

TECHNICAL MEMORANDUM

To: Ana Maria Gonzalez, RFT
Engineering Officer – Chilliwack Natural Resource District
MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS, AND RURAL DEVELOPMENT
46360 Airport Road
Chilliwack, BC V2P 1A5

From: Drew Brayshaw, Ph. D., P. Geo.

Date: May 30, 2019

RE: Wet Weather Safety Shutdown Procedures for Workers at Job Sites Without Rainfall Gauges

Statlu Environmental Consulting Ltd. (Statlu) developed updated wet weather safety shutdown guidelines for BC Timber Sales (BCTS) Chinook and Strait of Georgia business units in 2018¹, and BCTS implemented the guidelines in 2019.

During a May 2019 presentation on the updated wet weather safety shutdown criteria and procedures for BCTS and MOFLNRORD staff and contractors, Statlu was asked to provide additional guidance for those workers who work at job sites which do not have rain gauges in place, such as layout contractors.

Rain gauges are used at many work sites because they provide precise measurements of the amount of rainfall that occurs over time. Measurements of precipitation intensity (amount of precipitation over specified interval of time) therefore provide a reliable means to evaluate whether work should shut down or not. Workers at job sites where rain gauges are not present do not have access to such measurements and must therefore rely on other means that estimate rainfall intensity.

For these workers the recommended procedure is to check available data sources to evaluate whether it is likely to be safe to work in the field or not. If any sources indicate it is not safe, do not go. If no sources indicate that unsafe conditions have occurred or are likely to occur, then proceed to work, but remain alert for indications of hazard while in the field, and be prepared to leave if conditions become or are likely to become unsafe.

¹ https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/bc-timber-sales/ems-sfm-certification/business-area/chinook/tch_tsg_wet_weather_shutdown_criteria_harmonization_final.pdf.

Data sources that are useful for determining whether it is safe to work in terrain subject to hazards include federal and provincial government meteorological observations and forecasts, as well as those made by Crown corporations. Comparing observations from multiple sources located near a work site, as well as those from stations further afield but which might represent comparable environmental conditions, provide enough information to make an informed judgement about whether it is safe to work or not.

These sources include:

- Environment Canada weather warnings and special weather statements.
 - These are updated several times per day and typically include warnings of ongoing or predicted heavy rainfall and high winds, together with estimates of precipitation amounts and wind speeds:
 - https://weather.gc.ca/warnings/index_e.html?prov=bc
- Environment Canada meteorological observations.
 - Environment Canada weather stations record and report hourly and daily summary statistics for the past 24 hours and past days of a month and list (at the bottom of the page, under “Yesterday’s data” heading) the previous day’s 24-hour precipitation total. For example, for job sites near Hope, or between Chilliwack and Hope, consult the Hope climate data page. It provides the wind speed and temperature over the last 24 hours:
 - https://weather.gc.ca/city/pages/bc-36_metric_e.html
 - The “Historical Weather” link button on that page takes one to another page where previous 24 hour rainfall totals for previous days are recorded:
 - https://weather.gc.ca/past_conditions/index_e.html?station=yhe
- Some, but not all, of the DriveBC highway cams include weather data from nearby climate stations. For instance, along the Coquihalla Highway, the Zopkios summit webcam includes a weather data link that displays whether precipitation has fallen within the last hour, and depth of snow on the ground (if present) as well as total precipitation measured since 0600 or 1800 hrs (which, if checked in the morning or evening, provides a good proxy for 12-hour precipitation totals):
 - <http://images.drivebc.ca/bchighwaycam/pub/html/www/379.html>
- BC Hydro maintains its own network of hydrometeorological gauges near its reservoirs, and the data from these gauges is also available online, although it is not archived and so is typically only available for the preceding four days. The information is not always in a directly useable format, but can be checked anyway:
 - <https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/hydrometeorologic-data.html>
 - For an example job site near Hope, check the Wahleach (Jones Lake) gauge. It does not have precipitation values in mm of rainfall but it does report snow water equivalent (SWE) in mm, at 15-minute intervals. Increases in SWE can

be used as proxies for the amount of rainfall that fell at lower elevations over the same time interval. Decreases in SWE indicate ongoing melt.

- https://www.bchydro.com/info/res_hydromet/data/wlu.txt?WT.ac=gmap_hd_wlu&WT.mc_id=BCHGglMap
- The BC River Forecast Centre's high streamflow warnings, flood watches, and flood advisories are also useful: <http://bcrfc.env.gov.bc.ca/warnings/index.htm>

After checking all of these sources online in the morning before going to a job site, evaluate if it is safe to go or not, and determine whether any hazardous conditions are forecast to occur later in the day that might prompt shutdown partway through the day of work.

Once in the field, field observations are the most reliable indicators of unsafe conditions, particularly levels of runoff in streams and ditches, seepage from cutslopes, and the presence or absence of rockfall, cutslope slumping, high winds, rain-on-snow conditions, and other factors that can contribute to unsafe conditions when work should be shut down. These observations, in conjunction with the previous forecast, are used to evaluate whether or not it is safe to continue to work at the present location and locations where other work is planned for the day.

Finally, once the field day is over, review the online data sources for the day, and compare the previous predictions to field observations and to the data actually recorded over the course of the day. In this way, the differences between predicted conditions and what actually occurs, can be used to refine safe work thresholds and can help determine which stations are most representative of conditions in the work area.

Yours truly,
Statlu Environmental Consulting Ltd.

Prepared by:
Drew Brayshaw, Ph.D., P. Geo.
Senior Hydrologist and Geoscientist

Reviewed by:
Eryne Croquet, M. Sc., P. Ag., P. Geo.
Agrologist and Geoscientist