Calculating first and last lithology intercepts of drill holes

Determining the first and last drill hole intercept for a given lithology seems a daunting task that would require manual flagging of all your downhole records. However, this becomes much easier when you use database filters, inter-record calculation and $COMPARE in the TBCALC program **(see"$COMPARE" on page 0-61 and "Inter-record calculation" on page 0-64)**.

To locate or "Flag" the top and bottom of drill hole intercepts you can use the $COMPARE text operator defined in TBCALC program. The syntax of $COMPARE is:

```
txt2 txt1 $COMPARE
```

This calculation compares two text fields, and returns a numeric value. If text field txt2 is greater than text field txt1, a value of 1 is returned. If txt2 is less then txt 1, a value of -1 is returned, and if txt2 and txt1 are the same, a value of 0 is returned.

Inter-record calculation in Techbase is set up as follows.To compare a database field value with the value of the same field in the previous record, the syntax is:

```
txt1 txt1[-1] $COMPARE
```

To compare a record with the value in the next record use:

```
txt1 txt1[+1] $COMPARE
```

Combining $COMPARE with the inter-record calculation capability of Techbase, we can flag the top and bottom of drilled lithologies.

Method A: Creating a field to flag lithology top, and another for lithology bottom

Step 1

First, using the TECHBASE define program, create fields in your lithology or composite table to hold flags for the top and bottom of lithologic units. In this example we are going to create integer/actual fields "**Shale_Top"** and "**Shale_Bottom"** in the Geology table of our database to hold the flags will mark the first and last drillhole intercepts of a shale unit.

Step 2

Next, set a filter for the geologic unit whose top and bottom intercepts you would like to flag. In this case we would like to find the top and bottom of a shale unit, so will set a filter "**Lithology_Type = Shale**". At this point you might quickly check to confirm that you are only looking at shale units in your database, in the TBEDIT program.

Step 3

Now go to the TBCALC program to use $COMPARE and inter-record calculations to populate the Shale_Top and Shale_Bottom fields. To flag the first downhole shale intercept with a value of 1, the last intercept -1 and the other intercepts with a value of 0 enter the following calculations in TBCALC. NOTE: Make sure to sort your values on your drill hole id (Hole-id) and From (G_From) values before performing the calculation. To assign a "1" to Shale_Top enter the following equation in the TBCALC program:

```
Hole_id Hole_id[-1] $COMPARE = Shale_Top
```

Now run Calculate in TBCALC.
To assign a "-1" to the bottom shale intercept use:

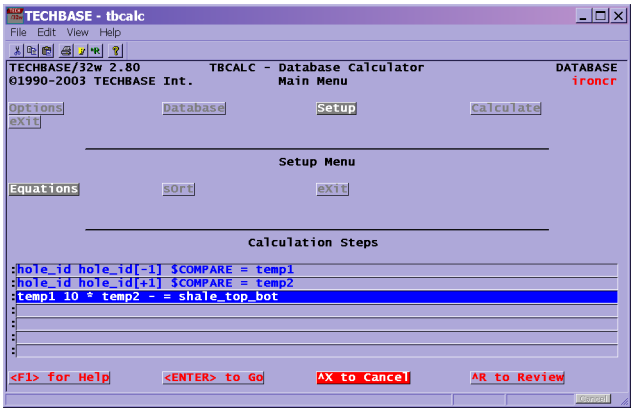
```
Hole_id Hole_id[+1] $COMPARE = Shale_Bottom
```

Run Calculate and check your results in the TBEdit or Report programs (illustrated on the next page).

NOTE: Check the first two and the last drillhole lithology intercepts. This method may incorrectly flag these values depending on your data. Hand edit these intercepts to bring them into compliance with the rest of your database flags.

Method B: Creating one field marking lithology top and bottom

To flag the first and last lithology intercepts using only one field, you can assign values to temporary fields, and then combine these temporary fields into one final field for permanent storage. To use Method B, follow Step 1 (creating a single text/actual field "shale_top_bot") and Step 2 in Method A. In Step 3 enter instead the following equation in TBCALC:




```
hole_id hole_id[-1] $COMPARE = temp1
hole_id hole_id[+1] $COMPARE = temp2
  temp1 10* temp2 - =shale_top_bot
```

Temp1 and temp2 are subtracted from each other and stored in "shale_top_bot". The shale top flag, 1, which is stored in temp1 is multiplied by 10 in this example before the two are combined. This step results in the top of the hole now being flagged with a 10 rather than a 1. Using 10 rather than 1 in this step avoids the problem of assigning a value of "0" to intercepts where the top and bottom are the same intercept. Remember to sort your values on Hole_id and From before running TBCALC. *NOTE:* as in Method A, manually check and edit your first and last drillhole intercepts to bring them into compliance with the rest of your flags. Unfortunately when you are using any interrecord calculation, the first and last intercepts have nothing to compare the values to and the result might be an incorrectly assigned flag.

The results of both Methods A and B are shown in the Techbase Report below. Method A assigns a flag of "1" for the first shale intercept in field Shale_Top, "-1" for the last intercept in Shale_Bottom, and 0 for all other shale intercepts. Method B Flags the first intercept 10, last 1 and others 0. If there is only one intercept in the hole is assigned a value of 11.

Using these flags, you can now set database filters on records so that you are working with only the top, bottom or all shale intervals in each drillhole. This can be an instrumental step in modeling the top and bottom surface of a unit, and in calculating unit thickness and volume.