boy Reservation and surrounding communities in the Milk River Basin).

Evaluation Criteria

Water Supply Impact

- Does the option increase or decrease the volume of water available to each jurisdiction?
- Does the option increase or decrease the security of municipal water supplies?
  - Number of day/year (long-term probability frequency)
- Effects on water supply after Tribal interests are met.
- Is the option effective in addressing the special circumstances associated with low water years?
  - Effectiveness during average water years.
  - Effectiveness during high water years.

Water Quality Impact

- Does the option improve or reduce water quality?

Implementation Impact

- Is the option economically feasible?
  - Cost (capital and O&M) versus benefits (economic)

- Costs incurred by which jurisdiction and which group of stakeholders within each jurisdiction.
- Benefits received by which jurisdiction and which stakeholders within each jurisdiction.

- Ease of implementation
  - Legislative
  - Political
  - Financial
  - Treaty/Order/LOI – Can the option be implemented within the current Treaty/Order or does the option require opening the Treat/Order?

Recommendations for further evaluation, and Reasoning

a) No further evaluation is needed.
b) Legislation authorizing the construction of the Rocky Boy's/North Central Montana Regional Water System was signed into law on 13 December, 2002 (see Public Law Number 107-331).

Items for discussion

a) None

Initial Option #2b

Title: Diversion from Tiber Reservoir for Agricultural Water

Description

The Tiber-Fresno Reservoir Pipeline project would pipe water from Tiber Reservoir on the Marias River to Fresno Reservoir on the Milk River. Capacity of the pipeline would be 50 cfs.

A pumping plant near Tiber Dam housing four 500-hp pumps would lift water 60 feet from the reservoir's active conservation storage (elevation 2993-2966 feet). Total dynamic head would be 272 feet. From this point, water would be conveyed to just east of Chester, Montana. Here a booster pumping plant housing four 450-hp pumps, would pump the water up a 200-foot high ridge. Total dynamic head of the water at this plant would be 221 feet.

From the booster plant, the 54-inch diameter pipeline would parallel U.S. Highway 2 for most of its 59.1 mile length. At Fresno Reservoir, it would empty into Grand Coulee.

Jurisdictional **interests** addressed

- Secure supply of water for MT municipalities.
- Secure water supply for the Milk River Project (MT).
- Quality of raw water supply is sufficient for use and treatment by Montana municipalities.
- Recognize possible increase in recreational uses.
- Recognize other beneficial uses of water.

Evaluation Criteria

Water Supply Impact

- Does the option increase or decrease the volume of water available to each jurisdiction?
- Does the option increase the number of acres provided "full service" irrigation (need to define)?
  - Percent of time
  - # of acres
- Does the option increase or decrease the number of acres receiving full service irrigation per unit of water per day?
- Does the option reduce water shortages to current acres?
  - Percentage of time.
- Does the option increase the length of the irrigation season?

- Number of days.
- Effects on water supply after Tribal interests are met.
- Is the option effective in addressing the special circumstances associated with low water years?
  - Effectiveness during average water years.
  - Effectiveness during high water years.

Water Quality Impact

- Does the option improve or reduce water quality?
- Does the option increase or decrease the volume of sediment entering the Milk River?
- Does the option increase or decrease the rate of sediment deposition in Fresno Reservoir over time?
- Does the option increase or reduce the rate of bank erosion and loss of adjacent lands along the Milk River in Alberta?

In-stream Flow Impact and Other Impact

- Does the option expand or decrease recreational use?
- Effects on habitat
  - Improve or reduce available habitat?
  - Improve or reduce quality of habitat?
  - Improve or reduce area of habitat?

Implementation Impact

- Is the option economically feasible?
  - Cost (capital and O&M) versus benefits (economic)
  - Costs incurred by which jurisdiction and which group of stakeholders within each jurisdiction.
  - Benefits received by which jurisdiction and which stakeholders within each jurisdiction.
- Ease of implementation
  - Legislative
  - Political
  - Financial
  - Treaty/Order/LOI – Can the option be implemented within the current Treaty/Order or does the option require opening the Treat/Order?

Operational Impact

- Does option increase or decrease management flexibility?

- Increase or decrease communications between jurisdictions and between water users?
- Increase or decrease operational flexibility and ability to adapt to changing circumstances?

Recommendations for further evaluation, and Reasoning

a) No further evaluation is needed.
b) This option was evaluated and determined to be unfeasible in the U.S. Bureau of Reclamation's North Central Montana Regional Feasibility Report. (USBR, October, 2004). Reclamation estimates the projects cost/benefit to be 0.4.

Items for discussion

a) None

Initial Option #3

Title: St. Mary Rehabilitation and Cost Share

Description

This option will rehabilitate and construct the St. Mary Diversion and Conveyance Works on the Blackfeet Reservation in Glacier County, MT. The system annually diverts approximately 160,000 acre-feet of water from the St. Mary River granted to the United States by the Boundary Waters Treaty (1909) to the North Fork of the Milk River.

The system was constructed from 1905 – 1916 to provide supplemental water to the U.S. Bureau of Reclamation's (Reclamation) Milk River Project located approximately 260 miles downstream. Without this supplemental water, the Milk River would run dry in six out of ten years. The system is also known as the St. Mary Unit of the Milk River Project.

The St. Mary's system is owned by the U.S. Government with operations and maintenance (O&M) carried out by Reclamation. All O&M expenses are paid for by assessments on holders of water delivery contracts in the Milk River Basin.

The 2007 Water Resources Development Act authorizes the U.S. Army Corps of Engineers, in consultation with the U.S. Bureau of Reclamation to rehabilitate and construct the St. Mary Diversion and Conveyance Works. The total authorized project cost is $153,000,000 with a 75% federal, 25% non-federal cost share.

Jurisdictional **interests** addressed

- Secure supply of water for MT municipalities.
- Secure supply of water for AB municipalities.
- Secure water supply for the Milk River Project (MT).
- Better utilization by MT of U.S. portion of water from the St. Mary River.
- May allow the Blackfeet Tribe to receive a benefit from share of U.S. St. Mary River.
- Fully rehabilitated and functional U.S. St. Mary River Diversion system.
- Collaboration on joint AB & MT infrastructure.
- Explore MT-AB cost-share arrangement for rehabilitation of St. Mary Canal.
- Better utilization by AB of Canadian portion of water from the Milk River.
- Identify and achieve in-stream flow needs in the AB Milk River in the future.
- Achieve formal Water Conservation Objectives in the Canadian Milk River.

Evaluation Criteria

Water Supply Impact

- Does the option increase or decrease the volume of water available to each jurisdiction?
- Does the option increase or decrease the security of municipal water supplies?
  - Number of day/year (long-term probability frequency)
- Does the option increase the number of acres provided "full service" irrigation (need to define)?
  - Percent of time
  - # of acres
- Does the option increase or decrease the number of acres receiving full service irrigation per unit of water per day?
- Does the option reduce water shortages to current acres?
  - Percentage of time.
- Does the option increase the length of the irrigation season?
  - Number of days
- Effects on water supply after Tribal interests are met.
- Is the option effective in addressing the special circumstances associated with low water years?
  - Effectiveness during average water years
  - Effectiveness during high water years

Water Quality Impact

- Does the option improve or reduce water quality?
- Does the option increase or decrease the volume of sediment entering the Milk River?
- Does the option increase or decrease the rate of sediment deposition in Fresno Reservoir over time?
- Does the option increase or reduce the rate of bank erosion and loss of adjacent lands along the Milk River in Alberta?

In-stream Flow Impact and Other Impact

- Does the option increase or decrease the amount of water available for in-stream flow?
  - Number of days in-stream flow objective are achieved?
  - Number of days Water Conservation Objectives are achieved?
- Does the option decrease the number of days winter flows are reduced to zero?
- Does the option expand or decrease recreational use?
- Effects on habitat
  - Improve or reduce available habitat?
  - Improve or reduce quality of habitat?

- Improve or reduce area of habitat?

Implementation Impact

- Is the option economically feasible?
  - Cost (capital and O&M) versus benefits (economic)
  - Costs incurred by which jurisdiction and which group of stakeholders within each jurisdiction.
  - Benefits received by which jurisdiction and which stakeholders within each jurisdiction.
- Ease of implementation
  - Legislative
  - Political
  - Financial
  - Treaty/Order/LOI – Can the option be implemented within the current Treaty/Order or does the option require opening the Treat/Order?

Operational Impact

- Does option increase or decrease management flexibility?
  - Increase or decrease communications between jurisdictions and between water users?
  - Increase or decrease operational flexibility and ability to adapt to changing circumstances?
- Does the option provide the ability to deal with potential service disruptions associated with reconstruction of St. Mary Canal? Construction may last 10 years.
- Does the option provide the ability to manage risk of failure before reconstruction is complete?

Recommendations for further evaluation, and Reasoning

Hydrologic analysis should be carried out for canal capacities of 650 cfs, 850 cfs, and 1,200 cfs

Items for discussion

a) Canal capacity will be determined through the Environmental Impact Statement process conducted by the U.S. Government.
b) Potential for cost share with Alberta government.

Initial Option #4

Title: Milk River Dam – Alberta

Description:

This is a project that would create water storage capacity within the Milk River watershed, Alberta. The primary storage location is just downstream of the confluence of the South Fork Milk R. and the mainstem Milk River, about 20 km upstream of the Town of Milk River, Alberta.

This project would provide water supply security and future development opportunities to the Town of Milk River, and also provide secure water supply for the irrigation expansion. Preliminary investigations examined three sizes of reservoirs and three levels of irrigation expansion in the Milk R. watershed, Alberta[1]:

Option	Reservoir storage	Potential irrigation
1	122 174 acre ft. (150 700 dam^3) [2]	25 655 acres expansion
2	187 923 acre ft. (231 800 dam^3)	30 735 acres expansion
3	237 377 acre ft. (292 800 dam^3)	34 290 acres expansion

There were a number of sub-options investigated, including other dam locations and off-stream storage sites. These other sub-options were eliminated for a variety of water management, economic and other issues.

This project could be a joint project between Alberta and Montana, providing storage for both jurisdictions, greater water management flexibility, secure water supplies for municipal and irrigation use, and erosion control.

Jurisdictional **interests** addressed:

- Secure water supply of water for MT municipalities
- Secure water supply for the Milk River Project (MT)
- Montana's Tribal interests have access to secure water supply
- Secure water supply for AB municipalities
- Increase Alberta's useable supply

[1] Klohn Crippen Berger Ltd. 2009, done for the Milk R. Watershed Council Canada

[2] 1.0 acre ft. = 1.23348 dam^3; 1 dam^3 (cubic dekametre) = 1000 cubic metres = 0.81071 acre ft.;

- Secure supply of water for existing AB Milk R. irrigators
- Better utilization by MT of U.S. portion of water from the St. Mary River
- Ft. Belknap better utilizes their share of U.S. Milk River natural flow
- Better utilization by AB of Canadian portion of water from the Milk River
- Enhanced water quality upstream of Fresno Reservoir
- Decrease future sediment loads entering Fresno Reservoir
- Better inter-jurisdictional agreement that allows for “flexible” sharing/utilization of water
- Decrease impacts on channel morphology (width, depth, meander length, bank stability) from increased flows in the Milk R., AB
- Expand economic base in AB Milk R. basin
- Recognize possible increase in recreational uses

Evaluation Criteria

Water Supply Impact

- Does the option increase or decrease the volume of water available to each jurisdiction?
- Does the option increase or decrease the security of municipal water supplies?
  - Number of day/year (long-term probability frequency)
- Does the option increase the number of acres provided "full service" irrigation (need to define)?
  - Percent of time
  - # of acres
- Does the option increase or decrease the number of acres receiving full service irrigation per unit of water per day?
- Does the option reduce water shortages to current acres?
  - Percentage of time.
- Does the option increase the length of the irrigation season?
  - Number of days
- Is the option effective in addressing the special circumstances associated with low water years?
  - Effectiveness during average water years
  - Effectiveness during high water years

Water Quality Impact

- Does the option improve or reduce water quality?
- Does the option increase or decrease the volume of sediment entering the Milk River?
- Does the option increase or decrease the rate of sediment deposition in Fresno Reservoir over time?
- Does the option increase or reduce the rate of bank erosion and loss of adjacent lands along the Milk River in Alberta?

In-stream Flow Impact and Other Impact

- Does the option increase or decrease the amount of water available for in-stream flow?
  - Number of days in-stream flow objective are achieved?
  - Number of days Water Conservation Objectives are achieved?
- Does the option decrease the number of days winter flows are reduced to zero?
- Does the option expand or decrease recreational use?
- Effects on habitat
  - Improve or reduce available habitat?
  - Improve or reduce quality of habitat?
  - Improve or reduce area of habitat?

Implementation Impact

- Is the option economically feasible?
  - Cost (capital and O&M) versus benefits (economic)
  - Costs incurred by which jurisdiction and which group of stakeholders within each jurisdiction.
  - Benefits received by which jurisdiction and which stakeholders within each jurisdiction.
- Ease of implementation
  - Legislative
  - Political
  - Financial
- Treaty/Order/LOI – Can the option be implemented within the current Treaty/Order or does the option require opening the Treat/Order?

Operational Impact

- Does option increase or decrease management flexibility?
  - Increase or decrease communications between jurisdictions and between water users?
  - Increase or decrease operational flexibility and ability to adapt to changing circumstances?
- Does the option provide the ability to deal with potential service disruptions associated with reconstruction of St. Mary Canal? Construction may last 10 years.
- Does the option provide the ability to manage risk of failure before reconstruction is complete?

<u>Recommendations for further evaluation, and Reasoning</u>:
TBD

<u>Items for discussion</u>:

a) Cost to build
b) Would this reduce MT's share of its entitlement of the combined rivers?
c) What is optimum storage MT would like to lease?
d) What would MT do with 1200 cfs, how often and for how long?
e) What is the siltation rate into Fresno Res.?
f) What is the value to MT of this? (technical analysis)
g) What does this do to the availability of water at the Eastern boundary?
h) Modeling should advise if MT will be negatively impacted. Can any negative impact be recovered? There may be a net gain to AB re: storing flood flows.
i) How does this impact 1921 Order?