

MEMO- JOCKO K PIPELINE PHASES 1-4 HISTORIC SEEPAGE RATE COMPACT IMPLEMENTATION TECHNICAL TEAM (CITT)

May 13, 2026

Introduction

The Compact Implementation Technical Team (CITT) was established by the CSKT-Montana Compact, *MCA 85-20-1901*, (Compact) and has State, Tribal, Federal, Flathead Indian Irrigation Project (FIIP), and irrigator representation. CITT's responsibilities are specified in *Appendix 3.5*. One duty of the CITT is to quantify water that is made available from completed rehabilitation and betterment actions. *Appendix 3.5(3)(j)(i)* states that *"The CITT shall directly measure water available for reallocation following a Rehabilitation and Betterment action. If direct measurement is not practicable, the CITT shall estimate Reallocated Water."*

The Jocko K Pipelines rehabilitation and betterment project will convert approximately 17.7 miles of open canals to pressurized pipe in six construction phases. The six phases were delineated through a master planning effort completed by Morrison-Maierle in 2022.

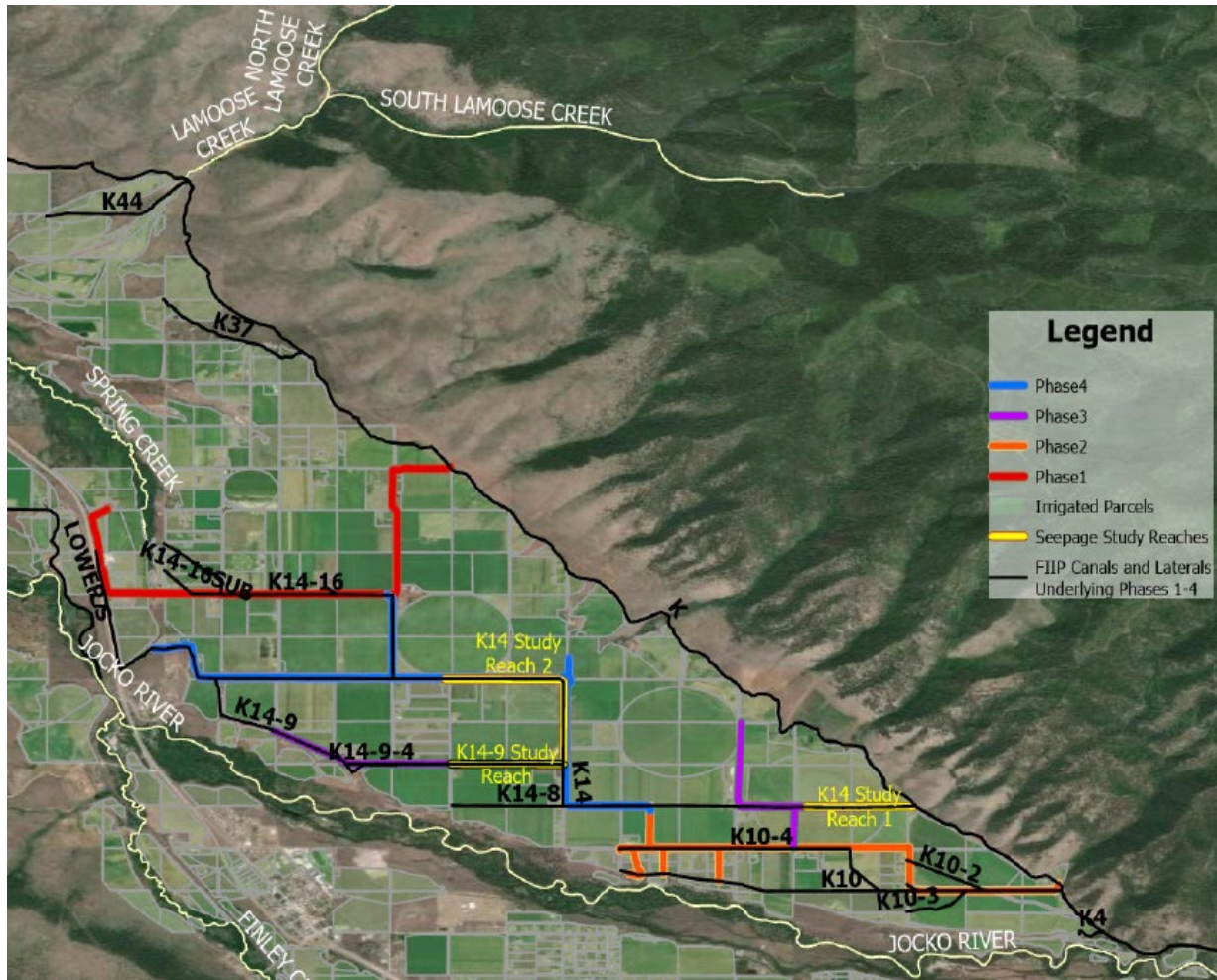
In the Fall of 2025, CSKT began construction on the first four phases of the Jocko K Pipelines Project, with significant completion of Phases 1-4 on April 16, 2026. Design for Phases 5-6 is complete and construction is planned to start in the Fall of 2026. In advance of this project, CSKT conducted a seepage study focused on the area to be converted in the K-14 lateral network (Jocko K Pipeline Phases 1-4 Seepage Study) to inform future reallocation efforts. Seepage studies by CSKT are ongoing in the Phase 5-6 areas.

Objective

This document memorializes the findings of the 2024 Seepage Study Report and quantifies the historical seepage rate for canals replaced by pipeline in Phases 1-4 of the Jocko K Pipelines Project. The next step in this process will be for the CITT to develop a reallocation report with the required elements in *Appendix 3.5(3)(j)(ii)(a)*.

Data Review and Discussion

In irrigation seasons 2021 and 2022, CSKT collected data for the Jocko K Pipeline Phases 1-4 Seepage Study by measuring discrete reaches of the Jocko K laterals and sub-laterals. These study efforts were conducted in accordance with workplans that were developed by CSKT with CITT input. The goal of this study was to quantify representative seepage losses in canal reaches to be replaced by pipe in phases 1-4 of the Jocko Pipeline Project.



The study used a mass balance approach with both synoptic and continuous measurements. Three representative reach areas were included:

- **Jocko K14 Canal Reach 1**- immediately downstream of turnout from K Canal west. Approx. 0.46 mi reach.
- **Jocko K14 Canal Reach 2**- Immediately downstream of the turnout from K14-9 canal north to the intersection of McLeod Road and Dumontier Road, then west approximately 0.5 miles. The total distance for this reach was 1.0 miles.
- **Jocko K14-9 Canal**- Immediately downstream of the intersection of K14 and K14-9 canal west to second irrigation turnout. Total distance 0.49 mile.

CITT's review of the study included the following findings:

The study employed a sound error analysis approach- the International Organization for Standardization (ISO) and the Interpolated Variance Estimation (IVE) methods. Using the results of the error analysis, all seepage data that were less than a 7% gain or greater than a 7% loss were set to zero. This was a conservative approach which likely resulted in a lower calculated seepage rate than otherwise would have been generated.

The seepage study field work measurements were collected during the 2021 and 2022 irrigation seasons. CITT notes the significant level of effort expended by CSKT's Water Monitoring and Measurement Program to complete the field work and subsequent report. Direct measurement of seepage in the open canals is no longer possible as they have been replaced with pipes. Average leakage rates in K14 Reach 1 varied widely from 2021 (7.5 ft/day) to 2022 (2.1 ft/day) suggesting that season-specific hydrologic conditions may have affected seepage rates. Results fall within the range of permeability values of soil in the area, which range from 1.14-3.96 ft/day according to the NRCS soil survey.

DNRC conducted a seepage study (currently unpublished) of FIIP canals in 2010. This study included a 0.75 mi section of K14 lateral. The reach in the DNRC study correlated with CSKT's Jocko K14 Canal Reach 1 and found a leakage rate of 2.9 ft/day compared to CSKT's leakage rate of 7.5 ft/day in 2021 and 2.1 ft/day in 2022.

One of the reaches (K 14-9) was discontinued after the first year because of difficulty controlling reach inputs and outputs. However, the seepage rate of this reach (0.2 ft/day) was included in the final seepage average, likely resulting in a lower calculated seepage rate.

The seepage study assumed a single wetted perimeter regardless of flow in the channel. The study also assumed that seepage was constant throughout the irrigation season, despite fluctuations in flow and vegetation growth. It is a best practice to determine wetted perimeter based on flow, as increased flow yields a larger wetted perimeter. A high-level basic analysis of the ratio of discharge to wetted perimeter by DNRC staff led to a similar estimated seepage rate with the available data.

CITT recommends the following be considered in future studies: an appropriately structured study timeframe, several synoptic runs be conducted at the beginning of a study to obtain a discharge to wetted perimeter relationship for the study reach, and LiDAR or other remote sensing technique be employed to better estimate wetted perimeter for the length of the reach.

During the initial planning phases of future seepage studies, CITT will work closely with the project proponents to evaluate project objectives, schedules, resource allocations, and available data ensuring the appropriate level of effort is expended to achieve our goals.

CITT did not evaluate or analyze the effects the seepage rate will have on the Jocko River and FIIP operations in the Jocko Valley. These will be the focus of a follow-up reallocation report.

Conclusion

On April 15, 2026, CITT unanimously voted to accept a rate of **3.0 ft/day** as the historical seepage rate for canals replaced by pipeline in phases 1-4 of the Jocko K Pipelines Project. CITT has not taken any actions related to reallocation.