

# DIVERSION RECORDS STANDARD

Department of Natural Resources  
Division of Water Resources

Effective November 1, 2018

Version 2.5

## Revision Sheet

| Version No. | Date Effective | Version Description  |
|-------------|----------------|--|
| 0           | September 2009 | Legacy documents compiled into new User's Manual format and updated  |
| 1.4         | November 2010  | <p>Added "ACTs" to WDIDs.</p> <p>Revised summation routines and water class coding to eliminate SOURCE codes "6", "7" and "R".</p> <p>Defined rules for the use of the FROM code.</p> <p>Changed USE code "Q" to mean "Quantified"; added USE code "Z".</p> <p>Added TYPE codes "D", "J", "F", "L", "Q", "U", "V", "W" and "R"; removed TYPE code "3" and modified TYPE code "7".</p> <p>Added new TO code.</p> <p>Added OBSERVATION codes "K", "U" and "C".</p>   |
| 1.5         | November 2010  | Corrected miscellaneous typographical errors; re-ordered one section; no significant content changes.  |
| 1.6         | June 2012      | <p>General revisions to remove inconsistencies and add clarifying information discovered during roll out of new standard. Deleted TYPE code "6" as being redundant; TYPE code "7" now is just "release to stream".</p> <p>Replaced the sections discussing the proposed development of Accounts with an overview of what was actually developed.</p> <p>Deleted all "proposed development" sections.</p> <p>Added clarification on recharge being associated with both accretions to the stream and underground "storage" for later direct withdrawal.</p> <p>Reordered "Diversion Records Warranted" and "Entry of Diversion Records" to come after "Diversion Record Codes" and "Water Class Protocols".</p> <p>Added "Ground water Protocols" section to the "Source Code Rules".</p> |
| 2.0         | November 2014  | <p>Updated branding. Significant reorganization of Sections into three Parts (1 - Background: Statutes &amp; Policy, 2 - Coding: Definitions &amp; Protocols, 3 - Data Analysis: Summation Routines &amp; Reports). Made each subsection of Section 5 (Diversion Record Codes) its own Section (0 - 0). Replaced Section 6 (Water Class Protocols) with Section 0 (SOURCE/USE Summation Routines &amp; Report). Made Subsection 9.2 (Structure Total Report) its own Section 0 (in Part 3). Moved prior appropriation comments from footnote to Section 1.3 and added information regarding the "Call".</p> <p>No other significant content amendments to Section 1 - 6</p>  |

|     |                |  |
|-----|----------------|--|
|     |                | <p>(other than order in which each Section is presented). Added Section 1.36 (Water Class Context/Purpose). Added definition to the water rights based template for accounts in Section 1.114. Modified Section 8.3 (Structure Type Protocols) substantially and moved it to its own new Section 0. Added definition subsections to Section 1.44 (Natural Water Source Codes). Added diversion associated with temporarily disabled structure in Section 1.52. Added substantially to Section 0 (USE Code), including new USE code of "I" in Table 0-1. Also added on-stream reservoir evaporative loss standard in Section 1.68. Added TYPE codes "X", "Y", "Z" and modified TYPE code "V" in Section 0. Added the concept of forbearance of out-of-priority depletions by a ditch in Section 0. Removed requirement for a TYPE code for "Augmentation" and "Evaporation" USE records, Section 1.85. Added statewide GROUP codes to Section 1.88. Added protocols requiring a TO code in Section 1.90. Modified SOURCE summation routine to exclude transfers of ground water between well fields in Section 1.124 and all reservoir releases TO another reservoir or reservoir system in Section 1.125. Modified USE summation routine to exclude all "re-storage" of water as well as modeling records associated with new TYPE codes in Section 1.126. Similar summation routine changes made to Structure Report in Section 0. Expanded "Other Associated Records" section of Structure Report to include any record where the subject WDID is in any ID field of a record that is not listed in another section of the report, Section 1.132. Modified Appendix B with new TYPE codes. Updated Appendix C and D to show new additional logic. Modified "Protocol" tables into "Stored Procedures" tables in new Appendix E and F. Added Call background information to Appendix G.</p> |
| 2.1 | February 2014  | <p>Removed HydroBase Stored Procedures appendices (Appendices E and F). Expanded concept of Alternate Point of Diversion to include decreed diversions of HCU from another structure even if the court does not use the term "alternate point of diversion", Section 1.76.</p>   |
| 2.2 | September 2015 | <p>Miscellaneous textual revisions for clarification. More fully explained "depletion" in Section 1.17 and "accretion" in Section 1.21. Section 0 FROM Code regarding subsequent diversions of an alternate point using the WDID that actually diverted the water. Added state wide group code 9900003 to Section 1.88. Moved discussion of Accounts to its own Section 0. Added Summary Structure Report to Section 0 (Report 4). Removed Water Rights Call information in Appendix E; replaced with references to Call Standard.</p>   |

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|-----|---------------|---|
| 2.3 | November 2016 | Update USE summation to ignore TYPE=D, TYPE=J records. Modify Observation Codes. Update on-stream reservoir evaporation.  |
| 2.4 | July 2017     | Added objectives related to provisional diversion records. Reorganized Section 10 content for clarity. Clarified evaporation records and corrected an example coding error for on-stream reservoirs in Sections 11.4.3 and 12.1.4. Added Transbasin Report to new Section 18. |
| 2.5 | November 2018 | Added "Substitution" as new Type of diversion in Section 12.1.8. Corrected Appendices so text was visible in logic diagrams.  |

## Diversion Records Standard Authorization

This manual is a standard and reference guide for the process of collecting data and compiling Diversion Records in accordance with Section 37-80-105, C.R.S. All Diversion Records should comply with this standard.



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11/1/2018

Date

**CONTENTS**

**Part I - BACKGROUND: STATUTES & POLICY**

1. *BASIS OF DIVERSION RECORDS* ..... 1

2. *PURPOSE OF DIVERSION RECORDS*..... 2

    2.1 Public Information..... 2

    2.2 Verify Administration ..... 2

        2.2.1 Prior Appropriation Doctrine..... 2

            Water Rights “Call” ..... 2

    2.3 Basis for Change of Water Rights Analysis ..... 3

    2.4 Abandonment Process ..... 3

    2.5 Data Source for Modeling..... 3

3. *DIVERSION RECORD PRINCIPLES*..... 4

    3.1 Create a Complete Record ..... 4

    3.2 Compliance with Coding Protocol is Required ..... 4

    3.3 Diversion Records are NOT Accounting..... 4

    3.4 Diversion Record is a Historical Document ..... 5

    3.5 Minimize the Number of Undocumented Diversions ..... 5

4. *DIVERSION RECORDS WARRANTED* ..... 6

    4.1 Diversions from the Stream..... 6

    4.2 Releases to the Stream ..... 6

    4.3 Off-Stream Diversions..... 7

        4.3.1 Alluvial Ground Water ..... 7

        4.3.2 Ground Water with Limited Appropriative Rights..... 7

        4.3.3 Depletion Record ..... 7

    4.4 Off-Stream Releases..... 7

        4.4.1 Recharge ..... 7

        4.4.2 Decreed Indirect Return Flows ..... 8

        4.4.3 Accretion Record..... 8

    4.5 Records of Non-use ..... 8

5. *ENTRY OF DIVERSION RECORDS* ..... 9

    5.1 Timing..... 9

    5.2 Responsibilities for Making Records..... 9

        5.2.1 Water Commissioners ..... 9

        5.2.2 Division Staff/Others ..... 9

**Part II - CODING: DEFINITIONS & PROTOCOLS**

**6. DIVERSION RECORD OPTIONS..... 11**

6.1 Diversion Comment..... 11

6.2 Infrequent Diversion Record..... 11

6.3 Daily Diversion Record..... 12

6.4 Reservoir Records ..... 12

6.4.1 Small Irrigation Only Reservoirs..... 12

6.4.2 Large or Multiple Use Reservoirs..... 12

**7. WATER CLASS ..... 13**

7.1 Water Class Definition ..... 13

7.2 Organized by Irrigation Year ..... 13

7.3 Water Class is Unique ..... 13

7.4 Water Class Context / Purpose ..... 13

7.4.1 Documents SOURCE / USE..... 14

SOURCE/USE Information in a Single Record ..... 14

SOURCE/USE Information in Different Structures ..... 14

7.4.2 Documents Individual Structure Operation..... 14

**8. WDID / ACCOUNT ..... 15**

8.1 WDID..... 15

8.1.1 WDID is Required..... 15

8.1.2 WDID is Unique ..... 15

8.1.3 Update Annually ..... 15

8.1.4 Structure Location..... 15

**9. "SOURCE" CODE ..... 16**

9.1 "Natural Water" SOURCE Codes ..... 16

9.1.1 Natural Stream Flow (SOURCE = "1") ..... 16

Tributary Springs ..... 16

Headgate Wells ..... 16

9.1.2 Ground Water (SOURCE = "3") ..... 17

Exempt, Non-tributary, Designated Basin & Non-Critical Basin Tributary Wells..... 17

Non-Critical Basin Tributary Wells with Plans of Augmentation ..... 17

Alternate Point Wells..... 17

Tributary Wells in an Over-Appropriated Basin ..... 18

9.1.3 Non-Stream Flow (SOURCE = "5") ..... 18

9.2 "Manufactured Water" SOURCE Codes ..... 18

---

|             |  |           |
|-------------|--|-----------|
| 9.2.1       | Reservoir Water .....  | 18        |
| 9.2.2       | Transbasin Water .....   | 18        |
| 9.2.3       | Re-usable Water .....  | 19        |
| <b>10.</b>  | <b><i>"FROM" CODE</i></b> .....  | <b>20</b> |
| <b>10.1</b> | <b>FROM Code Required</b> .....  | <b>20</b> |
| 10.1.1      | Record of Subsequent Diversion .....   | 20        |
|             | Subsequent Diversion of Natural Water to Prevent Double Counting SOURCE..... | 21        |
| 10.1.2      | Diversion is Enabled by FROM Structure.....                                  | 23        |
|             | Exchange .....   | 23        |
|             | Trade .....  | 23        |
|             | Alternate Point .....  | 23        |
|             | Subsequent Diversions of an Alternate Point Diversion.....                   | 23        |
|             | Diversions Associated with Temporarily Disabled Structure .....              | 24        |
| 10.1.3      | Transbasin Import Records.....   | 24        |
| <b>10.2</b> | <b>Optional FROM Code Applications</b> .....                                 | <b>24</b> |
| <b>11.</b>  | <b><i>"USE" CODE</i></b> .....   | <b>25</b> |
|             | USE Code Associated to Structure where USE Occurs.....                       | 26        |
| <b>10.3</b> | <b>Storage (USE = "0")</b> .....   | <b>26</b> |
| 10.3.1      | Off-stream Pond .....  | 26        |
| <b>11.1</b> | <b>Fishery (USE = "6")</b> .....   | <b>27</b> |
| <b>11.2</b> | <b>Augmentation (USE = "A")</b> .....  | <b>27</b> |
| 11.2.1      | Structure Type Restriction.....  | 27        |
| 11.2.2      | Augmentation with Accretions at Reach - Simple Structures.....               | 27        |
| 11.2.3      | Augmentation with Accretions at Reach - Aggregating Structures .....         | 28        |
| 11.2.4      | GROUP Code Required .....  | 28        |
| <b>11.3</b> | <b>Evaporation (USE = "E")</b> .....   | <b>29</b> |
| 11.3.1      | Structure Type Restriction.....  | 29        |
| 11.3.2      | Evaporation is Not Transit Loss .....  | 29        |
|             | Transit Loss Record .....  | 29        |
| 11.3.3      | On-stream Reservoir Evaporative Loss Records .....                           | 29        |
| <b>11.4</b> | <b>Minimum Stream Flow/Lake Level (USE = "M")</b> .....                      | <b>31</b> |
| <b>11.5</b> | <b>Recharge (USE = "R")</b> .....  | <b>31</b> |
| 11.5.1      | Alluvial Accretion to Stream.....  | 31        |
| 11.5.2      | Underground Storage .....  | 31        |
| <b>12.</b>  | <b><i>"TYPE" CODE</i></b> .....  | <b>32</b> |
| <b>12.1</b> | <b>Types of Diversions</b> .....   | <b>33</b> |

---

|             |  |           |
|-------------|--|-----------|
| 12.1.1      | Exchange (TYPE = "1") .....  | 33        |
|             | SOURCE Code of Exchange is SOURCE of Replacement Supply .....              | 33        |
|             | Only Initial Diversion by Exchange Uses TYPE = "1" Code .....              | 34        |
| 12.1.2      | Trade (TYPE = "2") .....   | 34        |
|             | Requires Three Records .....   | 34        |
| 12.1.3      | Alternate Point of Diversion (TYPE = "4") .....                            | 35        |
|             | Multiple, Equivalent Points of Diversion .....                             | 36        |
|             | Diversions of Another Structure's Water Rights .....                       | 36        |
|             | Diversion of Unmeasured HCU .....  | 36        |
|             | Only Initial Diversion by Alternate Point Uses TYPE = "4" Code .....       | 37        |
| 12.1.4      | Authorized/Augmented Diversion (TYPE = "A") .....                          | 38        |
|             | Only Initial Diversion by Special Authorization Uses TYPE = "A" Code ..... | 39        |
|             | Augmentation of Reservoir Evaporation Loss .....                           | 39        |
| 12.1.5      | Unauthorized Diversion (TYPE = "U") .....                                  | 40        |
|             | Out of Priority Diversions .....   | 40        |
|             | Unauthorized Reservoir Release and Diversion .....                         | 40        |
|             | Unauthorized Exchange .....  | 40        |
|             | Diversion by Structure in Authorizing Plan Cannot be "Unauthorized" .....  | 40        |
| 12.1.6      | Out-of-priority Depletion (TYPE = "D") .....                               | 41        |
|             | Forbearance of Out-of-Priority Depletion by Specific Structure .....       | 41        |
| 12.1.7      | In-priority Depletion (TYPE = "J") .....                                   | 41        |
| 12.1.8      | Substitution (TYPE = "S") .....  | 41        |
| <b>12.2</b> | <b>Types of Releases .....</b>   | <b>42</b> |
| 12.2.1      | Used by SOURCE Summation Routine and Structure Report .....                | 42        |
|             | Release to Stream (TYPE = "7") .....                                       | 42        |
|             | Release to an Off-Stream System (TYPE = "8") .....                         | 42        |
|             | Relinquishment of Dominion and Control (TYPE = "L") .....                  | 42        |
| 12.2.2      | Used only by Structure Report .....  | 43        |
|             | Release of Excess Diversion (TYPE = "E") .....                             | 43        |
|             | Quantified Release (TYPE = "Q") .....                                      | 43        |
|             | Released Underground (TYPE = "W") .....                                    | 44        |
|             | Recharge .....   | 44        |
|             | Underground Disposal .....   | 44        |
|             | Modeled Alluvial Accretion to Stream (TYPE = "Z") .....                    | 44        |
| 12.2.3      | Release Code Not Required for USE "A" & "E" .....                          | 44        |
| <b>12.3</b> | <b>Types of Data .....</b>   | <b>45</b> |

---

|   |           |
|---|-----------|
| Administrative Record (TYPE = 0) .....                            | 45        |
| USE Data Only (TYPE = "R") .....                                  | 45        |
| Alluvial Aquifer Model Inputs (TYPE = "V", "X", "Y") .....        | 46        |
| Accretion Example - Recharge .....                                | 46        |
| Accretion Example – Ditch Loss .....                              | 46        |
| Depletion Example .....   | 47        |
| <b>13. "GROUP", "TO" AND "OBSERVATION" CODES.....</b>             | <b>48</b> |
| <b>13.1 GROUP Code .....</b>                                      | <b>48</b> |
| 13.1.1 Statewide GROUP Codes .....                                | 48        |
| Diversions Futile to the Call .....                               | 48        |
| CWCB Temporary In-stream Flow Loan Program.....                   | 48        |
| Voluntary Conservation Program .....                              | 48        |
| <b>13.2 TO Code .....</b>   | <b>49</b> |
| 13.2.1 TO Code Required .....                                     | 49        |
| Ground Water Transfer between Well Fields.....                    | 49        |
| Reservoir Water Storage Transfer (Re-storage) .....               | 49        |
| Diversion for Off-stream Storage as an Alternate Point .....      | 50        |
| <b>13.3 OBSERVATION Code .....</b>                                | <b>50</b> |
| 13.3.1 Observed ("*") .....                                       | 50        |
| 13.3.2 Recorded ("R") .....                                       | 50        |
| 13.3.3 Estimated Amount ("S").....                                | 50        |
| 13.3.4 Estimated ("E").....                                       | 50        |
| 13.3.5 User Supplied Record - Unknown Reliability.....            | 51        |
| 13.3.6 User Supplied Record - Known Reliability.....              | 51        |
| 13.3.7 Calculated .....   | 51        |
| 13.3.8 Modeled .....  | 51        |
| <b>14. STRUCTURE TYPE .....</b>                                   | <b>52</b> |
| <b>14.1 Aggregating Structure Type.....</b>                       | <b>52</b> |
| 14.1.1 Well Field .....   | 53        |
| Records Associated with Appropriated Ground Water .....           | 53        |
| Records Associated with "Recharge" or "Underground Storage" ..... | 53        |
| 14.1.2 Reservoir/Reservoir System .....                           | 54        |
| Storage/Release Records.....                                      | 54        |
| Recharge by a "Reservoir" .....                                   | 54        |
| Intra-Reservoir Transfer (Book-over) .....                        | 55        |
| Simple Transfer between Accounts (Account Book-over).....         | 55        |

|   |           |
|---|-----------|
| Transfer between Accounts Based on In-Priority Bypass (In-Priority Book-over) ..... | 55        |
| Inter-Reservoir Storage Transfer (Re-storage) .....                                 | 55        |
| 14.1.3 Recharge Areas .....   | 55        |
| 14.1.4 Reach - Aggregating.....   | 56        |
| <b>14.2 Simple (Non-Aggregating) Structure Type .....</b>                           | <b>57</b> |
| 14.2.1 On-stream, Non-Aggregating Structures: Ditch, Pipeline, Pump, etc.....       | 57        |
| WDID Represents Head Gate Diversions and USE .....                                  | 57        |
| Release to Stream Must Use Subsequent ID .....                                      | 58        |
| Subsequent ID Can Be Separate WDID.....   | 58        |
| WDID Bypass .....   | 58        |
| Bypass ACT or In-stream WDID .....  | 59        |
| Bypass at Structures that Do Not Divert Water From the Stream .....                 | 59        |
| Seepage from a Non-Aggregating Surface Water Structure .....                        | 59        |
| Transbasin Return Flow .....  | 59        |
| Recharge .....  | 60        |
| 14.2.2 Well / Well Group .....  | 60        |
| 14.2.3 Non-Stream Flow Structures - Seep, Spring, Mine, etc. ....                   | 60        |
| 14.2.4 Minimum Flow .....   | 60        |
| 14.2.5 Reach - Simple .....   | 61        |
| <b>14.3 Structure Types NOT Allowed to make Diversion Records.....</b>              | <b>61</b> |
| 14.3.1 Ditch System .....   | 61        |
| 14.3.2 Plans .....  | 61        |
| <b>15. ACCOUNTS .....</b>   | <b>62</b> |
| <b>15.1 Account Templates .....</b>   | <b>62</b> |
| 15.1.1 Diversion Location.....  | 62        |
| 15.1.2 Entity/Ownership.....  | 63        |
| 15.1.3 Water Right Priority.....  | 64        |
| 15.1.4 Reservoir Pools.....   | 64        |
| 15.1.5 Reservoir Accounts - Division 2 .....  | 65        |
| <b>15.2 Accounts for Aggregating Structures.....</b>                                | <b>65</b> |
| <b>15.3 Account Attribute Combinations are Unique .....</b>                         | <b>65</b> |
| <b>15.4 Changing Account Attributes .....</b>                                       | <b>66</b> |

**Part III - DATA ANALYSIS: SUMMATION ROUTINES & REPORTS**

|   |           |
|---|-----------|
| <b>16. SOURCE/USE SUMMATION ROUTINES &amp; REPORTS.....</b> | <b>68</b> |
| SOURCE/USE Report .....                                     | 68        |

---

|  |           |
|--|-----------|
| USE Totals - IYR Report .....                              | 68        |
| USE Totals - Division Report .....                         | 68        |
| <b>16.1 SOURCE Summation .....</b>                         | <b>68</b> |
| 16.1.1 "Natural Water" Diversions.....                     | 68        |
| "Blank" FROM .....   | 69        |
| Trade or Alternate Point (TYPE = "2" or "4").....          | 69        |
| Rule Exceptions .....                                      | 69        |
| TYPE = "0" .....   | 69        |
| TYPE = "R" .....   | 69        |
| TYPE = "X", "Y", "V" or "Z" .....                          | 69        |
| WDID & TO Codes are "Well Field" Structure Type.....       | 70        |
| 16.1.2 "Manufactured Water" Releases.....                  | 70        |
| Specific Release TYPE Codes ("7", "8" or "L") .....        | 70        |
| Specific USE Codes ("E") .....                             | 71        |
| Rule Exceptions .....                                      | 71        |
| TYPE = "0" .....   | 71        |
| TYPE = "V", "X", "Y" or "Z" .....                          | 71        |
| Reservoir Re-storage .....                                 | 71        |
| <b>16.2 USE Summation.....</b>                             | <b>71</b> |
| All USE Codes Except "B" & "Q" .....                       | 71        |
| Rule Exceptions .....                                      | 72        |
| TYPE = "0" .....   | 72        |
| TYPE = "D", "J", "V", "X", "Y", or "Z" .....               | 72        |
| Reservoir Re-storage .....                                 | 72        |
| <b>17. STRUCTURE SUMMATION ROUTINES &amp; REPORT .....</b> | <b>76</b> |
| <b>17.1 Total Diversion .....</b>                          | <b>76</b> |
| 17.1.1 Aggregating Structures .....                        | 76        |
| 17.1.2 Non-Aggregating (Simple) Structures .....           | 77        |
| <b>17.2 Total Release .....</b>                            | <b>77</b> |
| <b>17.3 Associated USE .....</b>                           | <b>78</b> |
| <b>17.4 Other Associated Records.....</b>                  | <b>78</b> |
| <b>17.5 Statistics.....</b>                                | <b>78</b> |
| <b>18. TRANSBASIN EXPORT/IMPORT REPORT .....</b>           | <b>81</b> |
| <b>18.1 Water Division Summary Row .....</b>               | <b>81</b> |
| <b>18.2 WDID Summary Row .....</b>                         | <b>81</b> |
| <b>18.3 Water Class Detail Rows .....</b>                  | <b>81</b> |

## TABLES

|   |    |
|---|----|
| Table 6-1: Not Used/Not Released Codes (NUC/NRC) .....                  | 11 |
| Table 9-1: SOURCE Codes .....   | 16 |
| Table 11-1: USE Codes .....   | 25 |
| Table 12-1: TYPE Codes .....  | 32 |
| Table 13-1: Statewide GROUP Codes .....                                 | 48 |
| Table 13-2: OBSERVATION Codes .....                                     | 50 |
| Table 14-1: Diversion Structure Types .....                             | 52 |
| Table 14-2: Aggregating Structure Types .....                           | 52 |
| Table 14-3: Non-Aggregating Structure Types .....                       | 57 |
| Table 14-4: Structure Types NOT Allowed to have Diversion Records ..... | 61 |
| Table 15-1: Diversion Location Account Attribute .....                  | 62 |
| Table 15-2: Entity/Ownership Account Attribute .....                    | 63 |
| Table 15-3: Water Right Priority Account Attribute .....                | 64 |
| Table 15-4: Reservoir Pool Account Attributes .....                     | 65 |
| Table 15-5: Reservoir Accounts - Division 2 Account Attributes .....    | 65 |

## SUMMATION CRITERIA

|   |    |
|---|----|
| Summation Criteria 1: SOURCE Total Summation - Natural Water .....            | 69 |
| Summation Criteria 2: SOURCE Total Summation - Manufactured Water .....       | 70 |
| Summation Criteria 3: USE Total Summation .....                               | 71 |
| Summation Criteria 4: Total Diversion - Aggregating Structure Types .....     | 76 |
| Summation Criteria 5: Total Diversion - Non-Aggregating Structure Types ..... | 77 |
| Summation Criteria 6: Total Release - Structure Report .....                  | 77 |
| Summation Criteria 7: USE - Structure Report .....                            | 78 |
| Summation Criteria 8: Other Associated Records - Structure Report .....       | 78 |

## REPORTS

|  |    |
|--|----|
| Report 1: SOURCE/USE Report .....                | 73 |
| Report 2: USE Totals - IYR Report .....          | 74 |
| Report 3: USE Totals - Division Report .....     | 75 |
| Report 4: Summary Structure Report .....         | 79 |
| Report 5 - Detailed Structure Report .....       | 80 |
| Report 6 - Transbasin Export/Import Report ..... | 83 |

## APPENDICES

|  |    |
|--|----|
| Appendix A: Diversion Record Logic Diagram .....           | 85 |
| Appendix B: Quick Guide to Diversion Record Codes .....    | 86 |
| Appendix C: SOURCE/USE Summation Routine Logic .....       | 87 |
| Appendix D: Structure Totals Summation Routine Logic ..... | 88 |

# Part I - BACKGROUND: STATUTES & POLICY

## 1. BASIS OF DIVERSION RECORDS

As established by the constitution of the state of Colorado<sup>1</sup>:

*“The water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation...”*

The use of water in Colorado is the use of the public’s property. Such rights are termed “usufructuary”, meaning the right to use someone else’s property. In order to track the use of the public resource, Colorado statute<sup>2</sup> directs that the state engineer “shall require” the division engineers:

*“to report to him at suitable times their official actions; and shall require of them annual statements... of the amount of water diverted from the public streams in their respective divisions and such other statistics as, in the judgment of the state engineer, will be of benefit to the state.”*

Diversion records are the compilation of the “annual statements” required by statute and document administered diversions, user supplied information regarding diversions and the associated use of the water. While some may think diversion records are associated with uses of water “authorized” by the Division of Water Resources (Division), the coding standard makes no such affirmation even though the statement is generally true. The diversion record does, however, include coding that affirms a diversion was “unauthorized” from the Division’s perspective. Such coding does not intend to infer the contrary position that all records not coded as “unauthorized” were by default or design “authorized”. Diversion records document:

- the place of diversion or use
- the volume of water diverted
- the source of the water diverted
- the use to which the water was placed
- whether the diversion was made
  - by exchange
  - by trade
  - as an alternate point
  - under special authorization, like a plan of augmentation
  - as an “unauthorized” diversion
- modeled impacts to the stream associated with alluvial diversions.

Depending upon the complexity of the operations involved, diversion records may also provide information regarding the volume and types of water stored and other more specific information. The term “diversion record” applies to both the action of diverting water into a structure and releasing water from a structure.

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<sup>1</sup> Colorado Constitution, Article XVI, § 5.

<sup>2</sup> § 37-80-105, C.R.S.

## ***2. PURPOSE OF DIVERSION RECORDS***

There are five primary reasons to maintain diversion records.

### **2.1 Public Information**

First and foremost, diversion records are the “annual statements” required by statute<sup>3</sup>. Diversion records provide the public with information regarding the use of their property. The key information contained in a diversion record is:

- the SOURCE<sup>4</sup> and volume of water diverted or released; and,
- how and where that water was put to beneficial USE.

### **2.2 Verify Administration**

Diversion records may also be used to assert that the waters of the state are administered in accordance with the prior appropriation doctrine, Colorado revised statutes, decrees of the district court or water court, federal compacts and Supreme Court decrees. As required by statute<sup>5</sup>, water must be placed to a beneficial use and must not be wasted. Not only can diversion records be used to verify administration, if entered timely they can also be used as a basis of administering deliveries, return flows or other operations associated with previous diversions.

#### **2.2.1 Prior Appropriation Doctrine**

The prior appropriation doctrine provides that water rights developed first in time are first in the right to use the water. This doctrine is also commonly known as “first in time, first in right”. It is in contrast with the “riparian doctrine”, which associates water rights with adjacent land ownership.

Throughout this document, the terms “in-priority” and “out-of-priority” are used to describe diversions based on their ability to divert under the prior appropriation doctrine. In-priority diversions need no authorization beyond that granted in their appropriative water right to divert.

#### **Water Rights “Call”**

The “Call”<sup>6</sup> is a construct of the state engineer to communicate the demand on the natural stream flow. If there is sufficient supply to meet all beneficial use diversions, there is no Call; this condition is also known as “free river”. When the supply is not sufficient to meet the demand of water rights able to divert water for the decreed beneficial use, the water commissioner and division engineer must set a Call.

The Call communicates the affected stream reach, the water right priority that may divert and the time during which the Call is in effect. All water rights junior to the Call priority, located hydrologically above the Call location are not allowed to divert natural stream flow under the prior appropriation doctrine. The structure may be able to divert under other

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<sup>3</sup> *ibid*

<sup>4</sup> As discussed in Section 1.39, the terms WDID, SOURCE, FROM, USE, TYPE, GROUP and TO are coding terms used to describe diversions. They are printed in ALL CAPS in this document to facilitate their association with a diversion record.

<sup>5</sup> § 37-92-502(2)(a), C.R.S.; see also 37-84-107 and 37-84-108.

<sup>6</sup> For more information on the Call, see “Administrative Call Standard & HBDMC Call Manager User’s Guide” available at <http://water.state.co.us>.

authority, such as an authorized exchange, augmentation plan, a determination the diversion is futile to the Call, etc. The “out-of-priority” structure may also divert water of which it has dominion and control that is not part of the natural stream, such as reservoir water, transbasin water, re-usable flow, etc.

### **2.3 Basis for Change of Water Rights Analysis**

When water rights are changed in water court, diversion records provide a basis for determining the historical use of the water right, which can then be used to determine the historical consumption associated with the diversion. An adequate understanding of the historical use of a water right is required to prevent the change of use from injuring vested water rights, including water rights with priorities junior to the water right being changed. This application of the “vested-rights doctrine” as it applies to the diversion of water in Colorado holds that a water right has the right to the conditions of the river that existed at the time the water right was established. Because the supply relied upon by the junior water right may, at least in part, depend on the return flows and historical practices of the senior water right, those vested junior rights must not be injured by a new change to the senior right. Diversion records should provide the data required to make such an analysis.

### **2.4 Abandonment Process**

As set forth in statute<sup>7</sup>, the division engineer is required to prepare a “decennial abandonment list” and is directed to:

*“investigate the circumstances relating to each water right for which the available water has not been fully applied to a beneficial use.”*

Diversion records are an essential part of this investigation.

### **2.5 Data Source for Modeling**

Policy and planning decisions associated with issues ranging from population migration to water supply projections increasingly rely upon the science and technology of computer models to forecast change or provide virtual responses to “what if” scenarios. Such models require a robust database of information in order to formulate accurate solutions. Diversion records are a key part of such data.

Diversion records may also document the modeled on-stream impact of off-stream operations, such as irrigation return flows, recharge accretions, etc.

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<sup>7</sup> § 37-92-401, C.R.S.

### **3. DIVERSION RECORD PRINCIPLES**

#### **3.1 Create a Complete Record**

Diversion records use data management methodology associated with common accounting systems. As with all such systems, the basic goal is to reconcile the “ins” and the “outs”. Instead of “income” and “expenses”, diversion records document how much of each particular SOURCE of water is put to a specific USE. In the case of some structures, such as reservoirs, recharge areas, aggregating reaches or well fields, diversion records may also be used to record the administration of the volume “in” the structure in addition to the diversions to and releases from the structure.

In order to adequately reconcile how the water of the state is used, a complete diversion record is required. Some operations can be documented by a single diversion record that quantifies both the SOURCE of water diversion and the USE to which the water was placed. Other operations require multiple diversion records, one to document the diversion and one or more subsequent records to document the delivery and ultimate USE. The record is not complete until the diversion and the associated USE are documented.

#### **3.2 Compliance with Coding Protocol is Required**

Diversion records are a language. The nouns and verbs of the diversion record coding can only communicate clearly regarding the associated volume data if the protocols are followed rigorously. It is not enough for the water commissioner or division engineer to understand what is meant by a particular diversion record; it must be interpretable based on the application of the protocols. If the record does not comply with the protocol, the meaning of the record will ultimately be lost.

Also, bad data or data that does not comply with a known standard is worse than no data as it, in the first case, may represent as true something that is not; and, in the second case, subjects what is true to interpretation, which almost always leads to misinterpretation. Either result presents a less desirable condition upon which to base a scientific analysis. It would, generally, be more reliable to use educated assumptions about such data than to draw conclusions from bad or misinterpreted data.

#### **3.3 Diversion Records are NOT Accounting**

Although diversion records employ accounting techniques and may even mimic information from an accounting of the structure, diversion records are not accounting; they are a record of the diversion and use of water. A “complete” diversion record does not mean the USE volume will necessarily equal the volume of the SOURCE; nor is there a record of every aspect of the water’s “use”. There is no requirement, for instance, to include transit loss in the record. Diversion records, however much they may look like accounting, do not “account” for the water. Wherever the record happens to correspond to an actual accounting of the water is merely coincidental to maintaining the information required to document administration or report the volume of a SOURCE of water diverted for USE.

### 3.4 Diversion Record is a Historical Document

One of the most significant aspects of the diversion record is its historical context. As discussed above, the historical impact is lost if the record cannot be reliably interpreted. That is one context of what it means to “think historically”. A second one is the incredibly obvious observation that the only way a diversion record can be part of the historical understanding is if the record is made in the first place. There are times when it would be beneficial to have more than just the “complete record” required by Section 1.7.

Take the case of an irrigation ditch that has consistently run more tail than required to effectively operate the ditch. Recording the rate at which the natural stream was diverted for the irrigation USE may actually constitute a “complete record”. But, if that’s the only record made, a future historical consumptive use analysis of the ditch for the purposes of a change of use would result in the entire tail being included in the amount of water diverted and “used”, instead of just the amount of tail required to effectively operate the ditch. A good historical perspective should prompt the user to make an excessive tail record to document the amount of water that was diverted without ever really being able to put it to a beneficial use. If such a record is made, the historical analysis could reduce the diversion to the volume actually “used”; which is the appropriate basis for such an analysis. This would be an example of how the user is urged to think historically when compiling the diversion record.

### 3.5 Minimize the Number of Undocumented Diversions

A Diversion Comment is considered a “complete record” and should, therefore, be used to the fullest extent possible. However, an effort should also be made to minimize the number of NUC/NRC = (“E” or “F”) comments over time. These codes mean the status of a structure is either unknown or the structure is diverting water but has no data associated with the diversion. While there may be occasions when “active” structures fall into one of these two categories, they should not be allowed to remain in either of these conditions for an extended period of time. If the structure is one that, in the opinion of the division staff, will never be required to submit diversion records, the user should consider changing the CIU code to “U”<sup>8</sup>. If the structure is consistently diverting water, the user should determine the most effective way to obtain the associated data. This may mean requiring structures that divert “significant” amounts of water to install a measurement structure with recorder, establishing a User Supplied diversion record report with the water user or some other appropriate action.

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<sup>8</sup> HydroBase CIU code “U” means “Active structure but diversion records are not maintained.”

## **4. DIVERSION RECORDS WARRANTED**

This section identifies administration that, in the opinion of the state engineer, warrants a diversion record. Diversion records beyond the scope of those discussed here may also be made at the discretion of the water commissioner or division engineer:

- Diversions from the stream system;
- Releases to the stream system;
- Off-stream Diversions;
- Off-stream Releases; and,
- Records of Non-use.

### **4.1 Diversions from the Stream**

Any diversion that removes a “substantive”<sup>9</sup> volume of any SOURCE of water directly from the natural stream system should be recorded. The following diversions warrant a record:

- All substantive diversions of natural stream flow, non-stream flow (such as seeps and springs) and any other SOURCE of water being transported by the natural stream system, including diversions by exchange, trade or alternate point as well as diversions by head gate wells<sup>10</sup> or other similar structures; and,
- All diversions by on-stream reservoirs as recorded by either inlet measurement structure or stage-capacity curve and gauge height.

### **4.2 Releases to the Stream**

All water released directly (i.e. without delayed impacts) to the natural stream system or to an off-stream system for use should be recorded. The following direct releases warrant diversion records:

- Releases to the stream for delivery and diversion or USE downstream;
- Releases to an off-stream system for USE;
- Releases that relinquish dominion and control, returning the water to the public domain;
- Releases of any reusable effluent;
- Return flow releases;
- Excessive<sup>11</sup> tail-water releases; and,
- Transbasin imports/exports.

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<sup>9</sup> “Substantive” means any diversion that requires administration.

<sup>10</sup> A “head gate” well is a structure that, in effect, diverts water from the natural stream even though the structure is not necessarily in direct physical contact with the stream. The water court has decreed and the state engineer has permitted wells that operate without delayed depletions to the stream in effectively the same way a ditch head gate operates.

<sup>11</sup> “Excessive” means the volume released exceeds the volume minimally required to operate the ditch. Such records are required in order to prevent an inflated use analysis of the ditch shares.

## 4.3 Off-Stream Diversions

### 4.3.1 Alluvial Ground Water

Diversions of alluvial ground water by >50 GPM wells that deplete the natural stream must record the total volume pumped.

Records are not required for exempt structures or structures that cover their augmentation requirements by releasing the un-consumed portion of the diversion back to the natural stream system by means of a non-evaporative leach field. The water commissioner or division engineer may include records for such structures at their discretion. Such records, however, should be based on actual meter data and not simply an assumed volume based on USE or permitted rate.

### 4.3.2 Ground Water with Limited Appropriative Rights

In addition to >50 GPM alluvial wells, wells that have volumetric limits on the appropriation they are allowed to make require diversion records to effect administration. Examples would be: the 100 year volumetric limit of Denver Basin wells, decreed limits or well permit based limits. These wells should have, at a minimum, an infrequent record of the total volume diverted.

### 4.3.3 Depletion Record

A “depletion” is the reduction of natural stream flow caused by the diversion of alluvial groundwater. The depletion is typically determined by a model based on the aquifer characteristics, distance of the well from the stream and how the water is used. Depletions are recorded as a diversion of the natural stream flow and is assigned the same priority as the water right of the structure that diverted the groundwater<sup>12</sup>. In general, Decision Support System (DSS) tools will be relied upon to model and record the depletion caused by off-stream diversions that impact the stream, provided there is a diversion record of the volume removed from or added to the alluvial aquifer.

## 4.4 Off-Stream Releases

### 4.4.1 Recharge

Off-stream releases that recharge the alluvial aquifer impact the natural stream by means of an accretion, discussed further in Section 1.21. In order to calculate accretions, the diversion records shown below are required. The records, at the discretion of the water commissioner or division engineer, may be “Observed” or “User Supplied - Known Reliability”.

- Deliveries to recharge areas or recharge wells; and,
- Volume “transferred to the alluvial aquifer”<sup>13</sup>.

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<sup>12</sup> Some replacement plans use the most junior priority of all the plan structures as their basis for determining the priority of depletions.

<sup>13</sup> This is the volume that seeps into the aquifer from a recharge area holding pond or other structure, such as a ditch segment decreed for recharge or a structure with decreed authorization to obtain credit for seepage loss.

## 4.4.2 Decreed Indirect Return Flows

Diversion records should be made for non-recharge based return flows, such as decreed lawn irrigation return flow credit or losses of transbasin water. The record must be made using accounting approved by the court or division engineer if the return flow is:

- used to replace depletions by a replacement plan;
- used as the substitute supply for an exchange;
- delivered downstream for subsequent diversion; or,
- put to an in-stream USE.

## 4.4.3 Accretion Record

Decision Support System tools or other models are used to calculate the volume and timing of accretions to the stream. The time, place and amount of the accretions are based on aquifer characteristics and the distance of the recharge area from the stream.

## 4.5 Records of Non-use

Statute<sup>14</sup> directs that on each tenth anniversary of July 1, 1990, the division engineer:

*“shall...prepare...a separate abandonment list comprising all absolute water rights which he has determined to have been abandoned in whole or in part and which previously have not been adjudged to have been abandoned.”*

Statute<sup>15</sup> further provides that:

*“failure for a period of ten years or more to apply to a beneficial use the water available under a water right when needed by the person entitled to use same shall create a rebuttable presumption of abandonment of a water right with respect to the amount of such available water which has not been so used; except that such presumption may be waived by the division engineer or the state engineer if special circumstances negate an intent to abandon.”*

In order to comply with these statutes, one could certainly see an advantage to having an adequate record of failure to use an available water right. Such records may be as simple as the entry of a Diversion Comment, as discussed in Section 1.27.

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<sup>14</sup> § 37-92-401(1)(a), C.R.S.

<sup>15</sup> § 37-92-402(11), C.R.S.

## **5. ENTRY OF DIVERSION RECORDS**

### **5.1 Timing**

A complete diversion record should be made as soon after the diversion as possible. At a minimum, users should strive to enter at least the total volume diverted or released on a monthly basis. Diversion records must be completed by March 1 of the following irrigation year in order to allow sufficient time to incorporate the information into annual reports.

### **5.2 Responsibilities for Making Records**

Following are the recommended assignments for the responsibility of making diversion records, recognizing the division engineer is ultimately responsible for assigning the work duties of the division staff.

#### **5.2.1 Water Commissioners**

Water commissioners or other division staff should be responsible for making all "Observed" records related to the administration of the natural stream in their water district(s). This includes:

- diversions from the stream (Section 1.12);
- releases to the stream (Section 1.13);
- off-stream releases(Section 1.18); and,
- records of non-use (Section 1.22).

#### **5.2.2 Division Staff/Others**

Other division staff, water user groups or Decision Support System tools may be relied upon to supply the following diversion records:

- off-stream diversions, including associated stream depletions(Section 1.14); and,
- accretions to the stream from alluvial aquifer recharge (Section 1.21).

# **Part II - CODING: DEFINITIONS & PROTOCOLS**

## 6. DIVERSION RECORD OPTIONS

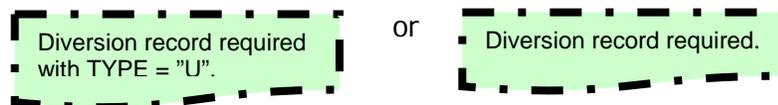
There are four forms of diversion records: Diversion Comment, Infrequent Diversion Record, Daily Diversion Record, and Reservoir Record.

### 6.1 Diversion Comment

A Diversion Comment potentially contains the following information<sup>16</sup>:

- “not used/ not released” codes (NUC/NRC); and/or,
- a general comment regarding the structure.

The available NUC/NRC are shown in Table 0-1. To determine whether a Diversion Comment is sufficient, refer to the “Diversion Record Logic Diagram” in Appendix A. A Diversion Comment with the resultant NUC/NRC is a sufficient record unless the result of the logic diagram is:



If the result of the logic diagram is either of the above “Diversion record required” results, then either an Infrequent Diversion Record or a Daily Diversion Record, depending on the data available, is required.

**Table 6-1: Not Used/Not Released Codes (NUC/NRC)**

|   |                                    |
|---|------------------------------------|
|   | Blank is acceptable                |
| A | Structure not usable               |
| B | No water available                 |
| C | Water available, but not taken     |
| D | Water taken in another structure   |
| E | Water taken, but no data available |
| F | No information available           |

### 6.2 Infrequent Diversion Record

If a diversion record is required based on the logic diagram in Appendix A and the data associated with the diversion structure is quantified on a monthly or annual basis, the Infrequent Diversion Record option should be used. The data may be in one of four formats:

- average daily amount for a month;
- total amount for a month;
- average daily amount for the year; or,
- total amount for the year.

<sup>16</sup> The number of acres irrigated was historically collected using a Diversion Comment. With the ability to use spatial data analysis of aerial photographs to determine the area irrigated by each division on an annual basis, there is no longer a need to enter this information.

### 6.3 Daily Diversion Record

The Daily Diversion Record option may be used **only** if the diversion is quantified on a daily basis. Quantification of daily amounts may be based on:

- regular<sup>17</sup> visits to the diversion structure with a log of the associated measurement;
- continuous measurement recorder; or,
- other equivalent process approved by the division engineer.

A Daily Diversion Record should **NOT** be used to capture “manufactured” daily data based on annual or monthly information. If a user needs to have monthly or annual infrequent data represented on a “daily” basis, the infrequent diversion record with the “average daily amount” option should be used.

### 6.4 Reservoir Records

Reservoirs must also be included in the diversion record and annual diversion information report. These reports may be used to generate an Infrequent Diversion Record in the absence of other data.

In addition to the minimum information detailed in the following two sections, reservoirs that make releases requiring administration, such as releasing water to the stream, must make a record of such releases. Any reservoir that has release records must also make records of the diversions to storage. Diversion records of the losses, such as evaporation or seepage, may be made at the option of the water commissioner or division engineer.

#### 6.4.1 Small Irrigation Only Reservoirs

Reservoirs that are only used to supply irrigation water must submit:

- the end of irrigation year (October 31) stage and volume amounts;
- the date and stage/volume amount when diversions to storage ended; and,
- the dates associated with the beginning and ending of releases from the reservoir.

#### 6.4.2 Large or Multiple Use Reservoirs

Large and/or multiple use reservoirs must submit, at a minimum, end-of-month stage readings and storage volume data. Daily storage and release records are also required if any release from the reservoir requires administration.

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<sup>17</sup> A “regular” visit schedule is whatever the water commissioner or division engineer believes is necessary to make the daily record. Daily visits are preferred, but a less frequent schedule, such as weekly or when the ditch turns on or off, may be acceptable.

## 7. WATER CLASS

### 7.1 Water Class Definition

Diversion records are a language. The basic sentence in the language is the Water Class, which consists of a series of codes that provide the location of the diversion, the SOURCE of water, the USE of the water and the administrative operation required to make the diversion. The Water Class, combined with a daily, monthly or annual volume, constitutes a "Diversion Record". The codes that make up a Water Class, are:

- WDID - structure ID at which the diversion was made
- ACT - each WDID may have multiple accounts as indicated by a three digit extension appended to the right of a decimal point after the WDID
- SOURCE - source of the water being diverted
- FROM - structure ID of "enabling structure" associated with more complex diversions; may also have an ACT extension
- USE - how the diverted water was used
- TYPE - provides additional detail regarding the administrative operation associated with the diversion
- GROUP - the ID of a group or authorizing agent associated with the diversion
- TO - the ID of a structure to which a release is being delivered; may also have an ACT extension

### 7.2 Organized by Irrigation Year

Diversion records are organized by "irrigation year"<sup>18</sup>, which begins November 1 of the previous calendar year and ends October 31 of the irrigation year. This practice is a holdover from the agrarian based development of most water rights as irrigation typically ended in October.

### 7.3 Water Class is Unique

There can be only one diversion record for each Water Class in any given diversion record period<sup>19</sup>. Versions of the following table format have been used throughout this document to illustrate diversion record water classes.

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | O | Description |
|---|----------|---|-------|---|---|---|--------|---|-------------|
| 1 | 0802500  | 1 |       | 0 |   |   |        |   |             |

### 7.4 Water Class Context / Purpose

The diversion record has two contexts. The water class must be constructed so that the diversion record accurately records the SOURCE of water being diverted as well as the USE and place the water was put to USE. Secondly, the water class must accurately quantify the inflows and outflows of the individual structure (WDID) whose operation is being recorded.

<sup>18</sup> Irrigation year "2008" (IYR 2008) would begin November 1, 2007 and end October 31, 2008.

<sup>19</sup> For annual records, only one entry is allowed for the year. Likewise, for monthly and daily records, only one record each month or each day, respectively, would be allowed.

### 7.4.1 Documents SOURCE / USE

First and foremost, the diversion record documents the volume of each SOURCE of the public's water and how it was put to USE. Because diversions are typically based on water rights and water rights are typically associated with the structure that first diverts the water, it is important to create all the records required to document the place of USE when the water is not used by the first structure diverting the water. The water class must, therefore, maintain the association between the structure that initially diverts the water and the ultimate USE of the water diverted.

#### SOURCE/USE Information in a Single Record

The simplest water class formulation is the direct diversion of a SOURCE of water that is put to USE by the same structure in an operation that can be recorded by a single record:

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | O | Description              |
|---|----------|---|-------|---|---|---|--------|---|--------------------------|
| 1 | 0100505  | 1 |       | 1 |   |   |        | * | SOURCE/USE in one record |

#### SOURCE/USE Information in Different Structures

If the SOURCE is quantified by one structure and a subsequent structure records the USE, two or more records are required. The WDID of the first structure is used as the FROM code in the subsequent record(s) to maintain the association between SOURCE and USE.<sup>20</sup> An example would be the case where a water commissioner makes an "Observed" record of the diversion from the stream and relies upon "User Supplied" data for the USE record:

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | O | Description                     |
|---|----------|---|---------|---|---|---|--------|---|---------------------------------|
| 1 | 0100501  | 1 |         | Q |   |   |        | * | WC Observed record              |
| 2 | 0104516  | 1 | 0100501 | 2 |   |   |        | K | User Supplied-Known reliability |

The FROM code **IS NOT** the WDID of the previous structure that measured the water, unless that previous structure was the initial diverting structure. This enables the Structure Report (Section 0) to associate the initial diversion structure, which is generally where the water right is tabulated, with each structure that subsequently measures the water as well as the ultimate USE and place of USE.

### 7.4.2 Documents Individual Structure Operation

The diversion record also documents the operations of structures regarding how much of each SOURCE of water the structure received, how much was put to USE by the structure and how much was released by the structure for USE at another location. Care must be taken to create records that not only properly document the SOURCE and USE of water, but also accurately quantify the water in terms of the specific structure inflow and outflow.

<sup>20</sup> The "non-blank" FROM code will also be relied upon, as discussed in Section Error! Reference source not found. to prevent double counting diversion of "natural water."

## 8. *WDID / ACCOUNT*

### 8.1 WDID

Diversion records are entered for “structures”. A structure is a physical object at which the flow or volume of water is quantified. Structures are identified by the division staff and assigned a unique seven digit identification number known as the “WDID”. The first two digits of the WDID are the “Water District”. The water district is a geographical area identified by the Office of the State Engineer that generally relates to the drainage area of a stream or group of streams. The last five digits of the WDID are simply a sequential identification number or “ID”.

#### 8.1.1 **WDID is Required**

The WDID is the key data requirement for any structure that requires administration as it is the identifier by which information is stored in the database. The only way to include the structure in the database (HydroBase) is to assign the structure a WDID. *Structures that are being administered for any reason, such as accounting, diversions, rule compliance, etc. must have a WDID.*

#### 8.1.2 **WDID is Unique**

The WDID is a unique number, which means there is one and only WDID for each structure or specific aspect of a structure. For instance, a ditch may have a WDID assigned to the head gate and a second WDID assigned to the return structure used to release water back to the stream. Previous data base limitations prompted the creation of “duplicate” WDIDs for the purpose of inter-district diversion records. Some users also created multiple WDIDs for a single structure in order to track multiple aspects of the structure, such as assigning a WDID to specific pools of storage water in a reservoir. Such practice only contaminates the database and compromises its integrity. *Every effort must be made to identify and eliminate duplicate WDIDs and merge the associated diversion records.*

#### 8.1.3 **Update Annually**

In order to maintain a complete database, diversion records for new structures must be added annually. This will best be achieved through a collaborative process between the water commissioners and the division staff charged with tabulating new water rights. *The division engineer should work to insure that such a process is in place and supported.*

#### 8.1.4 **Structure Location**

With the advent of technology, accurate structure locations bear more importance than simply being able to locate the structure in the field. All structures must have accurate GPS locations in order to properly model the relative locations of the structures and correctly display their locations.

## 9. "SOURCE" CODE

The diversion record tracks six "sources" of water as defined in Table 0-1. There are three naturally occurring sources of water and three "manufactured" sources of water. A seventh code, "X", is provided for administrative records (TYPE = "0") only and is not included in summation routines used to report the SOURCE or USE of water in Colorado.

**Table 9-1: SOURCE Codes**

|                 |                     |   |
|-----------------|---------------------|---|
| 1               | Natural Stream Flow | Waters of the state that are part of the natural stream.  |
| 2               | Reservoir Storage   | Water released from storage in a reservoir; not flow through water.   |
| 3               | Ground Water        | Includes tributary and non-tributary water.   |
| 4               | Transbasin Water    | Water imported from another basin, the drainage from which does not combine with drainage from the importing basin within the state of Colorado. Transbasin water is considered "foreign water" to the receiving basin and is, therefore, generally fully consumable. <sup>21</sup> |
| 5               | Non-Stream Flow     | Direct flow from springs, localized run-off, etc. before water enters stream; may also include diversions of water that is "futile" to the call or otherwise considered non-tributary, such as adit drainage, etc.  |
| 8               | Re-usable Water     | The unconsumed portion of fully consumable water that has been quantified and maintained under dominion and control after previous diversion, USE and release.  |
| X <sup>22</sup> | Unspecified         | Water of an unspecified nature or water associated with multiple SOURCES used for "total through head gate" kinds of diversion records for administrative purposes. (TYPE must equal "0").  |

### 9.1 "Natural Water" SOURCE Codes

"Natural water" sources include "natural stream flow", "ground water" and "non-stream flow". Natural water becomes available for USE only after the water is diverted from the SOURCE.

#### 9.1.1 Natural Stream Flow (SOURCE = "1")

Natural stream flow is the native flow in a surface stream that is "waters of the state", subject to appropriation.

#### Tributary Springs

If a "spring" produces water that consistently becomes part of a flowing "stream", the spring is considered to produce SOURCE = "1", Natural Stream Flow, water. By ruling of the court,<sup>23</sup> flowing water from a spring is presumed to be tributary.

#### Headgate Wells

Headgate wells are permitted under the statutory authority of the State Engineer as being

<sup>21</sup> See C.R.S. 37-82-106. Right to reuse of imported water

<sup>22</sup> SOURCE "X" should not be used as the only record for a structure as it provides no understanding regarding the SOURCE of water diverted.

<sup>23</sup> Ranson v. City of Boulder, 161 Colo. 478, 483, 424 P.2d 122, 123 (1967).

*"in such close proximity to the river that when pumped, the impact to the river occurs so quickly that the well's diversion can be administer as though they occur instantaneously at the river, just like a headgate for a surface water diversion."*<sup>24</sup>

As a result, a headgate well diverts whatever SOURCE of water is being delivered to the well. It could be SOURCE = "1" ("free river") or a diversion of any other SOURCE of water being delivered by means of the natural stream.<sup>25</sup>

### 9.1.2 Ground Water (SOURCE = "3")

The Division administers different kinds of ground water. While each kind of ground water does not have a completely unique water class structure, it is important to understand the water class differentiation between the groups of ground water diversion records.

#### Exempt, Non-tributary, Designated Basin & Non-Critical Basin Tributary Wells

Ground water diversions that require no authorization beyond that provided in statute include wells being used for exempt<sup>26</sup> purposes or diverting non-tributary<sup>27</sup> or designated<sup>28</sup> ground water. In addition, the diversion of tributary (alluvial) ground water in a non-critical or "not over-appropriated" basin can be made without additional authorization.

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description            |
|---|----------|---|-------|---|---|---|--------|------------------------|
| 1 | 1005555  | 3 |       | 1 |   |   |        | Ground water diversion |

#### Non-Critical Basin Tributary Wells with Plans of Augmentation

Some tributary wells in non-critical basins or in critical basins that have not yet passed well use rules voluntarily obtain plans for augmentation from the court. Once a well has obtained a plan of augmentation, all well pumping (regardless of whether the well's water right is "in-priority" or "out-of-priority") covered by the plan should make a TYPE = A record. This documents the operation of the decreed plan. It also provides a ready distinction from wells without decreed plans of augmentation should the basin become subject to rules requiring replacement plans.

|   | WDID.ACT | S | F.ACT | U | T | G      | TO.ACT | Description                        |
|---|----------|---|-------|---|---|--------|--------|------------------------------------|
| 1 | 1005555  | 3 |       | 1 | A | PLANID |        | Diversion pursuant to decreed plan |

#### Alternate Point Wells

Some wells are allowed to divert without quantifying or replacing any associated depletion by being decreed as an alternate point to a surface water right. When the surface water right is in-priority, the well may divert in lieu of making a surface water diversion.

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                  |
|---|----------|---|---------|---|---|---|--------|------------------------------|
| 1 | 6405523  | 3 | 6400586 | 1 | 4 |   |        | Diversion by alternate point |

<sup>24</sup> State Engineer Guideline 2012-1

<sup>25</sup> § 37-83-102

<sup>26</sup> § 37-92-602, C.R.S.

<sup>27</sup> § 37-90-103(10.5), C.R.S.

<sup>28</sup> § 37-90-103(6), C.R.S.

### Tributary Wells in an Over-Appropriated Basin

Diversion of tributary (alluvial) ground water in an over-appropriated<sup>29</sup> basin requires special authorization to prevent injury to vested surface water rights. As determined by the Supreme Court<sup>30</sup>

*"Absent a showing to the contrary, Colorado law presumes that (1) groundwater is tributary to the stream, and (2) that where surface water is over-appropriated, groundwater depletion through well pumping causes material injury to senior appropriators."*

Special authorization could be in the form of legislation, as in the case of the Colorado-Big Thompson project's Senate Document 80 that authorized the replacement of depletions associated with water rights senior to that project from a "Historic User Pool" of water in Green Mountain Reservoir whenever qualifying water rights are out-of-priority. More common are substitute water supply plans approved by the State Engineer and plans of augmentation decreed by the court.

|   | WDID.ACT | S | F.ACT | U | T | G      | TO.ACT | Description          |
|---|----------|---|-------|---|---|--------|--------|----------------------|
| 1 | 1005555  | 3 |       | 1 | A | PLANID |        | Authorized diversion |

### 9.1.3 Non-Stream Flow (SOURCE = "5")

Sources of surface water flow that are not considered part of the "natural stream flow" are characterized as "non-stream flow". This could include springs that are non-tributary, disconnected from the stream or futile to the call, sheet flow into a reservoir, seeps, etc.

## 9.2 "Manufactured Water" SOURCE Codes

The SOURCE code of water is maintained until changed by one of the administrative operations described below. The code change associated with the administrative operation applies regardless of what SOURCE the water was before the operation. Once the administrative operation is performed, the SOURCE of the water is changed to one of the following sources of "manufactured water":

### 9.2.1 Reservoir Water

All water undergoes a change to "Reservoir Water" when stored (USE = "0"). When released, the water is SOURCE = "2", regardless of what SOURCE it was prior to storage.

### 9.2.2 Transbasin Water

When exported<sup>31</sup> (USE = "T"), water becomes SOURCE = "4" in the importing basin regardless of what SOURCE the water was when exported. By statute,<sup>32</sup> transbasin water is considered "foreign water" and is, therefore, fully consumable, provided the user maintains dominion and control of the water at all times.

<sup>29</sup> In addition to being "over-appropriated", the basin would need to have rules implemented by the state engineer that govern the operation of the wells.

<sup>30</sup> *Simpson v. Bijou Irrigation Co.*, 69 P.3d 50, 57 n.7 (Colo. 2003).

<sup>31</sup> As stated in Table 0-1 water imported from another basin, the drainage from which does not combine with drainage from the importing basin within the state of Colorado, is "transbasin water".

<sup>32</sup> C.R.S. 37-82-106

### 9.2.3 Re-usable Water

The unconsumed portion of water diverted for USE that is still legally available for subsequent USE and under the dominion and control of the user becomes SOURCE = "8" water regardless of what SOURCE the water was when it was diverted for USE.

## 10. "FROM" CODE

The FROM code is the WDID of another structure that indicates the diversion:

- is a subsequent diversion of "natural water" to prevent the SOURCE of the water from being double counted;
- is importing transbasin water; the FROM code shows the exporting structure.
- is at a structure receiving water from another structure in order to associate the structure initially diverting or releasing the SOURCE to the USE and place of USE.
- can be made only because of its association to the WDID in the FROM code that "enables" the diversion, such as:
  - the source of replacement supply for a diversion by exchange;
  - the in-priority structure foregoing a diversion and trading the water to an out-of-priority structure; or,
  - the in-priority structure to which the diverting WDID is a decreed alternate point.

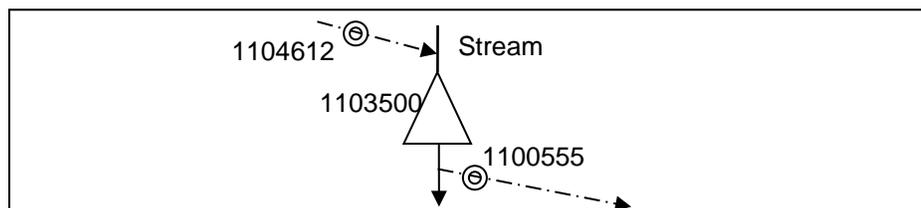
There are a couple of allowed "optional" uses of the FROM code, as discussed below. The user must adhere to the protocols set forth in this section to maintain the meaning of the code.

### 10.1 FROM Code Required

#### 10.1.1 Record of Subsequent Diversion

Structures that make a subsequent diversion of "natural water" that was initially diverted by another structure or "manufactured water" that was released from another structure must have the initial diverting or releasing structure WDID in the FROM code. This is necessary to associate the WDID of the structure that diverted or released the water to the delivery, USE and place of USE.

Illustrated below is a case where transbasin water is stored in an on-stream reservoir and then released for use in a downstream ditch. The storage record includes the WDID of the structure and ACT, if used, releasing the transbasin water in the FROM code. Likewise, the USE record at the ditch has the reservoir structure WDID and ACT, if used, as the FROM code.

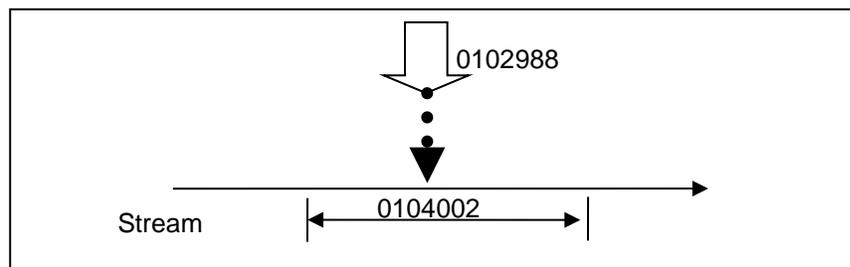


|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                         |
|---|----------|---|---------|---|---|---|--------|-------------------------------------|
| 1 | 1104612  | 4 | 3804613 | Q | 7 |   |        | Transbasin release                  |
| 2 | 1103500  | 4 | 1104612 | 0 |   |   |        | Storage of transbasin water         |
| 3 | 1103500  | 2 |         | Q | 7 |   |        | Reservoir release to stream         |
| 4 | 1100555  | 2 | 1103500 | 1 |   |   |        | Reservoir water used for irrigation |

Notice that when the transbasin water was “stored” (USE = “0”), it was changed to SOURCE = “2”. If it is necessary to track specific water through the system in spite of the change in SOURCE that occurs when water is stored, use an ACT in the reservoir to track the water as shown in the following example.

|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT | Description  |
|---|-------------|---|-------------|---|---|---|--------|--|
| 1 | 1104612     | 4 | 3804613     | Q | 7 |   |        | Transbasin release                                   |
| 2 | 1103500.006 | 4 | 1104612     | 0 |   |   |        | Storage of transbasin water; ACT 006 is “transbasin” |
| 3 | 1103500.006 | 2 |             | Q | 7 |   |        | Stored transbasin water released for delivery        |
| 4 | 1100555     | 2 | 1103500.006 | 1 |   |   |        | Stored TB water to irrigation                        |

Indirect releases to a stream reach must also be associated with the structure causing the stream impact by including the WDID of the structure and ACT, if used, in the FROM code. As an example, recharge accretions to a stream reach are recorded as a SOURCE = “8” release to a reach WDID. The WDID of the recharge structure and ACT, if used, placing the water into the alluvial aquifer are included in the FROM code. There may be exceptions to this rule, as in the case of lawn irrigation return flows (LIRFs) that are associated with an Entity ID instead of a distinct point of origin. In either case, the GROUP code would identify the replacement plan for which the accretions are available.



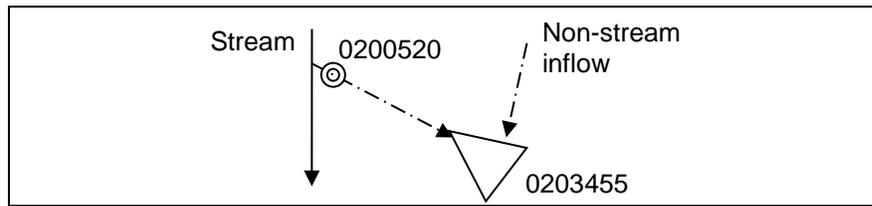
|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT | Description                           |
|---|----------|---|---------|---|---|---------|--------|---------------------------------------|
| 1 | 0104002  | 8 | 0102988 | Q | * | 0103335 |        | Accretions from recharge area 0102988 |

\* This water class with a “blank” TYPE code is for a Reach-Aggregating structure type. A Reach-Simple structure type would have TYPE = 0.

### Subsequent Diversion of Natural Water to Prevent Double Counting SOURCE

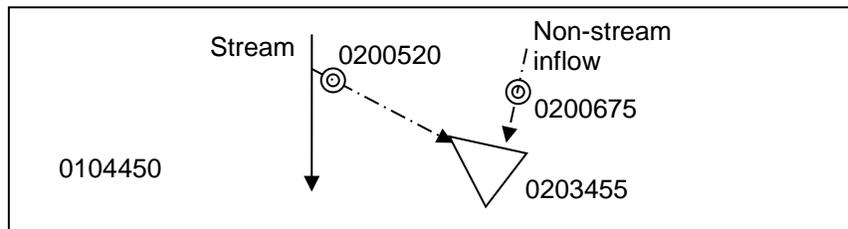
In addition to tracking the delivery of water to subsequent structures, records of “natural water” associated with subsequent measurements must include the WDID of the structure initially diverting the water in the FROM code in order to prevent the SOURCE of water from being double counted.

As illustrated in the example below, the storage of “natural stream flow” (Row 2) requires a FROM code to prevent double counting the SOURCE = “1” water. The storage of “non-stream flow” (Row 3, below) does not require a FROM code because the storage record is also the initial diversion record of the SOURCE = “5” water.



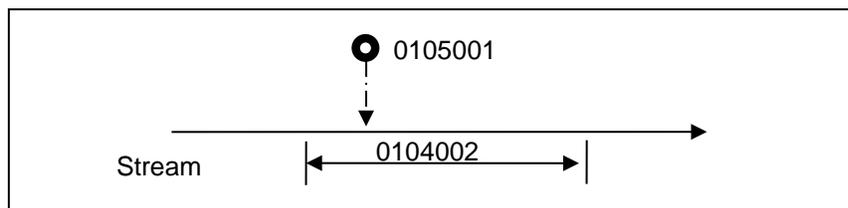
|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description  |
|---|----------|---|---------|---|---|---|--------|--|
| 1 | 0200520  | 1 |         | Q |   |   |        | Diversion of natural stream flow   |
| 2 | 0203455  | 1 | 0200520 | 0 |   |   |        | Subsequent storage; FROM code required to prevent double counting                      |
| 3 | 0203455  | 5 |         | 0 |   |   |        | Direct storage of non-stream flow; FROM must be blank since this is initial diversion. |

Had the “non-stream flow” in the example above been measured prior to storage in the reservoir, the storage record would require a FROM code to prevent double counting the SOURCE = “5” water, as shown below.



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description   |
|---|----------|---|---------|---|---|---|--------|---|
| 1 | 0200520  | 1 |         | Q |   |   |        | Diversion of natural stream flow                                  |
| 2 | 0203455  | 1 | 0200520 | 0 |   |   |        | Subsequent storage; FROM code required to prevent double counting |
| 3 | 0200675  | 5 |         | Q |   |   |        | Measured non-stream flow  |
| 4 | 0203455  | 5 | 0200675 | 0 |   |   |        | Subsequent storage; FROM code required to prevent double counting |

Another example of a subsequent measurement structure requiring the use of the FROM code to prevent double counting a SOURCE would be an on-stream “reach” receiving SOURCE = “3” water for augmentation (USE = “A”). The WDID of the well delivering the water would be in the FROM code so the volume of SOURCE = “3” water is not counted twice.



|   | WDID.ACT    | S | F.ACT       | U | T | G       | TO.ACT | Description                                 |
|---|-------------|---|-------------|---|---|---------|--------|---|
| 1 | 0105001.001 | 3 |             | Q | A | 0103335 |        | Ground water pumping by an augmented well   |
| 2 | 0105001.002 | 3 | 0105001.001 | Q | 7 | 0103335 |        | Ground water released as replacement supply |
| 3 | 0104002     | 3 | 0105001.001 | A |   | 0103335 |        | Augmentation of stream reach                |

In the above example, the subsequent records (Rows 2 and 3) require a FROM code to prevent double counting the SOURCE = "3" water. It also demonstrates the use of accounts as ACT 001 of 0105001 measures water pumped out of the ground while ACT 002 tracks the water released to the stream. Even though it is entirely likely that the two records (Rows 1 and 2) have the same volume, both records are still required because of the need to capture the two TYPE codes ("A" and "7").

## 10.1.2 Diversion is Enabled by FROM Structure

### Exchange

When a diversion is made by exchange (TYPE = "1"), the WDID of the structure and ACT, if used, releasing the associated replacement water must be in the FROM code of the diversion record. See Section 1.74 for a complete description of an exchange and associated coding requirements.

### Trade

Diversions made by trade (TYPE = "2") are done in pairs; both records have TYPE = "2". One record is a diversion from the stream, the FROM code of which is the WDID of the in-priority structure providing the traded water. The second record is at the in-priority structure, the FROM code of which is the WDID of the structure supplying the off-stream replacement supply. See Section 1.75 for a complete description of a trade and associated coding requirements.

### Alternate Point

Structures diverting or storing water as an alternate point (TYPE = "4") must have a FROM code that is the WDID of the in-priority structure to which the structure is operating as an alternate point of diversion. See Section 1.76 for a complete description of an alternate point of diversion and associated coding requirements.

### **Subsequent Diversions of an Alternate Point Diversion**

When water is diverted at an alternate point of diversion, the FROM code of the diversion record is the WDID of the in-priority structure to which the diverting structure is an alternate point. As shown in the example below, water is physically diverted at 0100575 because it is an authorized alternate point of diversion to 0100655.

| WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description               |
|----------|---|---------|---|---|---|--------|---------------------------|
| 0100575  | 1 | 0100655 | Q | 4 |   |        | Alternate point diversion |

If the water diverted by the above water class is diverted by a second structure, the second water class must have a non-blank FROM code to prevent the water associated with the second diversion from being double counted by the SOURCE summation routine. The FROM code in the second diversion is the WDID that physically diverted the alternate point water, not the WDID used in the FROM code for the initial TYPE = 4 diversion. Using the example above, the FROM code in the subsequent diversion is 0100575, not 0100655:

| WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                       |
|----------|---|---------|---|---|---|--------|-----------------------------------|
| 0100575  | 1 | 0100655 | Q | 4 |   |        | Alternate point diversion         |
| 0103500  | 1 | 0100575 | 0 |   |   |        | Subsequent diversion of alt point |

### Diversions Associated with Temporarily Disabled Structure

A particular application of the diversion authorized by FROM structure is when a water commissioner allows the water right decreed to a temporarily disabled structure, such as a structure that gets washed out by the spring run-off, to be diverted by a structure that is not a decreed alternate point of diversion to the disabled structure. In order to effectively capture this operation, the user should make a bypass record at the disabled structure to quantify the water associated with the water right. A second record would then capture the diversion and USE of the water at the structure diverting the water:

| WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT | Description  |
|-------------|---|-------------|---|---|---|--------|--|
| DSABLID.002 | 1 |             | Q | 7 |   |        | Bypass record at disabled structure                                |
| SECNDID     | 1 | DSABLID.002 | 1 |   |   |        | Record of diversion associated with temporarily disabled structure |

The second structure must deliver the water to the place of use decreed for the disabled structure.

### 10.1.3 Transbasin Import Records

Because of the need to make sure exports of transbasin water are being documented in the importing basin, import records must use the WDID of the exporting structure (USE = "T") in the FROM code.

| WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description   |
|----------|---|---------|---|---|---|--------|---------------|
| 3804613  | 1 |         | T |   |   |        | Export record |
| 1104612  | 4 | 3804613 | Q | 7 |   |        | Import record |

## 10.2 Optional FROM Code Applications

Using a FROM code beyond the protocols prescribed in Section 1.52 is allowed, but must have reasonable similarity to a protocol use. For example, a user may maintain control and dominion of the return flows associated with the use of imported transbasin water. Consider the following example where a ditch uses imported water for irrigation. The associated ditch loss can be quantified and credited back to the stream. The ditch loss record does not require a FROM code:

| WDID.ACT | S | F.ACT       | U | T | G       | TO.ACT      | Description                  |
|----------|---|-------------|---|---|---------|-------------|------------------------------|
| 1700552  | 2 | 1403526.342 | 1 |   |         |             | TB water used for irrigation |
| 1700552  | 8 |             | Q | V | 1707151 | 1700993.002 | Associated ditch loss        |

The user may, however, have several of these kinds of diversions at the same structure. Instead of tracking them all with a single ditch loss record, the user may find it more efficient to track them independently by adding the originating source of the transbasin water to the FROM code of the ditch loss record:

| WDID.ACT | S | F.ACT       | U | T | G       | TO.ACT      | Description                  |
|----------|---|-------------|---|---|---------|-------------|------------------------------|
| 1700552  | 2 | 1403526.342 | 1 |   |         |             | TB water used for irrigation |
| 1700552  | 2 | 1403526.346 | 1 |   |         |             | TB water used for irrigation |
| 1700552  | 8 | 1403526.342 | Q | V | 1707151 | 1700993.002 | Associated ditch loss        |
| 1700552  | 8 | 1403526.346 | Q | V | 1707151 | 1700993.002 | Associated ditch loss        |

## 11. "USE" CODE

USE codes describe the administrative operation associated with the diverted volume of water. The USE code includes operations that beneficially consume water, like irrigation or municipal (USE "1", "2"), as well as operations like "storage", "recharge" and "transbasin export" (USE "0", "R", "T") that only make the water available for future beneficial USE. Diversions that document a "sub-basin export" or "quantify" water (USE "B", "Q") are not included in the USE summation routine.

**Table 11-1: USE Codes**

|   |                                |   |
|---|--------------------------------|---|
| 0 | Storage                        | Stored in a Reservoir or Reservoir System for later release to beneficial USE.  |
| 1 | Irrigation                     | Application of water for the growth of beneficial vegetation.   |
| 2 | Municipal                      | Urban uses by a municipality or quasi-governmental entity legally responsible for distribution of water.  |
| 3 | Commercial                     | Ordinary non-manufacturing business such as hotels, campgrounds, retail stores, restaurants and stock yards.  |
| 4 | Industrial                     | Manufacturing, mining, steam production, etc.   |
| 5 | Recreation                     | Generally non-consumptive (except evaporation) uses for such things as aesthetics, acoustical, etc.   |
| 6 | Fishery                        | Generally non-consumptive (except evaporation) where only use is production of fish.  |
| 7 | Fire                           | As needed for emergencies or training.  |
| 8 | Domestic                       | Residential use for inside uses and lawn and garden irrigation; see also "H", for household use only diversion records.   |
| 9 | Stock                          | Livestock watering; no record required to document incidental access to water diverted for other uses.  |
| A | Augmentation                   | Replacement supply; must include the associated plan of augmentation in the GROUP.  |
| B | Sub-basin export               | Diverted from one sub-basin to another that is in the same river system. (Typically involves moving water from one water district to another water district within the same water division.)  |
| C | Change of Use Return Flows     | Water released to replace historic return flow obligations as a result of diverting changed water.  |
| E | Evaporation                    | Evaporative loss, generally from storage or recharge area impoundment.  |
| F | Federal reserved               | U.S. Government claimed uses in existence at statehood, typically associated with springs for stock and domestic or public campground wells.  |
| G | Geothermal                     | Nonconsumptive, thermal energy exchange.  |
| H | Household use only             | Generally associated with single dwelling, exempt wells; no uses outside the home or for more than basic sanitary and residential consumption.  |
| K | Snow making                    | Water turned into snow.   |
| M | Minimum stream flow/lake level | Defined in statute and used in decrees granted to the CWCB.   |
| P | Power generation               | Non-consumptive, hydroelectric operation.   |
| Q | Quantification of amount       | Denotes a quantification of a volume of water simply being carried by the structure.  |
| R | Recharge                       | Released underground or delivered to a recharge structure for later USE in accordance with a decree or approval of the State Engineer.  |
| S | Export from State              | Released out of state.  |
| T | Transbasin export              | Released from one basin to another basin, the drainage from which does not combine with drainage from the releasing basin within the State of Colorado. (Typically involves moving water from one water division to another, with the general exception of transfers between the Colorado and Gunnison Rivers.) |
| W | Wildlife                       | Habitat and wildlife watering.  |
| Z | Other                          | Use is something other than a USE specified in this table. (Comment required describing "use".)   |

### USE Code Associated to Structure where USE Occurs

The USE code should be associated with the WDID where the USE occurred. For instance, the only purpose of a ditch may be to divert water into a reservoir for storage. The USE = "0" should still be recorded as a reservoir record, not a ditch record (Row 1, below) because the ditch cannot actually "store" water. It's also not sufficient to rely on the TO code, as in Row 2 of the example, to identify where the record storage occurred. The only consistently clear record requires both the diversion from the stream and the storage in the reservoir by means of two records, as shown in Rows 3 - 4:

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT    | Description              |
|---|----------|---|---------|---|---|---|-----------|--------------------------|
| 1 | 1000503  | 1 |         | 0 |   |   |           | INCORRECT RECORD         |
| 2 | 1000503  | 1 |         | 0 |   |   | 1003590   | INCORRECT RECORD         |
| 3 | 1000503  | 1 |         | Q |   |   | (1003590) | Stream diverted by ditch |
| 4 | 1003590  | 1 | 1000503 | 0 |   |   |           | Storage USE at reservoir |

Likewise, water released from a reservoir may be used exclusively for augmentation. The USE record should be at the in-stream structure that makes use of the augmentation water, as opposed to showing the USE = "A" as part of the reservoir release since the reservoir is not where the augmentation USE occurred:

|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT    | Description                             |
|---|----------|---|---------|---|---|---------|-----------|---|
| 1 | 1003500  | 2 |         | A | 7 | 1005500 |           | INCORRECT RECORD                        |
| 2 | 1003500  | 2 |         | Q | 7 | 1005500 | (1007575) | Release for augmentation                |
| 3 | 1007575  | 2 | 1003500 | A |   | 1005500 |           | Reservoir release used for augmentation |

### 10.3 Storage (USE = "0")

The USE = "0", Storage, code should only be used with reservoirs whose primary purpose is to release water for a beneficial use. Off-stream ponds that use the natural stream to do things like keep the pond full or as a freshening flow for fish are not really "storing" water for use by release and should avoid the USE = "0" code.

#### 10.3.1 Off-stream Pond

When the natural stream (or non-stream) flow is used to do something like keep an off-stream pond full or as a freshening flow for piscatorial, aesthetic, etc., the primary use is not "Storage". The primary USE record should document the water consumed by evaporation. Instead of evaporating "reservoir water" from the pond and replacing the lost reservoir water by storing the stream flow, it is recommended the user show the evaporation as a loss of the natural flow.

| WDID.ACT | S | F.ACT | U | T | G     | TO.ACT | Description                              |
|----------|---|-------|---|---|-------|--------|--|
| DITCH    | 1 |       | Q |   |       | (POND) | In priority diversion                    |
| DITCH    | 1 |       | Q | A | AUGID | (POND) | Authorized, out of priority diversion    |
| POND     | 1 | DITCH | E |   | AUGID |        | Portion of diversion lost to evaporation |

If the pond has a water right for piscatorial, aesthetic, etc., the user may also document this use with the USE = "Z" ("Other") code. As discussed below, "piscatorial" use should not be assigned the USE = "6" ("Fishery") code.

In addition to the diversion and evaporative loss records above, the user could also make the following record.

| WDID.ACT | S | F.ACT | U | T | G     | TO.ACT | Description                     |
|----------|---|-------|---|---|-------|--------|---------------------------------|
| POND     | 1 | DITCH | Z |   | AUGID |        | Amount not lost to evaporation. |

Water diverted in excess of that required as a beneficial use would be documented by the following record:

| WDID.ACT | S | F.ACT | U | T | G     | TO.ACT | Description             |
|----------|---|-------|---|---|-------|--------|-------------------------|
| POND     | 1 | DITCH | Q | E | AUGID |        | Excess diversion record |

### 11.1 Fishery (USE = "6")

For the purposes of diversion records, the "Fishery" USE = "6" code does not include piscatorial uses at recreational, aesthetic ponds. The USE = "6" code should only be used with fish farms using water to mass produce fish for commercial, species preservation, sport fishing or stream restoration purposes. Recreational uses should be recorded with the USE = "Z" code.

### 11.2 Augmentation (USE = "A")

#### 11.2.1 Structure Type Restriction

Only in-stream structures will be allowed a USE = "A" record. By definition, the natural stream is the location where "Augmentation" occurs. Most replacement plans designate either explicitly or implicitly the section of stream or a point location on the stream requiring flow augmentation. A record that water was released for "Augmentation" USE by a structure is usually not sufficient information to demonstrate that the water was actually delivered to the point of depletion.

In order to fully demonstrate that the location of the natural stream requiring augmentation received a replacement supply of water, USE = "A" will only be accepted for in-stream structure type WDIDs. The most common structures used to designate the location where augmentation (USE = "A") occurs are "Reach - Simple", "Reach - Aggregating" and "Measuring Point", although other in-stream structures may also be used.

From a structure perspective, water put to "Augmentation" USE is "fully consumed" by the structure, meaning the water is used in the structure and there is no dominion and control "release" of the water from the structure. A release TYPE = "7" code would only be included if the record was also documenting the addition of SOURCE = "8" water supply to the system, as discussed below.

#### 11.2.2 Augmentation with Accretions at Reach - Simple Structures

If the augmentation water was released by an off-stream structure, such as a recharge area using the TYPE = "V" ("Accretion Input to Alluvial Model") code, there will generally be a TYPE = "Z" release record that has the designated in-stream "Augmentation" structure in the TO code (Row 1, below). This record is calculated by the alluvial model used to time the accretions back to the stream. The TYPE = "Z" record informs the user as to the volume of water available for USE.

Because the receiving in-stream structure will be the mechanism by which the SOURCE = "8" water is "administered", the in-stream structure will, generally, be the initial releasing structure. As a result, these records must make sure to use the TYPE codes required to "add"

the water to the system, generally TYPE = "7" or "L". Following is a typical set of records for an in-stream "Reach - Simple" or "Measuring Point" structure type:

| WDID.ACT  | S | F.ACT  | U | T | G        | TO.ACT    | Description   |
|-----------|---|--------|---|---|----------|-----------|---|
| RECHRG    | 8 |        | Q | Z | (PLANID) | INSTRMSIM | Modeled accretion to stream   |
| INSTRMSIM | 8 | RECHRG | A | 7 | PLANID   |           | Water used by INSTRM structure (TYPE code only required for SOURCE summation routine - see Section 1.130) |
| INSTRMSIM | 8 | RECHRG | Q | 7 | PLANID   | (OTHER)   | Water released for use under dominion and control at OTHER structure                                      |
| OTHER     | 8 | RECHRG | A | 1 | PLANID2  |           | Water used by OTHER structure   |
| INSTRMSIM | 8 | RECHRG | Q | L | PLANID   |           | Water released w/out dominion and control   |

For simple systems, like a reach that only receives lawn irrigation return flow (LIRF), the record formulation shown above may be reasonable. For more complicated systems where the in-stream structure receives accretions from dozens of off-stream structures, like a recharge based plan of augmentation, the user may want to consider a "Reach - Aggregating" in-stream structure type.

### 11.2.3 Augmentation with Accretions at Reach - Aggregating Structures

The Reach - Aggregating structure type enables the user to receive and aggregate multiple inflows of fully consumable water. The same number of inflow records is required by this formulation as in the Reach - Simple structure type example, above. The advantage is that once the water is aggregated into the structure, there is no longer a requirement to maintain the association to each of the contributing sources of augmentation supply. As discussed more fully in Section 1.104, all water placed into a Reach - Aggregating Structure must be fully consumable.

| WDID.ACT | S | F.ACT    | U | T | G       | TO.ACT   | Description                               |
|----------|---|----------|---|---|---------|----------|---|
| RECHRG1  | 8 |          | Q | Z | PLANID  | REACHAGG | Modeled accretion to stream               |
| RECHRG2  | 8 |          | Q | Z | PLANID  | REACHAGG | Modeled accretion to stream               |
| RECHRG3  | 8 |          | Q | Z | PLANID  | REACHAGG | Modeled accretion to stream               |
| REACHAGG | 8 | RECHRG1  | Q |   | PLANID  |          | Water quantified into aggregating reach   |
| REACHAGG | 8 | RECHRG2  | Q |   | PLANID  |          | Water quantified into aggregating reach   |
| REACHAGG | 8 | RECHRG3  | Q |   | PLANID  |          | Water quantified into aggregating reach   |
| REACHAGG | 8 |          | A | 7 | PLANID  |          | Water used by in-stream structure         |
| REACHAGG | 8 |          | Q | 7 | PLANID  |          | Water released under dominion and control |
| REACHAGG | 8 |          | Q | L | PLANID  |          | Water released w/out dominion and control |
| OTHER1   | 8 | REACHAGG | A | 1 | PLANID2 |          |   |
| OTHER2   | 8 | REACHAGG | Q | 1 | PLANID3 |          |   |
| OTHER3   | 8 | REACHAGG | 0 |   | PLANID3 |          |   |

### 11.2.4 GROUP Code Required

A record with USE = "A" must also have the WDID of the authorizing plan in the GROUP code. Augmentation only happens according to some authorizing plan, statute or decree. In order to effectively associate the USE to the authorizing agent, the GROUP code is required.

### 11.3 Evaporation (USE = "E")

"Evaporation" as a USE only occurs from bodies of water. Evaporative loss records are discretionary records unless the administration is required to reconcile the volume stored or contained by the impoundment, such as the case of on-stream reservoir evaporation discussed in Section 1.68.

#### 11.3.1 Structure Type Restriction

The USE = "E" code may only be used at "Reservoir", "Reservoir System", "Recharge Area" (for those that have impoundments) or "Well" (in the case of an un-lined gravel pit) structure types.

#### 11.3.2 Evaporation is Not Transit Loss

An "Evaporation" USE code should not be used as a transit loss record. Transit loss, in general, is not documented with a diversion record. For example, a reservoir release that has a 15% transit loss between the point of release and point of diversion would have the following two records:

| WDID.ACT | S | F.ACT | U | T | G | TO.ACT  | Description               |
|----------|---|-------|---|---|---|---------|---------------------------|
| RESID    | 2 |       | Q | 7 |   | (DITCH) | Release volume - 100 cfs  |
| DITCH    | 2 | RESID | 1 |   |   |         | Diversion volume - 85 cfs |

#### Transit Loss Record

The transit loss of 15 cfs is inferred in the above set of records. If, for modeling purposes or some other reason the user wants to make a transit loss record, the user could make a record like the following, using the water class description to confirm the meaning of the record or a generic "Transit Loss" GROUP ID to document:

| WDID.ACT | S | F.ACT | U | T | G        | TO.ACT | Description           |
|----------|---|-------|---|---|----------|--------|-----------------------|
| REACHID  | 2 | RESID | Q |   | (TRNSLS) |        | Transit loss - 15 cfs |

#### 11.3.3 On-stream Reservoir Evaporative Loss Records

Statute<sup>33</sup> requires on-stream reservoirs to make releases from the stored volume in an amount equal to the evaporative loss caused by the reservoir. One must first determine the operating conditions that warrant the application of this statute. When an on-stream reservoir has unfilled water rights that are in-priority or is not subject to a Call, the reservoir has the right to intercept and store all the inflow to the deprivation of the downstream water rights. This is not considered injury as it was part of the notice provided by the application for the water rights or the overt act of a new appropriation. As a result, downstream water users have no reasonable expectation of being protected from the evaporation that is occurring at the reservoir.

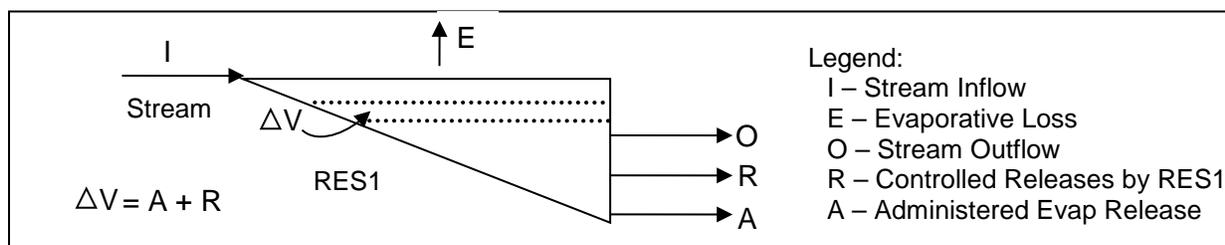
The diversion records when the reservoir is not on Call or has unfilled water rights that are in-priority are:

| WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description |
|----------|---|-------|---|---|---|--------|-------------|
| RESID    | 2 |       | E |   |   |        | Evaporation |
| RESID    | 1 |       | O |   |   |        | Fill Record |

<sup>33</sup> C.R.S. 37-84-117(5)

Once the on-stream reservoir is subject to a Call and its water rights are either filled or out-of-priority, the referenced statute requires the reservoir to replace the increased evaporation being suffered by the natural stream flow as it passes through the reservoir. The benefit of this statutory model is that it uses data that is generally known or easily obtained: calculated evaporative loss, change in reservoir stage and the volume of water administered as a release from the reservoir.

The evaporative loss of natural stream flow in an on-stream reservoir is denoted as "E" in the diagram below. When the stream below the reservoir is on call (short water) and the reservoir water rights are either filled or out-of-priority, the statute requires an administered evaporative release ("A") equal in volume to "E". The objective of the statute is to compensate the downstream system that is in need of water for the water lost to evaporation.



The mass balance for the reservoir is:

$$\Delta V = I - E - O - R - A$$

The simplest formulation of the administrative protocol is when the on-stream reservoir is full and spilling ( $\Delta V = 0$ ), making no controlled releases ( $R = 0$ ), and making no release, yet, for the evaporation ( $A = 0$ ). The mass balance reduces to:

$$I = O + E \text{ or } O = I - E$$

We will maintain that the outflow, not the volume of the reservoir, is diminished by the evaporation. Substituting into the previous equation, the change in volume then becomes:

$$\Delta V = (O + E) - E - O - R - A, \text{ or}$$

$$\Delta V = -R - A$$

The result is the impact to the stream can be administered by reducing the stored volume by the volume of the evaporative loss (A) plus any administrative release (R), a relatively easier task, typically, than attempting to determine the value of "I" and "O".

Seepage loss can be reasonably ignored as any such loss from an on-stream reservoir quickly, if not immediately, reports back to the stream below the reservoir and can, for the purpose of administration, generally be considered as part of the volume "O".

|   | WDID.ACT | S | F.ACT | U | T | G                     | TO.ACT   | Description                          |
|---|----------|---|-------|---|---|-----------------------|----------|--------------------------------------|
| E | RES1     | 1 |       | E | A | 9900004 <sup>34</sup> |          | Calculated from exposed surface area |
| A | RES1     | 2 |       | Q | L | 9900004               |          | Compensation for E per statute       |
| R | RES1     | 2 |       | Q | 7 | (PLAN)                | (SUBSQT) | Controlled releases by reservoir     |

<sup>34</sup> See Section 1.88 for a list and explanation of statewide group codes (990000\*).

## **11.4 Minimum Stream Flow/Lake Level (USE = "M")**

As expressed by the name, USE = "M" is associated with lake levels or specific stream segments. The respective structure types corresponding to these geographical features for which USE = "M" may be used are "Reservoir", "Reach" or "Measuring Point".

## **11.5 Recharge (USE = "R")**

The term "recharge" refers to two different operations. Four structure types, based principally on decreed function, are allowed to have USE = "R": Recharge Area, Reservoir, Ditch or Well. Coding protocols for each of these structure types are included in Section 0.

### **11.5.1 Alluvial Accretion to Stream**

Recharge can refer to water placed in the alluvium in order for the water to supplement the natural stream by accretion. This operation uses a water class with a TYPE = "V" code, which identifies a volume of water being placed in the alluvium to accrete back to the stream. It is not, theoretically, a "release" from the structure; it is the input for a modeled impact, the release of which is made by a TYPE = "Z" record from the structure to the stream.

### **11.5.2 Underground Storage**

Recharge is also used to describe the "storage" of water underground for later direct withdrawal from the underground "storage" area, which is typically, but not always, a confined aquifer. This water class has a TYPE = "W" code and is considered a release from the structure recharging the water to the structure receiving the water for "storage".

## 12. "TYPE" CODE

The type of diversion is characterized by the codes shown in Table 0-1. There are three categories of TYPE codes: diversions, releases and data. If no TYPE code is required to describe the diversion, release or water class data, the field is left blank.

Table 12-1: TYPE Codes

| Types of diversions |   |  |
|---------------------|---|--|
|                     | Blank is acceptable                             | TYPE Code is not, generally, required data.  |
| 1                   | Exchange  | Diversion allowed only because a replacement supply provides water to the vested water right that would have been able to divert water absent the diversion by "exchange".   |
| 2                   | Trade   | A particular kind of exchange in that the replacement supply is released off-stream directly to an in-priority structure instead of the stream.                              |
| 4                   | Alternate Point of Diversion                    | Diversion allowed only because of right to operate as an alternate point of diversion or storage to an in-priority structure.  |
| A                   | Authorized/Augmented                            | Diversion allowed only because of special authorization.   |
| U                   | Unauthorized Diversion                          | Characterizes a diversion of "waters of the state" that was not authorized by DWR such as an out-of-priority diversion, etc.   |
| D                   | Out-of-priority Depletion                       | Calculated impact associated primarily with an alluvial diversion that must be replaced to prevent impact to vested water rights.  |
| J                   | In-priority Depletion                           | Calculated impact associated primarily with an alluvial diversion the depletion from which is considered in-priority.  |
| S                   | Substitution                                    | A diversion that cannot be curtailed is allowed only because a replacement supply provides water to the vested water right.  |
| Types of releases   |   |  |
| 7                   | Released to Stream                              | Released to stream.  |
| 8                   | Released Off-stream                             | Released to off-stream system.   |
| L                   | Release of Dominion and Control                 | Released with relinquishment of dominion and control of the water.   |
| E                   | Release of Excess Diversion                     | Water diverted in excess of beneficial use.  |
| Q                   | Release of Quantified Amount                    | Similar to USE="Q", this code simply indicates the water is being released. Typically used to reconcile volumes in a reservoir or recharge area or with subsequent releases. |
| W                   | Released Underground                            | Water released underground for disposal or later direct withdrawal.  |
| Z <sup>35</sup>     | Modeled Alluvial Accretion to Stream            | Aggregated release to the stream from off-stream alluvial accretions, generally the output from a model.   |
| Types of data       |   |  |
| 0                   | Administrative Record Only                      | Volumes will not be added to the SOURCE or USE totals.   |
| R                   | USE Only Volume Data                            | Volume adds to the USE total, but not the SOURCE total.  |
| V <sup>35</sup>     | Accretion Input to Alluvial Aquifer Model       | Component of an off-stream diversion that, after application of a response function, will add water to the stream by accretion through alluvium.                             |
| X <sup>35</sup>     | Consumptive Use Input to Alluvial Aquifer Model | Component of an off-stream diversion that, after application of a response function, will cause a reduction in the stream.   |
| Y <sup>35</sup>     | Surface Return Input to Alluvial Aquifer Model  | Component of an off-stream diversion that, after application of a response function, will add water to the stream by surface return.   |

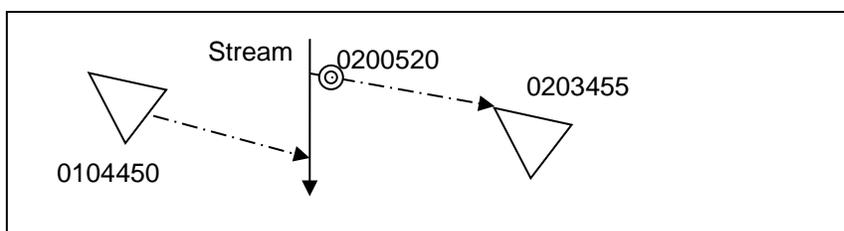
<sup>35</sup> TYPE = "V", "X", "Y" and "Z" were developed as inputs/output to models used to time accretions and depletions from off-stream structures to the stream.

## 12.1 Types of Diversions

### 12.1.1 Exchange (TYPE = "1")

An exchange occurs when a structure that would otherwise not be allowed to divert water from the stream is allowed to divert because a suitable<sup>36</sup> supply of replacement water is provided at another, downstream location in such a way that no vested water right is impacted by the upstream diversion. The diversion is generally allowed at the same rate as the replacement supply and is generally considered an instantaneous operation where the release and diversion occur simultaneously. If necessary to prevent specific injury, the water commissioner may require the release of replacement supply to lag the diversion by the amount of time that would have been required for the diverted water to arrive at the replacement location or make other modifications to the timing or amount diverted to prevent injury.

The replacement supply must be recorded with a USE = "Q" and TYPE = "7" water class as shown in Row 1, below. The associated diversion is recorded at the WDID making the diversion with the WDID of the structure releasing the replacement supply in the FROM code and TYPE = "1" (Row 2, below).



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                                 |
|---|----------|---|---------|---|---|---|--------|---|
| 1 | 0104450  | 2 |         | Q | 7 |   |        | Replacement supply release                  |
| 2 | 0200520  | 2 | 0104450 | Q | 1 |   |        | Diversion of replacement supply by exchange |
| 3 | 0203455  | 2 | 0104450 | 0 |   |   |        | Subsequent USE of exchanged water           |

### SOURCE Code of Exchange is SOURCE of Replacement Supply

The diversion SOURCE code (Row 2, above) is the same as the SOURCE of the replacement supply (Row 1, above) as that is the water being legally diverted even though the structure is actually taking "natural stream flow" directly from the stream. This is a rare exception to the rule that diversion records are a record of what was actually diverted and not accounting. The reason for this exception is that using the SOURCE code of the replacement supply as the SOURCE code of the diversion is the only way to reconcile the operation.

If the exchange was allowed to record a diversion of SOURCE = "1" water, the record would be showing SOURCE = "1" water coming from the reservoir, which makes no sense. Plus, there would be no record of where the SOURCE = "2" water from Row 1 was ever put to USE. Using a SOURCE = "1" code at the diversion by exchange also ends up double counting that water, once at the diversion by exchange and again by the structure that ends up diverting

<sup>36</sup> § 37-80-120(3), C.R.S., "Any substituted water shall be of a quality and continuity to meet the requirements of use to which the senior appropriation has normally been put."

the replacement supply. You cannot assign the in-priority structure that is actually diverting the replacement supply as diverting SOURCE = "2" water as that denies them a record of making an in-priority diversion, which is what they did. They also likely have no association with the reservoir, so showing the SOURCE = "2" water being diverted at that location also makes no sense.

### **Only Initial Diversion by Exchange Uses TYPE = "1" Code**

The exchange TYPE = "1" code is only used once. The storage, or any other operation (Row 3, above), that occurs subsequent to the diversion by exchange is not part of the exchange, even though the relationship between the SOURCE of the water and the structure that released the water must be maintained by using the releasing structure WDID in the FROM code.

### **12.1.2 Trade (TYPE = "2")**

A diversion by trade is similar to an exchange, except that the replacement supply is released to an off-stream system instead of using the stream to transfer the water. To divert by trade, an in-priority structure must be provided water by an off-stream replacement supply. In trade, an associated on-stream diversion that would not otherwise be authorized to divert is allowed to divert the amount of water provided as a replacement supply to the in-priority structure that takes the replacement supply in lieu of making an in-priority diversion from the stream.

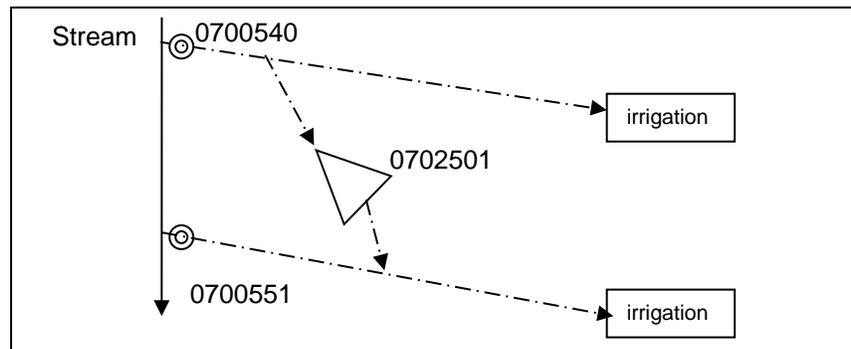
The out-of-priority diversion by trade is allowed to operate at the same rate the replacement supply is released generally without any delays if the diversion is upstream of the in-priority structure. If the diversion occurs downstream, the water commissioner must reduce the diversion for any transit loss incurred.

### **Requires Three Records**

As with the exchange operation, the trade may only be allowed if it does not impact the vested water rights. Trades always involve three records:

- 1) a TYPE = "8" release of the replacement supply (Row 1, below);
- 2) a record for the in-priority structure receiving the replacement supply with the WDID of the structure releasing the replacement supply in the FROM code and TYPE = "2" (Row 2, below); and
- 3) a record for the structure making the out-of-priority diversion from the stream with SOURCE = "1", FROM equal to the WDID of the in-priority structure taking the replacement supply, and TYPE = "2" (Row 3, below).

Because the diversion records for a "trade" are perhaps not straightforward or familiar, consider the following example, where Ditch 0700551 is in priority and could take water to irrigation by decree. Reservoir 0702501 has water stored for irrigation use. Ditch 0700540 is out-of-priority. The diversion "trade" allows reservoir 0702501 to deliver water off-stream for irrigation under ditch 0700551 and the water released is taken in "trade" out of the river by out-of-priority structure 0700540. The associated water classes look like:



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                          |
|---|----------|---|---------|---|---|---|--------|--------------------------------------|
| 1 | 0702501  | 2 |         | Q | 8 |   |        | Off-stream release                   |
| 2 | 0700551  | 2 | 0702501 | 1 | 2 |   |        | Released water taken for trade       |
| 3 | 0700540  | 1 | 0700551 | 1 | 2 |   |        | Amount equal to Row 1 taken by trade |

The in-priority structure receiving the replacement supply (Row 2, above) has TYPE = "2" code to distinguish the diversion as part of a trade instead of a delivery otherwise allowed by decree. A bottom line data check is that for every "trade" there should be one TYPE = "8" record and two TYPE = "2" records; one for the structure receiving the replacement supply and one for the on-stream diversion taking water by trade.

### 12.1.3 Alternate Point of Diversion (TYPE = "4")

A diversion by alternate point may only be made in accordance with specific decreed terms and conditions. While the decree need not use the specific term "alternate point of diversion", the decree must either:

- clearly authorize the diversion of the water right at multiple (alternate) points of diversion; or,
- authorize a structure to divert water separately decreed to another structure.

The alternate point structure may not operate unless the structure to which it is an alternate point is in-priority. In some cases, the court also limits the alternate point of diversion to the amount available at the in-priority structure. Wells that are alternate points of diversion to other wells are subject to rules governing their operation regardless of the alternate point designation. For instance, the alternate point well that is subject to a rule requiring a plan of augmentation may not pump simply because the well to which it is an alternate point is covered by a plan; the alternate point well must also be specifically covered by the plan. This is due to the fact that each structure may have different delayed impacts on the stream and all such impacts must be covered by the plan.

An alternate point of diversion record has the WDID of the in-priority structure to which it is an alternate point in the FROM code and TYPE = "4".

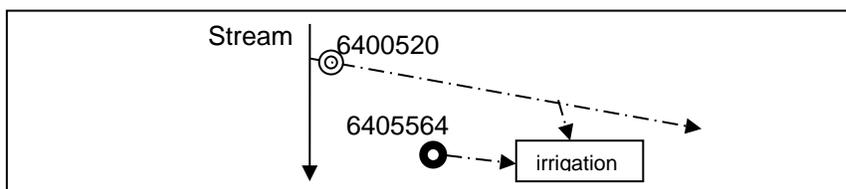
### Multiple, Equivalent Points of Diversion

The classic alternate point of diversion example is a decree that authorizes the user to divert a specific appropriation at any of two or more different points of diversion. This water right is tabulated at the primary point of diversion; if the decree does not designate a primary point of diversion, any of the points of diversion may be assigned the water right. Each of the other points of diversion is then tabulated as an "alternate point of diversion" to the primary structure.

Diversion records at the primary point of diversion do not use the TYPE=4 code as the water right has been tabulated at that diversion. Diversions at all the other points, however, do use the TYPE=4 code with the WDID of the primary structure as the FROM code to tell the user where the water rights associated with the diversion are tabulated.

### Diversions of Another Structure's Water Rights

The court has also authorized structures to divert water appropriated at a different structure, such as the case of a well that is a decreed, alternate point of diversion to a ditch. The primary structure must be in-priority in order for the well to divert as an alternate point. Again, the decree may or may not address the issue of rate, available diversion supply at the location of the in-priority diversion, etc. At a maximum, the combination of diversions by the decreed location and all decreed alternate points of diversion of a water right must not exceed the decreed rate.

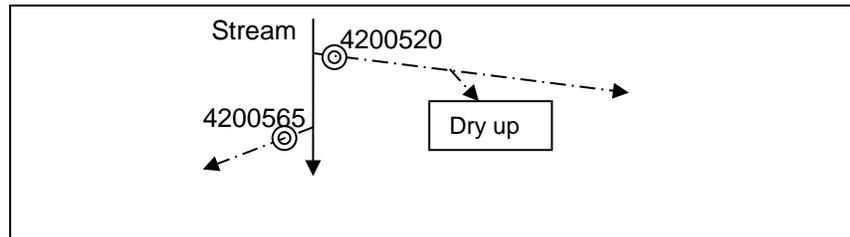


|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                  |
|---|----------|---|---------|---|---|---|--------|------------------------------|
| 1 | 6405564  | 3 | 6400520 | 1 | 4 |   |        | Diversion by alternate point |

### Diversion of Unmeasured HCU

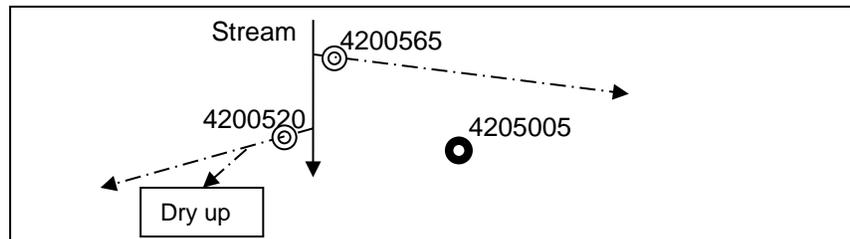
Another common form of alternate point diversion is the authorization for a structure to divert the quantified historical consumptive use (HCU) of a different structure, without a requirement to physically measure the water prior to the diversion. The typical example of this would be a dry up of land under a ditch that transfers the HCU to a well or upstream ditch. In this scenario, there is no requirement to measure the HCU volume past the dried up ditch.

If the decree required a quantification of the water at, for instance, the historical location of the ditch head gate, the diversion would not be an alternate point of diversion. This scenario would involve a quantification record followed by a subsequent diversion of the quantified water, less transit loss, as shown in the following:



|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT | Description                                    |
|---|-------------|---|-------------|---|---|---|--------|--|
| 1 | 4200520.002 | 1 |             | Q | 7 |   |        | Quantified HCU measured past ditch with dry up |
| 2 | 4200565     | 1 | 4200520.002 | 1 |   |   |        | Diversion of HCU volume                        |

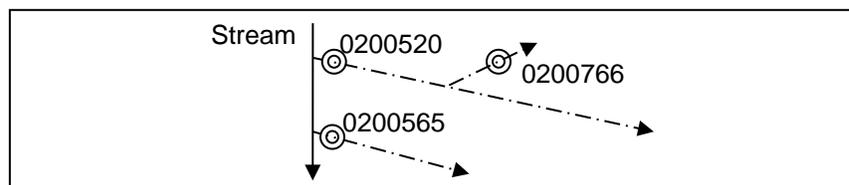
If, however, the decree requires no such quantification, the HCU may be diverted as an alternate point:



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                                      |
|---|----------|---|---------|---|---|---|--------|--|
| 1 | 4200565  | 1 | 4200520 | 1 | 4 |   |        | Quantified HCU from 4200520 that is not measured |
| 2 | 4205005  | 3 | 4200520 | 1 | 4 |   |        |  |

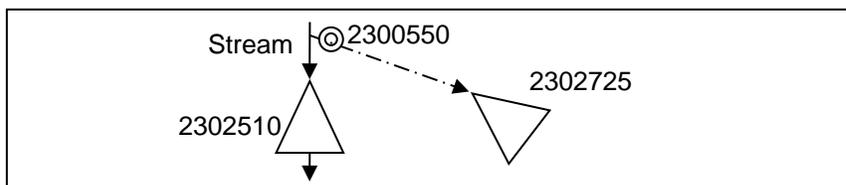
### Only Initial Diversion by Alternate Point Uses TYPE = "4" Code

If the alternate point of diversion is associated with a subsequent record, only the diversion at the decreed alternate point includes the TYPE = "4" code. In the following example, ditch 0200565 is in-priority and ditch 0200520 is a decreed alternate point of diversion. Ditch 0200766 is a subsequent measurement.



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                 |
|---|----------|---|---------|---|---|---|--------|-----------------------------|
| 1 | 0200520  | 1 | 0200565 | Q | 4 |   |        | Alternate point diversion   |
| 2 | 0200766  | 1 | 0200520 | 2 |   |   |        | Down ditch USE is not T = 4 |

Likewise, even if the alternate point decree addresses storage instead of a direct flow USE, the structure making the diversion from the natural water supply must be the TYPE = "4" diversion. Otherwise, the water will be counted twice. Consider the following example where reservoir 2302510 is in-priority and reservoir 2302725 is a decreed alternate point of storage. One might be tempted to put the TYPE = "4" at the storage record, as shown in Row 2, below:



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                     |
|---|----------|---|---------|---|---|---|--------|---------------------------------|
| 1 | 2300550  | 1 |         | Q |   |   |        | Natural stream carried by ditch |
| 2 | 2302725  | 1 | 2302510 | 0 | 4 |   |        | INCORRECT TYPE "4" Record       |

There are two problems with the above formulation. First, the volume of both records is included in the SOURCE summation, which means the water will be double counted. Second, there's no associated USE of the water diverted by 2300550.

The correct water class formulation would be:

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT  | Description                     |
|---|----------|---|---------|---|---|---|---------|---------------------------------|
| 1 | 2300550  | 1 | 2302510 | Q | 4 |   | 2302725 | APD made by ditch for reservoir |
| 2 | 2302725  | 1 | 2300550 | 0 |   |   |         | Down ditch USE                  |

The correct formulation also makes a strong argument to include the TO information, as it helps explain why the ditch would be making an alternate point diversion to the reservoir, 2302510.

### 12.1.4 Authorized/Augmented Diversion (TYPE = "A")

Diversions that are made in accordance with special authorization, like Senate Document 80 or other similar legislation or decree, approved substitute supply plans, decreed plans of augmentation or diversions futile to the Call are TYPE = "A" diversions. These diversion records must have the WDID of the authorizing agent in the GROUP code.

The TYPE Code "A" is always associated with the diversion of water directly from a natural SOURCE of water (SOURCE = "1", "3" or "5"). This is somewhat intuitive in that it's only the diversion of natural water that requires an in-priority analysis. Once water becomes "Reservoir", "Transbasin" or "Re-usable" (manufactured SOURCE of water), it is subject to the user maintaining dominion and control, not appropriation. Manufactured water may be diverted by the entity maintaining dominion and control of the water regardless of the Call on the river.

Diversion of natural water out-of-priority must have a TYPE code that explains the diversion. If the diversion is not an exchange, trade or alternate point diversion (TYPE Codes "1", "2" or "4"), then the diversion record must use TYPE = "A" with the WDID of the authorizing agent in the GROUP code. Examples of out-of-priority, natural water diversions are as follows:

| WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description                              |
|----------|---|-------|---|---|---------|--------|--|
| 0100501  | 1 |       | 4 | A | 9900001 |        | Authorized diversion futile to the Call  |
| 0106555  | 3 |       | 1 | A | 0103999 |        | Authorized diversion by replacement plan |
| 0101551  | 5 |       | 8 | A | 0104445 |        | Authorized diversion by replacement plan |

Each of the above diversion records shows natural water being diverted directly from the SOURCE as authorized by the associated GROUP WDID. Absent that authorization, the diversion could not have legally occurred.

### Only Initial Diversion by Special Authorization Uses TYPE = "A" Code

As with exchanges and alternate point diversions, only the diversion that's made in accordance with the terms of the GROUP plan gets the TYPE = "A" code. For example, a DITCH1 diverts water out-of-priority to storage in RES1. Only the DITCH diversion gets the TYPE code "A":

| WDID.ACT | S | F.ACT  | U | T | G         | TO.ACT | Description                     |
|----------|---|--------|---|---|-----------|--------|---------------------------------|
| DITCH1   | 1 |        | Q | A | 0103339   | (RES1) | Authorized diversion            |
| RES1     | 1 | DITCH1 | 0 |   | (0103339) |        | Storage of authorized diversion |

() - indicates optional coding

### Augmentation of Reservoir Evaporation Loss

Evaporative losses from a reservoir may also be the subject of a plan of augmentation. As discussed in Section 1.68, on-stream reservoirs that are out-of-priority must compensate the natural stream for the evaporative loss of natural stream flow caused by the increased surface area of the reservoir. This can be done without an augmentation plan by simply releasing an equal volume of stored water from the reservoir to compensate the stream for the loss of natural stream flow:

| WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description  |
|----------|---|-------|---|---|---------|--------|--|
| RES2     | 1 |       | E | A | 9900004 |        | Evaporation of natural stream flow at an on-stream reservoir   |
| RES2     | 2 |       | Q | L | 9900004 |        | Release of water stored in the on-stream reservoir to compensate for the loss of natural stream flow |

Should the reservoir obtain a plan of augmentation so that it can provide an alternate replacement supply as opposed to releasing water from the reservoir, the diversion records would be:

| WDID.ACT | S | F.ACT   | U | T | G     | TO.ACT | Description   |
|----------|---|---------|---|---|-------|--------|---|
| RES2     | 1 |         | E | A | PLAN2 |        | NSF evaporation still occurs, but the stream is now augmented by a supply other than RES2 |
| ALTSPLY  | 8 |         | Q | 7 | PLAN2 |        | Alternate replacement supply provided by PLAN2  |
| RES2     | 8 | ALTSPLY | A | 1 | PLAN2 |        |   |

If the reservoir is off-stream and the plan enables the reservoir to make up for evaporative losses, the records might be:

| WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description                             |
|----------|---|-------|---|---|---------|--------|---|
| RES4     | 2 |       | E |   | (PLAN4) |        | Evaporative loss from reservoir         |
| RES4     | 5 |       | 0 | A | PLAN4   |        | Storage to make up for evap loss        |
| RES8     | 2 |       | Q | 7 | PLAN4   |        | Replacement supply to augment lost flow |
| REACH    | 2 | RES8  | A |   | PLAN4   |        | Augmentation of lost flow               |

In the above example, note that the USE = "E" is not TYPE = "A"; the replacement storage (USE = "0") is the augmented diversion.

### 12.1.5 Unauthorized Diversion (TYPE = "U")

All aspects of what constitutes an "unauthorized" diversion are not rigidly defined and its use is at the discretion of the water commissioner or other division personnel making the record. Diversions made out of priority or in association with an insufficient or unacceptable release may be coded as TYPE = "U".

#### Out of Priority Diversions

Natural water diverted out of priority without authorization may be a TYPE = "U" diversion:

| WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description               |
|----------|---|-------|---|---|---|--------|---------------------------|
| DITCH    | 1 |       | 1 | U |   |        | Out of Priority Diversion |
| WELL     | 3 |       | 1 | U |   |        | Out of Priority Diversion |

#### Unauthorized Reservoir Release and Diversion

Water stored "in-priority" for a specific decreed USE that was released, delivered downstream and diverted to a USE not included in the storage decree, such as senior irrigation water delivered to an oil well work over rig, is not a decreed USE and is, therefore, "unauthorized". Presumably, such a release and diversion was not done with the water commissioner's knowledge, but was something discovered after the fact. The "industrial" USE of the "natural stream flow" is recorded with TYPE = "U" and the reservoir release is simply a loss of dominion and control, TYPE = "L":

| WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description                             |
|----------|---|-------|---|---|---|--------|---|
| RES2     | 2 |       | Q | L |   |        | Water released for un-decreed USE       |
| PUMP     | 1 |       | 4 | U |   |        | Unauthorized USE of natural stream flow |

#### Unauthorized Exchange

Another example would be the release of a replacement supply for an exchange that was not approved by the Division because it was injurious. A record of the diversion and USE should be made using SOURCE = "1" and TYPE = "U". The release should be coded as TYPE = "L" instead of TYPE = "7" since it couldn't actually be used as a replacement supply.

| WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description                                |
|----------|---|-------|---|---|---|--------|--|
| RES2     | 2 |       | Q | L |   |        | Water released for an un-approved exchange |
| DITCH    | 1 |       | 1 | U |   |        | Unauthorized USE of natural stream flow    |

#### Diversion by Structure in Authorizing Plan Cannot be "Unauthorized"

Diversions made by structures covered by a replacement plan may be "unauthorized" from the perspective of the plan administrator, but from the perspective of the Division, those diversions are "authorized" by virtue of the replacement plan and are, therefore, TYPE = "A" diversions.

### 12.1.6 Out-of-priority Depletion (TYPE = "D")

A "depletion" is the volume by which the stream is diminished as a result of a previous, off-stream diversion, typically associated with alluvial wells. The depletion is not, in and of itself, a USE of water. Depletion records, if done at all, are made at in-stream structures, typically a reach or measuring point structure type. The SOURCE is "1" since it's the natural stream flow that's "depleted" and USE = "Q" because it's a quantity of water associated with another off-stream USE.

Depletion records at the diverting structure are also used to document the lagged modeling process. In these cases, the USE is the same as the diversion record in order to track the different priorities associated with each USE. Even when the USE is not "Q", depletion records are not included in the USE summation.

If the depletion is associated with a decreed water right, it represents the appropriate priority of the right and may or may not, depending on stream conditions, be consider "in-priority". If such an analysis determines the depletion is out-of-priority, the TYPE code of the diversion would be TYPE = "D".

#### Forbearance of Out-of-Priority Depletion by Specific Structure

When authorized, the impact of out-of-priority depletions may be forborne by a specific structure as an alternative to requiring stream augmentation. The allowance is made when the impact of the depletions are determined to impact only a specific structure that, absent the depletion, would have been in priority to divert the volume of water depleted from the stream. The impacted structure has, typically, been compensated with something other than the provision of water; nonetheless, the structure, once authorized to do so by decree, simply informs the water commissioner that the structure is forbearing the depletion. The associated water classes might look like:

| WDID.ACT  | S | F.ACT   | U | T | G      | TO.ACT   | Description                                       |
|-----------|---|---------|---|---|--------|----------|---|
| REACH.001 | 1 |         | Q | D | PLANID |          | Reach depletion replaced by augmentation          |
| REACH.001 | 8 | AUGSRCE | A |   | PLANID |          | Matches the volume for REACH.001 depletion        |
| REACH.002 | 1 |         | Q | D | PLANID | WDIDFRBR | Depletions being forborne by a specific structure |

\* In this example, ACT 001 of the REACH structure is associated with augmented operations; while ACT 002 is associated with forborne depletions.

### 12.1.7 In-priority Depletion (TYPE = "J")

TYPE code "J" is used when the depletion analysis discussed in the previous subsection results in a determination that the depletion is "in-priority". Given the depletions are in-priority, vested water rights senior to the depletion are satisfied, which means the well owner is not required to make additional water available to the stream to replace the depletion. As with TYPE = "D" records, TYPE = "J" records are not included in the USE summation routine.

### 12.1.8 Substitution (TYPE = "S")

A substitution is similar to an exchange, except that the replacement supply does not need to be exchanged or exchangeable to the point of depletion associated with the diversion.

## 12.2 Types of Releases

Water users have an explicit statutory right<sup>37</sup> to use the natural stream to deliver water. There are a number of "release" TYPE codes: "7", "8", "L", "E", "Q", "W" and "Z". Diversion records, by default, are records of diversions "into" a structure unless one of the release TYPE codes is used. Release codes are, therefore, used to show water leaving a structure. Such records are required to either document administration or balance the volume of water in aggregating structures.

### 12.2.1 Used by SOURCE Summation Routine and Structure Report

Release TYPE codes "7", "8" and "L" are also used by the SOURCE summation routine to identify a volume of manufactured water (SOURCE = "2", "4", "8") being added to the system. As a result, **the user must be careful to use these three TYPE codes only once for each volume of manufactured water being administered.** As the manufactured water is diverted and released by subsequent structures, the TYPE = "Q" release code is generally used.

#### Release to Stream (TYPE = "7")

Releases of water to the stream for diversion and USE downstream, USE in-stream or to provide the replacement supply for an exchange are TYPE = "7" releases. As discussed above, the TYPE = "7" code is only included in the diversion record associated with the "initial" release of manufactured water in order to make sure that SOURCE = ("2", "4" or "8") water is only counted once.

#### Release to an Off-Stream System (TYPE = "8")

Releases made to an off-stream system are TYPE = "8". If the USE is not recorded at the time of the release, subsequent records are required to document the USE. The defining characteristic of the release is that it is made off-stream. As with the TYPE = "7" code, TYPE = "8" can be used only once with each volume of manufactured water (SOURCE = "2", "4" or "8") added to the system.

#### Relinquishment of Dominion and Control (TYPE = "L")

Releases of water for which the user has no ability to maintain dominion and control<sup>38</sup> must include a TYPE = "L" code. Releases of water for which no authorized USE was allowed are also TYPE = "L". An example of such a release, as discussed in Section 1.78, would be a reservoir releasing irrigation water that was picked up downstream for a use that was not contemplated by the storage decree. When discovered, the release would be TYPE = "L".

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<sup>37</sup> § 37-84-113, C.R.S.

<sup>38</sup> In general, if the user cannot identify a legitimate delivery destination for the water commissioner at the time the water is released or the water commissioner was not made aware of the release, the release should be a TYPE = "L" release. The water commissioner may, at their discretion, choose to code the release as TYPE = "7" after the fact provided the water was actually delivered without injury to other vested water rights.

## 12.2.2 Used only by Structure Report

### Release of Excess Diversion (TYPE = "E")

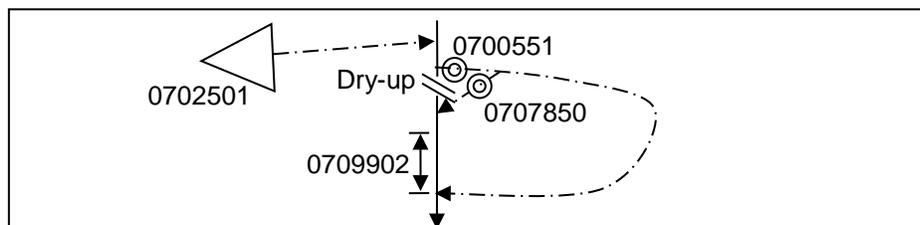
TYPE = "E" records are used to document releases the user made because a previously recorded diversion was in "excess" of the user's ability to actually USE the water. Generally, the diversion was "in-priority" or otherwise "allowed" by the water commissioner or division engineer, but once made was determined excessive. In essence, the record is made to document that the user should not be credited, typically for the purpose of historical consumptive use analyses or perfecting conditional water rights, as ever having established dominion and control of the water. The "releases" are not TYPE = "L" (relinquishing dominion and control), because the structure should not be credited as having dominion and control in the first place.

Examples of this kind of record would include ditch tails that are in excess of that required to effectively operate the ditch<sup>39</sup>, water stored out-of-priority with the division engineer's permission pursuant to the upstream out-of-priority storage statute<sup>40</sup> that is then released to satisfy a downstream senior, etc. TYPE = "E" should not be used to record "unauthorized" releases; unauthorized releases should be coded TYPE = "L" as discussed above.

### Quantified Release (TYPE = "Q")

The TYPE = "Q" release code is used to identify the "release" of a quantity of water. It is typically used with "subsequent" releases, ACT balancing in reservoirs or an uncontrolled "loss" of water.

For example, water released for use downstream would have a diversion record with a TYPE = "7" code from the structure releasing the manufactured water. If that water is delivered past a dry-up point by diverting the water into a head gate and releasing the water immediately back to the river, the release record associated with the structure bypassing the sweeping diversion cannot include a TYPE = "7" code as it is not a new amount of manufactured water being released. The structure diverting the delivery back to the river can have a USE = "Q", TYPE = "Q" record, indicating a "quantity" of water was released and the type of the release was for "quantification" purposes.



|   | WDID.ACT    | S | F.ACT       | U | T | G       | TO.ACT  | Description                           |
|---|-------------|---|-------------|---|---|---------|---------|---------------------------------------|
| 1 | 0702501.003 | 2 |             | Q | 7 | 0703333 | 0709902 | Release replacement supply            |
| 2 | 0700551     | 2 | 0702501.003 | Q |   | 0703333 |         | Delivery diverted at dry-up structure |
| 3 | 0707850     | 2 | 0702501.003 | Q | Q | 0703333 |         | Delivery released back to stream      |

<sup>39</sup> An "excessive" ditch tail/return flow must rely almost exclusively on the judgment of the water commissioner or division engineer. If in their opinion, the return is running more than required to effectively operate the ditch, the excess flow should be recorded so that future historical consumptive use analyses can have that information.

<sup>40</sup> § 37-80-120(1), C.R.S.

### Released Underground (TYPE = "W")

Releases underground are coded as TYPE = "W" and are generally associated with either recharge or underground disposal.

#### **Recharge**

Records of water used to recharge an aquifer would have USE = "R". This would include any water placed underground that the user has the right to later recover by directly withdrawing the water from the aquifer.

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT  | Description            |
|---|----------|---|-------|---|---|---|---------|------------------------|
| 1 | 6705575  | 1 | DITCH | R | W |   | WELLFLD | Recharge to well field |

See Section 1.101 for more information on USE = "R" by Well Field structure types.

#### **Underground Disposal**

Water placed underground to dispose of the water would have a USE = "Q" and TYPE = "W".

|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT | Description                 |
|---|----------|---|---------|---|---|---------|--------|-----------------------------|
| 1 | 6705575  | 3 |         | Q | A | 6702555 |        | Water generated by gas well |
| 2 | 6708500  | 3 | 6705575 | Q | W | 6702555 |        | Water disposed underground  |

### Modeled Alluvial Accretion to Stream (TYPE = "Z")

Records with a TYPE = "Z" code are associated with calculated or modeled releases to the stream from the alluvial aquifer. Alluvial modeling tools that rely on diversion records for input need to output the result of the modeling as a diversion record. The TYPE = "Z" code is the aggregated stream accretion associated with the placement of water in the alluvium, after the application of a response function. It could be used to document the modeled contribution of recharge accretions or other return flow credits, such as the use of fully consumable water to irrigate lawns or other USE generating return flows for which the water user maintained dominion and control. It is, generally, generated by a model, but could also be programmed into a user's accounting.

#### **12.2.3 Release Code Not Required for USE "A" & "E"**

The user must maintain a distinction between administration and mass balance when using release TYPE codes. Consider the example where an in-stream structure puts water to "Augmentation" USE ("A"). Once that water is put to the USE of "Augmentation" by the structure, no one has dominion and control of the water any longer. It has become waters of the state, subject to appropriation by the next in-priority water user and is no more a "release" from the in-stream structure than the rest of the natural streamflow. Simply because that volume of water will "leave" that structure from a mass balance perspective by means of becoming part of the river does not mean the structure "released" it.<sup>41</sup>

A similar argument can be made regarding "Evaporation" (USE = "E"). As a result, a USE = "E" record does not require a "release" TYPE code.<sup>41</sup>

<sup>41</sup> This is a specific correction from Version 1.6 of this standard, where all USE = "A" and USE = "E" records were required to have a TYPE = "Q" code.

## 12.3 Types of Data

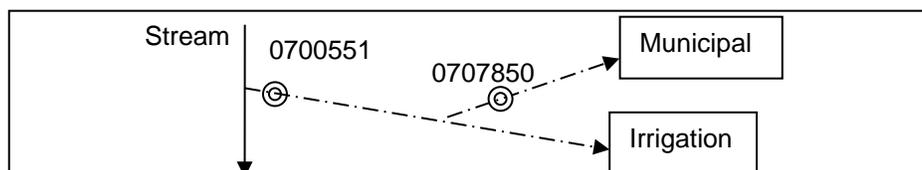
### Administrative Record (TYPE = 0)

Volumes associated with an administrative record will not be included in either SOURCE or USE summation routines. These records simply document administrative information such as: the total volume through a structure that has unspecified or more than one SOURCE and/or USE of water as a basis of documenting the volume of water recorded by a chart recorder or data logger; comparing or constructing detailed SOURCE and/or USE diversion records using the water commissioner's spreadsheet; etc. Another use may be to document water delivered past a structure that is sweeping the river. The structure has no right to take credit for "bypassing" the water, so the diversion is not a "bypass" and there is no other USE associated with the diversion. Because the user needs to record that water was delivered past the dry-up point, the TYPE = "0" record could provide that documentation.

### USE Data Only (TYPE = "R")

This TYPE code is used to indicate that the volume associated with the diversion record is associated only with the USE code, not the SOURCE code. Such a distinction is required in order to prevent a SOURCE from being double counted by the summation routines. It will almost always be associated with subsequent diversion records that have the same WDID used to divert the SOURCE of the water.

To illustrate, water is diverted into a ditch that can provide water to a municipality through a subsequent diversion structure with the remainder of the diversion being used for the historical irrigation USE. The water commissioner doesn't know how much water the city is taking until they submit their User Supplied data, but wants to document the in-priority diversion into the structure. The associated records would look like the following example.



|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description                           |
|---|----------|---|---------|---|---|---|--------|---------------------------------------|
| 1 | 0700551  | 1 |         | Q |   |   |        | In-priority diversion                 |
| 2 | 0707850  | 1 | 0700551 | 2 |   |   |        | City record of water to municipal use |
| 3 | 0700551  | 1 |         | 1 | R |   |        | Irrigation use: Row[1]- Row[2]        |

The diversion from the stream (Row 1, above) is included in the SOURCE total. The User Supplied USE record (Row 2, above) only adds to the USE total because of the WDID in the FROM code. The irrigation record (Row 3, above), without the TYPE = "R" code, would add to both the SOURCE and USE totals, which would result in double counting the SOURCE. Using TYPE = "R" prevents such double accounting.

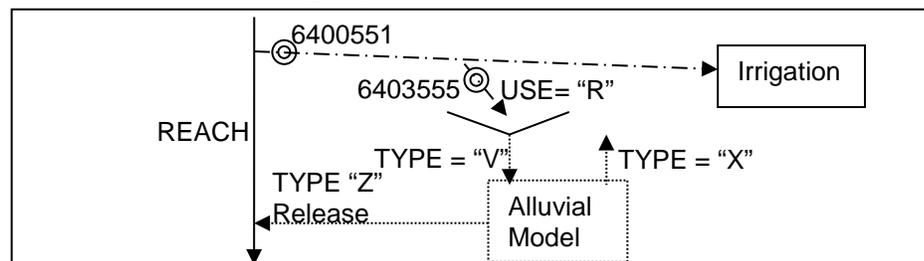
A record with TYPE = "R" will also be excluded from the Structure Report Total Diversion summation, as discussed in Section 1.127.

### Alluvial Aquifer Model Inputs (TYPE = "V", "X", "Y")

Three data TYPE codes have been developed as a way to provide diversion record input to alluvial accretion/depletion models. TYPE code "V" is used to record the deep percolation accretion component of the off-stream diversion.<sup>42</sup> TYPE code "X" is the consumptive use component of the diversion and TYPE code "Y" is the surface return flow component. Each input record requires the application of a response function to time and aggregate the effect of all inputs associated with the structure. The result is either an accretion release from the diversion structure or depletion from the stream, depending on the nature of the original diversion.

#### Accretion Example - Recharge

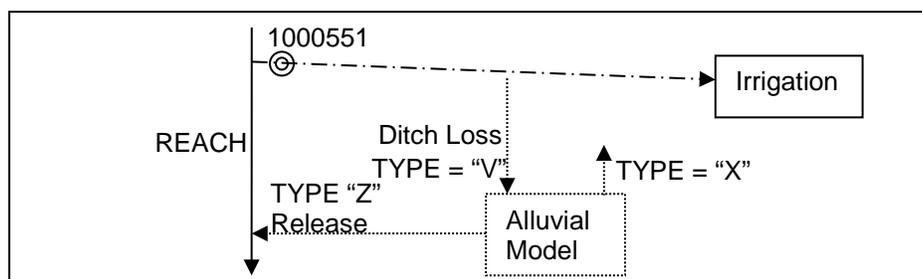
Input to an accretion operation is most often associated with some kind of recharge credit, either from specific recharge operations or credit from ditch loss, etc. An example of the model input associated with a recharge operation would be:



|   | WDID.ACT | S | F.ACT   | U | T | G      | TO.ACT | Description   |
|---|----------|---|---------|---|---|--------|--------|---|
| 1 | 6403555  | 1 | 6400551 | R |   | PLANID |        | Recharge (water into Recharge Area)                                   |
| 2 | 6403555  | 8 |         | Q | V | PLANID | REACH  | Accretion Input to Model (seepage from Recharge Area pond)            |
| 3 | 6403555  | 8 |         | Q | X | PLANID | REACH  | Reduction to accretion input due to sub-irrigation                    |
| 4 | 6403555  | 8 |         | Q | Z | PLANID | REACH  | Aggregated accretion (release from Recharge Area structure to stream) |

#### Accretion Example – Ditch Loss

Another application would be tracking the portion of transbasin water diverted for USE that is not consumed by the diversion, as in the case of ditch loss return flow:

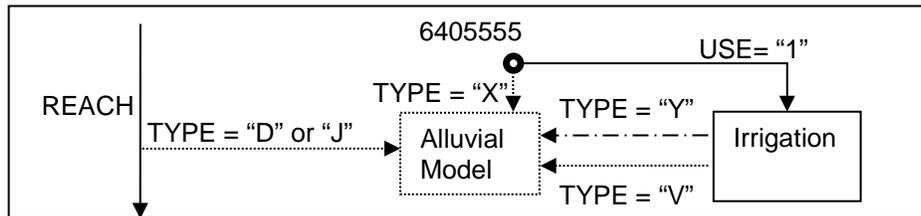


<sup>42</sup> While the nature of a TYPE "V" record is the same as previous versions of this standard, it is no longer considered a "release" type code since, technically, the structure making the diversion that resulted in the TYPE "V" record still has dominion and control of the water until the water is released to the stream. The TYPE "Z" code is now used to record that release.

|   | WDID.ACT | S | F.ACT         | U | T | G       | TO.ACT | Description  |
|---|----------|---|---------------|---|---|---------|--------|--|
| 1 | 1000551  | 2 | 1002555.004   | 1 |   |         |        | Irrigation USE of transbasin water (ACT 004 is TB water stored in Res) |
| 2 | 1000551  | 8 | (1002555.004) | Q | V | 1004799 | REACH  | Portion of water diverted for USE=1 that is lost by ditch              |
| 3 | 1000551  | 8 | (1002555.004) | Q | Z | 1004799 | REACH  | Model accretion based on TYPE=V input                                  |

### Depletion Example

Depletion operations that use this coding are most often associated with pumping from alluvial wells. While there are several methods available to model the impact to the stream that results from pumping an alluvial well, the most complicated involves a well that has both deep percolation and surface return flow credits that offset the consumptive use. Again, assuming the most complicated scenario, those components might have three different response functions as a result of the well being closer to or farther away from the stream than the land that's being irrigated, etc. In this scenario, the consumptive use component of the pumping would equal the pumping diversion. The ground water return flow component would be some fraction of the pumping as would the surface return flow component. The model would take each of the components, run the associated response functions, aggregate the impacts associated with all previous pumping and determine the impact on the stream as a function of time.



|    | WDID.ACT | S | F.ACT | U | T | G      | TO.ACT | Description   |
|----|----------|---|-------|---|---|--------|--------|---|
| 1  | 6405555  | 3 |       | 1 | A | PLANID |        | Irrigation diversion                                    |
| 2  | 6405555  | 3 |       | 1 | X | PLANID | REACH  | CU portion of diversion; 100% of Row 1 in this scenario |
| 3  | 6405555  | 3 |       | 1 | Y | PLANID | REACH  | Surface return portion; x% of Row 1                     |
| 4  | 6405555  | 3 |       | 1 | V | PLANID | REACH  | Deep perc portion; y% of Row 1                          |
| 5a | 6405555  | 1 | REACH | Q | J | PLANID |        | Portion of depletion that is in-priority                |
| 5b | 6405555  | 1 | REACH | Q | D | PLANID |        | Portion of depletion out-of-priority                    |

## 13. "GROUP", "TO" and "OBSERVATION" CODES

### 13.1 GROUP Code

The GROUP code is used to associate records. It is most often the WDID of the authorizing agent for an otherwise "unauthorized" diversion, such as replacement plan, statutory or decreed allowance, etc. The WDID of the authorizing agent must be included in the GROUP code for all diversions where TYPE = "A". When the authorizing agent is a replacement plan, the WDID must also be used in the GROUP code of all other records associated with the release, delivery or USE of replacement supply associated with the plan.

#### 13.1.1 Statewide GROUP Codes

Statewide GROUP codes have been formulated to address the following operations. Table 0-1 lists the currently available codes.

Table 13-1: Statewide GROUP Codes

| WDID    | Description                                  |
|---------|--|
| 9900001 | DIVERSIONS FUTILE TO CALL                    |
| 9900002 | CWCB TEMPORARY INSTREAM FLOW LOAN            |
| 9900003 | VOLUNTARY CONSERVATION PROGRAM               |
| 9900004 | ONSTREAM RESERVOIR EVAP PER CRS 37-84-117(5) |

#### Diversions Futile to the Call

GROUP Code "9900001" is defined as "DIVERSIONS FUTILE TO CALL" and is used to GROUP all such diversions. The futile diversion is coded as an "Authorized" diversion:

|   | WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description      |
|---|----------|---|-------|---|---|---------|--------|------------------|
| 1 | 1400505  | 1 |       | 1 | A | 9900001 |        | Futile Diversion |

#### CWCB Temporary In-stream Flow Loan Program

Water rights loaned to the CWCB for its in-stream flow program<sup>43</sup> are coded with a GROUP code of "9900002". Typical water classes would look like:

|   | WDID.ACT  | S | F.ACT     | U | T | G       | TO.ACT | Description                    |
|---|-----------|---|-----------|---|---|---------|--------|--------------------------------|
| 1 | DITCH.002 | 1 |           | Q | 7 | 9900002 |        | Bypass quantification          |
| 2 | MINFLOW   | 1 | DITCH.002 | M |   | 9900002 |        | Bypass used for in-stream flow |

#### Voluntary Conservation Program

The legislature has directed that some water users can forego diversions to make water available to the stream without that reduced diversion counting against the historical consumptive use of the decreed water right.<sup>44</sup> Water rights used in this way should be documented in order to inform the future HCU analyses. These records are similar to the in-

<sup>43</sup> C.R.S. 37-83-105(2)(c).

<sup>44</sup> C.R.S. 37-92-305(3)(c)

stream flow program, except that there is no associated USE record; the conservation record is the only record made.

|   | WDID.ACT  | S | F.ACT | U | T | G       | TO.ACT | Description           |
|---|-----------|---|-------|---|---|---------|--------|-----------------------|
| 1 | DITCH.002 | 1 |       | Q | 7 | 9900003 |        | Bypass quantification |

## 13.2 TO Code

The TO code is, generally, only used to help track the delivery of water and does not replace the requirement to enter a diversion record for the WDID, or ACT, receiving the water. If water is released from a reservoir and diverted downstream by a ditch, the ditch WDID - entirely at the discretion of the water commissioner - may or may not be placed in the TO code of the release record. Regardless of whether the ditch WDID is or is not in the TO code of the release record, a diversion record for the ditch WDID is required to divert the delivered water out of the stream for USE. The user should view the presence of a WDID in the TO code as simply a way to document the intended location of the delivery, with the following exceptions.

### 13.2.1 TO Code Required

#### Ground Water Transfer between Well Fields

As discussed in Section 1.101, ground water may be transferred from one Well Field to another Well Field by the following record:

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT   | Description         |
|---|----------|---|-------|---|---|---|----------|---------------------|
| 1 | WELLFLD1 | 3 |       | Q | Q |   | WELLFLD2 | Well Field transfer |

Even though the above is a "release", the volume will be included in the SOURCE summation because the SOURCE is natural water and the FROM code is "blank". In order to prevent the SOURCE summation routine from incorrectly including this water in the summation, the WDID of the Well Field receiving the water must be in the TO code. The SOURCE summation routine will ignore records for SOURCE = 3 where the WDID and TO code have Well Field structure types.

#### Reservoir Water Storage Transfer (Re-storage)

Similar to the transfer of ground water between Well Fields, transfer of reservoir water must include the WDID and ACT, if used, of the receiving structure in the TO code. The operation could involve a transfer of water between accounts in the same reservoir or between two different reservoirs, as discussed in Section 1.102.

The SOURCE summation routine ignores records where the WDID and TO codes are both Reservoir or Reservoir System structure types. As a result, intra-reservoir transfers between accounts could use the TYPE = "Q" code and inter-reservoirs transfers can use TYPE = "7".

|   | WDID.ACT   | S | F.ACT      | U | T | G | TO.ACT     | Description                                |
|---|------------|---|------------|---|---|---|------------|--|
| 1 | RESID1.002 | 2 |            | Q | Q |   | RESID1.007 | Intra-reservoir transfer between accounts. |
| 2 | RESID1.007 | 2 | RESID1.002 | 0 |   |   |            |  |
| 3 | RESID1     | 2 |            | Q | 7 |   | RESID2     | Inter-reservoir transfer                   |
| 4 | RESID2     | 2 | RESID1     | 0 |   |   |            |  |

### Diversion for Off-stream Storage as an Alternate Point

As discussed in Section 1.76, a ditch making a diversion as a carrying ditch to an off-stream reservoir that is storing as an alternate point of storage to another reservoir should include the WDID of the off-stream reservoir in the TO code:

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT  | Description                     |
|---|----------|---|---------|---|---|---|---------|---------------------------------|
| 1 | 2300550  | 1 | 2302510 | Q | 4 |   | 2302725 | APD made by ditch for reservoir |
| 2 | 2302725  | 1 | 2300550 | 0 |   |   |         | Down ditch USE                  |

Otherwise, it is unclear why the ditch is making a diversion as an alternate point to a reservoir (the FROM code).

### 13.3 OBSERVATION Code

There are a number of OBSERVATION codes for diversion records that describe the source and/or accuracy of the volume data.

Table 13-2: OBSERVATION Codes

| Code | Description                         | Counts as "Observation" | Volumetric Basis |
|------|-------------------------------------|-------------------------|------------------|
| *    | Amt Observed (In Person)            | Yes                     | Rated Control    |
| R    | Amt Recorded by Device              | Yes                     | Rated Control    |
| S    | Amt Estimated (In Person)           | Yes                     | Estimate         |
| E    | Date & Amt Estimated                | No                      | Estimate         |
| U    | User Supplied - Unknown Reliability | No                      | N/A              |
| K    | User Supplied - Known Reliability   | No                      | N/A              |
| C    | Calculated                          | No                      | Formula          |
| M    | Modeled                             | No                      | Model            |

#### 13.3.1 Observed ("\*")

Observed diversion records represent information that DWR obtains in person from a ratable measurement structure.

#### 13.3.2 Recorded ("R")

Added November 1, 2016, "Recorded" information is based on data associated with a continuous recorder that DWR either controls or audits such that the information can be corroborated.

#### 13.3.3 Estimated Amount ("S")

This code was also added November 1, 2016. It represents estimated flow data observed in person.

#### 13.3.4 Estimated ("E")

The Estimated code is changed effective November 1, 2016 to describe information where both the amount and date are estimated. These records typically apply to structures that either turned on or off since the last site visit. Prior to this change, the data would have been assigned an observation code of "\*" for the day of the site visit and a code of "E" for the day the user estimates the structure either started or stopped diverting. Now, the data has the code "S" for

an in-person visit to the structure and code “E” for data that’s estimated as to both when the diversion occurred and how much was diverted.

### 13.3.5 User Supplied Record - Unknown Reliability

Information provided by a user does not necessarily warrant a diversion record or may require comments regarding the information if used. Examples of User Supplied records would include:

- well diversions;
- time periods when the water commissioner is not on the payroll;
- non-administered areas that are not visited regularly;
- new structures;
- non-irrigation uses, such as industrial, municipal, commercial, etc.; and,
- non-consumptive uses, such as recreation, piscatorial, power, etc.

User supplied records are subject to review and approval by the water commissioner or division staff. The review should confirm the:

- accuracy of the water class;
- reliability of the volume data;
- adequacy of the water user’s accounting system; and,
- data is submitted timely.

Information submitted for which the Division has no knowledge regarding the reliability of the record should be assigned an OBSERVATION code of “U” for “Unknown Reliability”.

### 13.3.6 User Supplied Record - Known Reliability

User Supplied records based on diversion volume information that, in the opinion of Division staff, has a “Known Reliability” are assigned an OBSERVATION code of “K”.

### 13.3.7 Calculated

The definition of this code changed effective November 1, 2016. It was previously intended to indicate “modeled” information. It was changed to denote records that are determined by the use of math. For instance, a user may “observe” the total through a headgate and then use a formula to split the water out into the various colors of water. It would be appropriate to have a single “observed” record and multiple associated “calculated” records.

### 13.3.8 Modeled

This code is used for records that are based purely on some modeled operation, such as lawn irrigation or other return flows, stream depletions associated with a diversion of alluvial groundwater, etc.

## 14. STRUCTURE TYPE

The “structure type” data element is used to provide additional information to the user and provide opportunities for QA/QC protocols. Structure type is also separated into “aggregating” and “non-aggregating” structures to allow the program to know which summation routine to use for the structure report (Section 0).

Only the structure types shown in Table 0-1 may be used as the WDID in a diversion record.

**Table 14-1: Diversion Structure Types**

| Code | Structure Type Name | Aggregating or Non-Aggregating |
|------|---------------------|--------------------------------|
| 1    | Ditch               | N                              |
| 2    | Well                | N                              |
| WG   | Well Group          | N                              |
| WF   | Well Field          | A                              |
| 3    | Reservoir           | A                              |
| RS   | Reservoir System    | A                              |
| 4    | Spring              | N                              |
| 5    | Seep                | N                              |
| 6    | Mine                | N                              |
| 7    | Pipeline            | N                              |
| 8    | Pump                | N                              |
| 9    | Power Plant         | N                              |
| 0    | Other               | N                              |
| M    | Measuring Point     | N                              |
| MF   | Minimum Flow        | N                              |
| R    | Reach - Simple      | N                              |
| AR   | Reach - Aggregating | A                              |
| RA   | Recharge Area       | A                              |

### 14.1 Aggregating Structure Type

Aggregating structure types must make separate inflow and release diversion records in order for the Structure Report summation routine to correctly sum the Total Diversion. Aggregating structure types are shown in Table 0-2.

**Table 14-2: Aggregating Structure Types**

|    |                     |
|----|---------------------|
| WF | Well Field          |
| 3  | Reservoir           |
| RS | Reservoir System    |
| AR | Reach - Aggregating |
| RA | Recharge Area       |

### 14.1.1 Well Field

A Well Field, primarily, is the volume of ground water allocated under the Statewide Nontributary Ground Water Rules<sup>45</sup> and is more or less equivalent to an underground “reservoir”. Well Field diversion records document the administration of the allocated volume of water by recording additions through recharge or reductions through releases of water.

#### Records Associated with Appropriated Ground Water

The allocated volume of water associated with a Well Field involves an annual appropriation designed to achieve a 100 year aquifer life and allows water to be “banked”<sup>46</sup> from year to year. Diversion records, should the user so desire, could easily document the administration of the volume over time:

|   | WDID.ACT | S | F.ACT    | U | T | G | TO.ACT   | Description                          |
|---|----------|---|----------|---|---|---|----------|--------------------------------------|
| 1 | WELLFLD1 | 3 | AQRESVN  | Q |   |   |          | Annual allowed appropriation         |
| 2 | WELLFLD1 | 3 |          | Q | Q |   | WELLFLD2 | Volume transferred to 2nd Well Field |
| 3 | WELLFLD2 | 3 | WELLFLD1 | Q |   |   |          | Transfer added to 2nd Well Field     |
| 4 | WELLFLD1 | 3 |          | Q | 8 |   |          | Appropriated ground water            |
| 5 | WELL1    | 3 | WELLFLD1 | # |   |   |          | USE of ground water                  |

#### Records Associated with “Recharge” or “Underground Storage”

Currently, there is no specific USE code for “underground storage”. Instead, water is placed in a Well Field under the dominion and control of the user for direct withdrawal at a later time by means of a “Recharge” (USE = “R”) record, much like water is placed in reservoirs by a “Storage” (USE = “O”) record. After the water is put to a Recharge USE, the now “re-usable” water is “Quantified” (USE = “Q”) into a Well Field structure type (Row 3, below). The recharged water may then be distinguished from releases of ground water from the Well Field by the SOURCE code:

|   | WDID.ACT | S | F.ACT    | U | T | G | TO.ACT | Description                                   |
|---|----------|---|----------|---|---|---|--------|---|
| 1 | PUMP001  | 1 |          | Q |   |   |        | Water pumped from the stream                  |
| 2 | WELL1    | 1 | PUMP1    | R | W |   |        | Recharge by well                              |
| 3 | WELLFLD1 | 8 | WELL1    | Q |   |   |        | Water quantified into Well Field              |
| 4 | WELLFLD1 | 8 |          | Q | 8 |   |        | Recharged water released from Well Field      |
| 5 | WELL2    | 8 | WELLFLD1 | # |   |   |        | Recharged water put to USE                    |
| 6 | WELLFLD1 | 3 |          | Q | 8 |   |        | Ground water appropriated by WFLD001 released |
| 7 | WELL2    | 3 | WELLFLD1 | # |   |   |        | Ground water put to USE                       |

<sup>45</sup> The Statewide Nontributary Ground Water Rules, 2 CCR 402-7, are available at [www.state.co.us](http://www.state.co.us).

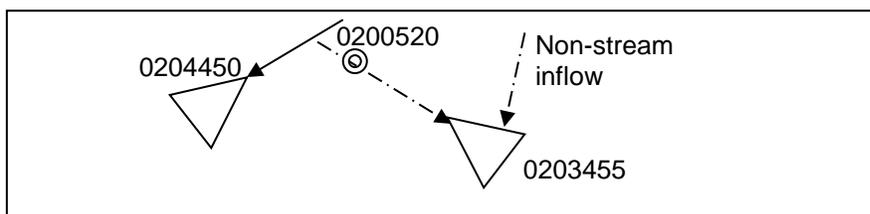
<sup>46</sup> Pursuant to 2 CCR 402-7 Rule 8.A, “the allowed annual amount of withdrawal may exceed the allowed average annual amount of withdrawal as long as the total volume of water withdrawn from the well or wells does not exceed the product of the number of years since the date or dates of issuance of the well permit or permits or the date or dates of determination or determinations of right to ground water by the water court, whichever comes first, times the allowed average annual amount of withdrawal.”

## 14.1.2 Reservoir/Reservoir System

A "Reservoir" or "Reservoir System" receives any SOURCE of water by means of a "Storage" (USE = "0") record whereby the water is aggregated into SOURCE = "2" and released using records with a release TYPE code. The water is typically put to USE by a subsequent structure; however, the release record may also document the USE, if appropriate, as in the case of direct irrigation from the reservoir or power generation.

### Storage/Release Records

For storage structures, the WDID represents the pool of water stored in the structure and its primary release point. Because of the change in SOURCE that occurs when water is stored in the structure, there is no confusion when the structure WDID for an on-stream reservoir is used to both divert water from the stream and release water back to the stream. Storage structure WDIDs, therefore, may make both diversion and release records provided the diversion and release are two separate records. Typical records are shown below.



|    | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT | Description   |
|----|----------|---|---------|---|---|---|--------|---|
| 1  | 0204450  | 1 |         | 0 |   |   |        | On-stream reservoir storage                             |
| 2a | 0200520  | 1 |         | Q |   |   |        | Off-stream reservoir storage                            |
| 2b | 0203455  | 1 | 0200520 | 0 |   |   |        |   |
| 3  | 0203455  | 5 |         | 0 |   |   |        | Storage of non-stream flow (on or off-stream reservoir) |
| 4  | 0203455  | 2 |         | 1 | 8 |   |        | Direct irrigation from reservoir                        |
| 5  | 0204450  | 2 |         | Q | 7 |   |        | Release for delivery or exchange                        |
| 6  | 0204450  | 2 |         | P | 7 |   |        | Power generation and release for delivery or exchange   |
| 7  | 0204450  | 2 |         | P | L |   |        | Power generation and release of dominion and control    |

### Recharge by a "Reservoir"

If a reservoir has a water right that enables the owner to maintain dominion and control of seepage from the reservoir, the reservoir may "recharge" (USE = "R") the seepage and release it back to the stream by means of accretion through the alluvial aquifer (TYPE = "V") or withdraw it directly back from ground at a later time (TYPE = "W"), depending on the terms of the decree.

|   | WDID.ACT | S | F.ACT   | U | T | G | TO.ACT   | Description                      |
|---|----------|---|---------|---|---|---|----------|----------------------------------|
| 1 | 0203455  | 1 | 0200520 | 0 |   |   |          | Storage record                   |
| 2 | 0203455  | 2 |         | R | 8 |   |          | Reservoir seepage as "recharge"  |
| 3 | 0203455  | 8 |         | Q | V |   | INSTRMID | Input to alluvial mode (= Row 3) |

**Intra-Reservoir Transfer (Book-over)****Simple Transfer between Accounts (Account Book-over)**

|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT      | Description          |
|---|-------------|---|-------------|---|---|---|-------------|----------------------|
| 1 | 0203455.002 | 2 |             | Q | Q |   | 0203455.004 | Release from account |
| 2 | 0203455.004 | 2 | 0203455.002 | 0 |   |   |             | Transfer to account  |

**Transfer between Accounts Based on In-Priority Bypass (In-Priority Book-over)**

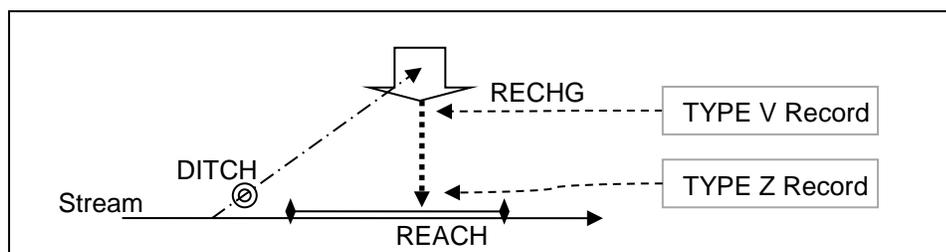
|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT        | Description  |
|---|-------------|---|-------------|---|---|---|---------------|--|
| 1 | 0200520     | 1 |             | Q | 0 |   | (0203455.006) | Natural stream available for diversion, but bypassed |
| 2 | 0203455.002 | 2 |             | Q | Q |   | 0203455.006   | Release from account (= Row 1)                       |
| 3 | 0203455.006 | 2 | 0203455.002 | 0 |   |   |               | Transfer to account (= Row 1)                        |

**Inter-Reservoir Storage Transfer (Re-storage)**

|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT      | Description                   |
|---|-------------|---|-------------|---|---|---|-------------|-------------------------------|
| 1 | 0204450.002 | 2 |             | Q | 7 |   | 0203525.004 | Water released for re-storage |
| 2 | 0203525.004 | 2 | 0204450.002 | 0 |   |   |             | Re-storage record             |

**14.1.3 Recharge Areas**

Recharge Areas are aggregating structures because of the need, typically, to impound the water in an above ground pond to facilitate the recharge. The "Recharge" (USE = "R") code is applied to the volume of water placed into the recharge facility, following the protocols set up for "Storage" (USE = "0"), even though some of the water may be lost to evapotranspiration. As any SOURCE of water placed into a reservoir for storage is released as SOURCE = "2" water, all water put to a "Recharge" USE is released as SOURCE = "8". The USE = "R" record, in effect, is the "gross" recharge since some amount of water is typically lost to evapotranspiration. The associated "net recharge" that seeps into the ground has a USE = "Q", TYPE = "V" diversion record.



|   | WDID.ACT | S | F.ACT | U | T | G     | TO.ACT | Description                                  |
|---|----------|---|-------|---|---|-------|--------|--|
| 1 | DITCH    | 1 |       | Q |   |       |        | Natural stream diversion                     |
| 2 | RECHRG   | 1 | DITCH | R |   |       |        | Water delivered to recharge area impoundment |
| 3 | RECHRG   | 8 |       | E |   |       |        | Evaporative loss (optional)                  |
| 4 | RECHRG   | 8 |       | Q | V | GROUP | REACH  | Input to alluvial aquifer                    |
| 5 | RECHRG   | 8 |       | Q | Z | GROUP | REACH  | Modeled accretion from 0702501               |

Rows 1 and 2 in the above example are typically daily records whereas rows 3, 4 and 5 are typically infrequent, monthly records.

The record set above are the records associated with getting water to and out of the recharge area. The additional records showing the water into the associated REACH are shown in Sections 1.104 or 1.110, depending on whether the REACH is an “aggregating” or “simple” structure type.

#### 14.1.4 Reach - Aggregating

The Reach - Aggregating structure type is an in-stream structure that is used to aggregate deliveries of water in the same way a Reservoir aggregates water for storage, with the exception that the aggregating reach cannot delay the downstream transport of the water. As with a reservoir where any SOURCE of water stored in the reservoir becomes SOURCE = “2” water, quantification of water into an aggregating reach changes the SOURCE of the delivered water to SOURCE = “8”. **As a result, only fully consumable water can be delivered to an aggregating reach.** The water is quantified into the aggregating reach with a USE = “Q” code, similar to the protocols for underground storage in a Well Field structure type (Section 1.101).

|    | WDID.ACT | S | F.ACT   | U | T | G      | TO.ACT | Description   |
|----|----------|---|---------|---|---|--------|--------|---|
| 1  | BYPASS   | 1 |         | Q | 7 | GROUP1 | AGGRCH | Bypass release; Fully consumable                                      |
| 2  | AUGSTAT  | 1 | DITCH   | Q | 7 | GROUP1 | AGGRCH | Aug station release; Fully consumable                                 |
| 3  | RES      | 2 |         | Q | 7 | GROUP1 | AGGRCH | Reservoir release; Fully consumable                                   |
| 4  | LIRF     | 8 |         | Q | 7 | GROUP1 | AGGRCH | LIRF return flows; Fully consumable                                   |
| 5  | RECHRG   | 8 |         | Q | Z | GROUP1 | AGGRCH | Aggregated recharge credit to the stream; Fully consumable. (Modeled) |
| 6  | AGGRCH   | 1 | BYPASS  | Q |   | GROUP1 |        | Row 1 water   |
| 7  | AGGRCH   | 1 | AUGSTAT | Q |   | GROUP1 |        | Row 2 water   |
| 8  | AGGRCH   | 2 | RES     | Q |   | GROUP1 |        | Row 3 water   |
| 9  | AGGRCH   | 8 | LIRF    | Q |   | GROUP1 |        | Row 4 water   |
| 10 | AGGRCH   | 8 | RCHRG   | Q |   | GROUP1 |        | Row 5 water   |
| 11 | AGGRCH   | 8 |         | Q | Q | GROUP1 |        | Aggregated release for GROUP1   |
| 12 | ENDUSER  | 8 | AGGRCH  | # |   | GROUP1 |        | Multiple end uses of aggregated water                                 |

The Reach - Aggregating structure type is only used for fairly complicated administration. The benefit is that once the water is released to the system (Rows 1 - 5) and quantified into the aggregating reach (Rows 6 - 10), the water can be administered as simply coming from the aggregating reach (Row 11). The subsequent USE records (Row 12) will show the aggregated water as coming only from the aggregating reach, instead of having to track the water back to each individual original release structure.

Entities using the reach to aggregate their various supplies of water may have multiple end uses, like exchange back up to one of more reservoirs, delivery downstream to one or more reaches for augmentation or delivery downstream to one or more diversions to irrigation or recharge or any number of other uses. When the user contemplates the administrative nightmare of trying to decide how much of each of the multiple supply sources of replacement water went to which of the end uses, the benefit of being able to show the water as having come from the aggregating reach is clear.

Because of the potential for double counting the SOURCE = “8” water, the user must be very careful when formulating Reach - Aggregating structure type water classes. **In general, the water classes associated with this structure type should only make TYPE = “Q” releases.**

Relying on the structure releasing the water to the aggregating reach to make the TYPE = ("7", "8" or "L") release record will prevent the user from losing track of whether or not the water has been "added to the system" (See Section 1.125 for protocols regarding how SOURCE = "8" water is "added to the system".)

Another drawback to the use of an aggregating reach is the lost connectivity between the SOURCE of water being made available and the ultimate USE and place of USE of that water. Quantifying all the supplies of water into the aggregating reach, however, makes it clear that the water was ultimately used in one of the many places associated with the USE of water from the aggregating structure. The rest of that consumptive use analysis must be left to an audit of the users accounting as to attempt to replicate that complexity in the diversion record is simply untenable.

## 14.2 Simple (Non-Aggregating) Structure Type

Non-aggregating structures may use one diversion record to quantify both the inflow into the structure and a release from the structure. Non-aggregating structures are shown in Table 0-3.

**Table 14-3: Non-Aggregating Structure Types**

|    |                 |
|----|-----------------|
| 1  | Ditch           |
| 2  | Well            |
| WG | Well Group      |
| 4  | Spring          |
| 5  | Seep            |
| 6  | Mine            |
| 7  | Pipeline        |
| 8  | Pump            |
| 9  | Power Plant     |
| 0  | Other           |
| M  | Measuring Point |
| MF | Minimum Flow    |
| R  | Reach - Simple  |

### 14.2.1 On-stream, Non-Aggregating Structures: Ditch, Pipeline, Pump, etc.

#### WDID Represents Head Gate Diversions and USE

WDIDs associated with non-storage structures making diversions from the stream, such as ditches, pipelines, pumps, etc., represent, first and foremost, the "head gate" or "principal intake" measurement structure. In many cases, this WDID has also been used to represent the general reach of the structure's length, as in the case of an irrigation ditch. As a result, the WDID has been used to record both the diversion from the stream and the USE.

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description                                     |
|---|----------|---|-------|---|---|---|--------|---|
| 1 | 0800500  | 1 |       | 1 |   |   |        | Irrigation diversion through head gate of ditch |

### Release to Stream Must Use Subsequent ID

A WDID for a non-storage structure that makes diversions from the stream may not be used to also make a “release” back to the stream. This is due to the fact that the WDID is associated with water being diverted from the stream. To use the same WDID to also make a release back to the stream is confusing. Where, for instance, is the release occurring? Is it from the tail of the ditch, from a sand gate, from water flowing backward through the head gate? There is also a SOURCE summation routine issue, discussed in Section 1.124.

### Subsequent ID Can Be Separate WDID

The two IDs required to distinguish diversions from releases in non-aggregating structure types may be completely different WDIDs:

|   | WDID.ACT | S | F.ACT                | U | T | G       | TO.ACT | Description                                     |
|---|----------|---|----------------------|---|---|---------|--------|---|
| 1 | 0800500  | 1 |                      | 1 |   |         |        | Irrigation diversion through head gate of ditch |
| 2 | 0800500  | 1 |                      | Q |   |         |        | Water carried thru head gate                    |
| 3 | 0807695  | 1 | 0800500              | Q | 7 | 0803500 |        | Release from ditch return using separate WDID   |
| 4 | 0809595  | 1 | 0800500 <sup>+</sup> | A |   | 0803500 |        | Augmentation of reach associated with aug plan  |

Alternatively, the second ID may simply be a different ACT ID for the same WDID:

|   | WDID.ACT    | S | F.ACT                    | U | T | G       | TO.ACT | Description                                     |
|---|-------------|---|--------------------------|---|---|---------|--------|---|
| 1 | 0800500.001 | 1 |                          | 1 |   |         |        | Irrigation diversion through head gate of ditch |
| 2 | 0800500.001 | 1 |                          | Q |   |         |        | Water carried thru head gate                    |
| 3 | 0800500.003 | 1 | 0800500.001              | Q | 7 | 0803500 |        | Release from ditch return using separate WDID   |
| 4 | 0809595     | 1 | 0800500.001 <sup>+</sup> | A |   | 0803500 |        | Augmentation of reach associated with aug plan  |

<sup>+</sup>Note that in both examples, the water received by the in-stream reach has the FROM code associated with the initial diversion of the water, as opposed to the immediately preceding structure.

### WDID Bypass

A “bypass” is when a decree for a stream diversion structure, like a ditch, allows the structure to forego a diversion and leave water that it could have diverted in the stream, using the water as a source of replacement supply. Such a record, as shown below, does not have the same SOURCE summation routine issues as the release from a non-aggregating structure discussed above. Nonetheless, it still has all the same issues regarding record clarity. It also introduces a disconnect in that the volume of water associated with Row “2” (below) was not actually “diverted” by the head gate and would not be included in any associated head gate chart record. The WDID or WDID.ACT associated with the head gate, or any other measurement location, of a ditch must correlate to the flow through that location.

|   | WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description   |
|---|----------|---|-------|---|---|---------|--------|---|
| 1 | 0800500  | 1 |       | 1 |   |         |        | Irrigation diversion through head gate of ditch   |
| 2 | 0800500  | 1 |       | Q | 7 | 0803500 |        | <u>INCORRECT RECORD</u> of water left in stream when WDID can also divert water from the stream |

## Bypass ACT or In-stream WDID

The WDID of a ditch that still diverts water from the stream for USE may not make a record of water “left in the stream”, unless the user assigns location based ACCOUNTS to the WDID:

|   | WDID.ACT    | S | F.ACT       | U | T | G       | TO.ACT | Description                                    |
|---|-------------|---|-------------|---|---|---------|--------|--|
| 1 | 0800500.001 | 1 |             | 1 |   |         |        | ACT 001: “head gate”                           |
| 2 | 0800500.002 | 1 |             | Q | 7 | 0803500 |        | ACT 002: “bypass”                              |
| 3 | 0809595     | 1 | 0800500.002 | A |   | 0803500 |        | Augmentation of reach associated with aug plan |

Alternatively, the user may create a measuring point WDID in the stream at the same location as the headgate and use that as the ID for the bypass record:

|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT | Description  |
|---|----------|---|---------|---|---|---------|--------|--|
| 1 | 0800500  | 1 |         | 1 |   |         |        | Irrigation diversion through head gate of ditch                                  |
| 2 | 0807575  | 1 |         | Q | 7 | 0803500 |        | In-stream measuring point associated with water left in stream by ditch 0800500. |
| 3 | 0809595  | 1 | 0807575 | A |   | 0803500 |        | Augmentation of reach associated with aug plan                                   |

There are pros and cons to each of the above choices. The main reason to consider the accounts option is that the water right that authorizes the bypass is usually tabulated under the ditch WDID. The bypass is just one more operation allowed by the ditch decrees and having the bypass record associated directly to the WDID where the right is tabulated automatically makes the link between diversion and water right.

The primary argument against using accounts for location based distinctions is that it prevents the accounts from being available to track different subgroups of water going through a specific structure, should the structure develop that need.

## Bypass at Structures that Do Not Divert Water From the Stream

A structure that no longer makes any diversions from the stream, but is, instead, used only to quantify the volume of water “available” at the decreed head gate location may be used to make a bypass record. This is allowed because the WDID now has only one function.

|   | WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description  |
|---|----------|---|-------|---|---|---------|--------|--|
| 1 | 0800500  | 1 |       | Q | 7 | 0803500 |        | Only allowed when ditch <u>cannot</u> divert water from the stream |

## Seepage from a Non-Aggregating Surface Water Structure

Some ditches have a right to maintain dominion and control of seepage either as return flows associated with unused supplies of transbasin water or as “recharge” when the ditch is diverting a more junior water right to recharge facilities.

## Transbasin Return Flow

Diversion records for maintaining dominion and control of transbasin return flows lost through transit seepage in a ditch would be as follows:

|   | WDID.ACT    | S | F.ACT | U | T | G | TO.ACT | Description                   |
|---|-------------|---|-------|---|---|---|--------|-------------------------------|
| 1 | 1202555.004 | 2 |       | Q | 7 |   |        | Release of TB water (ACT 004) |

|   |         |   |               |   |   |          |          |                              |
|---|---------|---|---------------|---|---|----------|----------|------------------------------|
| 2 | 1200555 | 2 | 1202555.004   | 1 |   |          |          | TB water used for irrigation |
| 3 | 1200555 | 8 | (1202555.004) | Q | V | (PLANID) | INSTRMID | Seepage loss of Row 2        |

### Recharge

If the recharge is recorded by the ditch WDID, the user will have to make sure the volume of the recharge record is not included in another head gate record to prevent double counting. To illustrate, consider the example where a ditch diverts 10 cfs to a single recharge area with an above ground impoundment and loses 10% to seepage in the process of carrying the water to the recharge area. The 10% seepage loss, by decree, can also be claimed as recharge:

|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT   | Description                     |
|---|----------|---|---------|---|---|---------|----------|---------------------------------|
| 1 | 0100501  | 1 |         | Q |   |         |          | Total through head gate-10 cfs  |
| 2 | 0102525  | 1 | 0100501 | R |   |         |          | Delivered to recharge-9 cfs     |
| 3 | 0100501  | 1 |         | R | R |         |          | Seepage loss to recharge - 1cfs |
| 4 | 0102525  | 8 |         | Q | V | 0103500 | INSTRMID | Recharged volume                |
| 5 | 0100501  | 8 |         | Q | V | 0103500 | INSTRMID | Recharged volume                |

Rows 1, 2 and 3 in the above example are daily records whereas rows 4 and 5 are typically monthly, infrequent records.

There are two alternative solutions to the above example that the user may want to consider. One would be to use accounts:

|   | WDID.ACT    | S | F.ACT       | U | T | G       | TO.ACT   | Description   |
|---|-------------|---|-------------|---|---|---------|----------|---|
| 1 | 0100501.001 | 1 |             | Q |   |         |          | Total through head gate-10 cfs ACT 001: "head gate"       |
| 3 | 0100501.003 | 1 | 0100501.001 | R |   |         |          | Seepage loss to recharge - 1 cfs ACT 003: "ditch seepage" |
| 5 | 0100501.003 | 8 |             | Q | V | 0103500 | INSTRMID | Recharged volume  |

A second alternative would be to tabulate the ditch segment decreed for seepage credit as a separate "Recharge Area" structure and assign it a WDID:

|   | WDID.ACT | S | F.ACT   | U | T | G       | TO.ACT   | Description                      |
|---|----------|---|---------|---|---|---------|----------|----------------------------------|
| 1 | 0100501  | 1 |         | Q |   |         |          | Total through head gate-10 cfs   |
| 3 | 0107575  | 1 | 0100501 | R |   |         |          | Seepage loss to recharge - 1 cfs |
| 5 | 0107575  | 8 |         | Q | V | 0103500 | INSTRMID | Recharged volume                 |

### 14.2.2 Well / Well Group

Wells may divert ground water and may also be used to release water to: the stream; off-stream systems; recharge the alluvial aquifer; recharge an underground storage structure; or, dispose of water underground. A Well Group is simply a group of wells being administered in aggregate.

### 14.2.3 Non-Stream Flow Structures - Seep, Spring, Mine, etc.

Non-stream flow structures may make a diversion, release or both, depending upon the specific operation being described.

### 14.2.4 Minimum Flow

Minimum Flow structures are used exclusively for an in-stream flow reach or a natural lake level water right.

### 14.2.5 Reach - Simple

A "Reach - Simple" structure type is, as the name implies, a reach of stream. In diversion records, it is primarily used to receive the replacement supply associated with plans of augmentation, substitute supply plans or return flow obligations. It may also be used to quantify exchange volumes or other volumes of water being administered through the Reach. For purposes of comparing the simple and aggregating reach structure type records, following is a subset of the records shown in Section 1.104.

|    | WDID.ACT | S | F.ACT  | U | T | G      | TO.ACT | Description   |
|----|----------|---|--------|---|---|--------|--------|---|
| 1  | BYPASS   | 1 |        | Q | 7 | GROUP1 | SIMRCH | Bypass release; Fully consumable                                      |
| 9  | RECHRG   | 8 |        | Q | Z | GROUP1 | SIMRCH | Aggregated recharge credit to the stream; Fully consumable. (Modeled) |
| 10 | SIMRCH   | 1 | BYPASS | A |   | GROUP1 |        | Row 1 water   |
| 18 | SIMRCH   | 8 | RCHRG  | A |   | GROUP1 |        | Row 9 water   |

### 14.3 Structure Types NOT Allowed to make Diversion Records

Structure types that are not allowed to have diversion records are shown in Table 0-4:

Table 14-4: Structure Types NOT Allowed to have Diversion Records

|    |                               |
|----|-------------------------------|
| DS | Ditch System                  |
| EP | Exchange Plan                 |
| P  | Augmentation/Replacement Plan |

#### 14.3.1 Ditch System

While Well Groups and Reservoir Systems are allowed to maintain diversion records, Ditch structure types are not administered as part of a Ditch System and, therefore, may not be used as the WDID of a diversion record. Ditch System structure types exist merely to provide a way to associate ditches.

#### 14.3.2 Plans

Exchange and augmentation/replacement plans are just what the name implies: they are plans, not structures. Only structures can make a diversion.

## 15. ACCOUNTS

The use of accounts is not required. In fact, the vast majority of structures do not need the complexity of accounts in order to accurately administer the structure. Accounts are used for the singular purpose of tracking multiple subgroups in a structure. For structures with no accounts, diversion records are associated with the seven-digit WDID.

Accounts are assigned to a WDID by the addition of a 3-digit number that appends the WDID to the right of a decimal point. The meaning of the ACT code is unique to each WDID; there is no ability to select or customize ACT codes absent a master design by the user. The WDID, without appended ACT, represents the structure as a whole. Using the WDID with appended ACT signifies diversions associated with that specific account. For instance, 0202503.001 would represent ACT 001 of WDID 0202503, etc.

Once accounts are assigned to the structure, the seven-digit WDID plus the three-digit ACT designation must be used. The exception to this rule is the administrative only (TYPE=0) record, discussed in Section 1.86.

Only structure types authorized to have a diversion record, shown in Table 0-1, may have accounts. All accounts must be subsets of only the parent structure; every account is completely independent from every other account.

### 15.1 Account Templates

#### 15.1.1 Diversion Location

The diversion location template specifies accounts based on measurement locations associated with the WDID. The only account attribute for Diversion Location based accounts is:

Table 15-1: Diversion Location Account Attribute

| ACT | Name | Full Description | Attribute: Location            |
|-----|------|------------------|--------------------------------|
|     |      |                  | (Headgate, Bypass, Tail, etc.) |

Non-storage diversion structures that also release water back to the stream must release the water either through a second measurement structure or by using accounts. For example, a ditch diverts more water than it can beneficially use and the water commissioner wants to make a record of the excess tail release and proposes the following water class:

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description      |
|---|----------|---|-------|---|---|---|--------|------------------|
| 1 | 1000501  | 1 |       | Q | E |   |        | INCORRECT RECORD |

This is an unacceptable water class because such a record would result in the volume of the excess tail being included in the summation routine of the Total SOURCE of natural stream flow. The only reason to make the record in the first place is to diminish the inferred use of an earlier record that showed the ditch diverting and using water from SOURCE = "1" in excess of what the ditch actually put to beneficial use. Instead of accomplishing that, this water class would add the volume a second time to the SOURCE total for the structure. The only way to prevent the double counting is to use an ID in the FROM code. This can be done by either assigning the tail a WDID (1000951 in the example below) or using accounts:

|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT | Description |
|---|-------------|---|-------------|---|---|---|--------|-------------|
| 1 | 1000951     | 1 | 1000501     | Q | E |   |        | Excess tail |
| 2 | 1000501.003 | 1 | 1000501.001 | Q | E |   |        | Excess tail |

In order to use accounts, the “head gate” diversions historically made using only the WDID must now be recorded by a “head gate” account (ACT 001 in the above example). The WDID then becomes the number used to refer to the structure when an account is not required, such as the ID in the FROM code of the record for an alternate point of diversion, etc.

### 15.1.2 Entity/Ownership

Similar to the Diversion Location template, Entity/Ownership based accounts are pretty straight forward should the user want to track diversions based on ownership. The account attribute for such Diversion Location based accounts is:

Table 15-2: Entity/Ownership Account Attribute

| ACT | Name | Full Description | Attribute: Entity/Owner |
|-----|------|------------------|-------------------------|
|     |      |                  |                         |

Another use of this account template would be a well that is used to supply irrigation water for the same plan of augmentation, same owner, etc., but some of the irrigation is flood and some is sprinkler. Because of the different application efficiencies, the volume of ground water applied to flood irrigation must be distinguished from that used through a sprinkler in order to correctly calculate the depletion impact on the river. Both volumes of water have the same water class, absent accounts:

|   | WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description   |
|---|----------|---|-------|---|---|---------|--------|---------------|
| 1 | 1000501  | 3 |       | 1 | A | 1003500 |        | Total pumping |

Again, there are games the user could play with the TO code or Comment, but a more reliable method to distinguish between application types would be to use accounts. ACT 001 tracks flood based irrigation and ACT 002 tracks sprinkler:

|   | WDID.ACT    | S | F.ACT | U | T | G       | TO.ACT | Description          |
|---|-------------|---|-------|---|---|---------|--------|----------------------|
| 1 | 1000501.001 | 3 |       | 1 | A | 1003500 |        | Flood irrigation     |
| 2 | 1000501.002 | 3 |       | 1 | A | 1003500 |        | Sprinkler irrigation |

The volumes associated with both diversion records would add to both the Total SOURCE of ground water pumped and to the USE of the ground water. If the operation was such that the two meters necessary to determine the two volumes were interdependent, such as a meter on

the total pumped and a meter on the sprinkler, the user could easily accommodate such a set up with an additional administrative record:

|   | WDID.ACT    | S | F.ACT | U | T | G       | TO.ACT | Description                |
|---|-------------|---|-------|---|---|---------|--------|----------------------------|
| 0 | 1000501     | 3 |       | Q | 0 |         |        | Total pumped meter         |
| 1 | 1000501.001 | 3 |       | 1 | A | 1003500 |        | Flood: Row [0]-Row [2]     |
| 2 | 1000501.002 | 3 |       | 1 | A | 1003500 |        | Sprinkler irrigation meter |

The summation of the volumes with the above three records still result in accurate SOURCE and USE totals as the TYPE = "0" record is ignored. The tabulation of the accounts could associate the information required to know how to calculate the respective depletions in the very same way it does for two different structures.

### 15.1.3 Water Right Priority

The Water Right Priority template also has a single attribute:

Table 15-3: Water Right Priority Account Attribute

| ACT | Name | Full Description | Attribute: Priority |
|-----|------|------------------|---------------------|
|     |      |                  |                     |

ACT 001 for this template is "Reservoir delivery / non-decreed diversions." ACT 002 is the most senior water right followed by successive accounts, as required, in the order of reverse seniority (most senior to most junior). Except for ACT 001, the lower the account number the more senior the water right.

### 15.1.4 Reservoir Pools

A more common need is to administer "pools" of water in a reservoir. The Reservoir Pools template allows the user to track the storage of water with two attributes.

Since the water class for each "pool" of water stored is exactly the same absent an ACT designation, such tracking was previously accomplished by assigning each owner a WDID and using that ID in the GROUP code or assigning the reservoir multiple WDIDs associated with each of the owners, etc. Any such use of the WDID, however, significantly corrupts the integrity of the data and, as discussed in Section 1.40, is not allowed.

The correct way to manage the data is to assign an ACT to each pool of water stored in order to maintain a unique water class association with the water stored, such as:

|   | WDID.ACT    | S | F.ACT | U | T | G | TO.ACT | Description   |
|---|-------------|---|-------|---|---|---|--------|---------------|
| 1 | 0802500.001 | 1 |       | 0 |   |   |        | Owner 1 water |
| 2 | 0802500.002 | 1 |       | 0 |   |   |        | Owner 2 water |

A similar example would be the need to track the use of transbasin water through the importing system if the transbasin water is ever stored. Because the transbasin water changes SOURCE from "4" to "2" when it's stored and the downstream diversion of the reservoir release uses the reservoir WDID as the associated FROM code, users would need to use an ACT to track the storage, release and associated downstream use of transbasin water stored in a reservoir:

|   | WDID.ACT    | S | F.ACT       | U | T | G | TO.ACT | Description                    |
|---|-------------|---|-------------|---|---|---|--------|--------------------------------|
| 1 | 0802500.003 | 4 | 0804600     | 0 |   |   |        | TB water stored in an account  |
| 2 | 0802500.003 | 2 |             | Q | 7 |   |        | TB water released for delivery |
| 3 | 0200551     | 2 | 0802500.003 | 1 |   |   |        | TB water used for irrigation   |

The Reservoir Pools template has two attributes:

**Table 15-4: Reservoir Pool Account Attributes**

| ACT | Name | Full Description | Attribute_1: Pool | Attribute_2: Owner |
|-----|------|------------------|-------------------|--------------------|
|     |      |                  |                   |                    |

### 15.1.5 Reservoir Accounts - Division 2

Compliance with the Arkansas River Compact requires fairly sophisticated reservoir administration in Division 2. As a result, this template has four attributes:

**Table 15-5: Reservoir Accounts - Division 2 Account Attributes**

| ACT | Name | Full Description | Attribute_1: Entity/Owner | Attribute_2: Pool | Attribute_3: Use   | Attribute_4: Vintage       |
|-----|------|------------------|---------------------------|-------------------|--------------------|----------------------------|
|     |      |                  |                           | (AG, M&I)         | (I&W, Project, WW) | (Current Year, Carry Over) |

## 15.2 Accounts for Aggregating Structures

As stated earlier, an ACT may not be a subset of another ACT. Therefore, the sum of the volumes placed in each ACT associated with an aggregating structure must be equal to the volume diverted by the structure as a whole.

Once water is placed in an aggregating structure ACT, releases from the structure must also be made from that ACT. As with any other release, the WDID and ACT of the structure must be in the FROM code of the record that receives the released water.

## 15.3 Account Attribute Combinations are Unique

Data integrity requires that in addition to a unique Account Name, the set of user supplied attributes that describe an account must also be unique. Even though each account is not required to use every attribute, a "blank" attribute cannot be the only characteristic that distinguishes the account from another account.

Attributes are also "progressive" in that in order for Attribute 2 to have a value, Attribute 1 for that account cannot be blank. Likewise, for Attribute 4 to have a value, Attributes 1 through 3 must not be blank.

## 15.4 Changing Account Attributes

Given the complexities of managing account information, once a set of account attributes are assigned and the account is used in an approved diversion record, the attributes for that account cannot be modified or deleted. If the administration of the account requires a change of attributes, the old account becomes invalid and must be "ended". A new account or accounts with the new attributes must be created.

# **Part III - DATA ANALYSIS: SUMMATION ROUTINES & REPORTS**

## **16. SOURCE/USE SUMMATION ROUTINES & REPORTS**

In addition to documenting that an identified structure diverted a specific SOURCE of water for a beneficial USE, the format of the Water Class is also the key to understanding whether the volume of the record should be included in the SOURCE or USE summation routines.

### **SOURCE/USE Report**

The SOURCE and USE summation routines and associated report are based on one of three specific geographic areas: water district, water division or entire state; and, for date ranges specified by the user. Only information associated with structures located in the designated area is included in the report. The format of the "SOURCE/USE Report" is shown in Report 1.

### **USE Totals - IYR Report**

A derivation of the "SOURCE/USE Report" is the "USE Totals - IYR Report", Report 2. This report shows the total USE by Division for a given irrigation year.

### **USE Totals - Division Report**

Another version of the USE Totals report is "USE Totals - Division Report", Report 3. This report shows the total USE by category for a specific Water District or Division for a specified range of irrigation years. It is used to quickly compare the year to year differences in USE.

## **16.1 SOURCE Summation**

The SOURCE summation routine uses two different protocols: one for "natural water" and one for "manufactured water".

### **16.1.1 "Natural Water" Diversions**

"Natural water" sources include "natural stream flow", "ground water" and "non-stream flow" (SOURCE = "1", "3", "5"). The total volume of water associated with these SOURCE codes is determined by summing the records that document the initial diversion of water directly from the SOURCE. In order to add the volume of water diverted only once, the summation routine relies upon the water class format to distinguish records that divert water directly from the SOURCE from "subsequent" diversions records, such as the re-measurement of water by another structure or transfer of water from one structure to another.

The volume of each SOURCE of natural water is the sum of diversion volumes associated with water classes that meet the following criteria:

**Summation Criteria 1: SOURCE Total Summation - Natural Water**

|  |
|--|
| (WDID is in the requested area & record is in the requested time interval) AND |
| SOURCE = (1, 3 or 5); Subtotaled separately                                    |
| FROM = "blank" OR TYPE = (2 or 4) <sup>47, 48</sup>                            |
| TYPE <> (0, R, V, X, Y, or Z)  |
| (WDID & TO) <> Structure type WF   |

**"Blank" FROM**

If a diversion record with a "natural water" SOURCE code has a "blank" FROM code, the water has not come "from" another structure; which, means it must have come directly from the SOURCE. As a result, the volume of the record will be the first quantification of a SOURCE of natural water.

**Trade or Alternate Point (TYPE = "2" or "4")**

If a diversion of natural water is made by a means of a trade (TYPE = "2") or decreed alternate point of diversion (TYPE = "4"), the FROM code will be the WDID of the in-priority water right or historically changed structure that is enabling the diversion. The diversion is still a direct diversion of a natural SOURCE and should be included in the SOURCE summation, even though the FROM code is not "blank".

**Rule Exceptions**

**TYPE = "0"**

Records with TYPE Code "0" are ignored as that code indicates the record is an "administrative record", which is made only to document some aspect of the administration process and not a diversion from a SOURCE.

**TYPE = "R"**

A TYPE = "R" record is a second quantification of the water for the purposes of documenting how the water was put to USE. As a result the record volume should not be included in the SOURCE summation.

**TYPE = "X", "Y", "V" or "Z"**

These TYPE codes are associated only with input to or output from an alluvial model and are not directly diverting water from a SOURCE.

<sup>47</sup> TYPE = "1" is not included as the summation will have already included the water as part of the replacement supply diversion and release record(s).

<sup>48</sup> Diversion records where the FROM code is not "blank" are generally subsequent records; such records are not the "initial" diversion and would therefore double count the water if the volume was included in the summation. Diversions made by trade (TYPE = "2") or as an alternate point (TYPE = "4"), however, are an exception to this generalization and must be included in the summation.

## WDID & TO Codes are "Well Field" Structure Type

A specific water class formulation enables the user to transfer ground water from one Well Field into a second Well Field. Although this transfer involves, technically, an initial diversion of water away from the first Well Field SOURCE of ground water, it's not actually making the water available for USE. As a result, it should not be included in the SOURCE summation. (This is a very specific operation and will not apply to most water districts.)

In order to prevent the diversion of ground water from the first Well Field from being included in the SOURCE summation, the water class must include the WDID of the second Well Field in the TO code. When the WDID and TO codes of a water class are both Well Field structure types, the record will be excluded from the SOURCE summation.

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT   | Description                  |
|---|----------|---|-------|---|---|---|----------|------------------------------|
| 1 | WLFIELD1 | 3 |       | Q | Q |   | WLFIELD2 | Ground water from WF1 to WF2 |

### 16.1.2 "Manufactured Water" Releases

The SOURCE of manufactured water (SOURCE = "2", "4" or "8") is based on the volume of water released to the system for subsequent USE or loss of dominion and control. The total volume of each SOURCE of manufactured water is determined by summing the volume for water classes with the following criteria:

#### Summation Criteria 2: SOURCE Total Summation - Manufactured Water

|  |
|--|
| (WDID is in the requested area & record is in the requested time interval) AND |
| SOURCE = (2, 4 or 8); Subtotaled separately                                    |
| TYPE = (7, 8 or L) <sup>49</sup> OR USE = E                                    |
| TYPE <> 0, V, X, Y, Z (if USE = E)   |
| (WDID & TO) <> Structure Type (3 or RS)  |

#### Specific Release TYPE Codes ("7", "8" or "L")

While the summation routine used to determine the total SOURCE of natural water only sums diversions made directly from the SOURCE, the summation routine for manufactured water only includes records that are the initial release of water to the system. This is due to the fact that manufactured water is not available for USE until it has been released from a structure. In general, the source summation routine for manufactured water includes all the records with TYPE = ("7", "8" or "L"). Examples of this kind of record would be:

|   | WDID.ACT  | S | F.ACT | U | T | G | TO.ACT | Description              |
|---|-----------|---|-------|---|---|---|--------|--------------------------|
| 1 | RESERVOIR | 2 |       | 1 | 8 |   |        | Reservoir water release  |
| 2 | TBIMPORT  | 4 |       | Q | 7 |   |        | Transbasin water release |
| 3 | SEWER     | 8 |       | Q | L |   |        | Reusable sewer release   |

<sup>49</sup> TYPE = ("7" OR "8") make the water "available for USE". TYPE = "L" releases are included even though as soon as the release is made it becomes natural stream flow to document that the water was available, but voluntarily surrendered.

### Specific USE Codes ("E")

"Evaporation" fully consumes the water and is, therefore, not associated with a "release". Nonetheless, the volume of manufactured water lost to evaporation should be added to the volume of water that was available for USE. Records with USE = "E" will be included, subject to the following exceptions.

### Rule Exceptions

#### TYPE = "0"

Records with TYPE Code "0" are ignored as that code indicates the record is an "administrative record", which is made only to document some aspect of the administration process and not a diversion from a SOURCE.

#### TYPE = "V", "X", "Y" or "Z"

These TYPE codes are associated only with input to or output from an alluvial model and are not directly diverting water from a SOURCE.

### Reservoir Re-storage

Reservoir water that is released for re-storage in another reservoir should not be included in the SOURCE summation as the water is not being made available for a new USE. If the WDID and TO code of a water class are both Reservoir or Reservoir System structure types, the released reservoir water, even if a TYPE = "7" code is used, will not be included in the SOURCE summation.

## 16.2 USE Summation

The USE summation combines diversion record volumes by USE, subtotaled by SOURCE for all records in the requested area according to the following protocol.

#### Summation Criteria 3: USE Total Summation

|  |
|--|
| (WDID is in the requested area & record is in the requested time interval) AND |
| USE <> (B, Q)  |
| TYPE <> (0, D, J, V, X, Y, or Z)   |
| USE = "0" ONLY IF SOURCE <> "2"  |

### All USE Codes Except "B" & "Q"

Records with USE = "B" or "Q" are excluded from the summation as these two codes are associated with a simple quantification and not a USE.

## Rule Exceptions

### **TYPE = "0"**

Records with TYPE Code "0" are ignored as that code indicates the record is an "administrative record", which is made only to document some aspect of the administration process and not USE.<sup>50</sup>

### **TYPE = "D", "J", "V", "X", "Y", or "Z"**

Records with TYPE Codes "D", "J", "V", "X", "Y" or "Z" are also ignored as those records are data associated with alluvial modeling tools and not intended to document USE.<sup>51</sup>

### **Reservoir Re-storage**

Reservoir water that is released for re-storage in another reservoir should not be included in the USE summation as the storage is not a new USE. If the USE = "0" and the SOURCE = "2", the record will not be included in the USE summation.

---

<sup>50</sup> Most records with a TYPE = "0" code have USE = "Q", which would also prevent the record volume from being included in the USE summation.

<sup>51</sup> TYPE code "D", "J", "V", "X", "Y" and "Z" records for alluvial depletions have the same USE code as the diversion record they are modeling.

## Report 1: SOURCE/USE Report

| SOURCE/USE Report - [WD, Div, State] |                    |              |                |                   |            |           |       |
|--------------------------------------|--------------------|--------------|----------------|-------------------|------------|-----------|-------|
| [Start date] - [End date] OR [IYR]   |                    |              |                |                   |            |           |       |
| AF                                   |                    |              |                |                   |            |           |       |
|                                      | Natural Streamflow | Ground Water | Non-Streamflow | Reservoir Storage | Transbasin | Re-usable | TOTAL |
| USE/SOURCE Ratio                     | {%}                | {%}          | {%}            | {%}               | {%}        | {%}       |       |
| SOURCE Total                         |                    |              |                |                   |            |           |       |
| USE Total <sup>1</sup>               | {Sum}              | {Sum}        | {Sum}          | {Sum}             | {Sum}      | {Sum}     |       |
| Storage (0)                          | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Irrigation (1)                       | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Municipal (2)                        | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Commercial (3)                       | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Industrial (4)                       | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Recreation (5)                       | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Fishery (6)                          | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Fire (7)                             | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Domestic (8)                         | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Stock (9)                            | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Augmentation (A)                     | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Change of Use RF (C)                 | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Evaporation (E)                      | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Federal reserved (F)                 | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Geothermal (G)                       | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Household use only (H)               | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Snow making (K)                      | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Minimum streamflow (M)               | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Power generation (P)                 | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Recharge (R)                         | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Export from State (S)                | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Transbasin export (T)                | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Wildlife (W)                         | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |
| Other (Z)                            | {Amt}              | {Amt}        | {Amt}          | {Amt}             | {Amt}      | {Amt}     |       |

<sup>1</sup> Use codes "B" and "Q" are not included as such records are simply a "quantification" of an amount associated with a USE that has been included in this report.

Report 2: USE Totals - IYR Report

| USE Report by Division - IYR YYYY (Acre Feet) |           |           |           |           |           |           |           |            |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
|   | 1         | 2         | 3         | 4         | 5         | 6         | 7         | Total      |
| Storage                                       | 847,185   | 31,759    | 5,225     | 174,063   | 189,563   | 46,145    | 258,363   | 1,552,302  |
| Irrigation                                    | 2,468,077 | 715,905   | 1,225,767 | 1,684,440 | 1,685,808 | 951,165   | 753,426   | 9,484,588  |
| Municipal                                     | 421,631   | 187,590   | 6,374     | 19,841    | 69,479    | 8,607     | 15,219    | 728,741    |
| Commercial                                    | 5,899     | 4,407     | 572       | 54        | 3,006     | 11        | 1,656     | 15,605     |
| Industrial                                    | 80,304    | 47,987    | -         | 3,308     | 3,149     | 44,611    | 440       | 179,799    |
| Recreation                                    | 55        | 2,402     | -         | 127,417   | 5,431     | 20,721    | 75        | 156,101    |
| Fishery                                       | 7,615     | 2,958     | 878       | 54,407    | 147,050   | 75,366    | 3,836     | 292,110    |
| Fire  | 8         | -         | -         | -         | -         | -         | -         | 8          |
| Domestic                                      | 729       | 1,526     | 1,884     | 2,511     | 4,058     | 2,069     | 646       | 13,424     |
| Stock   | 438       | 693       | -         | 25,112    | 26,245    | 29,495    | 90        | 82,072     |
| Augmentation                                  | 64,417    | 56,460    | 2,185     | 1,196     | 27,118    | 43        | 2,158     | 153,578    |
| Change of Use Return Flows                    | 18,406    | 27,358    | -         | -         | -         | -         | 14        | 45,778     |
| Evaporation                                   | 4,206     | 1,586     | 90        | 119,673   | 40,281    | 11,902    | 14,512    | 192,249    |
| Federal reserved                              | -         | -         | -         | -         | -         | -         | 10        | 10         |
| Geothermal                                    | -         | 32        | -         | -         | -         | -         | 3,024     | 3,056      |
| Household use only                            | -         | 40        | -         | 4         | 1         | -         | 0         | 45         |
| Snow Making                                   | 11        | -         | -         | 606       | 4,320     | 339       | 105       | 5,381      |
| Min. stream flow/lake level                   | 11,948    | -         | -         | -         | 98,985    | 23,734    | -         | 134,667    |
| Power Generation                              | 1,445,169 | 41,799    | 240       | 2,277,805 | 1,550,174 | 243,838   | 297,572   | 5,856,596  |
| Recharge                                      | 145,951   | 3,252     | 3,009     | -         | 647       | 211       | 7         | 153,077    |
| Export from State                             | 6,082     | -         | -         | -         | -         | 0         | 60,967    | 67,050     |
| Transbasin export                             | 23,581    | 116,061   | -         | 949       | 553,096   | 4,008     | 596,586   | 1,294,282  |
| Wildlife                                      | 1,995     | -         | 6,152     | 240       | 1,238     | 7,362     | -         | 16,987     |
| Other   | 145       | 32        | 4,411     | -         | 115       | -         | 227,516   | 232,219    |
| TOTAL   | 5,553,853 | 1,241,848 | 1,256,787 | 4,491,626 | 4,409,763 | 1,469,625 | 2,236,225 | 20,659,725 |

## Report 3: USE Totals - Division Report

| USE Report for {Division or Water District} # (Acre Feet) |           |              |           |
|---|-----------|--------------|-----------|
|   | IYRStart  | IYRStart + n | IYREnd    |
| Storage   | 722,262   | 847,185      | 1,034,756 |
| Irrigation  | 2,019,999 | 2,468,077    | 2,152,783 |
| Municipal   | 160,261   | 421,631      | 387,668   |
| Commercial  | 4,320     | 5,899        | 6,123     |
| Industrial  | 64,701    | 80,304       | 78,289    |
| Recreation  | 139       | 55           | 367       |
| Fishery   | 7,648     | 7,615        | 7,524     |
| Fire  | -         | 8            | 6         |
| Domestic  | 1,782     | 729          | 678       |
| Stock   | 253       | 438          | 399       |
| Augmentation  | 24,068    | 64,417       | 86,531    |
| Change of Use Return Flows                                | 13,561    | 18,406       | 16,419    |
| Evaporation   | 8,000     | 4,206        | 2,205     |
| Federal reserved  | -         | -            | -         |
| Geothermal  | -         | -            | -         |
| Household use only  | 0         | -            | -         |
| Snow Making   | 91        | 11           | 11        |
| Min. stream flow/lake level                               | 13,464    | 11,948       | 11,180    |
| Power Generation  | 938,877   | 1,445,169    | 465,498   |
| Recharge  | 259,971   | 145,951      | 166,699   |
| Export from State   | 4,826     | 6,082        | 3,877     |
| Transbasin export   | 24,825    | 23,581       | 29,942    |
| Wildlife  | 403       | 1,995        | 2,251     |
| Other   | 159       | 145          | 671       |
| TOTAL   | 4,269,611 | 5,553,853    | 4,453,878 |

## 17. STRUCTURE SUMMATION ROUTINES & REPORT

As in the previous section regarding the SOURCE/USE Report, the format of the Water Class is also the basis of the Structure Report as to:

- "Total Diversion" - Amount of water entering the structure;
- "Total Release" - Water released from the structure under dominion and control;
- "Associated USE" - How the water entering the structure was used, either by the structure itself or by another structure subsequent to a "release";
- "Other Associated Records" - Subsequent quantifications, administrative records, etc; and,
- "Statistics" - Historical statistics based on IYR report period.

The Structure Report may be requested for any given period using a start date and end date. The report can be in summary form, as shown in Report 4, which simply gives the total diversion, release, use and SOURCE=X records along with the annual statistics. The detailed report option will include the contributing water class information, as shown in Report 5.

### 17.1 Total Diversion

The Total Diversion is the total water into the structure. The summation routine for structures that aggregate all the inflow before making a release record is different than the summation routine for non-aggregating structure types. Aggregating structures must make an inflow only diversion record while non-aggregating structures may record the inflow into the structure and release from the structure with a single record.

A reservoir, for example, records all inflow and then makes release records:

|   | WDID.ACT | S | F.ACT | U | T | G | TO.ACT | Description       |
|---|----------|---|-------|---|---|---|--------|-------------------|
| 1 | 0802555  | 1 |       | 0 |   |   |        | Reservoir inflow  |
| 2 | 0802555  | 2 |       | Q | 7 |   |        | Reservoir release |

Conversely, a measuring point in the stream might simply record the inflow that is also being released to the stream:

|   | WDID.ACT | S | F.ACT | U | T | G       | TO.ACT | Description              |
|---|----------|---|-------|---|---|---------|--------|--------------------------|
| 1 | 2305585  | 1 |       | Q | 7 | 0803335 |        | Measuring point delivery |

#### 17.1.1 Aggregating Structures

The criteria used to determine which records to include in the Total Diversion for aggregating structure types are as follows:

##### Summation Criteria 4: Total Diversion - Aggregating Structure Types

|  |
|--|
| (WDID is the requested structure & record is in the requested time interval) AND |
| WDID (sans ACT) <> FROM (sans ACT)   |
| TYPE <> (7, 8, L, E, Q, W, O, R, V, X, Y or Z)                                   |

A diversion record where the WDID (without ACT extension) is equal to the FROM (without ACT extension) is simply moving water from one ACT to another ACT in the same structure.

The water associated with such a record is clearly not inflow into the structure as it is already in one ACT of the structure.

If the TYPE code is ("7", "8", "L", "E", "Q", "W" or "Z"), the diversion record is a "release", which by definition cannot also be used to record inflow into aggregating structure types.

All the summation routines ignore TYPE = "0", administrative only, records. TYPE = "R" records are associated with USE only information, which are of necessity concerned only with water that is already "in" the structure. TYPE = ("V", "X", "Y") records are delayed depletion model inputs associated with the structure and are, therefore, not associated with water entering the structure.

### 17.1.2 Non-Aggregating (Simple) Structures

The criteria to determine the total water into a non-aggregating structure are as follows.

#### Summation Criteria 5: Total Diversion - Non-Aggregating Structure Types

|  |
|--|
| (WDID is the requested structure & record is in the requested time interval) AND |
| WDID (sans ACT) <> FROM (sans ACT)   |
| TYPE <> (0, R, V, X, Y, or Z)  |

The criteria are the same as the aggregating structures criteria, except that "release" TYPE codes are not excluded with the exception of TYPE = "Z". TYPE = "Z" is not just a "release" type code; it is also a model "output", which can never be part of a diversion by the structure.

## 17.2 Total Release

The criteria used to determine the total water released from a structure, regardless of whether the structure type is aggregating or non-aggregating, are as follows:

#### Summation Criteria 6: Total Release - Structure Report

|  |
|--|
| (WDID is the requested structure & record is in the requested time interval) AND |
| USE <> "A" AND   |
| TYPE = (7, 8, L, E, Q, W or Z) AND   |
| WDID (sans ACT) <> TO (sans ACT)   |

The release TYPE codes "7", "8" and "L" are used to indicate a "release" as well as being used to identify the addition of "manufactured water" (SOURCE = "2", "4" or "8") to the system. As a result, there is an occasional need to formulate a water class with USE = "A" and TYPE = "7" so that the water is included in the SOURCE summation, even though the water is being used for "Augmentation". As discussed in Section 1.60, USE = "A" fully consumes the water from the perspective of the structure; there is no water being "released under the dominion and control of the structure". As a result, records that have USE = "A" will not be included as a "release" from the structure, even if TYPE = "7".

If USE <> "A" and the diversion record has a "release" TYPE code, the record volume is included as a release from the structure with the following exception.

Records where the same parent ID is in the WDID and TO codes are associated with transfers of water from one ACT to another ACT in the same structure and are, therefore, not a release from the structure.

### 17.3 Associated USE

The USE protocols for the Structure Report are shown in Summation Criteria 7. In addition to USE by the structure requested, the Structure Report will also show all the USE records where the requested WDID is in the FROM code. USE = "B" & "Q" are still excluded as are administrative and Type of Data TYPE code records.

#### Summation Criteria 7: USE - Structure Report

|  |
|--|
| [(WDID or FROM) is the requested structure & record is in the requested time interval] AND |
| USE <> (B, Q)  |
| TYPE <> (0 , D, J, X, Y, V or Z)   |

### 17.4 Other Associated Records

The Other Associated Records section of the Structure Report lists any other approved water classes that have not been included in the Total Diversion, Total Release or Associated Use sections where the requested WDID is in the WDID, FROM, GROUP or TO code of the record. This list would include records with a "NULL" amount for the year.

#### Summation Criteria 8: Other Associated Records - Structure Report

|   |
|---|
| [(WDID, FROM, GROUP or TO) is the requested structure & record is in the requested time interval] AND |
| Record is not in the Total Diversion, Total Release or Associated USE Sections of the Report          |

### 17.5 Statistics

Lastly, when the start date and end date signify the beginning and ending of an irrigation year, the Structure Report also shows:

- First Day Used;
- Last Day Used;
- Days Water Carried; and,
- Max Flow (Q), CFS.

### Report 4: Summary Structure Report

| Summary Structure Report - 0100677<br>Start date: 11/01/2012 End date: 10/31/2013<br>Amounts in AF |                      |            |     |
|--|----------------------|------------|-----|
| Total Diversion  |                      |            | 112 |
| Total Release  |                      |            | 0   |
| USE at Structure   |                      |            |     |
|  | Irrigation           |            | 67  |
|  | Recharge             |            | 32  |
| USE at Other Structures  |                      |            |     |
|  | Other Structure Name | USE (desc) | 43  |
|  | Other Structure Name | USE (desc) | 105 |
| Other Associated Records   |                      |            |     |
|  | Structure Name       | 112        |     |
| Statistics <sup>1</sup>  |                      |            |     |
|  | First Day Used       | 4/15/2010  |     |
|  | Last Day Used        | 8/25/2010  |     |
|  | Days Water Carried   | 52         |     |
|  | Max Q (CFS)          | 4          |     |
| <sup>1</sup> Only included when date range is an "Irrigation Year".                                |                      |            |     |

## Report 5 - Detailed Structure Report

| Structure Report - 0100677  |   |  |           |
|---|---|--|-----------|
| Start date: 11/01/2012 End date: 10/31/2013                         |   |  |           |
| Amounts in AF   |   |  |           |
| Total Diversion   |   |  | 112       |
|   | 0100677.001 S:1 F: U:1 T: G: To:                    |  | 37        |
|   | 0100677.001 S:1 F: U:Q T: G: To:                    |  | 60        |
| Total Release   |   |  | 16        |
|   | 0100677.002 S:1 F:0100677.001 U:Q T:7 G:0103333 To: |  | 16        |
| USE at Structure  |   |  | 37        |
|   | Irrigation  |  | 37        |
| USE at Other Structure  |   |  | 46        |
|   | 0502555 Name  | 0502555 S:1 F:0100677.001 U:0 T: G: To:        | 35        |
|   | 0507505 Name  | 0507505 S:1 F:0100677.001 U:A T: G:0103333 To: | 11        |
| Other Associated Records  |   |  |           |
|   | 0100677 Name  | 0100677 S:X F: U:Q T:0 G: To:                  | 112       |
| Statistics <sup>1</sup>   |   |  |           |
|   | First Day Used                                      |  | 4/15/2010 |
|   | Last Day Used                                       |  | 8/25/2010 |
|   | Days Water Carried                                  |  | 52        |
|   | Max Q (CFS)   |  | 4         |
| <sup>1</sup> Only included when date range is an "Irrigation Year". |   |  |           |

## 18. *TRANSBASIN EXPORT/IMPORT REPORT*

As stated previously in Table 0-1 regarding its definition, transbasin water is water that is released from one basin to another basin, the drainage from which does not combine with drainage from the releasing basin within the State of Colorado. This report provides information regarding the volume of transbasin water, where it is imported and how it is used.

As shown in Report 6, the report is an annual report (irrigation year) organized by water division and exporting structure WDID/name. The export information is on the left side of the report. On the right side is the import and use information that corresponds to the export. The first two rows are the page headers. While the example only shows a couple of exporting WDID entries and their corresponding set of import records, the actual report would show all exports organized by water division and WDID.

The report has a “summary” and “detail” mode. The summary report shows only the page headers, the water division row and the WDID summary row. The detail report shows all the information the summary report shows as well as all of the individual water class rows that make up the WDID summary row totals. The example report is shown in detail mode.

### 18.1 Water Division Summary Row

The water division row has two columns of data. The first column is the sum of all the USE=“T” (TYPE <> “0”) records in the water division. The second column is sum of all the records with SOURCE = “4”, a FROM code that’s in the water division and TYPE code = (“7”, “8” or “L”).

### 18.2 WDID Summary Row

Exports are tracked by USE code “T” (TYPE code <> “0”). This information is also included in the SOURCE/USE report as USE = “T” and is tracked as a “use” by the exporting division. The WDID of any record with USE = “T” and TYPE <> “0” is listed, sorted by WDID.

The four columns of the WDID summary row show the:

- sum of all the records where WDID is the summary row WDID, USE=“T” and TYPE <> “0”;
- sum of all the records where the SOURCE code is “4”, the FROM code is the summary row WDID and the TYPE code is (“7”, “8” or “L”);<sup>52</sup>
- sum of all the records where the SOURCE code is “4”, the WDID or FROM code is WDID\_Import<sup>52</sup>, the USE code is not (“B” or “Q”) and the TYPE code is not “0” ;
- same information as column three, except the USE code is not (“B”, “Q” or “P”).

### 18.3 Water Class Detail Rows

In “detail” mode, the report also lists all the water classes used in the WDID summary row summations. The same criteria are used to query the data. Export water classes have the same WDID as the WDID summary row, USE=“T” and TYPE <> “0”, which is the same as the criteria used for the sum shown in the first column of the WDID summary row. Import water classes include the results of both queries used to report the data shown in the second and

<sup>52</sup> Note that in the process of finding these records, the WDID of the importing records must be identified and used in the remaining two columns. For clarity the WDID of the importing structure is referred to as “WDID\_Import”.

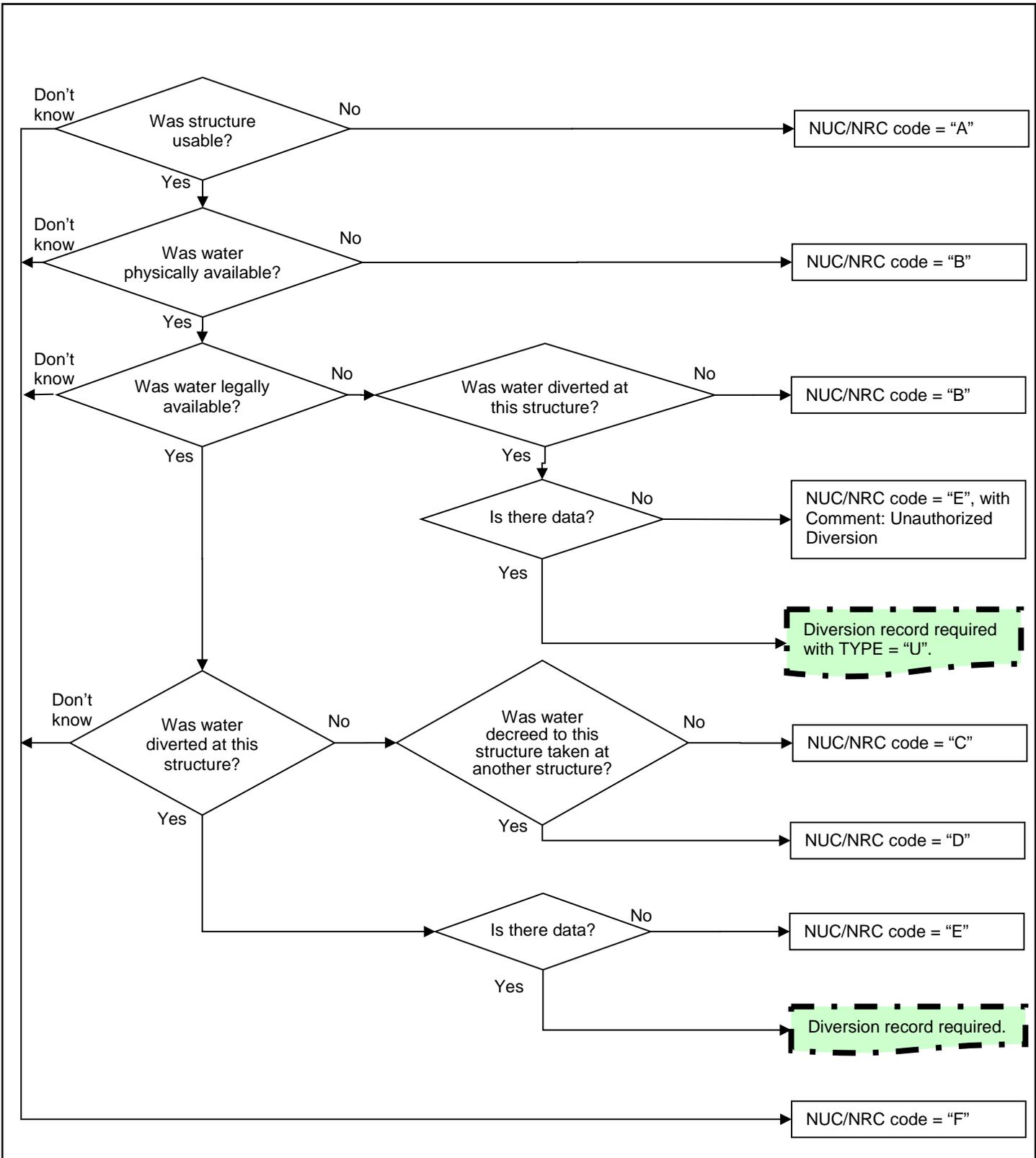
third columns of the WDID summary row, as shown in the second and third bullets of Section 1.135.

### Report 6 - Transbasin Export/Import Report

| Transbasin Export/Import Report<br>IYR: 2016<br>(Amounts in AF) |                 |  |   |                               |                                 |
|---|-----------------|--|---|-------------------------------|---------------------------------|
| Export Structure  | Export Amount   |  | Amount Imported                             | Amount put to USE (w/"Power") | Amount put to USE (w/o "Power") |
| <b>Water Division: 1</b>  | <b>12,231.7</b> |  | <b>12,292.6</b>                             | <b>12,292.6</b>               | <b>12,292.6</b>                 |
| 0815291 - CHEROKEE METRO NT AR WELL 75881-F                     | 142.5           |  | 142.5                                       | 142.5                         | 142.5                           |
| 0815291 S:3 F:07111141 U:T T: G: To:                            | 142.5           |  | 1000923 S:4 F:0815291 U:2 T:8 G: To:        |                               | 142.5                           |
|   |                 |  |   |                               |                                 |
| 2303962 - MONTGOMERY RES  | 12,089.2        |  | 12,150.1                                    | 12,150.1                      | 12,150.1                        |
| 2303962 S:2 F: U:T T:8 G: To:                                   | 12,089.2        |  | 1004676 S:4 F:2303962 U:2 T:8 G: To:        |                               | 12,150.1                        |
|   |                 |  |   |                               |                                 |
| <b>Water Division: 5</b>  | <b>373.2</b>    |  | <b>434.7</b>                                | <b>1,268.8</b>                | <b>1,268.8</b>                  |
| 3604626 - VIDLER TUNNEL WEST PORTAL                             | 373.2           |  | 434.7                                       | 1,268.8                       | 1,268.8                         |
| 3604626 S:1 F: U:T T:A G:3607315 To:                            | 111.4           |  | 0704626 S:4 F:3604626 U:Q T:7 G: To:        |                               | 416.7                           |
| 3604626 S:1 F:3600634 U:T T:4 G:3607314 To:                     | 35.5            |  | 0704626 S:4 F:3604626 U:Q T:7 G:0702501 To: |                               | 18.0                            |
| 3604626 S:1 F:3600665 U:T T:4 G:3607314 To:                     | 34.2            |  | 0704030 S:4 F:0704626 U:0 T:1 G: To:        |                               | 146.5                           |
| 3604626 S:1 F:3600778 U:T T:4 G:3607312 To:                     | 40.1            |  | 0702902 S:4 F:0704626 U:A T: G:0703390 To:  |                               | 1,104.3                         |
| 3604626 S:1 F:3600790 U:T T:4 G:3607312 To:                     | 118.5           |  | 0702913 S:4 F:0704626 U:A T: G:0702501 To:  |                               | 18.0                            |
| 3604626 S:1 F:3600809 U:T T:4 G:3607312 To:                     | 33.5            |  |   |                               |                                 |

# APPENDICES

# Appendix A: Diversion Record Logic Diagram



## Appendix B: Quick Guide to Diversion Record Codes

| SOURCE Code |                     |
|-------------|---------------------|
| 1           | Natural Stream Flow |
| 2           | Reservoir Storage   |
| 3           | Ground Water        |
| 4           | Transbasin Water    |
| 5           | Non-Stream Flow     |
| 8           | Re-usable Water     |
| X           | Unspecified         |

| TYPE Code           |   |
|---------------------|---|
| Types of diversions |   |
|                     | Blank is acceptable   |
| 1                   | Exchange  |
| 2                   | Trade   |
| 4                   | Alternate Point of Diversion                                |
| A                   | Authorized/Augmented  |
| U                   | Unauthorized Diversion                                      |
| D                   | Out-of-priority Depletion                                   |
| J                   | In-priority Depletion                                       |
| S                   | Substitution  |
| Types of releases   |   |
| 7                   | Released to Stream  |
| 8                   | Released Off-stream   |
| L                   | Release of Dominion and Control                             |
| E                   | Release of Excess Diversion                                 |
| Q                   | Release of Quantified Amount                                |
| W                   | Released Underground  |
| Z                   | Aggregated Recharge Release to Stream                       |
| Types of data       |   |
| 0                   | Administrative Record Only                                  |
| R                   | USE Only Volume Data  |
| V                   | Accretive Credit to Alluvial Aquifer                        |
| X                   | Depletive Component of Alluvial Aquifer Diversion           |
| Y                   | Surface Return Flow Component of Alluvial Aquifer Diversion |

| USE Code |                                |
|----------|--------------------------------|
| 0        | Storage                        |
| 1        | Irrigation                     |
| 2        | Municipal                      |
| 3        | Commercial                     |
| 4        | Industrial                     |
| 5        | Recreation                     |
| 6        | Fishery                        |
| 7        | Fire                           |
| 8        | Domestic                       |
| 9        | Stock                          |
| A        | Augmentation                   |
| B        | Sub-basin export               |
| C        | Change of Use Return Flows     |
| E        | Evaporation                    |
| F        | Federal reserved               |
| G        | Geothermal                     |
| H        | Household use only             |
| K        | Snow making                    |
| M        | Minimum stream flow/lake level |
| P        | Power generation               |
| Q        | Quantification of amount       |
| R        | Recharge                       |
| S        | Export from State              |
| T        | Transbasin export              |
| W        | Wildlife                       |
| Z        | Other                          |

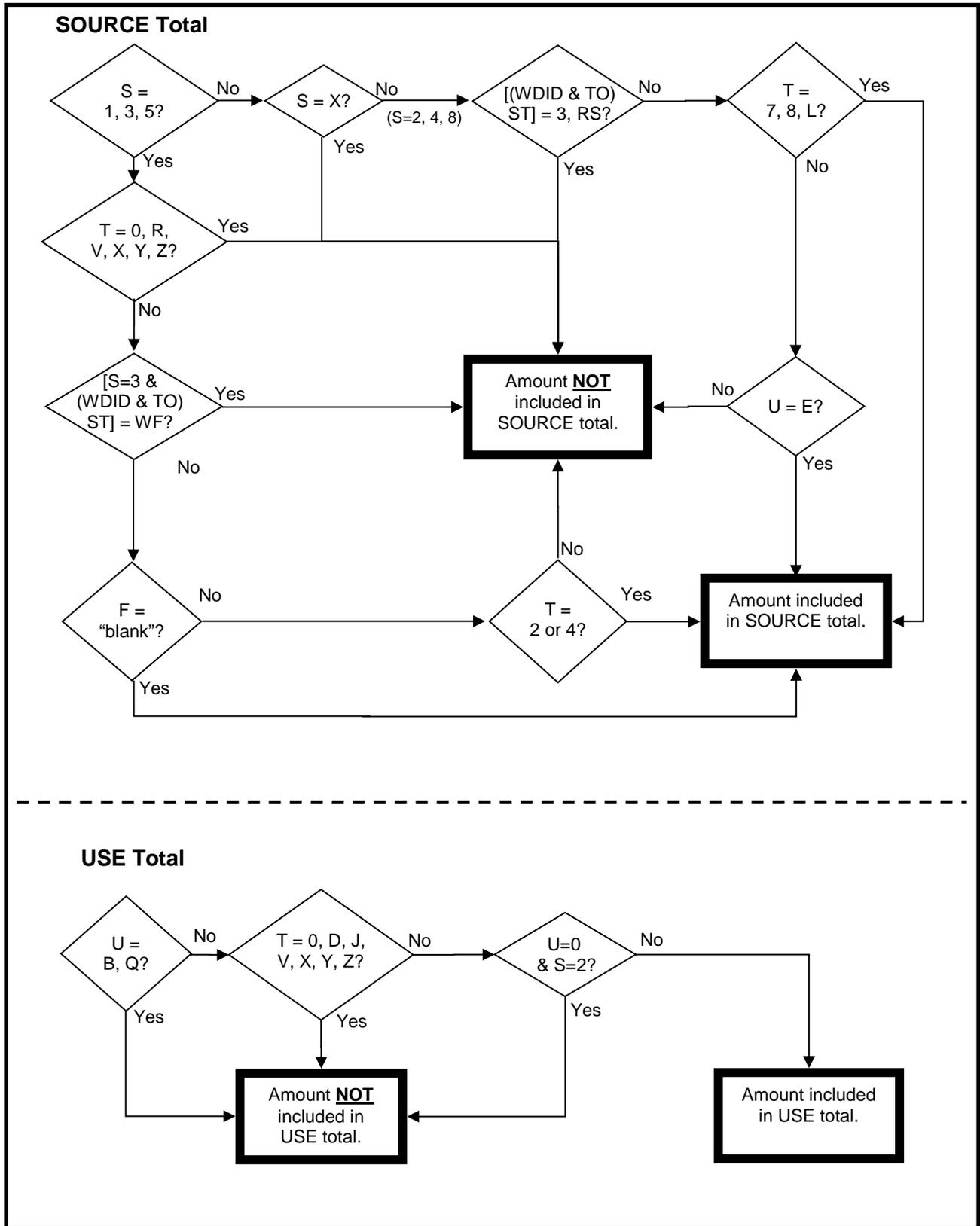
| OBSERVATION Code |                                     |
|------------------|-------------------------------------|
| *                | Amt Observed (In Person)            |
| R                | Amt Recorded by Device              |
| S                | Amt Estimated (In Person)           |
| E                | Date & Amt Estimated                |
| U                | User Supplied - Unknown Reliability |
| K                | User Supplied - Known Reliability   |
| C                | Calculated                          |
| M                | Modeled                             |

| Not Used/Not Released Code |                                    |
|----------------------------|------------------------------------|
|                            | Blank is acceptable                |
| A                          | Structure not usable               |
| B                          | No water available                 |
| C                          | Water available, but not taken     |
| D                          | Water taken in another structure   |
| E                          | Water taken, but no data available |
| F                          | No information available           |

| Allowed Diversion Record |                         |   |
|--------------------------|-------------------------|---|
| 1                        | Ditch                   | N |
| 2                        | Well                    | N |
| WG                       | Well Group              | N |
| 4                        | Spring                  | N |
| 5                        | Seep                    | N |
| 6                        | Mine                    | N |
| 7                        | Pipeline                | N |
| 8                        | Pump                    | N |
| 9                        | Power Plant             | N |
| 0                        | Other                   | N |
| M                        | Measuring Point         | N |
| MF                       | Minimum Flow            | N |
| R                        | Reach (Non-Aggregating) | N |
| WF                       | Well Field              | A |
| 3                        | Reservoir               | A |
| RS                       | Reservoir System        | A |
| RA                       | Recharge Area           | A |
| RG                       | Recharge Area Group     | A |
| AR                       | Aggregating Reach       | A |

| Not Allowed Diversion Record |                               |
|------------------------------|-------------------------------|
| AQ                           | Aquifer NNT/NT Reservation    |
| DS                           | Ditch System                  |
| EP                           | Exchange Plan                 |
| P                            | Augmentation/Replacement Plan |

### Appendix C: SOURCE/USE Summation Routine Logic



Appendix D: Structure Totals Summation Routine Logic

